SACRAMENTO GROUNDWATER AUTHORITY

WATER ACCOUNTING FRAMEWORK
PHASE II EFFORT

April 10, 2007

Section 1: Adopting Resolution

A RESOLUTION OF THE SACRAMENTO GROUNDWATER AUTHORITY APPROVING AND IMPLEMENTING THE WATER ACCOUNTING FRAMEWORK

[Original Resolution filed with SGA]

Section 2: Framework Overview

The Water Accounting Framework (Framework) is a set of policies and procedures intended to encourage conjunctive use operations within the Sacramento Groundwater Authority (SGA) area to insure the underlying groundwater basin's long-term sustainability. Based on activities over the past decade and extensive discussions with stakeholders, SGA has concluded that the most effective initial step to meet the Framework's intent is to establish a program that recognizes investments by SGA member agencies in conjunctive use operations and supports groundwater banking programs.

The Framework would support banking programs by setting forth rules for operating a groundwater bank (for example, confirming deposits and withdrawals) and monitoring the basin to ensure its sustainability as the program is implemented. This Framework does not limit the ability of participants to extract groundwater to meet their water supply needs within the SGA area.

Introduction

The purposes of this section include: (1) to provide relevant background information on events or activities since the inception of SGA that have influenced development of the Framework proposal; (2) to establish objectives of the Framework; and (3) to provide a depiction of the Framework elements. The intent and policy recommendations of the six primary elements of the Framework are described in following sections of this document. For a definition of terms as used in this document, see Appendix A.

Background

In April 2000, representatives from a diverse group of 40 stakeholder organizations executed the historic Water Forum Agreement (WFA). A centerpiece of the WFA was a regional program to manage and conjunctively use groundwater and surface water to help meet water supply needs through the year 2030, while reducing diversions from the Lower American River during environmentally sensitive periods. To help insure implementation of this regional conjunctive use program and to achieve some measure of equity among those agencies responsible for it, the SGA was charged with developing a Framework.

Beginning in 1998, a progression of events led to the current effort to establish the Framework. The American River Basin Cooperating Agencies (ARBCA) developed the initial concept that a Framework was necessary to support regional conjunctive use, while distributing the costs of the program equitably among basin stakeholders. ARBCA recommended that the task of developing the Framework be given to the SGA (described further below) as it is the agency responsible for implementing the regional groundwater management program. SGA has conducted two key pilot studies to investigate the feasibility of implementing the Framework. While initial efforts and pilot studies helped the region better understand conjunctive use, conditions in the region have changed substantially enough over the past few years so as to result in a Framework concept that takes advantage of opportunities being exercised by local participants, as opposed to the originally envisioned regulatory-oriented approach to manage the basin.

Sacramento Groundwater Authority

The SGA is a joint powers authority formed in 1998 to manage the Sacramento region's groundwater basin north of the American River. Formed as a result of the Water Forum, SGA is recognized as an essential part of implementing the groundwater management element of the WFA.

The SGA draws its authority from a joint powers agreement (JPA) signed by the cities of Citrus Heights, Folsom and Sacramento and the County of Sacramento to exercise their common police powers to manage the underlying groundwater basin. Among other purposes, the JPA cites the following purposes for establishing SGA:

- To maintain the long-term sustainable yield of the North Area Basin.
- To manage the use of groundwater in the North Area Basin and facilitate implementation of an appropriate conjunctive use program by water purveyors.

Since its inception, SGA has completed or initiated many elements that are foundational to meeting these purposes. These include:

- Creation of a Data Management System to compile important water supply and water quality data to assess and manage the basin.
- Development and adoption of a state-compliant Groundwater Management Plan (GMP) to identify specific actions and management objectives for properly managing the basin.
- Completion of two pilot projects to prove up the legal, institutional, and physical elements of banking and exchange agreements.
- Installation of dedicated monitoring wells and identification of additional existing monitoring wells to assess the basin as expanded conjunctive use operations are carried out.
- Update of an Integrated Groundwater and Surface Water Model (IGSM) application for the SGA area to simulate the impacts of existing or proposed conjunctive use operations at future dates in the basin (model completion expected in mid-2007).
- Completion of a biennial Basin Management Report to assess the current health of the basin, to report on management activities, and to recommend future management actions in the basin.

