

**STATE WATER RESOURCES CONTROL BOARD
BOARD MEETING SESSION – OFFICE OF RESEARCH, PLANNING, AND PERFORMANCE
NOVEMBER 1, 2016**

ITEM 3

SUBJECT

CONSIDERATION OF A RESOLUTION AUTHORIZING THE EXECUTIVE DIRECTOR OR DELEGATE TO APPLY FOR, ACCEPT, AND/OR AMEND A FEDERAL NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) GRANT, AND AUTHORIZING EXECUTION AND AMENDMENT OF CONTRACTS TO CONDUCT A REMOTE-SENSING EVAPOTRANSPIRATION STUDY.

DISCUSSION

The Sustainable Groundwater Management Act (Act) requires formation of local groundwater sustainability agencies and development of groundwater sustainability plans for the management of groundwater resources in high and medium-priority groundwater basins. Where there are no agencies or plans, or plans are insufficient, the State Water Board has the authority to directly intervene to manage groundwater resources in a basin.

The Office of Research, Planning and Performance's Groundwater Management Unit (GMU) is tasked with implementing the State Water Board's provisions of the Act, which includes state intervention authority in areas that fail to form a sustainability agency or develop an adequate sustainability plan.

One of the key tasks associated with intervention is mandatory reporting of groundwater extractions in areas lacking a local management agency. However, because there is no comprehensive statewide database that accurately shows extraction well locations, it will be difficult to identify well owners and groundwater users in those unmanaged areas. Remote sensing techniques offer a fast and efficient way to identify acreage irrigated by groundwater from a desktop computer, using far less staff resources than on-the-ground surveys. Furthermore, some remote sensing techniques allow for calculation of evapotranspiration (ET), including the estimated volume of water consumed over a given time period. Since a portion of water applied for irrigation purposes will return to the aquifer through percolation, remotely sensed calculations of consumptive loss may be a good choice to measure overall groundwater consumption for the purposes of water budgeting.

The ability of remotely-sensed ET to precisely map ET in California's unique geographic microclimates is mostly untested. Issues with cloud cover, humidity, and other climatic variables may differ between the Central Valley and Central Coast, and between the state's other geographic regions. Additionally, the degree to which automated and/or manual methodologies can sufficiently measure ET for local land-use decisions is also unknown. Automated approaches can be easily employed in geographic information systems, but the resolution for these automated approaches may limit local land users when making water use decisions that require high accuracy.

The NASA solicits proposals and offers grant funding to advance the use of satellite observations, including satellites equipped to measure ET. The NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) supports NASA research and grant proposal selection. NSPIRES has recently released \$9 million in grant funds through their

Applied Sciences Program Objective to discover and demonstrate innovative and practical uses of Earth observation technology through funding of projects that help inform end user decision-making and improve water resource management.

The GMU, working with researchers from the Desert Research Institute and University of Idaho, has identified key questions regarding ET consumptive use calculations that focus on method precision and automation, and is proposing to apply directly for an NSPIRES grant to evaluate the capability of remote-sensing technologies to measure ET and identify groundwater pumpers and their associated extraction volumes. The study will use NASA's LANDSAT satellite imagery to measure ET through the application of the METRIC process (Measuring EvapoTranspiration at high-Resolution with Internal Calibration). The proposal will request up to \$550,000 per year for three years, with awards expected to be available by December 2016. The funds will pay for some internal staff work, but will largely be used to contract with research institutions to conduct remote-sensing studies. In addition to directly applying for one or more grants, GMU staff also propose to participate in other grants should other research institutions develop relevant proposals.

The GMU has identified the Paso Robles Sub-Basin as an ideal candidate for a remote-sensing study. The basin is almost entirely reliant on groundwater, and has numerous microclimates that will test remotely-sensed ET capabilities. San Luis Obispo County has volunteered to work with the GMU and other researchers on implementation of the grant, should the grant application be approved and funded. Potential areas for collaboration include identification of viticultural operations to host equipment, provision of data (where available), and outreach efforts, amongst others.

POLICY ISSUE

Should the State Water Resources Control Board authorize the Executive Director to apply for the NASA INSPIRES Grant, and to enter into contracts to conduct a remote-sensing evapotranspiration study?

FISCAL IMPACT

Potential increase in the annual receipt of Federal Trust Funds in an amount up to \$550,000 per year for three years, up to a total of \$1.65 million.

REGIONAL BOARD IMPACT

None.

