

**Proposal to:**

U.S. Department of the Interior, Bureau of Reclamation

**WaterSMART - Applied Science Grants**

FOA No. BOR-DO-19-F012

**GROUNDWATER MODELING ENHANCEMENT  
PROJECT FOR THE MURRIETA-TEMECULA  
GROUNDWATER BASIN**

*Temecula, CA*

October 30, 2019



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FOR THE MURRIETA-TEMECULA GROUNDWATER BASIN**

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## **TECHNICAL PROPOSAL & EVALUATION CRITERIA**

### **D. Executive Summary**

#### **Date**

October 30, 2019

#### **Applicant Information**

Rancho California Water District  
42135 Winchester Road  
P.O. Box 9017  
Temecula, Riverside County, CA 92589-9017

#### **Project Summary**

To further maximize its conjunctive use and groundwater storage capabilities, Rancho California Water District (RCWD/District) intends to implement a Groundwater Modeling Enhancement Project for the Murrieta-Temecula Groundwater Basin (Proposed Project). The Proposed Project enhances RCWD's existing groundwater modeling efforts through updates, refinements, and recalibrations of its existing groundwater models not only to provide the District with a more accurate representation of the groundwater basin's physical system and more reliable information about current local groundwater availability and production capabilities, but also to answer questions about the potential for RWCD to operate the Murrieta-Temecula Groundwater Basin as a groundwater bank/storage reservoir into which surplus imported and/or local water can be recharged during wet years for use during dry years. Specific information provided by the Proposed Project includes:

1. Updated groundwater production recommendations based on current availability,
2. RCWD's total groundwater storage capabilities,
3. Potential benefits of additional recharge and extraction facilities
4. Potential locations of these additional facilities, and
5. Impacts to/interference from existing recharge and extraction facilities

The central goal of the Proposed Project is to develop new hydrologic information that can be used as a tool for making better water management decisions for the benefit of 150,000 water users within the District's 100,000 acre service area and 20 million southern Californians who rely heavily on water imported from both northern California and Reclamation's Colorado River Aqueduct facilities. The Proposed Project contributes to the goals of the U.S. Bureau of Reclamation's WaterSMART – Applied Science Grants Program by increasing access to information that will help to improve water supply reliability and to avoid water conflict through more effective drought management strategies. A grant of \$195,000 is requested for implementation of the Proposed Project, and the entire amount will be used to help pay for completion of its enhanced groundwater modeling efforts.

#### **Project Schedule (length of time and estimated completion date)**

The Proposed Project can begin immediately upon award of funding and execution of the grant or cooperative agreement, and will be complete within the three-year requirement for Funding Group II projects, no later than June 30, 2022. The overall Project schedule indicating key project milestones and applicable deliverables for each phase of the work is provided in the Technical Project Description & Milestones section of this proposal.

### **Proximity of Project to Federal Facility**

The Proposed Project will not be conducted on Reclamation project lands and does not involve Reclamation facilities. However, the Proposed Project will be completed for the benefit of an area residing within the Colorado River Basin, and a large portion of the water used in that area is imported through the Colorado River Aqueduct (CRA) (Reclamation project water).

### **E. Technical Project Description & Milestones**

#### ***Applicant Type***

RCWD is a water district, which qualifies as a ‘Category A’ applicant under the description provided in the Funding Opportunity Announcement for the WaterSMART – Applied Science Grants.

#### ***Project Description***

Built in 1949, Vail Dam was designed to contain local runoff up to its storage capacity of 42,680 acre-feet (AF), which at that time, was enough to meet the demands of a sparsely populated agricultural area of Riverside County, California. RCWD gained ownership of the dam in 1978, and since then, the area has transformed into a densely populated urban area surrounded by avocado groves and winegrape vineyards. Today, the District relies on local water made available by Vail Dam as an essential component of its diversified water supply portfolio, which helps provide reliable supplies to 150,000 urban water users and 10,000 acres of irrigated agriculture.

Recognizing the potential of Vail Dam to help mitigate future water-supply risks associated with climate change, ongoing drought conditions, and population growth, RCWD started work with Reclamation in 2009 to construct additional downstream infrastructure, including the Vail Lake Pipeline/Pump Station and Upper VDC Recharge facilities. By providing a physical connection between the dam, imported water supply pipelines, and the Murrieta-Temecula Groundwater Basin (Basin), these facilities provide RCWD with significant conjunctive use and groundwater storage/banking capabilities.

To further maximize its conjunctive use and groundwater storage/banking potential, RCWD intends to implement a Groundwater Modeling Enhancement Project for the Murrieta-Temecula Groundwater Basin (Proposed Project). The Proposed Project enhances RCWD’s existing groundwater models through updates, refinements, and recalibrations not only to provide the District with a more accurate representation of the Murrieta-Temecula Groundwater Basin’s physical system and better information about current local groundwater availability and production capabilities, but also to answer questions about the basin’s potential for being operated conjunctively with Vail Dam supplies and imported water supplies as a water bank/groundwater storage reservoir into which surplus local and/or imported water can be recharged during wet years for use during dry years. New information provided by the Proposed Project includes:

1. Updated groundwater production recommendations based on current availability,
2. RCWD’s total groundwater storage capabilities,
3. Potential benefits of additional recharge and extraction facilities,
4. Potential locations of these additional facilities, and
5. Impacts to/interference from existing recharge and extraction facilities.

Historical estimates of the Basin’s total storage capacity are at around 4 million AF, with about 200,000 AF of available capacity. If supported through the Proposed Project’s groundwater modeling efforts, this additional storage capacity would provide the District with significant opportunities for groundwater banking, which would give RCWD the ability not only to satisfy its own water demands for its 150,000 water users during adverse water supply conditions, but also

to make more water available to other southern California communities, including Metropolitan Water District of Southern California's 20-million person service area. Following is description of specific activities required for the groundwater modeling enhancements.

- **Activity 1: Collect and Compile Updated Geohydrologic Data**

Geohydrologic data required for groundwater modeling enhancements will be compiled and collected. These data will be collected for the period from October 2014 through September 2019, and will include the following:

- Production data and water level data,
- Vail Lake releases, diversions, and spill data,
- RCWD system releases to Murrieta Creek, and at the Gorge,
- Reclaimed water usage,
- Artificial recharge at VDC, and at the Sequence Batch Reactor (SBR),
- Streamflow data at various gaging stations including Vail Lake, Aguanga, Murrieta Creek at Temecula, and the Santa Margarita River Gaging Station near Temecula,
- Precipitation data for the Temecula Station,
- Lake Skinner releases, and spill data, and
- Water uses and land use maps for the model area,

- **Activity 2: Update the Existing Three-Dimensional Lithologic Model**

As part of past groundwater modeling efforts, a Three-Dimensional (3-D) lithologic model was developed based on lithologic and geophysical borehole logs from wells in the model area to improve the refinement of Basin model layer elevations. For the Proposed Project's groundwater modeling enhancements, this 3-D model will be updated using lithologic logs and geophysical logs for wells drilled after 2014. This work will be carried out using Petrel geomodeling software, which is a state-of-the-art, 3-D geological modeling software used to assist with development of model layers and aquifer parameters. The layer elevations for the groundwater modeling enhancements will be refined based on the results from the updated 3-D lithologic model.

- **Activity 3: Update, Refine, and Recalibrate Model**

The District's existing groundwater model will be updated with the new geohydrologic data (Activity 1), refined using new model layer elevations developed from the revised 3-D lithologic model (Activity 2), and then recalibrated. Model recalibration will be a transient flow calibration and will be conducted with a daily time step for the surface water model component and a monthly stress period for the groundwater flow model component from October 1988 through September 2019. The calibration will be conducted in general accordance with American Society for Testing and Materials Standard Guide for Comparing Ground-Water Flow Model Simulations to Site-Specific Information (ASTM, 1993) and ASTM Standard Guide for Calibrating a Ground-Water Flow Model Application (1996). The calibration process will consist of adjusting hydraulic parameters, boundary conditions, and/or initial model conditions within reasonable ranges to obtain a match between the observed and simulated water levels and streamflow. The calibration process may be assisted with the use of the PEST inverse parameter estimation software (Water Mark Numerical Computing, 2002) to enhance the statistical fit between observed water level data through an automated process.

- **Activity 4: Update the Existing Upper VDC Focused Model**

The Proposed Project's groundwater modeling enhancements also include an update to an existing Upper VDC Focused Model, which is being developed for the smaller, specific area where RCWD's groundwater current recharge and recovery activities take place. The purpose of this focused model is to develop a finer model cell size (e.g., cell size of 20 ft x 20 ft) and finer vertical discretization for RCWD's recharge and recovery areas in order to evaluate slant wells for use as recovery wells during groundwater banking operations. Updating this focused model includes use of the groundwater model updated, refined, and recalibrated as part of Activity 3.

- **Activity 5: Prepare Draft and Final Model Addendum Reports**

This activity includes two sub-activities.

- **Prepare a Draft Model Addendum Report**

A draft model addendum report will be prepared to summarize all of the results from Activities 1 through 4. The model addendum report will include:

- Background of the District's modeling efforts,
- Detailed description of model domain, grid, and boundary conditions
- Summary of model input parameters,
- Description of model calibration procedures and results, and
- Any potential limitations of the flow and solute transport model pertaining to the appropriateness of its use as a predictive tool for assessing various future scenarios.

The model report will also include figures of all pertinent model layer and aquifer parameters from the final transient model calibration run, including, but not limited to:

- Contoured top and bottom elevations for the aquifer layers,
- Contoured thickness (isopach) maps for each model layer,
- Horizontal hydraulic conductivity values for each aquifer layer, including a summary of average and range horizontal and vertical hydraulic conductivity values,
- Storativity values for each aquifer layer, including a summary of the average and range in storativity values for each layer, and
- Effective porosity values for each aquifer layer, including a summary of the average and range in effective porosity values for each model layer.

The draft model addendum report will be submitted to stakeholders including the Santa Margarita River Watershed Watermaster, USGS, Camp Pendleton, and RCWD for review.

- **Prepare a Final Model Addendum Report**

A draft report will be finalized based on comments and decisions made by stakeholders.

- **Activity 6: Create GIS Site Suitability Analysis Model**

Using information gained from Activities 1 through 5, a Geographic Information Systems model will be created, which will allow RCWD to evaluate potential sites for recharge and extraction during potential future water banking activities. A Technical Memorandum will be prepared describing results.

- **Activity 7: Conduct Model Workshop Meetings**

Four workshop meetings will be held to report on progress during the course of the efforts conducted as part of Activities 1 through 6. Draft meeting minutes will be prepared for review and comments will be incorporated into final meeting minutes.

- **Activity 8: Perform Land Level Monitoring**

Land level monitoring consists of collecting data related to extensometer readings, current water levels and water production and will take place concurrently with Activities 1 through 7. These data will be used to analyze aquifer compression and rebound through March 2021, and will be used in combination with groundwater modeling enhancements to make a groundwater production recommendation for Fiscal Year 2022/23.

- **Activity 9: Make Annual Groundwater Production Recommendation**

Groundwater production recommendations for Fiscal Year 2022/23 will be made using the enhanced groundwater modeling tools and data developed through completion of Activities 1 through 8. Production recommendations made through completion of this activity will be based on an improved understanding of both the groundwater basin’s physical system and existing recharge and extraction capabilities.

***Project Schedule***

The following table includes a schedule for each Proposed Project Task. The tasks include Activities described in the above *Project Summary*, and additional grant administration-related tasks.

Project Tasks/Milestones	Est. Project Schedule		Deliverable(s)
	Start	End	
<b>Task 1: Grant Agreement Execution</b> - Execute grant agreement.	12/1/19	1/2/20	Deliverable: Fully executed Agreement
<b>Task 2: Grant Reporting &amp; Invoicing</b> - Report to and invoice Reclamation.	7/2/20	3/2/22	Deliverables: Performance reports and invoices submit as required.
<b>Task 3: Professional Services Procurement</b> - Advertise Request for Quotes for groundwater modeling services; review quotes submitted to RCWD; award professional services contract.	1/2/20	2/3/20	Deliverables: Fully executed Professional Services Contract
<b>Task 4: Collect &amp; Compile Updated Geohydrologic Data</b> - Collect data for water years 2014 through 2019.	2/14/20	3/16/20	N/A
<b>Task 5: Update Existing Three-Dimensional Lithologic Model</b> - Update existing model using lithologic logs and geophysical logs for 2014 through 2019.	4/2/20	5/4/20	N/A
<b>Task 6: Update, Refine &amp; Recalibrate Basin Model</b> - Update existing groundwater model with geohydrologic data, refine with the updated lithologic data, and recalibrate.	5/11/20	7/13/20	N/A
<b>Task 7: Update Upper VDC Focused Model</b> - Update focused model.	7/14/20	9/1/20	N/A
<b>Task 8: Prepare Draft &amp; Final Model Addendum Reports</b> - Prepare draft and final model addendum reports.	9/2/20	11/25/20	Deliverables: Draft and Final Addendum Reports summarizing results of Tasks 4-7.

Project Tasks/Milestones	Est. Project Schedule		Deliverable(s)
	Start	End	
<b>Task 9: Create GIS Site Suitability Analysis Model</b> - Create model for evaluating recharge and extraction sites.	9/2/20	10/26/20	Deliverables: ESRI Model Builder Application for Site Suitability & Technical Memorandum
<b>Task 10: Conduct Workshops</b> - Coordinate four workshops held during modeling enhancement process.	1/2/20	12/18/20	Deliverables: Draft and final meeting minutes.
<b>Task 11: Perform Land Level Monitoring</b> Collect data related to extensometer readings, water levels and water production.	3/2/20	3/2/21	Deliverables: Summary Report including analysis of data through March 2020
<b>Task 12: Make Groundwater Production Recommendation</b> - Make specific production recommendation for FY 2022/23	9/2/21	12/18/21	Deliverables: Summary Report including ground water production recommendation
<b>Task 13: Dissemination of Results</b> - Participate in Reclamation sponsored webinar; disseminate results to stakeholders.	3/2/22	6/30/22	Deliverable: Documentation showing communication of results.

## F. Project Location

Rancho California Water District (RCWD/District) is located in southern California about 85 miles southeast of Los Angeles and 65 miles north of San Diego. The District comprises nearly 100,000 acres in the southwestern portion of Riverside County, and provides water for urban and agricultural uses to more than 150,000 people in the City of Temecula, portions of the City of Murrieta, and some unincorporated areas of southwestern Riverside County (See Figure 1).

The Proposed Project enhances the groundwater model for Murrieta-Temecula Groundwater Basin, a large portion of which is located within RCWD’s service area. This groundwater basin is part of the the Santa Margarita River (SMR) Watershed system, which covers an area of approximately 742 square miles and extends from the Pacific Ocean north to Temecula where it extends to the east between the San Jacinto Mountains on the north and the Palomar Mountain range on the south. More information showing the general location of the Project is included as Appendix D.



Figure 1



## **G. Data Management Practices**

Specific data that will be compiled and collected for the Proposed Project includes:

### ***Geohydrologic Data***

- Production data and water level data,
- Vail Lake releases, diversions, and spill,
- RCWD system releases to Murrieta Creek, and at the Gorge,
- Reclaimed water usage,
- Artificial recharge at VDC, and at the Sequence Batch Reactor (SBR),
- Streamflow data at relevant surface water gaging stations
- Precipitation data for the Temecula Station,
- Lake Skinner releases, and spill,
- Water uses in the model area, and land use maps.

### ***Lithologic & Geophysical Data***

Data from lithologic and geophysical borehole logs for wells drilled after 2014 will be collected.

### ***Land Level Monitoring Data***

Extensometer readings, current water levels and current water production data will be collected.

All data generated for the Proposed Project will be collected and managed by groundwater modeling consultants hired by RCWD who will use the data to update, refine, and recalibrate existing groundwater models. Results of these groundwater modeling enhancements will be provided in Technical Memorandums and Draft/Final Addendum Reports. The Addendum Reports will include a summary of model input parameters and figures of all pertinent model layer and aquifer parameters from the final transient model calibration run, including:

- Contoured top and bottom elevations for the aquifer layers,
- Contoured thickness (isopach) maps for each model layer,
- Horizontal hydraulic conductivity values for each aquifer layer, including a summary of average and range horizontal and vertical hydraulic conductivity values,
- Storativity values for each aquifer layer, including a summary of the average and range in storativity values for each layer, and
- Effective porosity values for each aquifer layer, including a summary of the average and range in effective porosity values for each model layer.

All data, including spatial data, created through implementation of the Proposed Project will be developed in industry standard formats compatible with standard information system platforms.

## **H. Evaluation Criteria**

### **1. Benefits to Water Supply Reliability**

#### ***• Description of water management issues addressed by Proposed Project***

The Proposed Project addresses complications arising from climate change, drought, water supply shortfalls and uncertainties, and the need to meet competing demands for water. All of California, including the RCWD's service area, is at high risk of experiencing drought conditions in any given year. The state recently endured its worst drought in recorded history, and given the results of climate change modeling efforts, it is expected that severe drought events will reoccur in the future. During the most recent drought, which occurred from 2014 through 2018, the U.S. Drought Monitor classified the majority of California, including

RCWD's service area, as being in an "Exceptional Drought" or "Extreme Drought." While these drought conditions have subsided temporarily due to recent precipitation in the northern

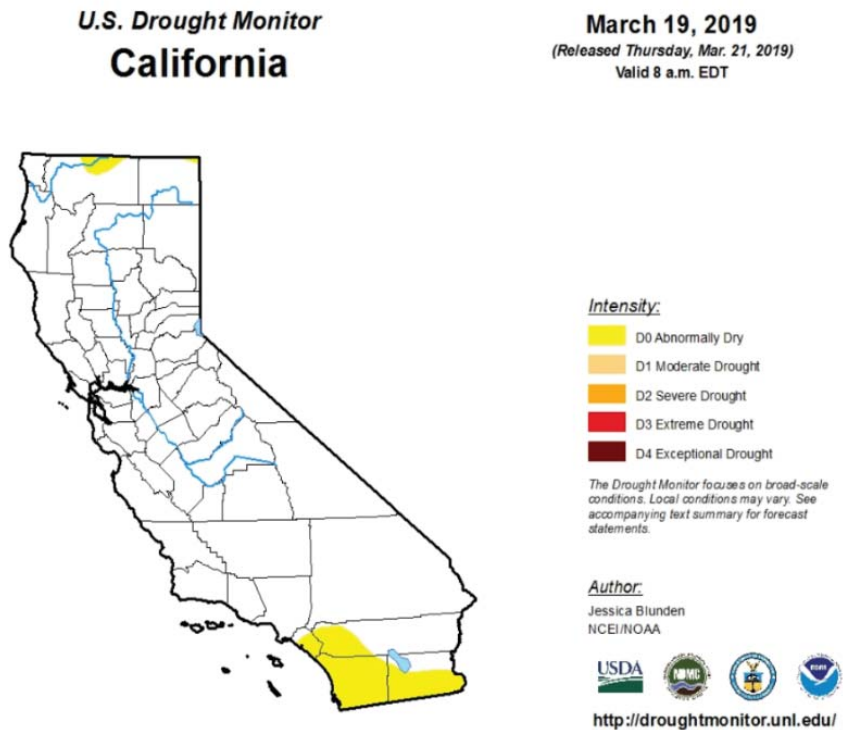
portion of the state, there are still some areas that are classified as "Abnormally Dry."

The District's service area is located in one of the areas of southern California still considered

"Abnormally Dry," and these conditions have had severe negative impacts on the availability of locally sourced groundwater. Generally, climate change is anticipated to cause increased temperatures and reduced rainfall; projections vary with

some showing two to four inches less rainfall. And it's generally accepted that storms will be less frequent, but more intense, which will negatively impact recharge of groundwater supplies. With higher temperatures and changes in rainfall volume and frequency both in locally and across the state, additional impacts will be felt in the District's service area. In addition to negatively impacting local groundwater supplies, imported water supply from the State Water Project (Bay-Delta) is projected to decrease by up to 25 percent. Colorado River supplies to the lower basin states (Arizona, California, and Nevada) may decrease by up to 24 percent, or 1.8 thousand AFY out of the 7.8 million AFY allocated to the lower basin states. In addition, the District projects a 6% and 12% decrease in available local groundwater supplies in the third and fourth years of a multiple dry year scenario, respectively.

In addition to negatively impacting water supplies available to the District, increases in temperature and a drier climate are expected to increase water demand, particularly for irrigation (unless plant palettes are changed [e.g., removal of turf], or agricultural crops change), due to increases in evapotranspiration rates. Based on the types of crops grown on the 10,000 farmed acres within the District's service area, a 10% increase in evapotranspiration rates would lead to an estimated agricultural water demand increase equal to approximately 3,500 acre feet per year (between 5% and 7% of the District's total water supply). This increased water demand increases production costs for farmers, threatens the viability of agribusiness in the District service area, and negatively impacts the monetary value of farmland. In addition to rising evapotranspiration rates, rising population within the District's service area is increasing urban water demands. Population within the District's service area has increased by approximately 15% since 2013, and under severe drought conditions, the availability of water for human health and safety is threatened. Temperature increases are also expected to increase the frequency of wildfires, with studies suggesting a slightly increased



risk of wildfire in the local region. Increases in wildfires have the potential to increase sedimentation and turbidity of surface waters and increase flash flooding.

The District's local groundwater supplies are limited, and it relies on imported supplies from California's State Water Project and the Colorado River Aqueduct to satisfy a large portion of the service area's ever-growing demands. Under conditions of severe drought, where both sources both local and imported water supplies are compromised, the District will not have another water source available to satisfy demands. In response to past drought conditions, the District has responded with implementation of a Water Shortage Contingency Plan, a call for extreme water use efficiency and conservation, a decrease in water budgets for classifications of users, and fines for those in violation of water shortage stage requirements.

- ***Description of HOW water management issues are addressed by Proposed Project***

The Proposed Project enhances RCWD's existing groundwater models through updates, refinements, and recalibrations not only to provide the District with a more accurate representation of the Murrieta-Temecula Groundwater Basin's physical system and better information about current local groundwater availability and production capabilities, but also to answer questions about the basin's potential for being operated as a water bank/groundwater storage reservoir into which surplus imported and/or local water can be recharged during wet years for use during dry years. With this information available, the District can more effectively manage water supplies to help mitigate complications arising from drought, water supply shortfalls and uncertainties, and the need to meet competing demands for water. Following are descriptions of how the Proposed Project contributes to specific water management objectives:

- ***Water Supply Reliability***

The Proposed Project increases water supply reliability by providing new information that allows RCWD to maximize use of the underlying groundwater basin and to potentially create additional local water supply. These additional supplies would be created by recharging, storing, and banking locally available surface water from nearby Vail Lake and/or relatively inexpensive untreated import water, whichever is available. These additional supplies could be drawn upon under any water supply condition, including dry years during which other water supplies may not be available.

- ***Management of Water Deliveries***

The Proposed Project improves RCWD's ability to manage water deliveries by enhancing the District's understanding of its groundwater recharge and extraction capabilities. With improved hydrologic information regarding the Murrieta-Temecula Groundwater Basin, the District can more effectively manage both local and untreated import water delivered to its groundwater recharge facilities. Furthermore, the Proposed Project improves water management through more cost-effective water management practices. By recharging and recovering inexpensive and locally available surface water supplies and/or relatively inexpensive untreated import water, the District realizes considerable cost savings over the alternative of importing fully treated water supplies. Therefore, use of these less expensive supplies reduces District water supply costs and mitigates rate increases for its customers.

- ***Water Marketing Activities***

The Proposed Project facilitates water marketing activities by providing better information about groundwater banking capabilities within the Murrieta-Temecula Groundwater Basin. With better knowledge of the recharge and storage capacity of basin,

RCWD can import more untreated import water (when available) for storage/banking purposes and participate in water marketing activities.

- *Drought Management Activities*

The Proposed Project helps RCWD to better manage drought by providing better hydrologic information about the full potential of its groundwater recharge, storage and banking capabilities. With this information, the District can maximize groundwater storage and bank water during wet years for use during dry years, which increases drought resiliency.

- *Conjunctive Use of Surface and Groundwater*

The Murrieta-Temecula Groundwater Basin is physically connected to both imported water pipelines and to Vail Dam via the Vail Lake Pipeline. During wet years when surplus import water is available, it can be pumped through the Vail Lake Pipeline into the lake and stored temporarily before being released to the District's groundwater recharge facilities. Likewise, in years when local runoff is plentiful, surplus native water can be captured behind the dam, and then released through the pipeline for groundwater recharge. New information provided by the Proposed Project regarding the District's groundwater recharge, storage, and banking capabilities increases the District's ability to recharge water sourced from Vail Lake into the Murrieta-Temecula Groundwater Basin.

- *Water Rights Administration*

The Murrieta-Temecula Groundwater Basin has been governed under court jurisdiction since 1928, as part of the Santa Margarita River Watershed system. Since then, court judgments have been issued directing the use and allocation of groundwater in the region. These judgments involved years power struggles by multiple parties, including the Federal government (U.S. Marine Corps Camp Pendleton) over water use in the basin, citing that court judgments did not fully meet the needs of the parties for effective water management. Finally, the "*Cooperative Water Resource Management Agreement between Camp Pendleton and Rancho California Water District*" (CWRMA), was reached and executed in March 2002. This agreement requires RCWD to maintain flows within the Santa Margarita River and remains in place today to govern not only water flow in the river, but also, overall production within the Murrieta-Temecula Basin. By increasing RCWD's understanding of the groundwater basin's recharge and storage capabilities, and helping it to pursue additional water supplies through groundwater banking, the Proposed Project further ensures the District's capability to meet the requirements of CWRMA.

- *Watershed Health*

By increasing RCWD's understanding of the groundwater basin's recharge and storage capacity, and helping it to pursue additional local water supplies through groundwater banking, the Proposed Project further ensures the District's capability to maintain required surface water flows within the Santa Margarita River, which benefits the health of the Santa Margarita Watershed.

- ***Description extent to which the Proposed Project benefits water management objectives***

- *Water Supply Reliability*

One of the central objectives of the Proposed Project is the quantify RCWD's groundwater recharge, storage, and banking capabilities through groundwater modeling enhancements. It has been estimated that the Murrieta-Temecula Groundwater Basin has a total storage capacity of approximately 4 million AF, with an estimated 200,000 AF of available capacity; therefore, if confirmed by the Proposed Project, RCWD could

potentially create a significant local water bank, which could be used to ensure reliable water supplies for RCWD's customers during both wet and dry years.

In addition, the potential water-banking capabilities provided by the Murrieta-Temecula Groundwater Basin would provide water supply reliability benefits that extend beyond the boundaries of RCWD's service area. During drought conditions or other types of emergencies that compromise available imported water supplies, RCWD could rely on banked water to meet its local demand, thereby decreasing the amount of imported water it purchases from Metropolitan District of Southern California (MWD). Whatever amount of water is pumped from the District's groundwater bank or surface storage for satisfying the District's demands would directly offset purchases from MWD, which makes more water available to MWD, which serves a 20-million-person service area.

- *Management of Water Deliveries*

With better knowledge of the storage capacity of the Murrieta-Temecula groundwater basin, the District can maximize use of less-expensive supplies and therefore manage its water supplies more cost-effectively. By recharging, banking, and recovering inexpensive and locally available surface water supplies and/or relatively inexpensive untreated import water, the District realizes considerable cost savings over the alternative of importing fully treated water supplies. For example, untreated import water costs \$319 per acre foot less than treated import supplies. Moreover, extracted recharge water sourced from native Vail Lake supplies costs \$950 per acre foot less than treated import supplies. Based on the estimated 200,000 AF of potential groundwater banking storage capacity, these savings are at a minimum equal to between \$63,800,000 and \$190,000,000 (not accounting for the timing of use and annual cost increases for fully treated import water) depending on which source is used. These significant cost savings not only reduce District water supply costs, but also mitigate rate increases and keep water affordable for its 150,000 water users.

- *Drought Management Activities*

Based on the past estimate that the Murrieta-Temecula Groundwater Basin has a total storage capacity of approximately 4 million AF, with an estimated 200,000 AF of available capacity, RCWD could potentially create a 200,000 AF local water bank, which could be used as a drought management tool. Based on historical water demand data, 200,000 AF would satisfy the water needs of the District's entire service area for nearly four years. Access to this significant and valuable water bank provides further assurance that, during any given year, RCWD can reliably meet the water demands of its service area, even when faced with temporary supply constraints.

- *Conjunctive Use of Surface and Groundwater*

Since Vail Dam is physically connected to both imported water pipelines and the Murrieta-Temecula Groundwater Basin, the Proposed Project allows the District to optimize conjunctive use of surface and groundwater. For example, during wet years when surplus import water is available, it can be pumped from imported water pipelines through the Vail Lake Pipeline and into the lake where it is stored temporarily before being released to the District's groundwater recharge facilities for storage and banking. Likewise, in years when local runoff is plentiful, surplus native water can be captured behind the dam, and then released for groundwater recharge.

The ability to convey water from surface storage to the groundwater basin is especially advantageous during extremely wet years. Intense storm events that come during wet

years produce huge quantities of water over a very short period of time. While it is difficult for most water agencies to take full advantage of this available water due to surface storage constraints and/or limits on the rate at which groundwater basins can be recharged, Vail Dam helps RCWD overcome these issues. When the water comes all at once, it can be stored behind Vail Dam and released slowly to the District's recharge facilities so as not to exceed the basin's recharge capacity. At this point water can be released from the dam at a current recharge capacity of approximately 27.4 CFS or 10,000 AF per year. Therefore, when surplus supplies are available for a short period of time, a large amount of water can be captured behind the dam at high rates of flow, stored temporarily, and then released at lower rates of flow into the downstream recharge ponds, maximizing wet year storage for use during dry years and minimizing losses in the lake due to evaporation.

With new information provided through implementation of the Proposed Project, the recharge capacity estimates for the Murrieta-Temecula Groundwater Basin could be increased, leading to more conjunctive use of surface and groundwater.

- *Water Rights Administration*

The CWRMA Agreement made between the District and Marine Corps Base Camp Pendleton requires RCWD to maintain flows within the Santa Margarita River by releasing 5,000 AFY into the river. By increasing RCWD's understanding of the groundwater basin's recharge and storage capabilities and helping it to pursue additional supplies through groundwater banking, the Proposed Project further ensures the District's capability to meet the requirements of CWRMA during both wet and dry years.

- *Watershed Health*

By further ensuring that RCWD can satisfy the 5,000 AFY release required by the CWRMA Agreement, the Proposed Project maintains required surface water flows within the Santa Margarita River, which benefits the health of the Santa Margarita Watershed.

- ***Explain how the project compliments similar efforts in the area where it is located***

The Proposed Project provides significant benefits to both local and regional water supply reliability, and therefore compliments other such local and regional efforts. For example, the regional water wholesaler, Metropolitan Water District of Southern California (MWD), works to maximize the region's groundwater storage and increase flexibility in how water resources are managed for its 20-million person service area (which includes RCWD's service area). Specifically, MWD's most recent Integrated Water Resources Plan (IWRP) identifies water storage banks as an adaptive water management strategy necessary for ensuring water supply reliability throughout the region. Metropolitan currently has nine groundwater storage projects within its service area, providing over 200,000 acre-feet of storage capacity. Both the District's service area and Vail Dam are located in close proximity to Lake Skinner and Diamond Valley Lake Reservoirs, as well as main distribution lines providing water to San Diego County, which are key MWD assets for regional storage and distribution. At this time, the District is actively reviewing with MWD the potential for a partnership involving the use of the Murrieta-Temecula Groundwater Basin as a component of their regional water storage infrastructure. Therefore, the Proposed Project is consistent with MWD's IWRP and represents a potential significant addition to regional groundwater storage capacity.

## 2. Need for the Project and Applicability of Project Results

The Proposed Project updates and enhances RCWD's existing groundwater modeling efforts for the Murrieta-Temecula Groundwater Basin not only to provide the District with better information about current local groundwater availability and production capability, but also to answer questions about the potential for RWCD to operate the Murrieta-Temecula Groundwater Basin as a water bank/groundwater storage reservoir into which surplus local and/or imported water can be recharged during wet years for use during dry years. The project will result in readily useful enhanced groundwater modeling information that will help RCWD to meet existing water reliability needs within both District's service area, the Upper Santa Margarita watershed, and the larger surrounding region.

- ***Does the project meet existing needs identified by water managers in the 17 Western States?***

- *Related Planning Efforts*

The Proposed Project shares Reclamation's goals for stretching scarce water supplies and avoiding conflicts over water. The project is consistent with RCWD's Integrated Resources Plan (IRP) and Water Facilities Master Plan (WFMP), the Upper Santa Margarita Watershed's Integrated Regional Water Management Plan (IRWMP) and MWD's Integrated Water Resources Plan (IWRP). Furthermore, these local and regional Plans are both consistent with the California Water Plan (CWP) and its roadmap for good water management.

- RCWD's 2005 Regional IRP was prepared to assist the District in developing a long-term water supply strategy that can meet demands now until 2050. The IRP was developed using a multi-objective approach, integrating both demand- and supply-side options. Among the objectives developed for the IRP are three that the Proposed Project can help to accomplish, including: Reliably Meet Demands, Maximize Local Control, and Provide Sustainable Supply.
- Acting upon the District's Mission Statement to deliver reliable water services to its customers and communities in a prudent and sustainable manner, the 2015 WFMP describes water resource management goals and implementation strategies. The fourth goal listed in the WFMP is to "enhance the reliability/sustainability of the District's water supply." Strategies recommended for accomplishing this goal include: maximizing the storage/banking of water in the Murrieta-Temecula Groundwater Basin and in Vail Lake through improvements to the District's recharge facilities and through the development of a storage/banking operations plan. Activities accomplished through implementation of the Proposed Project are considered to be the first step in developing the storage/banking operations plan.
- The 2014 Upper Santa Margarita Watershed's IRWMP was a regional effort involving multiple local agencies. Of the IRWMP's six main goals, the first two are to increase the diversification of the water supply portfolio and to maximize groundwater potential. Objectives described for accomplishing these goals include increasing knowledge of groundwater supply potential and increasing local supply development. The Proposed Project enhances groundwater modeling efforts for the Murrieta-Temecula Groundwater Basin, which will help the Region to more efficiently take advantage of local water resources.
- Metropolitan Water District of Southern California (MWD), works to maximize the region's groundwater storage and increase flexibility in how water resources are

managed for its 20-million person service area (which includes RCWD's service area). MWD's most recent Integrated Water Resources Plan (IWRP) identifies water storage banks as an adaptive water management strategy necessary for ensuring water supply reliability throughout the region. Metropolitan currently has nine groundwater storage projects within its service area, providing over 200,000 acre-feet of storage capacity. At this time, the District is actively reviewing with MWD the potential for a partnership involving the use of the Murrieta-Temecula Groundwater Basin as a component of their regional water storage infrastructure. Therefore, the Proposed Project is consistent with MWD's IWRP and represents a potential significant addition to regional groundwater storage capacity. Therefore, the Proposed Project is consistent with MWD's IWRP and represents an effort that could lead to a potential significant addition to regional groundwater storage capacity.

- The State of California's CWP identifies specific Management Objectives to help guide local agencies in managing their water resources. For one of these objectives, *Increase Water Supply*, a variety of Resource Management Strategies are recommended. Among these strategies, *Conjunctive Management and Groundwater Storage* refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. The Proposed Project represents an effort designed to provide new information, which would enhance Conjunctive Management and Groundwater Storage within RCWD's service area.

### **3. Project Implementation**

The Proposed Project can begin immediately upon entering into a Financial Assistance Agreement with Reclamation, and can be completed within the required timeframe. For detailed information regarding Proposed Project implementation, please see the Project Description on pages 4 through 7 of this proposal.

- ***Project Objectives, Methodology & Approach***

The Proposed Project enhances RCWD's existing groundwater models through updates, refinements, and recalibrations not only to provide the District with a more accurate representation of the Murrieta-Temecula Groundwater Basin's physical system and better information about current local groundwater availability and production capabilities, but also to answer questions about the basin's potential for being operated as a water bank/groundwater storage reservoir into which surplus imported and/or local water can be recharged during wet years for use during dry years. With this information available, the District can more effectively manage water supplies to help mitigate complications arising from drought, water supply shortfalls and uncertainties, and the need to meet competing demands for water.

The method used for implementing the Proposed Project will be to:

1. To collect and compile geohydrologic data from the time period following the last update of the existing groundwater model for the Murrieta-Temecula Groundwater Basin,
2. To perform land level monitoring through collection of extensometer readings, water level data, and water production data,
3. To use the updated geohydrologic data to update an existing 3-D lithologic model,
4. To use the updated geohydrologic data and 3-D lithologic model to update, refine, and recalibrate the existing groundwater model for the Murrieta-Temecula Groundwater Basin,



5. To use the updated, refined, and recalibrated groundwater model to update an existing Upper VDC focused model, which provides more granular information regarding groundwater recharge capabilities at existing RCWD recharge facilities,
6. To compile results of these model updates into Draft and Final Model Addendum Reports detailing RCWD's groundwater/recharge and extraction capabilities using existing facilities and future capabilities under a groundwater banking scenario,
7. To create a GIS Site Suitability Analysis Model using the updated groundwater models to evaluate future potential recharge and extraction sites for water banking operations,
8. To use land level monitoring data in combination with the updated groundwater models to make specific groundwater production recommendations for Fiscal year 2021/22 using existing facilities,
9. To make results of the Proposed Project available to stakeholders and other interested parties.

Following is the proposed Project's Work Plan:

- **Work Plan**

Project Tasks/Milestones	Est. Project Schedule	
	Start	End
<b>Task 1: Grant Agreement Execution</b> - Execute grant agreement.	12/1/19	1/2/20
<b>Task 2: Grant Reporting &amp; Invoicing</b> - Report to and invoice Reclamation.	7/2/20	3/2/22
<b>Task 3: Professional Services Procurement</b> - Advertise Request for Quotes for groundwater modeling services; review quotes submitted to RCWD; award professional services contract.	1/2/20	2/3/20
<b>Task 4: Collect &amp; Compile Updated Geohydrologic Data</b> - Collect geohydrologic data for water years 2014 through 2019.	2/14/20	3/16/20
<b>Task 5: Update Existing Three-Dimensional Lithologic Model</b> - Update existing 3-D lithologic model using lithologic logs and geophysical logs for water years 2014 through 2019.	4/2/20	5/4/20
<b>Task 6: Update, Refine &amp; Recalibrate Basin Model</b> - Update existing groundwater model with geohydrologic data, refine with the updated 3-D lithologic data, and recalibrate.	5/11/20	7/13/20
<b>Task 7: Update Upper VDC Focused Model</b> - Using results from the updated groundwater model (Task 6), update the Upper VDC Focused Model.	7/14/20	9/1/20
<b>Task 8: Prepare Draft &amp; Final Model Addendum Reports</b> - Prepare draft and final model addendum reports to summarize results.	9/2/20	11/25/20
<b>Task 9: Create GIS Site Suitability Analysis Model</b> - Create GIS site suitability model for evaluating potential future recharge and extraction sites	9/2/20	10/26/20
<b>Task 10: Conduct Workshops</b> - Coordinate four workshop meetings held throughout the groundwater modeling enhancement process.	1/2/20	12/18/20
<b>Task 11: Perform Land Level Monitoring</b> - Collect data related to extensometer readings, water levels and water production	3/2/20	3/2/21
<b>Task 12: Make Groundwater Production Recommendations</b> - Make a specific groundwater production recommendation for Fiscal Year 2022/23	9/2/21	12/18/21
<b>Task 13: Dissemination of Results</b> - Participate in Reclamation-sponsored webinar and make results of the model available to regional stakeholders.	3/2/22	6/30/22

- ***Quality of Existing Models & Data***

Existing data that supports the existing groundwater model for the Murrieta-Temecula Groundwater Basin is of high quality, and will be sufficient for implementation of the Proposed Project, which enhances the existing model. Initial calibration of the model took place in 1995. In subsequent years (1995-1999), seven versions were created to provide additions and changes to the original model. These changes included the addition of the Horizontal-Flow Barrier package, layer revisions, changes in evapotranspiration, recharge, tributary inflow, return flow, irrigation application, streambed conductance, releases, transmissivity, leakance, pumping and underflow values, development of a wet year algorithm, and changes in stress periods and time steps. The development and modification of the existing model is summarized below:

- 1995: Initial groundwater model calibration.
- 1995-1999: Various updates/modifications to groundwater model.
- 2003: Development of surface and groundwater model.
- 2014: Surface and groundwater model update and refinement; converted to GSFLOW model code.
- 2017: Update of 2014 version to include updated GSFLOW computer code, base elevations of Younger Alluvium, and return flow.

In addition, RCWD manages an Upper VDC Focused Model. The purpose of this effort is to create a model with finer model cell size (e.g., cell size of 20 ft x 20 ft) and finer vertical discretization for specific areas where groundwater recharge takes place. Through implementation of the Proposed Project, the Upper VDC Focused Model will be updated using the results from updated and recalibrated existing basin model model. Since the last full update of the basin model occurred in 2014, data from 2014 through 2019 will need to be compiled as part of the Proposed Project. The most recent Groundwater Production Recommendations made using the existing basin model are included as part of Appendix C.

- ***Staff Qualifications***

Eva Plajzer, RCWD's Assistant General Manager – Engineering/Operations will be leading Proposed Project implementation. Ms. Plajzer has over 20 years of engineering experience evaluating various water resource scenarios to provide reliable water supplies. She has utilized water modeling, including groundwater models, to evaluate water conditions and analyze various solutions to water supply issues. As part of her current position as the Assistant, she is responsible for providing direction to the groundwater modeling efforts for the Murrieta-Temecula Valley Groundwater Basin. Other RCWD staff involved in the project include Jeff Kirshberg, Water Resources Manager; Rich Ottolini, Water Operations Manager; and Kevin Marcoux, Water Systems Supervisor. Together, these RCWD employees will facilitate the work of a groundwater consulting firm, which will be hired by the District to perform the modeling work. District staff has extensive experience with working with groundwater consulting firms, and the firm hired to perform the work will have extensive knowledge of groundwater management and a proven track record in helping water utilities accomplish their groundwater development and protection goals. Specifically, the firm chosen will be consist of staff who possess doctoral degrees related to groundwater modeling and who are professional geologists and hydrogeologists experienced with high-profile geohydrologic investigations, groundwater basin evaluations, well-siting investigations, and artificial recharge.

- ***Products Resulting from Proposed Project***

A draft model addendum report will be provided to summarize results from the Proposed Project Tasks. The model addendum report will include the following key components:

- Background of the Basin Model,
- Detailed description of the model domain, grid, and boundary conditions,
- Summary of model input parameters,
- Description of model calibration procedures and results, and
- Any potential limitations of the flow and solute transport model pertaining to the appropriateness of its use as a predictive tool for assessing various types of future scenarios going forward.

The draft report will also include figures of all pertinent model layer and aquifer parameters from the final transient model calibration run, including, but not limited to:

- Contoured top and bottom elevations for the aquifer layers,
- Contoured thickness (isopach) maps for each model layer,
- Horizontal hydraulic conductivity values for each aquifer layer, including a summary table showing the average and range in horizontal and vertical hydraulic conductivity values for each model layer,
- Storativity values for each of the aquifer layers, including a summary table showing the average and range in storativity values for each model layer, and
- Effective porosity values for the aquifer layers, including summary table showing the average and range in effective porosity for each model layer.

The draft report will then be finalized based on the comments and decisions made by stakeholders during Proposed Project workshops.

#### **4. Dissemination of Results**

- ***Internal Communication***

Results of the Proposed Project will be communicated by District staff who are involved in project implementation to the District's Management Team, its Engineering & Operations Committee, and its Board of Directors during regularly scheduled meetings. While Manager Meetings are held weekly, Engineering & Operations Committee and Board of Directors meetings are held on a monthly basis.

- ***Communication with Regional Stakeholders & Water Managers***

On January 25, 1951, the United States of America sought a legal adjudication of all respective water rights within the Santa Margarita River Watershed. A Final Judgment and Decree was entered on May 8, 1963, and appealed to the U.S. Court of Appeals. A Modified Final Judgment and Decree was entered on April 6, 1966. In March 1989, the Court issued an Order appointing a Watermaster to administer and enforce the provisions of the Modified Final Judgment and Decree and subsequent orders of the Court. The appointing Order described the Watermaster's powers and duties as well as procedures for funding and operating the Watermaster's office. Also in 1989, the Court appointed a Steering Committee that is now comprised of representatives from the United States Marine Corps Base Camp Pendleton, Eastern Municipal Water District, Fallbrook Public Utility District, Metropolitan Water District of Southern California, Pechanga Band of Luiseno Mission Indians, Western Municipal Water District, and Rancho California Water District. The purposes of the Steering Committee are to assist the Court, to facilitate litigation, and to assist the Watermaster. For the Purpose of the Proposed Project, the Watermaster and members of the Steering Committee will be considered interested parties, and the results of the project, including the draft and final reports, will be provided to them.

- ***Communication Reclamation and the Public***

RCWD will participate in a Reclamation sponsored webinar. RCWD will inform Reclamation about Proposed project accomplishments, final results of the identified tasks, and any lessons learned. RCWD understands that this presentation may be open to the public as a webinar and may be recorded and made available on the WaterSMART website.

- ***Effectiveness of Approach***

The approach chosen for disseminating the results of the Proposed Project is the most effective approach because it targets for direct communication the partners and resource managers within the western United States who hold the largest stake in the project's water supply reliability benefits. These partners and resource managers represent local, regional, and Federal agencies, as well as Indian Tribes, that have a special interest in the water resources of the Santa Margarita Watershed.

## **5. Department of the Interior Priorities**

The Proposed Project shares the following Department of the Interior priorities:

- ***Creating a conservation stewardship legacy second only to Teddy Roosevelt***

*Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment*

The Proposed Project's development of the enhanced groundwater model for the Murrieta-Temecula Groundwater Basin is an example of using best practices involving scientifically-driven technologies to manage water resources and adapt to changes in the environment. Reclamation's Colorado River Basin Water Supply and Demand Study (Study) recognizes that the Colorado River Basin will face issues with increasing demands and uncertain supplies into the future. In addition, the reliability of water supplies available from sources in California have proven to be questionable over the course of the past few decades. These two supply sources are critical to RCWD as they represent more than half of the water used to meet the District's annual demand. Of the many solutions proposed by both Reclamation's Study and the state of California's recent *Making Conservation a California Way of Life* legislation for adapting to issues with water supply reliability, implementation of water banking strategies are one of the most important. The Proposed Project is consistent with this solution because it results in an enhanced groundwater model for the Murrieta-Temecula Groundwater Basin that answers questions about the basin's water banking capabilities.

*Examine land use planning processes and land use designations that govern public use and access*

The Proposed Project is located throughout RCWD's service area which includes the City of Temecula, portions of the City of Murrieta, and unincorporated areas of Riverside County. Each of the agencies has a land use plan, which includes a conservation element focusing on protecting and enhancing community environmental resources. In addition agencies downstream of RCWD, including the community of Fallbrook and Marine Corps Base Camp Pendleton have similar plans. The Proposed Project helps protect water supply reliability for each of these communities.

*Revise and streamline the environmental and regulatory review process while maintaining environmental standards*

The Proposed Project is a streamlined environmental and regulatory review process because it will be categorically exempt under the California Environmental Quality Act. In addition, it is anticipated that the project will be granted a Finding of No Significant Impact or a Categorical

Exclusion under the National Environmental Protection Act since there will be no significant impacts to the environment as a result of the project.

*Review Department water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity*

The Proposed Project will increase local water supply reliability, thereby leading to reduced demand for water imported through California's State Water Project and Reclamation's Colorado River Aqueduct during drought conditions. Reducing demand from these supply sources adds more water to them, thereby resolving conflict over limited Reclamation supplies.

*Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands*

The Proposed Project fosters relationships with organizations involved in the preservation and protection of the Santa Margarita Watershed. The organizations include, but are not limited to, the Santa Margarita Ecological Reserve, San Diego State University, Riverside County Flood Control and Water Conservation District, Mission Resource Conservation District, Temecula-Elsinore-Anza-Murrieta Resource Conservation District, The City of Temecula, The City of Murrieta, the Sierra Club, the community of Fallbrook, and Marine Corps Base Camp Pendleton.

*Shift balance towards providing greater public access to public lands over restrictions to access*

The Proposed Project area includes a variety of lands available for public use. Because the project benefits water supply reliability, which protects watershed health within these areas, public access to them is protected.

- ***Utilizing Our Natural Resources***

*Ensure American Energy is available to meet our security and economic needs*

The Proposed Project helps maximize local water supplies, and therefore can reduce pumping requirements for the conveyance of imported water to southern California. Decreased pumping requirements translates to energy savings and ensures American Energy is available to meet our security and economic needs.

- ***Restoring Trust with Local Communities***

*Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands*

The Proposed Project restores trust with local communities by providing more reliable water supplies. The enhanced groundwater model created through implementation of the Proposed Project leads to a water bank that can be used for storage of surplus water during wet years for use during dry years.

*Expand the lines of communication with Governors, state natural resources offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities*

RCWD partners with multiple agencies including, Riverside County Flood Control and Water Conservation District, the County of Riverside, Eastern Municipal Water District, Western Municipal Water District, the San Diego County Water Authority, and Municipal Water District of Southern California to ensure regional water supply needs are met through implementation of water infrastructure. By improving water supply reliability through maximization of local groundwater resources, the Proposed Project aligns with the goals of existing local, regional, state, and Federal water planning efforts.

- ***Striking a Regulatory Balance***

*Reduce the administrative and regulatory burden imposed on U.S. industry and the public*

By increasing water supply reliability, the Proposed Project helps to reduce the potential for implementation of local drought declarations and related regulatory requirements imposed upon industry and private citizens.

- ***Modernizing our Infrastructure***

*Support the White House Public/Private Partnership Initiative to modernize U.S. Infrastructure*

The Proposed Project supports partnerships between RCWD and the groundwater modeling firm that will be hired to perform the project modeling work. Through development of the enhanced model, RCWD will obtain answers to questions about the storage capabilities of the Murrieta-Temecula Groundwater Basin, which will guide the District in its future endeavors to modernize its water delivery infrastructure by creating a water bank.

*Prioritize DOI infrastructure needs to highlight construction of infrastructure, cyclical maintenance, and deferred maintenance*

The Proposed Project highlights construction of infrastructure through development of the enhanced groundwater model. Through development of the model, RCWD will obtain answers to questions about the storage capabilities of the Murrieta-Temecula Groundwater Basin, which will guide the District in its future endeavors to construct a modernized water delivery infrastructure to support a groundwater bank.

## **PROJECT BUDGET**

### **A. Funding Plan and Letters of Commitment**

#### ***Non-Reclamation Share of Project Costs***

The current estimated non-Federal contribution is \$214,050.20.

A portion of the non-Federal share of the Proposed Project costs will be funded through use of District staff-time. The value of the staff-time dedicated to implementation of the Proposed Project is estimated at \$89,050.20. This amount includes base pay, fringe benefits, and indirect costs.

In addition, RCWD's existing budget for existing groundwater modeling activities will help pay for the Proposed Project. An additional \$125,000 will be contributed to the Proposed Project through use of this budget. No third-party contributions will be used to pay for the project, and at this point, no pre-award costs are expected.

The following Table 1 summarizes the Project funding sources:

<b>Table 1. Summary of Non-Federal and Federal Funding Sources</b>	
<b>Funding Sources</b>	<b>Funding Amount</b>
Non-Federal Entities	
1. RCWD Staff Time	\$89,050.20
2. RCWD's Existing Budget	\$125,000.00
<i>Non-Federal Subtotal</i>	<b>\$214,050.20</b>
Other Federal Entities	
1. None	\$ 0.00
<i>Other Federal Subtotal</i>	<i>\$ 0.00</i>
Requested Reclamation Funding ( <i>maximum amount of request</i> )	<b>\$195,000.00</b>
<b><i>Total Project Funding</i></b>	<b>\$409,050.20</b>

#### ***Letter of Commitment***

The District is committed to providing at least \$214,050.20 for implementation of the Proposed Project. No third-part funding will be used to pay for the project, and therefore, no Letters of Commitment are provided with this proposal. The District's share of the project budget is available upon award announcement.

## B. Budget Proposal

The District's budget proposal is shown in Tables 2 and 3; the District requests Reclamation funding in the amount of \$195,000, 48% of the Proposed Project cost.

**TABLE 2. BUDGET PROPOSAL**

Budget Item Description	Computation			Non-Federal Share	Reclamation Share	Total Cost
	Cost	Unit	Quantity			
<b>SALARIES AND WAGES</b>						
Assistant General Manager - Engineering/Operations	\$ 98.02	per hour	58	\$ 5,685.16	\$ -	\$ 5,685.16
Water Resources Manager	\$ 83.32	per hour	74	\$ 6,165.68	\$ -	\$ 6,165.68
Water Operations Manager	\$ 87.56	per hour	74	\$ 6,479.44	\$ -	\$ 6,479.44
Water Systems Supervisor	\$ 53.08	per hour	40	\$ 2,123.20	\$ -	\$ 2,123.20
Water Use Efficiency & Grants Manager	\$ 66.16	per hour	68	\$ 4,498.88	\$ -	\$ 4,498.88
Senior Accounting Analyst	\$ 40.68	per hour	30	\$ 1,220.40	\$ -	\$ 1,220.40
<i>SUBTOTAL</i>			344	\$ 26,172.76	\$ -	\$ 26,172.76
<b>FRINGE BENEFITS</b>						
	<i>Basis</i>	<i>% of Basis</i>				
As per Federally approved Indirect Cost Rate Agreement, 93.13% of Salaries & Wages	\$ 26,172.76	93.13%	1	\$ 24,374.69	\$ -	\$ 24,374.69
<i>SUBTOTAL</i>				\$ 24,374.69	\$ -	\$ 24,374.69
<b>TRAVEL</b>						
None						
<b>EQUIPMENT</b>						
None						
<i>SUBTOTAL</i>						
<b>SUPPLIES/MATERIALS</b>						
None						
<b>CONTRACTUAL/CONSTRUCTION</b>						
Groundwater Model Enhancement Contract	\$194,000.00	per contract	1	\$ -	\$ 194,000.00	\$ 194,000.00
Land Level Monitoring Contract	\$ 88,000.00	per contract	1	\$ 88,000.00	\$ -	\$ 88,000.00
Groundwater Production Recommendation Contract	\$ 37,000.00	per contract	1	\$ 37,000.00	\$ -	\$ 37,000.00
<i>SUBTOTAL</i>				\$ 125,000.00	\$ 194,000.00	\$ 319,000.00
<b>OTHER</b>						
Environmental & Regulatory Compliance Costs	\$ 1,000.00	per review	1	\$ -	\$ 1,000.00	\$ 1,000.00
<i>SUBTOTAL</i>				\$ -	\$ 1,000.00	\$ 1,000.00
<b>TOTAL DIRECT COSTS</b>				\$ 175,547.45	\$ 195,000.00	\$ 370,547.45
<b>APPROVED INDIRECT COSTS*</b>						
	<i>Basis</i>	<i>% of Basis</i>				
As per Federally approved Indirect Cost Rate Agreement, overhead for G&A, 147.11% of Salaries & Wages	\$ 26,172.76	147.11%	-	\$ 38,502.75	\$ -	\$ 38,502.75
<i>SUBTOTAL</i>				\$ 38,502.75	\$ -	\$ 38,502.75
<b>TOTAL INDIRECT COSTS</b>				\$ 38,502.75	\$ -	\$ 38,502.75
<b>TOTAL PROJECT COSTS</b>				\$ 214,050.20	\$ 195,000.00	\$ 409,050.20



**Table 3. Salaries and Wages**

<b>Employee</b>	<b>Task</b>	<b>Activity</b>	<b>Hours</b>	<b>Rate</b>	<b>Total Direct Costs</b>
Assistant General Manager – Engineering & Operations: Eva Plajzer	2	Grant Reporting	4	\$98.02	\$5,685.16
	3	Professional Services Procurement	4		
	4	Collect & Compile Updated Geohydrologic Data	2		
	5	Update Existing Three-Dimensional Lithologic Model	2		
	6	Update, Refine & Recalibrate Basin Model	2		
	7	Update Upper VDC Focused Model	2		
	8	Prepare Draft & Final Model Addendum Reports	2		
	9	Create GIS Site Suitability Analysis Model	2		
	10	Conduct Workshops	16		
	11	Perform Land Level Monitoring	2		
	12	Make Groundwater Production Recommendation	2		
	13	Dissemination of Results	18		
	<b>SUBTOTAL</b>				
Water Resources Manager	2	Grant Reporting	4	\$83.32	\$6,165.68
	3	Professional Services Procurement	4		
	4	Collect & Compile Updated Geohydrologic Data	4		
	5	Update Existing Three-Dimensional Lithologic Model	4		
	6	Update, Refine & Recalibrate Basin Model	4		
	7	Update Upper VDC Focused Model	4		
	8	Prepare Draft & Final Model Addendum Reports	4		
	9	Create GIS Site Suitability Analysis Model	4		
	10	Conduct Workshops	16		
	11	Perform Land Level Monitoring	4		
	12	Make Groundwater Production Recommendation	4		
	13	Dissemination of Results	18		
	<b>SUBTOTAL</b>				

**Table 3. Salaries and Wages**

<b>Employee</b>	<b>Task</b>	<b>Activity</b>	<b>Hours</b>	<b>Rate</b>	<b>Total Direct Costs</b>
Water Operations Manager	2	Grant Reporting	4	\$87.56	\$6,479.44
	3	Professional Services Procurement	4		
	4	Collect & Compile Updated Geohydrologic Data	4		
	5	Update Existing Three-Dimensional Lithologic Model	4		
	6	Update, Refine & Recalibrate Basin Model	4		
	7	Update Upper VDC Focused Model	4		
	8	Prepare Draft & Final Model Addendum Reports	4		
	9	Create GIS Site Suitability Analysis Model	4		
	10	Conduct Workshops	16		
	11	Perform Land Level Monitoring	4		
	12	Make Groundwater Production Recommendation	4		
	13	Dissemination of Results	18		
<b>SUBTOTAL</b>			<b>74</b>	<b>\$87.56</b>	<b>\$6,479.44</b>
Water Systems Supervisor	2	Grant Reporting	4	\$53.08	\$2,123.20
	3	Professional Services Procurement	4		
	4	Collect & Compile Updated Geohydrologic Data	2		
	5	Update Existing Three-Dimensional Lithologic Model	2		
	6	Update, Refine & Recalibrate Basin Model	2		
	7	Update Upper VDC Focused Model	2		
	8	Prepare Draft & Final Model Addendum Reports	2		
	9	Create GIS Site Suitability Analysis Model	2		
	10	Conduct Workshops	16		
	11	Perform Land Level Monitoring	2		
	12	Make Groundwater Production Recommendation	2		
	<b>SUBTOTAL</b>				

<b>Table 3. Salaries and Wages</b>					
<b>Employee</b>	<b>Task</b>	<b>Activity</b>	<b>Hours</b>	<b>Rate</b>	<b>Total Direct Costs</b>
Water Use Efficiency & Grants Manager	1	Grant Agreement Execution	8	\$66.16	\$4,498.88
	2	Grant Reporting	60		
<b>SUBTOTAL</b>			<b>68</b>	<b>\$66.16</b>	<b>\$4,498.88</b>
Senior Accounting Analyst	2	Grant Reporting	30	\$40.68	\$1,220.40
<b>SUBTOTAL</b>			<b>30</b>	<b>\$40.68</b>	<b>\$1,220.40</b>
<b>TOTAL</b>			<b>344</b>		<b>\$26,172.76</b>

**C. Budget Narrative**

***Salaries and Wages***

The District’s Assistant General Manager – Engineering/Operations, Eva Plajzer, will function as the Project Manager. The Water Resources Manager, Water Operations Manager, Water Systems Supervisor, Water Use Efficiency & Grants Manager, and Senior Accounting Analyst will assist in implementation of the Proposed Project tasks, which are listed in the Table 2.