A remaining critical element needed to allow SGA to meets its purposes is the development of a Framework for the region's purveyors to implement an appropriate conjunctive use program. Given SGA's management responsibilities, the Framework should first and foremost be protective of the long-term health of the groundwater basin. However, there is considerable opportunity for the Framework to establish a program that recognizes investments by SGA member agencies in conjunctive use operations and supports groundwater banking programs, while emphasizing and protecting individual agency decision-making autonomy within the construct of the WFA.

SGA Pilot Studies

SGA facilitated two banking and exchange pilot studies that serve as the basis for much of the current proposed Framework – the first in 1999/2000 with the Sacramento Area Flood Control Agency (SAFCA) and the U.S. Bureau of Reclamation, and the second in 2002/2003 with the CALFED Bay-Delta Program Environmental Water Account (EWA). Both studies employed simplified mechanisms to track and account for:

- Groundwater banking and extraction and changes in groundwater storage.
- Estimated basin losses.
- Surface water forbearance.

Together, these pilot studies allowed SGA and its participating members to exercise the groundwater storage potential of the North Area Basin and investigate the mechanics of a banking program. Specifically, the EWA Pilot Study helped determine the initial policy decisions necessary to begin development of a Framework. The pilot studies also established a precedent for regional banking with state and federal agencies which, through their participation, recognized the validity of the water supply made available and accounted for through this mechanism. The pilot studies also stressed the need for a monitoring program to confirm that there were no unmitigated impacts resulting from the program.

At the conclusion of the Pilot Studies, a draft Proposed Water Accounting Framework was completed in June 2003. That proposal provided detailed analysis of how banking agreements could be facilitated. However, there was a great deal of complexity involved in the June 2003 effort that should only be required under more dire circumstances. As discussed further below, conditions in the basin appear to have already improved over the past several years and the required monitoring and management tools are in place to allow SGA to move toward a Framework that emphasizes opportunities with assurances of protection of the basin through monitoring.

Changed Conditions

Physical conditions and purveyor operations have changed over the past few years allowing Framework development to move forward using a different approach than was previously contemplated. These changes include:

(1) Conjunctive use is currently being implemented on a scale that has resulted in reduced groundwater extractions from the basin and some recovery of groundwater elevations;

(2) The threat of groundwater contamination and plume migration is more significant than previously thought; and

(3) SGA completed or initiated several foundational basin management initiatives including development of the GMP, a regional monitoring well network, updating a regional groundwater model, and completion of a Basin Management Report (BMR) that assesses basin conditions.

Each of these is discussed further below.

Conjunctive Use Being Implemented

When the WFA was executed in 2000, there was a widely-held belief that groundwater extractions from the basin would be near the WFA estimated long-term annual average sustainable yield of 131,000 acre-feet within about 10 years. However, this has not been the case; groundwater extractions have actually trended downward over the past few years. Gross basin pumping is currently below 100,000 acre-feet. Basin extractions are projected to remain lower than anticipated through at least 2010 (see **Figure 1**). While some of the reduced demand for groundwater can be attributed to wetter than normal hydrologic conditions over the past decade, much of these improved conditions can be explained by expanded conjunctive use facilities and operations (namely the importation of more surface water supplies) in the basin.

