Water Information and Data Subcommittee (WIDS)
https://westernstateswater.org/wids/

August 2021 Summer Meeting Webinar

Western States Water Council (WSWC)
Water Data Exchange (WaDE) Program

Date/Time: August 16, 2021. 11:00 am PT / 12:00 pm MT / 1:00 pm CT / 2:00 pm ET

Attendees (35)
Terry Schwarz and Charley Palmer (Alaska), James Dieckhoff (Arizona), Allison Odell (Bureau of Reclamation), Brent Vanderburgh, Jennifer Stricklin, and Greg Gearheart (California), Brian Macpherson (Colorado), Justin Huntington (Desert Research Institute), Dwane Young (EPA), Linda Davis (Idaho), Christopher Estes (Instream Flow Council), Kyle Onda (Internet of Water), Peter Colohan (Internet of Water), Sue Lowry (Interstate Council on Water Policy), Chris Kuntz (Montana), Jennifer Schellpeper (Nebraska), Levi Kryder (Nevada), Stacy Timmons and David Anderson (New Mexico), Christopher Neel (Oklahoma), Jordan Beamer (Oregon), Kathy Alexander and Taylor Christian (Texas), Jaime Painter, David Blodget, Nancy Barber (USGS), Craig Miller (Utah), Heather Hofman (WestFAST), Adel Abdallah, Tony Willardson, and Ryan James (WSWC), Melinda Fegle, Charlie Ferrantelli, and Mike Robertson (Wyoming)

Guests from the Interstate Council on Water Policy (ICWP) Water Data & Science Committee (5)
Tom Littlepage (Alabama), Philip Blankenau (Idaho), Heidi Moltz and Michael Nardolilli (Interstate Commission on the Potomac River Basin), Joy Loughry (Minnesota), Wayne Slade (Sequoia Scientific Inc.)

Absentees (6)
Chris Beightel (Kansas), Chris Colby (North Dakota), Forrest Melton (NASA), Ron Duvall (South Dakota), Sara Larsen (Upper Colorado River Commission), Ann-Marie Sweeten (Washington)

MEETING MINUTES

Welcome
Adel Abdallah (WSWC) welcomed everyone to the call. Adel shared the list of invited participates and the agenda in the Zoom chat. Adel welcomed the guests attending the call from the Interstate Council on Water Policy (ICWP) Water Data & Science Committee. Adel welcomed Justin Huntington as a guest speaker about the upcoming OpenET project release and then integration with WaDE. The agenda for this call are: first Tony to share a few remarks and Adel to provide a status update on WaDE, then Justin to present on OpenET and the proposal to integrate it with WaDE. Finally, there will be a discussion and questions and answer period in the end. The agenda was approved with no objections

Tony Willardson (WSWC) shared a brief remark about the WaDE Program starting a decade ago in 2011 with the backing of the Western Governors Association (WGA). He said that it was evident data was lacking to make informed water planning decisions. Tony mentioned that WGA governors were interested in the impacts of power generation and transmission on water and wildlife which led to two programs that streamline access to water and wildlife-related data in the west. The Crucial Habitat Assessment Tool (CHAT) (https://www.wafwachat.org/) is now maintained and operated by the Western Association of Fish and Wildlife Agencies (WAFWA) and the Water Data Exchange (WaDE) Program is housed at the Western States Water Council. Tony shared his excitement about the progress that both CHAT and WaDE have made over the years. He also mentioned that WaDE has been supported with funds from EPA, Department of Energy and we are closely working with the US Geological Survey, the Bureau of Reclamation, and others in the development of WaDE. He pointed out that WaDE recently received substantial philanthropic financial commitments to help in developing the upcoming WaDE dashboard. Tony recognized Dwane Young from EPA and Heather Hoffman. Heather is the federal liaison for the Council with the Western Federal Agency Support Team (WestFAST). Tony pointed out that Dwane filled the liaison role in 2011 and was instrumental in helping build the architecture for WaDE.

