

# **Drought Response Tool Central Basin User's Guide**

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### 1. INTRODUCTION

The Drought Response Tool (DRT) is an Excel spreadsheet model that has been developed to assist Central Basin and its Retail Agencies with:

- Evaluating baseline water use by sector and by indoor/outdoor use;
- Identifying customer sectors (e.g., Residential; Commercial, Industrial and Institutional [CII]; and Dedicated Irrigation) and major end uses to target for water savings;
- Evaluating a menu of drought response actions and associated water savings potential; and
- Tracking progress against the water conservation standards mandated under the May 2015 State Water Resources Control Board (SWRCB) Emergency Water Conservation Regulation.

The following sections guide the user through the model structure and the key input parameters, assumptions, and calculations that form the basis of the DRT. The DRT data inputs are largely consistent with data that the Retail Agencies must report to the SWRCB as part of the Emergency Drought Regulations.

It should be noted that the DRT is only a predictive tool that generates a water savings potential based on an assumed set of water use and savings inputs by the user, including Drought Response Actions, savings estimates, and implementation rates. The DRT in no way guarantees water savings or other performance metrics.

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### 2. DROUGHT RESPONSE TOOL STRUCTURE AND OVERVIEW

- **Structure:** The DRT consists of six, linked Excel worksheets:
  - (1) Home
  - (2) Water Use Inputs
  - (3) Water Use Profile
  - (4) Drought Response Actions
  - (5) Estimated Water Savings
  - (6) Drought Response Tracking

A detailed guide to each worksheet is provided in Section 3.

- **Navigation:** Users can navigate between worksheets using buttons at the top of each sheet or the tabs at the bottom of the Excel window.
- Color Coding: On each worksheet, the cells highlighted in white indicate locations where supplier inputs are required or the user can adjust default values. The model will automatically populate all charts and cells highlighted in light blue based on the input data and associated model calculations. Certain cells will be highlighted in gray to indicate that the value is overridden and will not factor into calculations (cells highlighted in gray are discussed in more detail in Section 3.4).
- **Default Values:** In some cases, the white cells are populated with default values. If a user modifies the default values, the revisions will be displayed as **bold font** so the user can clearly track where they have made modifications within the DRT.
- Instructions and Tips: Instructions and tips are provided in cells marked with the symbol ① and also appear in "pop ups" when certain cells are selected.
- **Data Validation.** Throughout the DRT there are a series of data validation checks to provide support to the user.
- Functionality: The DRT is designed to run on systems with Microsoft Office 2007 or later versions. For full functionality of the model, the user must enable the use of macros.<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> To enable the use of macros, click the Microsoft Office Button at the top left hand corner and then click Excel Options. Choose Trust Center from the menu at the left and then Trust Center Settings at the right. Under Macro Settings, select "Enable all macros." Alternatively you can follow instructions from Microsoft Help.



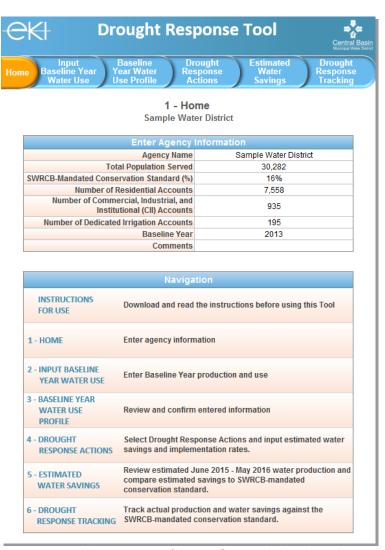
### 3. DROUGHT RESPONSE TOOL WORKSHEETS

This section provides a brief summary of the key DRT inputs, outputs and assumptions.

### 3.1 Worksheet 1 – Home

Input the following agency-specific information:

- Agency Name: Select from a drop down menu of Retail Agency names.
- Total Population Served:
   Population is assumed to be constant for the purpose of the DRT modeling. The population value entered should be consistent with what is being reported to the SWRCB.
- Required Conservation
   Standard: Select the
   Conservation Standard
   mandated by the SWRCB
   Emergency Conservation
   Regulations.
- Number of Accounts by Sector: The number of accounts for each sector (Residential, CII, and Dedicated Irrigation) is assumed to be constant for



**Figure 1:** Worksheet 1 – Home of the DRT © 2015 Erler & Kalinowski, Inc.

the purpose of the DRT modeling. If single-family and multi-family accounts are tracked separately, enter the combined number of both types of accounts under Residential accounts. If CII accounts are tracked separately, enter the combined number of all CII accounts.

