

STATE OF CALIFORNIA  
**Budget Change Proposal - Cover Sheet**  
 DF-46 (REV 08/15)

Fiscal Year 16/17	Business Unit 3860	Department Water Resources	Priority No.
Budget Request Name 3860-005-BCP-DP-2016-MR		Program 3230	Subprogram

Budget Request Description  
 Statewide Agricultural Land Use Data to Support Groundwater Sustainability Agencies

Budget Request Summary

This proposal requests \$1 million General Fund (one-time) to support the application of remote sensing technology through a contract to establish statewide agricultural land use data.

Requires Legislation <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Code Section(s) to be Added/Amended/Repealed	
Does this BCP contain information technology (IT) components? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If yes, departmental Chief Information Officer must sign.</i>	Department CIO	Date
For IT requests, specify the date a Special Project Report (SPR) or Feasibility Study Report (FSR) was approved by the Department of Technology, or previously by the Department of Finance. <input type="checkbox"/> FSR <input type="checkbox"/> SPR Project No. Date:		

If proposal affects another department, does other department concur with proposal?  Yes  No  
 Attach comments of affected department, signed and dated by the department director or designee.

Prepared By Simon Eching	Date 04/04/2016	Reviewed By <i>[Signature]</i>	Date 5/4/16
Department Director <i>[Signature]</i>	Date 5.4.2016	Agency Secretary <i>[Signature]</i>	Date 5/5/16

**Department of Finance Use Only**

Additional Review:  Capital Outlay  ITCU  FSCU  OSAE  CALSTARS  Dept. of Technology

BCP Type:  Policy  Workload Budget per Government Code 13308.05

PPBA Original Signed by Amanda Martin	Date submitted to the Legislature 5/13/16
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## BCP Fiscal Detail Sheet

BCP Title: Statewide Agricultural Land Use Data to Support Groundwater Sustainability Agencies

DP Name: 3860-005-BCP-DP-2016-MR

### Budget Request Summary

	CY	BY	FY16			
			BY+1	BY+2	BY+3	BY+4
Operating Expenses and Equipment						
5340 - Consulting and Professional Services - External	0	1,000	0	0	0	0
<b>Total Operating Expenses and Equipment</b>	<b>\$0</b>	<b>\$1,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Total Budget Request</b>	<b>\$0</b>	<b>\$1,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

### Fund Summary

Fund Source - State Operations

    0001 - General Fund

**Total State Operations Expenditures**

**Total All Funds**

	0	1,000	0	0	0	0
<b>Total State Operations Expenditures</b>	<b>\$0</b>	<b>\$1,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Total All Funds</b>	<b>\$0</b>	<b>\$1,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

### Program Summary

Program Funding

    3230 - Continuing Formulation of the California Water Plan

**Total All Programs**

	0	1,000	0	0	0	0
<b>Total All Programs</b>	<b>\$0</b>	<b>\$1,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

## **A. Budget Request Summary**

This proposal requests \$1 million General Fund (one-time) to support the application of remote sensing technology through a contract to establish statewide agricultural land use data. Agricultural land use is critical information for groundwater sustainability agencies (GSAs) to estimate agricultural water demand and in establishing the value of agricultural crops when developing water budgets required in groundwater sustainability plans due to Department of Water Resources (DWR) as soon as 2020. DWR has identified 21 groundwater basins in critical conditions of groundwater overdraft that will need to evaluate demand management options tied to land use and water use practices by 2020 and the remaining 106 groundwater basins will need this information to complete plans by 2022. DWR requires statewide agricultural land use to evaluate GSAs water budgets as part of the new Sustainable Groundwater Management Act (SGMA).

Remote sensing is a fairly new technology and the increased availability of digital satellite imagery and aerial photography along with improvements in software functionality related to imagery allows the cost-effective implementation of processes for applying remotely sensed data to identify and map crops efficiently from a statewide perspective. DWR already shares this type of general agricultural land use information with the public and is not aware of significant privacy issues or concerns. Numerous state and local agencies have expressed a need for current and regular updates of statewide agricultural land use information. In addition to GSAs and DWR, current land use information is needed by the California Department of Conservation, California Department of Food and Agriculture, and the State Water Resources Control Board.