Adel reviewed the action items from the Spring 2021 Kickoff Meeting: (1) scheduling this Summer Meeting (done); (2) creating a Discord channel as a forum for WaDE discussions (created: https://discord.gg/pNd8zxMTWR), and (3) sending invitations for focus groups to refine WaDE use cases and how WaDE can help the states (to be done this fall when we receive a pending grant).

Adel reviewed the role of the WIDS committee as a technical advisory body to the Council Executive Committee and WaDE and to provide feedback on federal data initiatives. Adel pointed out how WaDE provides access to data that compliments federal data providers such as USGS, Reclamation, and EPA.

Adel summarized the three phases of the WaDE program beginning in Phase I in late 2011 by establishing the program and its distributed architecture. Phase II started in early 2019 and extends through 2021 which adapted the distributed database architecture into a centralized design with a focus on interoperability with other data providers and support to use cases. Phase III is approaching which focuses on operationalizing WaDE's dashboard to allow decision-makers and the public to access and analyze water data across the west.

Adel shared a schematic of the WaDE 2.0 architecture which shows how the WaDE team imports publicly published states data into the database using a script that maps each state's data to a template which is then loaded to the database. The data is then publicly exposed through an Application Programming Interface (API). Adel mentioned that the WaDE team is working with the Internet of Water and USGS groups on connecting WaDE to the Geoconnex project. This includes indexing the state data in WaDE with the Network-Linked-Data-Index (NLDI) tool. Geoconnex will provide permanent identifiers to all sites that have data in WaDE and generalized landing pages with common metadata to facilitate the searchability of the data. NLDI will provide data query capabilities for locations upstream or downstream of water sites referenced in WaDE, USGS, Reclamation, and EPA data services based on the National Hydrography Dataset (NHDPlus). Users can further query WaDE sites and view their landing pages while federal data will point to their external landing pages as maintained by each federal data provider. As shared in the Spring 2021 WIDS call, the WaDE team has worked with an IT contractor who prototyped the web application as a proof-of-concept dashboard being connected

to the database through API calls. The team also has worked with the contractor on creating a full mockup of the desired dashboard functionalities.

Adel showed a screenshot of the Tableau dashboard summarizing the number and type of datasets that have been imported to the WaDE database. https://public.tableau.com/app/profile/wswc/viz/WaDE2_0_Shared_Datasets/ShraedDatasets_dash?publish=yes

Adel overview the 5-year workplan for WaDE which consists of seven main tasks that are detailed to 45 sub-tasks. The workplan is available online here https://westernstateswater.org/wade-updates/2021/wade-5-year-work-plan-2022-2026/

WSWC staff has invited Justin Huntington (Desert Research Institute-DRI) to present on the OpenET project and the proposed integration with WaDE. Justin thanked everyone for taking the time to attend this call. The proposed project is in response to the Request for Proposals (RFP) by the NASA Research Opportunities in Space and Earth Science (ROSES) Program which is due late September 2021. Justin thanked WSWC and Tony for leading the charge on ET data for decades concerning Landsat and consumptive use mapping and the acknowledgment that OpenET will provide a nice path to better manage water in the west.

Justin started with a statement that evapotranspiration is important for many reasons. It is the second-largest component of the water budget, after precipitation. Field level information can be used to help us develop more accurate water budgets and provide credit for reduced consumptive use, ultimately, with an automated system or operational reduce cost for water trading programs. Justin referred to the need to help out a grower's increase on-farm efficiencies.

Justin said that OpenET started about five years ago with a proposal to the NASA Applied Sciences Program with the title "*Operational Remote Sensing of Agricultural Water Use in Cooperation with Western State Water Agencies for Improved Water Management*". DRI partnered with nine western states, the Beaurea of Reclamation, and other agencies. The goal was to create the ability for water management agencies to make field-scale satellite-based ET maps, and summaries using the best available science. The approach at that time was to come up with a semi-automated open source, open platform software based in Python to produce these field-scale ET estimates. That effort started with two models: Satellite Irrigation Management Support (SIMS) and Mapping Evapotranspiration at high Resolution with Internalized Calibration model (METRIC). Justin mentioned that the project included many training activities for state agency staff including many who are on this call. Justin said that many of the state agencies have now taken this code and developed their ET estimates. For example, Jordan Beamer (Oregon) developed 10 years of ET data for the Harney basin and wrote up a report, comparing it to groundwater pumping records and updating the groundwater withdrawal information in that basin. The next step of that project was really to migrate all this software into the cloud to scale and keep it sustainable and make it easily automatable. The cloud migration also intended to remove the burden off the states and other agencies in terms of endlessly downloading data.

