On September 1, key NOAA officials briefed WSWC representatives on Western Water and Hydroclimatological Activities, including plans to accelerate improvements in subseasonal-to-seasonal (S2S) precipitation forecasting. The Council has urged NOAA to implement a western pilot project for improving S2S precipitation forecasting, contained in its 2020 report to Congress pursuant to the Weather Research Act. Improvements will require investments across NOAA research, operations and services at time scales ranging from 3-4 weeks to months and years (S2S). Activities to improve predictive capabilities at shorter times scales will also improve outcomes at longer time scales.

More useful winter S2S precipitation forecasts for water management in the Western U.S. requires better model resolution (horizontal and vertical) to resolve the influence of mountainous terrain on the intensity and rates of rain vs. snow, including higher fidelity in modeling the atmospheric boundary layer in mountainous regions. It also requires better prediction of blocked vs. unblocked flow patterns and periods over the eastern North Pacific Ocean.

Improvements in spring and summer S2S precipitation forecasts for agriculture for the Central U.S. requires better observations and model accuracy for the land surface and hydrologic cycle, especially soil moisture and the processes leading to flash drought, as well as greater fidelity in the modeling of warm season precipitation processes; and a better understanding and prediction of large-scale upper-level dynamical flow anomalies that occur in this region at this time of year.

NOAA's focus is on continued investment in the Precipitation Prediction Grand Challenge (PPGC) in order to accelerate research to operations (R2O) and leading to a transformational advance in the skill of atmospheric forecasts used in hydrologic models to predict streamflow across all time scales, including multi-decadal forecasts of water resources availability in the Western U.S. NOAA recognizes that the changing hydroclimate of the western U.S. poses a real and increasing threat to the Nation's economic and national security. "There is a societal imperative for improved precipitation prediction across time scales to inform critical and growing climate change challenges related to public safety, adaptation, and resilience." NOAA observed, "Unfortunately, precipitation forecast skill has not improved substantially over decades and remains one of the major technical challenges in atmospheric sciences. Poor prediction skill for flood and drought has an inordinate impact on disadvantaged communities."

The PPGC Strategy, published by NOAA's Weather, Water and Climate Board, is intended to focus on research as the foundation with users as the driver towards: (1) improving products and applications; (2) sustaining, enhancing and exploiting observations; (3) improving process-level understanding and modeling; (4) advancing understanding of precipitation predictability; (5) improving prediction systems for precipitation; and (6) enhancing and sustaining user engagement.

PPGC activities that are already underway involve: (1) product improvements, decision support services, and social science research to identify and address needs of vulnerable populations: (2) improvements to the Office of Atmospheric Research's (OAR) Earth System Model (SPEAR) and Unified Forecast System (UFS) especially for precipitation, flooding and drought; (3) data assimilation and model evaluation; (4) precipitation dataset development; (5) ocean data evaluation and analysis; (6) process studies including field campaigns and global modeling experiments; and (7) international coordination on the Global Precipitation Experiment (GPEX).

The PPGC is designed translate improved model forecasts into actionable information for critical decisions through: (1) improved Day 8, 9, 10 probabilistic daily precipitation forecasts and Week 3 and 4 forecasts; (2) improved understanding of atmospheric forcings leading to more accurate hydrologic forecasts across time scales; (3) improved Drought Early Warning information; (4) enhanced skill for prediction of atmospheric rivers; and (5) new tools based on reforecasts - such as the Extreme Forecast Index, and artificial intelligence (AI)-powered applications.

The inflation Reduction ACT (IRA) includes $2.6 billion in Section 40001, Investing in Coastal Communities and Climate Resilience, for “to enable coastal communities to prepare for extreme storms and other changing climate conditions, and for projects that support natural resources that sustain coastal and marine resource dependent communities.”

Section 40004, Oceanic and Atmospheric Research and Forecasting for Weather and Climate, provides $150M “to accelerate advances and improvements in research, observation systems, modeling, forecasting, assessments, and dissemination of information to the public as it pertains to ocean and atmospheric processes related to weather, coasts, oceans, and climate, and to carry out section 102(a) of the Weather Research and Forecasting Innovation Act of 2017.” Another $50M is “for competitive grants to fund climate research as it relates to weather, ocean, coastal, and atmospheric processes and conditions, and impacts to marine species and coastal habitat.”

Further, language in the Fiscal Year (FY)2022 Omnibus Appropriations Bill directed NOAA, in collaboration with the Interagency Integrated Water Cycle Group (IWCG) of the U.S. Global Change Resources Program (USGCRP), including the National Atmospheric and Space Administration (NASA), the Department of the Interior, the U.S. Army Corps of Engineers, the Council on Environmental Quality, and other federal agencies, to conduct a study of hydroclimatological changes in the major river basins of the Western United States over the next 30 years.

Within 24 months, NOAA is directed to submit a report on the results of the study, which shall include, to the extent possible, methodological evaluation and probabilistic modeling of future changes in the volumes of water naturally available and natural water cycle in the different regions of the West; taking into consideration the impacts of rising temperatures, changes to snowpack, hydrologic extremes, changes in the timing and quantity of runoff, and other factors, as deemed appropriate. The report shall also include a discussion of associated impacts on ecosystems, aquatic biology, and food production.

NOAA and federal collaborators are also directed to develop a plan to establish a long-term research and monitoring program to improve the understanding of the hydroclimatological changes in the major river basins of the Western United States, to be updated every five years, which also identifies sources of uncertainty in the hydroclimatological outlook for the Western United States and enumerates initiatives that associated federal agencies might undertake to improve future studies.

To support this work on western water across timescales, as well as to advance the work on Sub-seasonal to Seasonal (S2S) weather prediction, the FY2022 Omnibus appropriations act provided an increase of $2B above the FY2021 enacted level to Climate Competitive Research.