AGENDA
Borrego Valley Groundwater Basin: Borrego Springs Subbasin
Sustainable Groundwater Management Act (SGMA)
Advisory Committee (AC)
August 30, 2018 @ 10:00 AM – 12:00 PM
Location: UCI Steele Burnand Research Center: 401 Tilting T, Borrego Springs CA 92004

Remote Access: https://csus.zoom.us/j/170291701 **Call-In:** +1 669 900 6833 **Meeting ID:** 170 291 701

I. OPENING PROCEDURES [10:00 am – 10:30 am]
- **A.** Call to Order
- **B.** Pledge of Allegiance
- **C.** Roll Call of Attendees
- **D.** Review of Meeting Agenda
- **E.** Approval of July 26, 2018 AC Meeting Minutes
- **F.** Updates from the Core Team
- **G.** Updates from Advisory Committee Members
- **H.** As Needed Opportunity to Clarify Technical/Informational Material presented at July 26, 2018 Meeting

II. TECHNICAL AND POLICY ISSUES FOR DISCUSSION OR INTRODUCTION [10:30 am – 10:45 am]
- **A.** Baseline Pumping Allocations & Reductions – *Core Team*

III. INFORMATIONAL ITEMS [10:45 am – 11:45 am]
- **A.** Socioeconomic Efforts: Proposition 1 Grant Tasks Updates – *Consultants*
  - a. Tasks 2 and 3 Draft Report – *Jay Jones, Environmental Navigation Services, Inc. (ENSI)*
  - b. Community Engagement Efforts Update – *LeSar Development Consultants*
  - c. New Well Site Feasibility Study – *Core Team*
- **B.** California Environmental Quality Act (CEQA) Process Overview – *Core Team*

IV. CLOSING PROCEDURES [11:45 am – 12:00 pm]
- **A.** Correspondence
- **B.** General Public Comments (comments may be limited to 3 minutes)
- **C.** Review Action Items from Previous AC Meetings, Next AC Meeting Date(s), and Next Steps

The next regular meeting of the Advisory Committee is tentatively scheduled for **September 27, 2018** or **October 4, 2018**, at the UCI Steele/ Burnand Anza-Borrego Desert Research Center (*subject to change).

Please be advised that times associated with agenda are approximations only. Public comment periods will be accommodated at the end of each item listed for discussion and possible action. The duration of each comment period will be at the discretion of the meeting Facilitator. Any public record provided to the A/C less than 72 hours prior to the meeting, regarding any item on the open session portion of this agenda, is available for public inspection during normal business hours at the Office of the Borrego Water District, located at 806 Palm Canyon Drive, Borrego Springs CA 92004.

The Borrego Springs Water District complies with the Americans with Disabilities Act. Persons with special needs should call Geoff Poole at 760-767-5806 at least 48 hours in advance of the start of this meeting, in order to enable the District to make reasonable arrangements to ensure accessibility. Borrego SGMA Website: http://www.sandiegocounty.gov/content/sdc/pds/SGMA/borrego-valley.html

MINUTES
Borrego Valley Groundwater Basin: Borrego Springs Subbasin
Sustainable Groundwater Management Act (SGMA)
Advisory Committee (AC)
July 26, 2018 @ 10:00 AM – 3:00 PM
Location: Borrego Springs Resort / 1112 Tilting T Drive, Borrego Springs, CA 92004

I. OPENING PROCEDURES

A. Call to Order

The meeting was called to order at 10:00 a.m. by Borrego Water District (BWD) President Beth Hart.

B. Pledge of Allegiance

Those present stood for the Pledge of Allegiance.

C. Roll Call of Attendees

Committee members:	Present:	Jim Seley, Jim Wilson, Rebecca Falk, Dave Duncan, Bill Berkley, Gina Moran, Diane Johnson, Jack McGrory
Core Team members:	Beth Hart, BWD Geoff Poole, BWD Lyle Brecht, BWD	Jim Bennett, County of San Diego Leanne Crow, County of San Diego
Staff/Consultants:	Meagan Wylie, Center for Collaborative Policy Mason Einbund, County of San Diego	Wendy Quinn, Recording Secretary Rachel Ralston, LeSar Trey Driscoll, Dudek, GSP Consultant
Public:	Michael Sadler, *Borrego Sun* Cathy Milkey, Rams Hill Martha Deichler Jackie Larsen	Linda Haneline Bill Haneline Mike Seley, Seley Ranch

D. Review of Meeting Agenda

Meagan Wylie reviewed the meeting ground rules and Agenda. The presentations will be available on the County of San Diego SGMA website in a few days.

E. Approval of May 31, 2018 AC Meeting Minutes

Upon motion by Member Seley, seconded by Member Duncan and unanimously carried, the Minutes of the May 31, 2018 AC Meeting were approved as amended (add to Item I.F.d, "*(SGMA) provides expansive powers to the Groundwater Sustainability Agency (GSA) that are codified in the California Water Code sections in Division 6, Part 2.74. In general, SGMA provides that a GSA may adopt rules, regulations, ordinances, resolutions, may conduct investigations, require registration of groundwater extraction facilities, or otherwise manage and control polluted water (Water Code §§ 10725.2.(b), 10725.4.(a)(b)(c)), 10725.6. 10726.2.(e).) The local agency may conduct an inspection pursuant to this section upon obtaining any necessary consent or obtaining an inspection warrant pursuant to the procedure set forth in Title 13 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure. (Water Code § 10725.4.(a)(b)(c).) *Please be aware that Mr. Driscoll is not an attorney and is not providing legal interpretation of SGMA when responding to questions at the AC meetings;"* change Item III.A in part to read*, "A GDE is a plant and animal community that requires groundwater to meet some or all water needs (TNC 2018). GDEs are defined under the Sustainable Groundwater Management Act (SGMA) as 'ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface' (23 CCR § 351.(m)). GDEs encompass a wide range of natural communities, such as seeps and springs, wetlands and lakes, terrestrial vegetation and, rivers, streams and estuaries* ~~GDEs are plants that require groundwater~~.")

F. Updates from the Core Team

a. Grant Activities related to Proposition 1 Funding

Geoff Poole reported on the status of activities related to the $1 million grant awarded to the County of San Diego (County) and BWD by the State under Proposition 1 for GSP related activities. The Core Team is awaiting receipt of detailed documents.

b. Water Supply and Water Quality Act of 2018 with $35M Line Item for Borrego

Mr. Poole reported that the Water Supply and Water Quality Act of 2018, with a $35 million line item for Borrego Springs, will be Proposition 3 on the November ballot. The bond writers are seeking donations to cover marketing costs.

c. Other

None

G. Updates from Advisory Committee Members

Member Duncan reported he was continuing to meet with ratepayers, and had a meeting lon Monday, July 23rd. There is continuing concern about potential costs to the ratepayers related to future GSP implementation measures, particularly in view of a recent estimate of water use savings projected be nearer to 75 percent reduction from current pumping levels, than the previously provided estimate of 70 percent reduction.

Member Seley introduced a written statement regarding the proposed Baseline Pumping Allocations (BPAs), discussion of which was tabled until that respective agenda item later in the meeting.

H. Review of GSP Development Progress Over Last Year (Including Updated Groundwater Sustainability Plan (GSP) Schedule and California Environmental Quality Act (CEQA) Process as it Applies to SGMA and GSP Implementation)

Trey Driscoll reported that completion of the internal draft of the GSP is progressing on schedule. Components of the draft Plan are under careful review by the Core Team and subject to internal revision. Following completion of the draft GSP, there will be a 45-day public review period, followed by GSA development of responses to public comments, preparation of the final GSP, adoption of the GSP by BWD and County Board of Supervisors, and subsequent submission to DWR. Thereafter, GSP implementation will begin. As a critically overdrafted subbasin, Borrego Springs needs to achieve groundwater sustainability by 2040. Progress reports to DWR on reaching sustainability goals will be submitted every five years. To date, there have been 12 AC meetings and one socioeconomic workshop that have supported the gathering of input to aid in the development of the planning and policy recommendations contained in the GSP. The proposed 45-day public review period may be extended to 60 days upon the request of several AC members. At upcoming AC meetings, discussions will focus on particular components of the GSP, including financing, projects and management actions, and implementation.

Mr. Driscoll explained that the GSP includes five chapters: Introduction, Plan Area and Basin Setting, Sustainability Management Criteria, Projects and Management Actions, and Plan Implementation. He outlined the contents of each. Plan Area and Basin Setting includes technical and research data, management areas, groundwater conditions, the hydrogeologic model and the water budget. The Sustainability Management Criteria set forth the undesirable results, such as chronic lowering of groundwater levels, reduction of groundwater storage and declining water quality. There will also be an ongoing review of Groundwater Dependent Ecosystems (GDEs). The proposed reduction in water use over 20 years is approximately 74 percent, to reach an estimated sustainable yield of 5,700 acre-feet per year. Mr. Driscoll showed slides depicting wells used to measure production, water quality and groundwater elevation. The Projects and Management Actions include the water conservation and efficiency program, modifications to land use designation, agricultural fallowing and the water quality mitigation program. The Plan Implementation phase addresses the reporting requirements every five years, and cost factors.

Member Falk inquired about the use of Borrego's line item funds should Proposition 3 pass. Member Falk was concerned about fallowing mitigation and bioremediation, and Director Brecht explained that that would be addressed during the California Environmental Quality Act (CEQA) process applied to implementation of applicable projects and management actions. Mr. Driscoll explained that there is passive restoration and active restoration of fallowed lands, which is expensive, and recommendations on fallowing will be presented to the GSA in the future. Member Seley recommended taking tamarisk groves into consideration.

Member Johnson suggested adding a management action addressing governance after adoption of the GSP. Ms. Wylie clarified that governance does not qualify as a management action, and so would not be addressed under that particular chapter in the GSP. However, the Core Team recognizes the necessity of ongoing governance, and the topic will be discussed more in the future.

Member Moran asked what GSP implementation costs may include, and how the CEQA process is connected. Mr. Driscoll explained there are required costs for GSP implementation such as administration, fallowing, and various projects, but the requirements are not too detailed within the GSP. Mr. Bennett noted that the GSP development phase is exempt from CEQA, but GSP implementation is not. Upon adoption of the GSP, the CEQA process should begin as soon as possible. Ms. Wylie proposed an overview presentation on CEQA and Environmental Impact Reports (EIR) processes at the next AC meeting.

The Committee broke for lunch at 12:05 p.m. and reconvened at 12:40 p.m.

II. TECHNICAL AND POLICY ISSUES FOR DISCUSSION OR INTRODUCTION

A. Baseline Pumping Allocation Update

Mr. Driscoll presented presented baseline pumping allocations (BPAs) developed for 2010-2015, first by metered data and second by using evapotranspiration estimates for specific crops. The data included 31 farms, six golf courses, four other non-de minimis users, and BWD. The estimated total pumping is approximately 22,044 acre-feet per year. Agriculture accounts for 64.6 percent, plus 7.3 percent for water credits (71.9 percent total). Municipal is 11 percent, golf 16.8 percent, and additional users 3 percent. There are 52 active de minimis users (less than two acre-feet per year) in the subbasin.

Member Seley reported that the agricultural community has been working with a hydrologist and would like him to conduct an independent review of Mr. Driscoll's calculations. He was concerned that the average readings from the California Irrigation Management Information System (CIMIS) were used, rather than the highest annual reading, yielding a 12 percent difference in BPA calculations. He also questioned why the estimated water use reduction level had changed from 70 percent to 74 percent, particularly in view of a previous United States Geological Survey (USGS) estimate of 40 to 50 percent. Member Wilson asked whether the approximately 1,000 buildable vacant lots had been considered. Mr. Driscoll explained that the BPAs are based on highest water use during 2010-2015. Existing water credits can be used for future development. Member McGrory pointed out that the farmers could dispute the initial BPA proposals by pumper. Mr. Bennett reported that he had recently received a letter on the subject from an attorney for the Agricultural Alliance for Water and Resource Education (AAWARE), and would e-mail it to the AC and include it in the next Agenda Package.

Member Berkley asked whether agricultural salt flushing was taken into consideration in the BPA calculation, and Mr. Driscoll replied that it was. However, golf course salt flushing was not. Member Berkley believed that it should be. Mr. Driscoll explained that it depends on the specific type of grass, and invited Member Berkley to submit specific information.

Cathy Milkey of Rams Hill inquired about an eventual stipulated judgment. Director Brecht explained that a court validation of the GSP is anticipated. The question of a stipulated judgment is up to the attorneys. Ms. Milkey suggested obtaining a legal opinion.

III. INFORMATIONAL ITEMS

A. Groundwater Monitoring Network Spring 2018 Results

Mr. Driscoll reported that 30 wells were included in the groundwater monitoring network, six in the North Management Area, nine in the Central and fifteen in the South. Groundwater was tested for arsenic, fluoride, nitrate, sulfate and total dissolved solids (TDS). In the South Management Area there were some wells screened in the lower aquifer with elevated arsenic and nitrate. One well in the North Management Area and one in the South (near the wastewater treatment plant) showed elevated TDS.

The groundwater elevation monitoring included 46 wells. Mr. Driscoll showed charts summarizing the detailed analysis. Elevations are declining by about two feet per year. The groundwater monitoring network is being continually refined. Member McGrory inquired about surface water monitoring in Coyote Canyon. Mr. Driscoll replied that some stream flow measurements were taken last spring and will be done semiannually.