STAFF RECOMMENDATION

Authorize the Executive Director or designee to apply for NASA INPIRES grant funding, and if successful, authorize the Executive Director to enter into support contracts for up to \$550,000 for per year for fiscal years 2016-17, 2017-18, and 2018-19.

<p>State Water Board action on this item will assist the Water Boards in reaching Goal 2 of the Strategic Plan Update: 2008-2012 to improve and protect groundwater quality in high-use basins by 2030. In particular, approval of this item will assist in fulfilling Objective 2.1, which calls for an integrated protection approach for high-use groundwater basins that regulates activities that impact beneficial uses and promotes local management of groundwater resources.</p>

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STATE WATER RESOURCES CONTROL BOARD RESOLUTION NO. 2016-

AUTHORIZING THE EXECUTIVE DIRECTOR OR DELEGATE TO APPLY FOR, ACCEPT, AND/OR AMEND A FEDERAL NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA) GRANT, AND AUTHORIZING EXECUTION AND AMENDMENT OF CONTRACTS TO CONDUCT A REMOTE-SENSING EVAPOTRANSPIRATION STUDY

WHEREAS:

1. The Sustainable Groundwater Management Act requires formation of local groundwater sustainability agencies and development of groundwater sustainability plans for the management of groundwater resources in high and medium-priority groundwater basins. Where there are no agencies or plans, or plans are insufficient, the State Water Board has the authority to directly intervene to manage groundwater resources in a basin.
2. There is little available data on statewide or basin-scale groundwater use, as most groundwater wells do not require metering and are not required to report groundwater use to the state. Consequently, development of water budgets and identifying groundwater users will be time consuming and difficult if state intervention is needed.
3. Remote sensing of evapotranspiration (ET) can be used for identifying areas of high consumptive use and calculating consumptive use volume estimates, and is used by many state, federal, and private entities to evaluate water resources. Remote sensing approaches can quickly identify water users in a basin, and can offer significant cost savings by providing automated services, tools to prioritize investigations, and reducing the need for site visits when limited staff resources are available.
4. The Groundwater Management Unit has worked with researchers from the Desert Research Institute (DRI) and University of Idaho to identify research efforts to help facilitate use of remotely-sensed ET. Identified topics include: 1) the overall accuracy and precision of remotely-sensed ET measurements in California's unique geographic microclimates, and 2) whether automated and/or manual applications of remote sensing technology can sufficiently measure ET to inform state regulatory processes and local land-use decisions.
5. NASA solicits proposals and offers grant funding to advance the use of satellite observations, including the remote sensing of ET, to detect and mitigate threats to water security and sustainability with an emphasis on monitoring and management of agricultural water use. The NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) supports NASA research from the release of grant solicitation announcements through the peer review and selection process. NSPIRES proposals selected for award may receive funding ranging from \$275K - \$550K per year over a three year period.
6. The Office of Research, Planning and Performance's Groundwater Management Unit (GMU) is tasked with implementing the State Water Board's provisions of the Sustainable Groundwater Management Act (Act). The GMU is proposing to apply to NASA NSPIRES for grant funds to examine whether remote sensing approaches for measuring ET are a viable method of establishing on-farm groundwater use and informing the whole-basin groundwater budget. The grant funds would be used to implement an investigation that compares on-the-ground ET data collected at field stations, remotely-sensed ET

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calculations using NASA's LANDSAT satellite imagery, and metered pumping data (where available). The results of the study will help establish the GMU's regulatory processes and technical resource needs for the Act.

7. San Luis Obispo County staff supports exploring more cost-effective and accurate methods of estimating consumptive use of irrigated lands for water balance and basin modeling purposes. Furthermore, they recognize that remote sensing could serve as a tool for farmers seeking to improve water use efficiency practices on irrigated lands. San Luis Obispo County has volunteered to work with the State Water Board's GMU on implementation of the grant, should the GMU be successful in receiving federal funding, for investigation in the Paso Robles groundwater basin. Potential areas for collaboration include identification of viticultural operations to host equipment, provision of data (where available), and outreach efforts, amongst others.

THEREFORE BE IT RESOLVED THAT:

The State Water Board:

1. Authorizes the Executive Director to apply for, accept, and amend, as necessary, a NASA INSPIRES Grant for up to \$550,000 per year for fiscal years 2016-17, 2017-18, and 2018-19.
2. Authorizes the Executive Director or delegate to negotiate and issue contracts, grants, and amendments to implement the grant.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 1, 2016.

Jeanine Townsend
Clerk to the Board