Justin pointed to the new paradigm in terms of how imagery is being processed. It is bringing algorithms to the data in the cloud, instead of the other way around, which is just not feasible for operational production and long-term sustainability of ET mapping.

Justin pointed to open line communication with the tech team, expert support for agencies, version control of code, documentation, and data transparency. Justin stressed the fact that all this work would not be possible without the support from NASA and USGS to develop this software and trainings and to keep Landsat data free of charge. Justin celebrated that those issues are solved and that the OpenET team is looking to take this work to the next level up in terms of application readiness levels, using the NASA terminology. Justin summarized that OpenET now produces ET data using six widely used models at 30-meter resolution, followed by spatially averaging all that data to over 40 million field boundaries for the Western US. OpenET will make this data publicly available through the upcoming Data Explorer page.

Justin then talked about the NASA Research Opportunities in Space and Earth Science (ROSES) program and its call for proposals. He mentioned that the interest in this funding is to provide reliable ET data at low to no cost and easily accessible to anybody and how important that there's trust and validity in the data. Justin stressed that the data be trusted and adopted, both by the growers as well as regulators and that we can start to entertain a wide variety of sustainable resource management practices based on the information. Justin acknowledged the large team working on the OpenET project including experts in the field of remote sensing ET, many of them are the developers of the ET models.

Justin summarized that the start was with two models (i.e., SIMS and Metric) and now OpenET supports Operational Simplified Surface Energy Balance (SSEBop) covering the Contiguous United States (CONUS) 17 states with 30-meter resolution. Justin stated that Google is an important partner in this work as it made it possible for OpenET to scale and do cloud computing. He pointed out the many use cases that have been initiated in the Upper Colorado River Basin, including quantifying consumptive use for that basin. The OpenET team partnered with different experts to guide this development, including Ag-Tech and rural communities, farmers, producers, of course, state and federal regulators.
Justin summarized the components of work where OpenET combined Landsat with algorithms and also meteorological data to calculate reference ET. In Google Earth Engine, OpenET spatially averaged over 40 million fields, then it stored all that information into a geodatabase. OpenET then provides both the raster and also field-level summaries via API's and a graphical user interface. The six models that OpenET supports coded up are very widely used models within the US and also internationally.

Justin talked about how the important component of this work is irrigation status mapping. OpenET aims at summing up ET volumes for irrigated lands only and eliminating the volumes for non-irrigated lands or rain-fed agriculture, which is an important classification component in the database for identifying what is actively irrigated versus what is not. Justin said OpenET is using two different models: IrrMapper (developed at the University of Montana by David Ketchum) which performs exceptionally well in the Western states, and LanID (developed at the University of Wisconsin). Data is available CONUS wide for LanID but not for IrrMapper.

Justin then presented a summary on the intercomparison and accuracy assessment of estimated OpenET data across the 6 supported ET models. They used over 150 Eddy Flex towers all across the country located in a variety of different settings. The study results will be published by the OpenET team soon. One of the key findings that Justin shared was that the ensemble outperforms any single individual model in terms of the statistics which reduces confusion and provides consistency across space and time. It is important that users understand how different these models are from one another and reduce the confusion on what model to pick and what

situation and what place. There are some outliers, and the team is still resolving some final issues.

Justin shared an example in the Upper Colorado River Basin where ET values that fall below the lower bound are excluded before the data is aggregated into fields. Thus, an outlier is not influencing the ensemble estimate. The ensemble helps show how these models rank and which ones are classified as outliers using very robust statistics like the median outlier.