Baseline Year: The Baseline Year defines the year that corresponds with potable water production and use data that will be entered in Worksheet 2 – Water Use Inputs. The default Baseline Year is 2013, as required by the SWRCB Emergency



Conservation Regulations. However, the user may enter in a different Baseline Year, if desired.

Worksheet 1 – Home also provides users an overview for navigating the DRT and provides a live link to the *Central Basin Drought Response Tool User's Guide*, which is hosted on the Erler & Kalinowski, Inc. website.

### 3.2 Worksheet 2 - Water Use Inputs

Enter monthly potable water production and water use data for the Baseline Year (e.g., 2013). As before, these data should be consistent with what has been reported to the SWRCB. A drop down menu is provided in the table header to select the units for the input data (e.g., in million gallons, acre-feet, etc.). Baseline water use inputs include:

• **Monthly Production Data:** Enter the monthly potable water production for the Baseline Year, in the units selected in the table header.

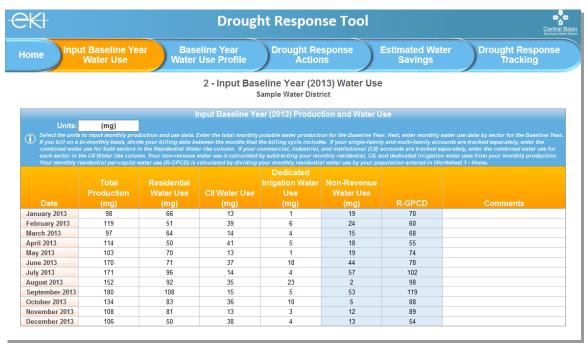


Figure 2: Worksheet 2 – Water Use Data of the DRT © 2015 Erler & Kalinowski, Inc.

• Monthly Water Use Data by Sector: Enter monthly water use by sector (Residential, CII, and Dedicated Irrigation) for the Baseline Year, in the units selected in the table header. Water use data will come from an agency's billing data for the Baseline Year and should be consistent with the values reported to the SWRCB. If water use data are collected on a bi-monthly basis, the water use data should be divided between the months that the billing cycle includes. If an agency's single-family and multifamily accounts are tracked separately, enter the combined water use in the Residential column. The same applies for the consolidation of water uses at CII and Dedicated Irrigation accounts, if applicable. If the total water use by sector exceeds



the amount entered for total production for a given month, the row will be highlighted in red.

- Monthly Non-Revenue Water Use: The DRT calculates non-revenue water use by subtracting the monthly Residential, CII, and Dedicated Irrigation water use volumes from the total monthly production.
- **R-GPCD:** The DRT calculates the monthly residential gallons per capita per day (R-GPCD) for the Baseline Year by dividing the residential water use by the total population specified in Worksheet 1.

Inputs from Worksheets 1 and 2 are used in the remaining worksheets to estimate water savings potential.

### 3.3 Worksheet 3 – Water Use Profile

This worksheet provides high-level, graphical summaries of an agency's Baseline Year water use by sector and by major end use (indoor versus outdoor). Users may select the units the data is displayed in from a drop down menu in the table header. By generally estimating how much of an agency's water use can be attributed to indoor use versus outdoor use and by sector, an agency can begin to identify areas and opportunities for water savings, see Figures 3 and 4. These data can also assist an agency is assessing where they can achieve

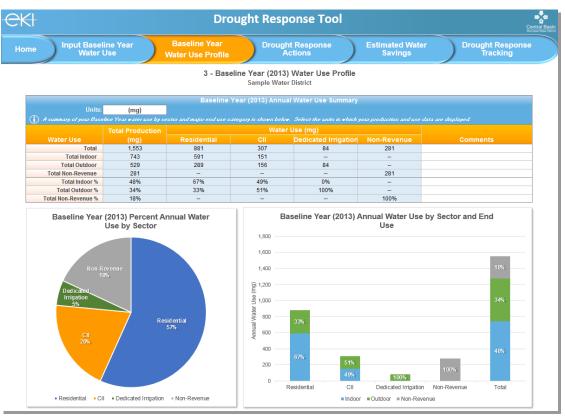


Figure 3: Worksheet 3 – Water Use Profile of the DRT © 2015 Erler & Kalinowski, Inc.





water savings potential with minimal revenue impacts.