In Table 3, costs for Tasks 1 through 3 involve District labor and include staff hours required for work related to administration of the grant award. Costs for Tasks 4 through 13 involve District labor and include staff hours required for collaborating with and overseeing a contractor/consultant who will be performing the bulk of the work described for each of these tasks. Hours are based on estimated level of staff involvement and duration of the Task based on the Schedule shown in the Technical Project Description. Rates reflect current rates and do not include fringe benefits or indirect costs. While rates generally increase each Fiscal Year, the amount is not known until the budget is approved each year.

***Fringe Benefits***

A Fringe Benefits rate is applied to Total Salaries and Wages for employees of RCWD. A base hourly rate plus additional rates for fringe benefits is included in the budget. As per a provisional 19/20 Indirect Cost Negotiation Agreement, Fringe Benefits are charged at 93.13%. This rate is Federally-approved and is a provisional rate for billing purposes (see Appendix A). Total Fringe Benefits is \$24,374.69. Indirect Costs allowed in the Indirect Cost Negotiation Agreement are computed separately as discussed below.

***Travel***

There are no travel costs included for the Project.

***Equipment***

There are no equipment costs included for the Project.

***Materials and Supplies***

There are no materials and supplies costs included for the Proposed Project.

### ***Contractual/Construction***

RCWD contracts exceeding \$10,000 in value are all procured using a competitive method consistent with CFR 200.320 *Methods of procurement to be followed*. A total of three contracts exceeding this amount will be executed for implementation of the Proposed Project's Tasks 3 through 13. The contracts are for: 1) Groundwater Model Enhancement, 2) Land Level Monitoring, and 3) Groundwater Production Recommendations. Based RCWD staff's prior experience with these types of contracts and conversations with consultants who have experience with these types of groundwater modeling activities, the combined cost for the Proposed Project's three contracts is anticipated to be \$319,000.00. Work performed by the contractor(s)/consultant(s) under the three contracts is described in detail in the Project Description included on pages 4 through 7 of this proposal. All three contracts will be executed after the grant award date. Following is a summary of the work to be carried out by each consultant.

#### **Groundwater Model Enhancement Contract (\$194,000)**

- Collect and Compile Updated Geohydrologic Data
- Update the Existing Three-Dimensional Lithologic Model
- Update, Refine, and Recalibrate Model
- Update the Existing Upper VDC Focused Model
- Prepare Draft and Final Model Addendum Reports
- Create GIS Site Suitability Analysis Model
- Conduct Model Workshop Meetings

#### **Land Level Monitoring Contract (\$88,000)**

- Perform Land Level Monitoring to include collection of extensometer readings, current water levels and current water production data for March 2020 - March 2021 time period.

#### **Groundwater Production Recommendation Contract (\$37,000)**

- Run updated and enhanced groundwater model to make Annual Groundwater Production Recommendation for FY 2022/23.

### ***Third-Party In-Kind Contributions***

There are no third-party in-kind contributions included for the Proposed Project.

### ***Environmental and Regulatory Compliance***

The District understands that the introduction of federal funding may prompt a review under applicable Federal environmental laws. Included in the budget is an estimated line item cost of \$1,000 for the potential environmental compliance effort. This amount is based on conversations the District has had with the local area Reclamation office. The Proposed Project will be groundwater modeling work and will have no direct significant impact on the environment.

### ***Other Expense***

There are no "other" costs included for the Proposed Project.

***Indirect Costs***

The Indirect Cost rate of 147.11% includes General/Administration Overhead as a percentage of total RCWD labor cost. Fringe Benefits are included separately under “Fringe Benefits” using the rate of 93.13%. These rates are Federally-approved and are provisional rates for billing purposes. Total estimated indirect costs for the Proposed Project are \$38,502.75. A copy of the Federally-approved Indirect Cost Negotiation Agreement is shown in Appendix A.

***Total Costs***

The total Proposed Project cost is equal to \$409,050.20. The applicant’s cost share is \$214,050.20 and Reclamation’s share is \$195,000.00.

## ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

The Proposed Project is a water supply reliability effort that enhances an existing groundwater model. No environmental and regulatory issues are posed through its implementation. Following are answers to questions provided in the Funding Opportunity Announcement.

- **Will the Proposed Project impact the surrounding environment (e.g. soil (dust), air, water [quality and quantity], animal habitat)?** *(Describe all earth-disturbing work and any work that will affect air, water, or animal habitat in the project area. Explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts)* Proposed Project activities do not include any surface disturbance, nor do they impact the surrounding environment.
- **Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area?** No species listed or proposed to be listed as a Federal endangered or threatened species, or designated critical habitats are known to reside within the Proposed Project area.
- **Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as “Waters of the United States”?** No, the Proposed Project will not affect wetlands or Waters of the United States. No associated impacts will occur and no mitigation is required.
- **When was the water delivery system constructed?** The majority of the water delivery system was constructed by the late 1980s; however, some infrastructure continues to be constructed today as the service area is being built out.
- **Will the project result in any modification of or effects to individual features of an irrigation system (e.g., head gates, canals, or flumes)?** No, the Proposed Project will not result in any modification of or effect to individual features, such as head gates, canals, or flumes, of an irrigation system.
- **Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?** There are no buildings, structures, or features listed or eligible for listing on the National Register of Historic Places within the Proposed Project sites. There are, however, at least 10 buildings in the Old Town Historic District of the City of Temecula, which is within the RCWD service area. These buildings are in the well-developed Old Town area and the Proposed Project would not affect them.
- **Are there any known archeological sites in the Proposed Project area?** No, there are no known archeological sites in the Proposed Project area.
- **Will the project have a disproportionately high and adverse effect on low income or minority populations?** No, the Proposed Project will not have any adverse effects on low income or minority populations.
- **Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?** No, the Proposed Project will not limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands.
- **Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?** No, the Proposed Project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

**REQUIRED PERMITS / APPROVALS**

No permits or approvals are required for the Proposed Project.

**APPENDIX A  
FEDERALLY-APPROVED INDIRECT COST NEGOTIATION AGREEMENT**

**State and Local Governments  
Indirect Cost Negotiation Agreement**

EIN: 95-2415751

**Organization:**

Rancho California Water District  
P.O. Box 9017  
Temecula, CA 92589-9017

**Date:**

**Report No(s) .:**

**Filing Ref.:**

Last Negotiation Agreement  
dated April 18, 2018

The indirect cost rates contained herein are for use on grants, contracts, and other agreements with the Federal Government to which 2 CFR Part 200 applies for fiscal years beginning on or after December 26, 2014 subject to the limitations in Section II.A. of this agreement. Applicable OMB Circulars and the regulations at 2 CFR 225 will continue to apply to federal funds awarded prior to December 26, 2014. The rates were negotiated by the U.S. Department of the Interior, Interior Business Center, and the subject organization in accordance with the authority contained in applicable regulations.

**Section I: Rates**

Type	Effective Period		Rate	Locations	Applicable To
	From	To			
Final	07/01/17	06/30/18	93.13%	1/	All Fringe Benefits
Final	07/01/17	06/30/18	11.45%	2/	All V&E Overhead
Final	07/01/17	06/30/18	147.11%	2/	All G&A Overhead
Final	07/01/17	06/30/18	92.13%	3/	All Engineering Overhead
Final	07/01/17	06/30/18	22.58%	4/	All O&M Overhead
Provisional	07/01/19	06/30/20	93.13%	1/	All Fringe Benefits
Provisional	07/01/19	06/30/20	11.45%	2/	All V&E Overhead
Provisional	07/01/19	06/30/20	147.11%	2/	All G&A Overhead
Provisional	07/01/19	06/30/20	92.13%	3/	All Engineering Overhead
Provisional	07/01/19	06/30/20	22.58%	4/	All O&M Overhead

1/ **Base:** Total salaries and wages, excluding fringe benefits and standby labor.

2/ **Base:** Total direct salaries and wages, excluding fringe benefits and labor associated with (a) vehicle and equipment (V&E), (b) direct allocation, (c) operations, (d) standby, and (e) support services.

3/ **Base:** Total direct salaries and wages of (a) capital and (b) engineering fee-for-service functions, excluding fringe benefits.

4/ **Base:** Total direct salaries and wages of the operations and maintenance function, excluding fringe benefits and labor associated with (a) standby, (b) support, (c) mechanics, (d) capital, and other labor (civic).

**Treatment of fringe benefits:** Fringe benefits applicable to direct salaries and wages are treated as direct costs; fringe benefits applicable to indirect salaries and wages are treated as indirect costs.



**A. Limitations:** Use of the rate(s) contained in this agreement is subject to any applicable statutory limitations. Acceptance of the rate(s) agreed to herein is predicated upon these conditions: (1) no costs other than those incurred by the subject organization were included in its indirect cost rate proposal, (2) all such costs are the legal obligations of the grantee/contractor, (3) similar types of costs have been accorded consistent treatment, and (4) the same costs that have been treated as indirect costs have not been claimed as direct costs (for example, supplies can be charged directly to a program or activity as long as these costs are not part of the supply costs included in the indirect cost pool for central administration).

**B. Audit:** All costs (direct and indirect, federal and non-federal) are subject to audit. Adjustments to amounts resulting from audit of the cost allocation plan or indirect cost rate proposal upon which the negotiation of this agreement was based will be compensated for in a subsequent negotiation.

**C. Changes:** The rate(s) contained in this agreement are based on the organizational structure and the accounting system in effect at the time the proposal was submitted. Changes in organizational structure, or changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rate(s) in this agreement, require the prior approval of the responsible negotiation agency. Failure to obtain such approval may result in subsequent audit disallowance.

**D. Rate Type:**

**1. Fixed Carryforward Rate:** A fixed carryforward rate is based on an estimate of the costs that will be incurred during the period for which the rate applies. When the actual costs for such periods have been determined, an adjustment will be made to the rate for future periods, if necessary, to compensate for the difference between the costs used to establish the fixed rate and the actual costs.

**2. Provisional/Final Rates:** Within six (6) months after year end, a final indirect cost rate proposal must be submitted based on actual costs. Billings and charges to contracts and grants must be adjusted if the final rate varies from the provisional rate. If the final rate is greater than the provisional rate and there are no funds available to cover the additional indirect costs, the organization may not recover all indirect costs. Conversely, if the final rate is less than the provisional rate, the organization will be required to pay back the difference to the funding agency.

**3. Predetermined Rate:** A predetermined rate is an indirect cost rate applicable to a specified current or future period, usually the organization's fiscal year. The rate is based on an estimate of the costs to be incurred during the period. A predetermined rate is not subject to adjustment. (Because of legal constraints, predetermined rates are not permitted for Federal contracts; they may, however, be used for grants or cooperative agreements.)

**E. Rate Extension:** Only final and predetermined rates may be eligible for consideration of rate extensions. Requests for rate extensions of a current rate will be reviewed on a case-by-case basis. If an extension is granted, the non-Federal entity may not request a rate review until the extension period ends. In the last year of a rate extension period, the non-Federal entity must submit a new rate proposal for the next fiscal period.

F. Agency Notification: Copies of this document may be provided to other federal offices as a means of notifying them of the agreement contained herein.

G. Record Keeping: Organizations must maintain accounting records that demonstrate that each type of cost has been treated consistently either as a direct cost or an indirect cost. Records pertaining to the costs of program administration, such as salaries, travel, and related costs, should be kept on an annual basis.

H. Reimbursement Ceilings: Grantee/contractor program agreements providing for ceilings on indirect cost rates or reimbursement amounts are subject to the ceilings stipulated in the contract or grant agreements. If the ceiling rate is higher than the negotiated rates in Section I of this agreement, the negotiated rates will be used to determine the maximum allowable indirect cost.

I. Use of Other Rates: If any federal programs are reimbursing indirect costs to this grantee/contractor by a measure other than the approved rate(s) in this agreement, the grantee/contractor should credit such costs to the affected programs, and the approved rate(s) should be used to identify the maximum amount of indirect cost allocable to these programs.

J. Central Service Costs: If the proposed central service cost allocation plan for the same period has not been approved by that time, the indirect cost proposal may be prepared including an amount for central services that is based on the latest federally-approved central service cost allocation plan. The difference between these central service amounts and the amounts ultimately approved will be compensated for by an adjustment in a subsequent period.

K. Other:

1. The purpose of an indirect cost rate is to facilitate the allocation and billing of indirect costs. Approval of the indirect cost rate does not mean that an organization can recover more than the actual costs of a particular program or activity.

2. Programs received or initiated by the organization subsequent to the negotiation of this agreement are subject to the approved indirect cost rate(s) if the programs receive administrative support from the indirect cost pool. It should be noted that this could result in an adjustment to a future rate.

3. Indirect cost proposals must be developed (and, when required, submitted) within six (6) months after the close of the governmental unit's fiscal year, unless an exception is approved by the cognizant agency for indirect costs.

**Section III: Acceptance**

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Listed below are the signatures of acceptance for this agreement:

By the State & Local Government:

By the Cognizant Federal Government Agency:

Rancho California Water District  
State/Local Government

U.S. Department of the Interior  
Agency

 /s/  
Signature

\_\_\_\_\_/s/  
Signature

Richard R. Aragon  
Name (Type or Print)

Craig A. Wills  
Name

Assistant General Manager-CFO/Treasurer  
Title

Division Chief  
Indirect Cost Services Division  
Title

7-9-19  
Date

U.S. Department of the Interior  
Interior Business Center  
Agency

Negotiated by Stacy Frost  
Telephone (916) 930-3815

**APPENDIX B  
VERIFICATION OF SAM ACCOUNT**

**SYSTEM FOR AWARD MANAGEMENT (SAM) REGISTRATION**

The District maintains an open and active SAM registration with current information. A screen shot of the District’s SAM account information is provided below as verification of SAM registration.

**SAM Status Tracker**

Check Entity Registration Status

**Page Description**

You can quickly check an entity's registration status in SAM by entering a DUNS Number or CAGE Code. The SAM Status Tracker will show you the current status of that entity's most recent record, as well as tell you what steps are left to complete based on why they are registering.

The SAM Status Tracker only returns the registration status for publicly-searchable registration records. If you are a Federal government user, please log into SAM and use the Search Records link in the main navigation menu to view registrations or data that are not publicly available.

**Use the SAM Status Tracker Now**

Check registration status by typing in a DUNS Number.

DUNS Number  Plus 4 (Optional)








Or, check registration status by typing in a CAGE Code.

CAGE Code

**RANCHO CALIFORNIA WATER DISTRICT**

**Status: Active**

Your registration was activated on Jul 02, 2019. It expires on Jul 01, 2020 which is one year after you submitted it for processing.

						
<b>Core Data</b>	<b>Assertions</b>	<b>Reps &amp; Certs</b>	<b>POCs</b>	<b>Submit</b>	<b>Processing</b>	<b>Active</b>
Completed	Not Required	Not Required	Completed	Completed	Completed	Completed

**APPENDIX C**  
**MOST RECENT GROUNDWATER PRODUCTION RECOMMENDATIONS**

Due to the size of the file associated with this Appendix, it was submitted separately to as an “attachment” to grants.gov

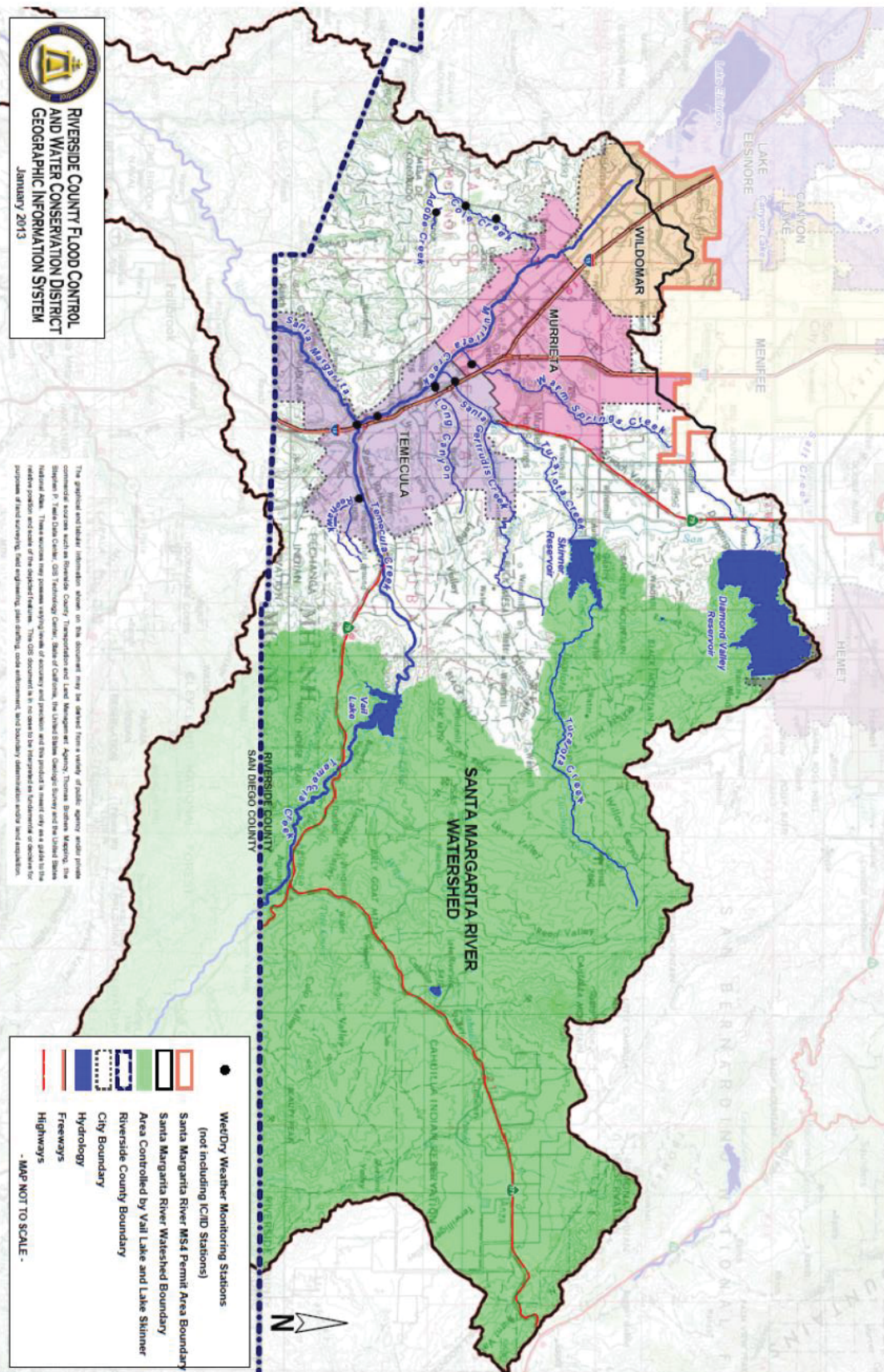
**APPENDIX D  
PROJECT LOCATION**





**RIVERSIDE COUNTY FLOOD CONTROL  
AND WATER CONSERVATION DISTRICT  
GEOGRAPHIC INFORMATION SYSTEM  
January 2013**

The geographic and related information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, Esri, Inc., San Diego County GIS Technology Center, State of California, the United States Geological Survey and the United States National Aeronautics and Space Administration. These sources may possess varying levels of accuracy and precision and this product is intended only as a guide to the location of features shown. It is not intended to be used for any purpose other than the purposes of flood planning, flood engineering, flood damage and mitigation, flood hazard identification and/or flood reduction.



●	Wet/Dry Weather Monitoring Stations (not including ICRD Stations)
▭ (orange border)	Santa Margarita River MS4 Permit Area Boundary
▭ (green border)	Santa Margarita River Watershed Boundary
▭ (blue border)	Area Controlled by Vail Lake and Lake Skinner
▭ (dotted border)	Riverside County Boundary
▭ (solid border)	City Boundary
▭ (dashed border)	Hydrology
▭ (solid border)	Freeways
▭ (solid border)	Highways

- MAP NOT TO SCALE -



# Recommended Ground Water Production

Fiscal Year July 1, 2019 through June 30, 2020

PREPARED FOR:

Rancho California Water District

February 11, 2019



THIS REPORT IS RENDERED TO RANCHO CALIFORNIA WATER DISTRICT AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. THE CONCLUSIONS OF THIS REPORT ARE BASED UPON DATA AS SUPPLIED BY RANCHO CALIFORNIA WATER DISTRICT AND WESTERN MUNICIPAL WATER DISTRICT. ALL CALCULATIONS WERE PERFORMED USING ACCEPTED PROFESSIONAL STANDARDS.



\_\_\_\_\_  
Dennis Williams, PHD, PG, CHG  
Principal Geohydrologist



\_\_\_\_\_  
Chris Coppinger, PG, CHG  
Senior Geohydrologist

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**RANCHO CALIFORNIA WATER DISTRICT  
RECOMMENDED GROUND WATER PRODUCTION  
FISCAL YEAR JULY 1, 2019 THROUGH JUNE 30, 2020**

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**FIGURES, TABLES, APPENDICES**

**FIGURES**

<b>No.</b>	<b>Description</b>
1	Rancho California Water District Well Locations
2	Hydrologic Subunits and Recommended 2019-2020 Production
3	Hydrographs of Selected Pauba Wells – Model Simulation under Recommended 2019-2020 Pumping Conditions
4	Hydrographs of Selected Temecula Wells – Model Simulation under Recommended 2019-2020 Pumping Conditions

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**TABLES**

<b>No.</b>	<b>Description</b>
1	Recommended Ground Water Production by Hydrologic Subunit – July 1, 2019 to June 30, 2020
2	Recommended Ground Water Production by Well Number – July 1, 2019 to June 30, 2020
3	Summary of Model Simulated Change in Water Levels for Pauba and Temecula Aquifer Wells under Recommended 2019-2020 Pumping Conditions

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**APPENDICES**

<b>Ltr.</b>	<b>Description</b>
A	Trend Analysis for Changing Ground Water Levels and Production – January 1981 to September 2018
B	Long-Term Hydrographs for Index Wells – January 1981 to September 2018
C	Western Municipal Water District Wells Long-Term Hydrographs and Production – January 1981 to September 2018

**RANCHO CALIFORNIA WATER DISTRICT  
RECOMMENDED GROUND WATER PRODUCTION  
FISCAL YEAR JULY 1, 2019 THROUGH JUNE 30, 2020**

**1.0 EXECUTIVE SUMMARY**

The purpose of the annual water audit review is to recommend a ground water production program for the period from July 1, 2019 through June 30, 2020 (fiscal year 2019-20). This review was performed using the most current data from the water year ending on September 30, 2018.

The ground water production recommendations for fiscal year 2019-2020 are based primarily on a review of individual well production and historical hydrographs. During the review, ground water level elevations from all production and monitoring wells were considered. Hydrologic subareas and “index wells” representing water level changes in the subarea were used to help formulate a recommendation for production during fiscal year 2019-20. This recommendation also includes input from a workshop held between Rancho California Water District (RCWD) and GEOSCIENCE Support Services, Inc. (GEOSCIENCE) personnel. The workshop included discussions of actual well production rates, instantaneous yield, natural and artificial recharge, water quality issues, pump settings and well maintenance factors.

Where water level trends in subarea index wells indicate a decline over several years, lower production values have been recommended. Where water level declines have not occurred, and as other factors permitted, recommended production values have been increased. Total recommended production for fiscal year 2019-2020 is 31,110 acre-ft. The recommended amount of annual production for the wells are consistent with RCWD’s ground water management plan and were made with consideration given to historical water levels, precipitation, production, and expected natural and artificial recharge. Consideration was also given to the projected production from Western Municipal Water District’s (WMWD) production wells in the northern Murrieta Valley area. As always, in keeping with sound ground water basin management practices, the recommended production should be considered as a guideline only, and is subject to revision as additional data become available.

For fiscal year 2019-20, the District intends to recharge 13,000 acre-ft of untreated import water in the Upper Valle De Los Caballos (VDC) area and utilize 680 acre-ft of cyclic storage under the RCWD and Metropolitan Water District (MWD) of Southern California Cyclic Storage Agreement. Considering a total

artificial recharge of 13,680 acre-ft and a total recommended ground water production of 31,110 acre-ft, the net ground water withdrawal from the basin for fiscal year 2019-2020 will be 17,430 acre-ft.

Tables 1 and 2 summarize recommended fiscal year 2019-20 ground water production. Table 1 shows the production recommendations sorted by hydrologic subunit<sup>1</sup> and Table 2 shows them sorted by RCWD well number. Figure 1 is a general map showing RCWD and WMWD well locations in the Murrieta-Temecula Ground Water Basin. Figure 2 shows the recommended 2019-2020 production for each of the District's 56 ground water pumping wells. Figures 3 and 4 provide the model-predicted water levels and Table 3 summarizes the predicted change in water levels for the Pauba and Temecula index wells in each subarea under the recommended fiscal year 2019-20 pumping conditions.

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<sup>1</sup> The names and boundaries of the nine hydrologic subunits are shown on Figure 1.



## **2.0 METHODOLOGY**

A ground water audit (water budget review) was performed to evaluate and recommend ground water production levels for fiscal year July 1, 2019 to June 30, 2020. The underlying philosophy guiding the audit has been, and continues to be, one of sound basin management. This management involves the operation of the ground water basin within safe yield limits so as not to create permanent overdraft (mining) or other undesirable conditions that could degrade water quality or violate legal restrictions. Determination of the amount of ground water hydrologically, economically, and legally available to RCWD is an ongoing process of evaluation and review.

### **2.1 Review of Historical Records of Ground Water Levels and Production**

#### **2.1.1 Index Wells, Production Wells, and Monitoring Wells**

In the wellfield optimization study (conducted by GEOSCIENCE in April 1993), the RCWD area was divided into small polygonal areas based on geohydrologic relationships and the relative locations of RCWD production wells (see Figure 1). Numbers were assigned to each subarea for identification purposes. An “index well” was chosen for each polygonal subarea. Index wells reflect changes in water levels in each of the production wells within a subarea. Generally, index wells are non-production monitoring wells having several years of historical water level data. When these criteria could not be met, a production well which best reflected water level changes in the subarea was chosen as an index well.

Multiple regression analyses were conducted for each polygonal subarea based on index well monthly water levels, production well monthly water levels, monthly production, and monthly precipitation in the area (i.e., Temecula Station No. 217). Long-term (i.e. January 1981 to September 2018) and short-term (i.e., October 2017 to September 2018) water level changes in each index well were then used to determine the water level trends for the corresponding subarea.

#### **2.1.2 Review of Water Level and Production Trends**

Trend analyses of changing long- and short-term ground water levels and production was performed for 56 of the District’s production wells (see Appendix A). January 1981 to September 2018 was designated as the period for long-term water level trend analysis, and July 2017 to June 2018 was designated as the period for short-term water level trend analysis. For wells with available construction data, the long-term graph also includes elevations of screen interval(s) to show the relationship between the

uppermost screen section and water level trend. Long-term water levels are provided for 17<sup>2</sup> index wells (Appendix B), and Appendix C contains plots of long-term water levels and production for the seven (7) WMWD wells located in the northern Murrieta Valley area.

The recommended production values for fiscal year 2019-2020 were first estimated based on water level trends and historical production within each subarea. Where water level trends in production wells and index wells indicated a decline over several years, lower production values have been recommended. Where water level declines have not occurred, recommended production values may have been increased contingent on other constraints (e.g., water quality, mechanical or legal).

## **2.2 Workshop with RCWD and GEOSCIENCE Personnel**

A workshop between RCWD and GEOSCIENCE personnel was held on November 6, 2018 for the purpose of discussing details regarding recommended production levels for the previous fiscal year and any specific problems or concerns on a well-by-well basis. For each well, items such as the instantaneous yield, static submergence, pump lowering potential, long- and short-term water level trends, water quality, construction, litigation, and air problems were discussed and tabulated. The charts provided as Appendix A summarizes these factors which are taken into consideration when developing a recommended production for each well. The initial production recommendations were then revised based on the well-by-well factors as discussed during the workshop.

## **2.3 Verification of Recommended Production**

The recommended ground water production for fiscal year 2019-2020 was verified using the updated surface and ground water model of the Murrieta-Temecula Ground Water Basin (GEOSCIENCE, 2014). In addition, the proposed amounts of artificial recharge in the upper VDC area were simulated using the model. Sources for the recharge water have previously included purchased untreated import water and releases from Vail Lake, however, no releases are planned from Vail Lake in fiscal year 2019-2020. The model was also used to simulate change in water levels for a two-year period (October 2018 to September 2020) under the recommended fiscal year 2019-20 production conditions.

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<sup>2</sup> It should be noted that water levels in RCWD Well No. 414 (Pauba Aquifer index well for Hydrologic Subarea No. 13) have not been measured since September 2002. Based on existing water level data, RCWD Well No. 499, which meets all criteria for an index well, may be considered as a replacement for Well No. 414.

### **2.3.1 Murrieta-Temecula Ground Water Basin Model**

The surface and ground water model of the Murrieta-Temecula Ground Water Basin (GEOSCIENCE, 2003) was first developed between 1995 and 1999 as a cooperative technical effort involving representatives of Camp Pendleton and the RCWD, their respective consultants (Stetson and GEOSCIENCE), their respective legal advisors, the Santa Margarita River Watermaster, and the U.S. Geological Survey. The model was updated to fulfill the requirement of the March 26, 2002 Cooperative Water Resources Management Agreement. Based on the review of the types of surface water models available, the Technical Advisory Committee (TAC) decided to use GSFLOW modeling software, which uses an integrated surface water model (PRMS) and ground water model (MODFLOW-2005), to account for the surface water recharge within the model boundary. The Murrieta-Temecula Ground Water Basin Model boundary was expanded during the refinement process in order to incorporate the PRMS watershed for the purpose of integrating the PRMS and MODFLOW components. The model grid covers an area of approximately 551 square miles (352,617 acres) with a uniform finite-difference grid consisting of 300 rows in the north to south direction and 320 columns in the west to east direction for a total of 96,000 cells per layer, or 480,000 cells total. Each model cell of the Murrieta-Temecula Ground Water Basin Model represents an area of 400 feet by 400 feet (GEOSCIENCE, 2014). Originally, the model cell size varied from 600 feet by 600 feet up to 5,000 feet by 5,000 feet. The refined model cell size allows for a more accurate description of the location of model features.

### **2.3.2 Model Simulation Run**

The model run was simulated for a period of two years from October 2018 through September 2020 with a total Upper VDC recharge of 13,000 acre-ft/yr. The artificial recharge includes 13,000 acre-ft of purchased untreated import water and an assumed 680 acre-ft of MWD cyclic storage. It was assumed there would be no release from Vail Lake in the simulation period. Simulated ground water pumping was based on the 2019-2020 recommended production. Geohydrologic parameters such as hydraulic conductivity, storativity, leakance, fault conductance, and streambed conductance were based on values from the updated model. Precipitation was based on the average of the selected hydrologic base period from 1983 to 2007. This base period covers both wet and dry hydrologic cycles, and the average precipitation is approximately the same as the long-term average of 15.5 inches.

Results of the model simulation run are provided as hydrographs (water level changes over time) for selected Pauba Aquifer wells (Figure 3) and Temecula Aquifer wells (Figure 4) located in the 21 hydrologic areas of the ground water basin. The net withdrawal of ground water from the basin is 18,110 acre-ft (31,110 acre-ft pumping less 13,000 acre-ft of artificial recharge in the Upper VDC area). As shown on Figures 3 and 4, operation of the ground water basin under the recommended 2019-2020 pumping and proposed artificial recharge in the upper VDC area are predicted to change water levels

from between an increase of approximately 1 ft and a decrease of approximately 4 ft in the Pauba Aquifer. Water levels within the Temecula Aquifer (see Figure 4) under the same conditions are predicted to change by approximately 3 ft increase to a 5 ft decline by the end of September 2020. Predicted change in water levels are summarized in Table 3.

### **3.0 RECOMMENDED GROUND WATER PRODUCTION**

#### **3.1 Pumping Schedule for Wolf Valley Wells**

##### **3.1.1 Well 211**

In order to monitor the aquifer compression/rebound under pumping conditions in the Wolf Valley area, ground water production at Wolf Valley Well 211 was recommenced in July 1994. During the period from fiscal year 1994-1995 through fiscal year 1998-1999, Well 211 was operated approximately 6 hours every other day. This limited schedule yielded an annual production of approximately 600 acre-ft. Starting in fiscal year 1997-1998 and continuing through November of 2002, the pumping schedule for Well 211 was increased, producing a total of approximately 1,200 acre-ft to 1,628 acre-ft of ground water annually.

Well 211 was turned off in December 2002 due to issues related with suction break; therefore, the annual production for fiscal year 2002-2003 decreased to approximately 420 acre-ft. During fiscal years 2003-2004 through 2007-2008, Well 211 was inactive, then reactivated for fiscal years 2008-2009 through 2017-2018 during which total production ranged from approximately 337 acre-ft to 754 acre-ft. For fiscal year 2019-2020, GEOSCIENCE recommends that Well 211 produce 400 acre-ft.

##### **3.1.2 Wells 119 and 122**

In fiscal year 1996-1997, Well 119 was initially turned on during even days of the month between the hours of 6:00 AM and noon, at a pumping rate of approximately 500 gpm. This schedule yielded a production of approximately 500 acre-ft. Well 122 was left idle in fiscal year 1996-1997. For fiscal year 1997-1998, an increased annual production of 750 acre-ft and 500 acre-ft was recommended for Wells 119 and 122, respectively. Production for Well 119 was increased slightly in fiscal years 1998-1999 and 1999-2000. During fiscal years 2000-2001 through 2017-2018, annual production for Well 122 ranged from 178 acre-ft to 1,496 acre-ft, and from 178 acre-ft to 1,588 acre-ft for Well 119. For fiscal year 2019-2020, it is recommended that Wells 119 and 122 produce a total of 400 acre-ft each (800 acre-ft combined production).

#### **3.2 Pumping Schedule for the Southern Murrieta Wells**

On April 1, 1992, in order to monitor aquifer compression/rebound under pumping conditions, RCWD reactivated the four southern Murrieta wells (101, 102, 118, and 121). The duration of pumping for the program's first phase was eight hours per day with only two wells operating at the same time. Since the 1995-1996 fiscal year, pumping of the southern Murrieta wells has been according to the program's planned second phase schedule. This second phase schedule pumps two wells at a time for 16 hours per

day, every other day. This increased pumping program and the corresponding monitoring program produced data that conclusively showed no occurrence of non-recoverable aquifer compaction. These data also indicate that the compression and rebound of this aquifer is closely related to ground water pumping. Continued monitoring and analysis of these aquifers will prevent the occurrence of future problems.

Actual annual production amounts for fiscal years 2001-2002 through 2017-2018 from these southern Murrieta wells ranged from 0 acre-ft to 1,927 acre-ft. For fiscal year 2019-2020, it is recommended that 1,000 acre-ft is produced by Well 102, and no production is to occur from Wells 101, 118, and 121.

### **3.3 Pumping Schedule for the Northern Murrieta Wells**

In fiscal year 2006-2007, RCWD Wells (135, 144, 145, 146, and 155) in the Northern Murrieta Valley produced approximately 1,465 acre-ft of water. In fiscal year 2007-2008, these wells produced 1,323 acre-ft. In fiscal year 2007-2008, Well 156 was activated and produced 396 acre-ft of water. Since that time through fiscal year 2017-2018, the total annual production from RCWD wells ranged from approximately 386 to 2,310 acre-ft. During the same period of time, the total annual production for WMWD-owned wells in the area ranged from approximately 401 to 1,041 acre-ft.

For fiscal year 2019-2020, the recommended production for RCWD Wells 135, 144, 145, 146, 155, and 156 is 25 acre-ft, 300 acre-ft, 300 acre-ft, 15 acre-ft, 20 acre-ft, and 650 acre-ft, respectively, for a total recommended production of RCWD is approximately 1,310 acre-ft from the Northern Murrieta wells.

### **3.4 Pumping Schedule for the Upper Pauba Valley Wells**

In fiscal year 2017-2018, there was 0 appreciable recharge in the Upper VDC recharge basin area. For fiscal year 2019-2020, the recommended Upper VDC purchased untreated import water artificial recharge is 13,000 acre-ft, with an additional 680 acre-ft of MWD cyclic storage recharge for a total artificial recharge of 13,680 acre-ft. In order to optimize the artificial recharge and recovery operations for the Upper VDC recharge facility, it is recommended that RCWD operate Wells 152, 153, 154, 157, 158 and 161 as much as possible. During fiscal years 2005-2006 through 2017-2018 the total production for these Upper VDC recharge recovery wells ranged from 1,416 acre-ft to 9,037 acre-ft. For fiscal year 2019-2020, the total recommended production for these wells is approximately 8,200 acre-ft.

In addition, production from Wells 164, 132, 236<sup>3</sup>, and 233 should be maintained at a high level, creating a “pumping depression” to maximize VDC recharge capabilities. For fiscal year 2019-2020, the total recommended production for these four Upper Pauba Valley wells is 3,400 acre-ft.

### **3.5 Recommended Production for Fiscal Year 2019-2020**

The final recommended production values for the wells during fiscal year 2019-2020 are provided in Tables 1 and 2 (by Hydrologic Unit and well number, respectively). The locations of the wells are shown on Figure 1. Recommended production amounts are also shown graphically by hydrologic subunit on Figure 2. The total recommended production for the period from July 1, 2019 through June 30, 2020 is 31,110 acre-ft, which will be produced from 46 active wells.<sup>4</sup> Considering the recommended total ground water production and a total artificial recharge of 13,680 acre-ft, the net ground water withdrawal from the basin for fiscal year 2019-2020 will be approximately 17,430 acre-ft.

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<sup>3</sup> Well 210 was destroyed in 2016 and replaced with new Well 236, which was operational in 2017.

<sup>4</sup> RCWD has a total of 56 production wells; however, some wells are not intended to be operated during the 2019-2020 fiscal year. Refer to Appendix A for detailed operational information on each of the wells.

#### **4.0 REFERENCES**

GEOSCIENCE Support Services, Inc. (GEOSCIENCE), 2003. *Surface and Ground Water Model of the Murrieta-Temecula Ground Water Basin, California*. 3 Volumes. January 31, 2003. Prepared for Rancho California Water District.

GEOSCIENCE, 2014. *Surface and Ground Water Model of the Murrieta-Temecula Ground Water Basin, California, Model Update and Refinement*. April 25, 2014. Prepared for Rancho California Water District.

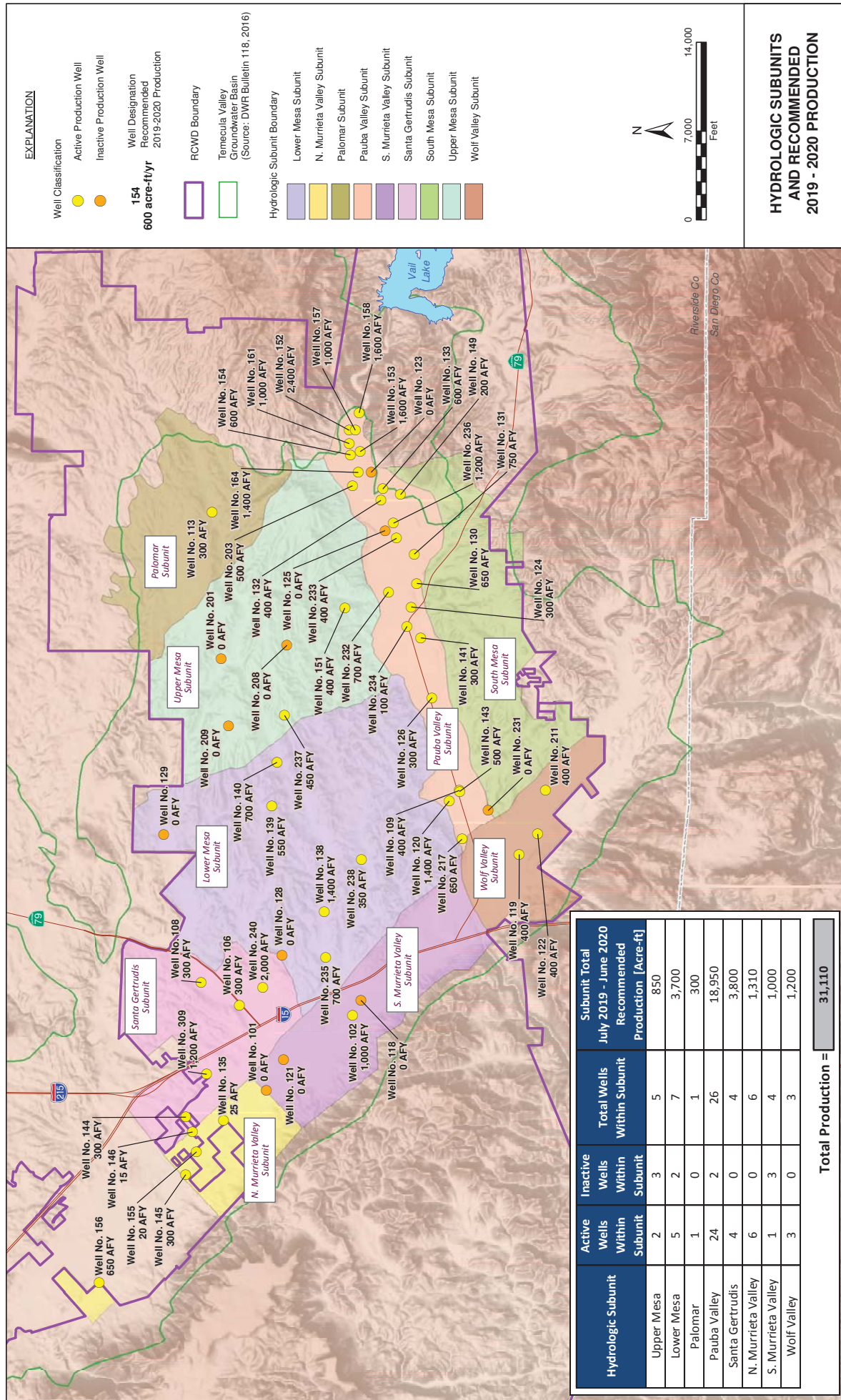


**FIGURES**

***GEOSCIENCE***







**EXPLANATION**

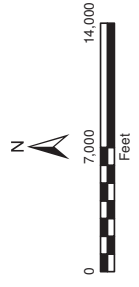
Well Classification  
 Active Production Well  
 Inactive Production Well

154  
 Well Designation  
 Recommended  
 2019-2020 Production  
 600 acre-ft/yr

RCWD Boundary  
 Temecula Valley  
 Groundwater Basin  
 (Source: DWR Bulletin 118, 2016)

Hydrologic Subunit Boundary

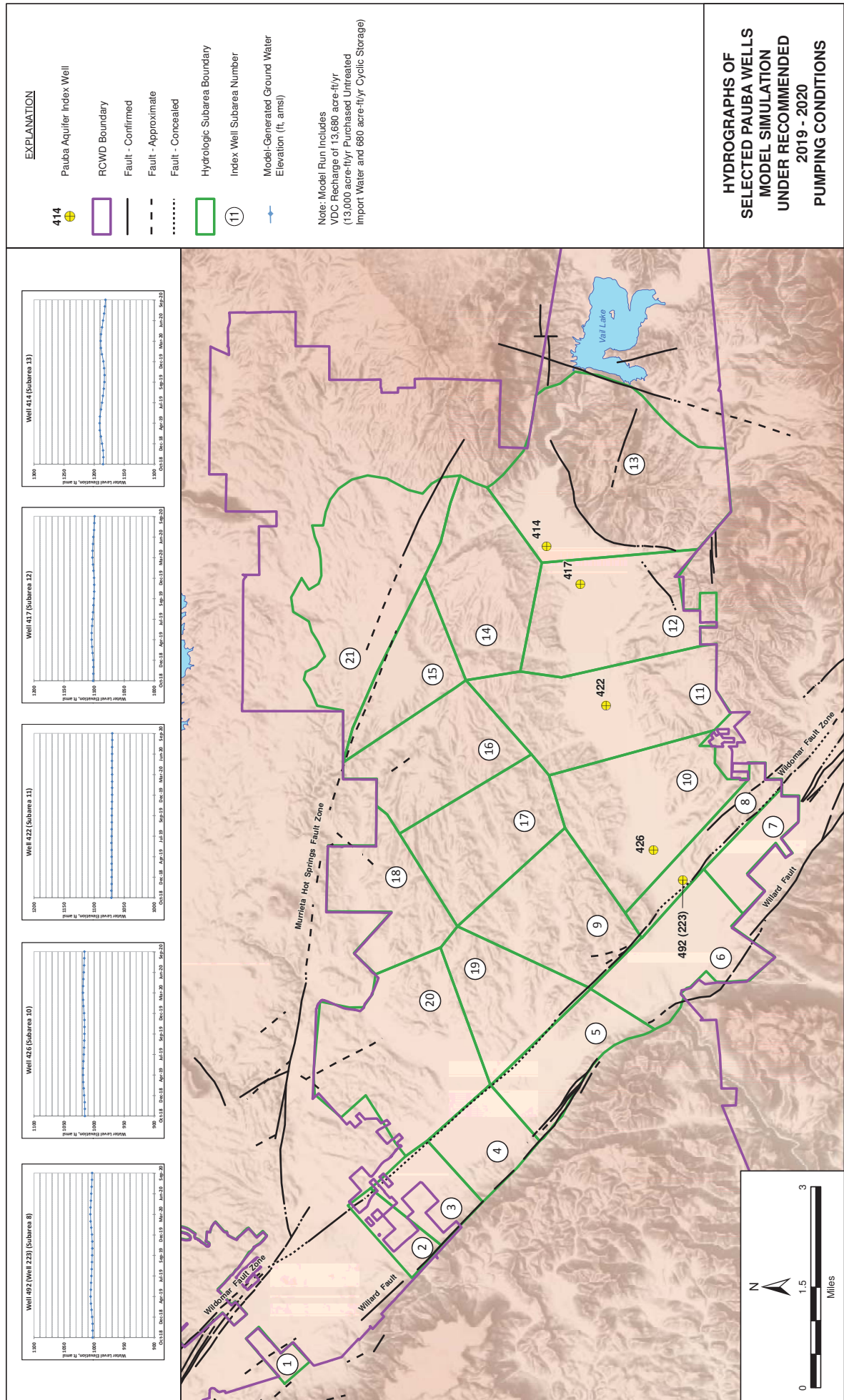
Lower Mesa Subunit  
 N. Murrieta Valley Subunit  
 Palomar Subunit  
 Pauba Valley Subunit  
 S. Murrieta Valley Subunit  
 Santa Gertrudis Subunit  
 South Mesa Subunit  
 Upper Mesa Subunit  
 Wolf Valley Subunit



**HYDROLOGIC SUBUNITS  
 AND RECOMMENDED  
 2019 - 2020 PRODUCTION**

Hydrologic Subunit	Active Wells Within Subunit	Inactive Wells Within Subunit	Total Wells Within Subunit	Subunit Total July 2019 - June 2020 Recommended Production [Acre-ft]
Upper Mesa	2	3	5	850
Lower Mesa	5	2	7	3,700
Palomar	1	0	1	300
Pauba Valley	24	2	26	18,950
Santa Gertrudis	4	0	4	3,800
N. Murrieta Valley	6	0	6	1,310
S. Murrieta Valley	1	3	4	1,000
Wolf Valley	3	0	3	1,200
<b>Total Production =</b>				<b>31,110</b>

11 Feb 19  
 RANCHO CALIFORNIA WATER DISTRICT  
 RECOMMENDED GROUND WATER PRODUCTION - FISCAL YEAR JULY 1, 2019 THROUGH JUNE 30, 2020  
**FIGURE 2**  
 GEOSCIENCE



**FIGURE 3**  
**GEOSCIENCE**  
**FRANCO CALIFORNIA WATER DISTRICT**  
**RECOMMENDED GROUND WATER PRODUCTION - FISCAL YEAR JULY 1, 2019 THROUGH JUNE 30, 2020**



**TABLES**

Rancho California Water District  
 Recommended Ground Water Production  
 Fiscal Year July 1, 2019 through June 30, 2020

**Recommended Ground Water Production by Hydrologic Subunit  
 July 1, 2019 to June 30, 2020**

RCWD Well No.	Hydrologic Subunit	Aquifer	July 1, 2017 - June 30, 2018 Actual Production [Acre-ft]	July 1, 2019 - June 30, 2020 Recommended Production [Acre-ft]
135	N. Murrieta Valley	Temecula	27	25
144	N. Murrieta Valley	Temecula	235	300
145	N. Murrieta Valley	Temecula	90	300
155	N. Murrieta Valley	Temecula	19	20
156	N. Murrieta Valley	Temecula	925	650
	<b>Subtotal</b>		<b>1,296</b>	<b>1,295</b>
146	N. Murrieta Valley	Pauba	15	15
	<b>Subtotal</b>		<b>15</b>	<b>15</b>
101	S. Murrieta Valley	Temecula	0	0
102	S. Murrieta Valley	Temecula	0	1,000
118	S. Murrieta Valley	Temecula	0	0
121	S. Murrieta Valley	Temecula	0	0
	<b>Subtotal</b>		<b>0</b>	<b>1,000</b>
122	Wolf Valley	Temecula	601	400
211	Wolf Valley	Temecula	754	400
	<b>Subtotal</b>		<b>1,355</b>	<b>800</b>
119	Wolf Valley	Pauba	178	400
	<b>Subtotal</b>		<b>178</b>	<b>400</b>
240*	Santa Gertrudis	Temecula	836	2,000
309	Santa Gertrudis	Temecula	1,661	1,200
	<b>Subtotal</b>		<b>2,497</b>	<b>3,200</b>
106	Santa Gertrudis	Combined	12	300
108	Santa Gertrudis	Combined	558	300
	<b>Subtotal</b>		<b>570</b>	<b>600</b>

**Table 1**

**Recommended Ground Water Production by Hydrologic Subunit  
 July 1, 2019 to June 30, 2020**

RCWD Well No.	Hydrologic Subunit	Aquifer	July 1, 2017 - June 30, 2018 Actual Production [Acre-ft]	July 1, 2019 - June 30, 2020 Recommended Production [Acre-ft]
128	Lower Mesa	Temecula	0	0
129	Lower Mesa	Temecula	0	0
138	Lower Mesa	Temecula	1,724	1,400
139	Lower Mesa	Temecula	712	550
140	Lower Mesa	Temecula	816	700
235	Lower Mesa	Temecula	888	700
238*	Lower Mesa	Temecula	90	350
		<b>Subtotal</b>	<b>4,230</b>	<b>3,700</b>
151	Upper Mesa	Temecula	671	400
201	Upper Mesa	Temecula	0	0
208	Upper Mesa	Temecula	0	0
209	Upper Mesa	Temecula	0	0
237*	Upper Mesa	Temecula	238	450
		<b>Subtotal</b>	<b>909</b>	<b>850</b>
120	Pauba	Temecula	1,401	1,400
124**	Pauba	Temecula	361	300
125**	Pauba	Temecula	0	0
126	Pauba	Temecula	340	300
130	Pauba	Temecula	703	650
131	Pauba	Temecula	779	750
133	Pauba	Temecula	350	600
143	Pauba	Temecula	727	500
149	Pauba	Temecula	127	200
203	Pauba	Temecula	509	500
217	Pauba	Temecula	715	650
		<b>Subtotal</b>	<b>6,012</b>	<b>5,850</b>

**Table 1**



Rancho California Water District  
 Recommended Ground Water Production  
 Fiscal Year July 1, 2019 through June 30, 2020

**Recommended Ground Water Production by Hydrologic Subunit  
 July 1, 2019 to June 30, 2020**

RCWD Well No.	Hydrologic Subunit	Aquifer	July 1, 2017 - June 30, 2018 Actual Production [Acre-ft]	July 1, 2019 - June 30, 2020 Recommended Production [Acre-ft]
109	Pauba	Pauba	435	400
141	Pauba	Pauba	404	300
152	Pauba	Pauba	2,756	2,400
153	Pauba	Pauba	3,065	1,600
154	Pauba	Pauba	187	600
157	Pauba	Pauba	946	1,000
158	Pauba	Pauba	1,747	1,600
161	Pauba	Pauba	336	1,000
164	Pauba	Pauba	1,396	1,400
236*	Pauba	Pauba	1,360	1,200
233	Pauba	Pauba	538	400
		<b>Subtotal</b>	<b>13,170</b>	<b>11,900</b>
123	Pauba	Combined	0	0
132	Pauba	Combined	356	400
232	Pauba	Combined	710	700
234	Pauba	Combined	32	100
		<b>Subtotal</b>	<b>1,098</b>	<b>1,200</b>
113	Palomar	Temecula	422	300
		<b>Subtotal</b>	<b>422</b>	<b>300</b>
		<b>Total Recommended Production</b>	<b>31,752</b>	<b>31,110</b>

\* New well.

\*\* Existing well scheduled for replacement in 2018/19.

