DECEMBER 2022

WestFAST News

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NASA Launches International Mission to Survey Earth's Water

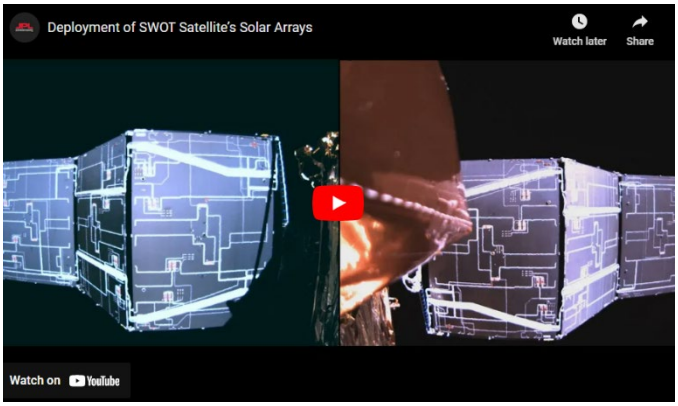
NASA 12/16/2022

Credits: NASA/Keegan Barber.
A SpaceX Falcon 9 rocket launches with the Surface Water and Ocean Topography (SWOT) spacecraft onboard, Friday, Dec. 16, 2022, from Space Launch Complex 4E at Vandenberg Space Force Base in California. Jointly developed by NASA and Centre National D'Etudes Spatiales (CNES), with contributions from the Canadian Space Agency (CSA) and United Kingdom Space Agency, SWOT is the first satellite mission that will observe nearly all water on Earth's surface, measuring the height of water in the planet's lakes, rivers, reservoirs, and the ocean.

A satellite built for NASA and the French space agency Centre National d'Études Spatiales (CNES) to observe nearly all the water on our planet's surface lifted off on its way to low-Earth orbit at 3:46 a.m. PST on Friday. The Surface Water and Ocean Topography (SWOT) spacecraft also has contributions from the Canadian Space Agency (CSA) and the UK Space Agency.

The SWOT spacecraft launched atop a SpaceX rocket from Space Launch Complex 4E at Vandenberg Space Force Base in California with a prime mission of three years. The satellite will measure the height of water in freshwater bodies and the ocean on more than 90% of Earth's surface. This information will provide insights into how the ocean influences climate change; how a warming world affects lakes, rivers, and reservoirs; and how communities can better prepare for disasters, such as floods.

After SWOT separated from the second stage of a SpaceX Falcon 9 rocket, ground controllers successfully acquired the satellite's signal. Initial telemetry reports showed the spacecraft in good health. SWOT will now undergo a series of checks and calibrations before it starts collecting science data in about six months.



Credits: NASA/JPL-Caltech.
This video shows the deployment of the solar arrays that power the SWOT satellite. The arrays, which measure 48.8 feet (14.9 meters) from end to end, deployed over the course of about 10 minutes after the spacecraft's Dec. 16 launch.

"Warming seas, extreme weather, more severe wildfires – these are only some of the consequences humanity is facing due to climate change," said NASA Administrator Bill Nelson. "The climate crisis requires an all-hands-on-deck approach, and SWOT is the realization of a long-standing international partnership that will ultimately better equip communities so that they can face these challenges."

SWOT will cover the entire Earth's surface between 78 degrees south and 78 degrees north latitude at least once every 21 days, sending back about one terabyte of unprocessed data per day. The scientific heart of the spacecraft is an innovative instrument called the Ka-band radar interferometer (KaRIn), which marks a major technological advance. KaRIn bounces radar pulses off the water's surface and receives the return signal using two antennas on either side of the spacecraft. This arrangement – one signal, two antennas – will enable engineers to precisely determine the height of the water's surface across two swaths at a time, each of them 30 miles (50 kilometers) wide.

"We're eager to see SWOT in action," said Karen St. Germain, NASA Earth Science Division director. "This satellite embodies how we are improving life on Earth through science and technological innovations. The data that innovation will provide is essential to better understanding how Earth's air, water, and ecosystems interact – and how people can thrive on our changing planet."