B. Socioeconomic Efforts: Proposition 1 Grant Tasks Updates

Mr. Poole reported that BWD had been working with LeSar Development Consultants on a Proposition 1 funded project on potential socioeconomic impacts of GSP implementation. Members Falk, Johnson and Duncan have been assisting, along with Martha Deichler, Suzanne Lawrence and Mike Seley (the ad hoc committee). Rachel Ralston of LeSar reported that since the March 5, 2018 community meeting, she has been working with the ad hoc committee on the Severely Disadvantaged Community (SDAC) engagement process. Additional community meetings are tentatively planned for September 19 and 20 (one in English and one in Spanish). Ms. Ralston invited the Committee's attention to material in the Agenda Package, including a SGMA/GSP informational power point presentation, a door-to-door GSP education and feedback tool, a brochure, a flyer, and frequently asked questions. Information will be available on the BWD website and the Borrego Springs 92004 Facebook page, and a new Facebook page is being created.

Ms. Ralston went on to explain the community characteristics report, which will help with Dr. Jay Jones' socioeconomic modelling efforts. Surveys were distributed to BWD ratepayers and businesses, and efforts are continuing to gather more responses from the Hispanic community. With an 11.6 percent response from the ratepayers, 57 percent are willing to pay a $25 or less monthly water bill increase, 83 percent are homeowners, 70 percent are retired, and 28 percent volunteer. The average time spent by survey respondents in Borrego Springs each year is nine months. Concerns included those on fixed incomes, equality of regulations among residents, agriculture and golf, and water quality. Most support water conservation.

The next steps in the study will be to compile data and develop specific metrics for the SDAC. Member Johnson suggested asking a community member to review the survey responses from businesses, and Ms. Ralston agreed to discuss it with the ad hoc committee. Member Berkley suggested that Ms. Ralston review Dr. Roger Mann's report, and Mr. Poole agreed to provide a copy. Member McGrory requested a copy also. Member McGrory noted that some farmers were concerned about privacy issues in responding to the survey, and perhaps personal contact would be better; also for La Casa Del Zorro. Mr. Poole agreed to follow up. Ms. Deichler suggested segregating the responses by English and Spanish.

C. Groundwater Dependent Ecosystems

Mr. Driscoll presented slides outlining data from the Department of Fish and Wildlife regarding groundwater dependent ecosystems (GDEs). A map of critical habitats included peninsular big horn sheep and least bells vireos. Impacts to biological resources will be analyzed during the CEQA review. Other mammals, birds, reptiles and amphibians were also identified. The next steps will be to continue to evaluate potential GDEs and communicate with local, State and federal agencies and stakeholders to monitor them.

Member Wilson inquired about the impact on GDEs of the changes in water level between now and 2040. Mr. Driscoll explained that the model will assist in predicting this, but he did not believe the State Park would be damaged. Investigation is continuing. Member Johnson asked about potential impacts in Coyote Canyon. Mr. Driscoll replied that based on available data, he did not believe there was a substantial nexus between pumping in the basin and Coyote Canyon. Member Moran felt adjustments in BPAs should be made for environmental water. Mr. Driscoll suggested that perhaps a percentage of water traded could be allocated to environmental use. Environmental agencies could also buy water rights, or developers could be required to provide water for environmental use.

IV. CLOSING PROCEDURES

A. Correspondence

Ms. Wylie announced that the correspondence was included in the Agenda Package. Member Duncan asked how the County would respond to the June 15 letter from AAWARE's attorney regarding a 2017 agricultural water use survey and report. Mr. Bennett explained that the Core Team is moving toward the GSP public review process, and time for back and forth letter writing is limited.

B. General Public Comments

A question was asked re de mimimis pumpers. When identifying them, is it less than two acre-feet per year per parcel, per home, or per well? Mr. Driscoll explained that he used County well permits and Department of Water Resources well logs to make determinations on a per parcel basis, considering aerial photos and outdoor water use.

Jackie Larsen inquired about restrictions on development, noting Borrego Springs had only one inch of rain last year. Member Moran pointed out that the bypass road in Coyote Canyon washed out last year due to rains in higher elevations.

Member Duncan asked what the GSA's responsibility would be beyond 2040, and Ms. Wylie agreed to include that discussion as a future Agenda item under governance.

Member Seley asked the AC for opinions on his suggestion that members arrange for an independent review of BPA data. Leanne Crow explained that Dudek's consultant contract was set up so that Dudek works with two other contractors who conduct independent reviews. Director Brecht asked Member Seley to put his concerns and proposal in writing to the Core Team.

C. Review Action Items from Previous AC Meetings, Next AC Meeting Date(s), and Next Steps

The next AC meeting was tentatively scheduled for August 30. The next community meetings will tentatively be September 19 and 20. Ms. Wylie asked the AC members to review the draft SDAC material in the Agenda Package and submit comments to her, or Members Johnson and Falk, to then be transmitted to Ms. Ralston. She recommended that the members review the slides from the previous meeting prior to each AC meeting.

There being no further business, the meeting was adjourned at 3:00 p.m.

August 30, 2018

TO: Borrego Advisory Committee

FROM: Jay Jones, Environmental Navigation Services, Inc. (ENSI)

SUBJECT: Item III.A.a: Proposition 1 SDAC Grant Tasks 2 and 3 Draft Report

The introductory presentation by Jay Jones of ENSI will include two parts. The first will provide a summary-level overview explanation of Tasks 2 and 3 being conducted under the Proposition 1 grant and how they relate to other grant components. The second part will be to introduce a methodology that can be used to assess how pumping rate reduction scenarios relate to groundwater overdraft.

The overdraft has a direct impact on BWD operations and potential costs that directly impact the Severely Disadvantaged Community who are dependent on BWD for their water. The methodology builds on prior work and is intended to help examine cumulative overdraft over time going forward under the GSP. It is based on a Basin-wide water balance values derived from the results of the updated USGS Groundwater model.

The water balance values include estimates of groundwater inflow and outflow, time-varying groundwater recharge, irrigation return flows, consumptive use by groundwater-dependent native vegetation, and pumping rates. Statistical variability is introduced into the calculations to support assessment of uncertainty over time as pumping rates are decreased and show the potential range of overdraft that may occur. It is not intended to be a 'final answer' but instead used to better understand how to optimize groundwater management.

August 30, 2018

TO: Borrego Advisory Committee

FROM: LeSar Development Consultants

SUBJECT: Item III.A.b: Proposition 1 SDAC Grant Community Engagement Effort Updates

Update on SDAC Engagement Project

1. Community engagement planning and implementation – April 2018-June 2019

a. The next round of SDAC engagement meetings will take place in September. Dates, times, and location to be confirmed by Aug. 31.

b. Municipal surveys – results update. See below.

Response Rate: 14%

- English responses – 247
- Spanish responses – 54

Water Rates and Dependability

- 51% of respondents indicated they could pay up to $25 more/month for dependable water
    - 10% of respondents indicated they could pay $0 more/month.
    - 70% of respondents earning $36,000/year or less indicated they could pay up to $25 more, 17% of respondents indicated $0 more.
    - English survey
        - 53% of respondents indicated they could pay up to $25 more.
        - 14% indicated up to $50 more.
    - Spanish survey
        - 44% of respondents indicated they could pay up to $25 more.
        - 20% of respondents indicated $0 more.

Income

- 43% of respondents make $36,000/year or less. From the responses received, we can assume that many households in this category are either on a fixed income or working a lower-wage job. (Not all respondents filled out this section.)

Income		
< 36,000	110	43%
$36,001 - $72,000	67	26%
$72,001 - $150,000	50	19%
> $150,000	30	12%
TOTAL	**257**	100%

Income – English Surveys		
< 36,000	67	33%
$36,001 - $72,000	58	28%
$72,001 - $150,000	50	24%
> $150,000	30	15%
TOTAL	**205**	100%

Income – Spanish Surveys		
< 36,000	43	83%
$36,001 - $72,000	9	17%
$72,001 - $150,000	0	0%
> $150,000	0	0%
TOTAL	**52**	100%

Homeownership

- 84% of respondents are homeowners.
  - 95% of English survey respondents are homeowners.
  - 83% of Spanish survey respondents are renters.

- Rate of homeownership by income

<$36,000	61% homeownership
$36,001 – $72,000	95% homeownership
$72,001 – $150,000	98% homeownership
> $150,000	100% homeownership

Employment

- 57% of respondents are retired.
- 20% indicated they were employed in “Other” – responses included: legal, self-employed, State Park, education, construction.
- 5% indicated they were employed in the hotel industry, 5% indicated the golf industry.

Other Results

- 66% of respondents live in Borrego 12 months per year.
  - Respondents live in Borrego an average of 9.4 months per year.
- 29% of respondents indicated they volunteer in Borrego. Common responses: State Park, American Legion, local churches & food bank, Rotary Club.
- Themes
  - Concerns about having to leave Borrego due to water use reductions. Concerns are primarily from golf and agricultural workers who are concerned about job loss.
  - 29 comments concerned with rising costs/high rates/cost burden.
  - 15 critical of golf/agriculture water use.
  - 10 regarding privacy/security of survey.
  - 9 related to concern with water rates related to fixed income/retirement.

August 30, 2018

TO: Borrego Advisory Committee

FROM: Core Team

SUBJECT: Item III.A.c: Proposition 1 SDAC Grant Task 5 Water Vulnerability/ New Well-Site Feasibility Analysis

A new well-site feasibility analysis was conducted to provide recommendations to the Borrego Water District (BWD) for a new groundwater extraction well. The new well-site feasibility analysis included review of the BWD's water distribution infrastructure and existing well network, the development of a well location-ranking matrix, and evaluating predicted pumping rates for various well locations to the current distribution system using an updated water model in WaterCAD.

The review of existing BWD information included identifying water distribution pressure zones, reviewing available BWD well information from well logs and data provided by Pump Check, estimating the remaining useful life of BWD wells, and conducting informational interviews with the BWD.

The well location-ranking matrix considered factors such as land ownership (i.e. District and County owned properties), the saturated thickness of the middle and lower aquifer, well interference, water quality, and the proximity of a new well site location to existing BWD distribution infrastructure.
The findings from the BWD information review and well location-ranking matrix were input as scenarios in the updated WaterCAD model. The results of this analysis are being provided to the BWD in a technical memorandum for review prior to final well-site location selection.

Borrego SGMA Advisory Committee (AC) & Core Team (CT)

Work Planning & Timeline Chart

Draft Version 08/30/2018

Date	Meeting / Milestone / Action	Topics to Discuss / Notes
August 2018		
August 30, 2018	**Joint SDAC/ Borrego AC Meeting #13** Location TBD Time: TBD	• Proposition 1 SDAC Tasks • Overview of SDAC Components to be incorporated into GSP • EIR/CEQA Process Overview
September 2018		
September 2018	**SDAC Components incorporated into GSP for CT review**	
September 27, 2018 **Alternatively October 4, 2018*	**Borrego AC Meeting #14** Location TBD 10:00am – 3:00pm	• Comprehensive Overview of Elements of the GSP: a series of three AC meetings will be held in September, October, and November to allow the AC to review the key components of the GSP prior to public review. • After a comprehensive overview by core team and consultants, the AC will be able to highlight any issues of concern and identify aspects that they would like further discussion on.
October 2018		
October 25, 2018	**Borrego AC Meeting #15** Location TBD 10:00am – 3:00pm	• Comprehensive Overview of Elements of the GSP (continued from September) • GSP review meeting in October will focus on the issues highlighted by AC in the September meeting • Discussion of SDAC Components Incorporated into GSP
November 2018		
November 29, 2018	**Borrego AC Meeting #16** Location TBD 10:00am – 3:00pm	• Comprehensive Overview of Elements of the GSP (continued from October) • The AC and Core Team will have additional time to work through any remaining items of concern and/or to discuss any aspects of the GSP that still need clarification. • AC straw poll consensus recommendation to support the adoption of the GSP as a whole.
December 2018		

December	**Draft GSP made available for 60-day public review and comment**	• *Estimated date subject to change*
January through May 2019		
January through April/May 2019	**GSA Development of Responses to Public Comments and Preparation of Final GSP**	
Spring 2019	**Borrego AC Meeting #17** Location TBD Time TBD	• Meeting to discuss any changes made to the GSP in response to public comments • The AC will provide formal consensus recommendation to support the adoption of the GSP as a whole.
Summer 2019		
	GSP Adoption by BWD and County Boards of Supervisors	• *Estimated date subject to change*

Subject: Borrego Sun Asks

Date: Friday, July 27, 2018 at 3:45:44 PM Pacific Daylight Time

From: Borrego Sun <editorialsun@gmail.com>

To: geoff@borregowd.org <geoff@borregowd.org>, jim.bennett@sdcounty.ca.gov <jim.bennett@sdcounty.ca.gov>, tdriscoll@dudek.com <tdriscoll@dudek.com>, lbrecht@gmail.com <lbrecht@gmail.com>, beth@borregowd.org <beth@borregowd.org>, julia.chase@sdcounty.ca.gov <julia.chase@sdcounty.ca.gov>, leanne.crow@sdcounty.ca.gov <leanne.crow@sdcounty.ca.gov>, Wylie, Meagan D <meagan.wylie@csus.edu>

A letter written to the Core Team and the Borrego Water District Board of Directors

It is likely that the Plan for bringing the critical overdraft of this basin needs some degree of acceptance by our community.
The Borrego Water District is required to publish the assessed property values for its customers in its annual report each year. For FY2017, this was $341,947,744, according to County records. This is the value of property served by municipal water.
Why in the Plan are we not evaluating its potential impact on municipal rates? Without affordable rates, Borrego's property values will tank. On what basis are you proposing another 20 years of critical overdraft, even with reductions? This appears somewhat imprudent and capricious.
Our understanding is that there's nothing in the SGMA law that mandates 20 years as the required planning period. It profits this community little if the Plan brings the basin into sustainable use in 20 years, but few are able to live here due to the resultant municipal water rates.