**Table 1**

Rancho California Water District  
 Recommended Ground Water Production  
 Fiscal Year July 1, 2019 through June 30, 2020

**Recommended Ground Water Production by Well Number  
 July 1, 2019 to June 30, 2020**

RCWD Well No.	Hydrologic Subunit	Aquifer	July 2019 - June 2020 Recommended Production [Acre-ft]	Short- and Long- Term Hydrographs Located in Appendix A Page Number
101	S. Murrieta Valley	Temecula	0	A-1
102	S. Murrieta Valley	Temecula	1,000	A-2
106	Santa Gertrudis	Combined	300	A-3
108	Santa Gertrudis	Combined	300	A-4
109	Pauba	Pauba	400	A-5
113	Palomar	Temecula	300	A-6
118	S. Murrieta Valley	Temecula	0	A-7
119	Wolf Valley	Pauba	400	A-8
120	Pauba	Temecula	1,400	A-9
121	S. Murrieta Valley	Temecula	0	A-10
122	Wolf Valley	Temecula	400	A-11
123	Pauba	Combined	0	A-12
124**	Pauba	Temecula	300	A-13
125**	Pauba	Temecula	0	A-14
126	Pauba	Temecula	300	A-15
128	Lower Mesa	Temecula	0	A-16
129	Lower Mesa	Temecula	0	A-17
130	Pauba	Temecula	650	A-18
131	Pauba	Temecula	750	A-19
132	Pauba	Combined	400	A-20
133	Pauba	Temecula	600	A-21
135	N. Murrieta Valley	Temecula	25	A-22
138	Lower Mesa	Temecula	1,400	A-23
139	Lower Mesa	Temecula	550	A-24

**Table 2**

Rancho California Water District  
 Recommended Ground Water Production  
 Fiscal Year July 1, 2019 through June 30, 2020

**Recommended Ground Water Production by Well Number  
 July 1, 2019 to June 30, 2020**

**Table 2**

RCWD Well No.	Hydrologic Subunit	Aquifer	July 2019 - June 2020 Recommended Production [Acre-ft]	Short- and Long- Term Hydrographs Located in Appendix A Page Number
140	Lower Mesa	Temecula	700	A-25
141	Pauba	Pauba	300	A-26
143	Pauba	Temecula	500	A-27
144	N. Murrieta Valley	Temecula	300	A-28
145	N. Murrieta Valley	Temecula	300	A-29
146	N. Murrieta Valley	Pauba	15	A-30
149	Pauba	Temecula	200	A-31
151	Upper Mesa	Temecula	400	A-32
152	Pauba	Pauba	2,400	A-33
153	Pauba	Pauba	1,600	A-34
154	Pauba	Pauba	600	A-35
155	N. Murrieta Valley	Temecula	20	A-36
156	N. Murrieta Valley	Temecula	650	A-37
157	Pauba	Pauba	1,000	A-38
158	Pauba	Pauba	1,600	A-39
161	Pauba	Pauba	1,000	A-40
164	Pauba	Pauba	1,400	A-41
201	Upper Mesa	Temecula	0	A-42
203	Pauba	Temecula	500	A-43
208	Upper Mesa	Temecula	0	A-44
209	Upper Mesa	Temecula	0	A-45
211	Wolf Valley	Temecula	400	A-46
217	Pauba	Temecula	650	A-47
232	Pauba	Combined	700	A-48
233	Pauba	Pauba	400	A-49

Rancho California Water District  
 Recommended Ground Water Production  
 Fiscal Year July 1, 2019 through June 30, 2020

**Recommended Ground Water Production by Well Number  
 July 1, 2019 to June 30, 2020**

RCWD Well No.	Hydrologic Subunit	Aquifer	July 2019 - June 2020 Recommended Production [Acre-ft]	Short- and Long- Term Hydrographs Located in Appendix A Page Number
234	Pauba	Combined	100	A-50
235	Lower Mesa	Temecula	700	A-51
236*	Pauba	Pauba	1,200	A-52
237*	Upper Mesa	Temecula	450	A-53
238*	Lower Mesa	Temecula	350	A-54
240*	Santa Gertrudis	Temecula	2,000	A-55
309	Santa Gertrudis	Temecula	1,200	A-56
<b>Total Recommended Production</b>			<b>31,110</b>	-

\* New well.

\*\* Existing well scheduled for replacement in 2018.

**Table 2**

**Summary of Model Simulated Change in Water Levels for  
 Pauba and Temecula Aquifer Wells Under Recommended 2019-20 Pumping Conditions**

Hydrologic Subarea No.	Aquifer	RCWD Well No.	Predicted Change in Water Level after Two Years [ft]
13	Pauba	414	-4
12	Pauba	417	-3
11	Pauba	422	-2
10	Pauba	426	0
8	Pauba	492	1
12	Temecula	131	-5
13	Temecula	133	-5
15	Temecula	464	-4
14	Temecula	462	-4
16	Temecula	509	-4
19	Temecula	466	-4
17	Temecula	139	-4
11	Temecula	465	-4
6	Temecula	495	-4
9	Temecula	410	-4
20	Temecula	493	-4
8	Temecula	217	-3
10	Temecula	468	-3
5	Temecula	402	-1
7	Temecula	211	0
18	Temecula	129	1
4	Temecula	401	1
2	Temecula	439	1
3	Temecula	454	1
1	Temecula	510	1
21	Temecula	463	3

Note:

See Figures 3 and 4 for locations of hydrologic subareas and RCWD wells.

**APPENDIX A**  
**Long-Term Hydrographs and Production**  
**January 1981 to September 2018**

**APPENDIX A**  
**Trend Analysis for Changing Ground Water Levels and Production**  
**January 1981 to September 2018**

**CONTENTS**

RCWD Well No. 101 .....	A-1
RCWD Well No. 102 .....	A-2
RCWD Well No. 106 .....	A-3
RCWD Well No. 108 .....	A-4
RCWD Well No. 109 .....	A-5
RCWD Well No. 113 .....	A-6
RCWD Well No. 118 .....	A-7
RCWD Well No. 119 .....	A-8
RCWD Well No. 120 .....	A-9
RCWD Well No. 121 .....	A-10
RCWD Well No. 122 .....	A-11
RCWD Well No. 123 .....	A-12
RCWD Well No. 124 .....	A-13
RCWD Well No. 125 .....	A-14
RCWD Well No. 126 .....	A-15
RCWD Well No. 128 .....	A-16
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RCWD Well No. 130 .....	A-18
RCWD Well No. 131 .....	A-19
RCWD Well No. 132 .....	A-20
RCWD Well No. 133 .....	A-21

**APPENDIX A CONTENTS**

**(Continued)**

RCWD Well No. 135 .....	A-22
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RCWD Well No. 139 .....	A-24
RCWD Well No. 140 .....	A-25
RCWD Well No. 141 .....	A-26
RCWD Well No. 143 .....	A-27
RCWD Well No. 144 .....	A-28
RCWD Well No. 145 .....	A-29
RCWD Well No. 146 .....	A-30
RCWD Well No. 149 .....	A-31
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RCWD Well No. 155 .....	A-36
RCWD Well No. 156 .....	A-37
RCWD Well No. 157 .....	A-38
RCWD Well No. 158 .....	A-39
RCWD Well No. 161 .....	A-40
RCWD Well No. 164 .....	A-41
RCWD Well No. 201 .....	A-42
RCWD Well No. 203 .....	A-43
RCWD Well No. 208 .....	A-44
RCWD Well No. 209 .....	A-45
RCWD Well No. 211 .....	A-46



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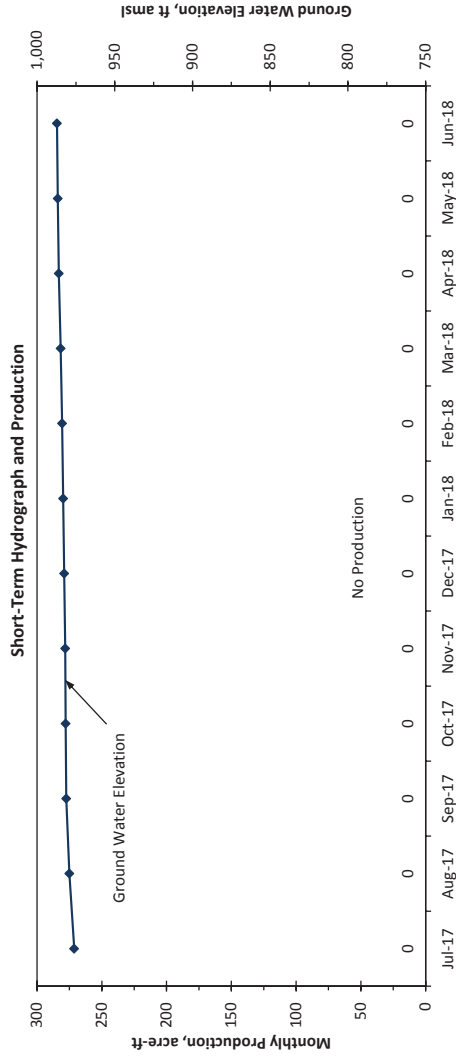
**APPENDIX A CONTENTS**

**(Continued)**

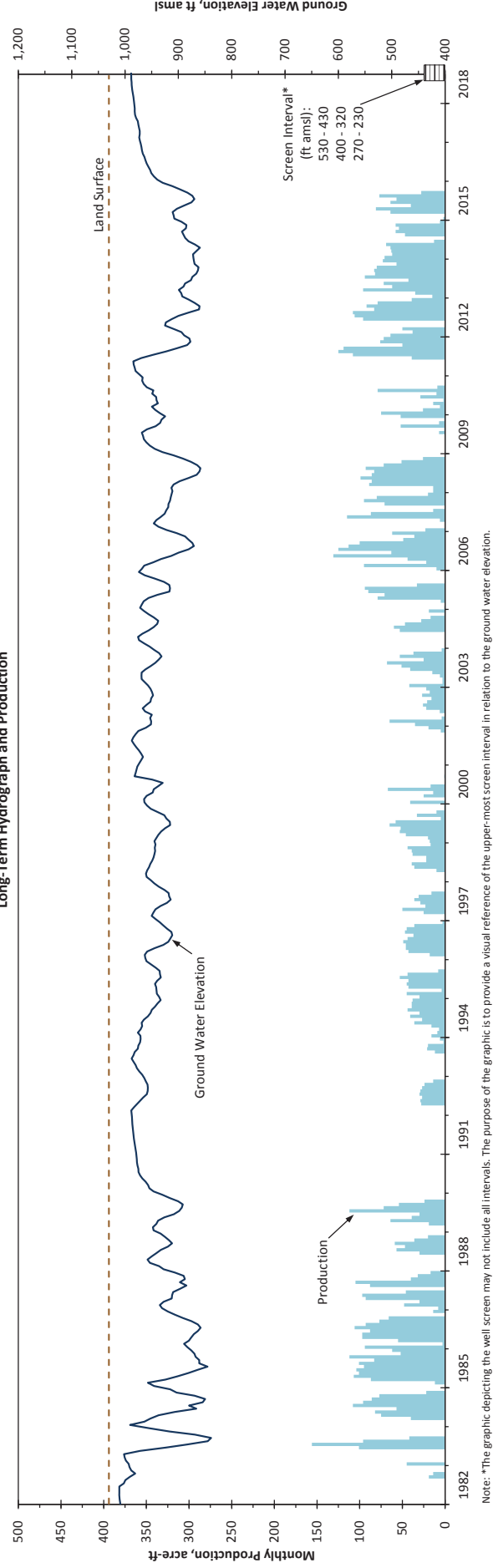
RCWD Well No. 217 .....	A-47
RCWD Well No. 232 .....	A-48
RCWD Well No. 233 .....	A-49
RCWD Well No. 234 .....	A-50
RCWD Well No. 235 .....	A-51
RCWD Well No. 236 .....	A-52
RCWD Well No. 237 .....	A-53
RCWD Well No. 238 .....	A-54
RCWD Well No. 240 .....	A-55
RCWD Well No. 309 .....	A-56

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 101

Well Performance and Recommended Production	
Hydrologic Subarea	4
Hydrologic Subunit	South Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	535
Static Submergence [ft]	515
Comments	Currently offline; requires chlorine treatment; high iron & manganese
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	0
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	0
Jul-2019 to Jun-2020	0

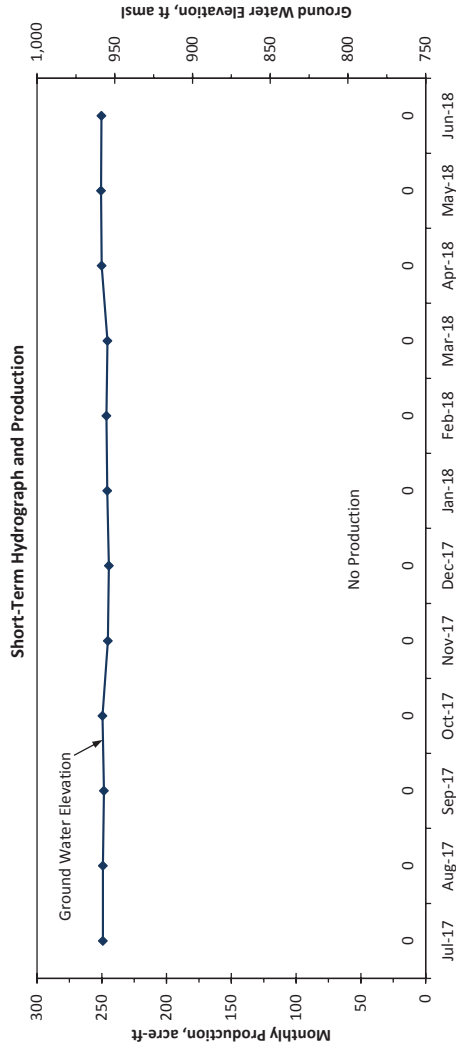


Long-Term Hydrograph and Production

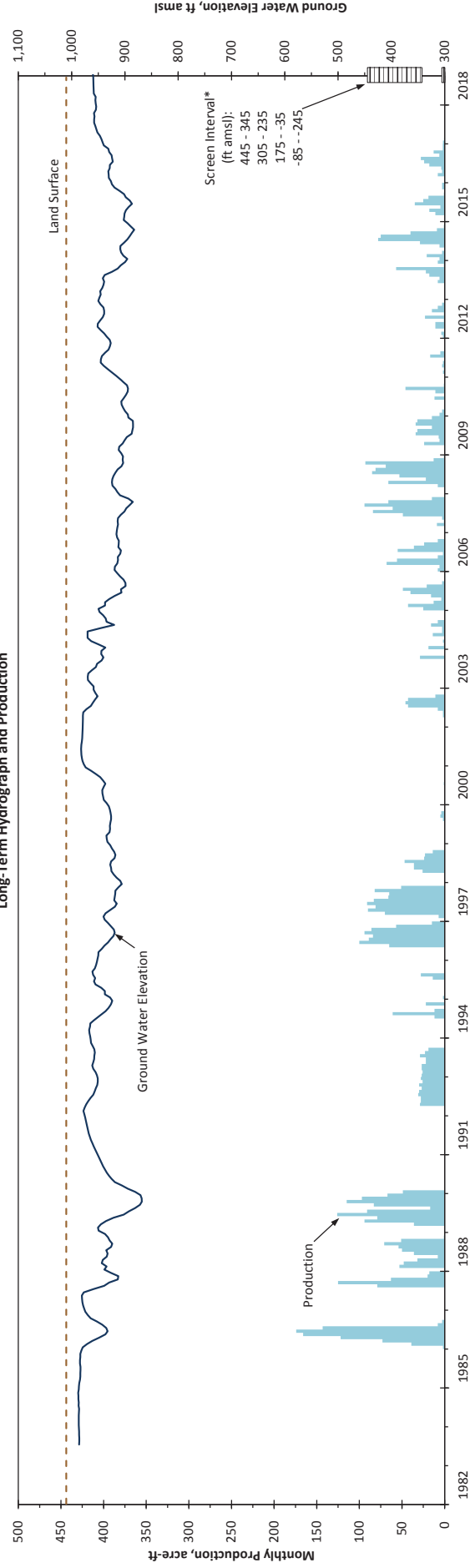


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 102

Well Performance and Recommended Production	
Hydrologic Subarea	5
Hydrologic Subunit	South Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	1,260
Static Submergence [ft]	510
Comments	Switching over to treatment wells
Recommended Production [acre-ft] Jul-2017 to Jun-2018	400
Actual Production [acre-ft] Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	1,000



Long-Term Hydrograph and Production

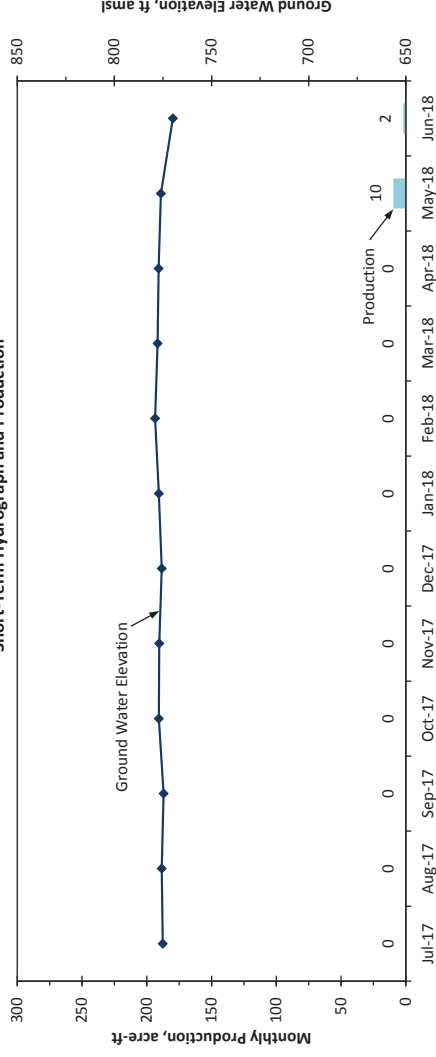


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

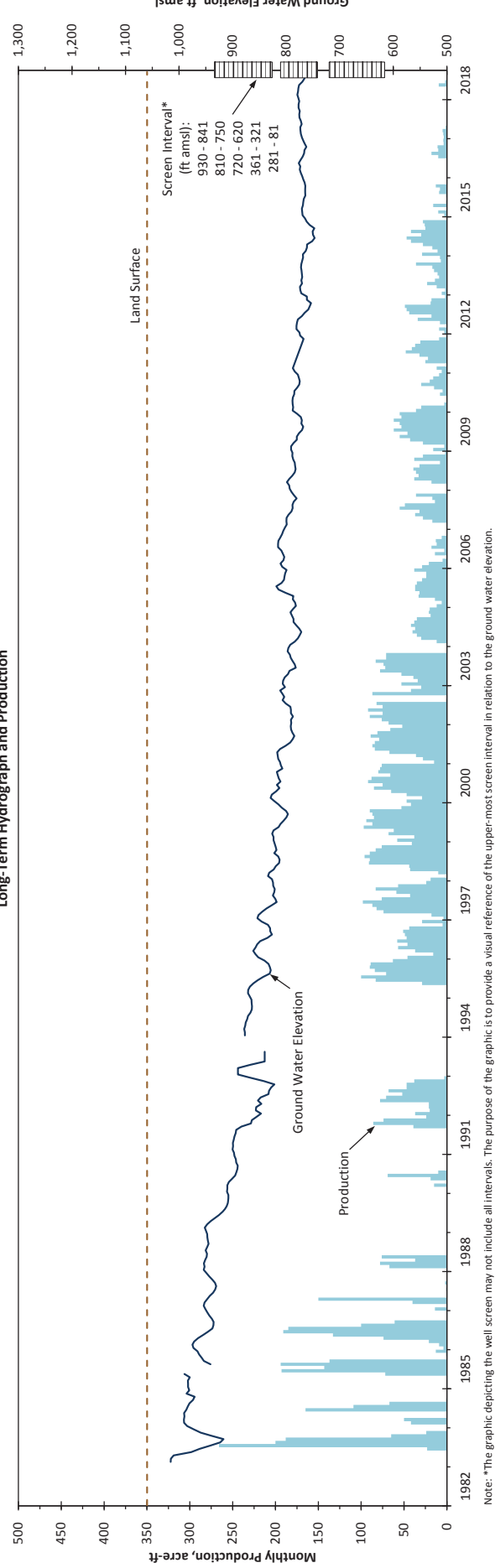
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 106

Well Performance and Recommended Production	
Hydrologic Subarea	20
Hydrologic Subunit	Santa Gertrudis
Aquifer	Combined
Instantaneous Yield [gpm]	420
Static Submergence [ft]	812
Comments	Offline; high bacteria counts; runs with EM-20 only, blending plan; Arsenic increases (>10 ug/L) with increased discharge; screen interval partially dewatered
Recommended Production [acre-ft]	100
Actual Production [acre-ft]	12
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300
Jul-2019 to Jun-2020	

Short-Term Hydrograph and Production



Long-Term Hydrograph and Production



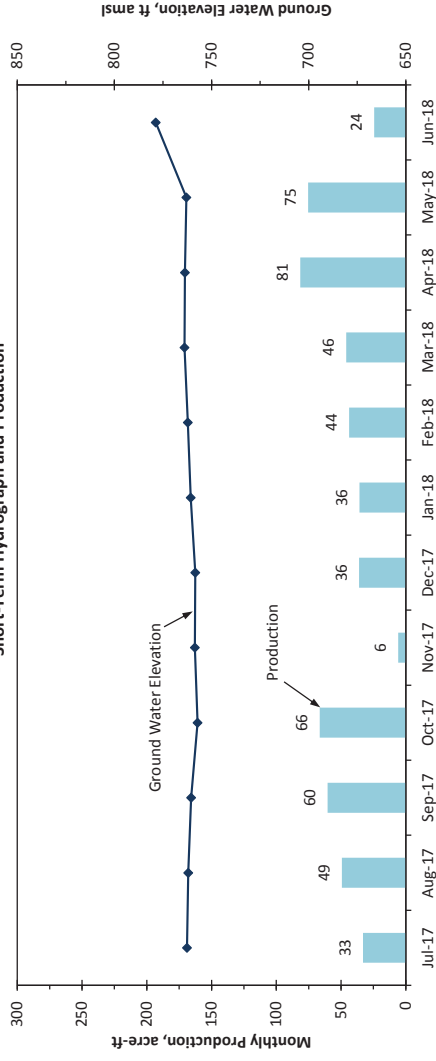
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 108

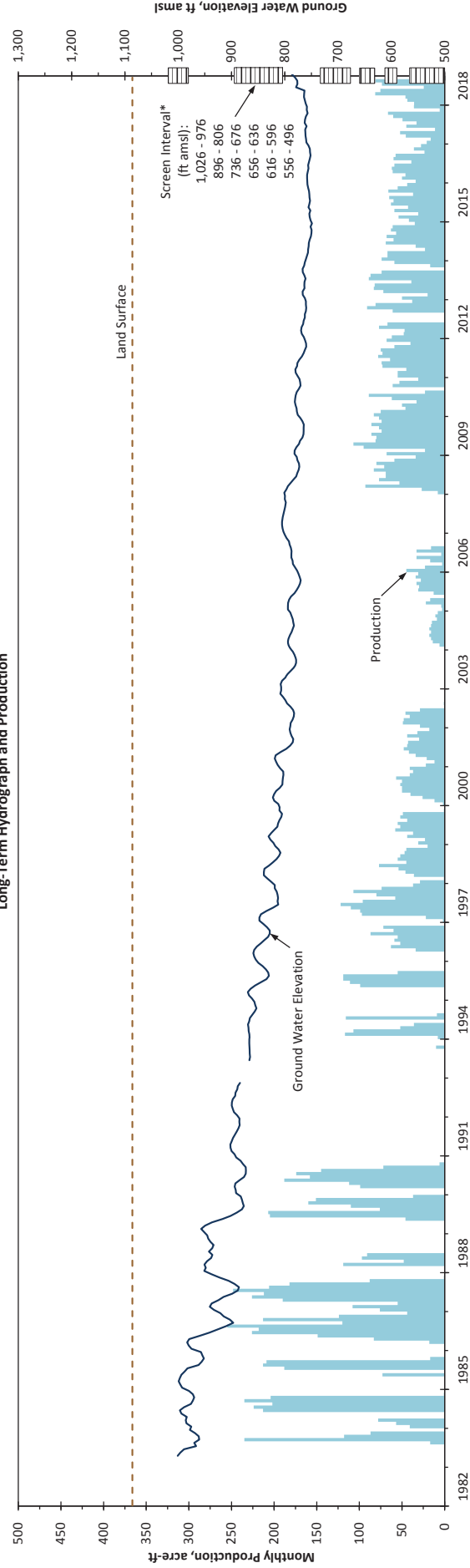
Well Performance and Recommended Production

Hydrologic Subarea	20
Hydrologic Subunit	Santa Gertrudis
Aquifer	Combined
Instantaneous Yield [gpm]	410
Static Submergence [ft]	640
Comments	Reduced pumping rate due to breaking suction; screen interval partially dewatered; zone isolation 2013
Recommended Production [acre-ft]	500
Actual Production [acre-ft]	558
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300
Jul-2017 to Jun-2018	
Jul-2017 to Jun-2018	
Percent of Total Production from Qyal	
Production from Qyal [acre-ft]	
Recommended Production [acre-ft]	300
Jul-2019 to Jun-2020	

Short-Term Hydrograph and Production



Long-Term Hydrograph and Production



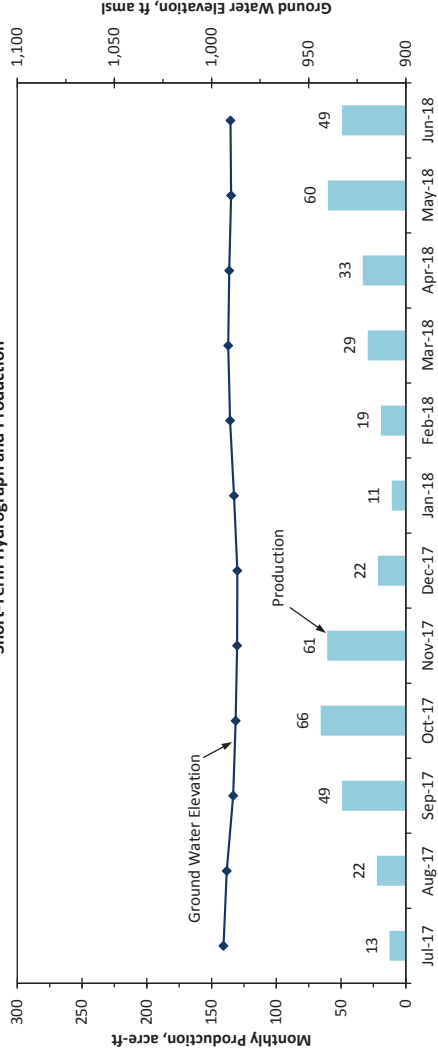
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 109

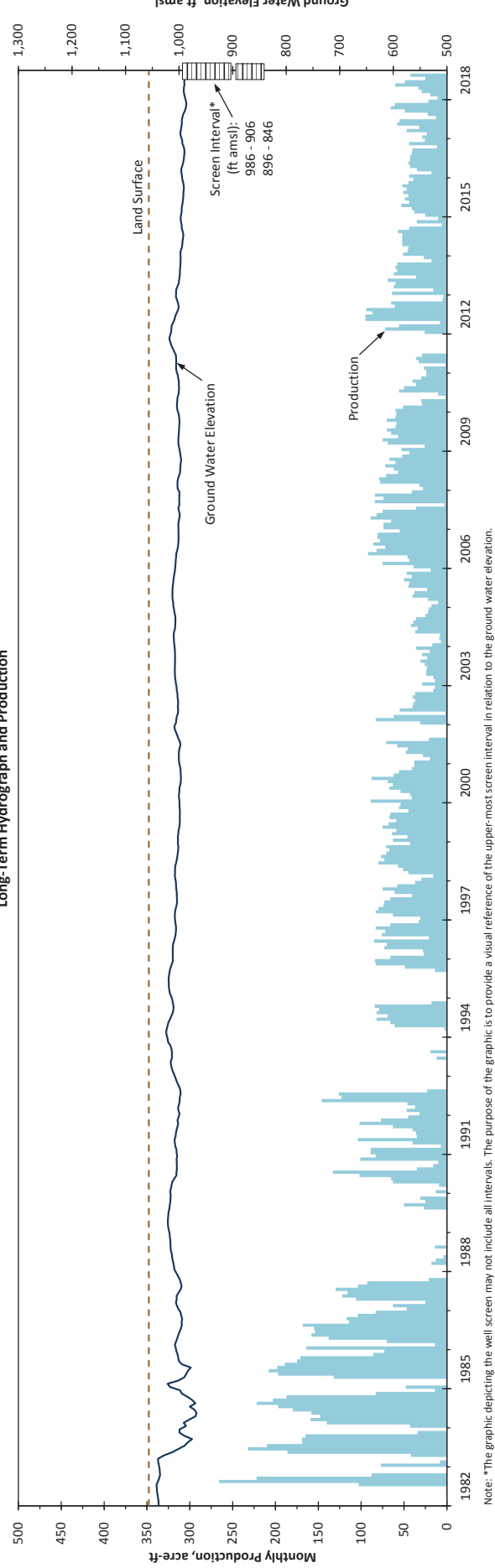
Well Performance and Recommended Production

Hydrologic Subarea	10
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	375
Static Submergence [ft]	276
Comments	Rehab scheduled for 2019-20; high bacteria counts; rehab in 2012
Recommended Production [acre-ft]	400
Actual Production [acre-ft]	435
Percent of Total Production from Qyal Production from Qyal [acre-ft]	84%
Recommended Production [acre-ft]	365
Jul-2019 to Jun-2020	400

Short-Term Hydrograph and Production



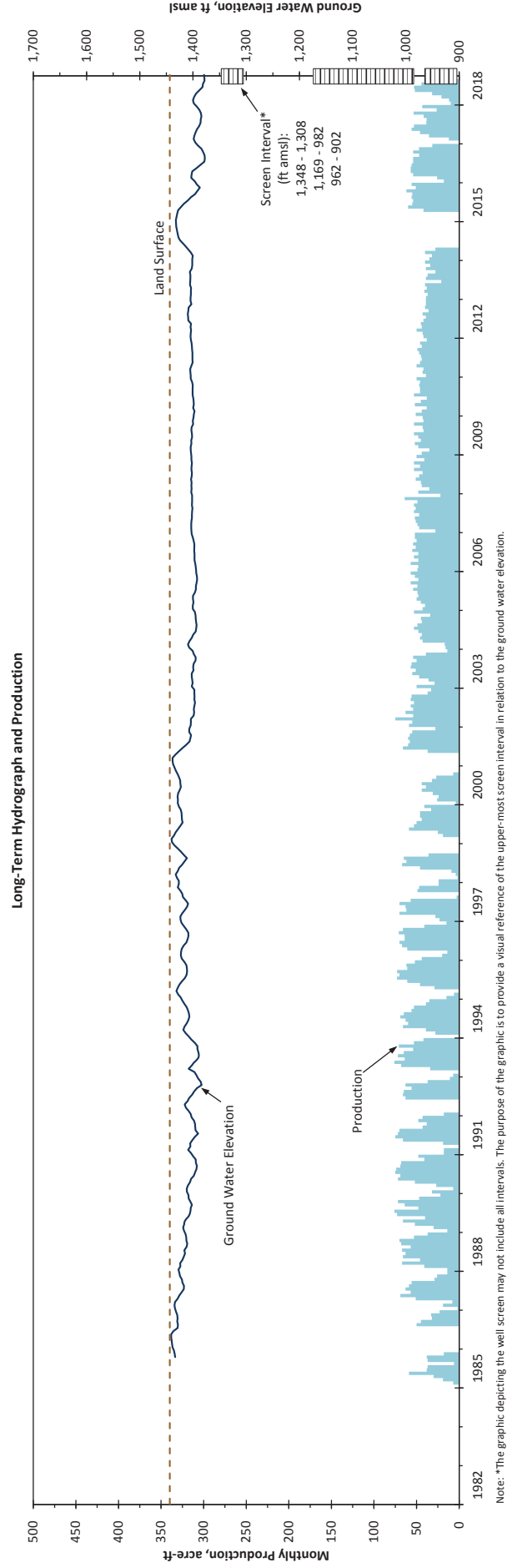
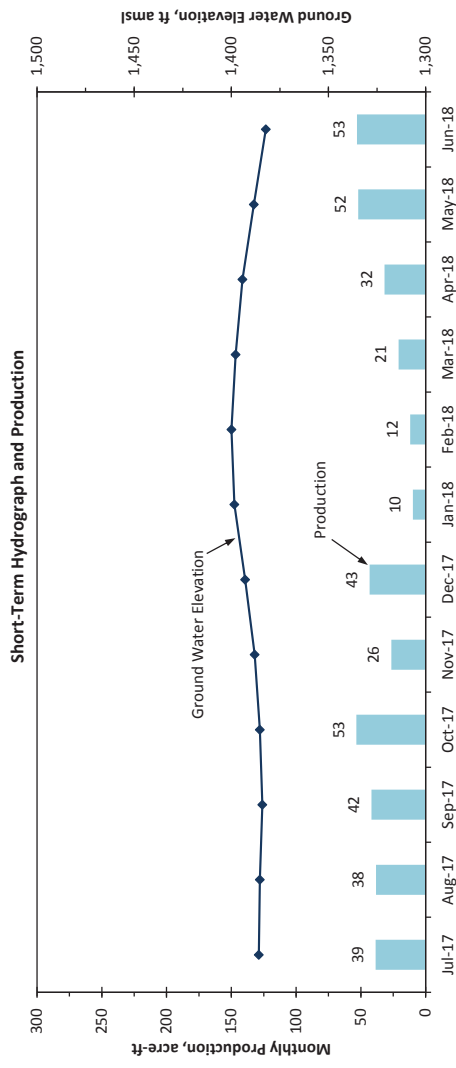
Long-Term Hydrograph and Production



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 113

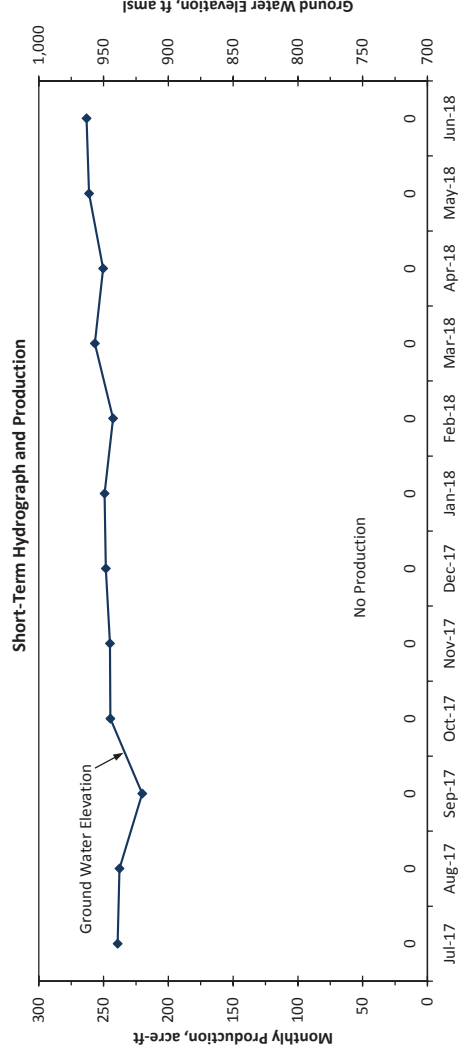
Well Performance and Recommended Production	
Hydrologic Subarea	21
Hydrologic Subunit	Palomar
Aquifer	Temecula
Instantaneous Yield [gpm]	0
Static Submergence [ft]	397
Comments	Rehab in 2015
Recommended Production [acre-ft]	400
Actual Production [acre-ft]	422
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300
Jul-2019 to Jun-2020	



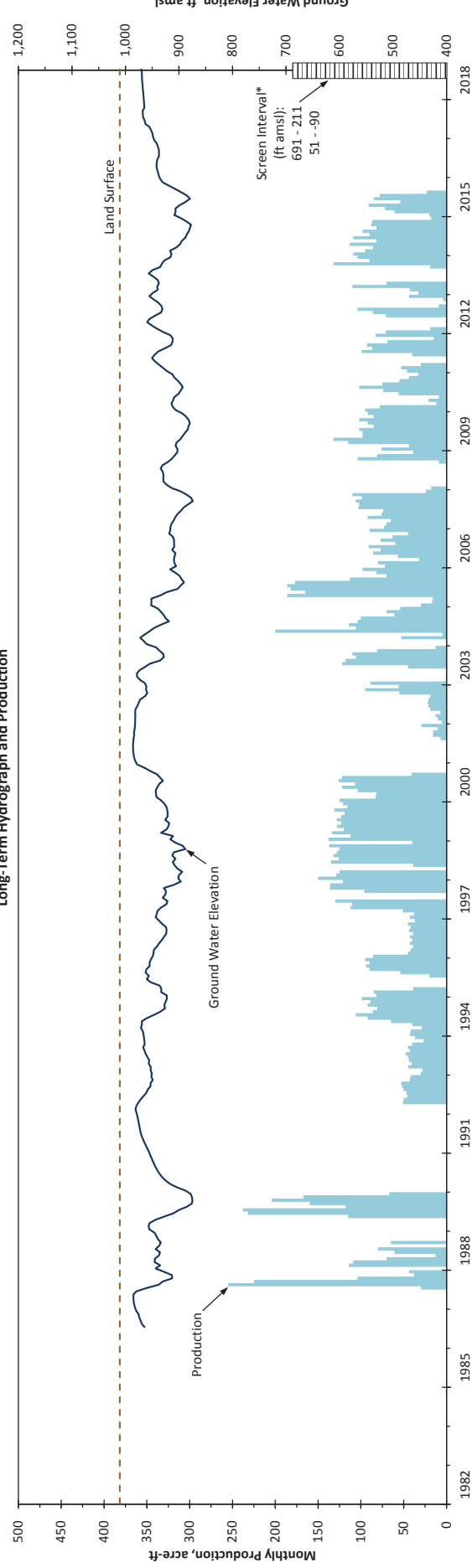
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 118

Well Performance and Recommended Production	
Hydrologic Subarea	5
Hydrologic Subunit	South Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	800
Static Submergence [ft]	540
Comments	Currently offline; high iron & manganese; rehab in 2008
Recommended Production [acre-ft] Jul-2017 to Jun-2018	0
Actual Production [acre-ft] Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	0



Long-Term Hydrograph and Production

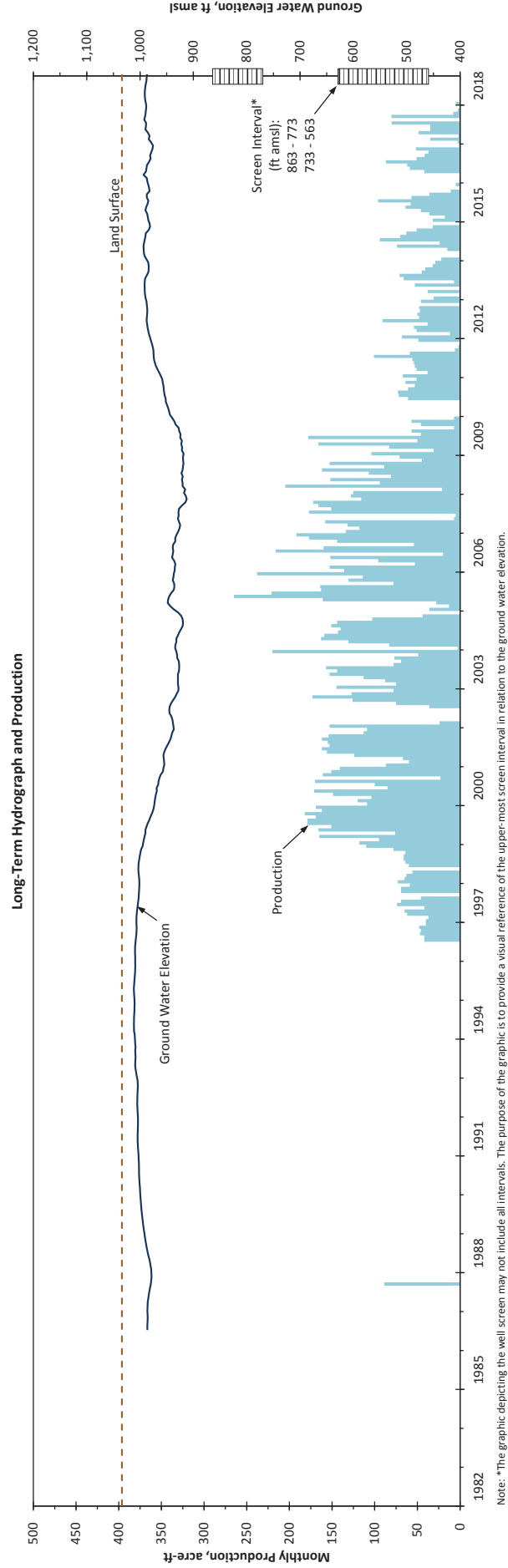
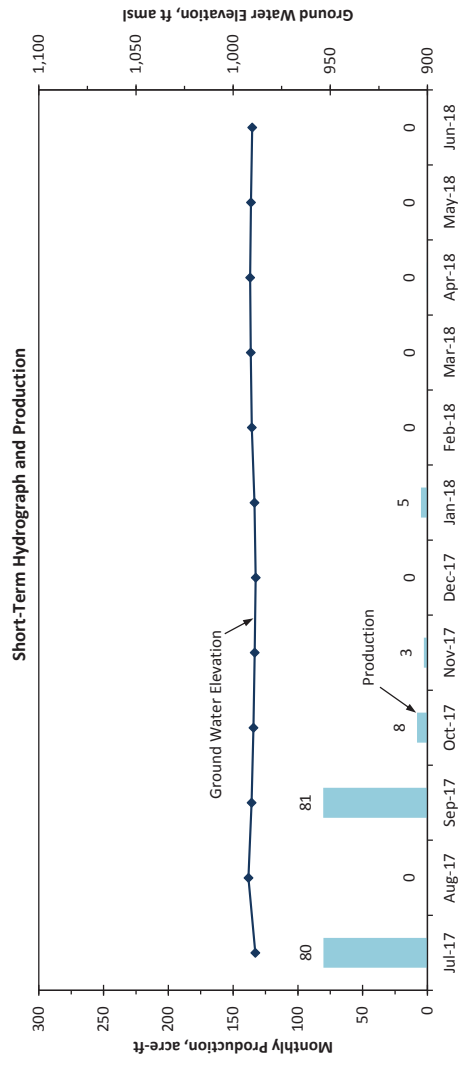


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.



TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 119

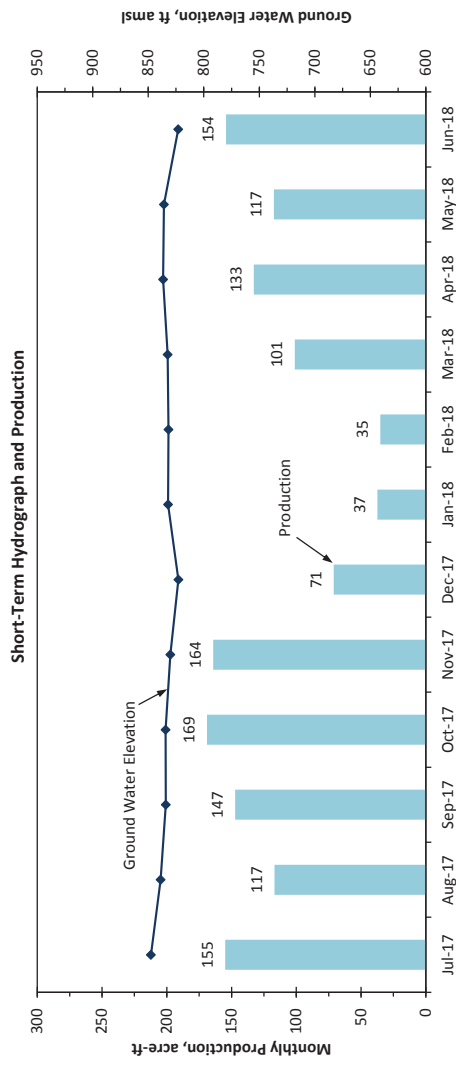
Well Performance and Recommended Production	
Hydrologic Subarea	6
Hydrologic Subunit	Wolf Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	2,600
Static Submergence [ft]	509
Comments	None
Recommended Production [acre-ft]	167
Actual Production [acre-ft]	178
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	400
Jul-2019 to Jun-2020	



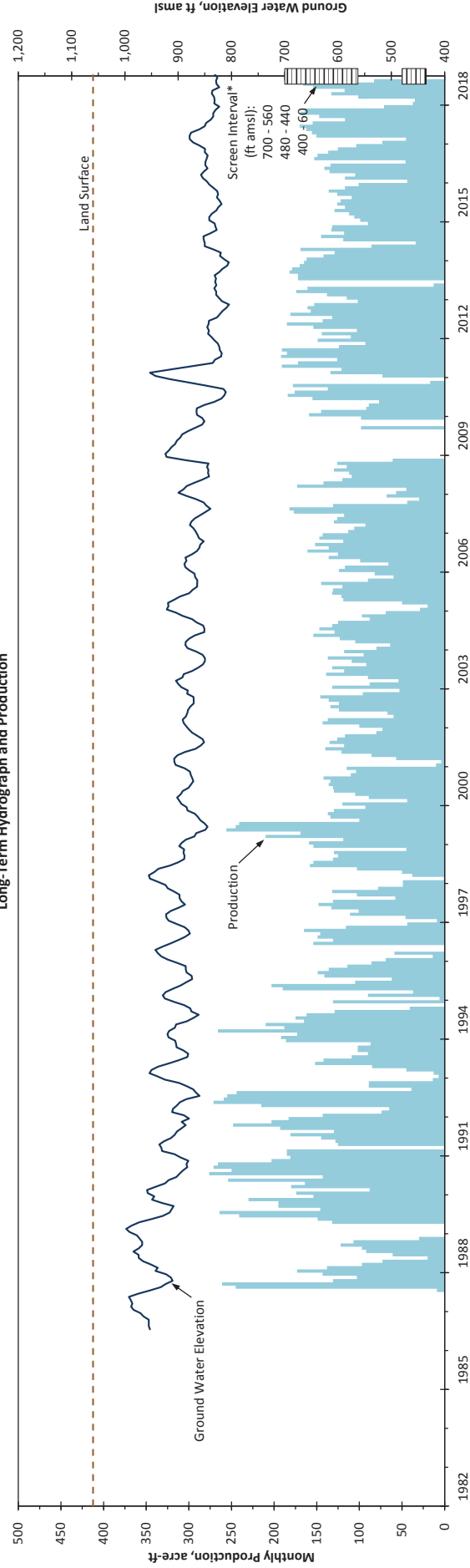
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 120

Well Performance and Recommended Production	
Hydrologic Subarea	10
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	1,350
Static Submergence [ft]	627
Comments	Pump removed late-2018; bacteria issue; water level affected by Well No. 143; rehab in 2008
Recommended Production [acre-ft]	1,200
Actual Production [acre-ft]	1,401
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	1,400



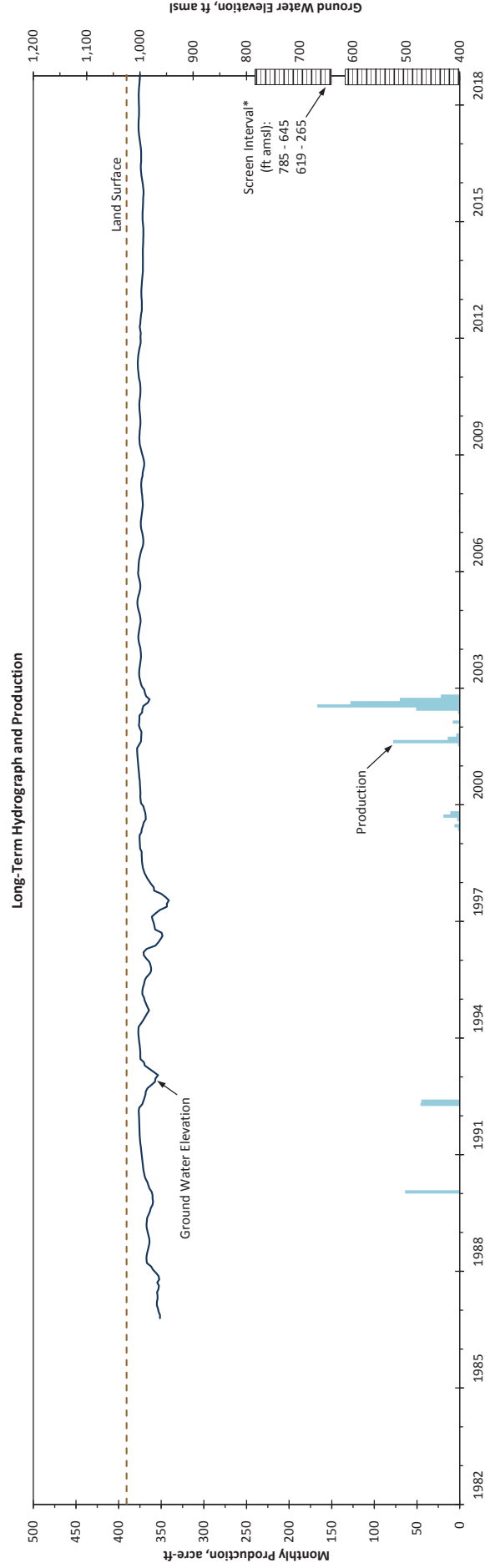
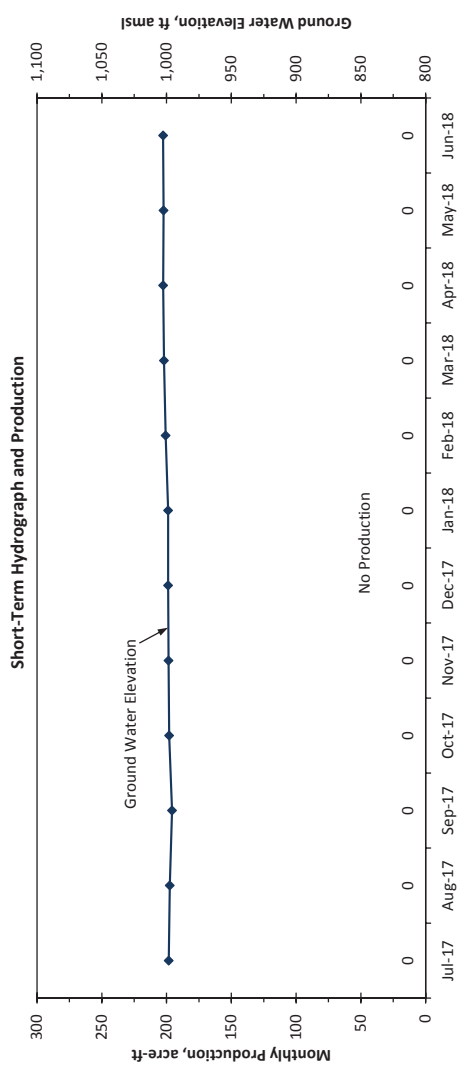
Long-Term Hydrograph and Production



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 121

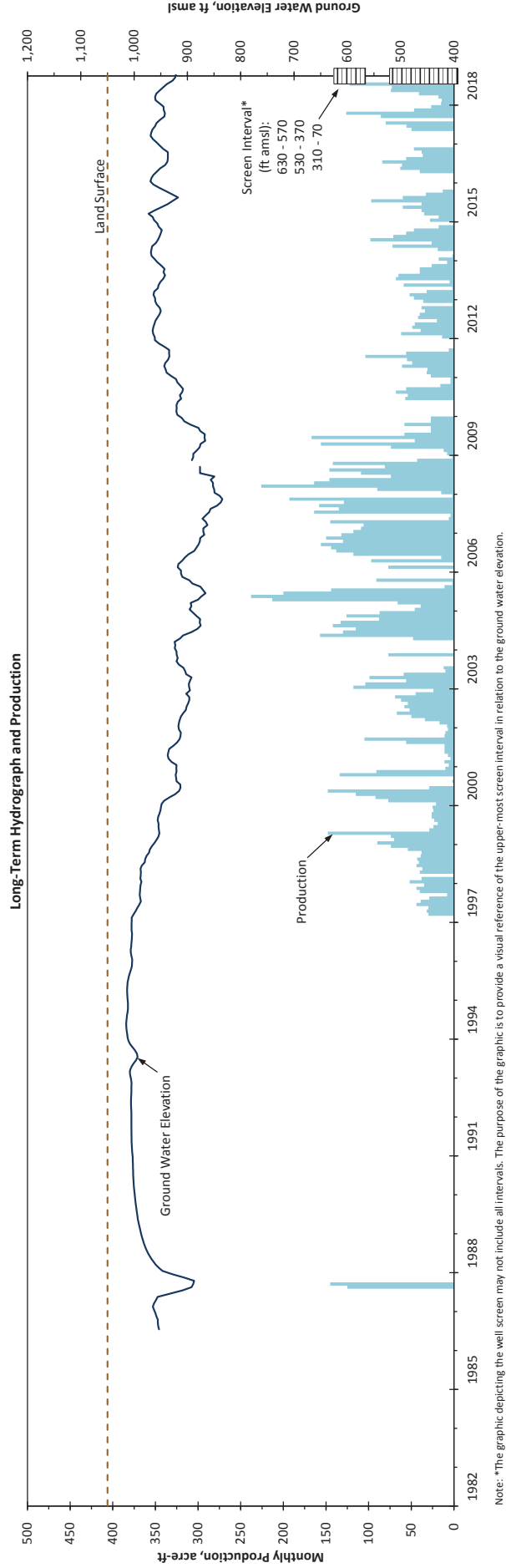
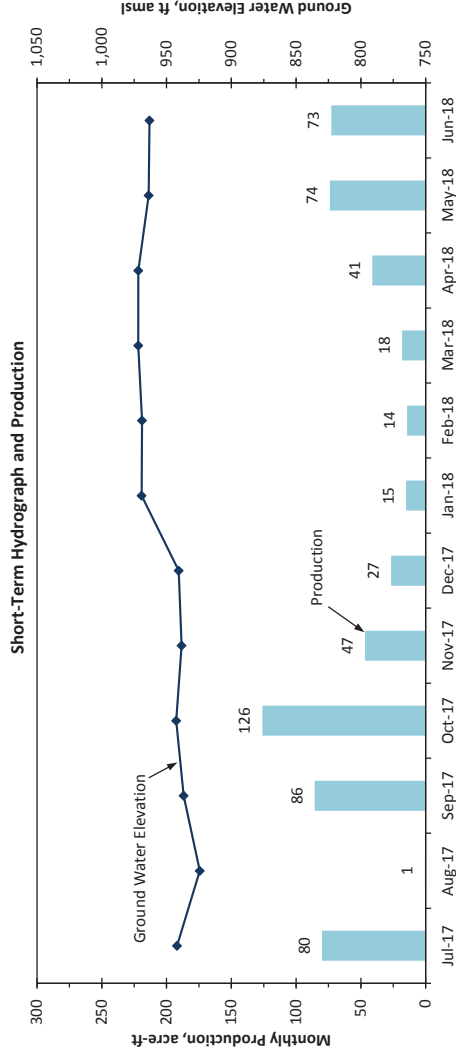
Well Performance and Recommended Production	
Hydrologic Subarea	4
Hydrologic Subunit	South Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	900
Static Submergence [ft]	460
Comments	Currently offline
Recommended Production [acre-ft] Jul-2017 to Jun-2018	0
Actual Production [acre-ft] Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	0



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 122

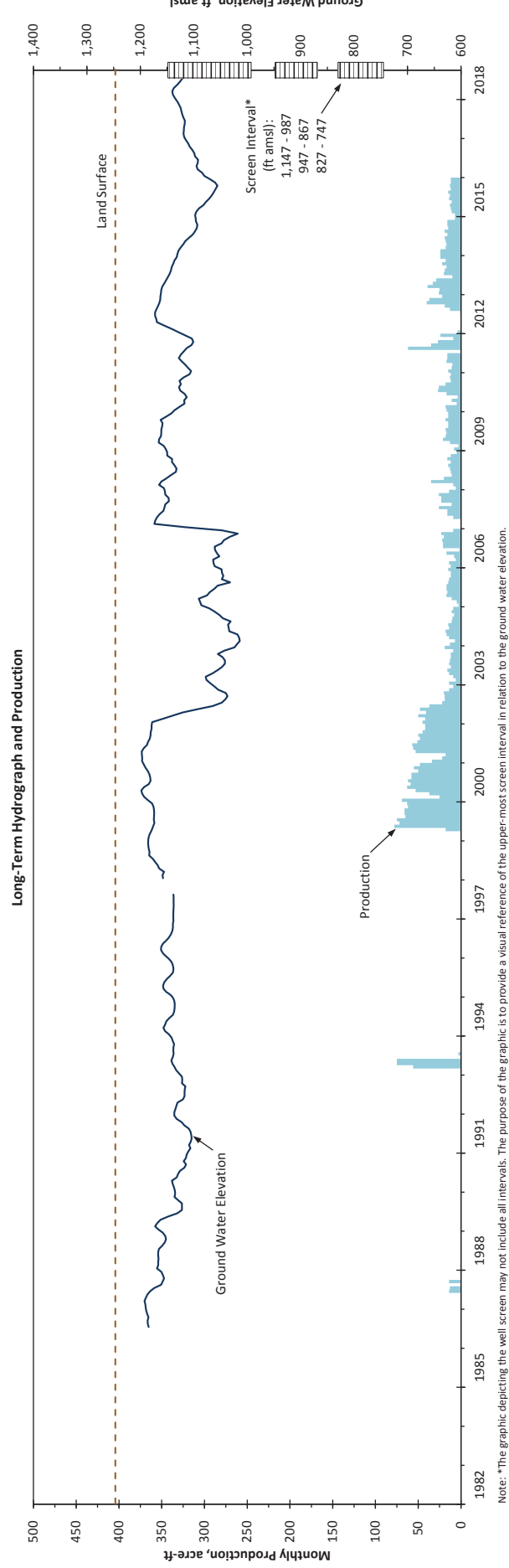
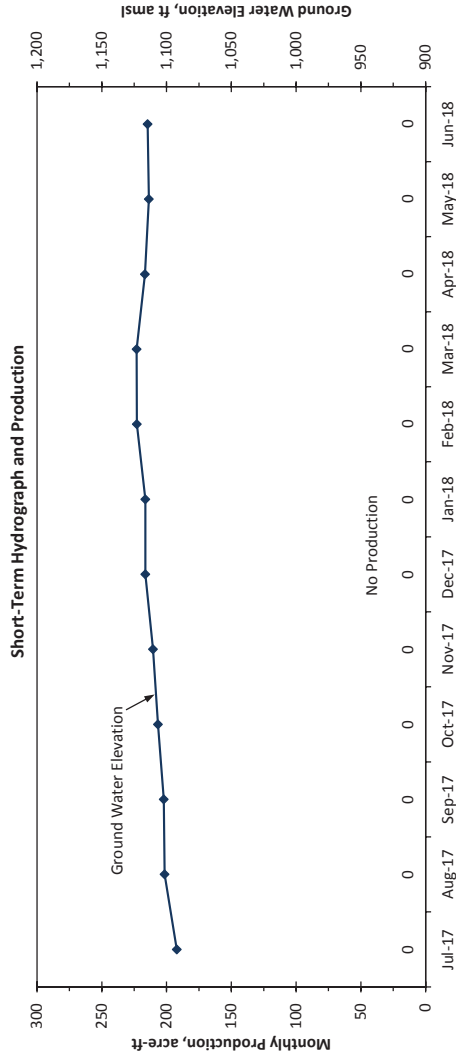
Well Performance and Recommended Production	
Hydrologic Subarea	7
Hydrologic Subunit	Wolf Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	2,450
Static Submergence [ft]	602
Comments	None
Recommended Production [acre-ft]	167
Actual Production [acre-ft]	601
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	400



