Written Testimony of the
WESTERN STATES WATER COUNCIL

Submitted to the
Senate Appropriations Committee
Subcommittee on Commerce, Justice, Science, and Related Agencies

Regarding FY2021 NASA and NOAA Appropriations
May 8, 2020

The Western States Water Council (WSWC) appreciates the opportunity to submit comments related to appropriations for the National Aeronautics and Space Administration (NASA) and the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). The Western States Water Council is a policy advisory body representing eighteen States. Members are appointed by their respective governors. The Council has been actively involved in supporting water and weather observing systems, including water-related NASA missions and NOAA programs.

The Council strongly supports efforts to improve seasonal to subseasonal (S2S) forecasting, as authorized by the Weather Research and Forecasting Innovation Act of 2017, as well as the National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018. The Council's Executive Director co-chairs the NIDIS Executive Council.

The Council also strongly supports NASA's Earth Science Mission Directorate observation missions, including the Sustainable Land Imaging program, Landsat 9, Landsat Next and NASA-ISRO Synthetic Aperture Radar (NISAR) – and has worked with NASA for decades to apply science to improve water management and policy.

These and other programs are fundamental for the application of science to improve operational forecasting and response capabilities, as well as enable federal and non-federal policy, project and program planning, designed, construction and implementation.

Sound water policy and decision-making requires accurate data on precipitation, temperature, evapotranspiration, snowpack and snow water content, groundwater, land use and land cover, topography, water use, and weather and climate at operational time scales. This data is collected by a complex network of federal and non-federal partners, and is used by federal, state, tribal, and local government agencies to: (1) forecast flood and drought occurrence; (2) project future water supplies for agricultural, municipal, and industrial uses; (3) estimate streamflows for hydropower production, recreation, and environmental purposes; (4) facilitate water management and administration of water rights, decrees, interstate compacts, and international water treaties; (5) assist in disaster response; and (6) assess climate impacts.

NASA Programs and Data

The President's FY 2021 $25.2B budget request for NASA includes $1.768B for Earth Science, including the upcoming launches of Landsat-9, Sentinel-6 Michael Freilich Radar, NISAR, the

Surface Water and Ocean Topography Mission (SWOT), and for other related programs, data systems, analysis, and missions. However, this is a $203M decrease from the 2020 budget.

The Council strongly supports funding for NASA's Sustainable Land Imaging Program, with existing thermal imaging capabilities, including the expedited launch of Landsat 9 and advancing Landsat Next for exploring the potential for medium and longer-term advances in technology and systems design. The Council also support NISAR, the NASA-ISRO SAR Mission, with its interferometric synthetic aperture radar (InSAR), and other water-related NASA missions.

NASA is a pioneer in the application of basic science to address national and regional water resources challenges. Several NASA programs have produced valuable data for present and future management of scarce water resources. For example, thermal infrared (TIR) imaging data available from Landsat 7 and 8 are used to measure and monitor consumptive agricultural and other outdoor water uses and needs. InSAR has been used to measure land subsidence, sometimes due to groundwater extraction.

The NASA Earth Science Research and Applied Sciences program is exploring promising remote sensing and airborne approaches for estimating snowpack on regional and watershed spatial scales – offering revolutionary opportunities for water resources planning, management and decision-making – with sustained engagement with water users to effectively transition from research to operations (R2O).

NASA's Earth Missions, Earth Science Research, and Applied Sciences, as well as long-term data continuity from key sensors, are critical for present and future water management based on sound science, as highlighted in the 2017 Earth Sciences National Academy of Sciences Decadal Survey and the Landsat/SLI Program.

NOAA Programs and Data

The $4.6B budget request for NOAA includes goals to reduce the impacts of extreme weather and water events to save lives and protect property by implementing the 2017 Weather Research and Forecasting Innovation Act (Public Law 115-25) and the 2018 NIDIS Reauthorization Act (Public Law 115-423). However, this represents a $727M decrease from 2019, and raises questions related to the impact of proposed reorganization plans on accomplishing these goals, as well as Congressional priorities for improving S2S forecasting. The President's budget request would eliminate the NWS's Climate Prediction Center, the NOAA program charged with making operational S2S outlooks.

The Council supports a sustained effort towards improving seasonal precipitation forecasting to support water management in the West under the U.S. Weather Research Program, to be carried out in coordination with the National Weather Service (NWS) Climate Prediction Center, Earth System Prediction and Innovation Center, and Environmental Modeling Center. This effort could be modeled after NOAA's Hurricane Forecasting Improvement Project, with a similar commitment of funding and a focus on measurable objectives for operational forecast improvement for seasonal mountain snowpack, as well as total seasonal precipitation.