A response to the corresponding letter would be appreciated.

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Borrego Sun
707 Christmas Circle
P.O. Box. 249
Borrego Springs, CA, 92004
Office: **760.767.5338**
Fax: **760.767.4971**

Jackson Tidus
A LAW CORPORATION

July 25, 2018

Direct Dial: 949.851.7491
Email: bhill@jacksontidus.law
Reply to: Irvine Office
File No: 7588-122439

VIA E-MAIL AND FAX (760) 767-5994

Jim Bennett, CHG
County of San Diego
Planning and Development Services
25510 Overland Avenue, Suite 310
San Diego, CA 92123
jim.bennett@sdcounty.ca.gov

Geoff Poole
General Manager
Borrego Water District
806 Palm Canyon Drive
Borrego Springs, CA 92004
6geoff@borregowd.org

RE: AAWARE COMMENTS RE 7/26/18 GSA ADVISORY COMMITTEE AGENDA

Dear Messrs. Bennett and Poole:

We represent the Agricultural Alliance for Water and Resource Education ("AAWARE"). AAWARE's members comprise the majority of the agricultural property owners in Borrego Valley. AAWARE is dedicated to protecting and preserving the Basin's groundwater resources. Jim Seley and Ryan Hall, both members of AAWARE, sit on the Borrego Valley Basin Advisory Committee. AAWARE has the following comments regarding the July 26, 2018, Advisory Committee Agenda.

1. **Agenda Item I.E.—Minutes of May 31, 2018, Meeting**

   a. **Objection to Suggested GSP Requirement for Water Quality Monitoring of Private Wells**.

According to the May Advisory Committee meeting minutes, Trey Driscoll of Dudek asserts that the Groundwater Sustainability Plan ("GSP") can require water quality monitoring of private wells. (May 31, 2018, AC Meeting Minutes, p. 2.) AAWARE cannot find any provision in the Sustainable Groundwater Management Act ("SGMA") that would allow for mandatory water quality monitoring of private wells as part of the GSP. Although the GSP can include water quality monitoring (Water Code, § 10727.2), the GSA must have the well owner's permission to go onto private property to monitor wells. (Water Code, § 10725.4(c).) The May meeting minutes should be revised to clarify the Dudek statement.

Rather than monitoring private agricultural wells, which do not provide drinking water and are not located near drinking water wells, ***the GSP water quality monitoring plan should monitor recognized sources of potential groundwater quality impairment in the area of municipal well production***, including the Borrego Water District's wastewater treatment plant (specifically the water quality effects of discharging sludge from the WWTP to on-site drying beds), and the septic tanks of municipal customers. (See May 31, 2018, AC Meeting Minutes, p. 4; Water Quality Control Plan–Colorado River Basin (https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/docs/bp032014/entire_basinplan_combined.pdf, amended through August 2017), p. 5-3 [Borrego Springs is listed as an unsewered community that has the potential to have a negative impact on the groundwater and was identified by the Regional Board as a community with a high density of septic systems]; BWD website (http://www.bvgsp.org/sewer.html); Borrego Valley Municipal Service Review & Sphere of Influence Update (SD LAFCO, October 2007, http://sdlafco.org/document/MSR_Borrego%20Valley%20Report%20Oct-07.pdf), p. 47 ["The Borrego WD has requested that their sewer service sphere be expanded to include all of the developed lots in Borrego Springs in order to facilitate their transition from subsurface septic systems, which have been recognized as a threat to local groundwater quality, to public sewer service."].)

b. **Objection to Timing for Release of Draft GSA/CEQA**.

According to the May meeting minutes, the GSP and CEQA documents will be released in December 2018 for a 45 day comment period. (May 31, 2018, AC Meeting Minutes, p. 2.) The release of these important documents to coincide with the holiday season will not allow sufficient time or focus for productive well-reasoned consideration and comments. Given the timing, ***the GSP should schedule a minimum 60-day review and comment period***.

c. **Objection to Suggested General Plan Changes to Exclude Agriculture**.

According to the May meeting minutes, Asha Bleier of Dudek suggests that the Community Plan will be amended after the GSP to exclude farming. Specifically, Ms. Bleier notes that the Community Plan is zoned residential, which allows farming as a permitted use, and that "changes would be considered to transition to land uses that are low water use and compatible with sustainability requirements of SGMA." (May 31, 2018, AC Meeting Minutes, p. 4.) This heavy handed approach to regulate agriculture out of business seems at odds with SGMA's purpose of ensuring sustainable water supplies to existing uses and its approach to voluntary land fallowing agreements which will not take private property. (See Water Code, §§ 10720.1(b), 10723.2, 10726.2(c).)

2. **Agenda Item 2.A.—Baseline Pumping Allocations Update**

Objection to Baseline Allocation Methodology Which Uses a Nine Year Average Rather Than Actual Reference Evapotranspiration to Determine the Highest Annual Use.

The Core Team previously determined that the Baseline Pumping Allocations would be based on the "highest annual use" during the baseline period. (May 31, 2018, AC Meeting Minutes, p. 3.) The Preliminary Baseline Allocation Methodology adopted by the Core Team backtracks on that determination by using a nine year CIMIS ***average*** for each month rather than the actual CIMIS data to determine the highest reference evapotranspiration. (Agenda Report for Item 2.A, Attachment B, Preliminary Baseline Pumping Allocation Methodology, p. 2, Table 2; see also the redacted copy of the County's recent Preliminary Baseline Pumping Allocation letter, attached to this letter as Attachment 1.) We have prepared a comparison showing the difference between using the average rather than the actual CIMIS data. (See chart labeled Evaporation at CIMIS Station Borrego Springs 2009-2017, attached to this letter as Attachment 2.) As shown by the chart, which uses that same CIMIS data used by the Dudek, the maximum is 107% of the average. The departure between the minimum and the maximum is about 12%. As you can see, 3 of the 9 years are higher than the average. ***This means that farmers would be shortchanged 33% of the time by establishing Baseline Pumping Allocations based on the average. Also, by using a nine year average rather than actual CIMIS data, the Base Pumping Allocations are too low. Additional comments on the preliminary BPAs will be included in response to the County's BPA letter***.

3. **Agenda Item III.B—Socioeconomic Efforts: Proposition 1 Grnat Tasks Updates**

a. **Objection to Alarmist Statements in GSA Publication Materials**.

The GSA publication materials attached at Agenda item III.B (Community Outreach Flyer, Community Meeting Powerpoint Presentation, GSA Door to Door and Education Feedback Tool) incorrectly repeat throughout that the GSP will "*require*" a 75% reduction in use. The GSP requirements are still being developed and serious questions have been raised about the inconsistencies in the technical data that have not yet been resolved. For example, the 2015 USGS Report finds that the Basin can be brought into balance by a 40-50% reduction in production, not 75%. (2015 USGS Report, pp. 4, 122, 124, 130 [excerpts attached to this letter as Attachment 3].) Also, the current GSP proposals fail to account for significant basin return flows included in the USGS study. (2015 USGS Report, pp. 2, 48, 88, 90 [see Attachment 3 to this letter].) ***The GSA should make available the technical data that went into the USGS studay, and any Dudek report or data that Dudek is relying on for the 75% reduction, for review by AAWARE's technical consultant and other stakeholders' technical consultants.***

b. **Objection to GSA Publication Materials that Make Agriculture the Problem Rather Than the Solution**.

The GSA publication materials make subtle references to agriculture that could be misinterpreted as vilifying and blaming solely agriculture for the status of the groundwater basin. For example, the frequently asked questions include: "Why not just make the farmers and agricultural industry reduce water usage and exempt municipal users?" Agriculture is part of the solution. The Community Meeting Powerpoint states: "The sustainability goal does not necessarily mean that individual users will have to reduce consumption by approximately 75%. This reduction will take place through a variety of strategies (e.g., agricultural land fallowing, water conservation equipment, etc.)."

The intent is to use a portion of the $35 million bond funds that may become available for the Borrego Basin from the Water Supply and Water Quality Act of 2018 bond measure to purchase irrigated agricultural land and water production allocations from willing sellers in order to reduce groundwater pumping to a sustainable level as part of the GSP. (See, Water Code, § 10726.2(c), 10726.4(a)(3); see also proposed Water Code, § 86113(b)(1) in the water bond measure, attached to this letter as Attachment 4.) ***The GSA publication materials should discuss the amount allocated from the potential bond funding for fallowing, and the creation of a market-based transfer program should be mentioned in the GSA publication materials.***

Please distribute a copy this letter and its attachments at tomorrow's July 26, 2018, Advisory Committee meeting and attach a copy to the Advisory Committee meeting minutes.

Thank you.

Sincerely,

Boyd L. Hill

Boyd L. Hill

BLH:dt

Attachments:
1) Redacted copy of County BPA letter to agricultural well owners
2) Chart labeled Evaporation at CIMIS Station Borrego Springs 2009-2017
3) Highlighted excerpts of 2015 USGS Report
4) Proposed Water Code section 86113(b)(1) in the 2018 water bond measure

cc: Jim Seley, AAWARE*
Trey Discoll, Dudek*
Russell McGlothlin, Esq., for Rams Hill*
Michele Staples, Esq., for AAWARE*

*by email only

ATTACHMENT 1

County of San Diego

MARK WARDLAW
DIRECTOR

PLANNING & DEVELOPMENT SERVICES
5510 OVERLAND AVENUE, SUITE 310, SAN DIEGO, CA 92123
(858) 694-2962 • Fax (858) 694-2555
www.sdcounty.ca.gov/pds

KATHLEEN A. FLANNERY
ASSISTANT DIRECTOR

July 13, 2018

RE: SUSTAINABLE GROUNDWATER MANAGEMENT ACT – GROUNDWATER PUMPING DATA FOR BORREGO VALLEY GROUNDWATER BASIN

Dear Owner Representative/Property Manager:

On January 1, 2015 the Sustainable Groundwater Management Act (SGMA) went into effect. SGMA provides a state-wide framework to regulate groundwater pumping for the first time in California history. The County of San Diego (County) and Borrego Water District (BWD), as members of the Borrego Valley Groundwater Sustainability Agency (GSA), are jointly working to implement SGMA for the Borrego Springs Subbasin (Subbasin) of the Borrego Valley Groundwater Basin (Basin). The GSA will prepare a Groundwater Sustainability Plan (Plan) for the Basin, which is due no later than January 31, 2020. Implementation of SGMA is anticipated to result in an approximately 70 percent mandatory reduction in groundwater use for the Basin within 20 years to achieve this overall reduction in Basin pumping.

The Plan will include, among other requirements, a baseline pumping allocation for groundwater users in the Basin. The "baseline pumping allocation" is defined as the amount of groundwater each pumper in the Basin is allocated prior to SGMA-mandated reductions. It is further defined as the verified maximum annual production, in acre-feet per year (AFY), for each well owner over the baseline pumping period. The baseline pumping period is the 5-year period from January 1, 2010 to January 1, 2015.

In a letter dated January 17, 2018, the GSA made a formal request to you for any groundwater production data you may have from January 1, 2005 through January 1, 2015 at your properties located at

which overlie the Basin. This data would be taken into consideration when preparing the Plan (including developing the baseline pumping allocation) and was requested to be provided within 45 days of receipt of the letter. To date, the GSA has not received any groundwater production data from you. For site-specific information to be considered by the GSA, follow the instructions provided at the end of this letter.

Preliminary Baseline Pumping Allocation: The baseline pumping allocation will be determined from validated metered groundwater use, if available. If no groundwater production data is received, the GSA has developed a water-use estimate approach (Evapotranspiration Method) to develop a preliminary baseline pumping allocation for each groundwater pumper in the Subbasin. The combined preliminary baseline pumping allocation for all pumpers in the Subbasin is 22,044 acre-feet/year. The preliminary baseline pumping allocation for your property(ies) is summarized as follows:

Assessor Parcel Number	Farm Name	Crop Type	Groundwater Consumptive Use Factor (acre-feet/acre)	Max Year	[1]Irrigated Area (Acres)	[2]Preliminary Baseline Pumping Allocation (acre-feet/year)
				Total		

[1]Attachment A presents aerial imagery of the farm which depicts the area of irrigation for each of your parcels.
[2]Attachment B describes the methodology used to develop the baseline pumping allocation.

Request for Comments: The GSA welcomes any groundwater production data and comments to aid in finalizing the baseline pumping allocation for the Plan.
Within 30 days of receipt of this letter, please submit the following:

1. Any groundwater production data from each well being used for pumping at your property. If groundwater production data is not received, the GSA will be moving forward with the water use estimate approach outlined in this letter to develop your baseline pumping allocation.
2. Any comments you may have regarding your preliminary baseline pumping allocation.