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 123

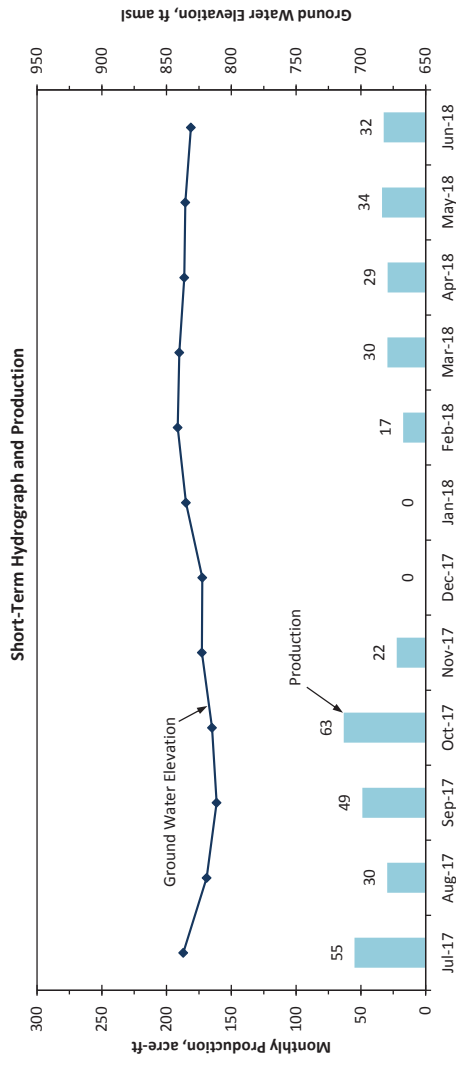
Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Combined
Instantaneous Yield [gpm]	150
Static Submergence [ft]	578
Comments	Currently offline; rehab in 2013; screen interval partially dewatered
Recommended Production [acre-ft] Jul-2017 to Jun-2018	0
Actual Production [acre-ft] Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	65%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	0



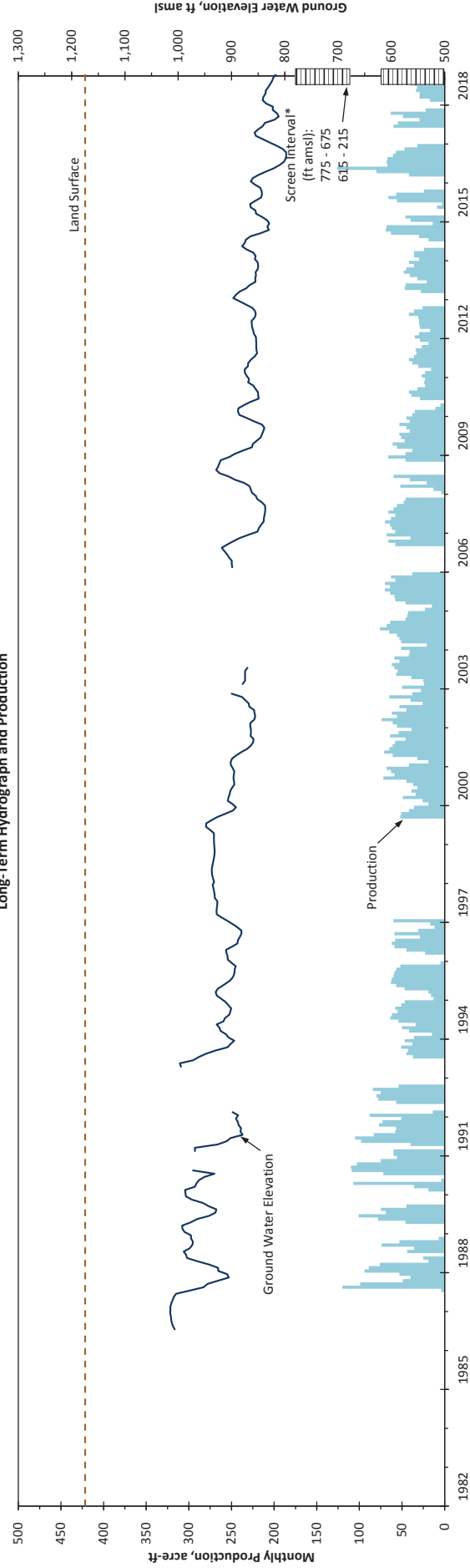
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 124

Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	0
Static Submergence [ft]	734
Comments	Currently offline; well to be replaced; replaced motor in 2015 and 2017; elevated arsenic; rehab in 2013
Recommended Production [acre-ft]	300
Actual Production [acre-ft]	361
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300



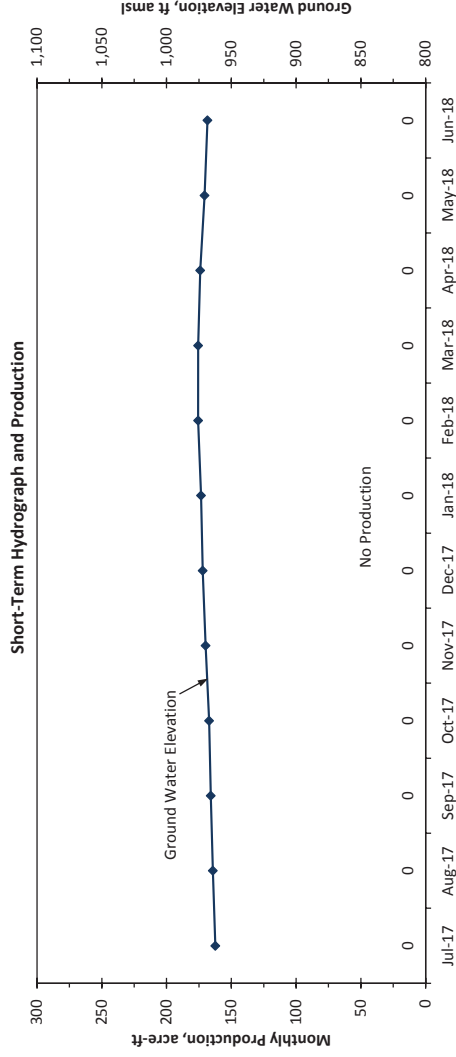
Long-Term Hydrograph and Production



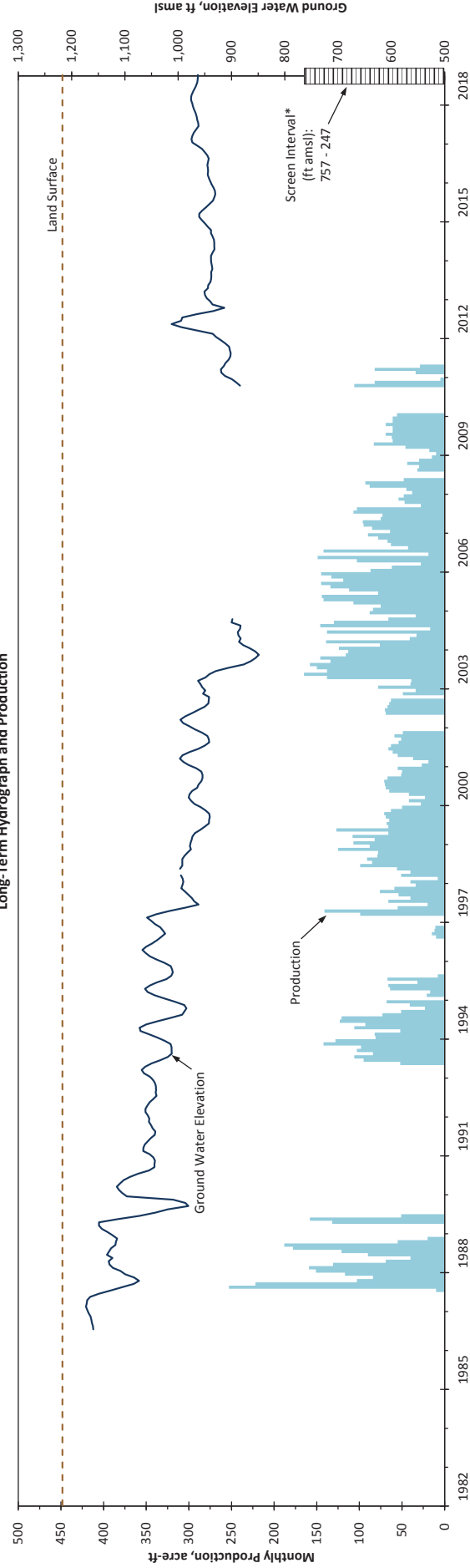
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 125

Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	0
Static Submergence [ft]	769
Comments	Currently offline; well to be replaced; high bacteria, corroded well casing; rehab in 2012
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	0
Percent of Total Production from Qyal	0%
Recommended Production [acre-ft]	0
Jul-2019 to Jun-2020	0



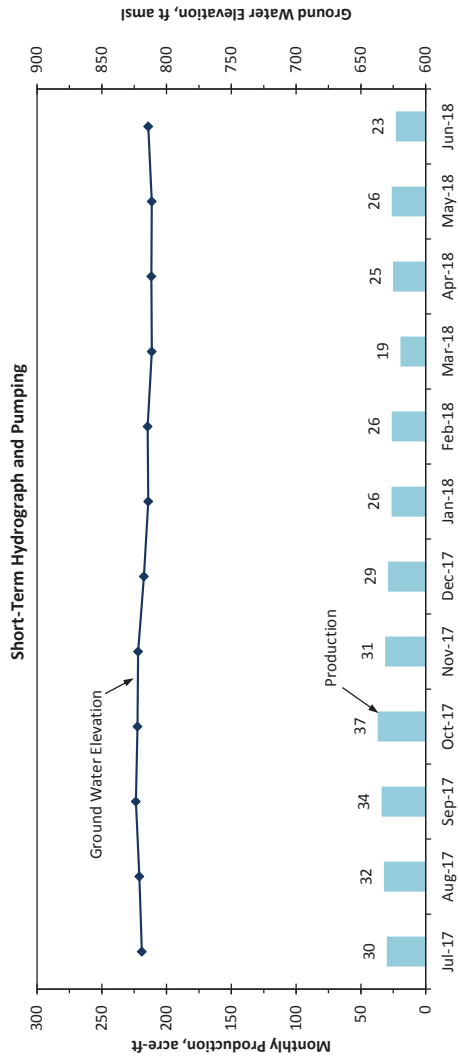
Long-Term Hydrograph and Production



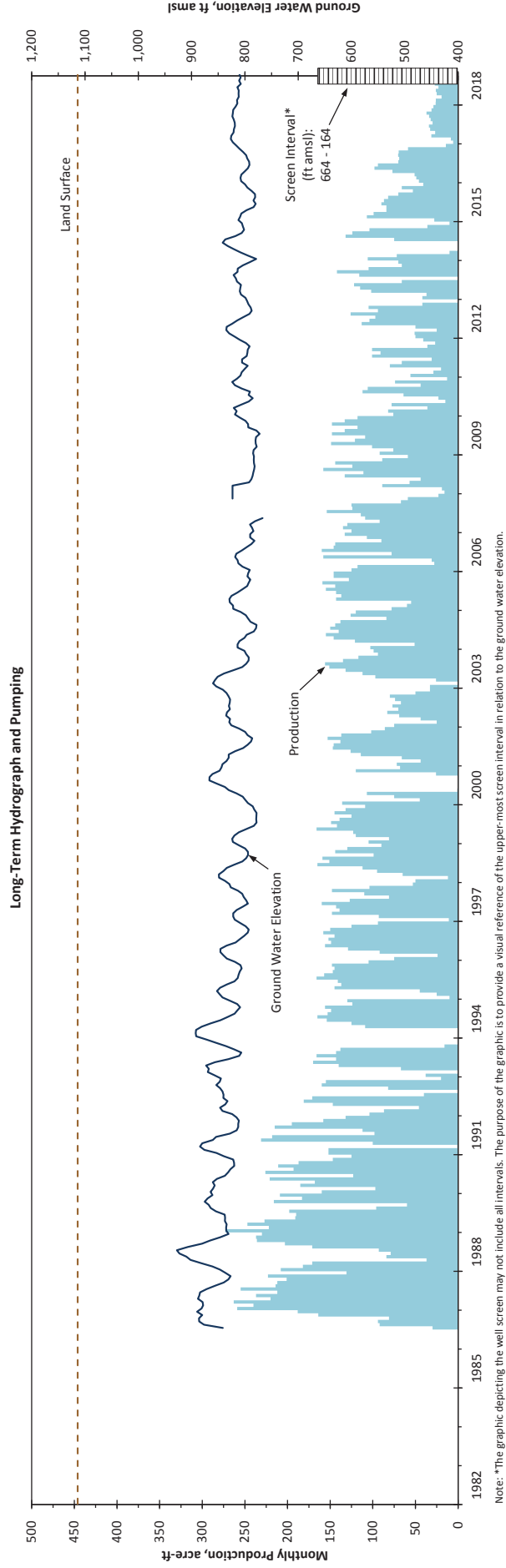
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 126

Well Performance and Recommended Production	
Hydrologic Subarea	10
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	0
Static Submergence [ft]	758
Comments	Rehab scheduled for 2019-20; high fluorine & arsenic; requires blending; rehab in 2014
Recommended Production [acre-ft]	700
Actual Production [acre-ft]	340
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300
Jul-2019 to Jun-2020	



Short-Term Hydrograph and Pumping

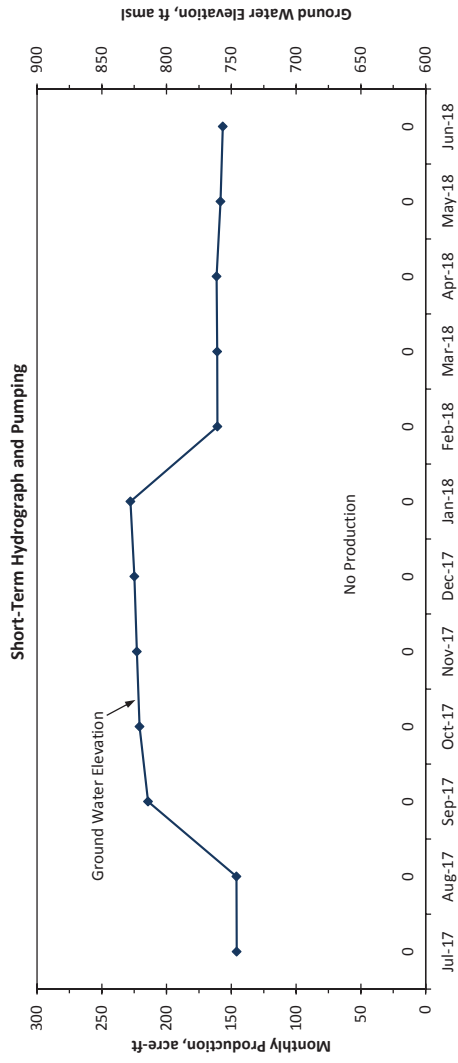


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

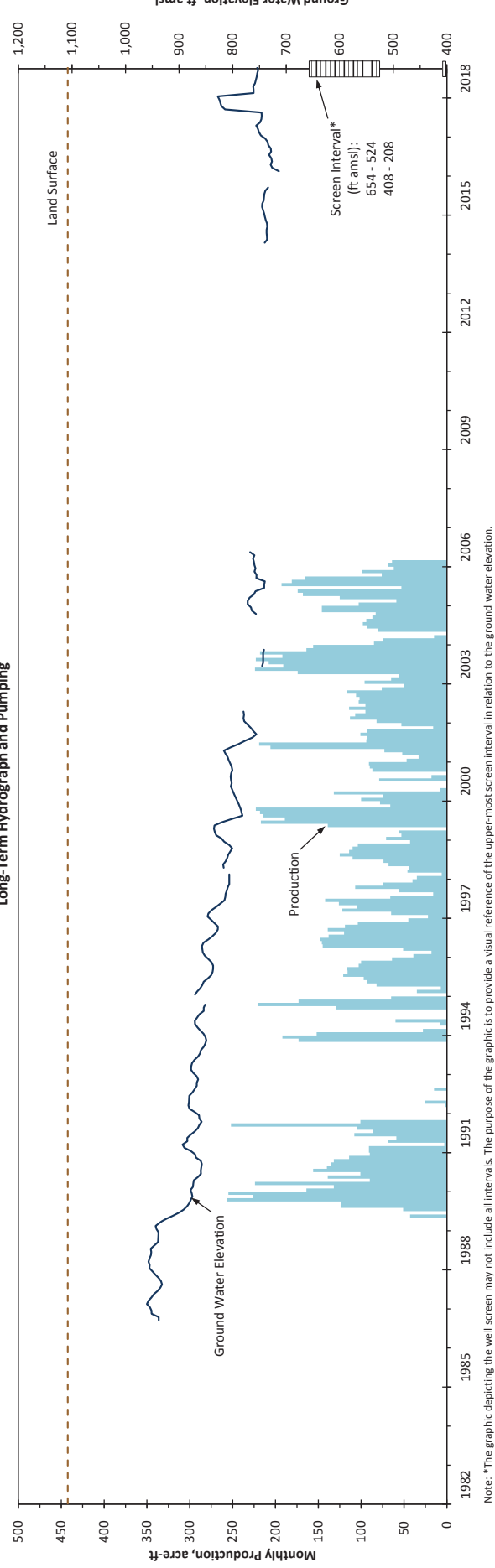


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 128

Well Performance and Recommended Production	
Hydrologic Subarea	19
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	0
Static Submergence [ft]	797
Comments	Currently offline due to high arsenic
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	0
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	0
Jul-2019 to Jun-2020	0



Long-Term Hydrograph and Pumping

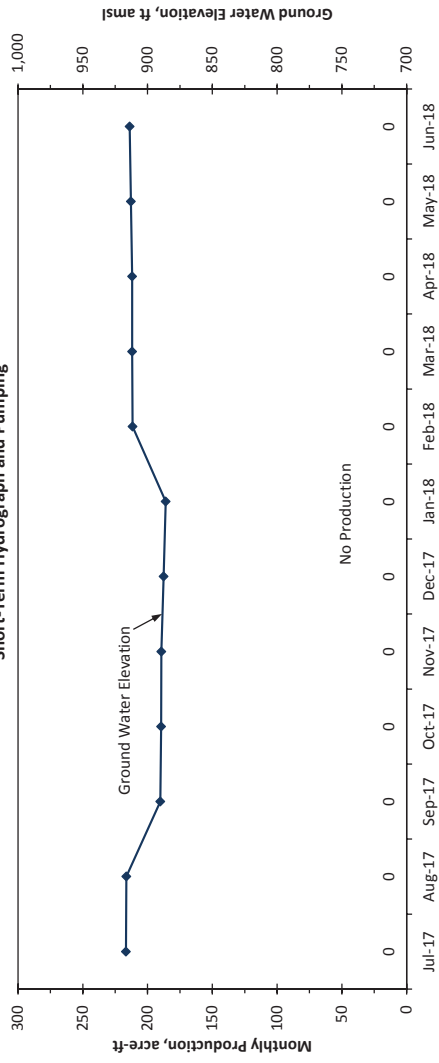


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

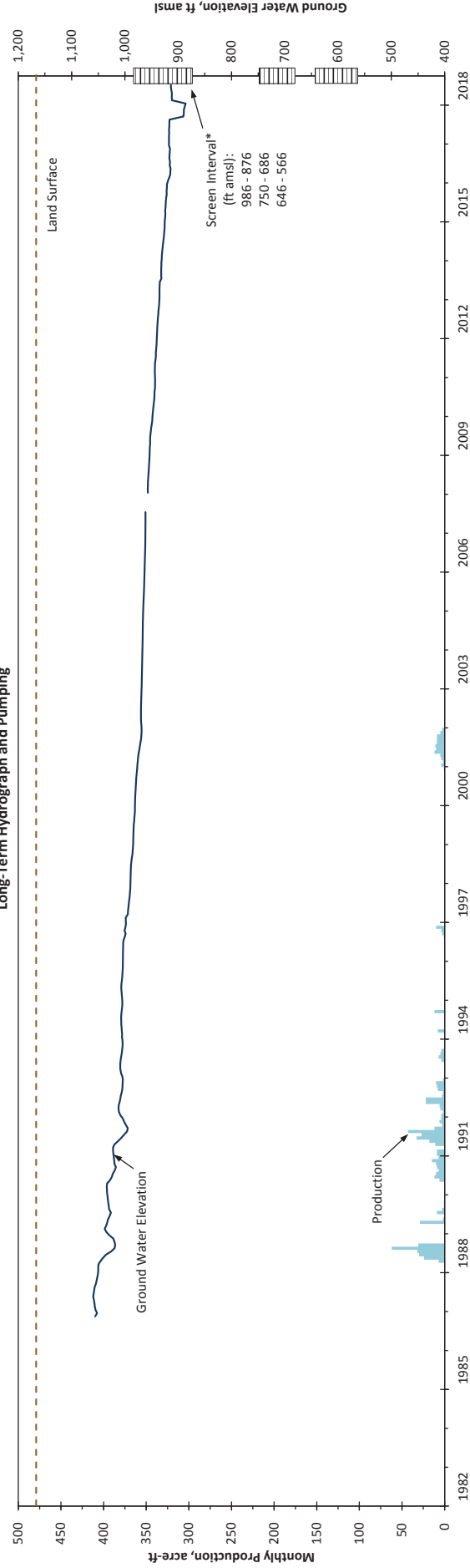
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 129

Well Performance and Recommended Production	
Hydrologic Subarea	18
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	0
Static Submergence [ft]	479
Comments	Currently offline until re-equipped; screen interval partially dewatered; Temecula Aquifer Index Well
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	0
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	0
Jul-2019 to Jun-2020	0

Short-Term Hydrograph and Pumping



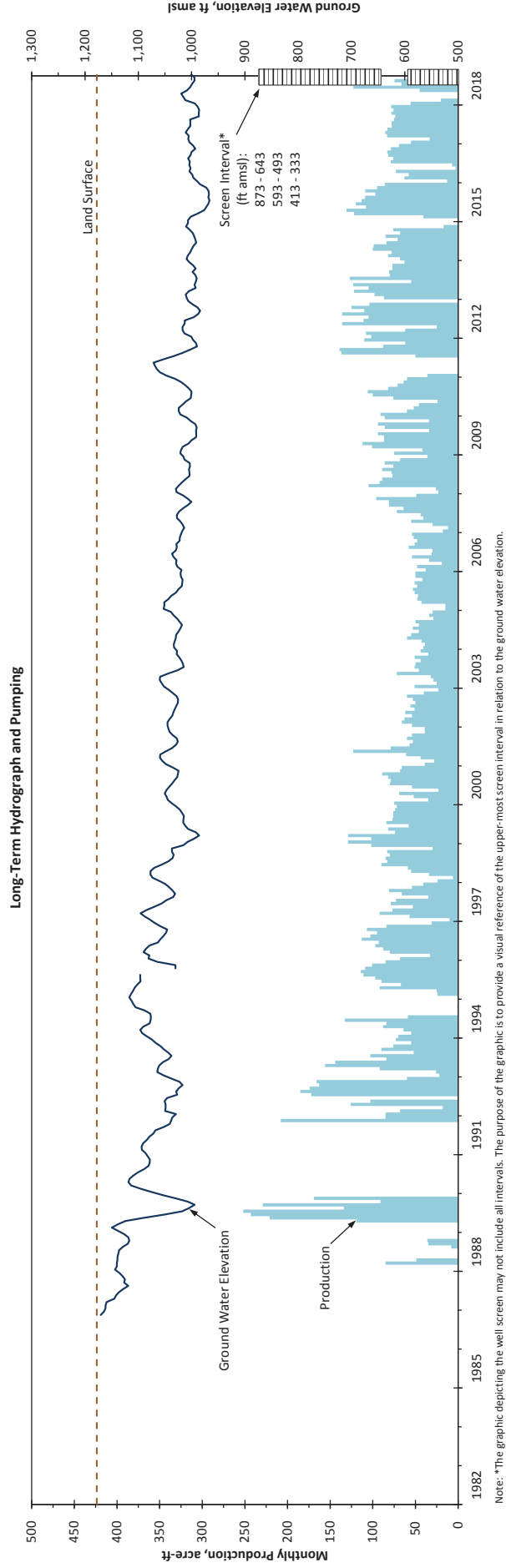
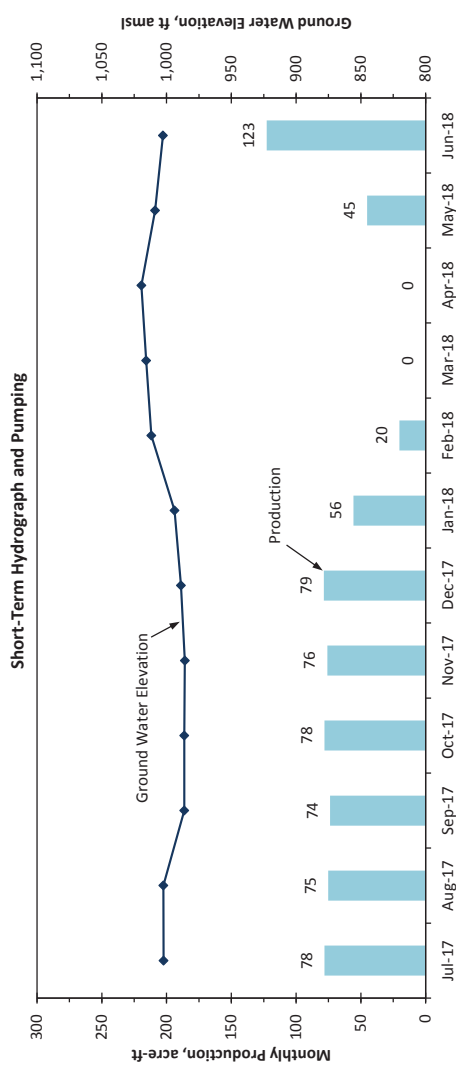
Long-Term Hydrograph and Pumping



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

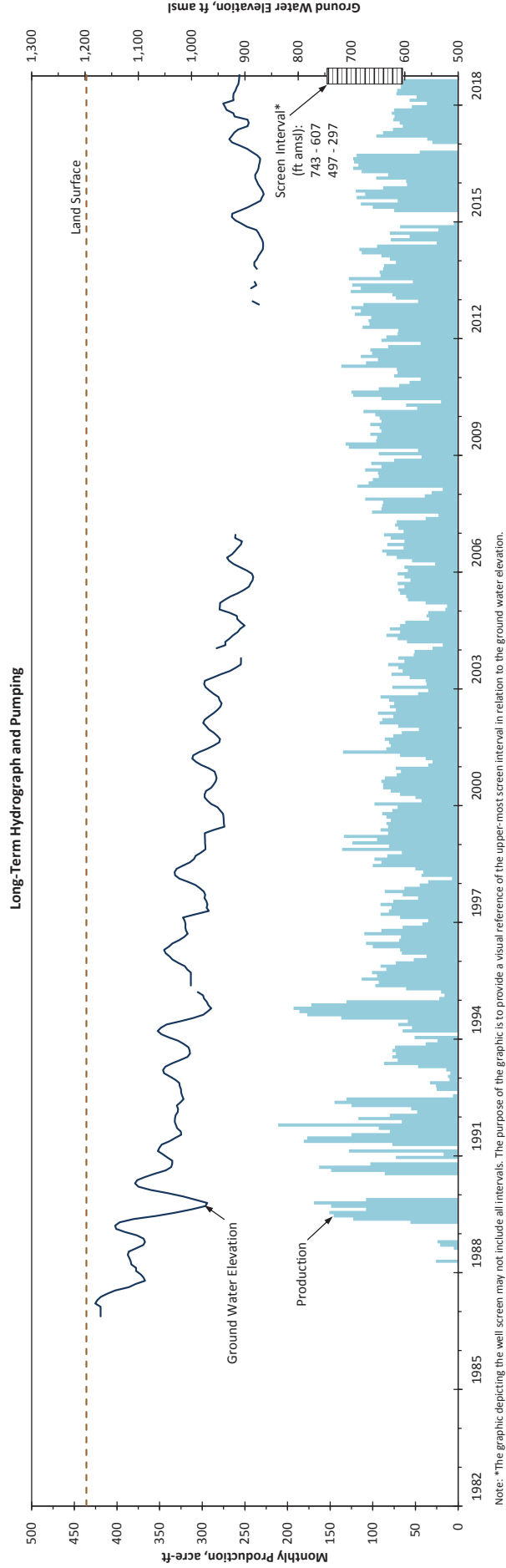
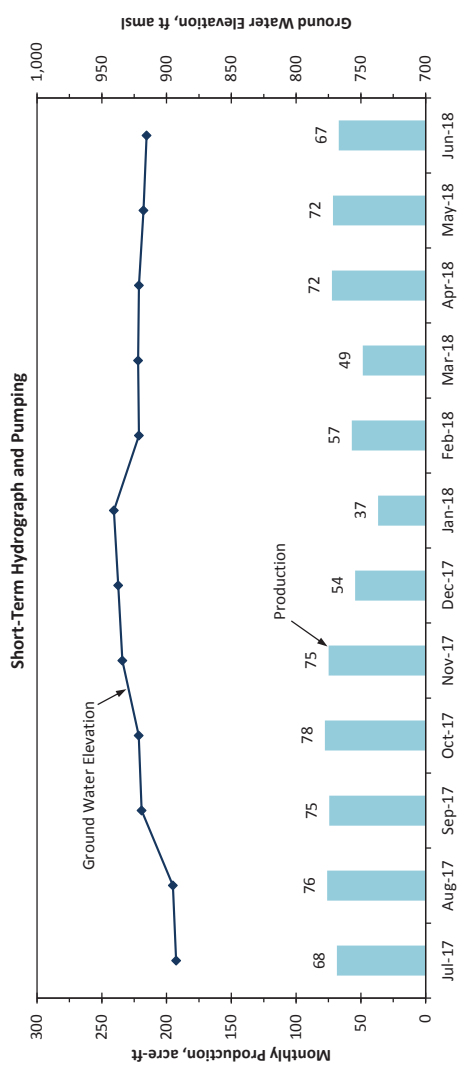
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 130

Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	550
Static Submergence [ft]	528
Comments	Re-valved to 1380 zone; rehab in 2011
Recommended Production [acre-ft]	800
Actual Production [acre-ft]	703
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	650



TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 131

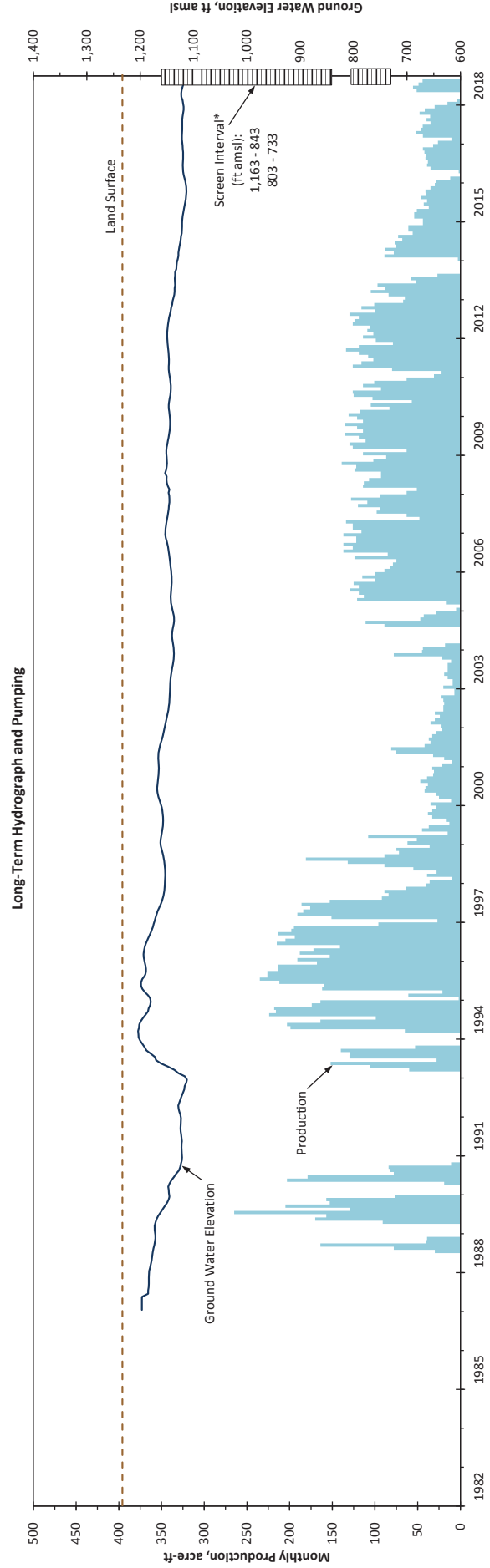
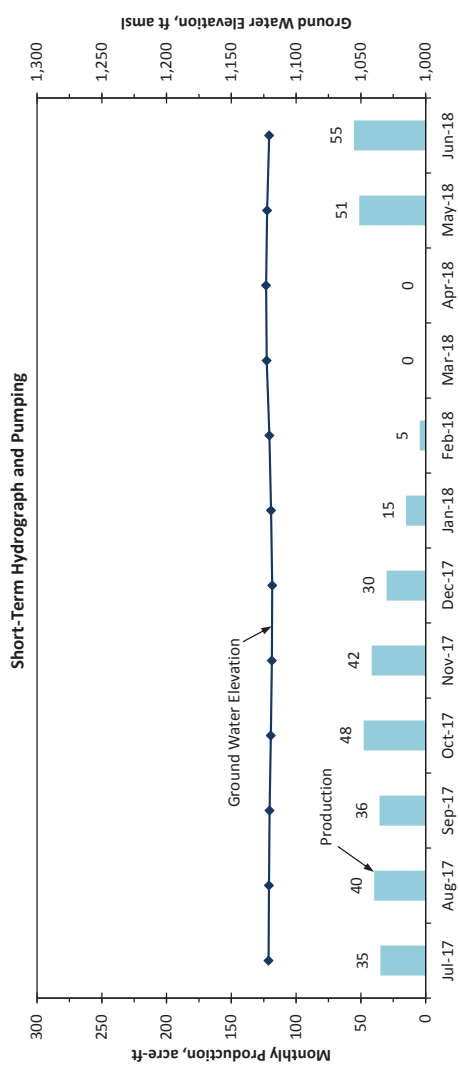
Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	670
Static Submergence [ft]	752
Comments	Positive coliform; rehab in 2015; Temecula Aquifer Index Well
Recommended Production [acre-ft]	1,000
Actual Production [acre-ft]	779
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	750



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

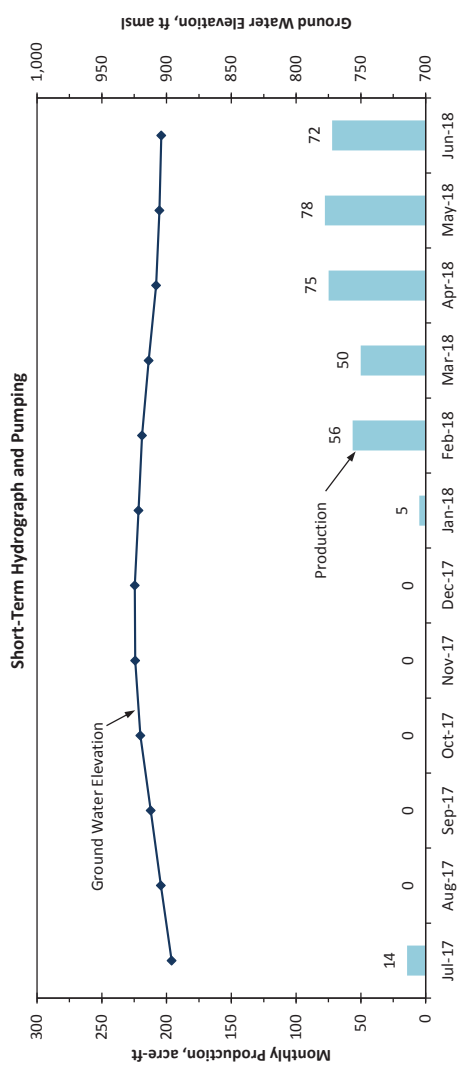
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 132

Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Combined
Instantaneous Yield [gpm]	650
Static Submergence [ft]	337
Comments	Air to screen interval partially dewatered; rehab in 2013
Recommended Production [acre-ft]	400
Jul-2017 to Jun-2018	356
Actual Production [acre-ft]	356
Jul-2017 to Jun-2018	82%
Percent of Total Production from Qyal	292
Production from Qyal [acre-ft]	400
Recommended Production [acre-ft]	400
Jul-2019 to Jun-2020	

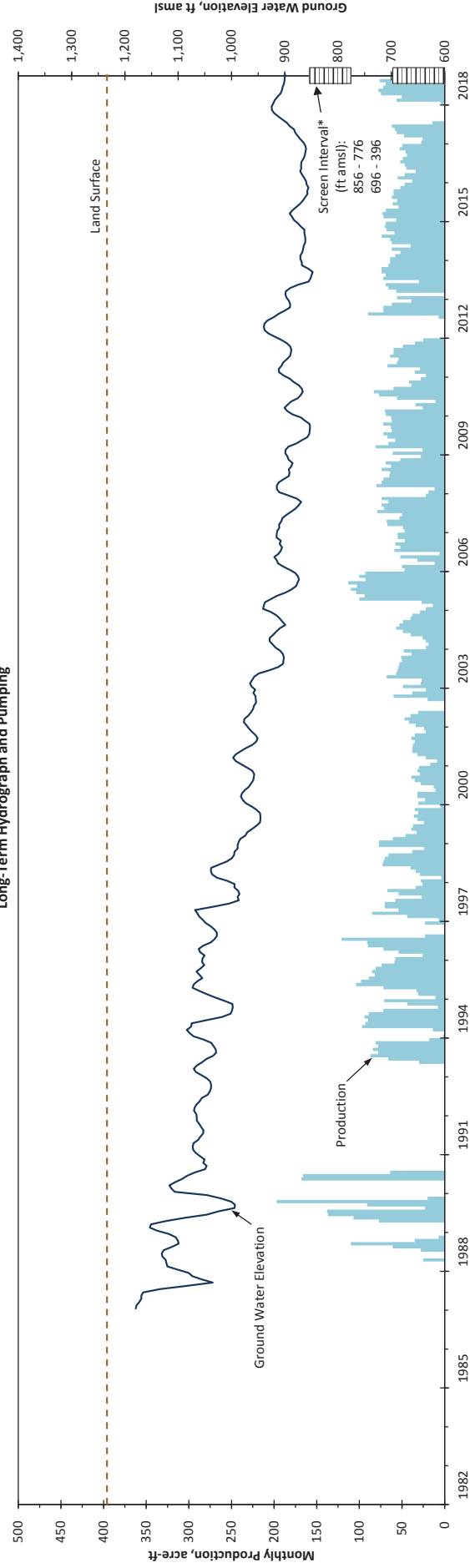


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 133

Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	450
Static Submergence [ft]	870
Comments	Rehab in 2017; discharge is declining; rehab in 2012; Temecula Aquifer Index Well
Recommended Production [acre-ft]	350
Actual Production [acre-ft]	350
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft]	600



Long-Term Hydrograph and Pumping



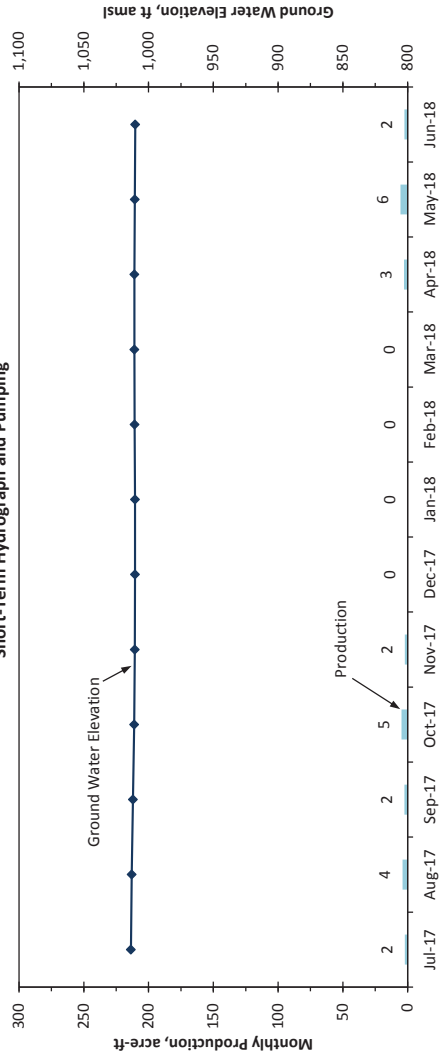
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 135

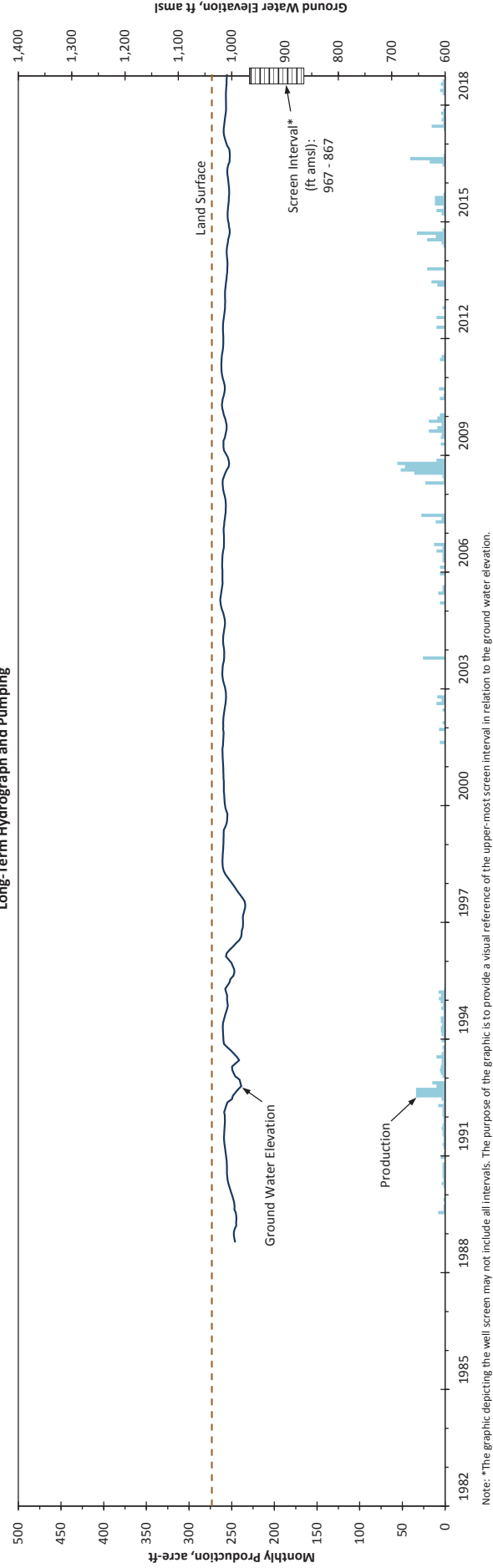
Well Performance and Recommended Production

Hydrologic Subarea	3
Hydrologic Subunit	North Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	685
Static Submergence [ft]	196
Comments	None
Recommended Production [acre-ft]	25
Actual Production [acre-ft]	27
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	25
Jul-2019 to Jun-2020	

Short-Term Hydrograph and Pumping



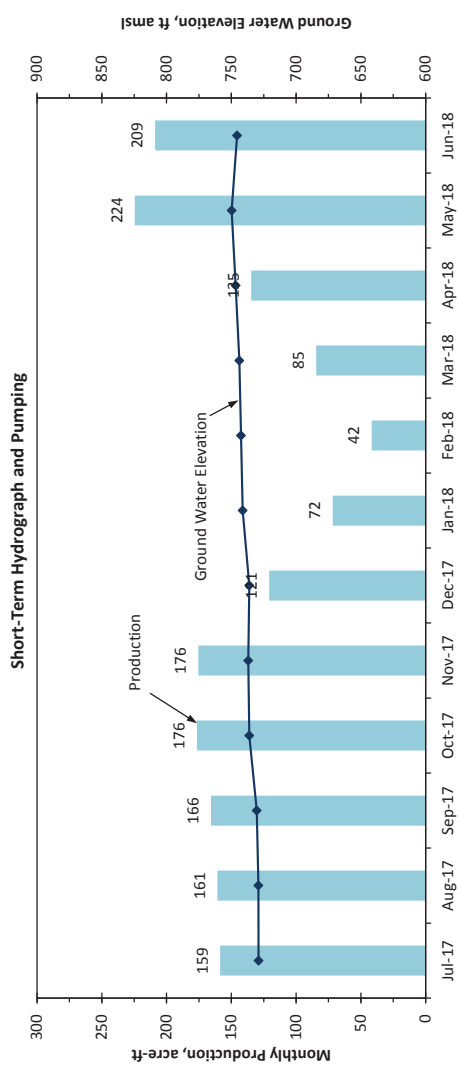
Long-Term Hydrograph and Pumping



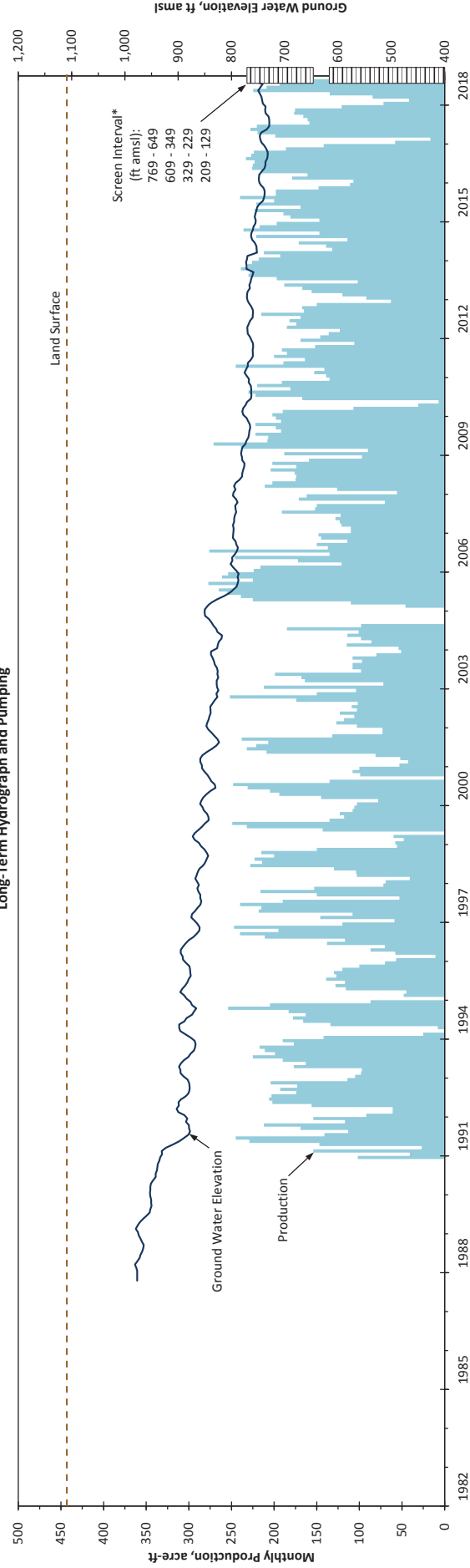
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 138

Well Performance and Recommended Production	
Hydrologic Subarea	19
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	1,820
Static Submergence [ft]	838
Comments	Rehab scheduled in 2019; declining water level; screen interval partially dewatered; rehab in 2004
Recommended Production [acre-ft]	1,600
Actual Production [acre-ft]	1,724
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	1,400



Long-Term Hydrograph and Pumping

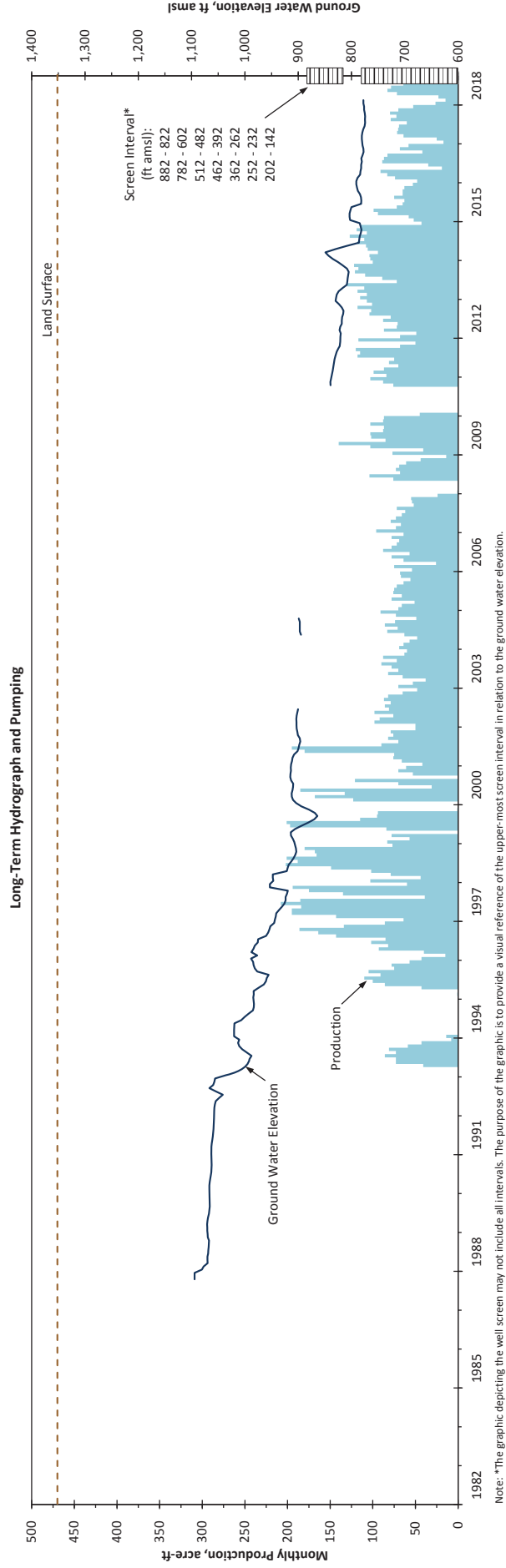
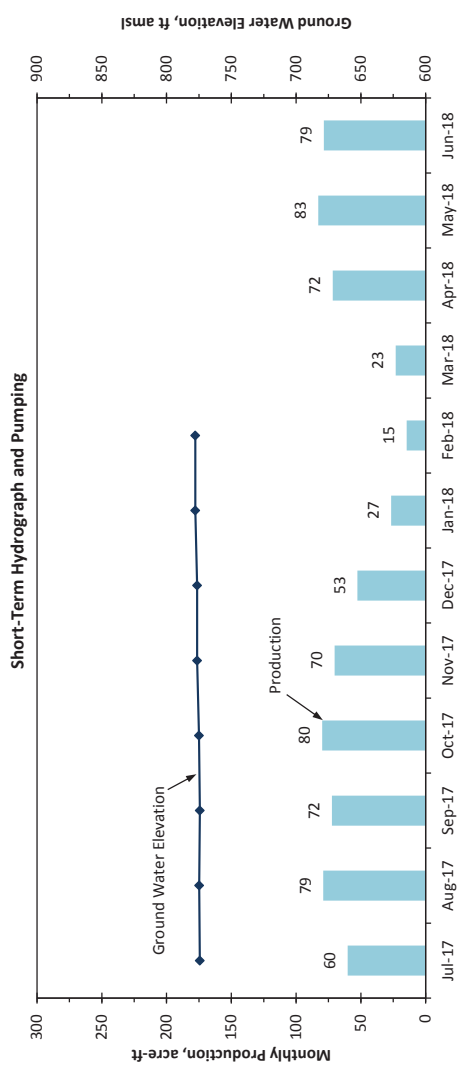


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.



TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 139

Well Performance and Recommended Production	
Hydrologic Subarea	17
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	870
Static Submergence [ft]	1,087
Comments	Rehab to be scheduled; declining water levels; screen interval partially dewatered; rehab in 2013; Temecula Aquifer Index Well
Recommended Production [acre-ft]	700
Actual Production [acre-ft]	712
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	550
Jul-2019 to Jun-2020	

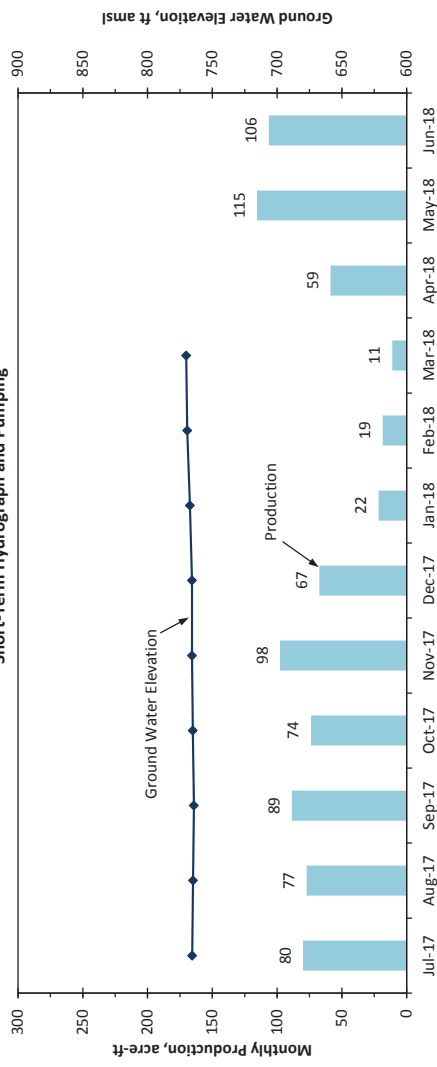


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

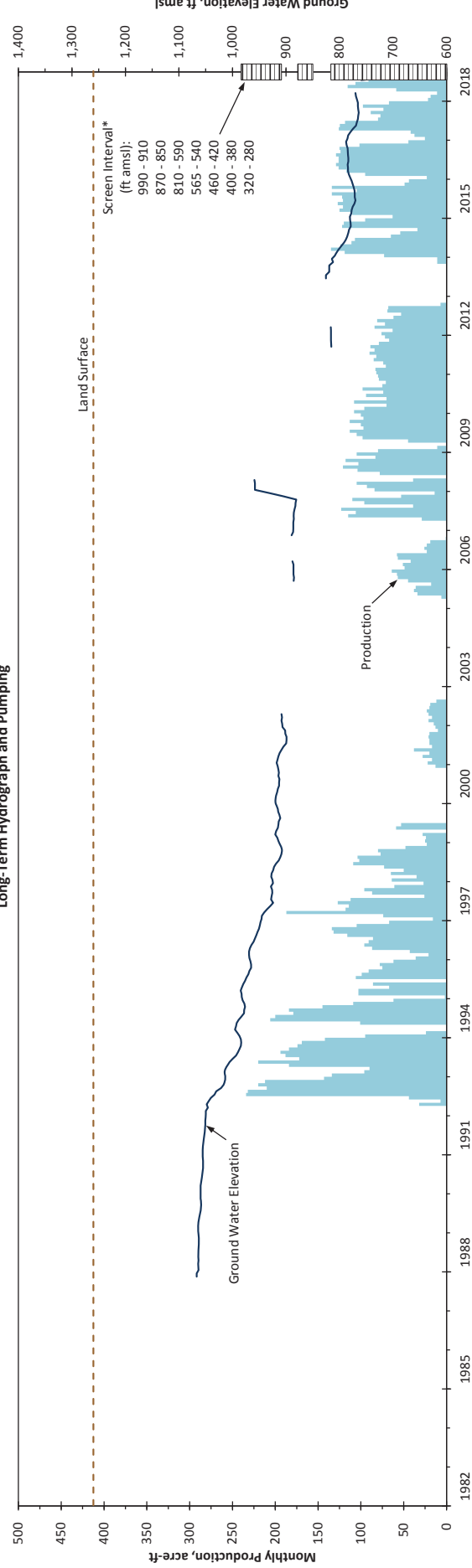
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 140

Well Performance and Recommended Production	
Hydrologic Subarea	17
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	1,100
Static Submergence [ft]	953
Comments	Rehab scheduled for 2019; declining water levels; screen interval partially dewatered; rehab in 2013
Recommended Production [acre-ft]	800
Actual Production [acre-ft]	816
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	700
Jul-2019 to Jun-2020	

Short-Term Hydrograph and Pumping



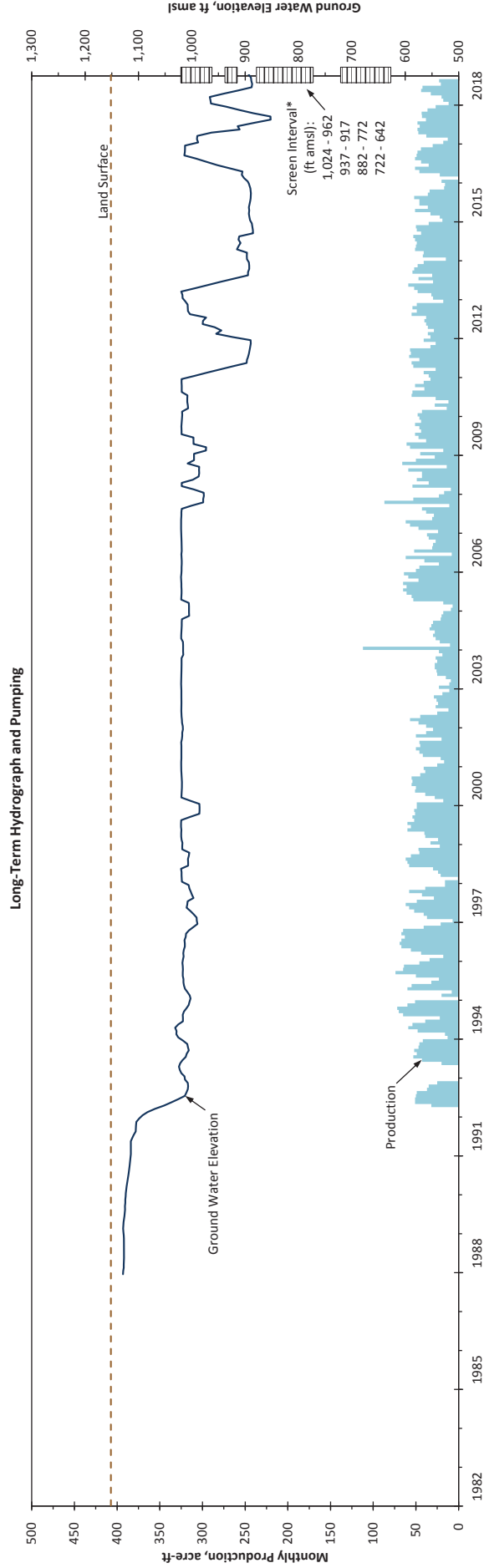
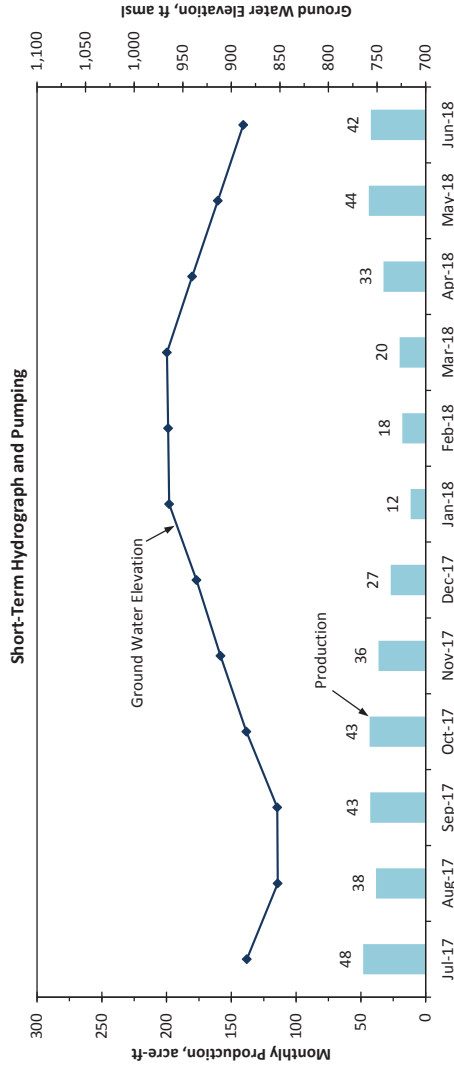
Long-Term Hydrograph and Pumping



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 141

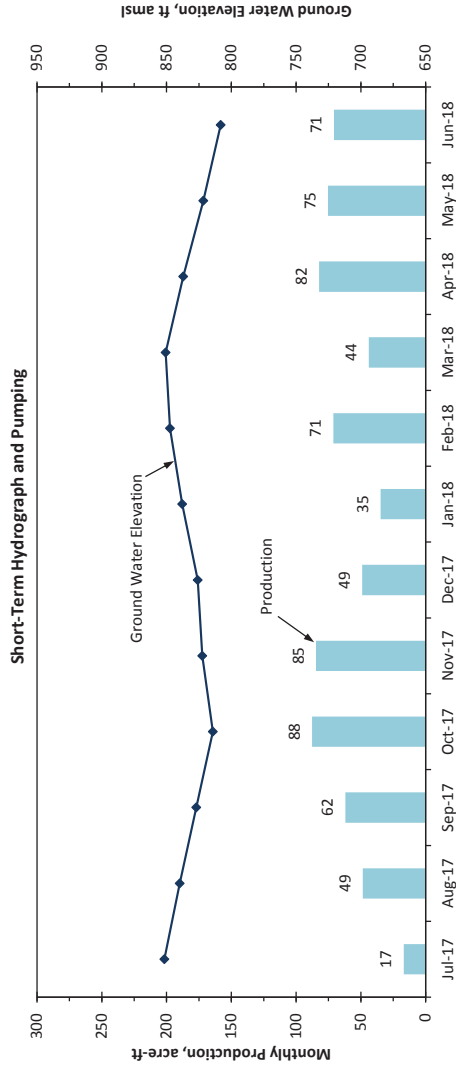
Well Performance and Recommended Production	
Hydrologic Subarea	11
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	385
Static Submergence [ft]	710
Comments	Pump replacement and rehab scheduled for 2019; screen interval partially dewatered; cascading water
Recommended Production [acre-ft]	400
Actual Production [acre-ft]	404
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300
Jul-2019 to Jun-2020	



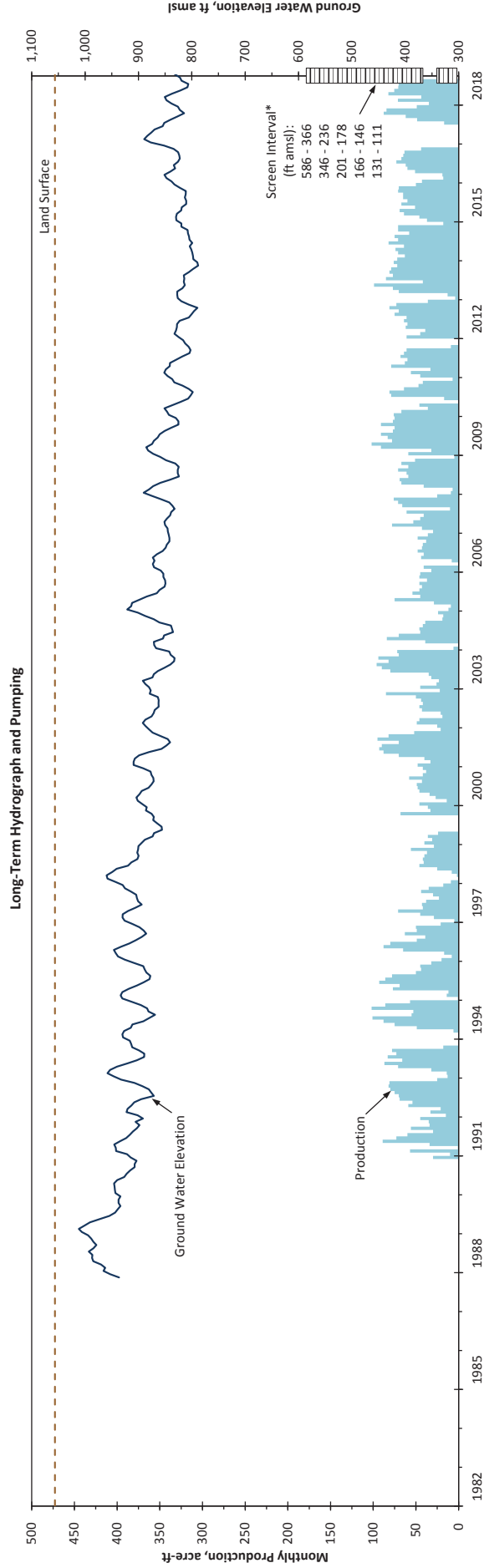
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 143

Well Performance and Recommended Production	
Hydrologic Subarea	10
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	600
Static Submergence [ft]	756
Comments	Rehab in 2017; arsenic near 100 ug/L; planning to blend with Well No. 109; rehab in 1999
Recommended Production [acre-ft]	500
Actual Production [acre-ft]	727
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft]	0
Recommended Production [acre-ft]	500



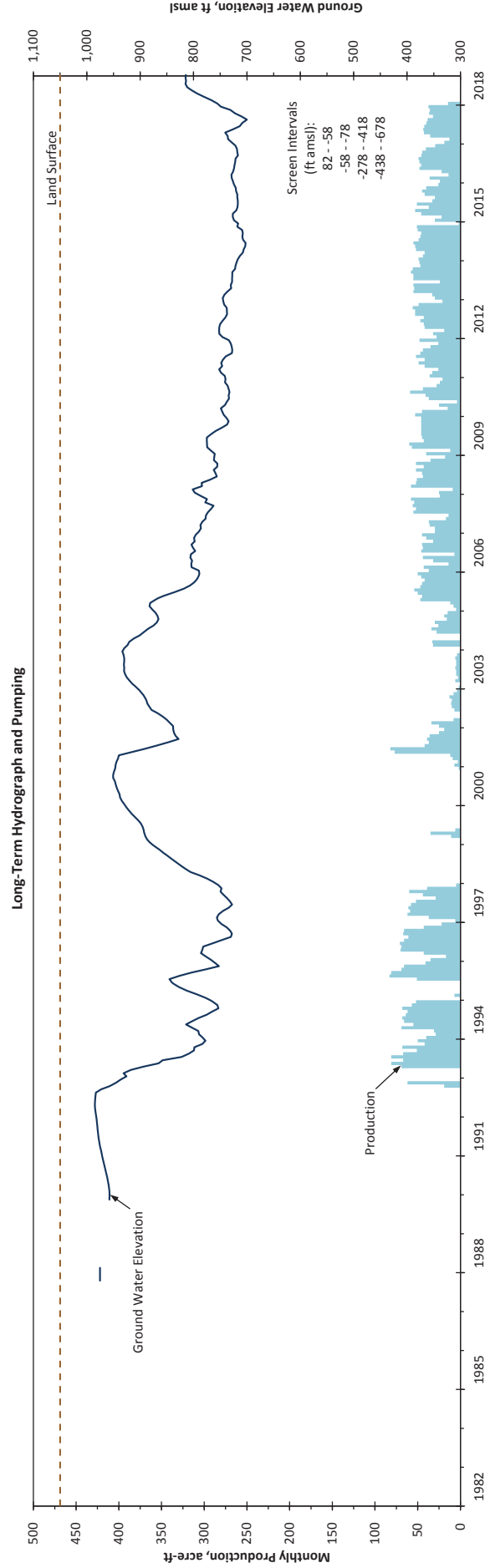
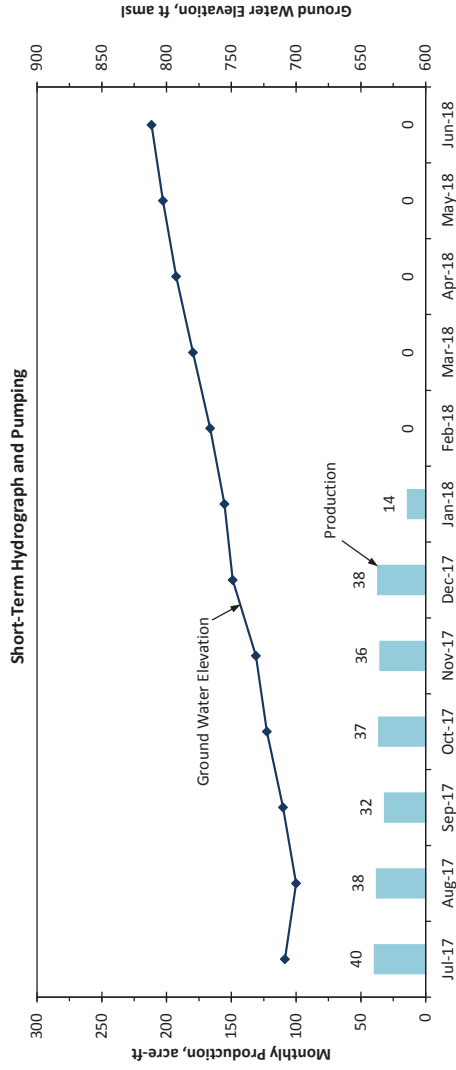
Short-Term Hydrograph and Pumping



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

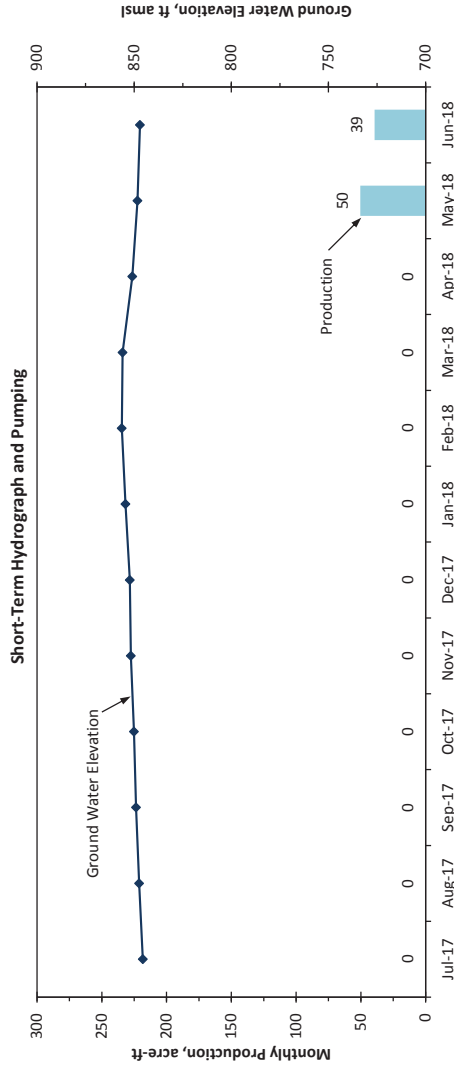
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION- RCWD WELL NO. 144

Well Performance and Recommended Production	
Hydrologic Subarea	3
Hydrologic Subunit	North Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	480
Static Submergence [ft]	734
Comments	Offline; requires long pump to waste; no record of rehab
Recommended Production [acre-ft] Jul-2017 to Jun-2018	400
Actual Production [acre-ft] Jul-2017 to Jun-2018	235
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	300

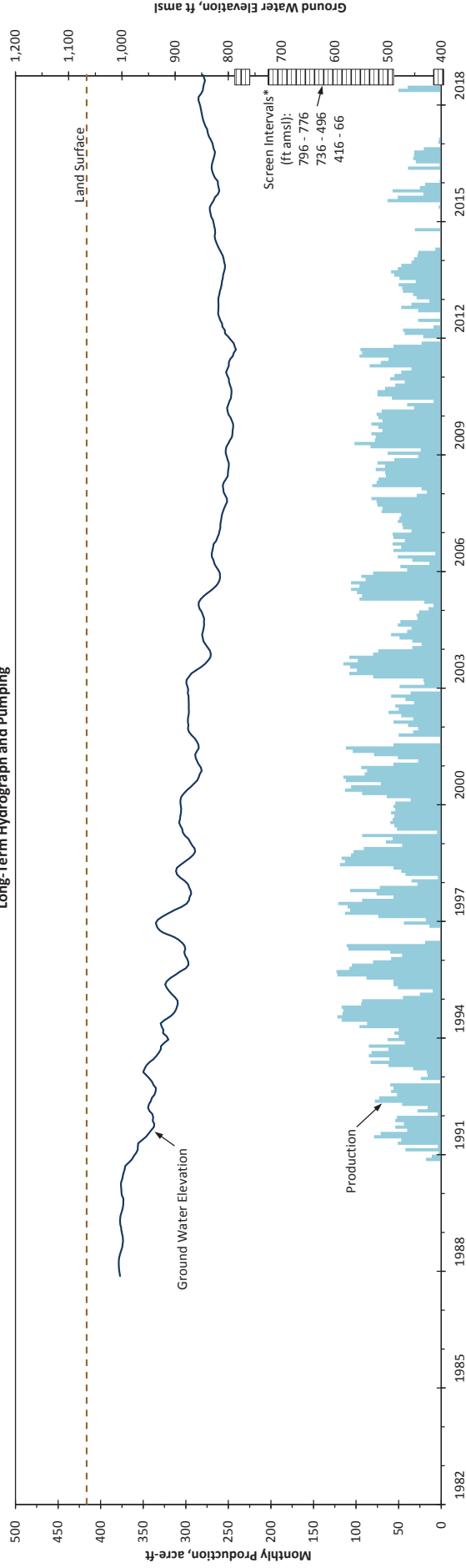


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 145

Well Performance and Recommended Production	
Hydrologic Subarea	2
Hydrologic Subunit	North Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	730
Static Submergence [ft]	878
Comments	Rehab in 2017; column added in 2014
Recommended Production [acre-ft]	350
Actual Production [acre-ft]	90
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	300
Jul-2019 to Jun-2020	



Long-Term Hydrograph and Pumping



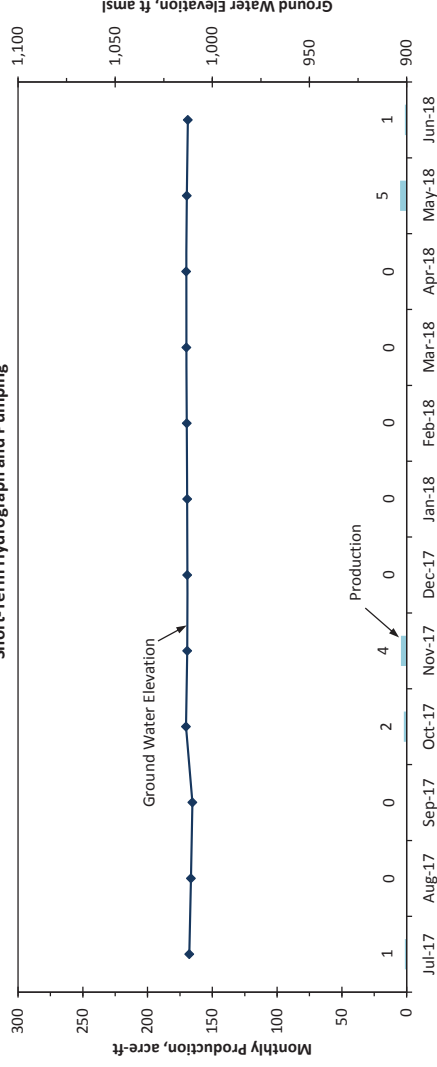
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 146

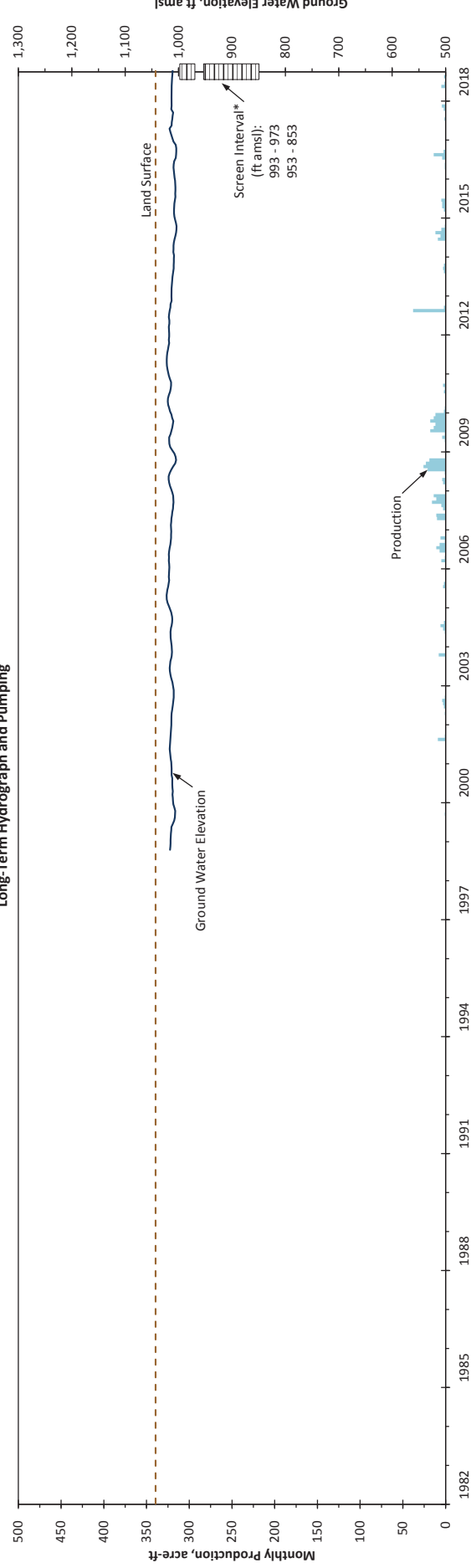
Well Performance and Recommended Production

Hydrologic Subarea	3
Hydrologic Subunit	North Murrieta Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	368
Static Submergence [ft]	256
Comments	Recycled system
Recommended Production [acre-ft] Jul-2017 to Jun-2018	15
Actual Production [acre-ft] Jul-2017 to Jun-2018	15
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	15

Short-Term Hydrograph and Pumping



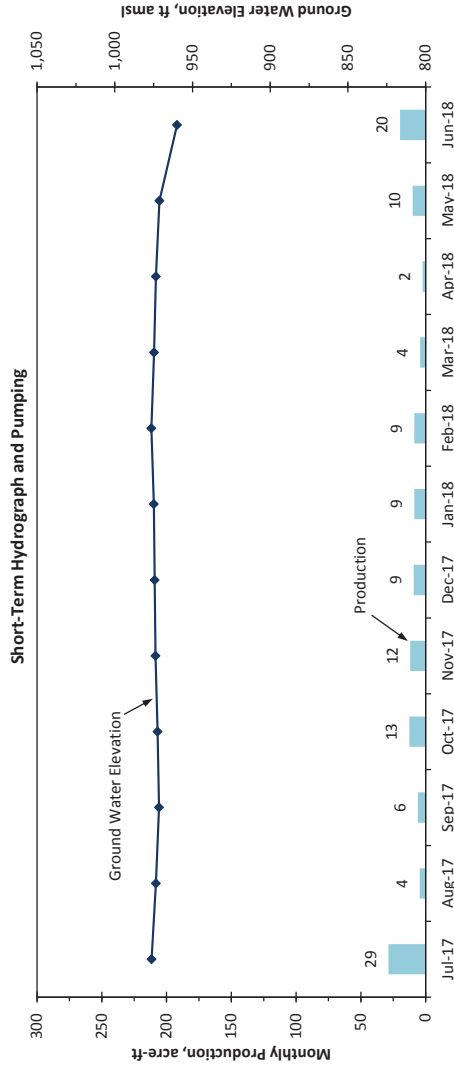
Long-Term Hydrograph and Pumping



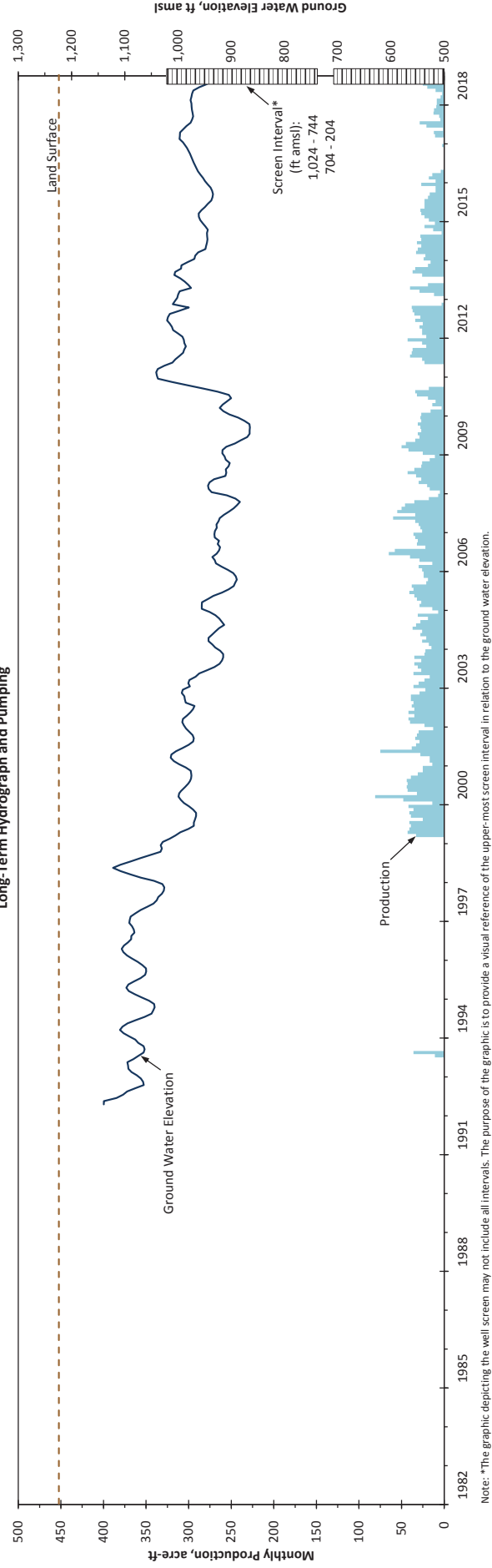
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 149

Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	210
Static Submergence [ft]	852
Comments	Air at higher pumping rates; screen interval partially dewatered; rehab in 2011; to be re-located near Well No. 133
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	127
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	200
Jul-2019 to Jun-2020	



Long-Term Hydrograph and Pumping

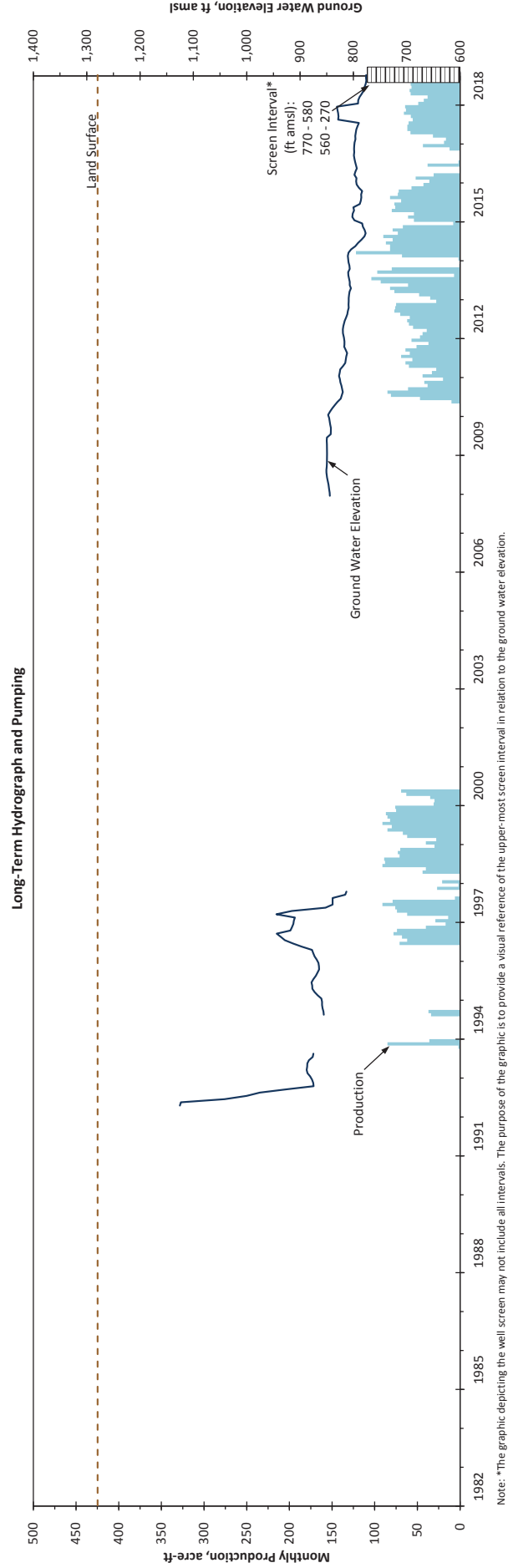
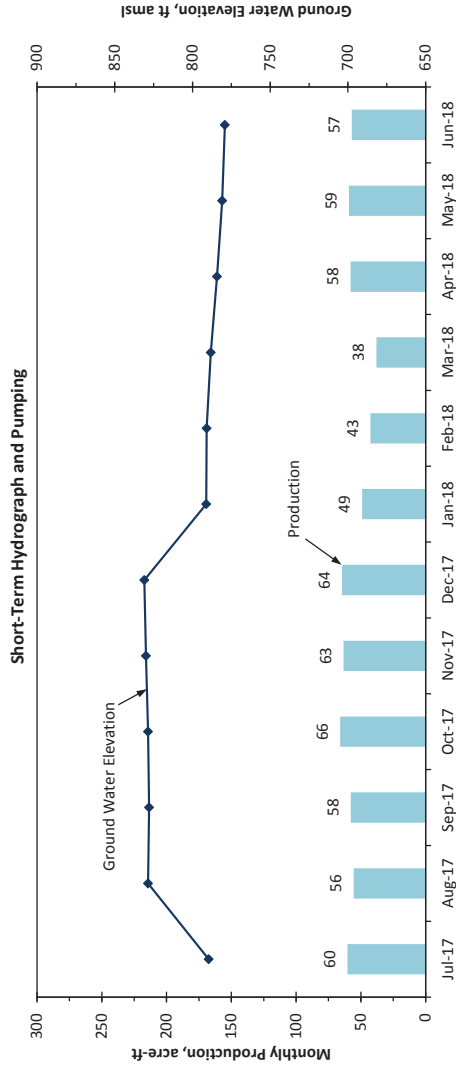


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.



TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 151

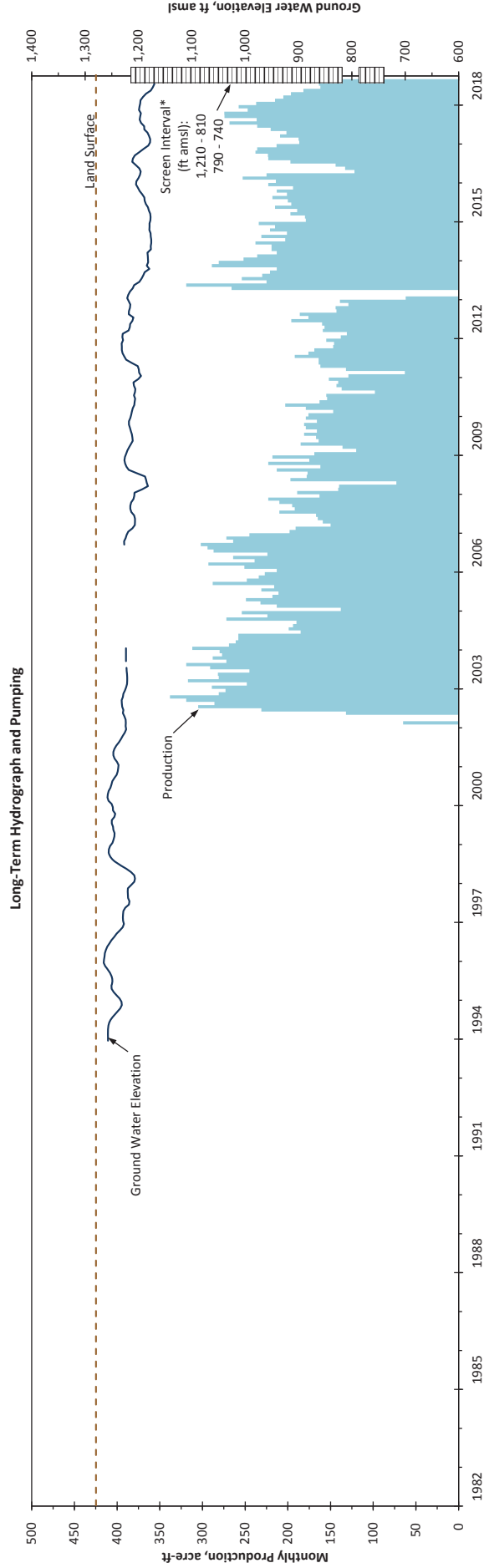
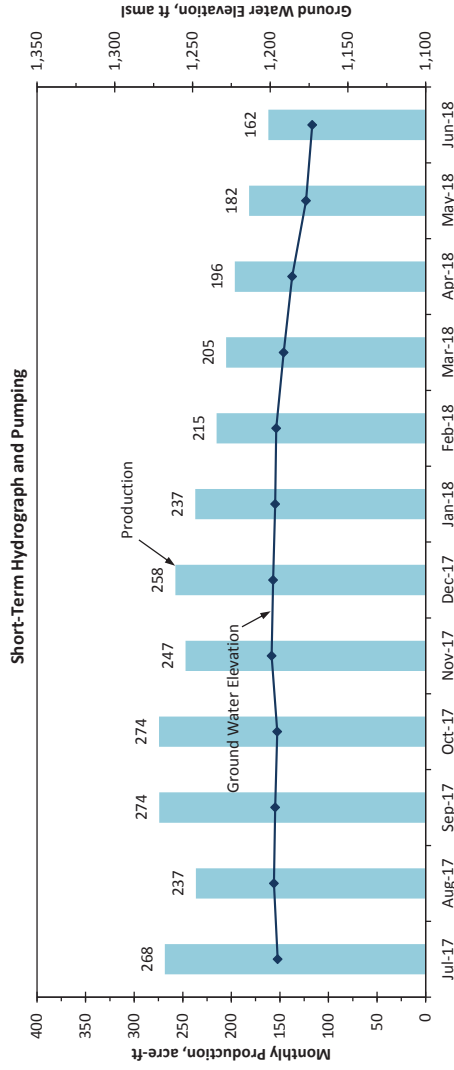
Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Upper Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	635
Static Submergence [ft]	1,117
Comments	Blending plan; rehab in 2008
Recommended Production [acre-ft]	600
Jul-2017 to Jun-2018	671
Actual Production [acre-ft]	0%
Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	400
Recommended Production [acre-ft]	400
Jul-2019 to Jun-2020	



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 152

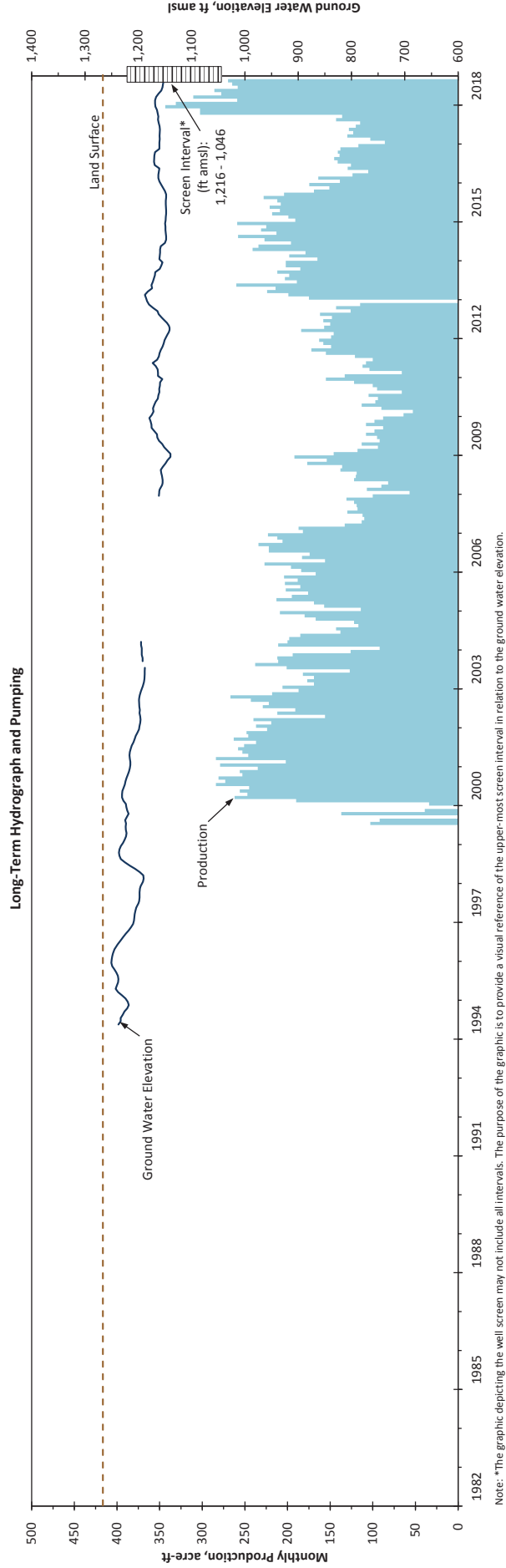
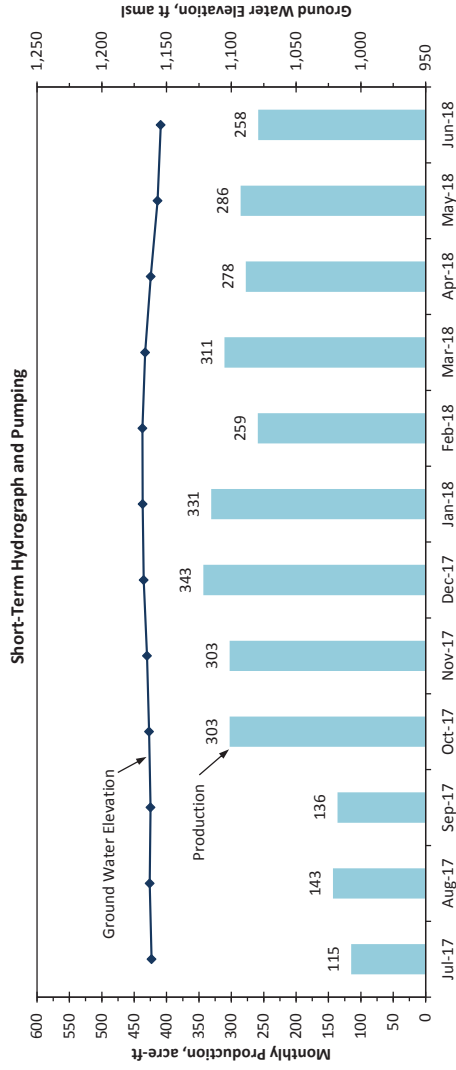
Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	1,800
Static Submergence [ft]	277
Comments	Rehab scheduled for 2019-20; located in VDC recharge area; PWL only; rehab in 2013
Recommended Production [acre-ft] Jul-2017 to Jun-2018	2,300
Actual Production [acre-ft] Jul-2017 to Jun-2018	2,756
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	2,400



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

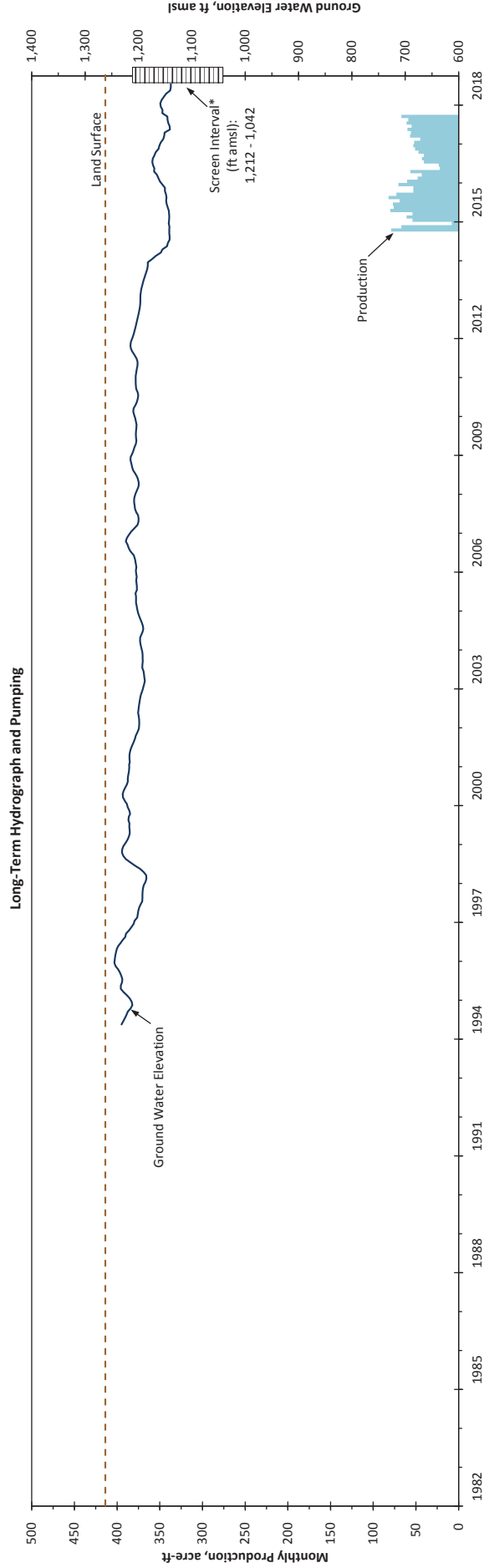
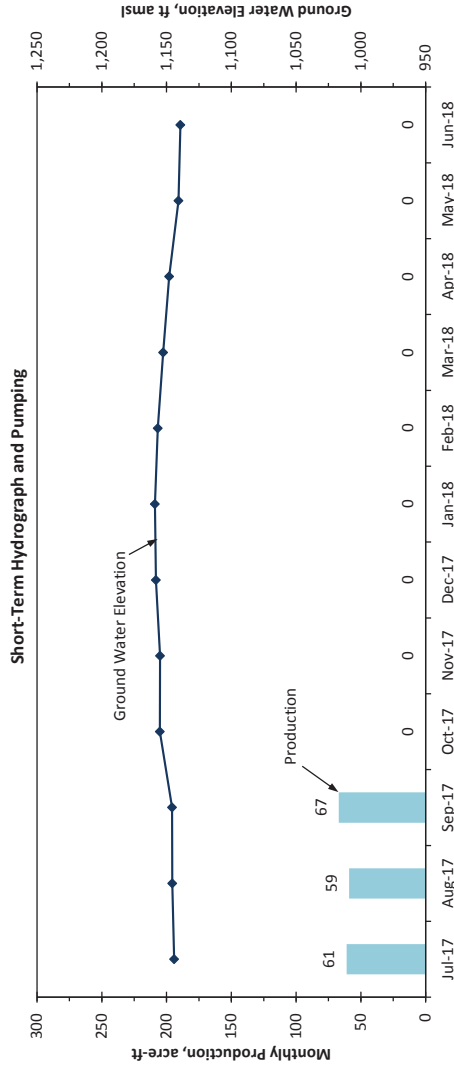
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 153

Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	1,450
Static Submergence [ft]	355
Comments	Rehab scheduled for 2019; located in VDC recharge area; PWL only; screen interval partially dewatered; rehab in 2013
Recommended Production [acre-ft]	1,600
Actual Production [acre-ft]	3,065
Percent of Total Production from Qyal	100%
Production from Qyal [acre-ft]	3,065
Recommended Production [acre-ft]	1,600



TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 154

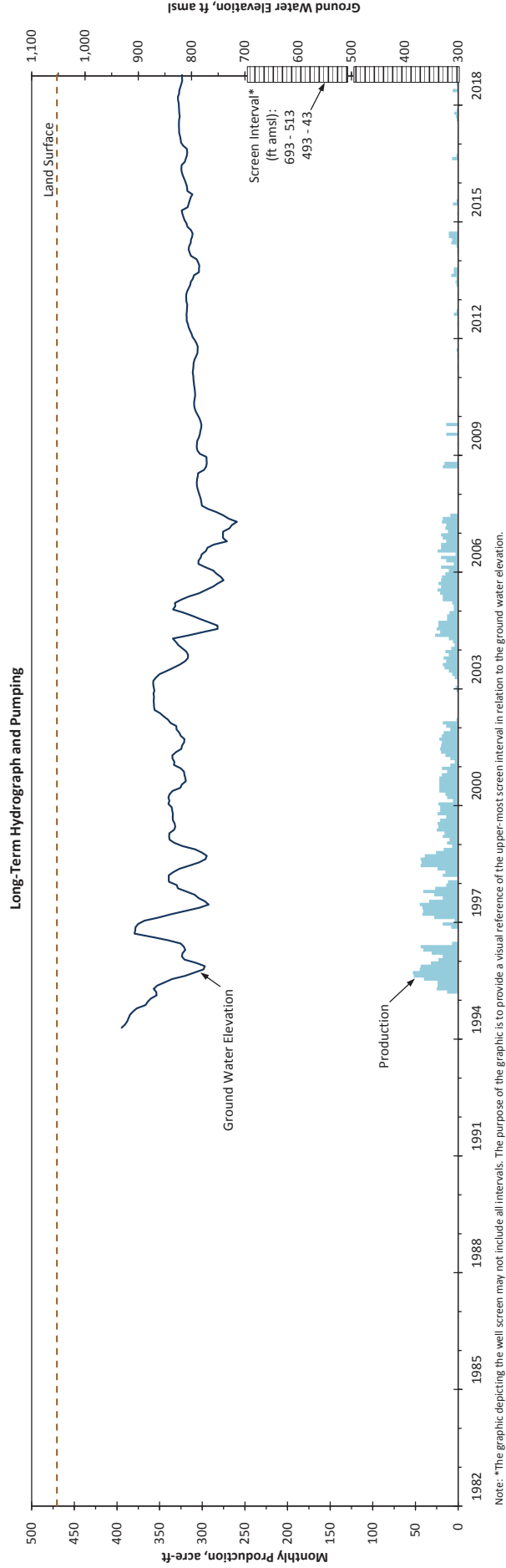
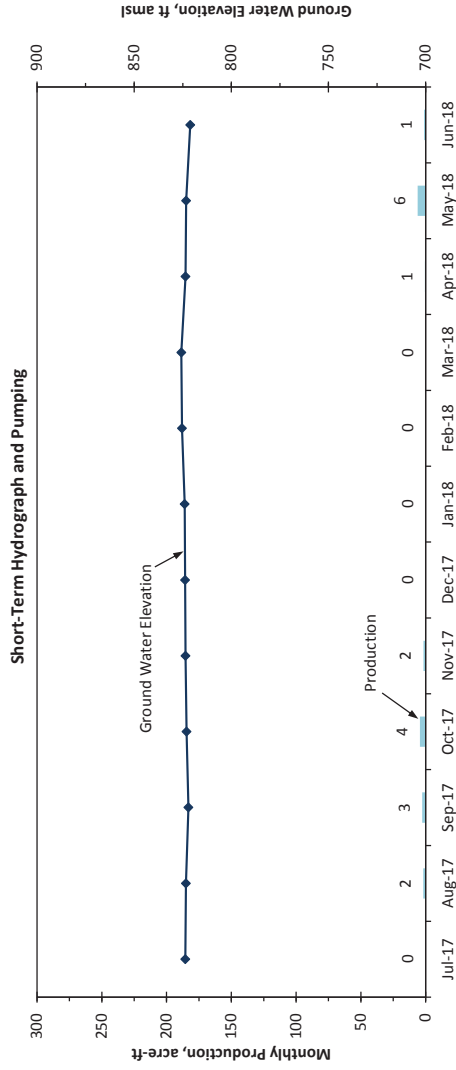
Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	440
Static Submergence [ft]	NA
Comments	Located in VDC recharge area; PWL only; screen interval partially dewatered
Recommended Production [acre-ft]	500
Actual Production [acre-ft]	187
Percent of Total Production from Qyal	100%
Production from Qyal [acre-ft]	187
Recommended Production [acre-ft]	600
Jul-2019 to Jun-2020	



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 155

Well Performance and Recommended Production	
Hydrologic Subarea	3
Hydrologic Subunit	North Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	350
Static Submergence [ft]	975
Comments	None
Recommended Production [acre-ft] Jul-2017 to Jun-2018	20
Actual Production [acre-ft] Jul-2017 to Jun-2018	19
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	20



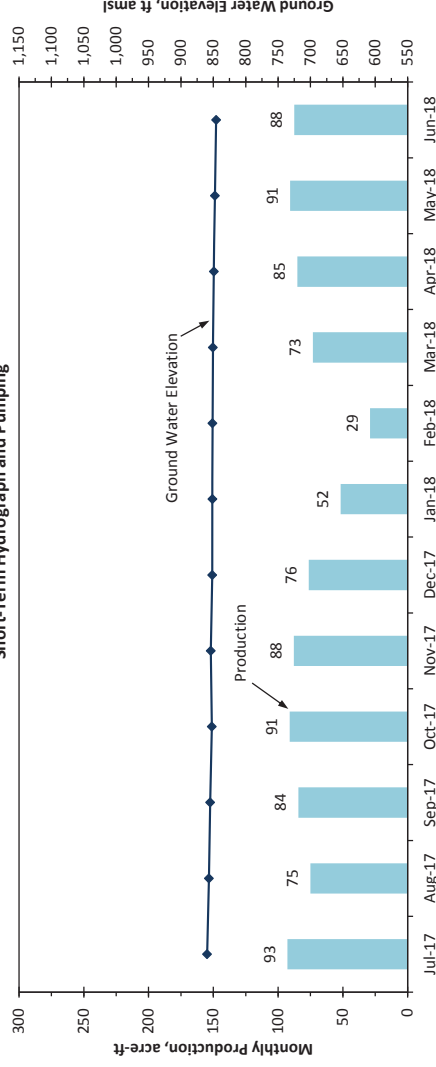
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 156

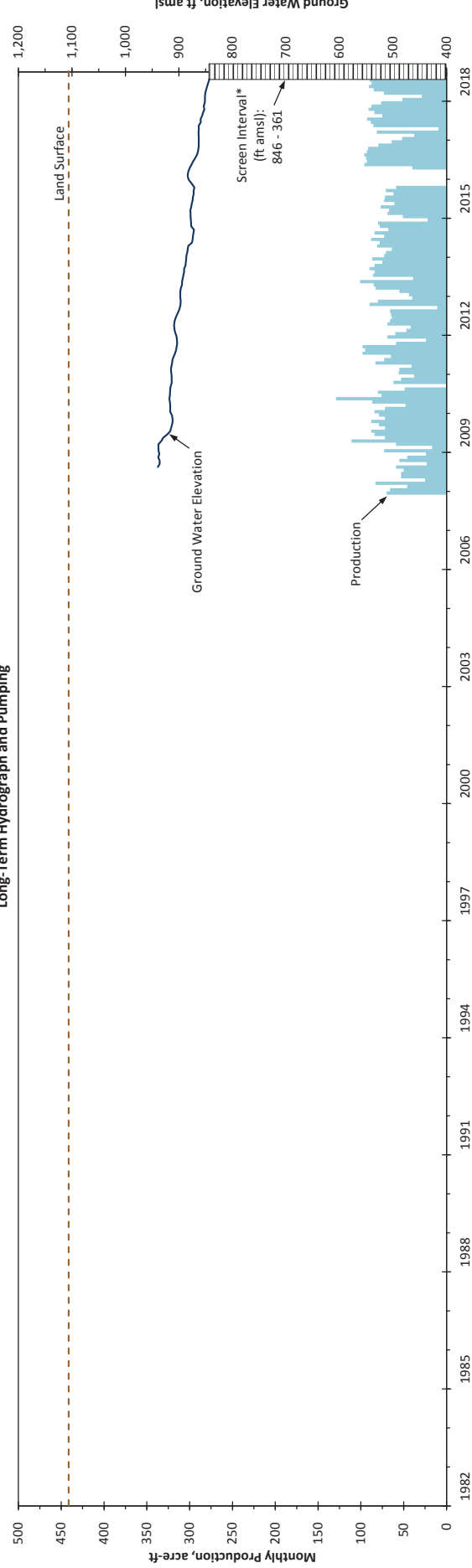
Well Performance and Recommended Production

Hydrologic Subarea	1
Hydrologic Subunit	North Murrieta Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	640
Static Submergence [ft]	424
Comments	Rehab in 2016
Recommended Production [acre-ft]	800
Actual Production [acre-ft]	925
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	650

Short-Term Hydrograph and Pumping



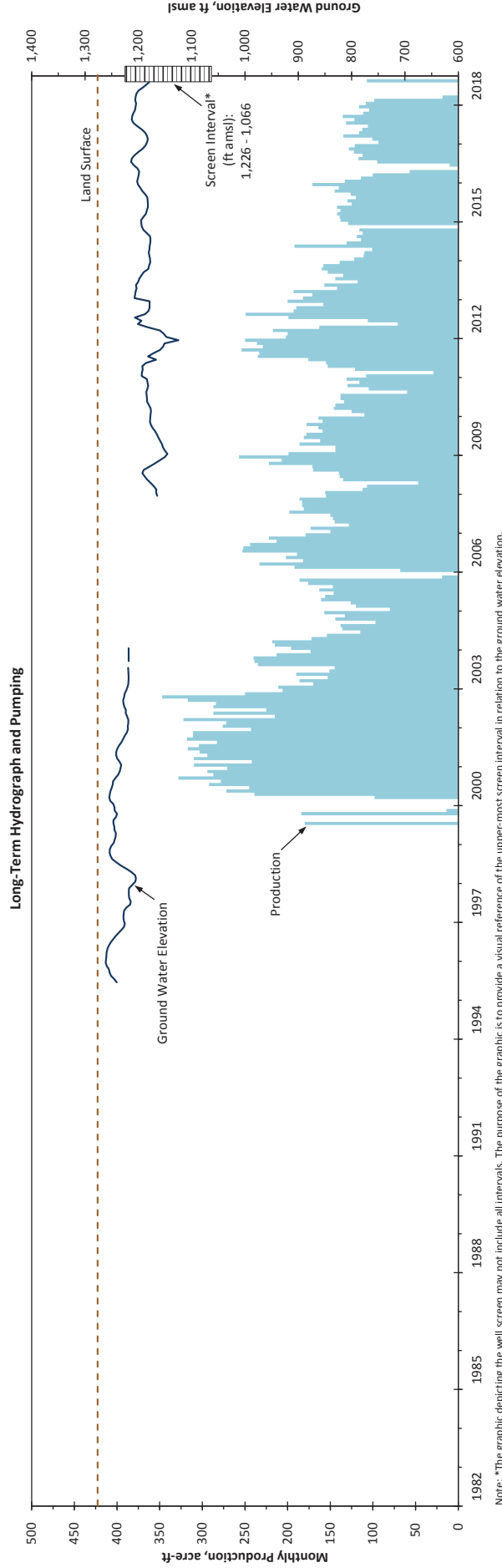
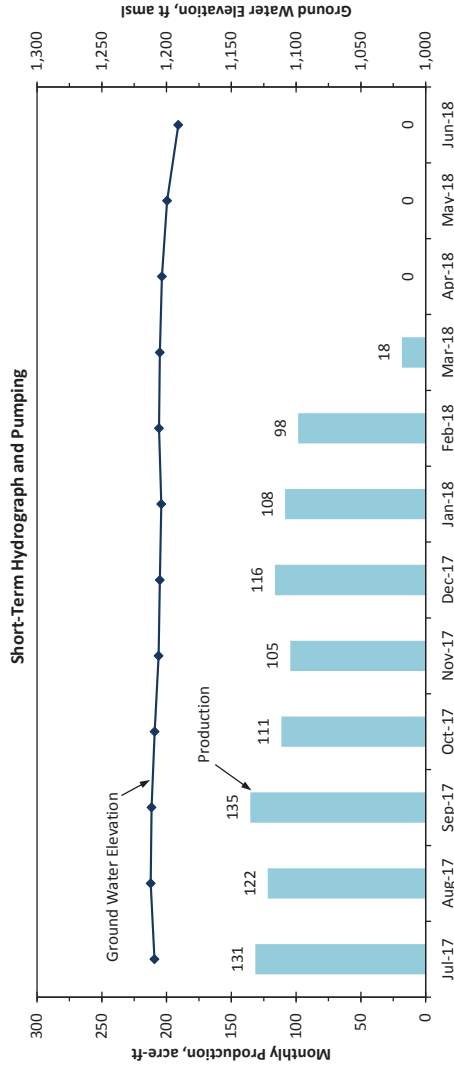
Long-Term Hydrograph and Pumping