Currently, DWR uses on site land use surveys, to acquire limited agricultural land use data (crop acreages.) The process is very tedious, time consuming and does not allow Statewide data to be collected annually. Due to limited resources and the current technology, the data in any area is collected every five years which will no longer be adequate with the new requirements of SGMA. This proposal will fund a contract for California specific remote sensing technology and is expected to resolve the accuracy of remote sensing.

Although this request is only for one year, this is considered a no regret data project because land use information is a critical component for estimating and evaluating water budgets as many local agencies lack information about land uses within their jurisdictional areas, and DWR lacks timely land use information to fulfill our sustainability evaluation requirements under SGMA. This project will provide the needed information for the current year. In addition, the results will be used to evaluate funding needs and benefits for on-going use of this technology in future years. It is expected that if this technology is used in the foreseeable future, efficiencies may be gained and costs may be less in later years.

## **B. Background/History**

DWR is legislatively mandated to update the California Water Plan every five years. With the inception of SGMA, the need for more accurate and annual statewide land use data has become even more critical.

Since about 1950, land classification surveys were conducted as needed to determine current and potential water demands for specific planning studies. By the mid-1960s all of California had been surveyed and classified to varying degrees of detail. The DWR land use program was established to provide for continued periodic surveys. Traditional land survey aerial imagery consisted of low elevation 35 mm slide photography, and data were tabulated through cut and weigh methods.

In 1954, DWR began a program for determining rates of agricultural and urban water use, and for monitoring changes. This information is incorporated into the California Water Plan Update, the basic statewide planning document.

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In 1992, a feasibility study report was approved to develop geographic information system (GIS) technology for the land use program, including digitally generated land use maps and computer tabulation. GIS is now being incorporated into the program statewide. Also, new technology for higher elevation digital imagery has been tested and found to have labor saving advantages over slide photography. The potential for other new technologies was considered, they include satellite imagery (remote sensing) for remote crop identification and determination of changes in irrigated acreage. Lack of resources has prevented implementation of remote sensing technologies, and as a result, traditional land use survey is still being used. Between four to eight counties are surveyed every year.

## Resource History (Dollars in thousands)

Program Budget	PY - 4	PY - 3	PY - 2	PY - 1	PY	CY
Authorized Expenditures	1,000	890	890	890	1,000	1,000
Actual Expenditures*	1,000	1,000	1,000	1,300	1,450	1,500
Revenues						
Authorized Positions	7	7	7	7	7	7
Filled Positions	7	7	7	7	7	7
Vacancies	0	0	0	0	0	0

\*Actual Expenditures are higher than Authorized Expenditures due to funding being diverted from the Water Use program for the Land Use program. Due to the interdependent nature of the work, a portion of the Land Use studies need to be completed before conducting Water Use studies. At this time, the Water Use studies need to be started back up, so funding can no longer be diverted.

## Workload History

Workload Measure	PY - 4	PY - 3	PY - 2	PY - 1	PY	CY
Agricultural land use data county surveyed	5 counties	5 counties	5 counties	4 counties	4 counties	5 counties
Perform quality control (QC) on collected land use data survey in major agricultural counties	5 counties	3 counties	3 counties	3 counties	2 counties	4 counties

### C. State Level Considerations

DWR conducts field surveys to identify crops being produced and other land uses to fulfill the legislatively mandated California Water Plan update. Under optimal conditions, major agricultural counties would be surveyed every five years to coincide with updates of the California Water Plan. However, because of the limitation of traditional surveys and a lack of resources, the survey interval has increased to ten years or more for many counties. Extended intervals between crop surveys affects the quality of data, the timeliness of data availability and the accuracy of water use estimates. Furthermore, lack of current agricultural land use information limits DWR's ability to evaluate water budgets that will be provided by GSAs.