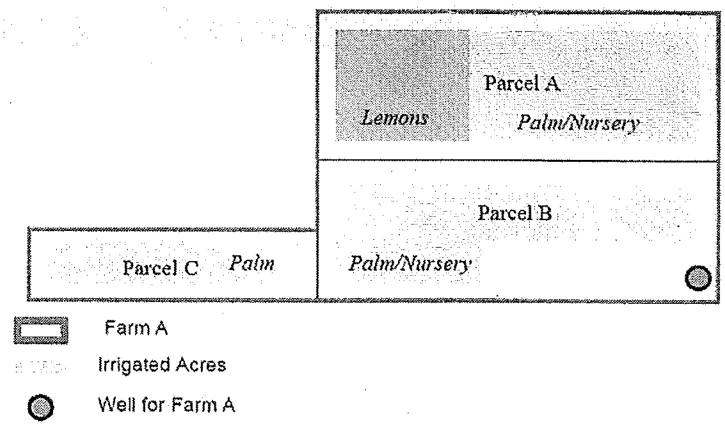
Please provide any comments regarding the draft baseline pumping methodology/results and/or groundwater pumping data via e-mail to PDS.Groundwater@sdcounty.ca.gov or via US Mail to:
County of San Diego
Planning & Development Services
Jim Bennett, Groundwater Geologist
5510 Overland Avenue, Suite 310
San Diego, CA 92123.

If you would like to submit the data in confidence to the County, include the following statement with any groundwater production data submitted:

> *"The attached geological or geophysical water production data is being submitted in confidence and the submitter requests that this information be exempt from public disclosure to the maximum extent allowed by law, including but not limited to Government Code 6254."*

The data will be maintained for use by the GSA, and only publicly available as aggregate values by water use sector (i.e., agriculture, municipal, golf courses).

In order for metered water use data to be validated by the GSA, it is necessary to present data on the individual level and include specific identification of the well and flow meter type, San Diego County Assessor's Parcel Number (APN) for each parcel served by each well, and farm identification. The information submitted should document the crop type by parcel and by area (acreage) irrigated. The figure below is provided as an example of one well serving multiple parcels within a farm with multiple crop types:



Example Documentation of Parcels Served by a Well for a Farm

A community advisory committee has been established to aid in the development of the Plan. If you are interested in attending advisory committee meetings, learning about items discussed during those meetings, or receiving periodic updates regarding SGMA, please visit the County's SGMA website at: http://www.sandiegocounty.gov/pds/SGMA.html.

If you have any questions, please contact me at 858-694-3820.

Sincerely,

JIM BENNETT, Groundwater Geologist
County of San Diego Planning & Development Services

cc: Geoff Poole, General Manager, Borrego Water District

Attachment A: Aerial Imagery, Irrigated Acres
Attachment B: Baseline Pumping Allocation Methodology

SOURCE: NAIP 2014, SANGIS 2018

DUDEK

0 650 1,300 Feet

FIGURE 5

Agriculture Sector

Proposed Baseline Pumping Allocation

Attachment B: Preliminary Baseline Pumping Allocation Methodology

The baseline pumping allocation for the Borrego Springs Subbasin (Subbasin) will be determined from validated metered groundwater use data, if available. If no groundwater production data is received, the Groundwater Sustainability Agency (GSA) has developed a water-use estimate approach (Evapotranspiration Method). This approach includes the use of available aerial imagery to determine irrigated areas on each parcel, which is multiplied by a water use factor for each crop type. The following outlines the methodology for measuring total irrigated area and calculating the water use factor.

Area Irrigated: The area of irrigation was determined using ArcGIS (GIS), a computer based mapping and data analysis software. A 1:2,000 scale was used to create polygons of irrigated area over available aerial imagery from the National Agriculture Imagery Program (NAIP). Available years of aerial imagery included 2010, 2012, and 2014. The total area of each polygon was calculated using coordinate system NAD 1983, State Plane California VI, feet.

Water Use Factor: The water use factor estimates the total applied groundwater lost through the evaporation from soil and transpiration from plants (evapotranspiration). These factors are specific to each vegetation type. Turf, ponds[1], palms, citrus, nursery, and potatoes were identified and considered for all sectors. Table 1 provides the water use factors for each irrigation use type.

Table 1
Water Use Factors

Use Type	Water Use Factor (Feet per Year)
Turf	6.02
Ponds[a]	5.75
Palms	3.76
Citrus	5.86
Nursery	4.51
Potatoes[b]	2.50

Source: Water Use Classification Landscape Species IV (WUCOLS IV), DWR 2018, Borrego Water District and County of San Diego 2013.
Notes:

a. Applied to golf courses only. Surface water evaporation based on pan evaporation data from the Imperial Valley (Salton Sea Salinity Control Research Project U.S. Department of Interior 2004).

b. Approximately 2.5 acre-feet per acre are applied to potato fields per information obtained from the potato farmer in the Subbasin.

The water use factor is calculated using local station specific evapotranspiration (ETo), documented plant factors, and irrigation efficiency by irrigation type (Equation A). The water use factor for citrus also includes a factor for leaching (Equation B).

The equations below present the calculations used to determine the water use factor.

[1] Evaporation for ponds was only considered for maximum groundwater use for golf courses.

Attachment B: Preliminary Baseline Pumping Allocation Methodology

Equation A

$$Annual\ Water\ Use\ Factor = \frac{Eto * PF * 1\ Acre}{IE}$$

Equation B

$$Annual\ Water\ Use\ Factor = \left(\frac{Eto * PF * 1\ Acre}{IE} * CLF\right) + \left(\frac{Eto * PF * 1\ Acre}{IE}\right)$$

Where:

Eto = Reference Evapotranspiration (feet/year)
PF = Plant Factor
IE = Irrigation Efficiency
CLF = Citrus Leaching Factor

The following section describes the factors, which contribute to calculating the water use factors. Similar methods have been used to assign water credits for fallowed irrigated land in the Subbasin for the Borrego Water District (BWD) Demand Offset Mitigation Water Credits Policy (WCP).

Reference Evapotranspiration: Reference evapotranspiration (ETo) is based on potential evapotranspiration (ET) from turf grass/alfalfa crop, which assumes a continuous source of moisture and does not consider summer plant dormancy. Therefore, ETo is an overestimation of actual ET, which varies with the vegetation type since some plants consume significantly more water than others. The ETo was determined from the California Irrigation Management Information System (CIMIS) station #207 located in Borrego Springs (DWR 2018). The nine-year average ETo from 2009 – 2017 was 6.02 feet per year.

Table 2
Monthly and Yearly Reference Evapotranspiration (ETo) for Borrego Springs

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total (Inches)	Annual Total (Feet)
9-Year Average	2.53	3.72	6.17	7.60	8.57	9.09	8.96	8.55	6.85	4.96	3.10	2.11	72.21	6.02

Source: Borrego Springs CIMIS Station #207 (DWR 2018).
Notes: 2008 is excluded from the average, as the record for that year is not complete.

Plant Factor: The plant factor is the percentage of evapotranspiration needed to maintain acceptable health, appearance, and growth of a specific plant type. Plant factors were obtained from the Water Use Classification of Landscape Species (WUCOLS) database. Additionally, the County of San Diego (County) has relied on documented plant factors used for assigning water credits, which are outlined in the Memorandum of Agreement between the Borrego Water District and the County of San Diego Regarding Water Credits (MOA). The plant factor used in this report either was based on an average of recent WUCOLS data or documented County plant factors, whichever was higher.

Table 3
Plant Factors

Type	Plant Factor (MOA)	Plant Factor Range (WUCOLS VI)	Proposed Plant Factor Used
Citrus	0.65[a]	0.4 - 0.6	0.65
Palms	0.5	0.4 - 0.6	0.5
Nursery	0.6	0.4 - 0.6	0.6
Potatoes	N/A	N/A	N/A[b]
Turf	0.63[c]	0.6 – 0.8	0.7

Source: BWD and County 2013, WUCOLS 2014, UCCE CDWR 2000
N/A = not available
a. Plant factor sourced from A Guide to Estimating Irrigation Water Needs of Landscape Planting in California
b. Site-specific information was used since no information was available on WUCOLS IV.
c. An average of warm and cool season.

Irrigation Efficiency: Irrigation efficiency is the amount of water supplied to a plant type compared to the amount consumed. Two common irrigation methods in the Subbasin are rotor and drip. The irrigation efficiency was determined from the Turf and Landscape Irrigation Best Management Practices prepared by the Water Management Committee of the Irrigation Association (Water Management Committee of the Irrigation Association 2004). Table 4 presents the irrigation efficiencies used by irrigation method.

Table 4
Irrigation Efficiency

Irrigation Method	Irrigation Efficiency
Rotor[a]	0.7
Drip[b]	0.8

Source: BWD and County 2013, Water Management Committee of the Irrigation Association 2004.
a. Rotor used for turf and decorative landscaping
b. Drip used for citrus, nursery, palms, and native landscaping

Salt Leaching: Leaching for salts is the overwatering of an area to flush excessive salts below the root zone. Leaching typically occurs in arid environments with high evapotranspiration rates. Because leaching is necessary for the health of citrus in the Subbasin, a leaching requirement of 20% of the water use factor is assumed based on optimal crop yield and source water with total dissolved solids (TDS) concentration of less than 1,000 mg/L.[2] The leaching requirement is provided in Equation C (Rhoades 1974; and Rhoades and Merrill 1976):

[2] A 20% leaching requirement for citrus is assumed taking into account typical Subbasin water quality (i.e. <1,000 mg/L TDS and average soil salinity tolerated by grapefruit of 1.8 dS/m for optimal yield (Ayers and Westcot 1985).

Attachment B: Preliminary Baseline Pumping Allocation Methodology

Equation C

$$LR = ECw/\,5(ECe) - ECw$$

where:

LR = the minimum leaching requirement needed to control salts within the tolerance (ECe) of the crop with ordinary surface methods of irrigation
ECw =salinity of the applied irrigation water in deciSiemens per metre (dS/m)[3]
ECe = average soil salinity tolerated by the crop as measured on a soil saturation extract.

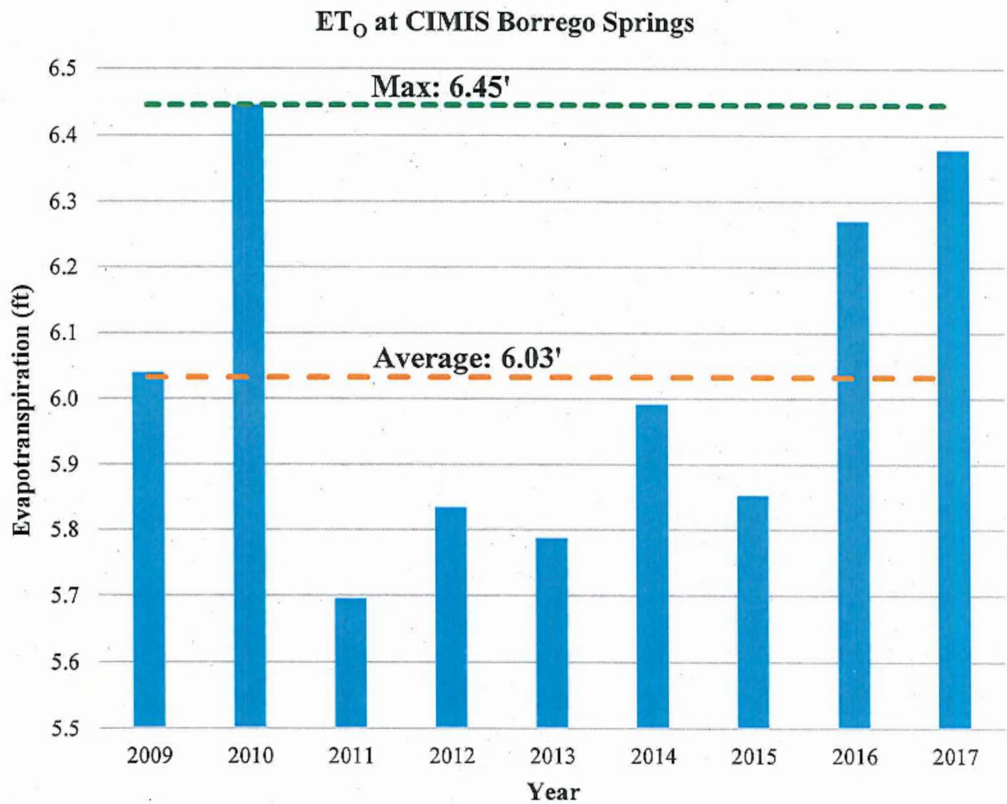
[3] Soil and water salinity is often measured by electrical conductivity (EC). A commonly used EC unit is deciSiemens per metre (dS/m). The ratio of total dissolved solids (TDS) to EC of various salt solutions ranges from 550 to 700 ppm per dS/m, depending on the compositions of the solutes in the water. Simple relationships are used to convert EC to TDS, or vice Versa:
TDS (mg/L or ppm) = EC (dS/m) x 640 (EC from 0.1 to 5 dS/m)
TDS (mg/L or ppm) = EC (dS/m) x 800 (EC > 5 dS/m)
Source University of California Salinity management: http://ucanr.edu/sites/Salinity/Salinity_Management/Salinity_Basics/Salinity_measurement_and_unit_conversions/

ATTACHMENT 2

Evapotranspiration at CIMIS Station Borrego Springs
2009-2017

Year	ET_O (ft)
2009	6.04
2010	6.45
2011	5.69
2012	5.83
2013	5.79
2014	5.99
2015	5.85
2016	6.27
2017	6.38
Average	**6.03**
Max	**6.45**
Departure of Maximum from Average	**107%**

San Diego County Water Use Factor for citrus, based on average ET_O (ft)[1]	**5.9**
San Diego County Water Use Factor for citrus, based on maximum ET_O (ft)[1]	**6.3**



Notes

[1] Calculated using ET_O, 80% irrigation efficiency, crop coefficient for citus (Kc) of 0.65, and 20% salt leaching factor.