Western states experience variability in precipitation and temperatures that can drastically affect water supplies. This variation has serious consequences for mountain snowpack accumulation, timing of snowmelt runoff, changes in plant and crop evapotranspiration, and planning and management of water supply, including reservoir storage operations, for various water users.

NOAA houses critical research, data collection, and forecasting programs through the Office of Oceanic and Atmospheric Research (OAR), the National Weather Service (NWS), and the National Environmental Satellite, Data and Information Service (NESDIS) that help states to make informed water supply decisions, as well as respond to droughts and floods in a timely and effective manner. These should be funded at a level sufficient to enable NOAA to address gaps in information and forecasting.

A crucial gap in our forecasting ability is at the "seasonal to subseasonal" (S2S) scale, the forecast range from two weeks to 12 months. Better forecasts at this range would allow for improved water management, planning, and operational decision-making on the ground. Under Title II of the Weather Research and Forecasting Innovation Act of 2017 (P.L. 115-25), Congress directed NOAA to report on the steps needed to develop and improve S2S predictive capabilities. We ask that the committee prioritize funding for NOAA to carry out a pilot project on improving seasonal precipitation forecasting in the West as directed in P.L. 115-25. NOAA's Hydrometeorological Testbed program on West Coast atmospheric rivers demonstrates the potential to improve extreme event forecasting at operational time scales for water and reservoir managers. Much of the West's precipitation originates as storms move over the Pacific Ocean and Gulf of Mexico, and the availability of key ocean observations constrains our ability to improve related forecasting. Expanding this federal, state, and regional partnership would advance new precipitation observation technologies and further advance forecasting capabilities.

The National Integrated Drought Information System (NIDIS) has proved to be another critical program supporting water management in western states. Amendments to P.L. 115-25 in the NIDIS Reauthorization Act of 2018 added precipitation, soil moisture, and evaporative demand as key indicators of drought and drought impacts. The Act directed NIDIS to develop a strategy for a national coordinated soil moisture monitoring network and to undertake research activities relating to the prediction of drought. Further, as amended, the law requires OAR to advance weather modeling and prediction skill and improve the transition from research to operations. The tools that have emerged from NIDIS, such as the Drought Early Warning System, have helped state decisionmakers better monitor, forecast, prepare for, and mitigate the impacts of drought. The Council strongly supports NIDIS and encourages funding sufficient to ensure ongoing operations and implementation of the recent amendments.

Finally, the Council encourages continued and adequate funding for important weather station networks, satellites, and buoy systems that support accurate and timely water-related predictions. These networks and systems collect data that is also used to ground-truth, calibrate, and validate remote satellite-derived observations and support models that are critical to water-related forecasting. Interrelated programs within OAR, NWS, and NESDIS are necessary to ensure accurate forecasting. For example, NESDIS Satellite and Product Operations supplies 93% of the information that NWS uses in their numerical weather prediction models.

Weather station networks are operated by federal and state agencies, local interests, volunteer private observers, and universities that span the West, and many have been in existence for decades. Such long-term observation networks are key to monitoring and understanding base line information and extreme events, but face funding and programmatic challenges that threaten the continuity of crucial data records. Many of the Nation's weather observing networks suffer due to aging instrumentation, deferred maintenance, the need for technology upgrades, and flat or declining budgets.

Conclusion

The Council urges the Subcommittee to prioritize adequate funding for the above programs carried out by NASA and NOAA. Too often, the lack of capital investments in water data programs has led to the discontinuance, disrepair, or obsolescence of vital equipment needed to maintain existing water and weather observing systems and related data gathering and modeling activities. There is a serious need for consistent federal funding to maintain, restore, modernize, and upgrade federal water, weather and climate observation programs, not only to avoid the loss or further erosion of critical information and data and ensure the continuity of data, but also to address new emerging needs, with a primary focus on coordinated data collection and dissemination.

Sound decision-making for western water management relies on sound science investments. Well-informed decisions depend on our ability to observe, understand, model, predict and adapt to climate and weather events, which threaten public health and safety, billions of dollars of economic investments, and our environment. Our present level of investment is not yet commensurate with the potential benefits, which far exceed the costs.

Thank you for considering our continued support for these important programs.