Figure 4: Worksheet 3 – Water Use Profile of the DRT © 2015 Erler & Kalinowski, Inc.

The following key assumptions were made in the DRT to support evaluation of supplier water use profiles:

- (1) Monthly indoor use for each sector is assumed to be the amount of water used during the lowest water use month, normalized by the number of days in the month, based on the data entered by the user in *Worksheet 2 Water Use Data*.
- (2) Monthly outdoor use for each sector is calculated by subtracting the assumed monthly indoor water use [from (1)] from the total water use data entered by the user in *Worksheet 2 Water Use Data*.

# 3.4 Worksheet 4 - Drought Response Actions

This worksheet provides a framework for estimating water savings associated with the implementation and enforcement of various Drought Response Actions. Key inputs include:

• Maximum Savings Potential: The DRT allows the Retail Agencies to establish sector-specific "caps" on the water savings potential that the DRT will estimate. Specifically, these caps limit the potential savings estimated by the DRT based on certain agency-defined criteria. For example, to protect the economic vitality of a City, an agency may want to limit CII indoor reductions to 10%. Therefore, the water savings for indoor water use for the CII sector shown in Worksheet 5 – Estimated



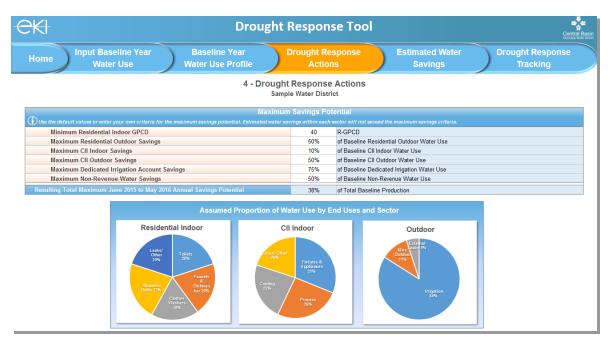
Water Savings will not exceed 10%, even if the water savings based on the selected indoor CII Drought Response Measures may exceed 10%.

The savings caps in the DRT include:

- Minimum allowable indoor residential use (R-GPCD);
- The maximum percent (%) reductions in residential outdoor use;
- The maximum % reduction in CII indoor use;
- o The maximum % reduction in CII outdoor uses; and
- o The maximum % reduction in dedicated irrigation use.

Based on the specified sector-specific caps, the DRT calculates the resulting % total maximum annual savings potential.

- End Use Savings Potential: Three pie chart graphs are shown towards the top of the worksheet that represent the assumed proportions of major end uses by sector based on published data (see Section 4). These end use proportions are used in the DRT water savings calculations in two ways:
  - The end use proportions are used in combination with the End-Use Savings Estimates and Implementation Rates to estimate the Drought Response Action-specific water savings; and
  - The end use proportions serve as a "cap" on the potential water savings estimates because the DRT does not allow a Drought Response Action or suite of Actions to "save" more water than the targeted end use uses. For example, no matter how many Actions are implemented that target toilets,



Response Actions of the DRT © 2015 Erler & Kalinowski, Inc.



the DRT will not attribute a water savings greater than total amount of water assumed to be used by toilets.

- Potential Drought Response Actions: A customized menu of potential Drought Response Actions or "Actions" is provided for Retail Agency consideration. For each Action the Worksheet lists:
  - The associated end use(s) targeted by that Action;
  - The default estimated savings as a percentage of those end uses compared to baseline uses;
  - The default implementation rate (percentage of accounts that will take advantage of or comply with that Action); and
  - The basis of the default savings and implementation rates.

Users can select the Drought Response Actions they wish to implement and include in the estimated savings calculations. The Drought Response Actions with cells highlighted in gray indicate that the action is overridden by another selected Action and will not factor into water savings calculations, even if selected.

Default values for end use savings and implementation rates are provided based on a variety of local and regional water use studies and generalizations. However, all of these values may be adjusted by users based on their understanding of the communities they serve and their intended implementation and enforcement actions, wherever possible.

The suites of Actions and associated default water savings and implementation rates are presented in the following groupings and are based on the sources indicated in the Worksheet.

- Passive Residential Savings: Passive water savings are the savings that results from the natural replacement of toilets, showerheads, and other fixtures and appliances whose minimum use efficiency is dictated by national, state, or local code requirements, and are more water-efficient than the fixtures they replace (see Figure 6).
- SWRCB Mandatory Prohibitions: The May 2015 SWRCB regulation prohibits certain water uses by water customers (see Figure 6). The failure of water customers to comply with these restrictions can result in the water customer being fined up to \$500 per day for each day in which the violation occurs.