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 157

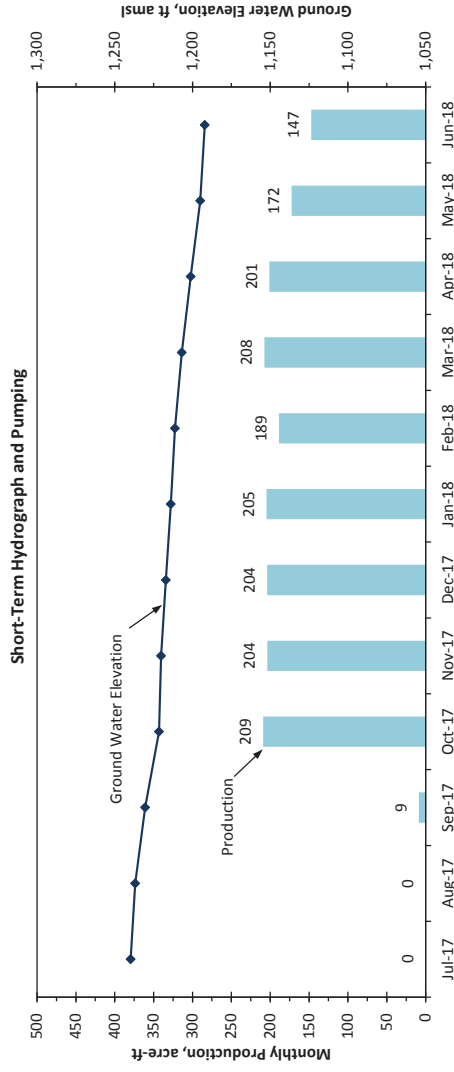
Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	930
Static Submergence [ft]	326
Comments	Located in VDC recharge area; rehab in 2012, 2014, 2016, and 2018.
Recommended Production [acre-ft]	1,200
Actual Production [acre-ft]	946
Percent of Total Production from Qyal	100%
Production from Qyal [acre-ft]	946
Recommended Production [acre-ft]	1,000
Jul-2019 to Jun-2020	



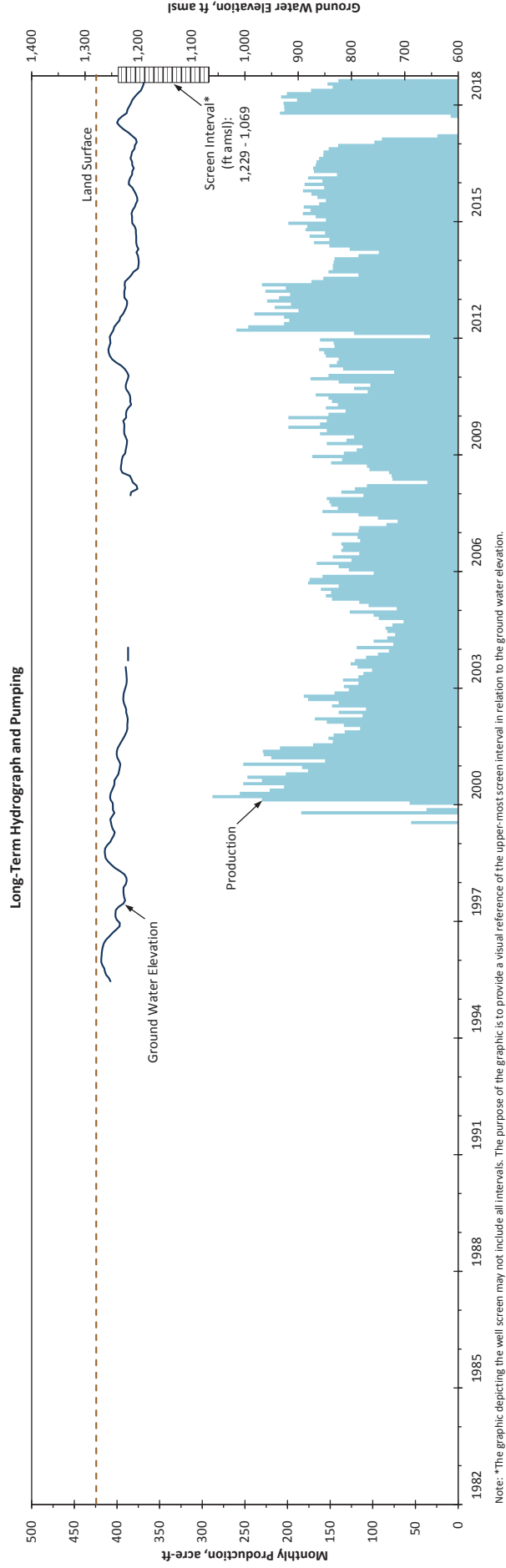
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 158

Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	1,260
Static Submergence [ft]	277
Comments	Located in VDC recharge area; rehab in 2012
Recommended Production [acre-ft] Jul-2017 to Jun-2018	1,800
Actual Production [acre-ft] Jul-2017 to Jun-2018	1,747
Percent of Total Production from Qyal Production from Qyal [acre-ft]	100% 1,747
Recommended Production [acre-ft] Jul-2019 to Jun-2020	1,600



Short-Term Hydrograph and Pumping

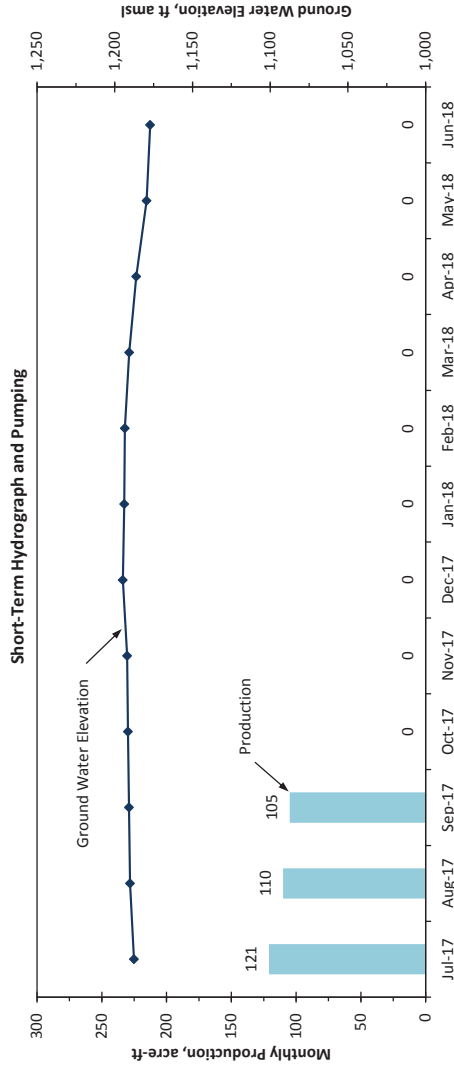


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

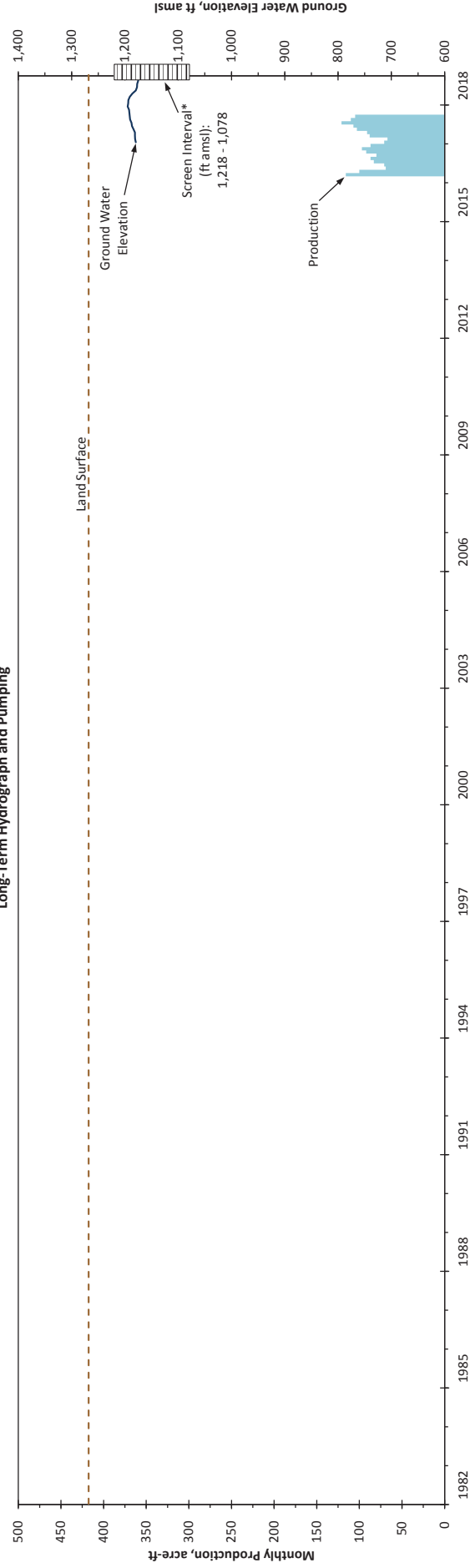


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 161

Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	NA
Static Submergence [ft]	NA
Comments	None
Recommended Production [acre-ft] Jul-2017 to Jun-2018	1,000
Actual Production [acre-ft] Jul-2017 to Jun-2018	336
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	1,000



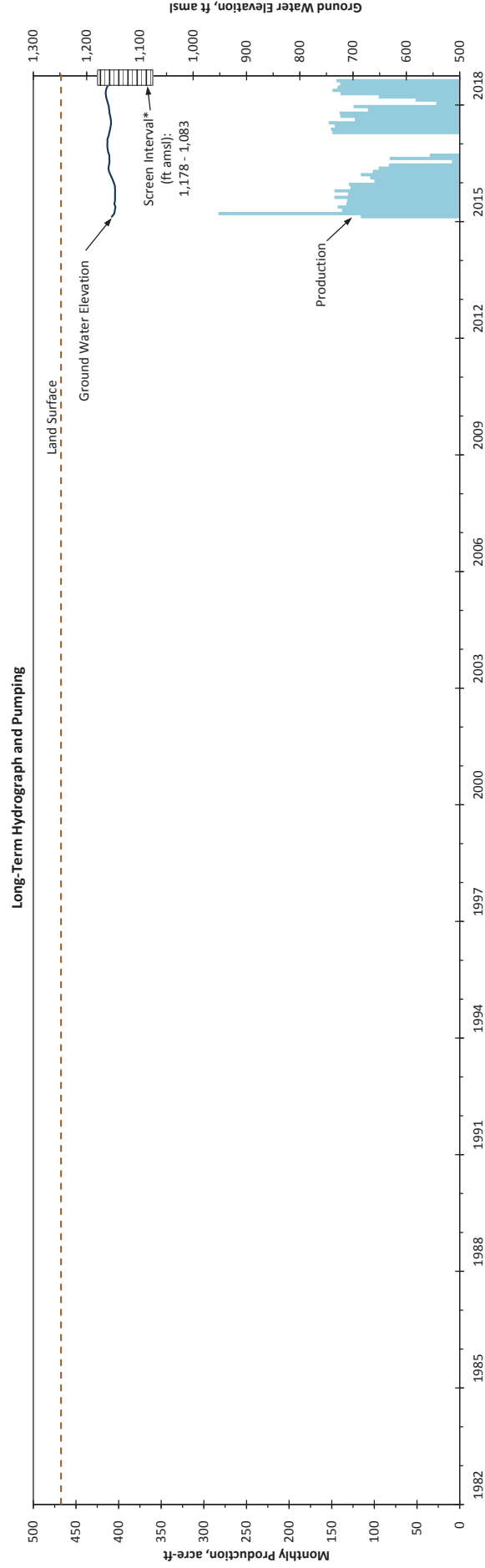
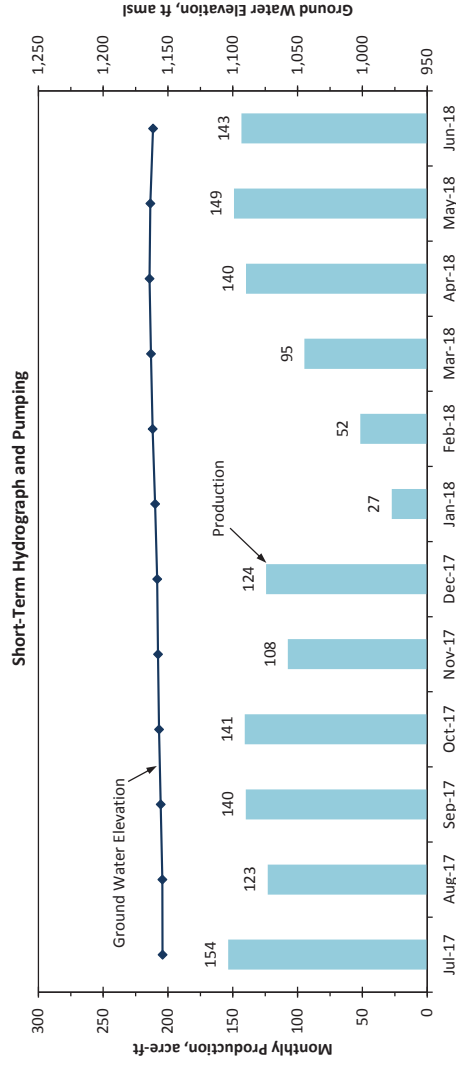
Long-Term Hydrograph and Pumping



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 164

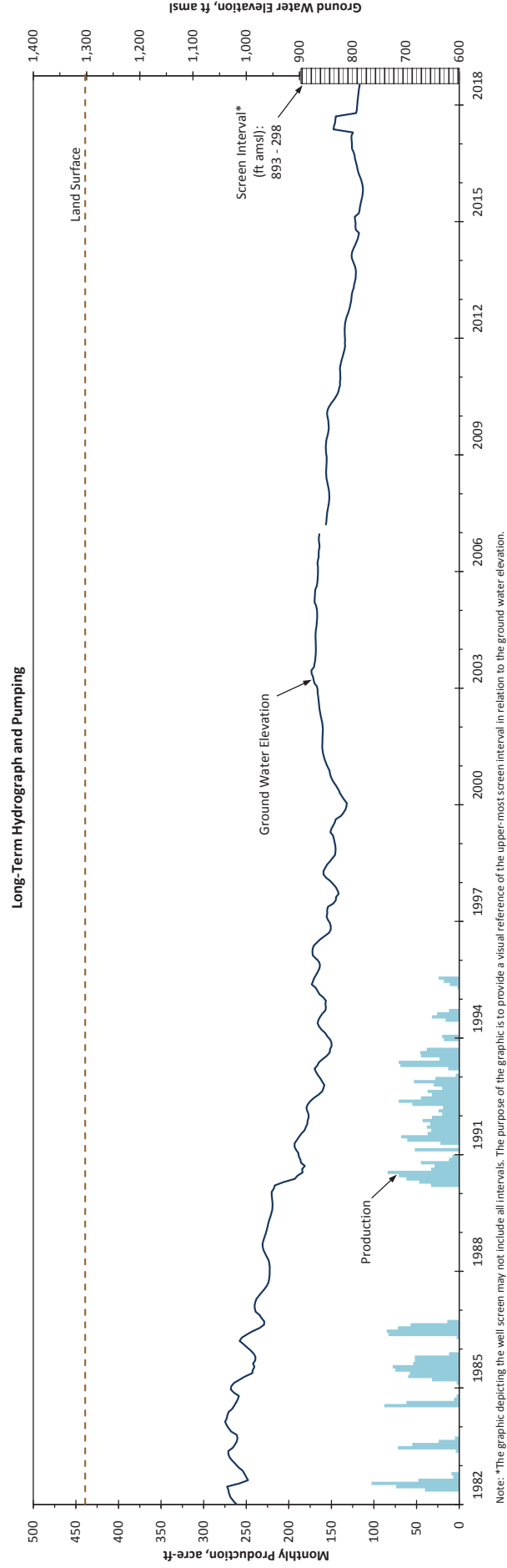
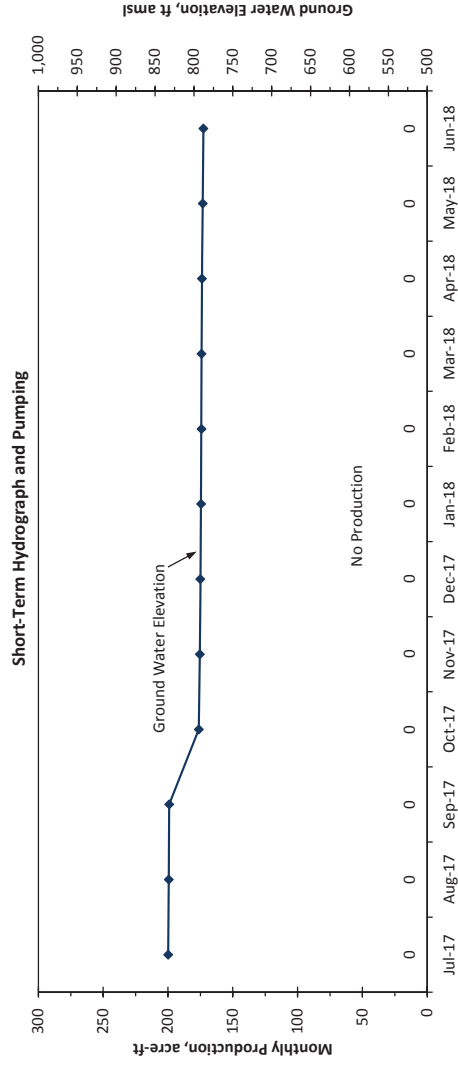
Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	1,100
Static Submergence [ft]	NA
Comments	None; replaces old Well No. 110
Recommended Production [acre-ft] Jul-2017 to Jun-2018	1,300
Actual Production [acre-ft] Jul-2017 to Jun-2018	1,396
Percent of Total Production from Qyal Production from Qyal [acre-ft]	97% 1,354
Recommended Production [acre-ft] Jul-2019 to Jun-2020	1,400



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

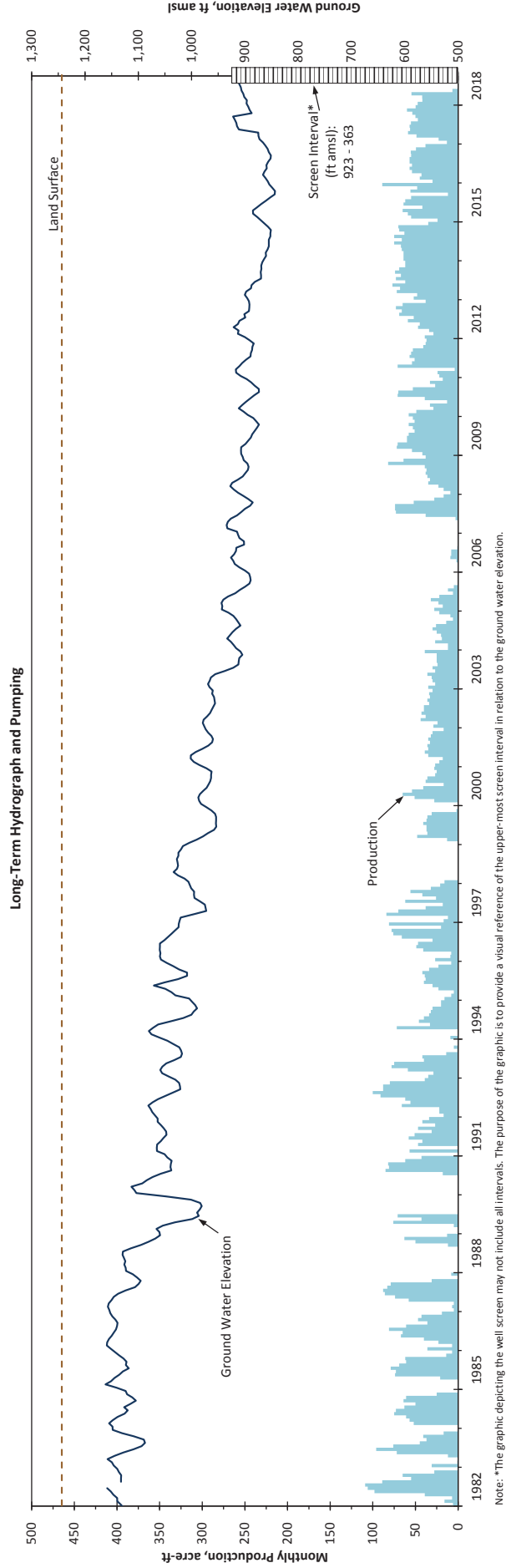
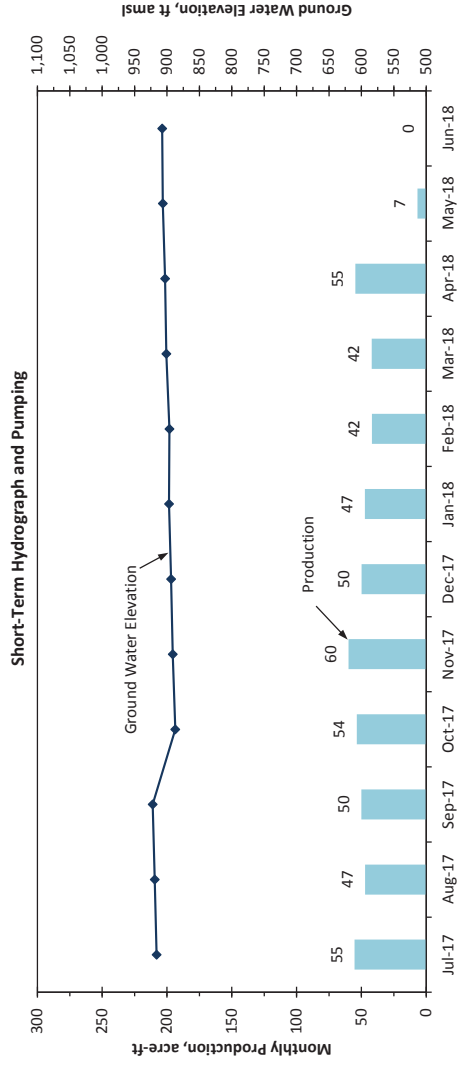
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 201

Well Performance and Recommended Production	
Hydrologic Subarea	16
Hydrologic Subunit	Upper Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Inactive since 1995; screen interval partially dewatered
Recommended Production [acre-ft] Jul-2017 to Jun-2018	0
Actual Production [acre-ft] Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	0



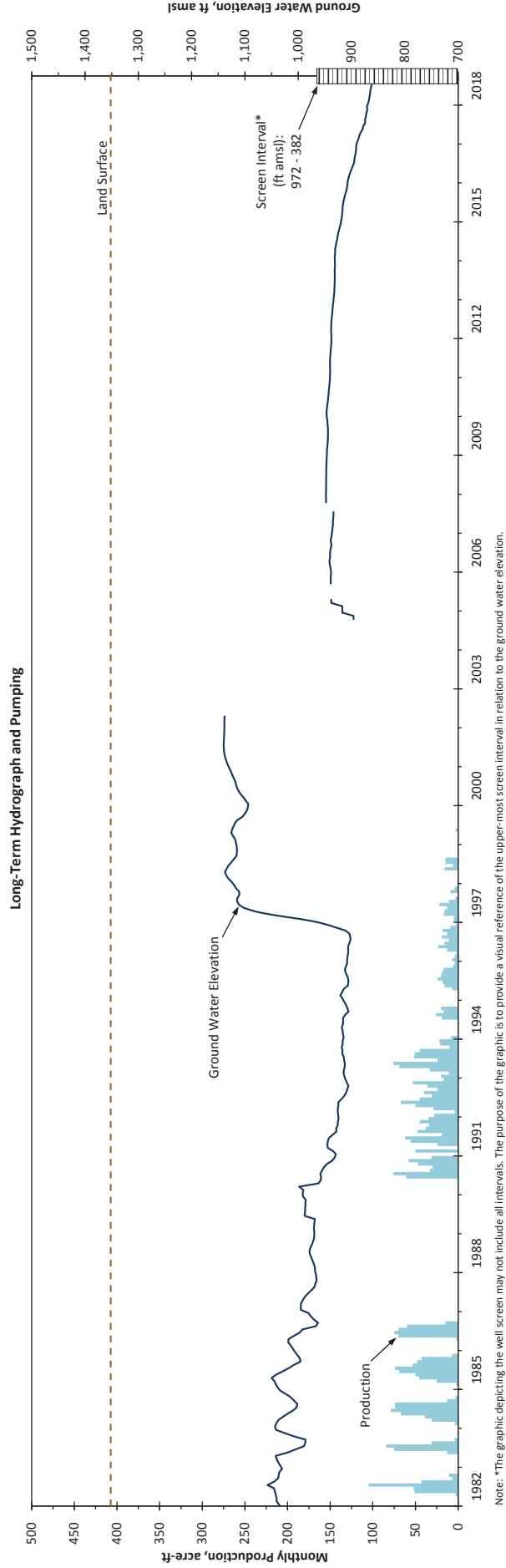
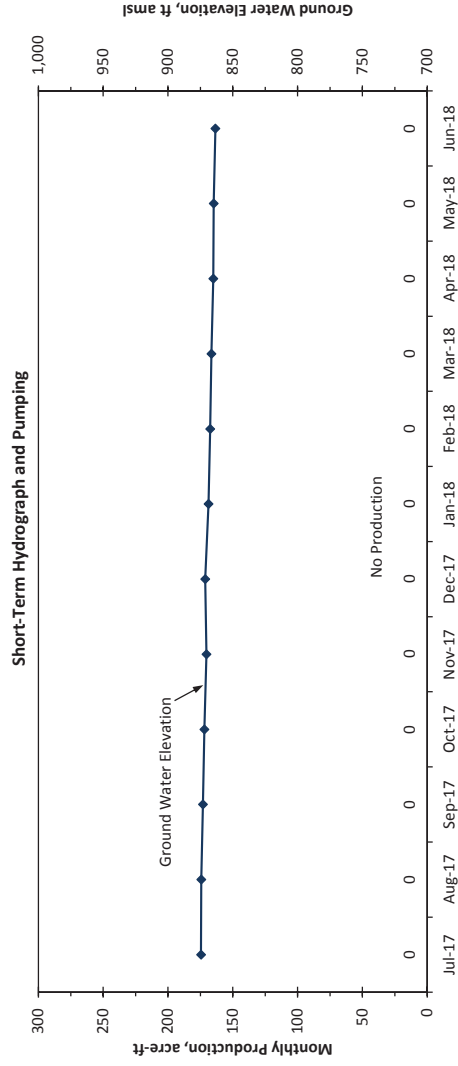
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 203

Well Performance and Recommended Production	
Hydrologic Subarea	13
Hydrologic Subunit	Pauba Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	490
Static Submergence [ft]	950
Comments	High bacteria; rehab in 2016 and 2017
Recommended Production [acre-ft]	500
Actual Production [acre-ft]	509
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	500
Jul-2017 to Jun-2020	



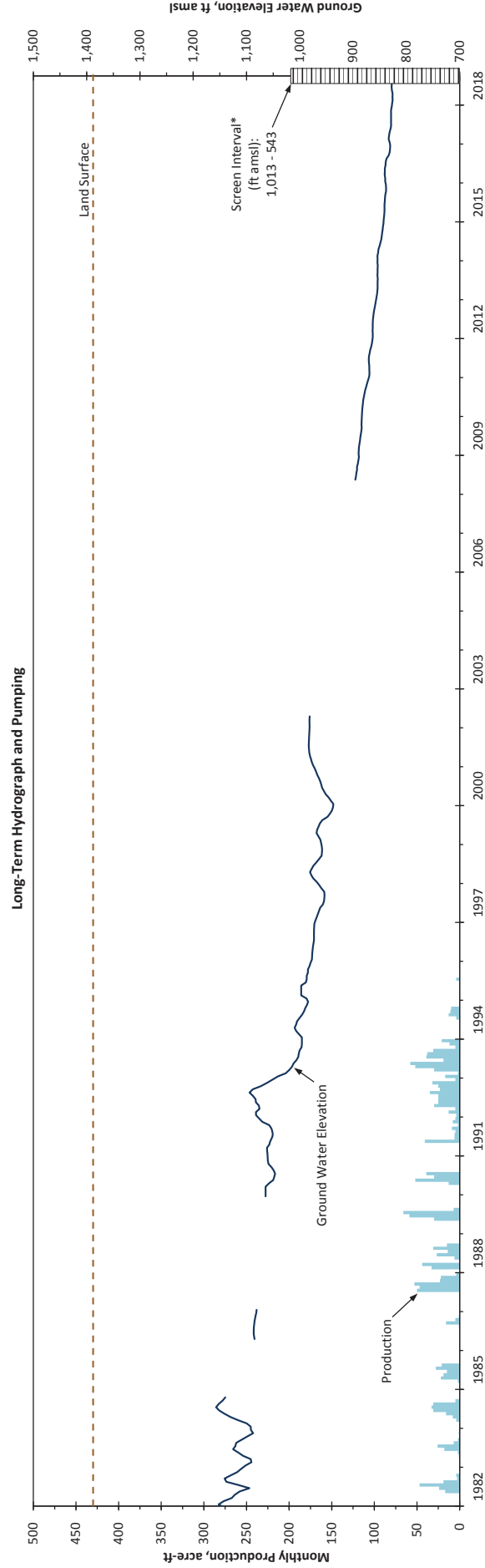
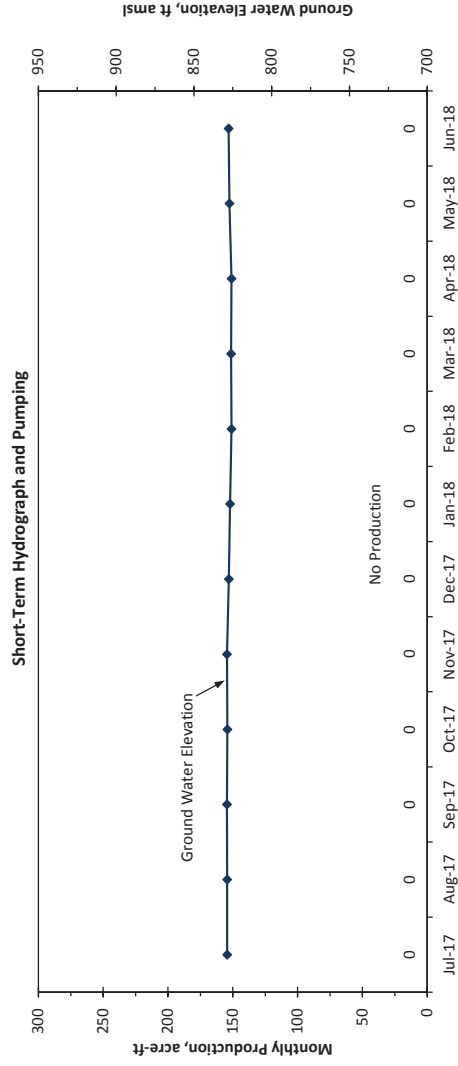
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 208

Well Performance and Recommended Production	
Hydrologic Subarea	16
Hydrologic Subunit	Upper Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Inactive since 1999
Recommended Production [acre-ft] Jul-2017 to Jun-2018	0
Actual Production [acre-ft] Jul-2017 to Jun-2018	0
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	0



TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 209

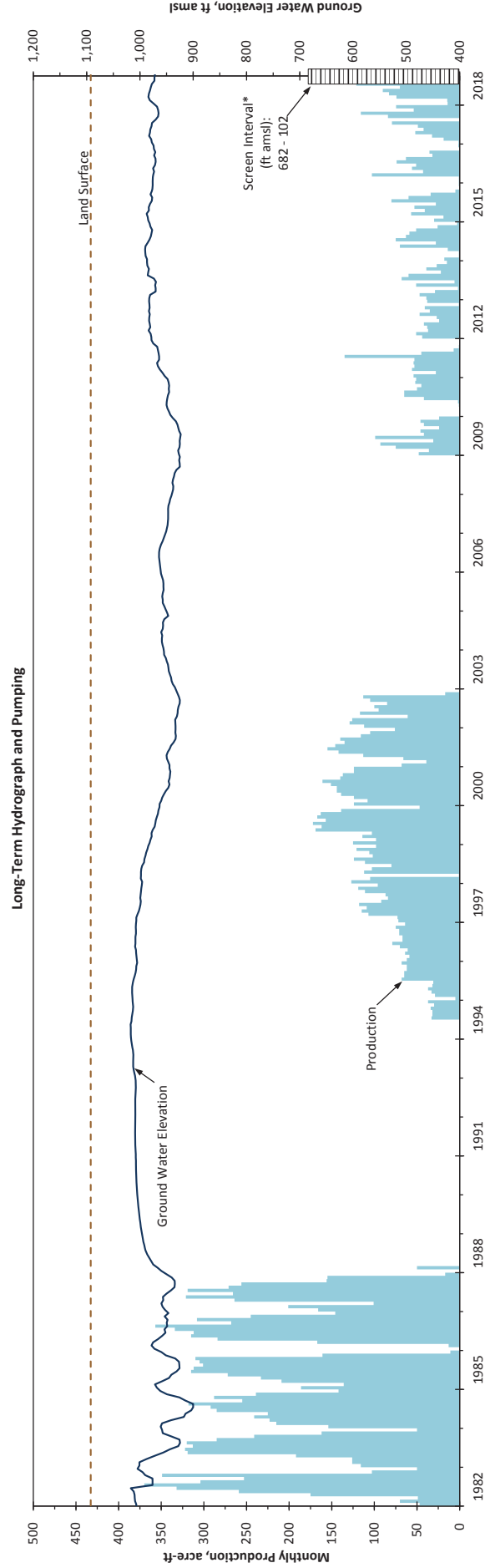
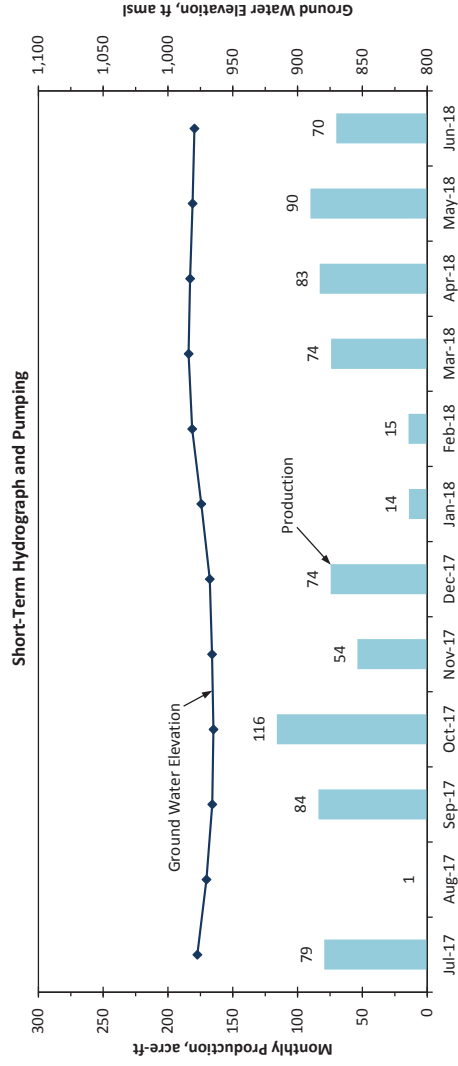
Well Performance and Recommended Production	
Hydrologic Subarea	16
Hydrologic Subunit	Upper Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Inactive since 1995; screen interval partially dewatered; Temecula Aquifer Index Well
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	0
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	0
Jul-2019 to Jun-2020	0



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 211

Well Performance and Recommended Production	
Hydrologic Subarea	7
Hydrologic Subunit	Wolf Valley
Aquifer	Temecula
Instantaneous Yield [gpm]	1,790
Static Submergence [ft]	467
Comments	Temecula Aquifer Index Well
Recommended Production [acre-ft]	167
Actual Production [acre-ft]	754
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	400
Jul-2019 to Jun-2020	



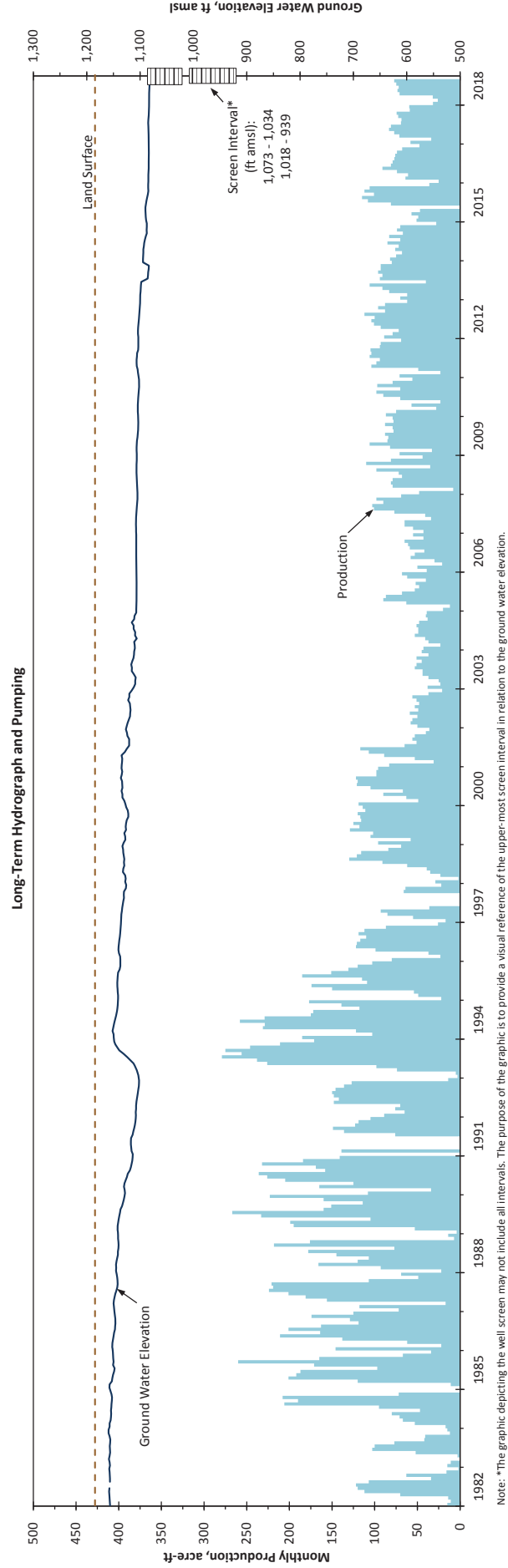
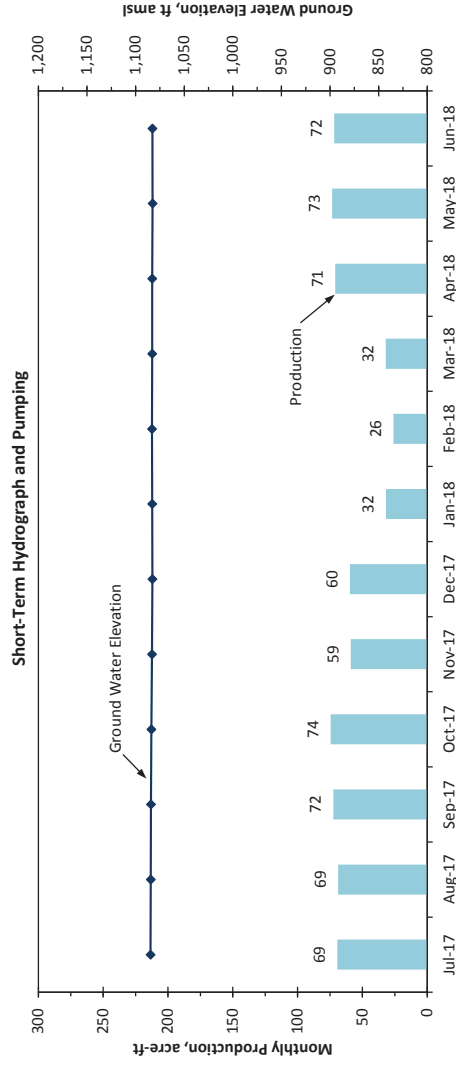
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.





TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 232

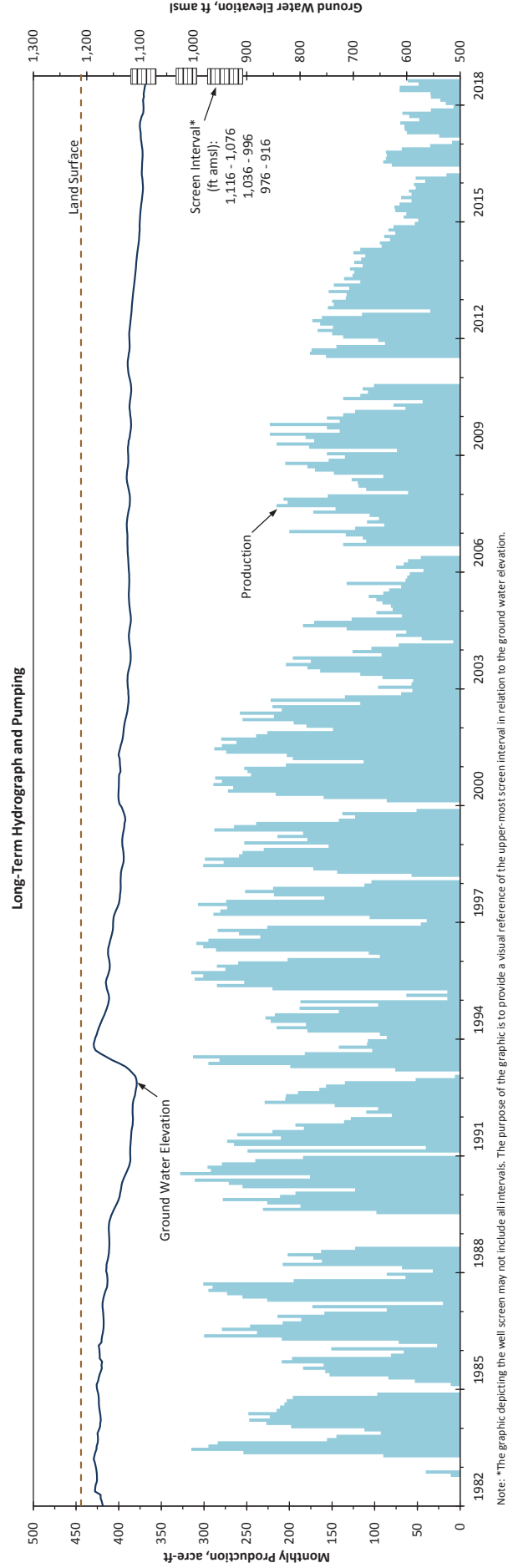
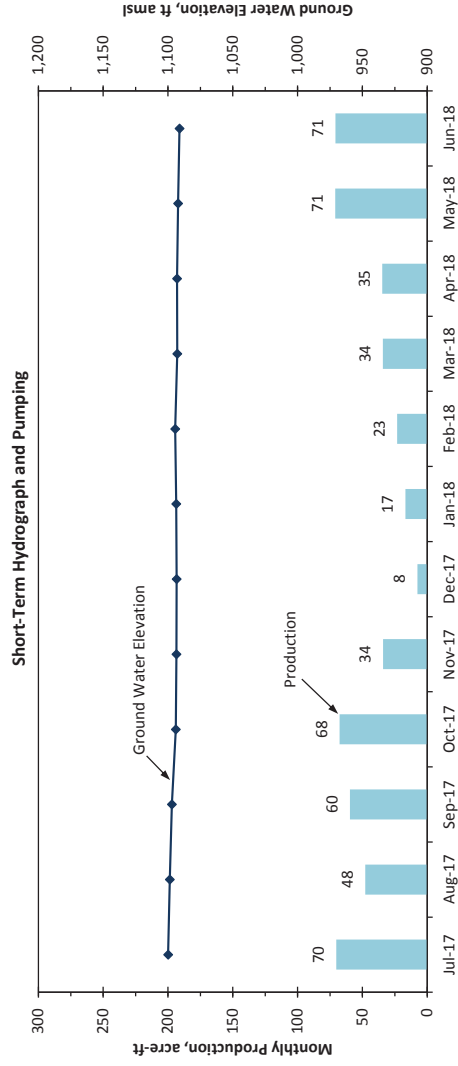
Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Combined
Instantaneous Yield [gpm]	800
Static Submergence [ft]	234
Comments	Intermittent Air; rehab in 2015
Recommended Production [acre-ft]	700
Actual Production [acre-ft]	710
Percent of Total Production from Qyal Production from Qyal [acre-ft]	92%
Recommended Production [acre-ft]	653
Recommended Production [acre-ft]	700



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 233

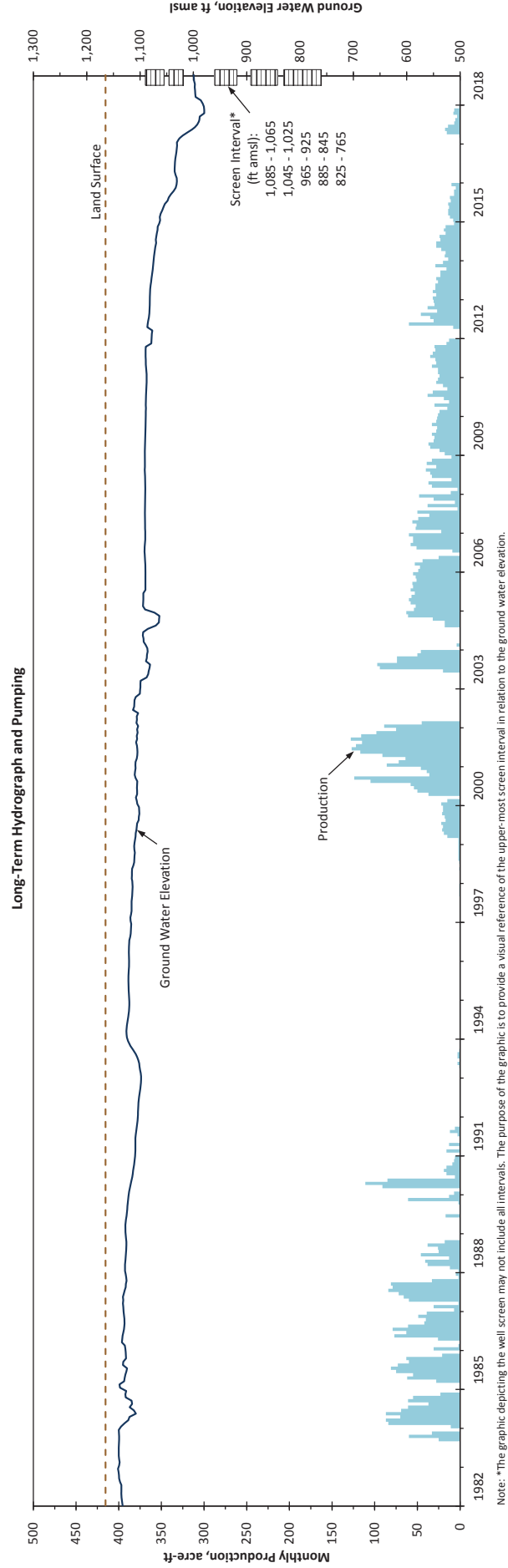
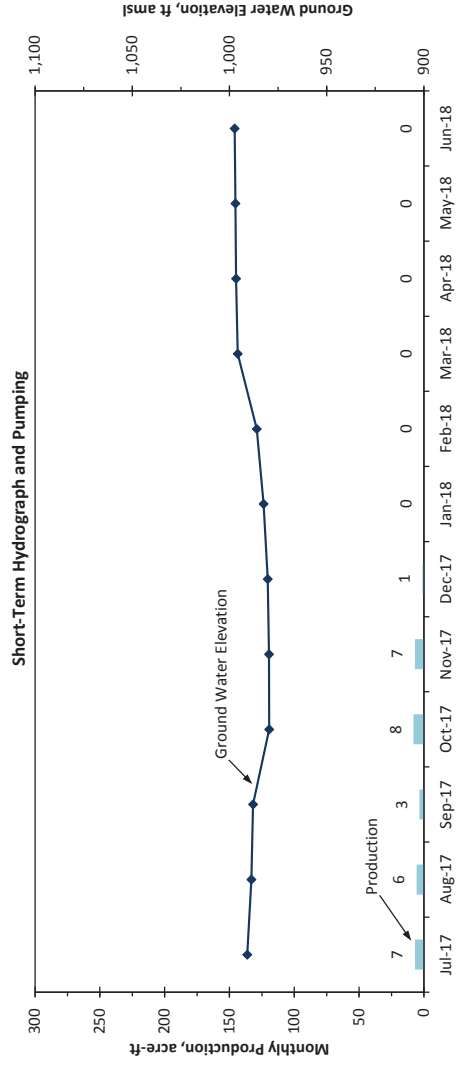
Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Pauba
Instantaneous Yield [gpm]	670
Static Submergence [ft]	227
Comments	Rehab scheduled for 2019-20; air (breaks suction); rehab in 2011
Recommended Production [acre-ft]	500
Actual Production [acre-ft]	538
Percent of Total Production from Qyal	88%
Production from Qyal [acre-ft]	473
Recommended Production [acre-ft]	400
Jul-2019 to Jun-2020	



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 234

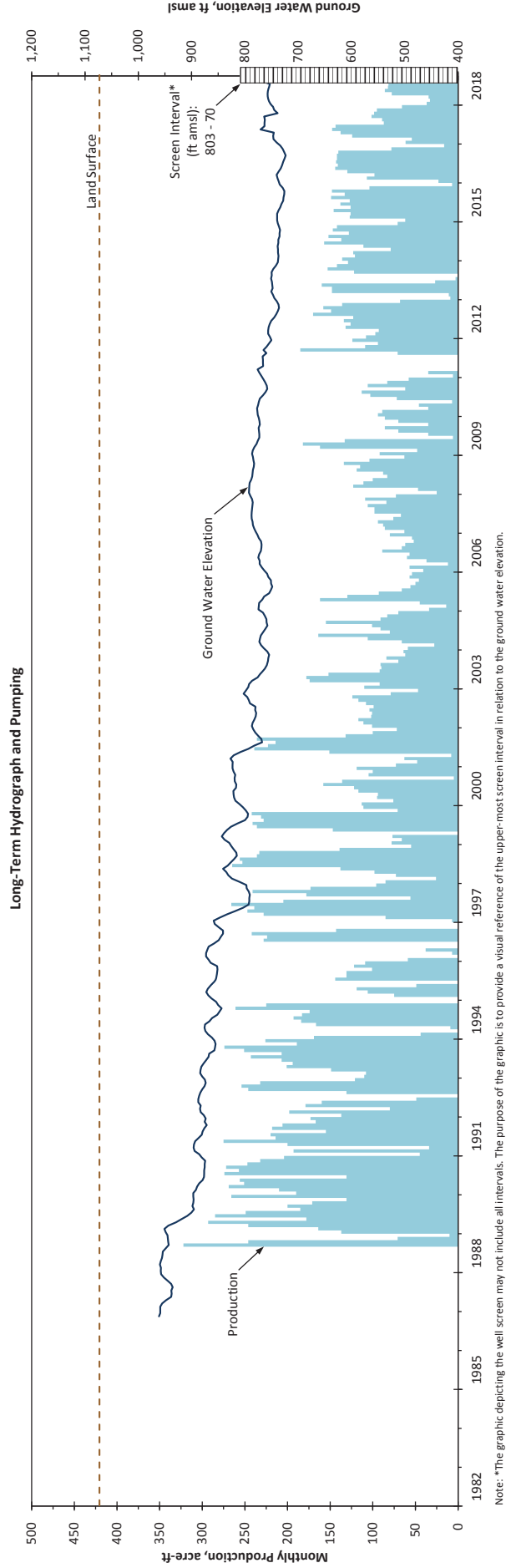
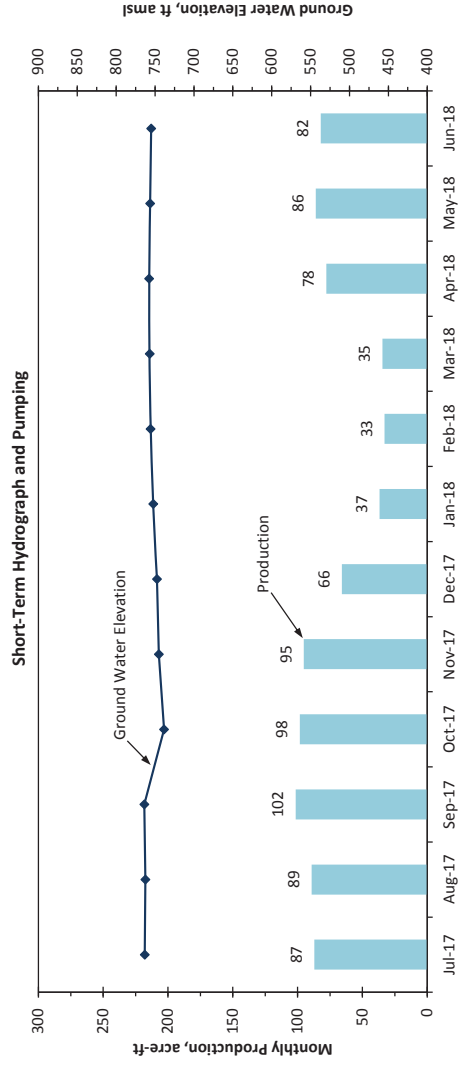
Well Performance and Recommended Production	
Hydrologic Subarea	11
Hydrologic Subunit	Pauba Valley
Aquifer	Combined
Instantaneous Yield [gpm]	70
Static Submergence [ft]	421
Comments	Air above 200 GPM; rehab in 2013
Recommended Production [acre-ft] Jul-2017 to Jun-2018	0
Actual Production [acre-ft] Jul-2017 to Jun-2018	32
Percent of Total Production from Qyal Production from Qyal [acre-ft]	74%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	100



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

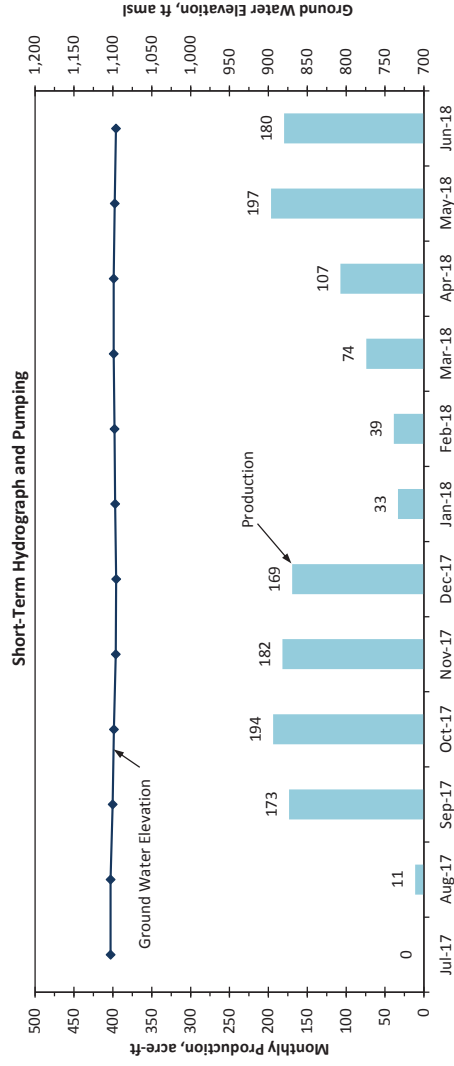
TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 235

Well Performance and Recommended Production	
Hydrologic Subarea	19
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	1,150
Static Submergence [ft]	657
Comments	Rehab in 2011; replaced pump in 2013
Recommended Production [acre-ft] Jul-2017 to Jun-2018	900
Actual Production [acre-ft] Jul-2017 to Jun-2018	888
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	700

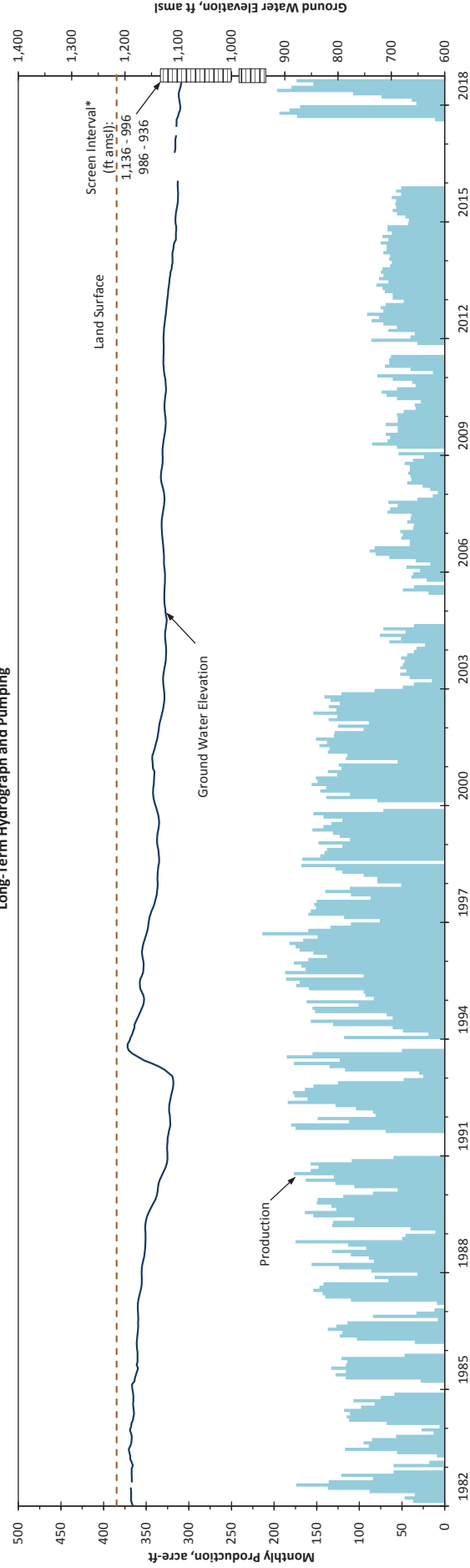


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 236 (old 210)