OpenET data explorer supports drawing polygons or uploading shapes into the Application Programming Interface (API). The suite of different API endpoints from getting GeoTIFF sets raster to getting time series over field boundaries in an automated way. The API will be publicly released in the next six months.

NASA ROSES 2nd Stage Proposal
Justin mentioned the NASA ROSES proposal that DRI, WSWC, and Environmental Defense Fund (EDF) through Robyn Grimm are partnering on called "*Developing Operational Watersheds, Scale Summaries of ET and Irrigated Lands and Water Right Information to Improve Western State Sustainable Water Management*." The proposed project will enable water resource agencies to: (1) summarize ET estimates at larger watershed and administrative scales rather than the field scale (2); programmatically integrate OpenET data with their operations water budget models; (3) report estimated agricultural consumptive use with the USGS Water Availability and Use Science Program; (4), generate comparative permitted vs. actual water use at the watershed scale through the integration of OpenET and WaDE data services.

Justin mentioned that Tony, Adel, Robyn, and himself are requesting the WIDS partnership on this proposal with all participants through the Western States Water Council. Justin pointed to the plan to conduct extensive stakeholder engagement and outreach and do training activities on the use of OpenET as well as WaDE to identify what the limits and uncertainties are. This last step is needed to gain agency and stakeholder confidence and support for full operational use of satellite-based TT information.

Justin presented a schematic showing the existing components of the OpenET and WaDE programs and the proposed integration and new features and how they fit together with stakeholders' engagement.

Justin demonstrated the use of OpenET Data Explorer in the Grande Valley, a tributary to the Colorado River where a particular farmer did some voluntary demand management in 2017. During which you can see the reduction in monthly ET in 2017. Viewers were able to clearly see the reduction in consumptive use due to demand management and then be able to look at the cumulative as well. Justin then shared how the download capabilities to CSV tables.

Interest from the Western States
Justin pointed to legislative efforts in many states to support and use OpenET as part of their water management.

Congress
Legislation it recently introduced by congressman Susie Lee in Southern Nevada as well as senator Cortez Masto in Nevada, for an authorization bill, called the Open Access Evapotranspiration Data Program, which is $14 million a year over four years.

Nevada
Justin shared a quote by Adam Sullivan, Nevada State Engineer highlighting the benefits to water users throughout Nevada.

Wyoming
Justin shared a quote by Greg Lanning, Wyoming's State Engineer supporting the OpenET efforts and their importance to reporting water use and consumption.

Oregon
Mark Owens, Oregon State Representative, is a grower who farms out in the Harney Basin, and just his recognition of how valuable this ET information is, for growers, and he was instrumental in getting a bill passed at the state of Oregon recently.

DISCUSSION

A couple of participants asked if WSWC and OpenET need a letter of support for the proposal. Justin responded that the teams would reach out about the letters.

Jennifer Schellpeper (Nebraska) asked if the team could share the first stage proposal. Adel shared the proposal's PDF in the Zoom chat.

Tony mentioned that he will be presenting next week in Lewiston, Idaho about WaDE and the partnership with the OpenET project to a group of state legislatures dedicated to looking at river governance in the Columbia Basin. The group is part of the Council of State Governments West (CSG West). CSG West is a non-profit, non-partisan organization that serves the western legislatures of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, the Pacific islands of American Samoa, the Commonwealth of Northern Mariana Islands, and Guam.

Tony suggested sharing the prototype WaDE dashboard on the screen. Adel showed the different filters in the dashboard supporting water rights queries. He mentioned that the WaDE team will be developing the full dashboard once they receive the grants in the next few months.

WRAP UP

Adel asked participants to indicate their availability for the Fall WIDS call in October. He also asked interested WIDS members to join the WaDE and OpenET workgroup. Adel, Tony, and Justin thanked all participants for taking the time to join the call and the meeting was adjourned.

Action Items

#	Description	Assignee
1	Send a poll for a third WIDS Committee Meeting in October.	Adel
2	Join the WaDE and OpenET workgroup	All WIDS members
3	Send invitations for focus groups to refine WaDE use cases and how WaDE can help the states.	Adel
4	Send any comments, questions, or concerns to Adel via email.	All WIDS members