Select the Drought Response Actions you would like to include in you or input your own values. The "End Use Savings" estimates the perce	r estimated savings cal	culations. For ea	ich selected acti	on, use the default en	d use savings estimates an	d implementation rates
to the estimated percentage of accounts that will implement a specifi		ings potential at		capped based on the .	assumed distribution of end	d use water demands
shown in the pie charts above. A dash () indicates that professiona	l judgement was used to					
Antion Depositation	End Use(s)	Implement		Implementation Rate	Source of Default	Source of Defaul
Action Description	End Use(s)	Program	Savings (%)	Rate	Savings Estimate	Implementation
Passive Residential Savings	All Indoor	⊽	19%	4%	CBMWD, 2011a	CBMWD, 2011a
High Efficiency Toilet Replacement	Toilets	Г		4%	CBMWD, 2011a	
ligh Efficiency Clothes Washer Replacement	Clothes Washers	Г	40%		H2OUSE, 2009	CBMWD, 2011a
ow Flow Showerhead Replacement	Showers/Baths	Г			CBMWD, 2011a	
ow Flow Faucet Replacement	Faucets & Dishwasher	Г	13%		H2OUSE, 2009	
NERGY STAR® Dishwasher Replacement	Faucets & Dishwasher	Γ	3%	4%	ENERGY STAR, 2011; Pacific Institute, 2003	
SWRCB Mandatory Prohibitions	All Outdoor	V	14%	50%		
lomes and Buildings that is not Delivered by Drip or Microspray systems	Irrigation	Г				
Require Shut-Off Nozzles on Hoses for Vehicle Washing	Misc. Outdoor	Г				
rohibit Use of Potable Water to Wash Sidewalks and Driveways	Miso, Outdoor	Г	17%		See Appendix D of the DRP	
rohibit the Use of Potable Water for Street Washing	Misc. Outdoor	Г	17%			
rohibit Irrigation with Potable Water in a Manner that causes Runoff	Irrigation	Г			DeOreo et al., 2011	
Prohibit Irrigation with Potable Water within 48 Hours following leasurable Rainfall	Irrigation	Г				
Prohibit Irrigation of Ornamental Turf with Potable Water on Street Medians	Irrigation	Г				
Prohibit Potable Water Use for Decorative Water Features that do not Recirculate Water	Misc. Outdoor	Г	50%	50%	EBMUD, 2008	
Provide Linen Service Opt Out Options	Fixtures & Appliances	Г			EBMUD, 2011	
Prohibit Serving Drinking Water other than upon Request in Eating or Drinking Establishments	Fixtures & Appliances	Г	0.5%	50%	EBMUD, 2011	
	Drought I	Response Act	tions			
	Implementation	Source of Default	Source of Defaul			
Action Description	End Use(s)	Implement Program	End Use Savings (%)	Rate	Savings Estimate	Implementation
<u> </u>						
Accelerate Implementation of Existing Water Iservation Programs	All	Г	1%	100%	CBMWD, 2011a; CBMWD, 2011b	
Residential						
ligh-Efficiency Clothes Washer (HECW) Rebate	Clothes Washers	Г	40%	0.2%	H2OUSE, 2009	
ingle Family High-Efficiency Toilet Rebate	Toilets	Г	20%	0.2%	CBMWD, 2011a	
lulti-family High-Efficiency Toilet Rebate	Toilets	П	20%	0.7%	CBMWD, 2011a	- CBMWD, 2011a
Rain Barrel Rebate	Irrigation	П	2370	5.770		
totating Nozzles for Pop-up Spray Heads Rebate	Irrigation	П	10%	0.2%	CUWCC, 2014	
/eather-Based Irrigation Controller (WBIC) Rebate	Irrigation	П	25%	0.001%	CUWCC, 2004	
ioil Moisture Sensor System (SMSS) Rebate	Irrigation	Г	20%	0.001%	Pacific Institute, 2003	
Turf Removal Rehate	Irrigation		25%	0.001%	Pacific Institute, 2003	

**Figure 6:** "Passive Residential Savings," "SWRCB Mandatory Prohibitions," and "Accelerate Implementation of Existing Water Conservation Program" actions from *Worksheet 4 – Drought Response Actions* of the DRT © 2015 Erler & Kalinowski, Inc. **Figure 5:** "Maximum Savings Potential" and "End Use Savings Potential" from *Worksheet 4 – Drought* 