Well Performance and Recommended Production	
Hydrologic Subarea	12
Hydrologic Subunit	Pauba Valley
Aquifer	Combined
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Replaced Well No. 210, figure shows water level and production from both old well and new well; On-line mid-2018.
Recommended Production [acre-ft]	1,200
Actual Production [acre-ft]	1,360
Percent of Total Production from Qyal	37%
Production from Qyal [acre-ft]	503
Recommended Production [acre-ft]	1,200



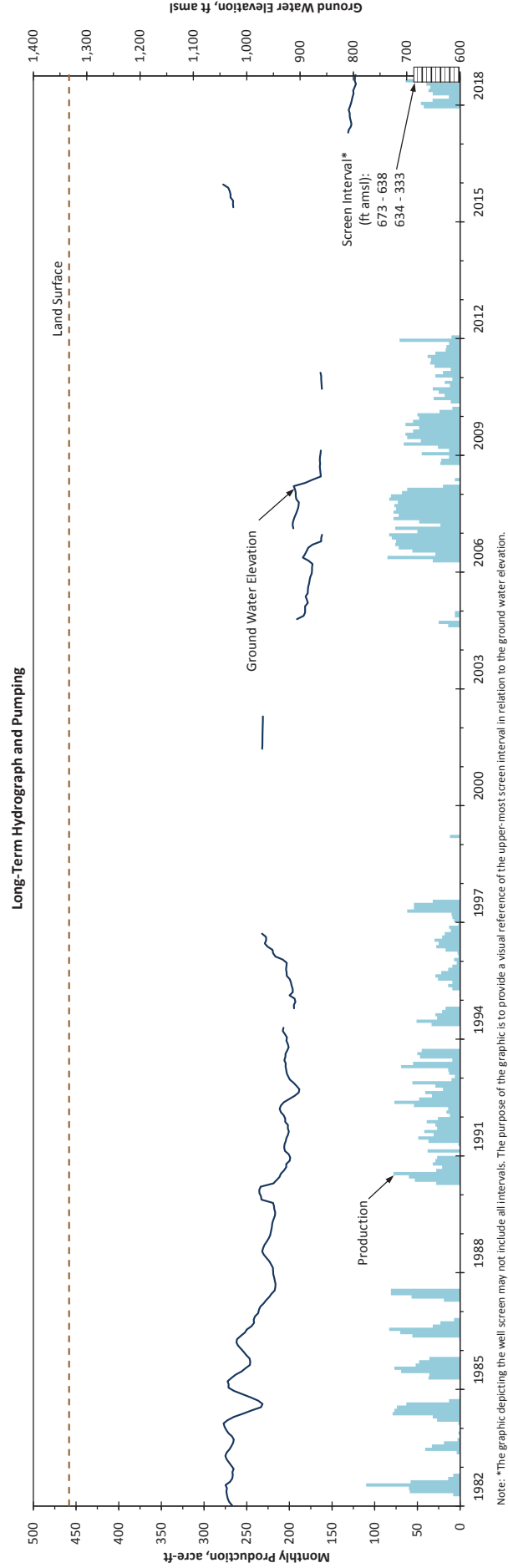
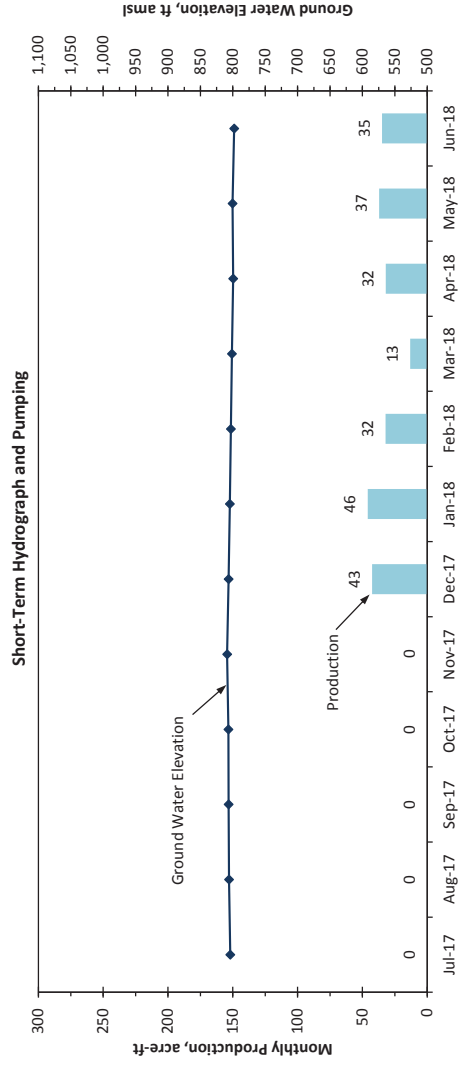
Long-Term Hydrograph and Pumping



Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 237 (old 215)

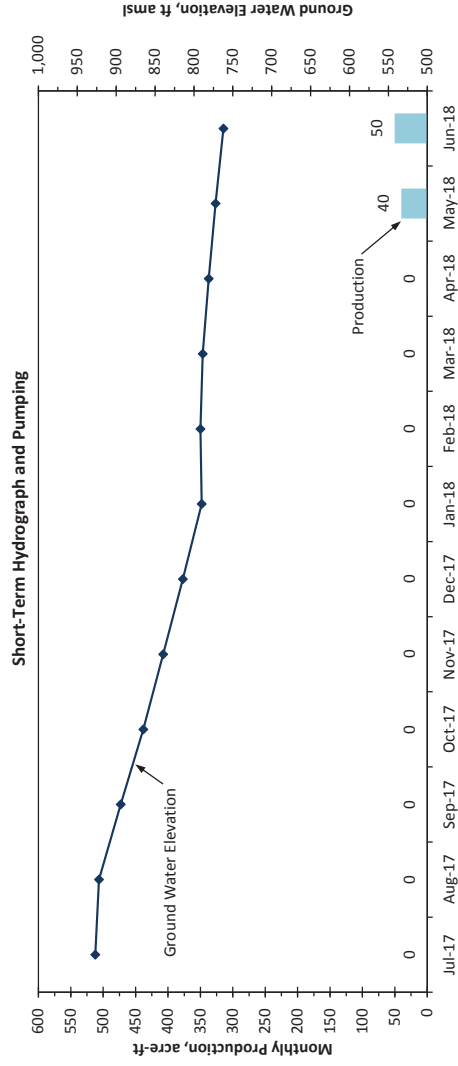
Well Performance and Recommended Production	
Hydrologic Subarea	16
Hydrologic Subunit	Upper Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Replaced Well No. 215, figure shows water level and production from both old well and new well; On-line mid-2018
Recommended Production [acre-ft]	300
Jul-2017 to Jun-2018	238
Actual Production [acre-ft]	0%
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	450
Jul-2019 to Jun-2020	



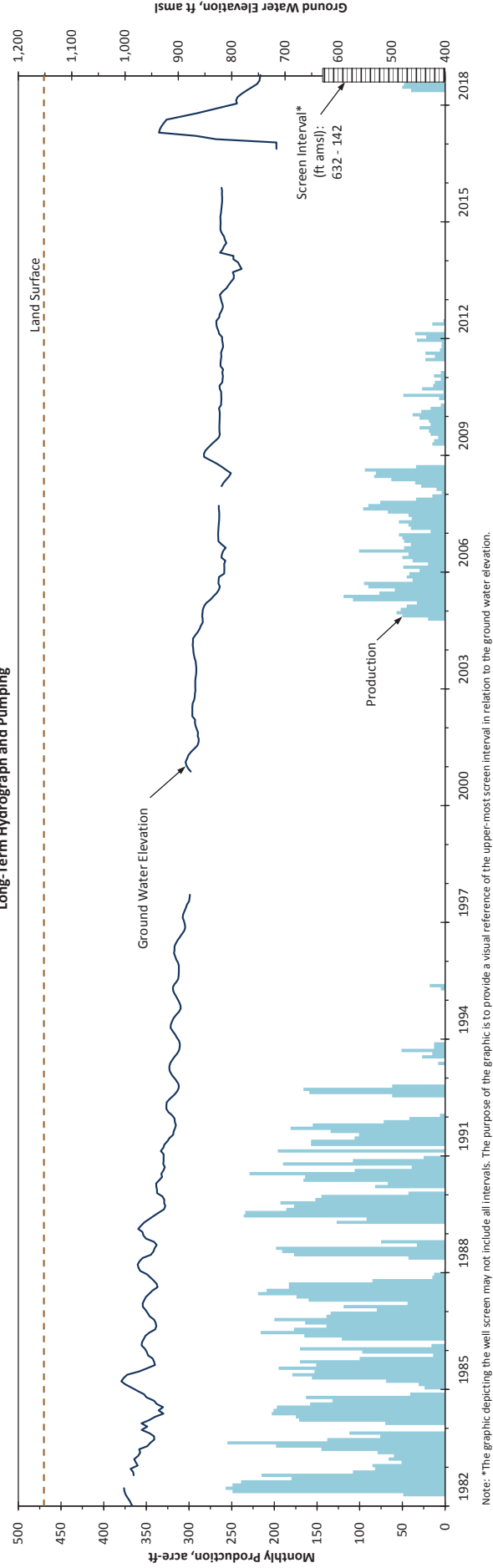
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 238 (old 216)

Well Performance and Recommended Production	
Hydrologic Subarea	9
Hydrologic Subunit	Lower Mesa
Aquifer	Temecula
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Replaced Well No. 216, figure shows water level and production from both old well and new well; On-line mid-2018
Recommended Production [acre-ft]	0
Actual Production [acre-ft]	90
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	350
Jul-2019 to Jun-2020	



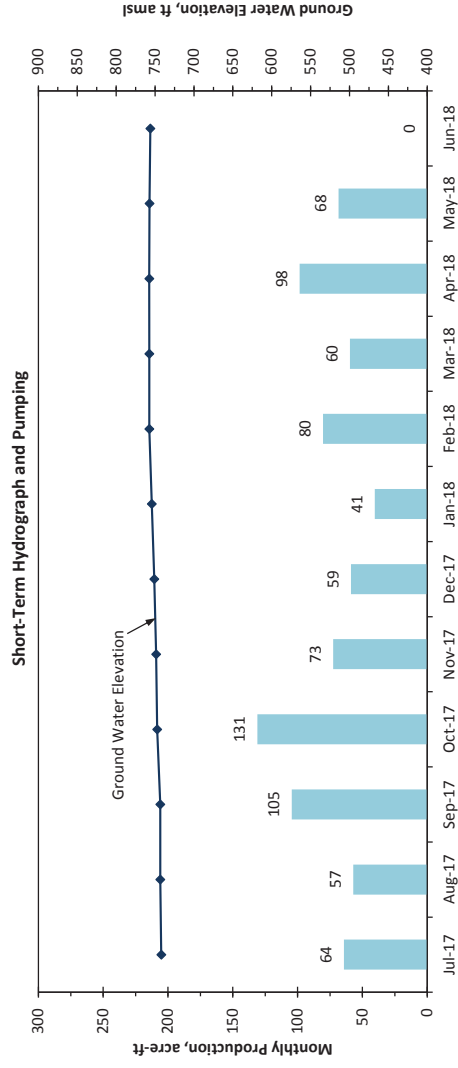
Long-Term Hydrograph and Pumping



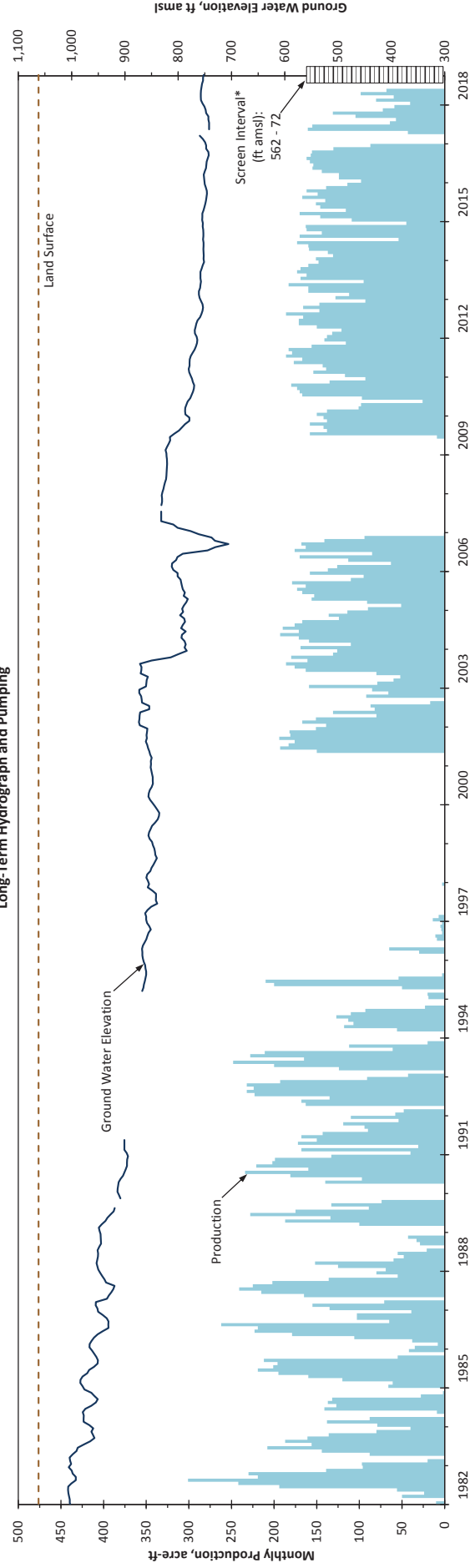
Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 240 (old 205)

Well Performance and Recommended Production	
Hydrologic Subarea	20
Hydrologic Subunit	Santa Gertrudis
Aquifer	Temecula
Instantaneous Yield [gpm]	-
Static Submergence [ft]	-
Comments	Replaced Well No. 205, figure shows water level and production from both old well and new well, On-line 2018-19
Recommended Production [acre-ft]	1,600
Actual Production [acre-ft]	836
Percent of Total Production from Qyal	0%
Production from Qyal [acre-ft]	0
Recommended Production [acre-ft]	2,000



Long-Term Hydrograph and Pumping

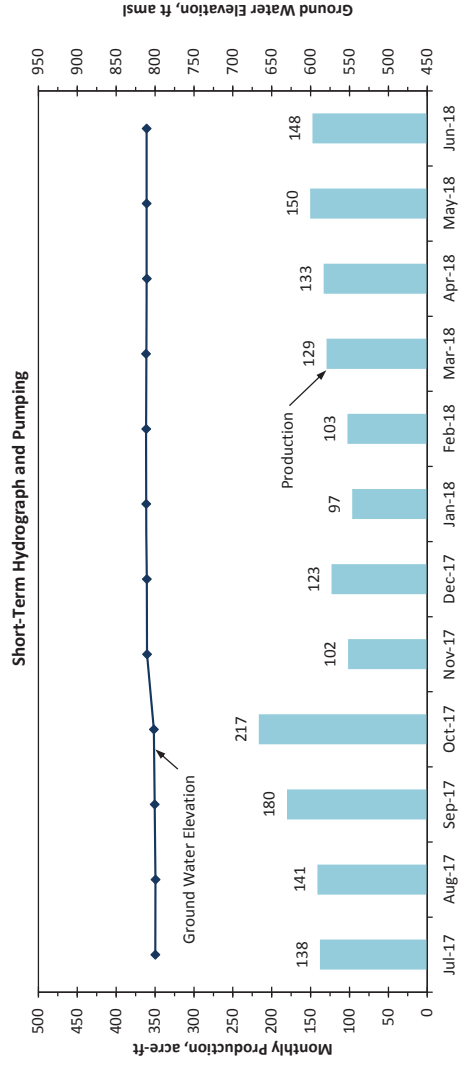


Note: \*The graphic depicting the well screen may not include all intervals. The purpose of the graphic is to provide a visual reference of the upper-most screen interval in relation to the ground water elevation.

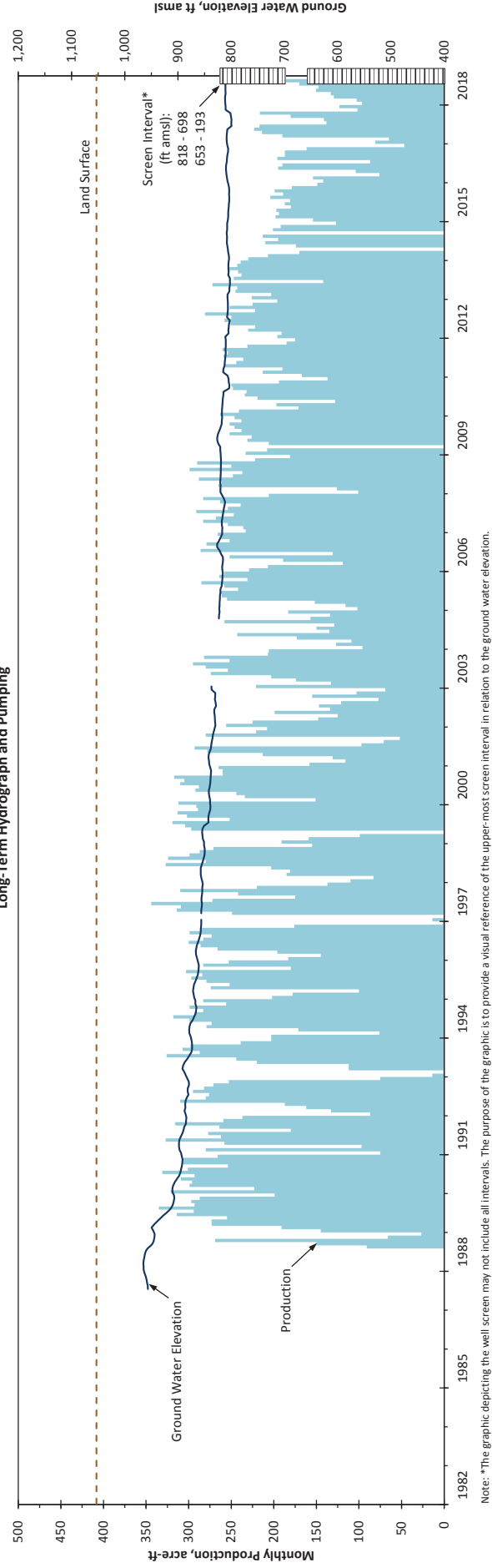


TREND ANALYSIS FOR CHANGING GROUND WATER LEVELS AND PRODUCTION - RCWD WELL NO. 309

Well Performance and Recommended Production	
Hydrologic Subarea	20
Hydrologic Subunit	Santa Gertrudis
Aquifer	Temecula
Instantaneous Yield [gpm]	1,450
Static Submergence [ft]	651
Comments	Rehab to be scheduled; rehab 2014
Recommended Production [acre-ft] Jul-2017 to Jun-2018	2,000
Actual Production [acre-ft] Jul-2017 to Jun-2018	1,661
Percent of Total Production from Qyal Production from Qyal [acre-ft]	0%
Recommended Production [acre-ft] Jul-2019 to Jun-2020	1,200



Long-Term Hydrograph and Pumping



**APPENDIX B**  
**Long-Term Hydrographs for Index Wells**  
**January 1981 to September 2018**

**APPENDIX B**  
**Long-term Hydrographs for Index Wells**  
**January 1981 to September 2018**

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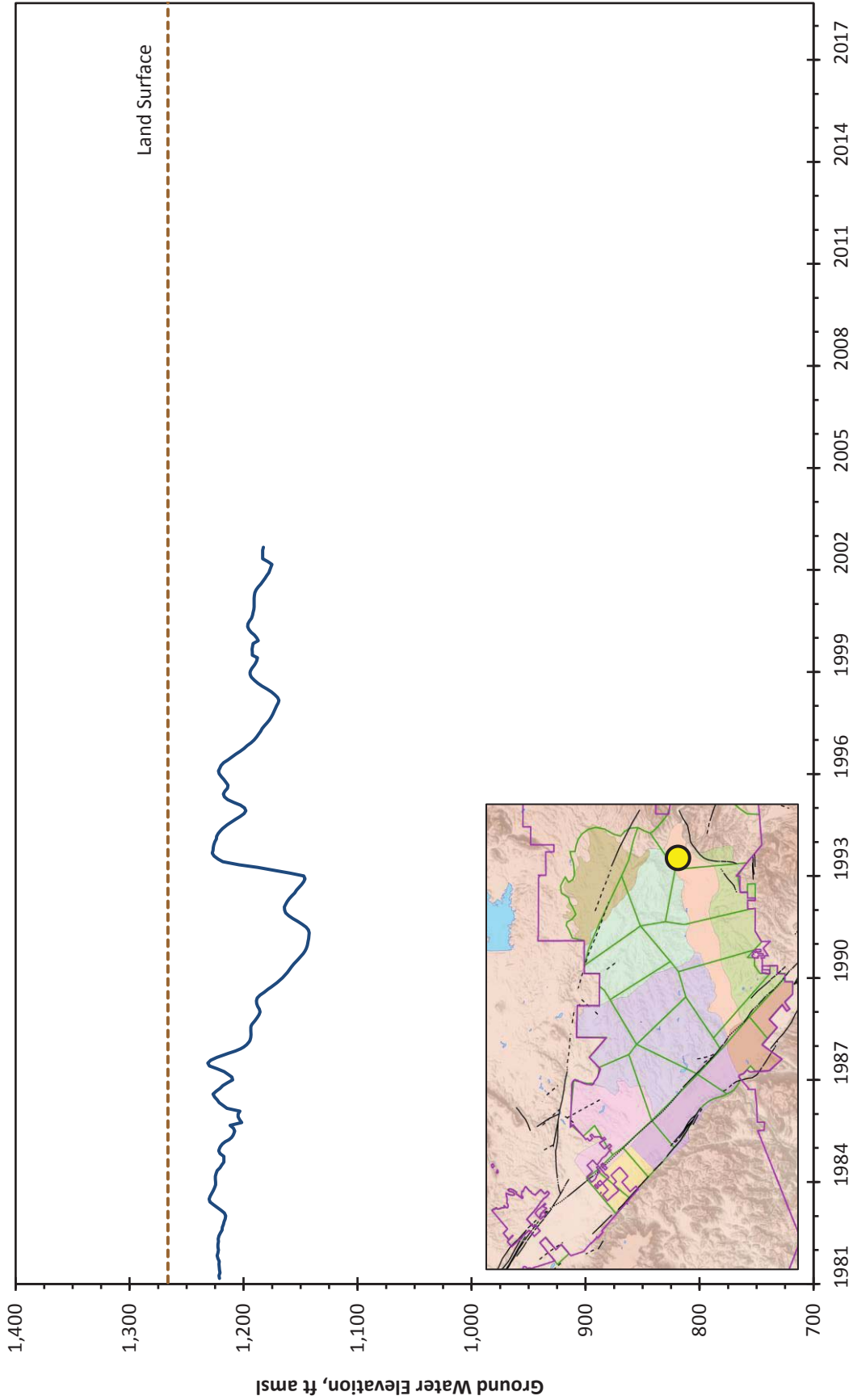
Pauba Aquifer Index Wells

RCWD Well No. 414 .....	B-1
RCWD Well No. 417 .....	B-2
RCWD Well No. 422 .....	B-3
RCWD Well No. 426 .....	B-4
RCWD Well No. 492 .....	B-5

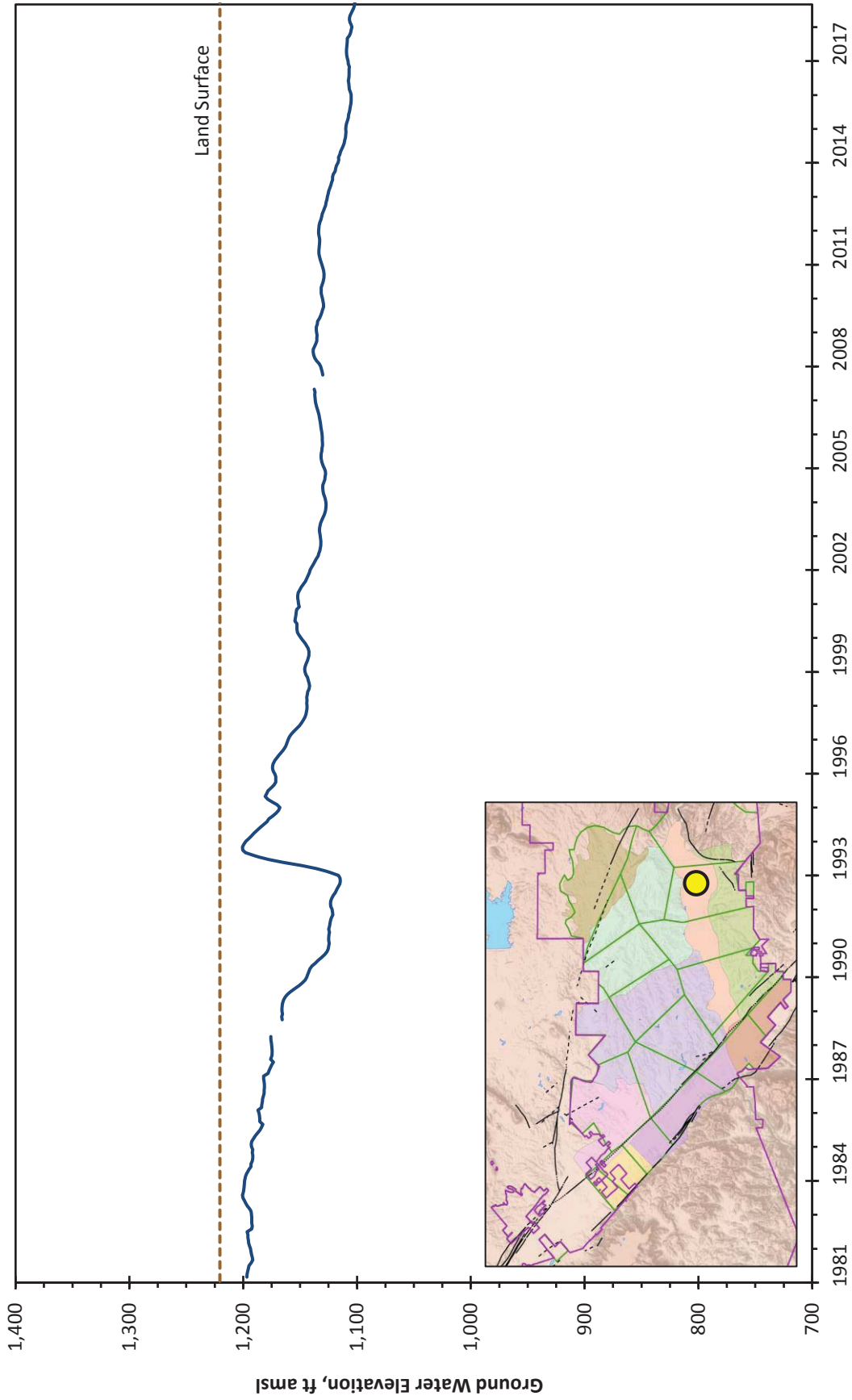
Temecula Aquifer Index Wells

RCWD Well No. 410 .....	B-6
RCWD Well No. 439 .....	B-7
RCWD Well No. 454 .....	B-8
RCWD Well No. 462 .....	B-9
RCWD Well No. 463 .....	B-10
RCWD Well No. 464 .....	B-11
RCWD Well No. 465 .....	B-12
RCWD Well No. 466 .....	B-13
RCWD Well No. 468 .....	B-14
RCWD Well No. 473 .....	B-15
RCWD Well No. 493 .....	B-16
RCWD Well No. 495 .....	B-17

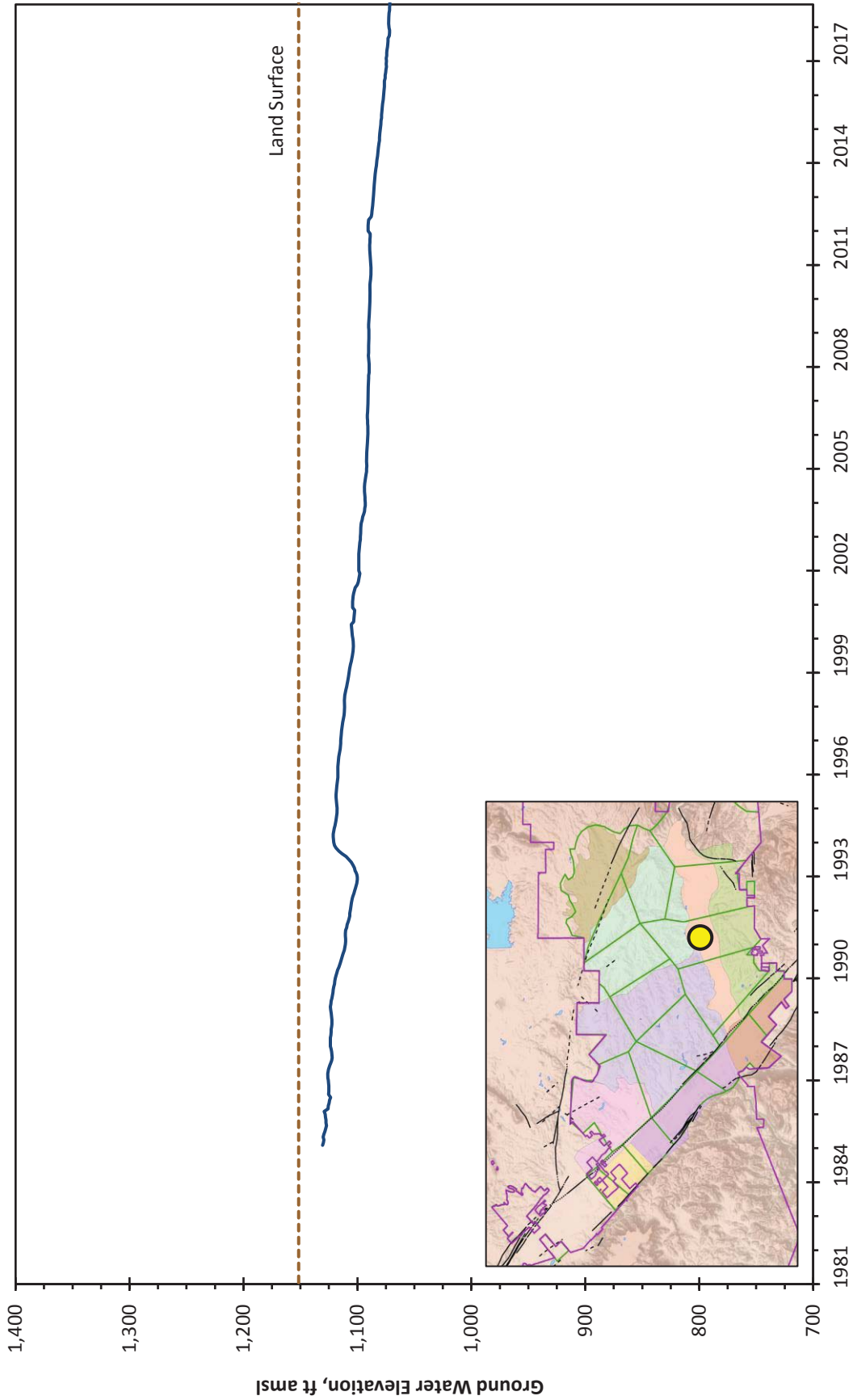
Long-Term Hydrograph - RCWD Well No. 414  
Pauba Aquifer Index Well



Long-Term Hydrograph - RCWD Well No. 417  
Pauba Aquifer Index Well

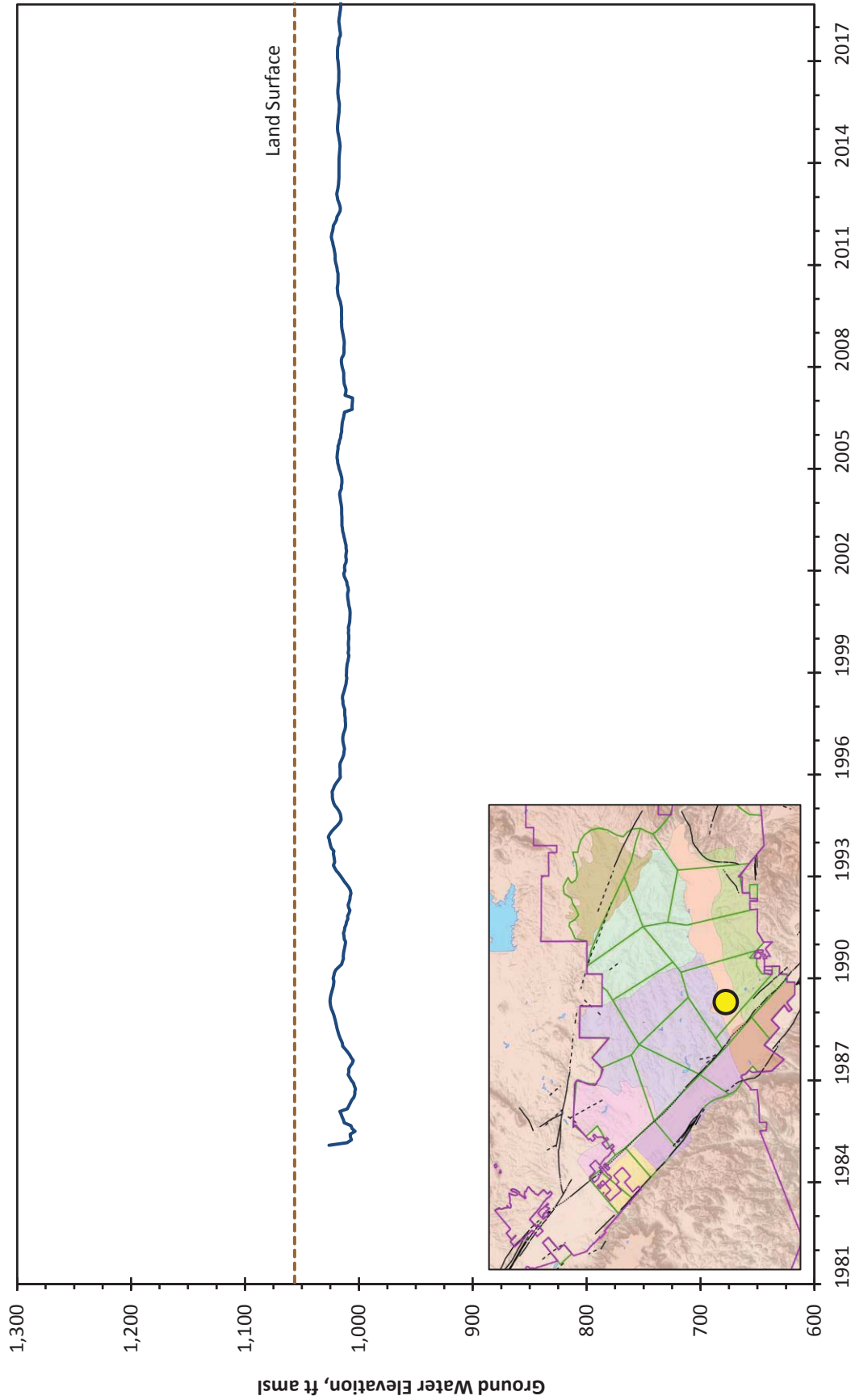


Long-Term Hydrograph - RCWD Well No. 422  
Pauba Aquifer Index Well

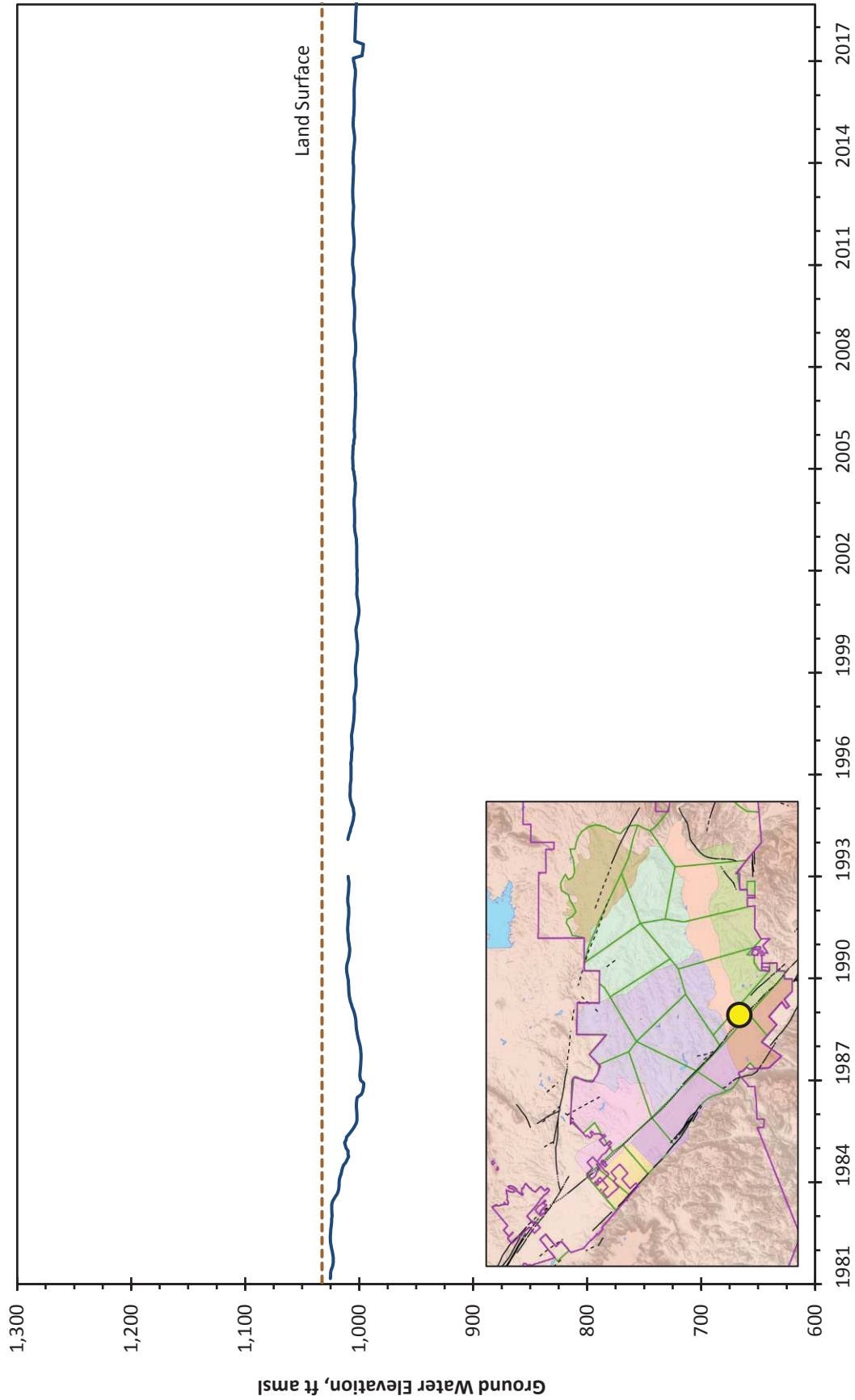


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Long-Term Hydrograph - RCWD Well No. 426  
Pauba Aquifer Index Well

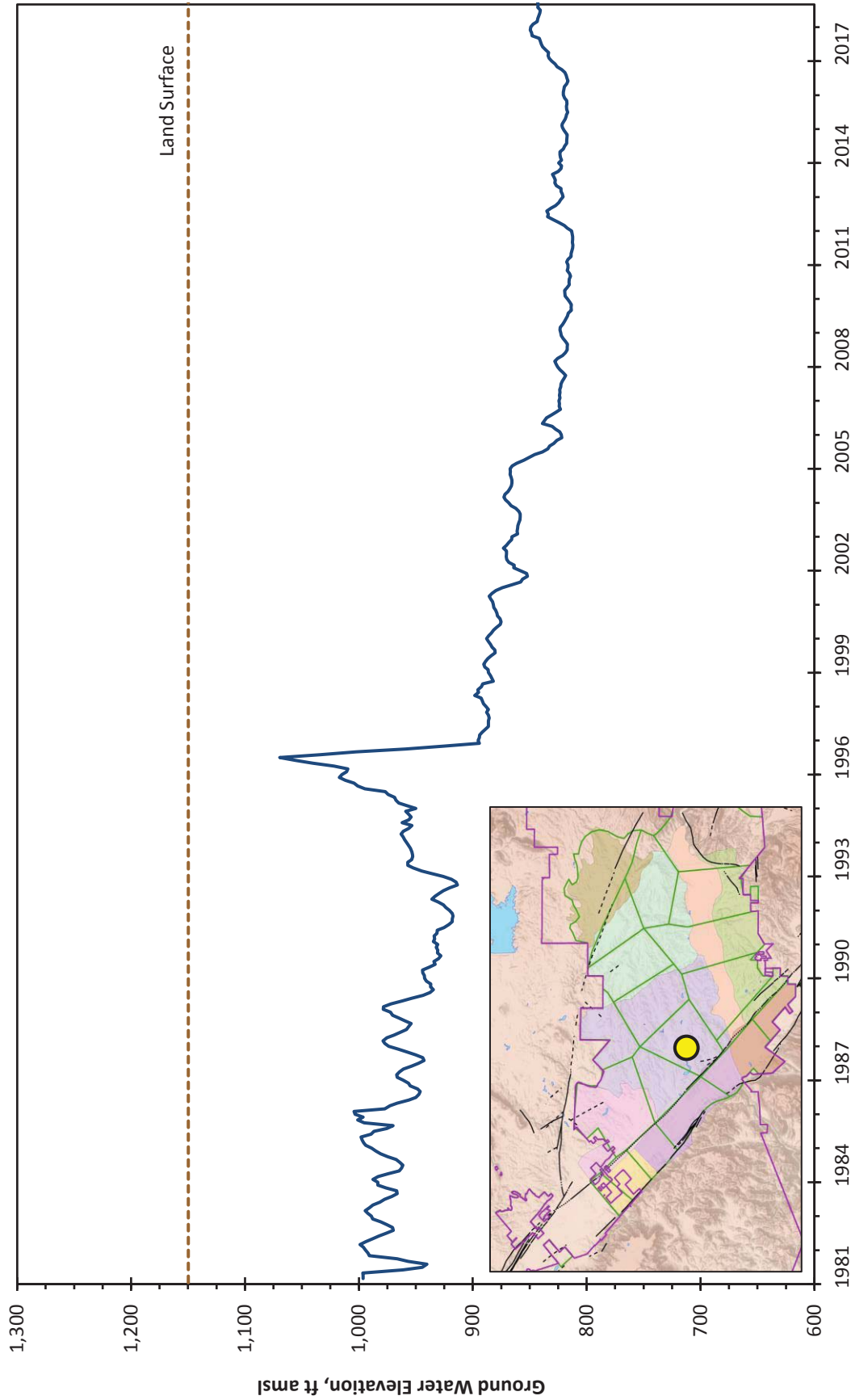


Long-Term Hydrograph - RCWD Well No. 492  
Pauba Aquifer Index Well



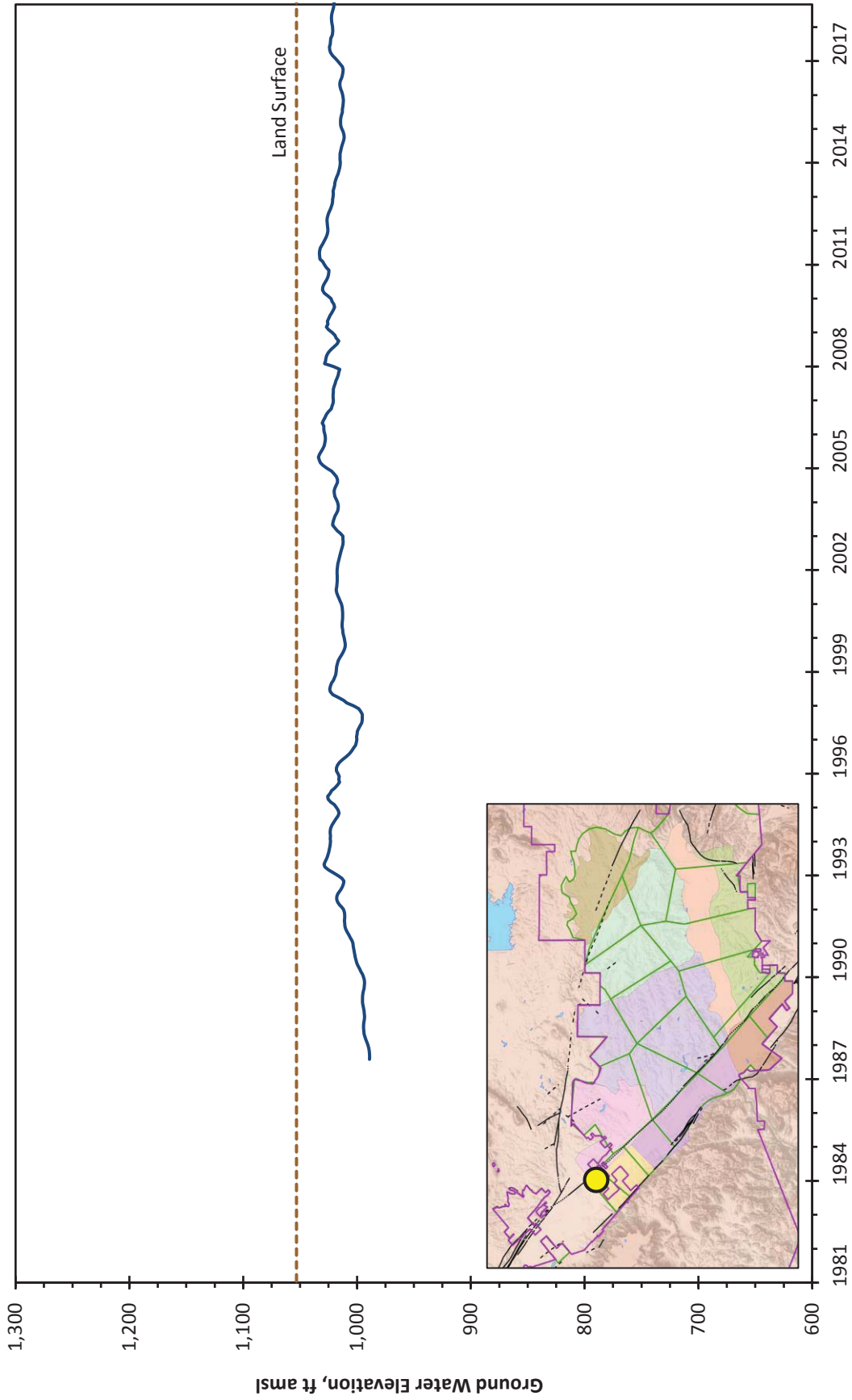


Long-Term Hydrograph - RCWD Well No. 410  
Temecula Aquifer Index Well

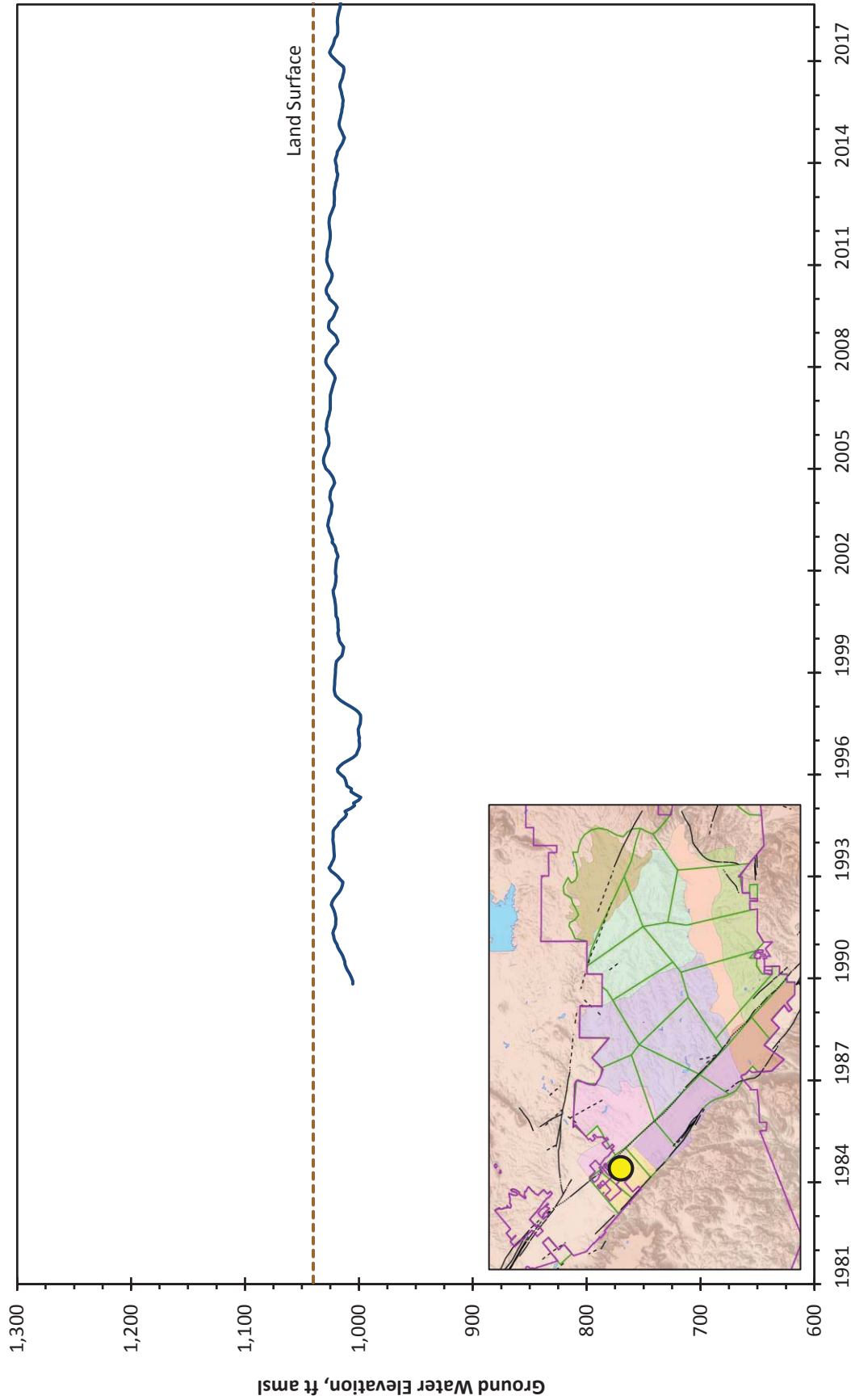


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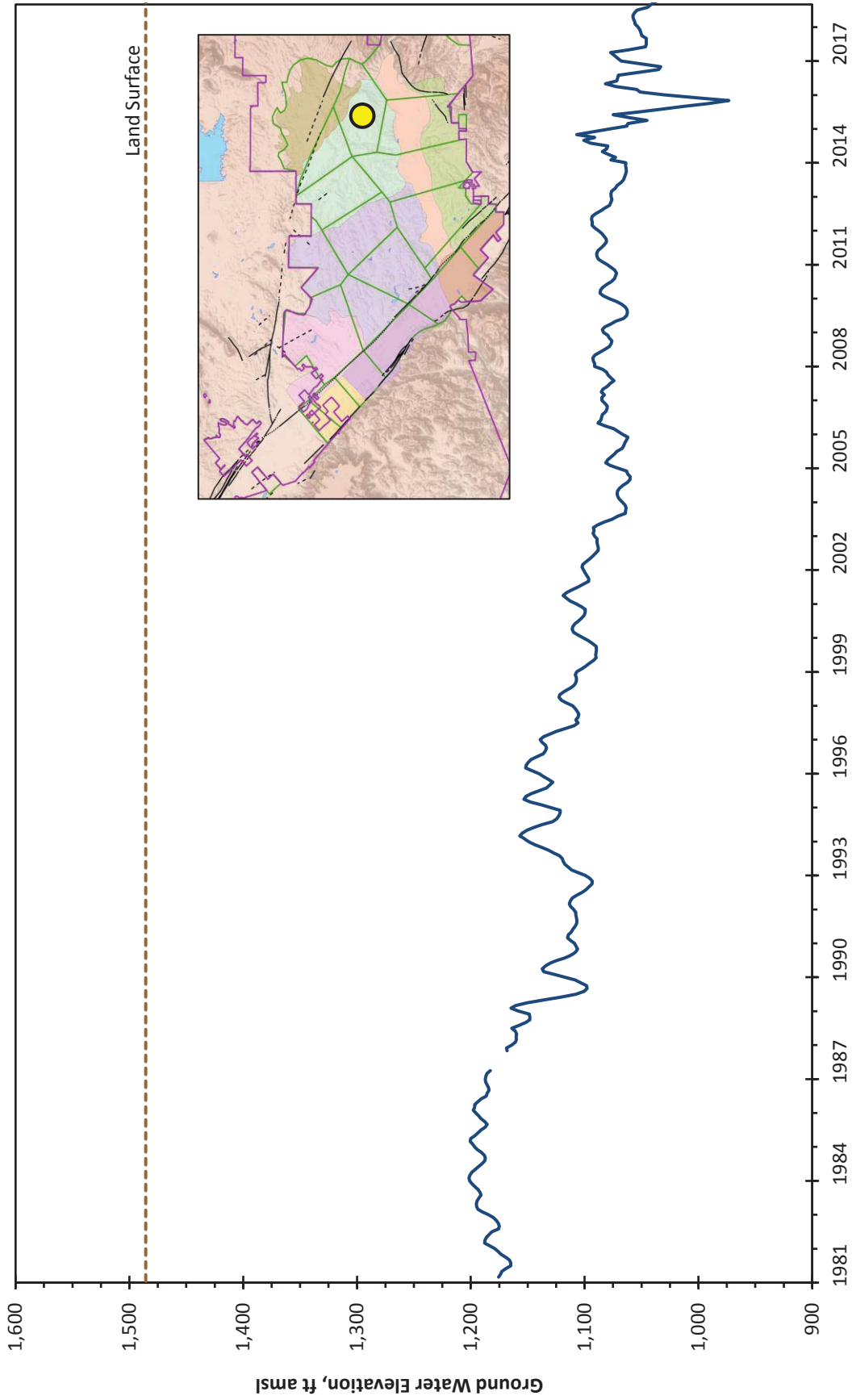
Long-Term Hydrograph - RCWD Well No. 439  
Temecula Aquifer Index Well