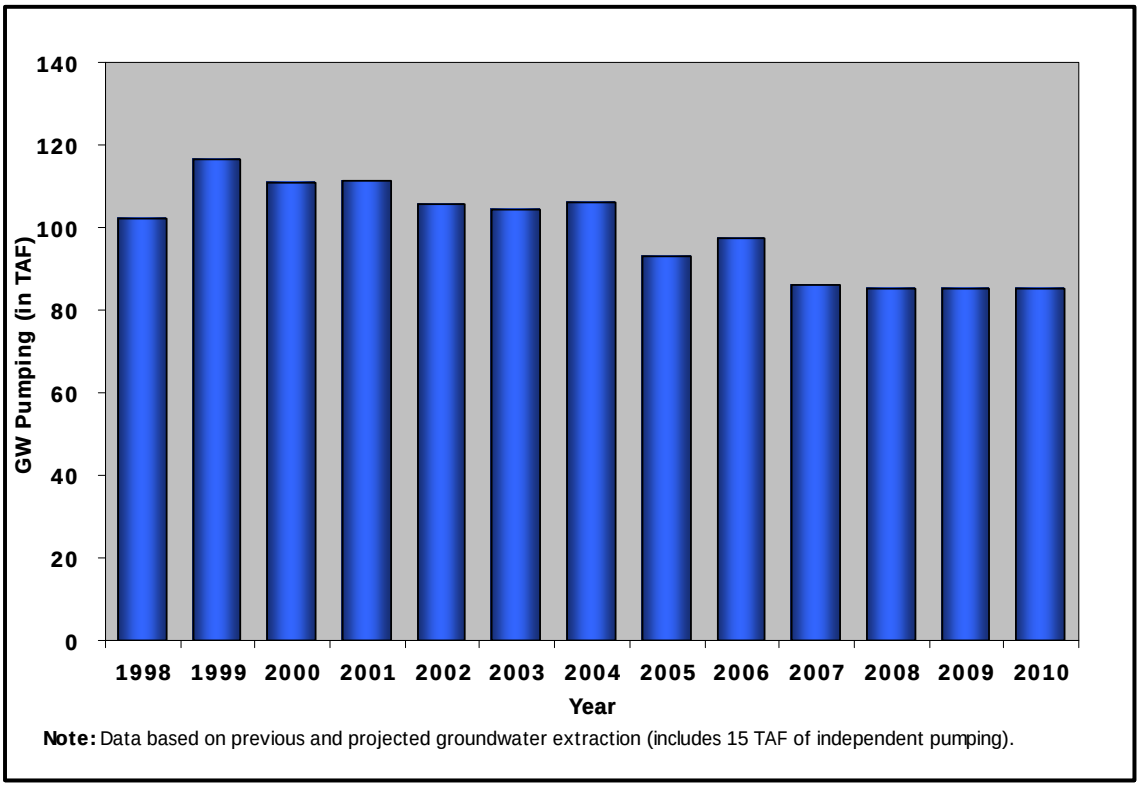

Figure 1. Annual Groundwater Pumping in North Area Basin

For example, Sacramento Suburban Water District initiated a groundwater stabilization project by completing a pipeline to take delivery of Placer County Water Agency surface water, entering into an agreement with San Juan Water District to divert this water supply from Folsom Reservoir and treat it at San Juan's water treatment plant, and take other actions necessary for delivery of this surface water supply to the Sacramento Suburban service area in the mid-1990s. Historic reliance on groundwater had resulted in a large cone of depression in the central portion of the basin, with groundwater elevations that declined over several decades at a rate of about 1.5 ft/yr. With the Sacramento Suburban conjunctive use program implemented in the mid 1990's, water levels have stabilized and in some areas groundwater elevations have recovered at a rate of about 0.5 ft/yr over the last several years. Sacramento Suburban has also recently completed facilities needed to implement a conjunctive use program in its southern service area.

Groundwater Contamination More Threatening
Groundwater contamination has impacted water purveyors over the last decade. Contaminant plumes associated with the Aerojet facility near Rancho Cordova are confirmed to have migrated north of the American River into Fair Oaks and Carmichael, threatening groundwater production wells within SGA's boundaries. The contamination threat emphasizes the need for expanded conjunctive use facilities and operations to maximize flexibility to respond to this problem. Because of this threat, monitoring activities and possibly the use of modeling tools will be integrated into the Framework.

Basin Monitoring and Management Program in Place
When the WFA was executed in 2000, few mechanisms for ensuring groundwater basin sustainability existed. For example, the primary groundwater control mechanism was to establish an agreed upon average annual sustainable yield for the basin at 131,000 acre-feet as part of the WFA. The other key recommendation of the WFA was to have the SGA serve as the groundwater management entity for the Sacramento County portion of the basin north of the American River, while other management options were developed in the central and south basins. Since its inception, SGA has worked with its member agencies to develop several tools including a data management system, a regional monitoring well network, a GMP, and a BMR. Additionally, an update of the regional groundwater model is currently underway. Together, these tools can be used to evaluate the health of the basin from a variety of perspectives (e.g., groundwater elevations, groundwater quality, subsidence, etc.). Based on the most recent BMR completed in May, 2006, the management practices undertaken by member agencies--on the whole--are producing positive results in the groundwater basin. Because these programs are in now in place, the proposed Framework focuses more on monitoring parameters to assess basin sustainability rather than on a single, gross "sustainable yield" ceiling for the basin.

Objectives of the Water Accounting Framework

For purposes of initiating development of the Framework, four objectives were identified as follows:

1. Ensure a safe and sustainable water supply for the greater Sacramento region.
2. Encourage water purveyors to "bank" water in the basin, when available, for use during dry periods.
3. Establish a framework that supports groundwater banking programs by setting forth rules for operating a model groundwater bank, and monitoring the basin to ensure its sustainability as the program is implemented.
4. Refine and enumerate SGA's role in implementing the objectives of the Framework.