- Accelerate Implementation of Existing Water Conservation Programs: The Retail Agencies already implement and take advantage of a number of water conservation programs or measures. However, in response to the drought conditions, an agency may choose to promote and encourage these measures more aggressively than in normal years. Users can adjust the assumed water savings and implementation rates to reflect the amount of additional savings anticipated by aggressively promoting these measures. Modifications to the default values will automatically display in **bold font**.
- Agency Drought Actions / Restrictions: Potential Drought Response Actions and prohibitions that and agency may choose to implement are provided here and shown in Figure 7. These actions and prohibitions are grouped by (1) actions that can be taken by the supplier, (2) actions/prohibitions specific to dedicated irrigation accounts, (3) actions/prohibitions that target residential water and (4) actions/prohibitions that target CII water use.



	Drought	Response Act		I manufacture de discontinue		
Action Description	End Use(s)	Implement Program	End Use Savings (%)	Implementation Rate	Source of Default Savings Estimate	Source of Default Implementation
<u> </u>	Lina OSC(S)	rrogram	Oddings (%)	nute	ouvings Estimate	Imprementation
Agency Drought Actions / Restrictions						
Agency Actions						
Media Campaign, Newspaper Articles, Website	All	V	0.5%	50%	EBMUD, 2011	
Promote Water Conservation / Rebate Programs	All			50%		
Water Efficiency Workshops, Public Events	All	V	0.5%	25%	EBMUD, 2011	
Water Bill Inserts	All	V	0.5%	100%	EBMUD, 2011	
Promote / Expand Use of Recycled Water	Irrigation	V	100%			
Home or Mobile Water Use Reports	All	V	5%	10%	WaterSmart Software, 2015	Target 5% of accounts.
Decrease Frequency and Length of Line Flushing	Non Revenue Water	✓	25%	50%	See Appendix D of the DRP	Reduced flushing by 50%.
Audit and Reduce System Water Loss	Non Revenue Water	V	45%	50%	DWR, 2015	Target 50% of leakage.
Implement Drought Rate Structure / Water Budgets	All		5%	100%	CUWCC, 2015	
Establish Retrofit on Resale Ordinance	All Residential Indoor	V	21%	6%	SFPUC, 2004	First Tuesday, 2015
Require Net Zero Demand Increase on New Connections	All					
Moratorium on New Connections	All					
Move to Monthly Metering / Billing	All	V	5%	10%		
Increase Water Waste Patrols / Enforcement	All					
Establish Drought Hotline	All					
Reduce Distribution System Pressures	Non Revenue Water		4.5%	100%	CUWCC, 2010; DWR, 2015	
Dedicated Irrigation						
Conduct Irrigation Account Surveys	Irrigation	V	30%	10%	EBMUD. 2011	Target top 10% of users.
Limit Irrigation Days, Time and Duration (Select One)		1	5070	1070	20/100,2011	raige(top to/Forabets)
Limit Irrigation to 2 Days/Week, 15 Minutes/Day, Between 9PM and 6AM	Irrigation	V	38%	50%	UC IPM, 2014	
Limit Irrigation to 1 Day/Week, 10 Minutes/Day, Between 9PM and 6AM	Irrigation	Г		50%		
Prohibit use of Potable Water for Irrigation	Irrigation	Г				
Require Repair of all Leaks within 24 hours	External Leaks		100%	5%		Target top 5% of users.
- OR -						
Establish Water Budget - 25% Reduction	Irrigation	П	25%	50%		
Establish Water Budget - 50% Reduction	Irrigation		50%	50%		
Establish Water Budget - 75% Reduction	Irrigation		75%	50%		
-	Describt	Response Act				<u> </u>
	Drought	Implement	End Use	Implementation	Source of Default	Source of Defaul
Action Description	End Use(s)	Program	Savings (%)	Rate	Savings Estimate	Implementation
Action Description	Liid OSE(S)	Trogram	Javings (%)	Rate	Javings Estimate	Implementation
Agency Drought Actions / Restrictions						
► Residential						
Conduct Water Use Surveys Targeting High Water Users	All Residential Uses	П	10%	10%	EBMUD. 2011	Target top 10% of users.
Limit Irrigation Days, Time and Duration (Select One)	All mesidential Oses	1	1070	1070	LDH00, 2011	raige(top 10% or users.
Limit Irrigation bays, Time and Duration (Select One)  Limit Irrigation to 2 Days/Week, 15 Minutes/Day,						
Between 9PM and 6AM	Irrigation	V	38%	50%		
Between 9PW and OAM						

**Figure 7:** "Agency Drought Actions / Restrictions" from *Worksheet 4 – Drought Response Actions* of the DRT © 2015 Erler & Kalinowski, Inc.