ATTACHMENT 3

Hydrogeology, Hydrologic Effects of Development, and Simulation of Groundwater Flow in the Borrego Valley, San Diego County, California

By Claudia C. Faunt, Christina L. Stamos, Lorraine E. Flint, Michael T. Wright, Matthew K. Burgess, Michelle Sneed, Justin Brandt, Peter Martin, and Alissa L. Coes

Prepared in cooperation with the Borrego Water District

Scientific Investigations Report 2015–5150

U.S. Department of the Interior
U.S. Geological Survey

Hydrogeology, Hydrologic Effects of Development, and Simulation of Groundwater Flow in the Borrego Valley, San Diego County, California

By Claudia C. Faunt, Christina L. Stamos, Lorraine E. Flint, Michael T. Wright, Matthew K. Burgess, Michelle Sneed, Justin Brandt, Peter Martin, and Alissa L. Coes

Executive Summary

The Borrego Valley is a small valley (110 square miles) in the northeastern part of San Diego County, California. Although the valley is about 60 miles northeast of city of San Diego, it is separated from the Pacific Ocean coast by the mountains to the west and is mostly within the boundaries of Anza-Borrego Desert State Park. From the time the basin was first settled, groundwater has been the only source of water to the valley. Groundwater is used for agricultural, recreational, and municipal purposes. Over time, groundwater withdrawal through pumping has exceeded the amount of water that has been replenished, causing groundwater-level declines of more than 100 feet in some parts of the basin. Continued pumping has resulted in an increase in pumping lifts, reduced well efficiency, dry wells, changes in water quality, and loss of natural groundwater discharge. As a result, the U.S. Geological Survey began a cooperative study of the Borrego Valley with the Borrego Water District (BWD) in 2009. The purpose of the study was to develop a greater understanding of the hydrogeology of the Borrego Valley Groundwater Basin (BVGB) and to provide tools to help evaluate the potential hydrologic effects of future development. The objectives of the study were to (1) improve the understanding of groundwater conditions and land subsidence, (2) incorporate this improved understanding into a model that would assist in the management of the groundwater resources in the Borrego Valley, and (3) use this model to test several management scenarios. This model provides the capability for the BWD and regional stakeholders to quantify the relative benefits of various options for increasing groundwater storage. The study focuses on the period 1945–2010, with scenarios 50 years into the future.

This report documents and presents (1) an analysis of the conceptual model, (2) a description of the hydrologic features, (3) a compilation and analysis of water-quality data, (4) the measurement and analysis of land subsidence by using geophysical and remote sensing techniques, (5) the development and calibration of a two-dimensional borehole-groundwater-flow model to estimate aquifer hydraulic conductivities, (6) the development and calibration of a three-dimensional (3-D) integrated hydrologic flow model, (7) a water-availability analysis with respect to current climate variability and land use, and (8) potential future management scenarios. The integrated hydrologic model, referred to here as the "Borrego Valley Hydrologic Model" (BVHM), is a tool that can provide results with the accuracy needed for making water-management decisions, although potential future refinements and enhancements could further improve the level of spatial and temporal resolution and model accuracy. Because the model incorporates time-varying inflows and outflows, this tool can be used to evaluate the effects of temporal changes in recharge and pumping and to compare the relative effects of different water-management scenarios on the aquifer system. Overall, the development of the hydrogeologic and hydrologic models, data networks, and hydrologic analysis provides a basis for assessing surface and groundwater availability and potential water-resource management guidelines.

The groundwater-flow system consists of three aquifers within the BVGB: upper, middle, and lower. The three aquifers—which were identified on the basis of the hydrologic properties, age, and depth of the unconsolidated deposits—consist of gravel, sand, silt, and clay alluvial deposits and clay and silty-clay lacustrine deposits. Recharge is primarily the infiltration of runoff from the surrounding mountains. Infiltration of return flows from agricultural irrigation is an additional source of recharge to the aquifer system. Some underflow from the surrounding tributary basins also contributes to recharge of the BVGB. Partial barriers to horizontal groundwater flow, such as faults, have been identified on the eastern edge of BVGB. Prior to groundwater development in the BVGB, groundwater flowed from the recharge areas, generally near the margins of the basin, to discharge areas around the Borrego Sink, where it discharged from the aquifer system through evapotranspiration. Groundwater-level declines owing to groundwater development have eliminated the natural sources of discharge, and pumping for agricultural, recreational, and municipal uses has become the primary form of discharge from the groundwater system.

The quality of groundwater in the Borrego Valley is a concern because of reliance on groundwater for agricultural, recreational, and municipal supply. Groundwater quality can be affected by land-use activities occurring at or near land surface. These activities include irrigation of vegetated landscapes and the use of septic systems to dispose of wastewater. Groundwater quality can also be affected by declining groundwater levels, because there is the potential for a change in the distribution of flow from underlying aquifers to wells. Historical and current groundwater-quality data were used to determine which constituents were present in relatively high concentrations compared to State water-quality thresholds and whether these constituent concentrations had changed in response to declining groundwater levels. Age-dating isotopes (tritium and carbon-14 [^{14}C]) were analyzed to determine whether modern (tritium-containing) groundwater recharge is occurring in Borrego Valley. Major findings of the groundwater-quality part of this study follow.

- Historical water-quality data show that, in the upper aquifer, total dissolved solids (TDS) and nitrate (as N) exceeded their water-quality thresholds of 500 mg/L (secondary recommended California maximum contaminant level) and 10 mg/L, respectively. At the time of publication, the source of this nitrate is unknown.
- TDS and sulfate are the only constituents that show increasing concentrations with simultaneous declines in groundwater levels.
- TDS and nitrate concentrations were generally highest in the upper aquifer and in the northern part of the Borrego Valley where agricultural activities are primarily concentrated.
- Age-dating isotopes indicate that little natural groundwater recharge is occurring under current (1900–2000) climatic conditions and that almost all of the natural recharge is occurring adjacent to the mountain fronts.

The long-term extraction of groundwater causes increases in the effective or intergranular stresses in the aquifer-system materials; this increased stress can result in irreversible compaction of the aquifer system. This compaction results in land subsidence in many areas where long-term pumping, typically in excess of recharge, has depleted groundwater storage. Three methods were employed as part of this study to assess the land subsidence in Borrego Valley: Global Positioning System (GPS) surveys, continuous GPS (CGPS) data collection, and interferometric synthetic aperture radar (InSAR) remote sensing techniques. InSAR results, derived from synthetic-aperture radar data, provide spatially detailed ground deformation maps (interferograms) that can elucidate spatially detailed patterns of vertical deformation for specific time spans. The InSAR methods complement the GPS surveys and CGPS data, which provide time-series data at a series of points. The GPS surveys, CGPS data, and InSAR analyses show little land subsidence has occurred in the Borrego Valley (much less than 1 inch in the last 50 years, 1961–2010). Hence, land subsidence attributed to aquifer-system compaction is not currently a problem in the Borrego Valley and is unlikely to be a significant problem in the future.

The GPS surveys were also used to improve the previous crude determinations of elevations for groundwater wells, which were derived from topographic maps and from which groundwater levels and groundwater-level gradients were determined. Historical land-surface elevations were updated for 79 groundwater wells. Historical elevations were changed by more than 5 feet at 10 wells and by almost 30 feet at 1 well. The updated elevations give a better estimate of spatially distributed groundwater levels, particularly the locations of highs and lows of the groundwater table.

The BVHM was developed on the basis of historical conditions (66 years) for the analysis of the use and movement of groundwater and surface water throughout the valley and to provide a basis for addressing groundwater availability and sustainability analyses. The model has a uniform horizontal discretization of 92 acres per cell (2,000 ft by 2,000 ft) and is oriented subparallel to the tectonic structure and to Coyote Creek. Vertically, the model has three layers representing the upper, middle, and lower aquifers. The model was calibrated by using groundwater-level measurements for 1945–2010 and simulates conditions during that period. Natural and anthropogenic recharge and discharge, and the transient nature of these stresses, were simulated.

The main sources of recharge to the system are runoff from creeks and streams draining the surrounding watershed, which quickly seeps into the permeable streambeds and infiltrates through the unsaturated zone, and groundwater underflow from the adjacent basins. Exceptionally large and infrequent storms typically contribute the most water to recharge. Excess flow sometimes terminates in middle of the valley at the Borrego Sink or flows out the southeastern end of the valley along San Felipe Wash. Over the 66-year study period, on average, the natural recharge that reached the saturated groundwater system was approximately 5,700 acre-feet per year (acre-ft/yr), but natural recharge fluctuated in the arid climate from less than 1,000 to more than 25,000 acre-ft/yr. On average, of the 5,700 acre-ft/yr, about 1,700 acre-ft/yr seeps into the ground during wet years and rapidly discharges as evapotranspiration. In addition, approximately 1,400 acre-ft/yr enters the basin as underflow from adjacent basins. Since agricultural, recreational, and municipal land uses have been developed, a relatively small amount of recharge also occurs from excess irrigation water and septic-tank effluent. Recharge from irrigation return flows, as indicated by the model results, was about 10–30 percent of agricultural and recreational pumpages. Although a small amount of recharge from septic systems occurs and can be important locally, it is negligible relative to natural recharge and return flow from agricultural and recreational pumpages.

The BVHM uses a one-dimensional unsaturated-zone model to estimate the delay associated with return flow moving through the unsaturated zone. Depending on the thickness, permeability, and residual moisture content in the relatively thick unsaturated zone, it takes tens to hundreds of years for the bulk of return flow to reach the water table. In addition, not all water that reaches the root zone reaches the water table because some water is lost through evapotranspiration or goes into storage in the unsaturated zone. Therefore, in many areas, water that is applied to previously unirrigated land arrives at the underlying water table decades or longer after it is applied.

Groundwater discharge occurs in three primary forms: (1) evapotranspiration from the ground and through the direct uptake of plants (mostly in and around the Borrego Sink); (2) a small amount of seepage from the southern end of the basin; and (3) groundwater pumping for agricultural, recreational, and municipal uses. Natural discharge from evapotranspiration ranges from approximately 6,500 acre-ft/yr prior to development to virtually zero in the last several decades (1990–2010), because the groundwater levels in the basin dropped below the reach of the mesquite in the basin. Underflow out the southern end of the basin was small and relatively stable over time, at about 500 acre-ft/yr. Groundwater pumpage for agriculture and recreation was estimated on the basis of irrigated acreage and consumptive-use data. Values of pumpage for municipal supply were compiled from water-use records. Estimated combined annual agricultural, recreational, and municipal pumpage peaked at around 19,600 acre-ft from 2005 to 2010.

Results of the calibrated model simulations indicated that simulated groundwater pumpage exceeded simulated actual natural recharge in most years, resulting in an estimated cumulative depletion of groundwater storage of about 450,000 acre-ft from 1945 to 2010. Groundwater pumping resulted in simulated groundwater-level declines of more than 150 ft from 1945 conditions in much of the northern portion of the study area. The decline in groundwater levels was the result of this depletion of groundwater storage. In turn, the simulated decline in groundwater levels resulted in the elimination of almost all of natural discharge through evapotranspiration from the groundwater basin. Because there are few fine-grained, compressible deposits in the aquifer system materials, little aquifer-system compaction and land subsidence have occurred.

The calibrated BVHM was used to simulate the response of the aquifer system to six future 50-year (2011 to 2060) pumping scenarios: (1) no change in the agricultural, recreational, and municipal pumpage rates (status quo); (2–4) various levels of reductions in agricultural and recreational pumpage rates, coupled with low to high increases in municipal pumping rates; (5) reduction of all groundwater pumpage to that needed to avoid future groundwater-storage depletion over 50 years; and (6) a less severe, but more rapid, reduction in all groundwater usage over 20 years, followed by 30 years at a constant much lower pumpage rate.

Results from Scenario 1 (continuation of current, 2010, annual pumpage) indicated that the drawdown observed since pre-development would continue, with a total depletion in groundwater storage of about 1,000,000 acre-ft by 2060. Consequently, the water table declines to the middle aquifer in some areas. Because of the lower hydraulic conductivity and storage properties of the middle aquifer relative to the upper aquifer, continued pumping at these rates would result in larger, more rapid groundwater-level declines in the future and possibly a reduction in groundwater quality. As a result, more or deeper wells could be needed to accomplish similar pumpage rates. Scenarios 2–4 represent combinations of changes in agricultural and recreational pumpages, as well as in municipal pumpage. Although less than Scenario 1 (status quo) pumpage rates, pumpage rates in two of these three scenarios exceed the average annual recharge rate, groundwater levels continue to decline, and there is continued cumulative depletion of groundwater storage. Because more water is being extracted from the groundwater basin than is being recharged either through natural or induced means, groundwater levels continue to decline. As the groundwater table is lowered from the relatively storage-rich and permeable upper aquifer to the middle and lower aquifers, the rate and areal extent at which groundwater levels decline accelerate, and the areal extent over which storage changes would be affected would be larger in the middle and lower aquifers with lower storativities. Furthermore, if the groundwater quality is less desirable deeper in the system, as existing information indicates, then the water quality of groundwater pumpage would deteriorate as deeper sources of water contribute more water to supply wells; this water could require more advanced water treatment than is used at present (2010) for municipal, and potentially, irrigation supply.