Additional objectives will be added as necessary as the Framework is implemented and experience with a groundwater banking program is obtained.

Elements of the Water Accounting Framework

The Framework can be depicted as a pyramid (see **Figure 2**) with a foundation of needed tools supported primarily by SGA via its existing groundwater management program, supporting a robust groundwater banking program, topped by an overarching objective of ensuring a safe and sustainable water supply for the region. The diagram is intended to assist in visualizing the various elements that comprise the Framework. The diagram is not intended to depict a strict hierarchal structure, rather the interaction of several discrete yet related activities. Each of these elements is discussed in detail in subsequent sections of this document.

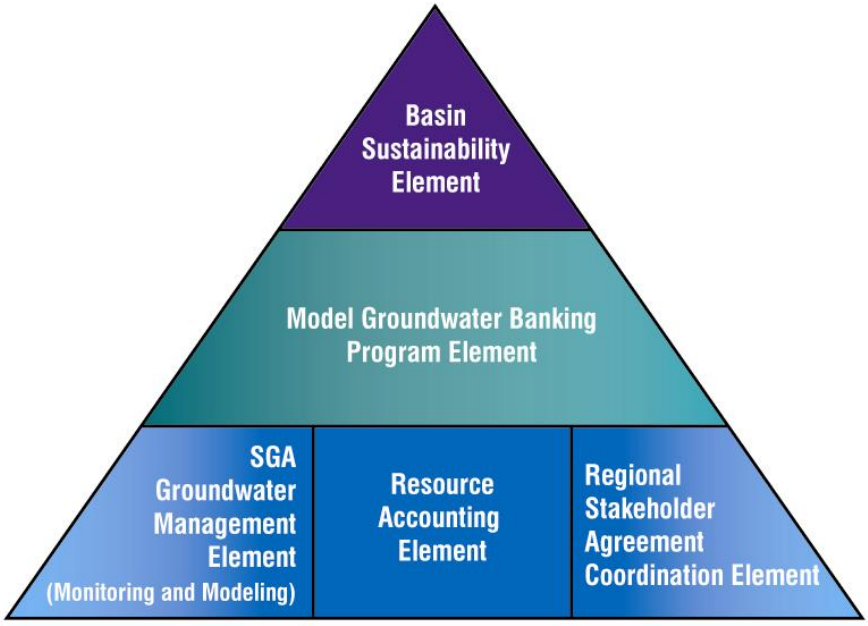

Figure 2-- Proposed Framework Elements

Section 3: Groundwater Management Element

The intent of the Groundwater Management Element is to document the many monitoring and management tools developed over several years that are already in place to ensure basin sustainability and that will support Framework participants should they choose to develop and implement a groundwater banking program.

The Groundwater Management Element includes the tools that SGA already uses to ensure the sustainability of the groundwater basin. Most of these tools were developed after member agencies participated in the banking and exchange pilot studies in 1999/2000 and 2002, so they are directly supportive of implementing the Framework.

The tools currently available that could serve in implementing the Groundwater Management Element are described below:

- **Groundwater Management Plan (GMP) –** To meet SGA's goal of maintaining a sustainable, high-quality groundwater resource for the users of the groundwater basin underlying Sacramento County north of the American River consistent with the objectives of the WFA, a GMP was adopted in 2003. The GMP serves as the initial framework for coordinating the many independent management activities into a cohesive set of management objectives and related actions necessary to meet those objectives. The GMP prescribes a set of Basin Management Objectives (BMO) that SGA and its members agreed to adhere to. The BMOs will serve as a basis for evaluating proposed banking and exchange agreements, and include:

    1. *Maintain or improve groundwater quality in the SGA area for the benefit of basin groundwater users.*
    2. *Maintain groundwater elevations that result in a net benefit to basin groundwater users.*
    3. *Protect against any potential inelastic land surface subsidence.*
    4. *Protect against adverse impacts to surface water flows in the American River and Sacramento River.*
    5. *Protect against adverse impacts to water quality resulting from interaction between groundwater in the basin and surface water flows in the American River and Sacramento River.*

- **Data Management System (DMS) –** SGA maintains a DMS that provides ready access to data in either tabular or graphical formats. Data in the DMS include: well construction details; known locations of groundwater contamination and potentially contaminating activities; long-term monitoring data on groundwater extraction, elevations, and quality; and aquifer characteristics based on well completion reports.
- **Regional Monitoring Well Network –** SGA utilizes over 260 public supply wells operated by its member agencies to observe trends in groundwater elevations and water

quality. Additionally, eight dedicated monitoring wells were installed in the basin in 2005 by SGA that can be used under this Framework.