Use of remote sensing technology provides economies of scale when conducted statewide because everyone is utilizing the same data from satellite imagery and applying the same analytical techniques to estimate land use. One satellite image may cover boundaries of ten different GSAs, and it is more efficient for the state to purchase and process this information one time and then provide it to all ten entities. Furthermore, DWR needs this same information to independently verify information submitted by GSAs and having control over the processing allows DWR to enforce standardization of information provided as part of local assistance to GSAs.

**D. Justification**

DWR is legislatively mandated to update the California Water Plan every five years. DWR develops estimates of annual agricultural, urban and environmental water use for each update. Data collected through land and water use surveys is essential information needed for the California Water Plan Update, which is a primary statewide water planning effort, and regional water management. GSAs will now have a critical need for agricultural land use information on an annual basis to support development of water budgets required by SGMA. This request creates a framework to integrate the analysis of digital satellite imagery (remotely sensed data) into the land use survey program in support of SGMA. This proposal would allow DWR to evaluate water budgets that will be provided by GSAs.

**E. Outcomes and Accountability**

**Projected Outcomes**

Workload Measure	BY FY16-17
Application of one-time remote sensing technology through a contract.	Statewide application of remote sensing technology to determine agricultural land use data. This is critical information for GSAs to estimate agricultural water demand and in establishing the value of agricultural crops when developing water budgets required in groundwater sustainability plans.

**F. Analysis of All Feasible Alternatives**

Alternative 1: Approve \$1.0 million funding for Architectural and Engineering contract to establish statewide agricultural land use data collection.

Pros: The contract will allow the implementation remote sensing data collection (digital satellite) allowing DWR to evaluate water budgets that will be provided by GSAs. This alternative supports the Sustainable Groundwater Management Act and Water Plan Update.

Cons: Increase one-time obligation to the General Fund.

Alternative 2: Continue funding Land Use Data Collection Programs at the current levels.

Pros: Funding Land Use at current level results is a cost saving.

Cons: The current level of effort cannot support future GSA needs and DWR’s review of groundwater sustainability plans. Current funding will result in slow progress towards achieving these goals and the implementation of remote sensing technology would be impossible or it will be very slow. DWR would not be able to build on existing efforts on crop identification and mapping. Current land use assessment procedures are time consuming, costly and often lag several years behind the current calendar year. These procedures must be updated to provide current and technically consistent land use information to GSAs, and to support DWR’s review of groundwater sustainability plans.

**G. Implementation Plan**

Fund a one-time contract to establish statewide agricultural land use data. The contract would implement the following activities between July 1, 2016 and June 30, 2017:

1. Contractor will obtain imagery from either satellite or aerial photography, format as appropriate, maintain the data, and deliver the images as part of the contract deliverables. All the images acquired will be owned by DWR.
2. Contractor will delineate field perimeters. The field perimeters delineated by Contractor shall define:
  - a. Cropped fields
  - b. Non-planted areas within cropped fields

3. Contractor will design accuracy assessment method.
4. Contractor will provide accuracy assessments on unsupervised or supervised image classification methods. Contractor's assessment will provide an error matrix showing agreement/accuracy, commission, omission, and overall error for each county. Contractor shall not use statewide accuracy to determine accuracy.
5. Contractor will map field-by-field irrigated land use on a quarterly basis to determined vegetable double or triple cropping and winter grains. DWR will provide the current Standard Agricultural Land Use Legend for this purpose.
6. Contractor shall provide GIS electronic and non-electronic files showing all data utilized for mapping crops in California. The GIS files will include footprints of the reference and model input data with attributes identifying each dataset (e.g. which satellites, the dates of the imagery, all imagery, imagery resolution, sources of field borders, sources and dates of aerial photographs.) Contractor will provide polygon shape files for the classified fields with attributes (crop type, acreages), and the date the image was taken on quarterly basis.

**H. Supplemental Information**

None.

**I. Recommendation**

DWR recommends approval of Alternative Number 1 in order for DWR to apply remote sensing technology through a contract to establish statewide agricultural land use.