Among the many benefits the SWOT mission will provide is a significantly clearer picture of Earth's freshwater bodies. It will provide data on more than 95% of the world's lakes larger than 15 acres (62,500 square meters) and rivers wider than 330 feet (100 meters) across. Currently, freshwater researchers have reliable measurements for only a few thousand lakes around the world. SWOT will push that number into the millions.

Along the coast, SWOT will provide information on sea level, filling in observational gaps in areas that don't have tide gauges or other instruments that measure sea surface height. Over time, that data can help researchers better track sea level rise, which will directly impact communities and coastal ecosystems.

Such an ambitious mission is possible because of NASA's long-standing commitment to working with agencies around the world to study Earth and its climate. NASA and CNES have built upon a decades-long relationship that started in the 1980s to monitor Earth's oceans. This collaboration pioneered the use of a space-based instrument called an altimeter to study sea level with the launch of the TOPEX/Poseidon satellite in 1992.

"This mission marks the continuity of 30 years of collaboration between NASA and CNES in altimetry," said Caroline Laurent, CNES Orbital Systems and Applications director. "It shows how international collaboration can be achieved through a breakthrough mission that will help us better understand climate change and its effects around the world."

SWOT measurements will also help researchers, policymakers, and resource managers better assess and plan for things, including floods and droughts. By providing information on where the water is – where it's coming from and where it's going – researchers can improve flood projections for rivers and monitor drought effects on lakes and reservoirs.

"SWOT will provide vital information, given the urgent challenges posed by climate change and sea level rise," said Laurie Leshin, NASA's Jet Propulsion Laboratory (JPL) director. JPL developed the KaRIn instrument and manages the U.S. portion of the mission. "That SWOT will fill gaps in our knowledge and inform future action is the direct result of commitment, innovation, and collaboration going back many years. We're excited to get SWOT science underway."

More Mission Information

JPL, which is managed for NASA by Caltech in Pasadena, California, leads the U.S. component of the project. For the flight system payload, NASA is providing the KaRIn instrument, a GPS science receiver, a laser retroreflector, a two-beam microwave radiometer, and NASA instrument operations. CNES is providing the Doppler Orbitography and Radioposition Integrated by Satellite (DORIS) system, the dual frequency Poseidon altimeter (developed by Thales Alenia Space), the KaRIn radio-frequency subsystem (together with Thales Alenia Space and with support from the UK Space Agency), the satellite

platform, and ground control segment. CSA is providing the KaRIn high-power transmitter assembly. NASA is providing the launch vehicle and the agency's Launch Services Program, based at Kennedy Space Center, is managing the associated launch services.

To learn more about SWOT, visit: https://www.nasa.gov/swot

EPA and Army Finalize Rule Establishing Definition of WOTUS and Restoring Fundamental Water Protections

EPA 12/30/2022

Today, the U.S. Environmental Protection Agency (EPA) and the U.S. Department of the Army (the agencies) announced a final rule establishing a durable definition of "waters of the United States" (WOTUS) to reduce uncertainty from changing regulatory definitions, protect people's health, and support economic opportunity. The final rule restores essential water protections that were in place prior to 2015 under the Clean Water Act for traditional navigable waters, the territorial seas, interstate waters, as well as upstream water resources that significantly affect those waters. As a result, this action will strengthen fundamental protections for waters that are sources of drinking water while supporting agriculture, local economies, and downstream communities.

"When Congress passed the Clean Water Act 50 years ago, it recognized that protecting our waters is essential to ensuring healthy communities and a thriving economy," said EPA Administrator Michael S. Regan. "Following extensive stakeholder engagement, and building on what we've learned from previous rules, EPA is working to deliver a durable definition of WOTUS that safeguards our nation's waters, strengthens economic opportunity, and protects people's health while providing greater certainty for farmers, ranchers, and landowners."

"This final rule recognizes the essential role of the nation's water resources in communities across the nation," said Assistant Secretary of the Army for Civil Works Michael L. Connor**.** "The rule's clear and supportable definition of waters of the United States will allow for more efficient and effective implementation and provide the clarity long desired by farmers, industry, environmental organizations, and other stakeholders."

This rule establishes a durable definition of "waters of the United States" that is grounded in the authority provided by Congress in the Clean Water Act, the best available science, and extensive implementation experience stewarding the nation's waters. The rule returns to a reasonable and familiar framework founded on the pre-2015 definition with updates to reflect existing Supreme Court decisions, the latest science, and the agencies' technical expertise. It establishes limits that appropriately draw the boundary of waters subject to federal protection.