- **Regional Groundwater Model Update –** SGA is currently updating a regional groundwater model to simulate potential regional benefits and impacts of individual or cumulative banking and exchange agreements over multiple years. The update will be completed in early 2007.
- **Basin Management Report –** The Basin Management Report is intended to report, on a biennial basis, hydrologic conditions and SGA management activities. The report also documents the ongoing implementation of the GMP and recommends future implementation activities.

Policy Recommendations

- SGA will continue to maintain its groundwater management tools in support of the Framework's Groundwater Management Element.
- SGA staff will be available at the request of Framework participants to identify groundwater management tools available for specific proposed groundwater banking projects.

Section 4: Resource Accounting Element

The intent of the Resource Accounting Element is to establish that SGA will have the responsibility of maintaining a record of groundwater deposits and withdrawals of each agency should they choose to implement a groundwater banking program. SGA will account for and provide a running tally of SGA member agency groundwater banking program activities. This tally will include tracking credits or debits from the banking program, and accounting for losses or dissipation of credits over time. Dissipation rate estimates are currently being studied separately by SGA and are not a part of this Element.

Tracking or accounting of SGA member agencies' activities as they relate to groundwater banking activities is essential for the Framework's success. The Resource Accounting Element will provide a transparent and defensible means of tracking credits and debits for participants in the groundwater banking program.

Policy Recommendations

- Upon adoption of the Framework, SGA will develop and maintain a spreadsheet tool to maintain an ongoing record of banking activities.
- The accounting spreadsheet will be a public document, and shall be made readily accessible upon request.
- At a minimum, banking program participants will report for inclusion into the accounting spreadsheet once annually.
- Banking program participants may report data more frequently at their discretion.

Section 5: Regional Stakeholder Coordination Element

The intent of this element is to communicate with stakeholders of potential banking program agreements. Most notable is the need to coordinate with Water Forum Successor Effort (WFSE) staff, as conjunctive use operations are a critical component of successfully implementing the WFA. SGA intends to routinely coordinate with the WFSE staff initially during development, and later during implementation of the Framework. Also, SGA will work with additional stakeholders identified by banking program participants as essential to successful implementation of proposed projects (for example, the Sacramento County Planning Department).

Policy Recommendations

- Upon adoption of the Framework, SGA will schedule briefings to describe the overall Framework, its objectives and its relationship to the WFA to WFSE staff or other stakeholder groups as identified by banking and exchange participants.
- An annual statement of banked and exchanged groundwater from within the North Area Basin will be provided to WFSE staff and other stakeholder groups as identified by banking and exchange participants.
- SGA staff will be available, when requested by project participants, to coordinate with identified stakeholder groups to assist in describing a proposed project and its consistency with relevant local policies or regulations.

Section 6: Model Groundwater Banking Program Element

The intent of the Model Groundwater Banking Program (MGBP) Element is to develop a consistent template for use by SGA member agencies should they choose to implement a groundwater banking program. A groundwater banking program will encourage conjunctive use and acknowledge individual agencies' investments in groundwater banking activities by setting forth rules for operating a groundwater bank, including confirming deposits and withdrawals. It is envisioned that the MGBP would suggest the mechanisms under which accumulated banking credits could be transferred or sold to other agencies for use consistent with the WFA, the GMP, or other relevant policies or regulations.

For purposes of the Framework, a banking program is intended to reward and create incentives for agencies expanding their conjunctive use practices brought about by intentional investments or implementation of specific projects or programs. In order for the Framework to properly reward an agency for an investment in conjunctive use infrastructure while ensuring sustainability of the basin, the MGBP would establish criteria and procedures that should be met for an agency to receive banking credits.

Similar to other established groundwater banking programs throughout the state, and as observed in the EWA pilot study technical work, the MGBP will likely need to include a loss or dissipation factor as a percentage of banking operations. These factors will be determined after adoption of the Framework. SGA would review operating rules for other groundwater banks to assist in developing the MGBP.

Policy Recommendations

- Upon adoption of the Framework, the Board directs SGA staff to develop a model groundwater banking program that will establish criteria for operating a groundwater bank, including confirming deposits and withdrawals, and setting loss or dissipation factors. The model groundwater bank will consider how other banks operate within the state, but will also consider local conditions and needs during its development.
- SGA staff will bring the proposed Model Groundwater Bank back to the Board for the consideration of adoption by the end of December, 2007.