The location of the largest drawdown varies with the relative contributions of the three water-use categories (agricultural, recreational, and municipal) to overall pumpage in each scenario. In Scenario 5, water use is reduced in all three categories (agricultural, recreational, and municipal) to reach a sustainable level over a 50-year time span. The California Sustainable Groundwater Management Act (SGMA) of 2014 requires basins to reach sustainable yield. Scenario 5, with its 50-year time span, covers a longer period than is required by the act. The sustainable level for the Borrego Valley, assuming no significant degradation in groundwater quality, equates to total discharge equaling the long-term average recharge to the basin. As human activities change the system, the components of the water budget (inflows, outflows, and changes in storage) also change and must be accounted for in any management decision. Because there currently is little effect on captured recharge or discharge, in this system, 'sustainability' is a maximum amount of discharge to avoid future groundwater-storage depletion and is being simplified and equated to this average recharge. As the rate of total groundwater extraction approaches the rate of recharge (meaning all inflows—natural and anthropogenic recharge, including induced recharge from captured water sources) to the aquifer system, the change in groundwater storage, and thus the rate of groundwater storage depletion, approaches zero, indicating no additional loss in storage. In the long run, the average change in groundwater storage would be negligible when the basin is operated at the sustainable level; however, groundwater levels and storage changes would fluctuate as they have historically with climatic variability. For example, during relatively wet years, more water could go into storage than is extracted. In turn, during moderate and relatively dry years, more water would be extracted than goes into storage.

In order to simulate a realistic approach for meeting SGMA requirements on the 20-year SGMA timeline for implementation, in Scenario 6, municipal and recreational pumpages both were reduced to 50 percent of current (2010) rates, and agricultural pumpage was reduced to 40 percent of current rates. These reductions were applied linearly over 20 years and continued for the next 30 years until 2060. With these reductions, at 2060, recharge approximates discharge. Simulated drawdowns are approximately 50 feet over a broad part of the basin. Drawdown and groundwater-storage losses continue in areas where agricultural, recreational, and municipal pumping occurs. In the long run, groundwater levels would stabilize and would not decline as they would for the Scenario 1 simulation, which had continued significant groundwater level and storage declines. However, changes in groundwater storage would fluctuate with climatic variability. Because climate models indicated greater variability in natural recharge in the future than during historical periods, the variability of groundwater-storage changes could also increase. Managed artificial recharge through engineered, enhanced infiltration of storm water or imported surface water is a water-management strategy that could help alleviate the demands on the valley's groundwater system.

Introduction

The Borrego Valley is a small valley in the northeastern part of San Diego County, California, about 60 miles northeast of San Diego (fig. 1). Native Americans inhabited the valley and utilized the springs and surface-water sources from the nearby mountain ranges. Cattlemen began homesteading the Borrego Valley in about 1875. The first successful modern well was dug in 1926, which quickly led to irrigation farming (Moyle, 1982). By then, the valley's population center, the small desert community of Borrego Springs, included a post office, a small general store, and a gas station. Historically, the principal source of water for the valley has been groundwater. The Anza-Borrego Desert State Park, which has 600,000 acres in and around the Borrego Valley, was established in 1933 (fig. 1). The park was established to protect this unique desert environment. The military presence both of the Army and Navy during World War II brought the first paved roads and electricity to Borrego Springs. After the war, land developers subdivided the area, attempting to create a resort community supported by an increase in tourism generated by the Anza-Borrego Desert State Park (fig. 1).

The residents of the valley rely on groundwater for drinking water and irrigation (Moyle, 1982; Mitten and others, 1988; California Department of Water Resources, 2003). Irrigated agriculture, golf courses, residential and commercial uses, and the Anza-Borrego Desert State Park require five times more water than is available through natural recharge. The imbalance between recharge and discharge, which began in the mid-1940s, has caused long-term groundwater-level declines. Moyle (1982) estimated that from 1945 to 1980 about 330,000 acre-feet (acre-ft) of groundwater was pumped from the basin in excess of recharge. As a result, by 2010, the northern part of the groundwater basin had groundwater-level declines of about 120 feet (ft; fig. 2). Therefore, the U.S. Geological Survey (USGS), in cooperation with the Borrego Water District (BWD), undertook this water-resource assessment to understand the hydrologic budget and the limits of groundwater availability better in order to avoid future groundwater-storage depletion. The purpose of the study was to develop a greater understanding of the hydrogeology of the Borrego Valley Groundwater Basin (BVGB) and provide tools to evaluate the potential hydrologic effects of future development. The objectives of the study were to (1) improve the understanding of groundwater conditions and land subsidence, (2) incorporate this improved understanding in an integrated hydrologic model to aid in managing the groundwater resources in the Borrego Valley, and (3) apply this model to test several management scenarios. An integrated hydrologic model can provide the capability for the BWD and regional stakeholders to quantify the relative benefits of various options for reducing groundwater overdraft.

The California Sustainable Groundwater Management Act (SGMA) requires that groundwater basins reach sustainable yield. SGMA sets a 20-year timeline for implementation. Overdrafted basins must achieve groundwater sustainability by 2040 or 2042, predicated on the implementation of plans, which are expected to take 5 to 7 years to complete. The SGMA recognizes that groundwater is managed at the local or regional level best and that there are geographic, geologic, and hydrologic differences accounting for groundwater supply. The goal of this legislation is reliable groundwater management, which it defines as "the management and use of groundwater in a manner that can be maintained during the 5-to-7-year planning period and 20-year implementation horizon without causing undesirable results" (California Department of Water Resources, 2015). Undesirable results are defined as any of the following effects:

New anthropogenic sources of recharge accompanied development in the basin, including irrigation-return flow from agricultural fields and municipal lawns and the infiltration of treated wastewater and untreated wastewater from septic systems. From the late 1940s onward, these sources of anthropogenic recharge have significantly increased the total groundwater recharge in the valley, at times becoming many times larger in magnitude than natural recharge. On the basis of a chloride mass-balance technique, Netto (2001) estimated irrigation return flow to the groundwater system at a citrus grove and a golf course fairway to be 22 percent and 14 percent, respectively. Any water from these anthropogenic sources that reaches the water table by infiltrating the vadose zone is part of the overall water budget. This water is a component of recharge in the integrated hydrologic model (described in the "Integrated Hydrologic Model" section of this report).

Transient Estimates of Natural Recharge from the Basin Characterization Model

As mentioned previously, estimates of the quantity, distribution, and source of natural groundwater recharge vary widely. Therefore, the regional-scale Basin Characterization Model (BCM; Flint and others, 2004) was used to better quantify components of the natural groundwater recharge (underflow and streamflow into the Borrego Valley). The BCM uses a deterministic water-balance approach to estimate recharge and runoff in a basin. The model uses the distribution of precipitation, snow accumulation and melt, PET, soil-water storage, and bedrock permeability to estimate a monthly water balance for the groundwater system. Results from the BCM are useful for providing bounds associated with water-balance results of more detailed models, evaluating long-term climate conditions, illustrating the mechanisms responsible for recharge in a basin, and comparing the locations and volumes of recharge and runoff in different basins on a regional scale (Flint and Martin, 2012).

The BCM is grid based at a spatial resolution of 886 ft (270 m) and calculates monthly recharge and runoff. The BCM incorporates spatially distributed parameters (monthly precipitation, monthly minimum and maximum air temperature, monthly PET, soil-water storage capacity, and saturated vertical hydraulic conductivity (K) of bedrock and alluvium) to determine where excess water is available in a basin and whether the excess water is stored in the soil or infiltrates downward into underlying bedrock. Excess water is partitioned by the BCM as either potential in-place recharge or potential runoff, depending on the saturated K of bedrock and alluvium. Potential in-place recharge is the maximum volume of water for a given month that can recharge directly into bedrock or deep alluvium (greater than 20 ft). Potential runoff is the maximum volume of water for a given month that runs off the mountain front or becomes streamflow. The total of runoff and underflow from upstream components of the watershed is the summation of in-place recharge and a percentage of runoff that is determined through calibration to measured streamflow (Flint and Flint, 2007a). The downscaled PRISM precipitation and air-temperature maps were used with the monthly PET results (fig. 4), available spatial maps of elevation, bedrock permeability estimated from the geology (fig. 7), and soil-water storage from the State Soil Geographic Data Base (STATSGO; National Resources Conservation Service, 2006) to calculate snow accumulation and melt snow and to calculate changes in soil moisture, runoff, and recharge.

The BCM calculates potential in-place recharge and potential runoff and generates distributions of both components. In this study, the BCM provided estimates of the underflow from the adjacent mountains and basins and potential runoff in stream channels into the basin. Moreover, the BCM can be used to compare the potential for recharge under the current climate (2010) and that for past wetter and drier climates (Flint and Flint, 2007a). The BCM model domain includes the watersheds that surround and drain into the Borrego Valley (fig. 16).

PET and snow modules of the BCM were calibrated regionally throughout the southwestern United States to measured PET data and the Moderate-Resolution Imaging Spectroradiometer (MODIS) snow-cover data (U.S. Geological Survey, 2007; Flint and Flint, 2007b). For this study, the model was also calibrated to measured unimpaired streamflow data. The determination of whether excess water becomes recharge or runoff is governed in part by the underlying bedrock characteristics that govern permeability (fig. 16). The greater the bedrock permeability, the greater the recharge and the less the runoff generated for a given grid cell. In small, gaged watersheds that generate unimpaired flows, the bedrock permeability can be adjusted to calculate a total watershed discharge that matches the measured watershed discharge. Following calibration to bedrock permeability, recharge and runoff can be accumulated for all grid cells upstream from streamgages to account for stream channel gains and losses to calculate basin discharge and optimize the fit between total measured volume and simulated volume for the period of record for each gage. The simple exponential equations described in detail in Flint and others (2013) were used to calculate surface-water flow recession, seepage, and base flow that can extend throughout the dry season; constrain estimates of flow and recharge when measured data are not available; and provide estimates of flows and recharge in ungaged basins. In the Borrego Valley region, there are three streamgages that represent unimpaired flows, which were used for model calibration (figs. 15, 16). However, two of the streamgages (10255800 and 10255700) are downstream from large alluvial valleys in which an unknown amount of runoff that reaches the streams infiltrates the streambeds and potentially recharges the local water table.

Recharge

Recharge to the Borrego Valley comes from natural and anthropogenic sources. As mentioned previously, the primary source of natural recharge to the basin is infiltration from the ephemeral streams and washes entering the Borrego Valley from the adjacent mountains. Surface-water runoff was simulated by using the Streamflow Routing Package (SFR; Niswonger and Prudic, 2005; Prudic and others, 2004); the head-dependent boundary condition allows for streamflow routing, the capture and conveyance of overland runoff, groundwater discharge (gaining stream reaches), and streamflow infiltration into the aquifer (losing stream reaches). The SFR package was applied by using a streamflow routing network composed of 84 stream segments representing Coyote Creek, San Felipe Creek, Borrego Palm Creek, and other smaller tributaries. This network was used to simulate the inflows of 24 canyon stream channels from the surrounding mountains, streamflow infiltration, and occasional outflows along the Borrego Valley streamflow network (fig. 37). Runoff simulated by FMP within the active model domain was redirected to the SFR streamflow networks and provided a small component of groundwater recharge and streamflow during the wettest months. The stage-discharge relations were assumed to be constant for each group of stream cells (reaches) used to discretize the stream segments for the model cells representing the SFR stream network (fig. 37). The streambed elevations, based on the DEM, for the beginning and end of each segment were specified, along with the streambed thickness and K_v of reaches within each segment. For simplicity, a wide rectangular channel for the stream geometry and a constant estimation of Manning's "n" was used during the simulation.

Inflows from the runoff in stream channels entering the 24 canyons were specified as input to the SFR (fig. 37). The BCM provided deterministically simulated monthly runoff in stream channels to the basin (figs. 16, 19). The BCM domain includes the watersheds that surround and drain into the Borrego Valley (fig. 16).

For application to the BVHM, the monthly runoff volumes from the BCM for the 24 surface-water entry points were used as inflow rates for each BVHM monthly stress period and provided the intermittent runoff inflows along the outer boundary of the active BVHM model area. Although streamflows typically are not constant over monthly periods, the monthly volume of inflow estimated by using the BCM model was preserved. Despite this simplification, flow from runoff varied widely on a monthly basis, based on the BCM. Runoff inflows to the SFR network were simulated by SFR as rapidly infiltrating the unsaturated zone and ultimately recharging the groundwater system by assuming a high streambed K_v and a delay for vertical flow through the unsaturated zone below the streambed. The unsaturated zone delay is specified in SFR in a manner similar to that of the UZF package described in section "Unsaturated Hydraulic Properties."