Customer Actions to Encourage: These are Actions that the Retail Agencies may encourage its customers to perform as part of a general education campaign targeting behavioral modifications. These actions are provided for informational purposes; the default savings values assume that the water savings associated with them are captured by an agency's overall public information campaign. Users can, however, adjust the assumed water savings and implementation rates to estimate the amount of additional savings anticipated by aggressively promoting these actions.

## 3.5 Worksheet 5 – Estimated Water Savings

Worksheet 5 displays the estimated potential monthly water production and savings for June 2015 through May 2016, compared to the Baseline Year production data, and based on the selected suite of Drought Response Actions (and assumed end use savings estimates and implementation rates). As shown on Figure 8, tables and charts display how the estimated savings compare to the SWRCB-mandated Conservation Standards by month and cumulatively from June 2015 through May 2016. Users may select the units that the data are displayed in from a drop down menu in the table header. If it appears that an agency



will not meet its target, cells in the Potential Cumulative Savings column will be highlighted in red.

It should be noted that the DRT is only a predictive tool that generates a water savings potential based on an assumed set of water use and savings inputs by the user, including Drought Response Actions, savings estimates, and implementation rates. The DRT in no way guarantees water savings or other performance metrics.

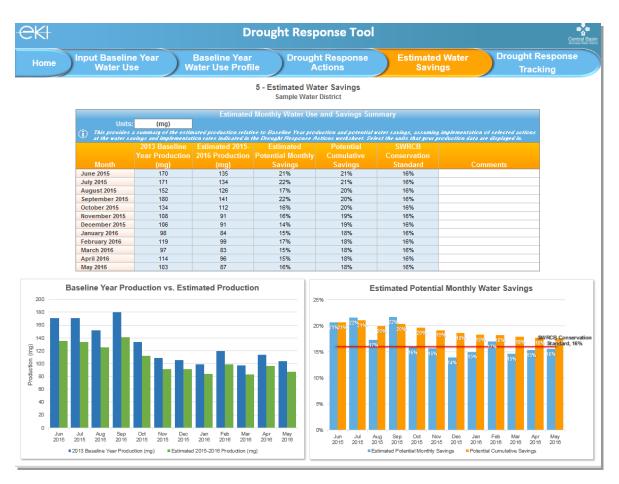


Figure 8: Worksheet 5 - Estimated Water Savings of DRT © 2015 Erler & Kalinowski, Inc.

### 3.6 Worksheet 6 - Drought Response Tracking

Worksheet 6 can be used to track an agency's water production/savings and progress towards meeting the SWRCB-mandated Conservation Standard. Users can input their production data for 2015/2016. The monthly and cumulative savings compared to the Baseline Year data are then calculated. As shown on Figure 9, tables and charts display these savings compared to the SWRCB-mandated Conservation Standard. Users may select the units the data are displayed in from a drop down menu in the table header. If an agency



did not meet its target, cells in the 2015-2016 Cumulative Savings column will be highlighted in red.

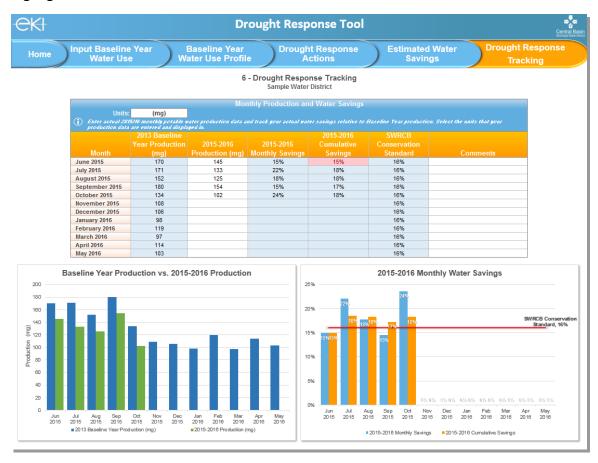


Figure 9: Worksheet 6 – Drought Response Tracking of DRT © 2015 Erler & Kalinowski, Inc.

For additional information and guidance, please contact Anona Dutton at adutton@ekiconsult.com or (650) 292-9100.



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