Section 7: Basin Sustainability Element

The intent of the Basin Sustainability Element is to define a process by which monitoring parameters will be used to ensure basin sustainability. While the simplest measure of basin sustainability involves maintaining average annual groundwater extraction below the 131,000 acre-feet/year as agreed upon in the WFA, it is also important to consider sub-regional groundwater use. Certain locations of the North Area Basin are more susceptible to negative impacts when pumped than others. Because of this, extra precautions are needed, such as the establishment of monitoring and response criteria in sensitive locations to ensure that future groundwater production does not adversely impact groundwater basin elevations, groundwater gradients, or groundwater quality. Between the existing SGA monitoring and the member agencies programs, much of the required monitoring is already in place.

Sustainability of the North Area Basin is a primary mission of the SGA. In creating a sustainability element for the Framework, it is important to consider the Groundwater Management Element of the WFA and the SGA JPA as discussed further below.

Groundwater Management Element of the Water Forum Agreement

The Water Forum Agreement contains seven major elements, one of which being the Groundwater Management Element. The intent of the element states:

> *"Our vital groundwater resource supplies over half the water used in the region. The purpose of a groundwater management plan is to protect the viability of that resource for both current and future users. To do so requires monitoring the amount of water withdrawn from the groundwater basin and promoting the use of groundwater in conjunction with surface water supplies to maximize the availability of both. This must be accomplished by creating publicly accountable governance structures which respect the rights of all groundwater users. Ideally, these structures should be established using existing authority and institutions."*

Among other requirements of sustainable yield, the preservation of groundwater rights, and the establishment of a governance structure, the Water Forum Agreement's Groundwater Management Element also states the various activities that SGA should undertake. Among the activities are to:

- *Collect and monitor data on annual pumping amounts;*
- *Monitor the migration of toxic plumes;*
- *Facilitate collaboration among purveyors to identify the area's needs and develop a plan to meet those needs.*

SGA Joint Powers Agreement

SGA was formed on the basis of the Water Forum Agreement's Groundwater Management Element. Many of the recommendations from the Water Forum were included explicitly into the

SGA JPA. The powers and functions given to SGA that specifically deal with groundwater management included:

- *Collect and monitor data on the extraction of groundwater from, and the quality of groundwater in, the North Area Basin;*
- *To require permitting of groundwater extractions facilities within the boundaries of the Authority, to maintain a record of extraction with respect to any such facilities, and to require the installation of meters on groundwater extraction facilities for the purpose of determining the amount of groundwater being extracted from the North Area Basin.*
- *To carry on technical and other investigations of all kinds necessary to further the purposes of the Authority.*

Additionally, the JPA cites the following purposes for the Authority:

- To maintain the long-term sustainable yield of the North Area Basin.
- To manage the use of groundwater in the North Area Basin and facilitate implementation of an appropriate conjunctive use program by water purveyors.

Policy Recommendations

- Upon adoption of the Framework, SGA should investigate establishing monitoring criteria for parameters and objectives identified in the adopted SGA GMP. These include groundwater quality, groundwater elevations, land surface subsidence, and groundwater/surface water interactions. Criteria for these parameters are not currently quantified. Any proposed quantifications of parameter criteria would be subject to approval by the SGA Board.
- Monitoring parameter criteria will, at a minimum, be evaluated during preparation of the SGA Basin Management Report or more frequently as individual data items become available. If SGA staff review determines areas of concern, the issues will be presented for consideration by the SGA Board.

Basin (or North Area Basin) – the groundwater basin underlying the SGA management area, which includes Sacramento County north of the American River.

Conjunctive Use – maximizing operational capacity to utilize either surface water or groundwater as a supply. Surface water is used preferentially during wet periods, while groundwater is used preferentially in dry periods.

Groundwater Banking Program –the initial storage and subsequent extraction of groundwater within the SGA management area. Criteria for crediting or debiting groundwater under the program will be established by development of the Model Groundwater Banking Program Element.

Sustainability – the planned use of a resource in a manner such that the resource is not depleted or damaged through time.

Sustainable Yield – the amount of water that can be pumped from a basin on a long-term average annual basis such that the groundwater is not unacceptably depleted or damaged. The amount of acceptability for depletion or damage is determined based upon local management decisions.