The total estimated average runoff and recharge to the basins surrounding Borrego Valley is 4,700 acre-ft/yr, of which about 3,650 acre-ft/yr (78 percent) was estimated to represent runoff into the valley. Because these estimates were based on a model, factors were developed to allow for scaling both of runoff and underflow to allow for adjustments during model calibration to best match measured groundwater levels and groundwater-level changes in the valley. A total of 12 scaling factors, consisting of 2 scaling factors (for runoff and underflow) for 6 creeks or washes (San Felipe Wash, Coyote Creek, Henderson Creek, Borrego Palm Creek, and 2 groupings of other intermittent washes) were estimated separately (fig. 37). Mountain block recharge was assumed to be a component of the underflow from the upstream components of the watershed.

In addition to these natural sources of recharge, irrigation return flow from agricultural fields and municipal lawns and infiltration of treated and untreated wastewater also contribute to recharge. These sources of anthropogenic recharge have substantially increased the total recharge into the valley. The irrigation return flow from agricultural fields was simulated by BVHM as part of the FMP. As mentioned previously, BVHM uses UZF to estimate the delay associated with flow moving through the unsaturated zone (Niswonger and others, 2006). Depending on the unsaturated-zone thickness, permeability, and residual moisture content, it can take years to decades for irrigation return flow to pass through the unsaturated zone. In addition, not all water that passes through the root zone percolates to the water table within the simulation period because some water is held in storage in the unsaturated zone. Therefore, a portion of the water that is applied to previously unirrigated land or seeps from septic tanks might not arrive at the underlying water table for decades, depending on the application rate, the depth to water, the properties of the unsaturated zone, and the initial water content of the unsaturated zone (Izbicki and others, 2002).

Most of the homes in the area utilize septic-tank treatment and disposal systems. The BWD (J. Rolwing, Borrego Water District, written commun., 2011) estimated that about 80 percent of the domestic water deliveries are to homes with septic-tank systems. Potential recharge from this water use is difficult to quantify, but is believed to be small. Mills (2009) estimated an average indoor usage of 100 gallons per day per home and a 50 percent loss rate owing to evaporation and transpiration. On the basis of this estimate, the infiltration from septic tanks is simulated at an application rate of 0.056 acre-foot per year per home at land surface into the unsaturated zone by using UZF. The infiltration from irrigation of municipal lawns and treated and untreated wastewater was assumed to be negligible (Henderson, 2001).

Water-Balance Subregions

The evolution of the landscape is a combination of changes in land use and related land ownership in Borrego Valley over the 66 years of the historical simulation, 1945–2010. Parcels defined for 2010 were used to define land ownership and divide the valley into WBSs (fig. 38). The footprint of these WBSs was held constant throughout the simulation; however, the land-use types change over time in each WBS and reflect the evolution of land use. The land-use type determines the water demand for native vegetation or irrigated crops, which is used to calculate the required groundwater pumping for irrigation.

Landscape Water Use

The FMP provides a coupled simulation of the groundwater and surface-water components of the hydrologic cycle for irrigated and non-irrigated areas. A dynamic allocation of groundwater recharge and groundwater pumping was simulated on the basis of residual crop-water demand after surface-water deliveries (in Borrego Valley surface water is not used for irrigation) and root uptake from shallow groundwater. For a given stress period, the estimation of irrigation groundwater pumping in FMP was dependent on satisfying demands for ET from precipitation and variable irrigation efficiencies that govern the availability of excess water available for deep percolation. For a complete description of these components, please see the FMP manual (Schmid and others, 2006a). The FMP not only estimates supply, demand, movement, and consumption of irrigation water, but also estimates these components for natural vegetation. To summarize, the use and movement of water on the landscape is fully coupled with streamflow and groundwater flow and is dependent on atmospheric (and soil) conditions through precipitation and reference ET.

The FMP simulates the demand components representing the crop irrigation requirement (CIR) that are subject to crop and farm-specific irrigation efficiencies and the supply components representing precipitation, direct uptake from groundwater, uptake of soil moisture, and irrigation from groundwater pumping. The FMP also simulates additional head-dependent inflows and outflows from the landscape, such as surface runoff from precipitation and irrigation to the streamflow network and groundwater recharge as deep percolation of water in excess of actual evapotranspiration (ET_{act}) and runoff (Schmid and others, 2006a, b; Schmid and Hanson, 2009). Changes in soil moisture were not simulated by the FMP and were assumed to be negligible at the monthly time scale.

Inflows and outflows throughout the WBSs on the landscape were simulated by FMP. Water mass within each WBS was calculated and balanced for each simulation time step (Schmid and others, 2006a, b; Schmid and Hanson, 2009). The FMP dynamically integrates irrigation water demand from ET with water supply and irrigation efficiencies. In order to do this, the FMP first calculates crop water demand as the transpiration or consumption of water by plants and the related evaporation on the basis of cell-by-cell estimations for each WBS. The FMP then determines a residual plant water demand that cannot be satisfied by precipitation and by root uptake from groundwater, if available from shallow groundwater near the root zone. This residual water demand is the vegetation's irrigation requirement for the cells with irrigated crops (that is, exclusive of any natural vegetation), which is called CIR and is calculated on a cell-by-cell basis.

The CIR is then adjusted (increased) by accounting for evaporative losses from irrigation and other inefficiency losses to yield a final total farm delivery requirement (TFDR). For Borrego Valley, where groundwater is the sole source of irrigation water, FMP attempts to satisfy the TFDR by using groundwater pumpage. This demand is not met when the demand exceeds the capacity of the wells for a specific WBS, either because groundwater levels dropped below the maximum screen-interval depth or the pumping rate of a given well is exceeded. The amount of excess water from irrigation (irrigation efficiencies) and precipitation that is not effectively used for crop growth then becomes either overland runoff to nearby streams or groundwater recharge as deep percolation below the root zone, on the basis of parameters specified in the FMP. In the BVHM, all the excess water ultimately becomes groundwater recharge. Thus, the FMP dynamically links the demand, supply, and related change in head. All of the supply and demand components are then tabulated into WBS budgets, which complement the groundwater flow, and streamflow budgets, which collectively represent the hydrologic cycle within Borrego Valley.

In order to estimate the inflows and outflows, the FMP dynamically simulates the supply and demand components for a WBS by integrating the following computational components specific to Borrego Valley's hydrologic setting:

1. TFDR, which is largely dependent on the CIR, but also depends on efficiency, climate variability (PET and precipitation), and variable aquifer head.
2. Groundwater pumping, which is equivalent to the TFDR in the BVHM.
3. Net recharge (deep percolation) to groundwater, which is taken to be the sum of excess irrigation and precipitation minus ET from groundwater.

OWHM maintains a mass balance for each WBS budget, for the streamflow network, and for the groundwater-flow system. Flows between these budgets are accommodated by head-dependent inflows and outflows, such as ET_{act}, runoff and infiltration, or ET from groundwater. For the BVHM, the processes of evaporation, transpiration, runoff, deep percolation to groundwater, and groundwater pumping were simulated. The simulated groundwater pumpage reflects climatic differences and differences in agricultural practices (including irrigation method) among defined WBSs. The BVHM model provides a detailed transient analysis of changes in groundwater storage in relation to climatic variability, urbanization, land use, and changes in irrigated agriculture.

Future Groundwater-Management Scenarios

The simulation results in the previous section, along with the measured changes in groundwater levels, indicate that groundwater usage currently exceeds the amount of water recharging the Borrego Valley. As a result, groundwater is being removed from storage, and water availability is likely to be a limiting factor in meeting future water demands. In order to understand the effects of this reduction in storage better, water managers are considering different groundwater management scenarios to manage their available water resources. For this analysis, six water-use scenarios were considered during a 50-year period (2011–60):

1. No change in the magnitude and distribution of pumping, or the 2010 status quo.
2. Low growth over 50 years (agricultural and recreational pumpages are decreased linearly over time to 5 times the 2010 rates for 2060, while municipal pumpage is increased linearly over time to 76 times the 2010 rates for 2060).
3. Medium growth over 50 years (agricultural pumpage is decreased linearly over time to 25 times the 2010 rates for 2060, and recreational pumpage is decreased linearly over time by 50 times the 2010 rates for 2060, while municipal pumpage is increased linearly over time to 33 times the 2010 rates for 2060).
4. High growth over 50 years (agricultural pumpage is decreased linearly over time to zero for 2060, and recreational pumpage is decreased linearly over time by 5 times the 2010 rates for 2060, while municipal pumpage is increased linearly over time to 79 times the 2010 rates for 2060).
5. Water-usage reduction to avoid future groundwater-storage depletion over 50 years (agricultural and recreational pumpage is decreased linearly over time to 32 times the 2010 rates for 2060, and municipal pumpage is decreased linearly over time by 52 times the 2010 rates for 2060).
6. Management scenario water-usage reduction over 20 years (agricultural pumpage is reduced linearly over time to 40 times the 2010 rates for 2030, and recreational and municipal pumpages are each reduced linearly over time to 50 times the 2010 rates for 2030; then, usage is held constant at the 2030 rate for the next 30 years, 2031–60).

The calibrated BVHM was used to simulate the hydrologic effects of the six groundwater management scenarios with monthly stress periods. The projected pumpage rates for the six management scenarios are summarized in table 20. In order to include climate variability in all six of these scenarios, it was assumed that the climatic inputs of the last 50 years repeated in reverse from the last calibration year (2010). Note that this results in a relatively dry period near the end of the simulation. For the first five scenarios, the changes in groundwater pumpage are spread throughout the basin for each of the water-use types (agricultural, recreational, and municipal) evenly over the 50-year scenario simulation. In Scenario 6, the changes occur in the first 20 years, then the land use and municipal pumpage are held constant for the remaining 30 years. Slight variations occur in all scenarios for the agricultural and recreational pumpages owing to climatic factors. For the municipal and Rams Hill recreational pumpage, the pumpage change was accomplished by using a multiplier to change the total pumpage. For agricultural and the remaining recreational pumpage, the reduction was accomplished by randomly removing crops, as needed, for each of the scenario simulations. The cumulative change in groundwater storage for the six water-management scenarios is shown in figure 53. The water tables simulated for each scenario in 2060 are shown along a longitudinal cross section of the basin in figure 54.

Table 20. Groundwater budgets for six management scenarios from the Borrego Valley Hydrologic Model, Borrego Valley, California, 2011–60.

[Pumping rates are in acre-feet per year.]

Scenario	2010 Pumping rates				Percent of 2010 pumping rates			2060 Pumping rates			
	Agricultural	Recreational	Municipal	Total	Agricultural	Recreational	Municipal	Agricultural	Recreational	Municipal	Total
1	13,162	4,113	1,006	18,281	100	100	100	13,162	4,113	1,006	18,281
2	13,162	4,113	1,006	18,281	50	50	176	6,581	2,056	1,771	10,408
3	13,162	4,113	1,006	18,281	25	50	233	3,291	2,056	2,344	7,691
4	13,162	4,113	1,006	18,281	0	50	379	0	2,056	3,813	5,869
5	13,162	4,113	1,006	18,281	32	32	52	4,212	1,316	523	6,051
6[1]	13,162	4,113	1,006	18,281	40	50	50	5,265	2,056	503	7,824

[1]Scenario 6 represents the scalar change occurring over 20 years between 2010 and 2030.

Scenario 1: Status Quo

Scenario 1 consists of simulating the same stresses as the last calibration year (2010) for the 50-year horizon with no other management strategy. Although the simulated future pumpage is decreased for some years owing to climate variations, the future pumpage is still greater than simulated recharge for all years; consequently, the model simulation resulted in continued drawdowns and a large loss in storage (figs. 53, 55). Simulated drawdowns for 2011 through 2060 exceed 125 ft in the northern agriculturally dominated part of the valley, and groundwater levels decline to the middle aquifer in most of the basin as the upper aquifer drains.

Scenarios 2–4: Low, Medium, and High Municipal Growth Over 50 Years

Scenarios 2, 3, and 4, associated with low, medium, and high growth, respectively, involve reducing agricultural and recreational pumpages in various combinations, while linearly increasing municipal pumpage at different rates over 50 years. The low-growth scenario consists of an increase in municipal pumpage linearly to a maximum of 1.76 times 2010 rates until 2060 (table 20). The medium-growth scenario linearly increases municipal pumpage to 2.33 times the 2010 rates until 2060, and the high-growth scenario linearly increases municipal pumpage to 3.79 times the 2010 rates until 2060. Like the status quo Scenario 1, simulated future pumpage exceeds recharge rates in Scenarios 2 and 3. Therefore, each of these two scenarios increases the loss in storage and drawdowns. Simulated maximum water-level declines occurred in the southwestern part of the basin, particularly near the BWD supply wells. Because agricultural and recreational pumping continue in Scenarios 2 and 3, drawdown and storage losses continue in the areas where this pumping occurs. With the eventual removal of agricultural pumpage, Scenario 4 reaches a pumping rate that is less than the rate of recharge to the groundwater system at the end of the 50-year scenario.