Long-Term Hydrograph - RCWD Well No. 454  
Temecula Aquifer Index Well

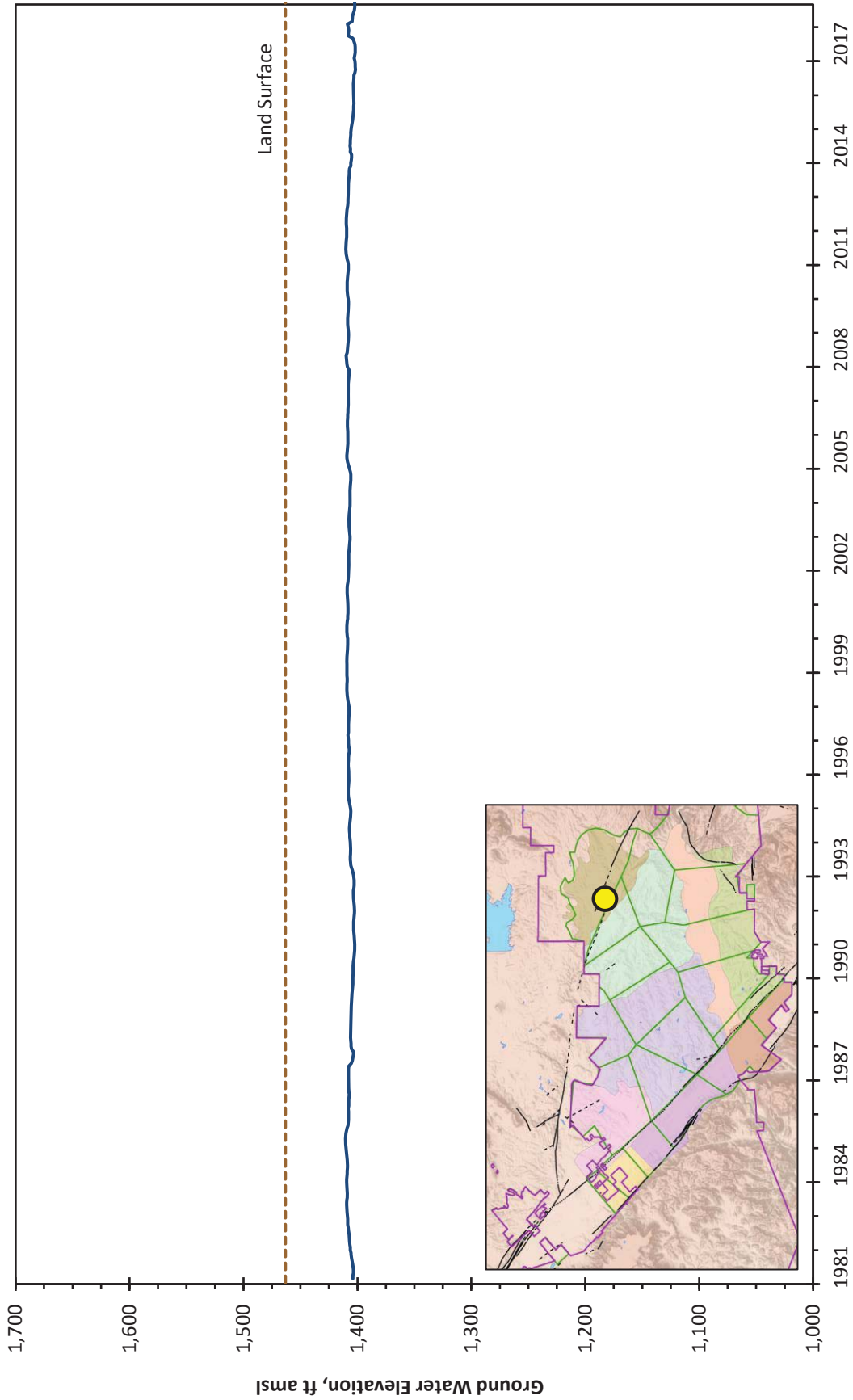


Long-Term Hydrograph - RCWD Well No. 462  
Temecula Aquifer Index Well

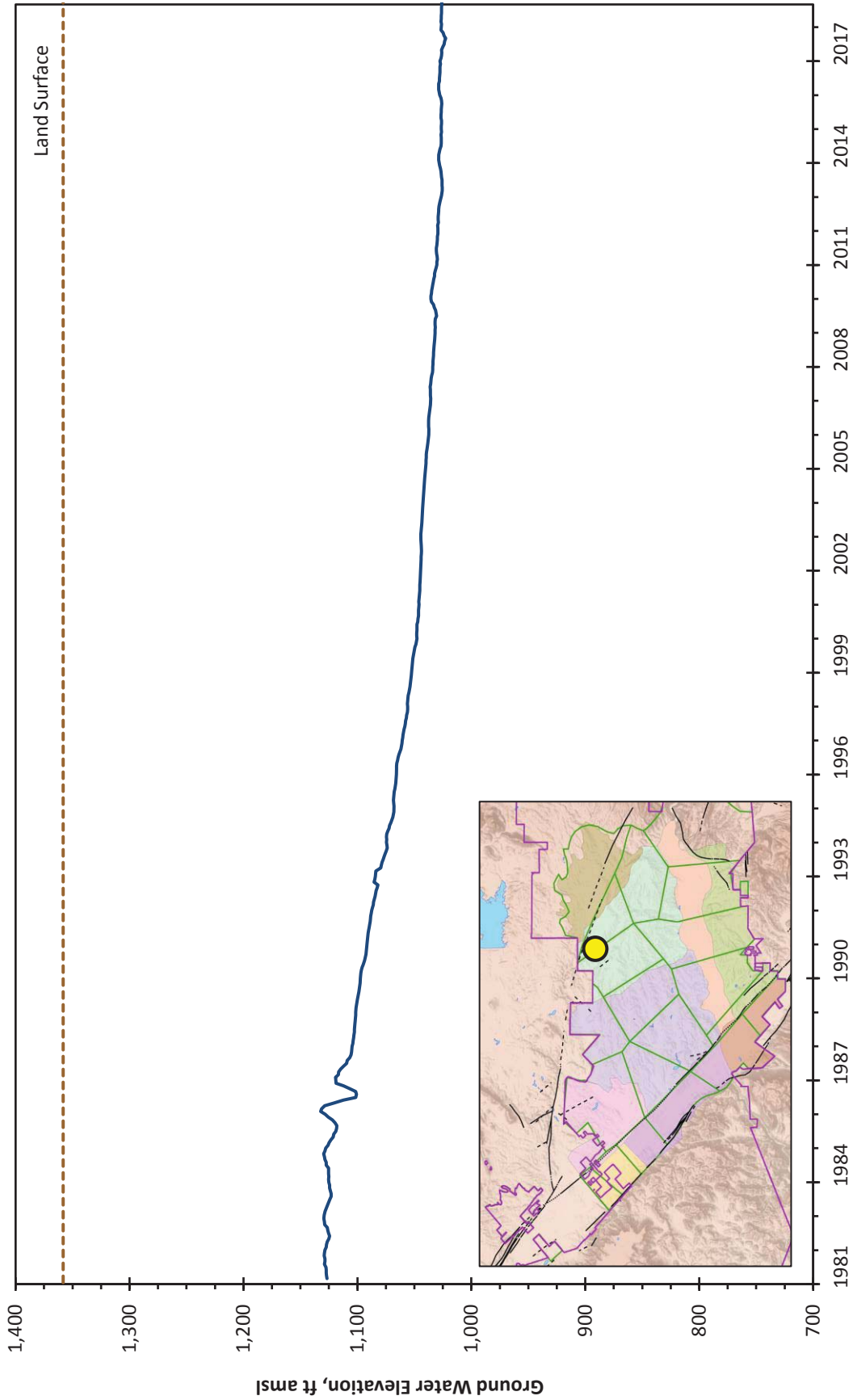


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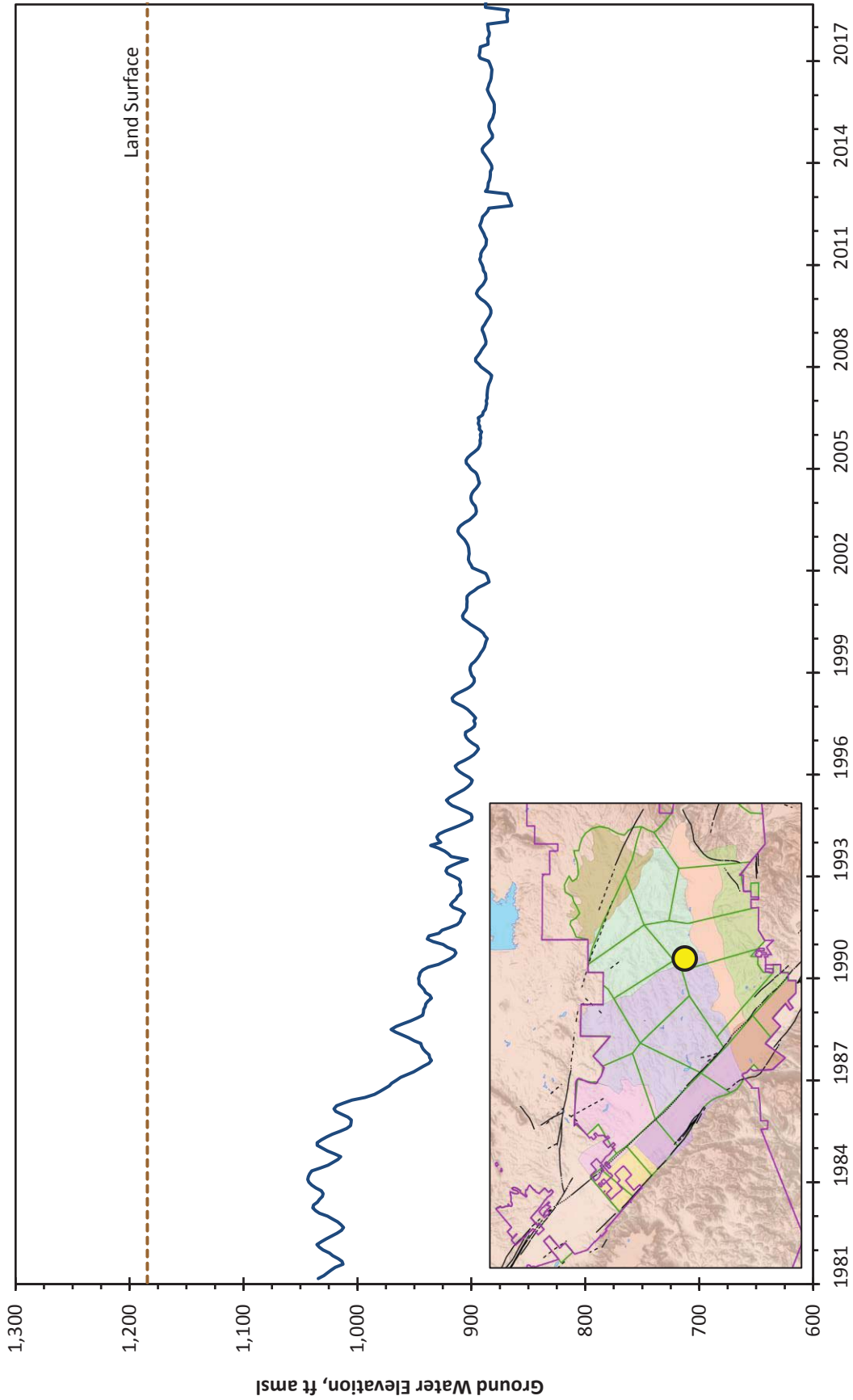
Long-Term Hydrograph - RCWD Well No. 463  
Temecula Aquifer Index Well



Long-Term Hydrograph - RCWD Well No. 464  
Temecula Aquifer Index Well

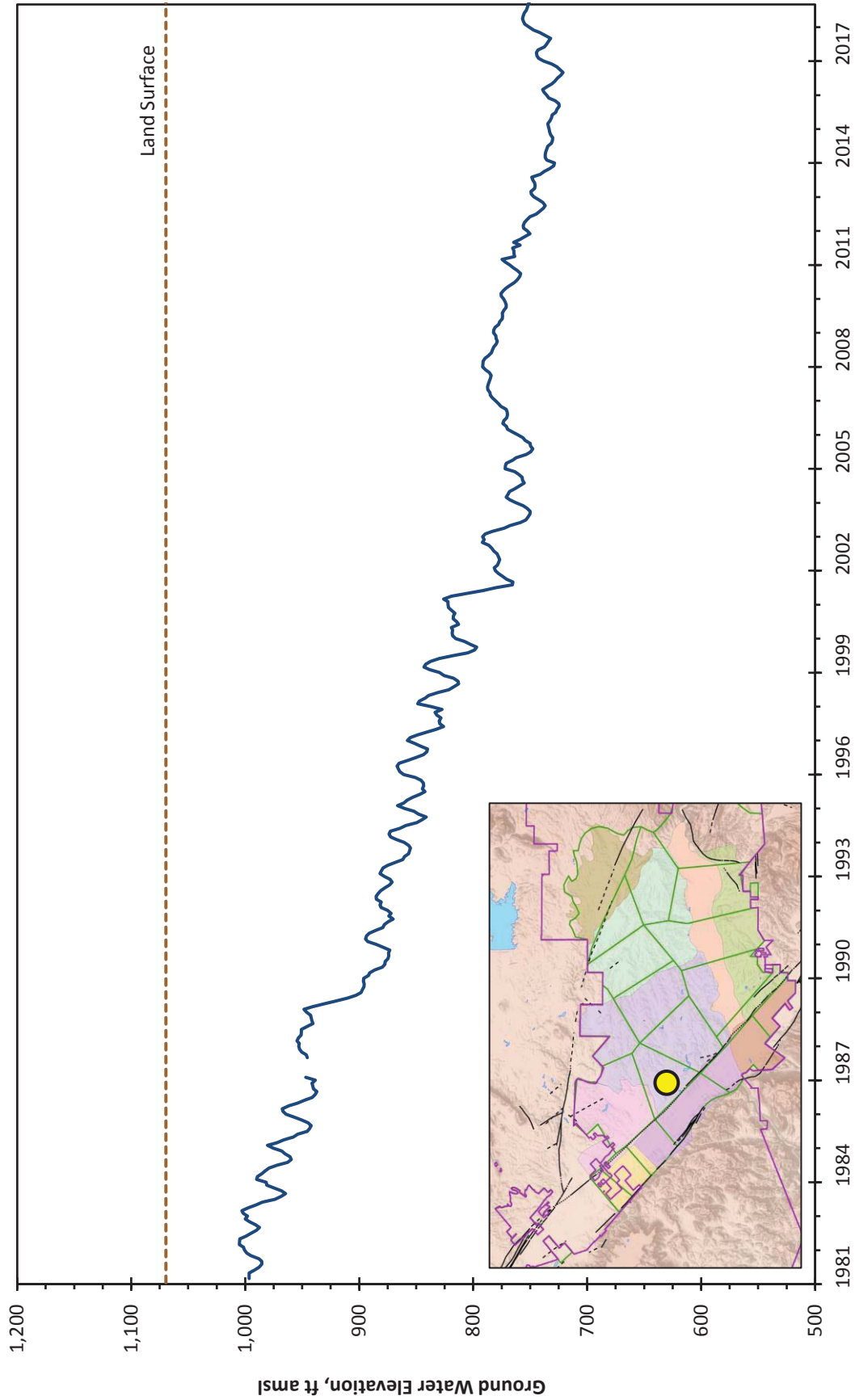


Long-Term Hydrograph - RCWD Well No. 465  
Temecula Aquifer Index Well



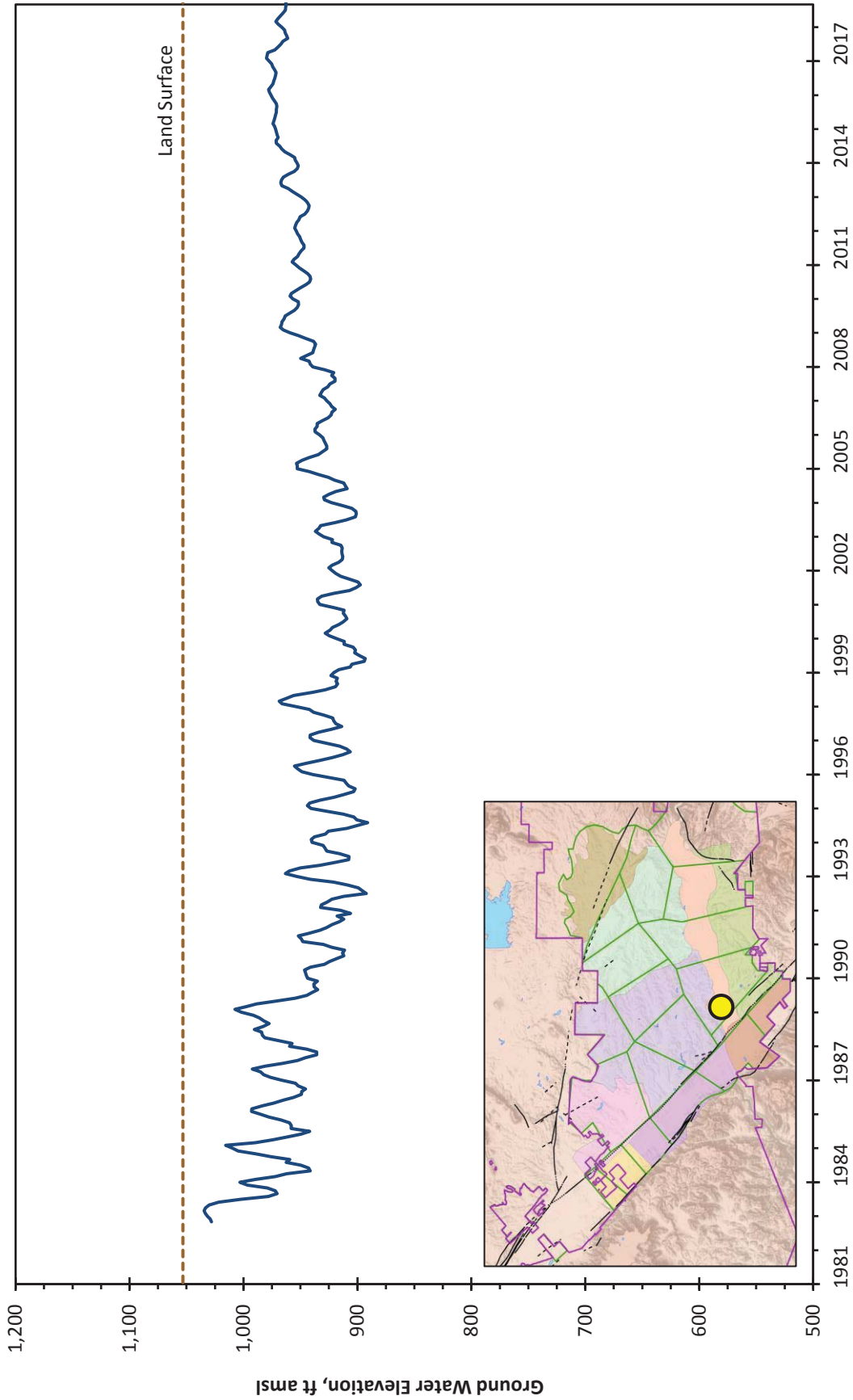
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Long-Term Hydrograph - RCWD Well No. 466  
Temecula Aquifer Index Well



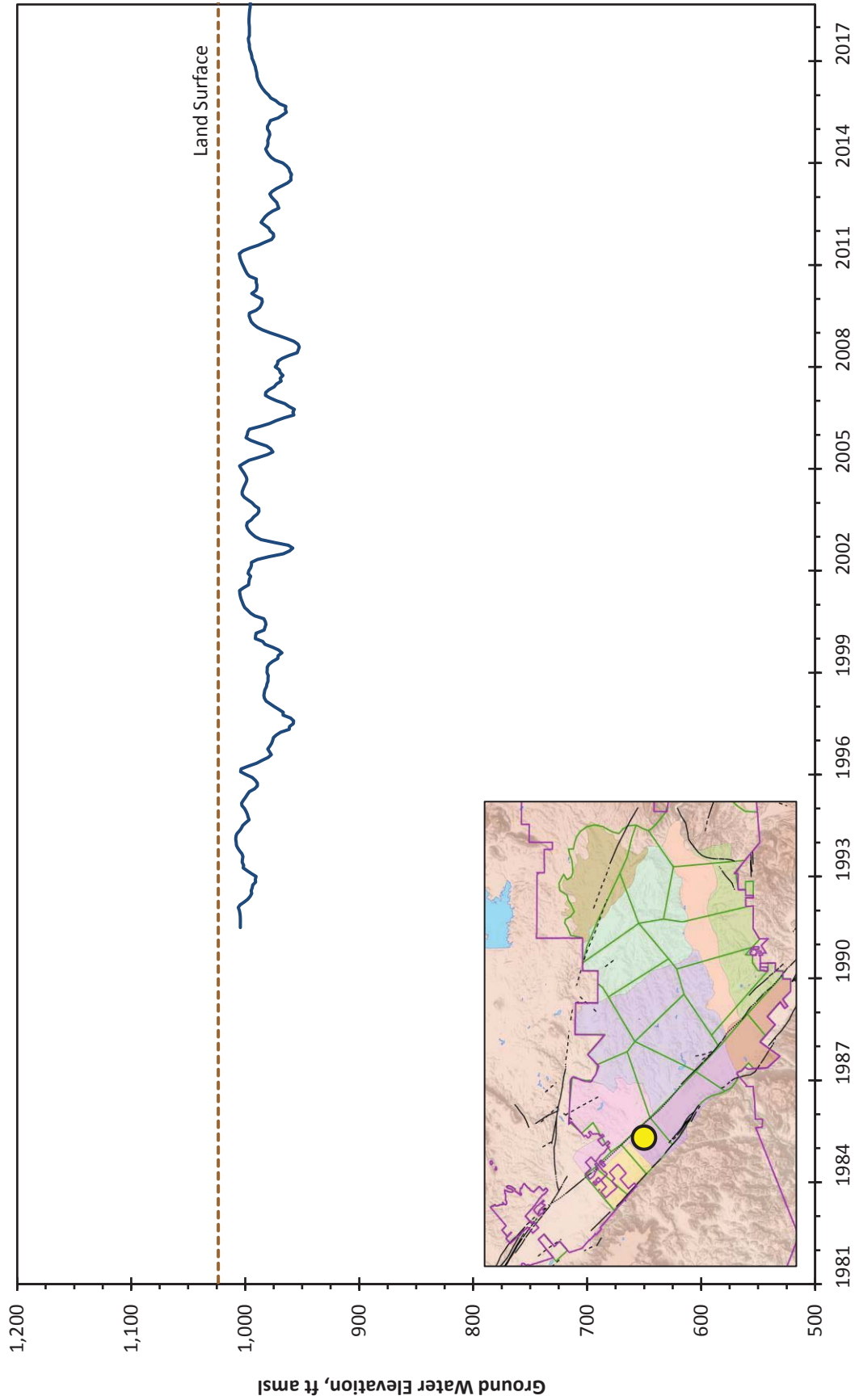


Long-Term Hydrograph - RCWD Well No. 468  
Temecula Aquifer Index Well



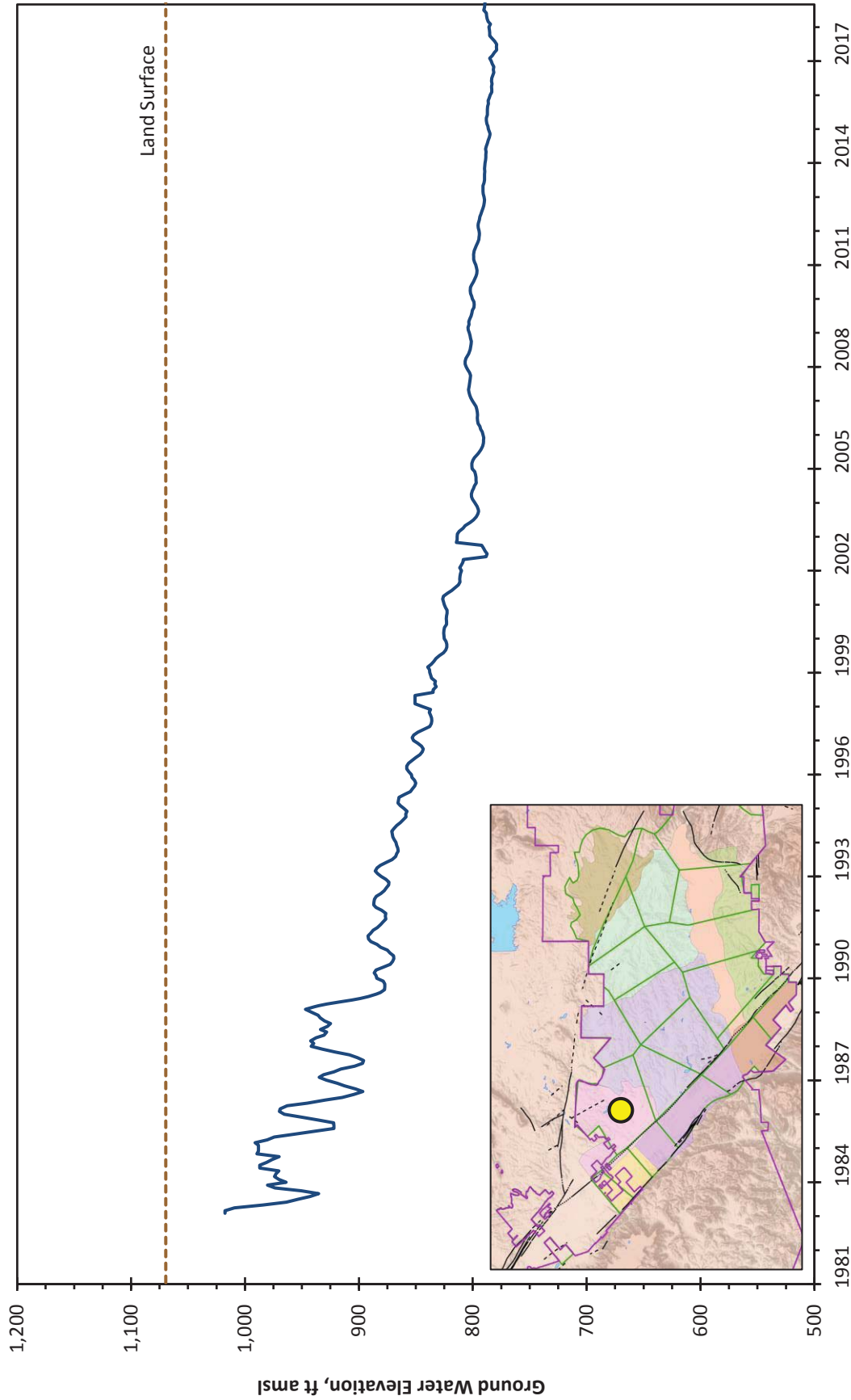
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Long-Term Hydrograph - RCWD Well No. 473  
Temecula Aquifer Index Well

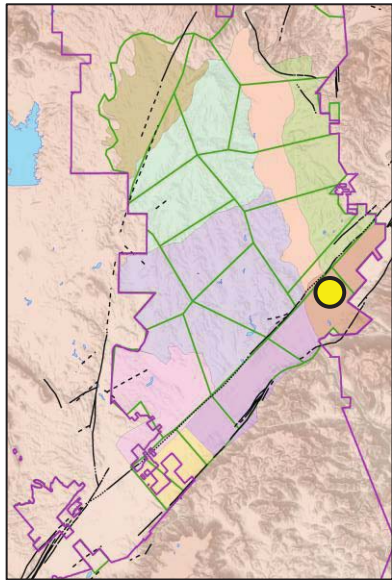
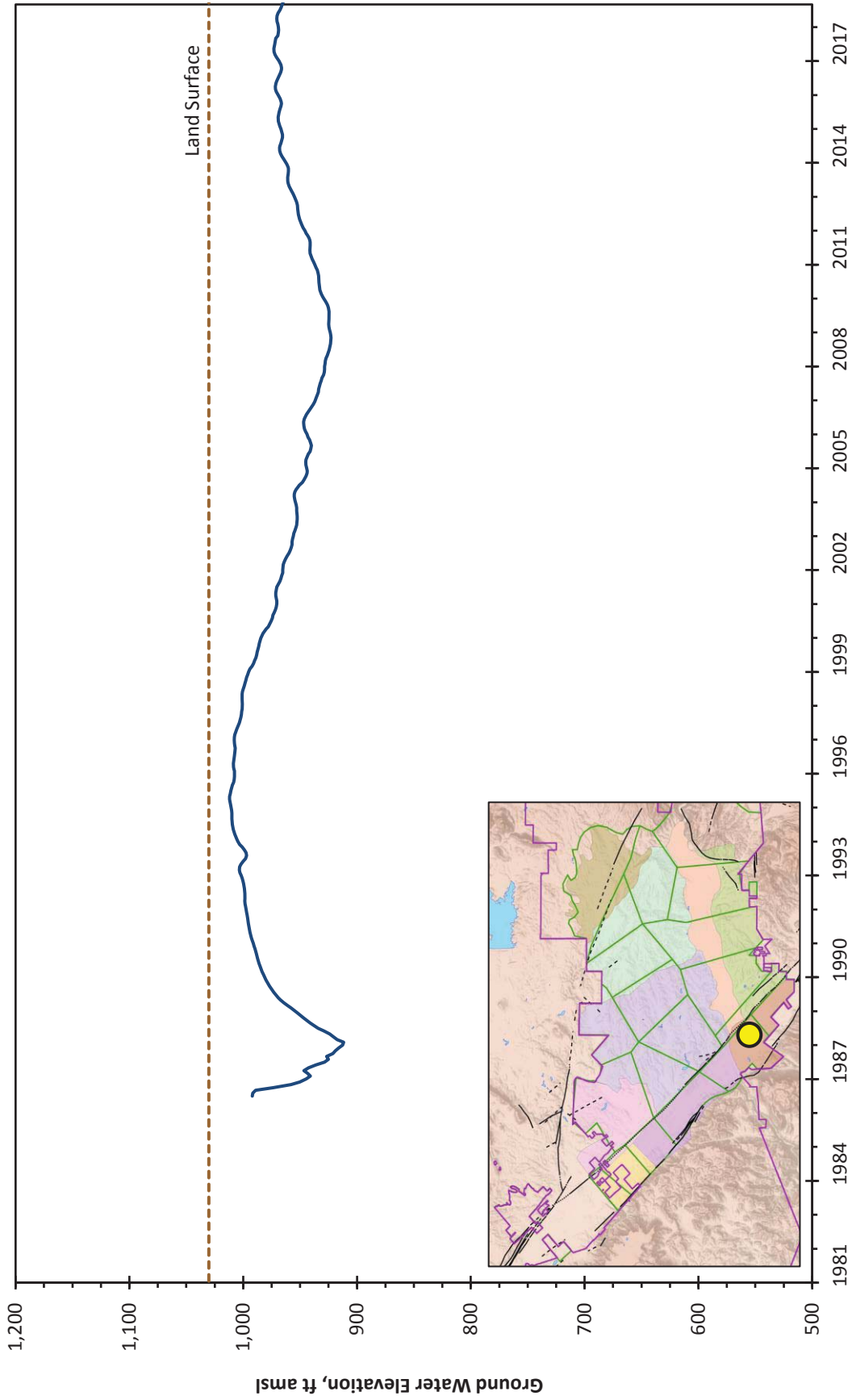


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Long-Term Hydrograph - RCWD Well No. 493  
Temecula Aquifer Index Well



Long-Term Hydrograph - RCWD Well No. 495  
Temecula Aquifer Index Well



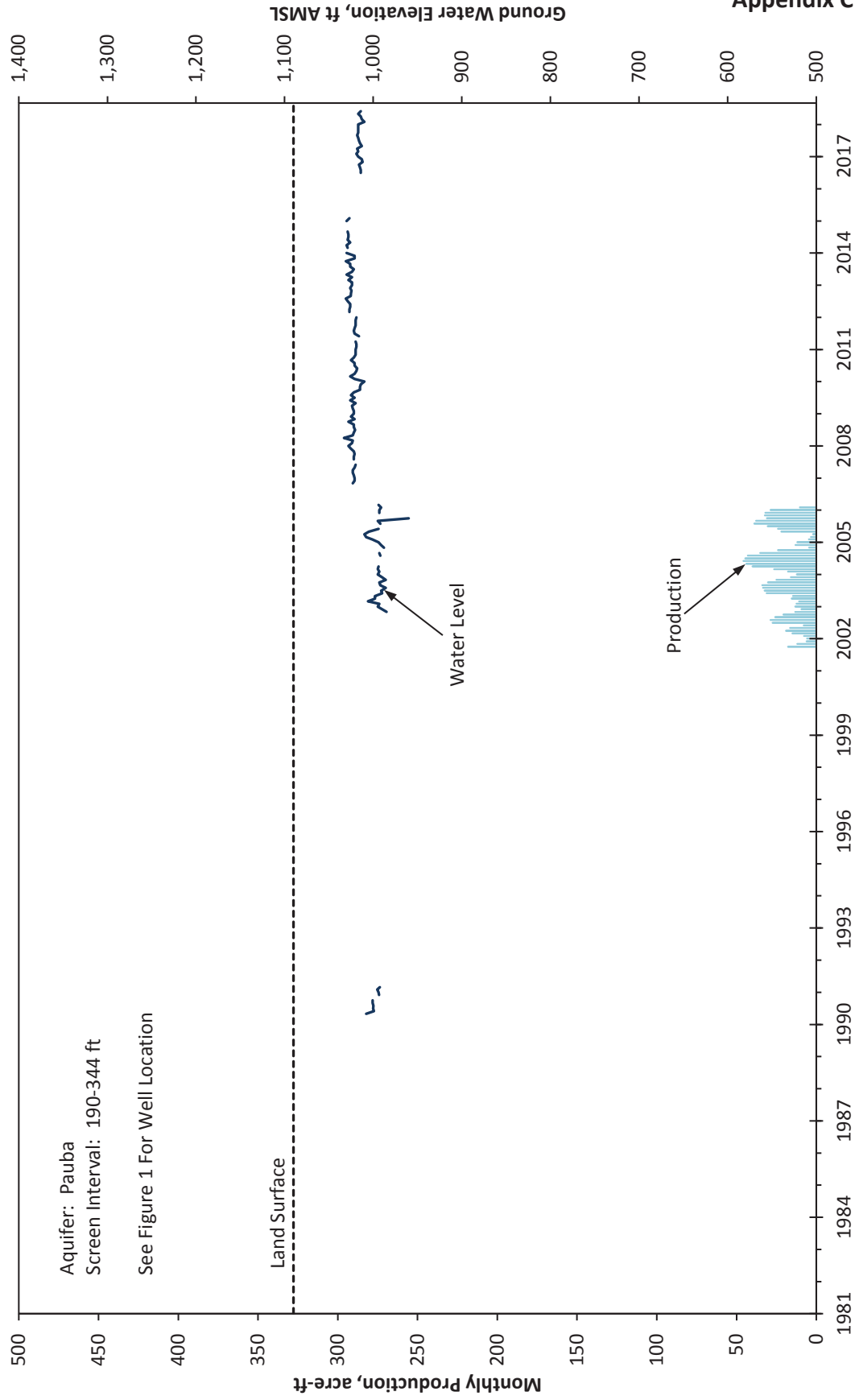
**APPENDIX C**  
**Western Municipal Water District Wells**  
**Long-Term Hydrographs and Production – January 1981 to September 2018**

**APPENDIX C**  
**Western Municipal Water District Wells**  
**Long-Term Hydrographs and Production**  
**January 1981 to September 2018**

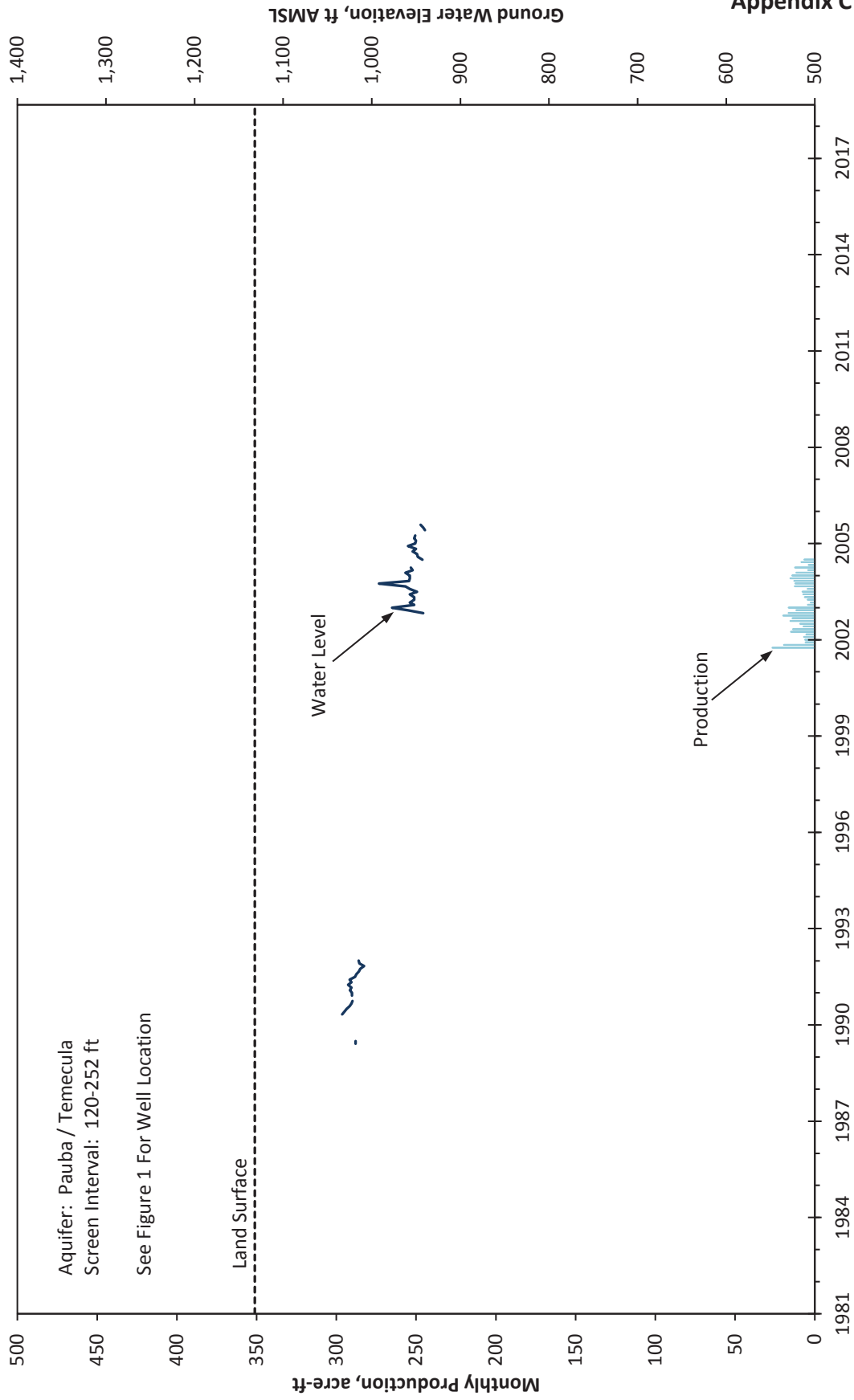
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Lynch Well ..... C-3  
North Well ..... C-4  
South Well ..... C-5  
Alson Well ..... C-6  
New Clay Well ..... C-7

### Long-Term Ground Water Levels and Production - WMWD Holiday Well



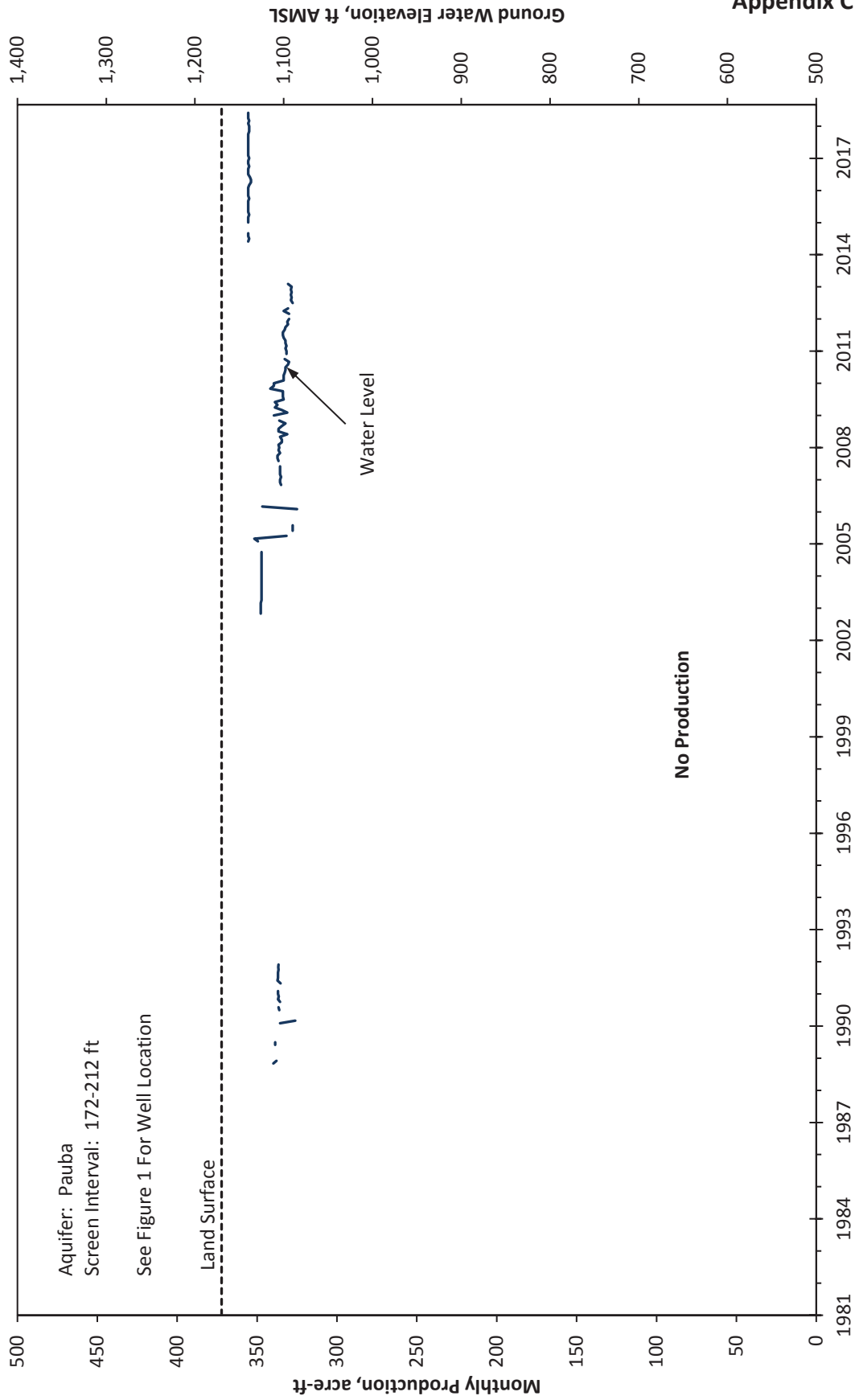
Long-Term Ground Water Levels and Production - WMWD House Well



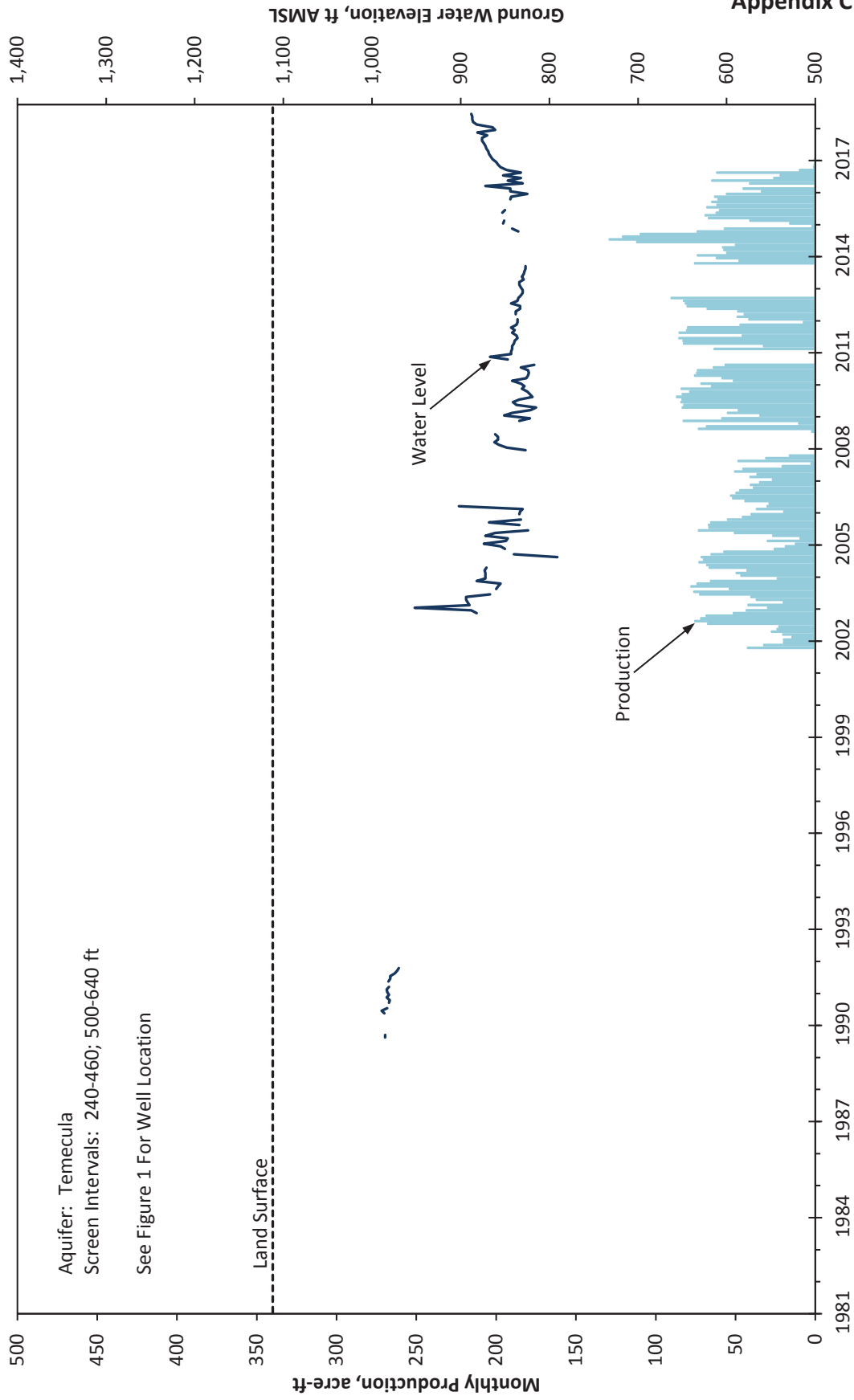
Appendix C



### Long-Term Ground Water Levels and Production - WMWD Lynch Well

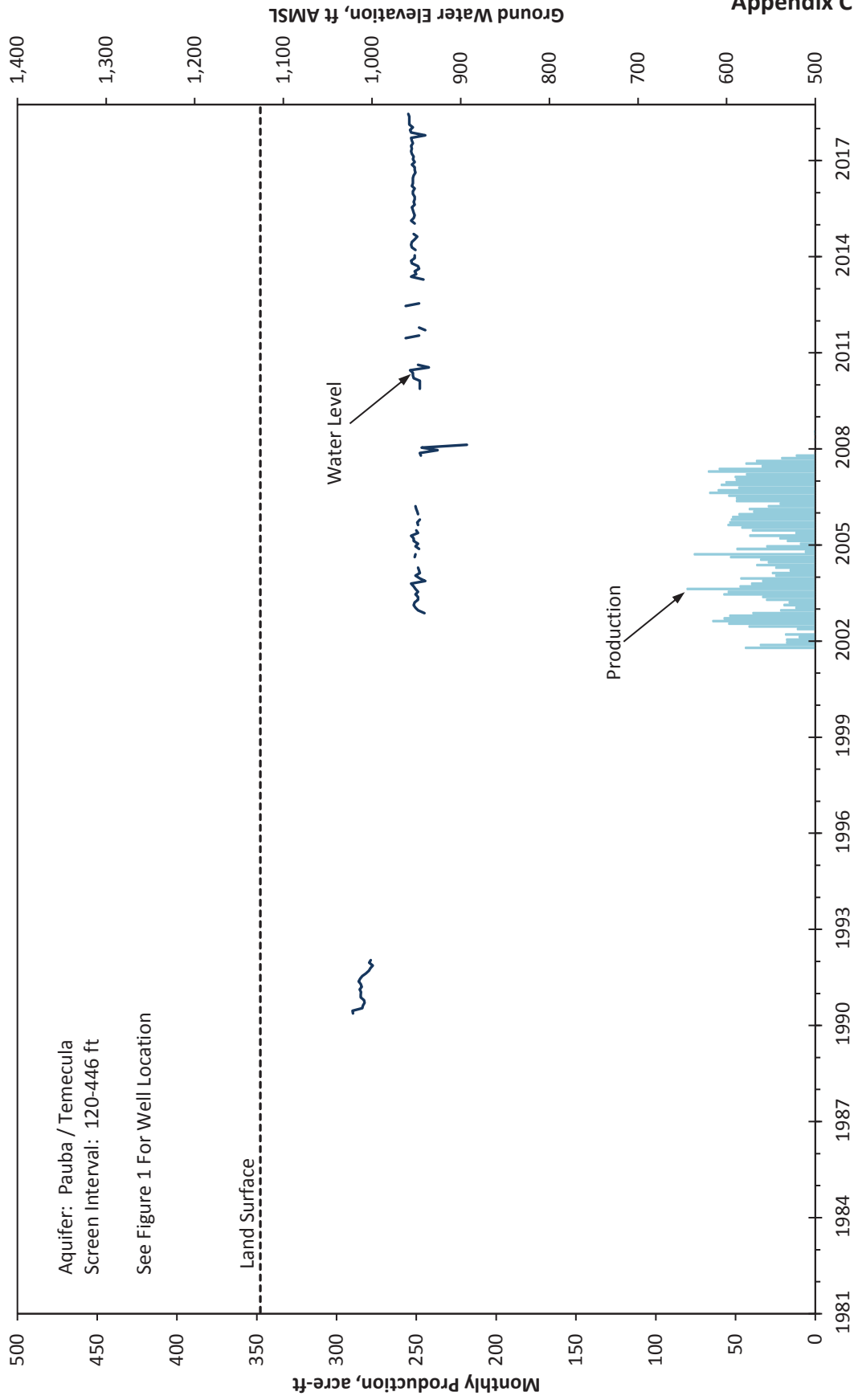


**Long-Term Ground Water Levels and Production - WMWD North Well**

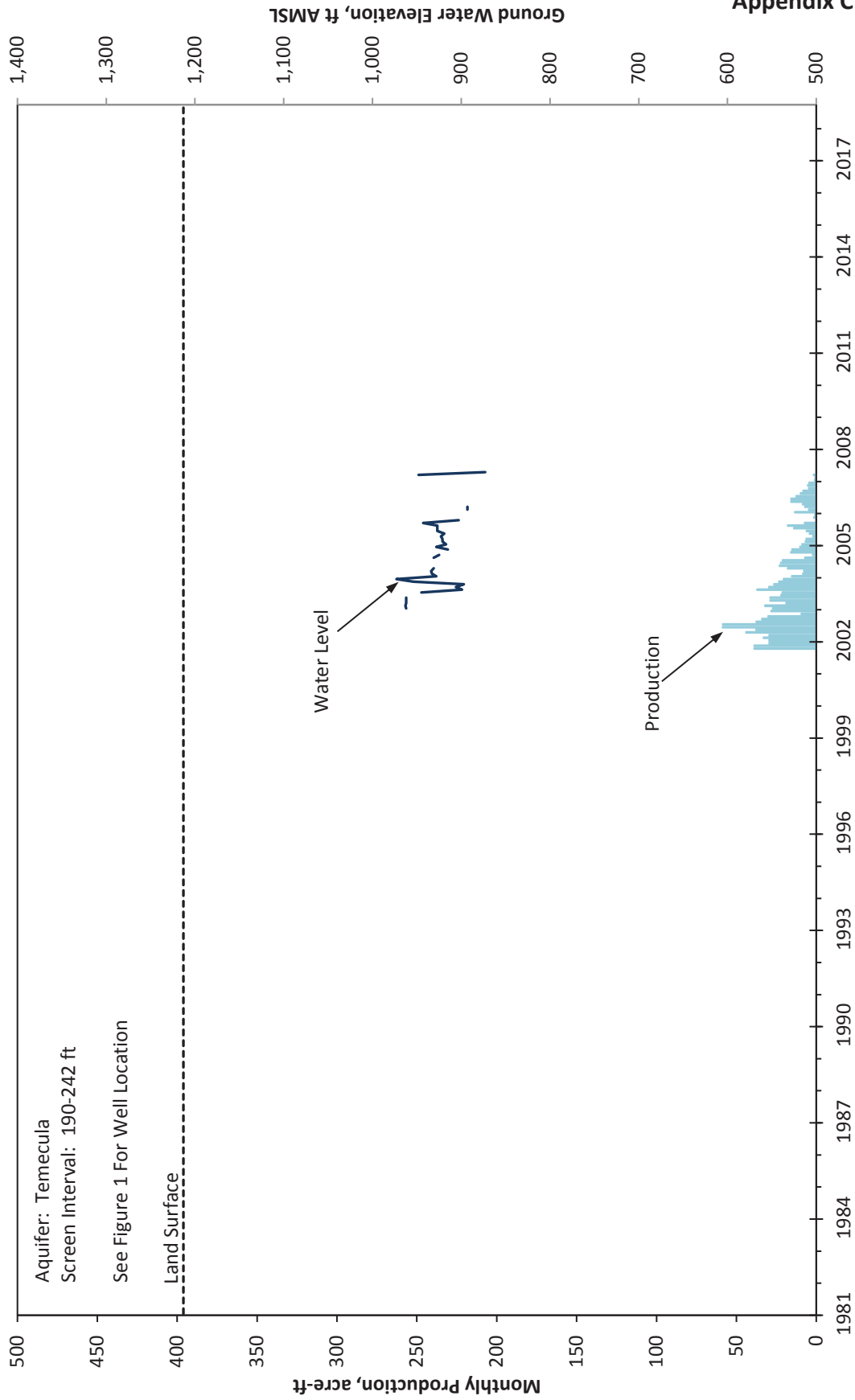


Appendix C

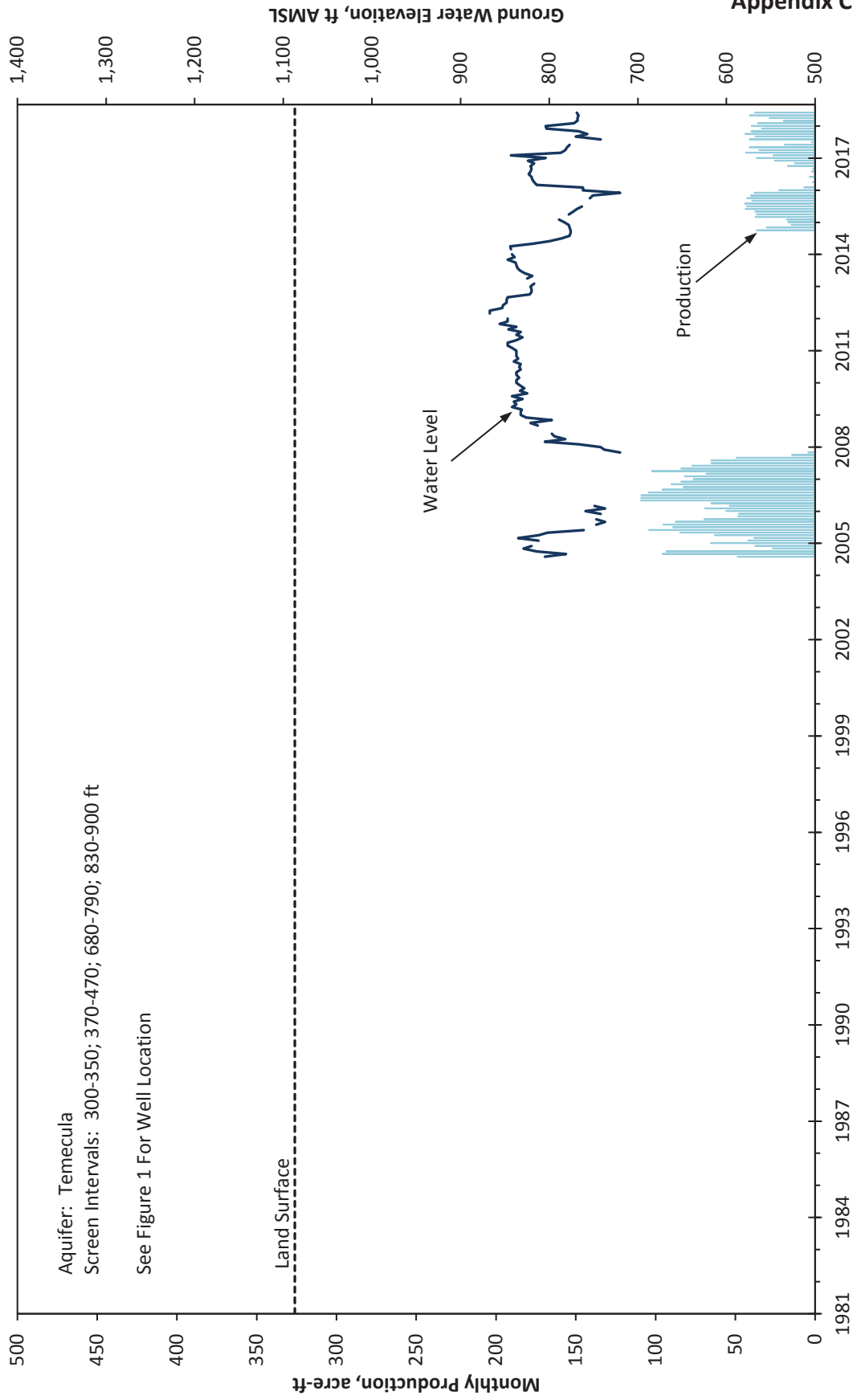
Long-Term Ground Water Levels and Production - WMWD South Well



### Long-Term Ground Water Levels and Production - WMWD Alson Well



### Long-Term Ground Water Levels and Production - WMWD New Clay Well



Appendix C

***GEOSCIENCE***