Scenario 5: Water-Usage Reduction to Avoid Future Groundwater Storage Depletion Over 50 Years

In terms of water-resources management, 'sustainable' is a subjective term whose definition typically depends on various socio-economic, cultural, aesthetic factors in addition to physical-process factors, and thus, there are many ways to define sustainability. In Scenario 5, sustainability is defined as groundwater recharge, on average, equaling groundwater discharge (over the long run there is no change in groundwater storage). In order to reach sustainability as defined, combined groundwater losses from ET, underflow, and pumping cannot exceed inflows from recharge and underflow. To accomplish this balance, agricultural and recreational pumpages were both reduced to 32 percent of current rates, and municipal pumpage was reduced to 52 percent of current rates (2010). These changes were applied linearly over 50 years. Simulated maximum water-level declines occur in the northern and western parts of the basin, where pumping is centered. Because agricultural, recreational, and municipal pumping continue, drawdown and storage losses continue in the areas where this pumping occurs. As total outflows (pumpage, ET, and underflow) approach the rate of total inflows (recharge and underflow), the cumulative change in storage approaches a constant value (slope approaches zero; fig. 53). Simulated drawdowns from 2011 through 2060 are approximately 60 ft in the northern, agriculturally dominated, part of the valley. Because pumpage rates are lower than for Scenario 1, the levels do not decline into the middle aquifer in most of the basin. The results for this scenario indicate that there would be small storage gains and losses that fluctuate with climatic variability. However, in the long run, the groundwater levels are relatively stable, although still much lower than pre-development conditions.

Scenario 6: Management Scenario for Rapid Changes Over 20 Years

In order to simulate what is thought to be realistic, but more rapid, changes during the next 20 years (2011–30), municipal and recreational pumpages both were reduced to 50 percent of current rates (2010), and agricultural pumpage was reduced to 40 percent of current rates by 2030 (table 20; fig. 53). These changes were applied linearly over 20 years. The 2030 pumpage rates were then held constant for the next 30 years to 2060. Simulated drawdowns from 2011 through 2060 were greater than 25 ft throughout much of the northern part of the basin. Because agricultural, recreational, and municipal pumping continue at rates greater than recharge, drawdown and storage losses continue in the areas where this pumping occurs (fig. 56). Because pumpage is lower than in Scenario 1, the levels do not decline to the middle aquifer in most of the basin. Although in the long run, groundwater levels would continue to decline, they would decline at slower rates than those simulated in Scenario 1, and storage gains and losses would fluctuate with climatic variability.

on average, the natural recharge that reaches to the saturated groundwater system is approximately 5,700 acre-ft/yr, but natural recharge fluctuates in the arid climate from less than 1,000 to more than 25,000 acre-ft/yr. Of this 5,700 acre-ft/yr, about 1,700 acre-ft/yr seeped into the ground during wetter years to undergo rapid evapotranspiration. Another approximately 1,400 acre-ft/yr on average comes as underflow from upstream portions of the watershed. Because agricultural, recreational, and municipal land uses have developed, recharge also occurred from excess irrigation and septic-tank effluent. Recharge from irrigation return flows was estimated to be about 20–30 percent of agricultural and recreational pumpages. Although a small amount of recharge from septic tanks occurs, it is negligible relative to natural recharge and return flow from agricultural and recreational pumpages. The BVHM uses a one-dimensional unsaturated-zone model to estimate the delay associated with return flow moving through the unsaturated zone. Depending on the thickness, permeability, and residual moisture content in the relatively thick unsaturated zone, it would take tens to hundreds of years for return flow to pass through the unsaturated zone. In addition, not all water that passes through the root zone reaches the water table because some water contributes to storage in the unsaturated zone as the depth to the water table increases. Therefore, water that is applied to previously unirrigated land might not reach the underlying water table for decades.

Groundwater discharge occurs from three primary sources—(1) evapotranspiration in areas where the water table is shallow and direct uptake from plants (mostly in and around the Borrego Sink) can occur; (2) a small amount of seepage from the southern end of the basin; and (3) groundwater pumpage for agricultural, recreational, and municipal uses. Natural discharge from evapotranspiration ranged from approximately 7,100 acre-ft/yr prior to development to virtually zero during the mid-1990s to 2010, because the groundwater levels in the basin dropped below the reach of the mesquite in the basin. Seepage out the southern end of the basin is small and relatively stable over time, at about 500 acre-ft/yr. Groundwater pumpage for agriculture and recreation was estimated on the basis of irrigated acreage and consumptive-use data. Pumpage for municipal supply was compiled from water-use records. Simulated combined annual agricultural, recreational, and municipal pumpage peaked at around 19,600 acre-ft during 2005–10.

Results of the calibrated model simulations indicate that simulated groundwater pumpage exceeded recharge in most years, resulting in an estimated cumulative depletion in groundwater storage of about 440,000 acre-ft. Groundwater pumping resulted in simulated groundwater levels declining by more than 150 ft relative to 1945 conditions in pumping areas. The decline in groundwater levels is the result of this depletion of groundwater storage. In turn, the simulated decline in groundwater levels has resulted in the decrease in natural discharge from the basin. Because the aquifer system consists of few fine-grained sediments, few areas are susceptible to compaction, and little land subsidence or compaction of fine-grained deposits has occurred.

The calibrated BVHM was used to simulate the response of the aquifer to six future 50-year (2011 to 2060) pumping scenarios: (1) no change in the agricultural, recreational, and municipal pumpage rates, or status quo; (2–4) various levels of reductions in agricultural and recreational pumpage rates coupled with small to large increases in municipal pumpage rates; (5) reduction in all groundwater usage to avoid future groundwater-storage depletion over 50 years; and (6) a less severe, but more rapid, reduction in all groundwater usage over 20 years, followed by 30 years at a constant, much lower usage rate.

Results from Scenario 1 indicate that the total drawdown observed since pre-development would continue, with values exceeding 125 ft in the northern agriculturally dominated part of the valley and groundwater-level declines into the middle aquifer in most of the basin. Because of the lower hydraulic conductivity and storage properties of the middle aquifer relative to the upper aquifer, continued pumping at these rates would result in more rapid water-level declines in the future and possibly a reduction in water quality. Scenarios 2–4 evaluated various combinations of increases and reductions in agricultural, recreational, and municipal pumpages. The pumpage rate in 2 of 3 of these scenarios, although less than in Scenario 1 (status quo), still exceeds the average annual recharge rate. As a result, groundwater levels still decline, and there is a continued cumulative loss in storage. Basically, groundwater levels would continue to drop if more water is being extracted from the groundwater basin than is being recharged on a long-term basis. As more groundwater levels drop from the relatively storage rich and permeable upper aquifer to the middle and lower aquifers, the rate at which groundwater levels would drop and storage depletion would occur would accelerate. Furthermore, if the water quality is less desirable deeper in the system, as existing information indicates, then the water quality of pumped water would deteriorate as well.

In Scenario 5, water usage is reduced in all three categories (agricultural, recreational, and municipal) to reach a sustainable level over a 50-year span. The sustainable level equates to total discharge equaling the long-term average recharge to the basin. In order to avoid future groundwater-storage depletion, agricultural and recreational pumpages were reduced to 32 percent of current rates, and municipal pumpage was reduced to 52 percent of current rates. These changes were applied linearly over 50 years. Simulated maximum groundwater-level declines occurred in the northern and western parts of the basin where pumping is centered. Because agricultural and recreational pumping continues, drawdown and storage losses continue in the areas where this pumping occurs. As the rate of discharge reaches the rate of recharge, there is no net change in storage, and the cumulative loss in storage does not change significantly. Although in the long run, groundwater levels would not rise significantly, and the change in storage would be negligible, in Scenario 5, groundwater levels and storage changes would fluctuate, as they have historically, with climatic variability. For example, during relatively wet years, more water could go into storage than is extracted; however, during moderate and relatively dry years, more water could be extracted than goes into storage.

In Scenario 6, in order to simulate what is thought to be realistic, but more rapid, changes in the next 20 years (2011–30), municipal and recreational pumpages were reduced to 50 percent of current rates (2010), and agricultural pumpage was reduced to 40 percent of the current rate. These changes were applied linearly over 20 years and continued for the next 30 years, until 2060. Simulated drawdowns from 2011 through 2060 were greater than 25 ft throughout much of the northern part of the basin. Because agricultural, recreational, and municipal pumping continue at rates greater than the rate of recharge, drawdown and storage losses continue in the areas where this pumping occurs. Although in the long run, groundwater levels would continue to decline, they would not decline as fast as they would during the status quo (Scenario 1) simulation, and storage gains and losses would fluctuate with climatic variability.

In order to maintain the usefulness of a numerical hydrologic flow model, such as the BVHM, periodic updates are required. As changing conditions of the actual hydrologic system continue to respond to the stresses, and as new information on the surface-water and groundwater systems becomes available, the BVHM could be updated to improve the model and its utility as a water-management tool for the Borrego Valley.

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ATTACHMENT 4

(b) The department shall consider the following criteria when awardinggrants:

(1) The potential of the project to prevent or correct undesirable results due to groundwater use.

(2) The potential of the project to maximize groundwater storage, reliability, recharge or conjunctive use.

(3) The potential of the project to support sustainable groundwater management.

(4) The annualized cost-effectiveness of the project to achieve the goals of the Sustainable Groundwater Management Act (Chapter 2.74 of Division 6 (commencing with Section 10720).

(c) Eligible entities as defined in subdivision (a) of Section 86166, including groundwater sustainability agencies, shall be eligible for grants.

(d) For purposes of awarding funding under this chapter, a local cost share of not less than fifty percent (50%) of the total costs of the project shall be required. The cost-sharing requirement may be waived or reduced for projects that directly benefit a disadvantaged community or economically distressed area, or for projects the majority of whose benefits are to restore ecosystems dependent ongroundwater.

(e) No grant may be made unless the Department of Fish and Wildlife certifies that harm done to fish or wildlife as a result of the project will be mitigated to ensure any potential impacts are less than significant.

(f) Eligible projects may include such infrastructure improvements as improved canal and infiltration capacity.

86113. (a) For purposes of this Section, "District" means the Borrego Water District.

(b) Of the amount appropriated in Section 86110, thirty five million dollars ($35,000,000) shall be awarded as a grant to the District for the following programs:

(1) acquisition of land and acquisition of the right to pump groundwater from willing sellers to reduce groundwater pumping in order to bring groundwater pumping within the boundaries of the Borrego Springs Subbasin of the Borrego Valley Groundwater Basin to a level which is sustainable on a long term basis pursuant to the Sustainable Groundwater Management Act (Chapter 2.74 of Division 6 (commencing with Section 10720). Lands acquired may be transferred to the Department of Parks and Recreation, a nonprofit organization or another public agency for future management.

(2) Water end-use efficiency, including urban and agricultural water conservation, and water conservation on recreational facilities such as golf courses.

(3) Restoration of lands acquired pursuant to this section.

(4) Stormwater capture for groundwater basin recharge and re-use.

(5) Other District projects implementing the Sustainable Groundwater Management Act.

(c) No cost sharing by the District is required to implement this section. This is justified because the community of Borrego Springs is a severely disadvantaged community, and because excessive groundwater pumping can impact important resources in Anza-Borrego Desert State Park whose 500,000 annual visitors contribute an estimated $40 million annually to the region, as well as support 600 jobs. The District may require cost sharing when implementing paragraphs (2) and (4) of subdivision (b).

(d) As a condition of this grant, the District must:

1) implement measures which assure that lands not presently being irrigated will not come into irrigation, and that presently irrigated lands will not become more intensively irrigated; and

2) require new development to pay all the costs of water purchase the District incurs as a result of that development if new water supplies become available for purchase.

(e) (1) The District or a nonprofit organization that receives funding pursuant to this chapter to acquire an interest in land may use up to twenty percent (20%) of those funds to establish a trust fund that is exclusively used to help pay for the maintenance, monitoring and restoration of that interest in land.

(2) The District or a nonprofit organization that acquires an interest in land with money from this chapter and transfers the interest in land to another public agency or nonprofit organization shall also transfer the ownership of the trust fund that was established to maintain that interest in land.

(3) This subdivision does not apply to state agencies.

(4) If the District or nonprofit organization does not establish a trust fund pursuant to this subdivision, the agency, tribe or organization shall certify to the department that it can maintain the land to be acquired from funds otherwise available to the agency, tribe or organization.

(5) If the interest in land is condemned or if the District or nonprofit organization determines that the interest in land is unable to fulfill the purposes for which money from this chapter was expended, the trust fund and any unexpended interest are appropriated to the District. The funds returned to the District may be utilized only for projects pursuant to this chapter.

(f) Any funds not needed by the District to implement the program described in this section may be granted by the District to a nonprofit organization or the California Department of Parks and Recreation to acquire lands adjacent to or in the immediate proximity of Anza-Borrego Desert State Park to prevent development or irrigation of that land which might impact groundwater resources in the Park. These lands may be inside or outside the boundaries of the District, but must be within the boundaries of the Borrego Springs Subbasin of the Borrego Valley Groundwater Basin, the source of all potable water for the Borrego Springs community and visitors to the Park. The lands may be used for wildlife habitat.

(g) The District may award grants to nonprofit organizations in order to carry out all or part of the programs authorized by this section.

86114. (a) land acquired pursuant to this chapter shall not be irrigated, but may be used for farming using rainfall, for fish and wildlife purposes, for solar or wind energy development and for other purposes which do not require groundwater pumping or the use of surface or imported water supplies. If the land is used for wildlife purposes, irrigation may be used to establish wildlife habitat for the first three years.

(b) A local public agency, Indian tribe or nonprofit organization receiving funding under this chapter may use up to twenty percent (20%) of those funds to establish a trust fund used exclusively to pay or help pay for the maintenance and monitoring of the agency's or organization's interest in the land.