The final rule restores fundamental protections so that the nation will be closer to achieving Congress' goal in the Clean Water Act that American waters be fishable and swimmable, and above all, protective of public health. It will also ensure that the nation's waters support recreation, wildlife, and agricultural activity, which is fundamental to the American economy. The final rule will cover those waters that Congress fundamentally sought to protect in the Clean Water Act—traditional navigable waters, the territorial seas, interstate waters, as well as upstream water resources that significantly affect those waters.

More information, including a pre-publication version of the *Federal Register* notice and fact sheets, is available at EPA's "Waters of the United States" website.

Accompanying the issuance of the final rule, the agencies are also releasing several resources to support clear and effective implementation in communities across America. Today, a summary of 10 regional roundtables was released that synthesizes key actions the agencies will take to enhance and improve implementation of "waters of the United States." These actions were recommendations provided during the 10 regional roundtables where the agencies heard directly from communities on what is working well from an implementation perspective and where there are

opportunities for improvement. The roundtables focused on the geographic similarities and differences across regions and provided site specific feedback about the way the scope of "waters of the United States" has been implemented by the agencies.

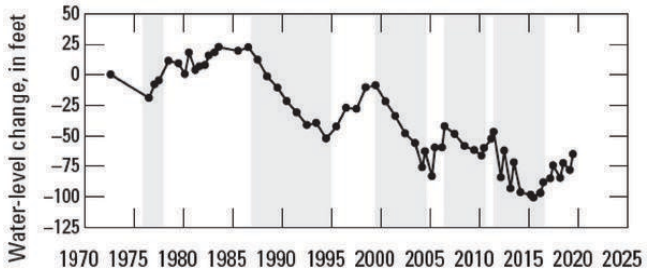
Today, the agencies are also taking action to improve federal coordination in the ongoing implementation of "waters of the United States." First, EPA and Army are issuing a joint coordination memo to ensure the accuracy and consistency of jurisdictional determinations under this final rule. Second, the agencies are issuing a memo with U.S. Department of Agriculture to provide clarity on the agencies' programs under the Clean Water Act and Food Security Act.

Background
On June 9, 2021, EPA and the Department of the Army announced their intent to revise the definition of "waters of the United States" to better protect our nation's vital water resources that support public health, environmental protection, agricultural activity, and economic growth. On Nov. 18, 2021, the agencies announced the signing of a proposed rule revising the definition of "waters of the United States."

The Clean Water Act prohibits the discharge of pollutants from a point source into "navigable waters" unless otherwise authorized under the Act. "Navigable waters" are defined in the Act as "the waters of the United States, including the territorial seas." Thus, "waters of the United States" is a threshold term establishing the geographic scope of federal jurisdiction under the Clean Water Act. The term "waters of the United States" is not defined by the Act but has been defined by the agencies in regulations since the 1970s and jointly implemented in the agencies' respective programmatic activities.

Water "bank account" Running Low in Agricultural Areas of Nevada

USGS 12/29/2022



Sources/Usage: Public Domain.
Line-graph plot showing the magnitude of water-level decline in a well in Smith Valley, 1970-2020.

In a new report published today, U.S. Geological Survey scientists determined that groundwater in the Smith and Mason Valleys, a key agricultural region in Nevada, is being used up by humans at rates faster than it can be replenished.

The report documents water-level changes between 1970 and 2020, estimating groundwater storage-volume declines of 287,600 acre-feet in Smith Valley and 269,000 acre-feet in Mason Valley. The study also demonstrates that even during wet years, the Walker River is not able to adequately recharge the groundwater supply.

"Looking at groundwater, streamflow, and climate data from over half a century, it is clear that we are running into a water deficit," said Gwendolyn Davies, USGS hydrologist and lead author of the report. "Groundwater is like a bank account, and when you take more out than you are putting in, at some point the account runs dry."


Sources/Usage: Public Domain.
Visit Media to see details. Low stream flows at USGS Wabuska stream gage (10301500) on the Walker River in Nevada, near the end of the 2011-2016 drought. Link to streamgage data.

In the report, valley-wide water-level change was calculated by comparing water-table maps for the

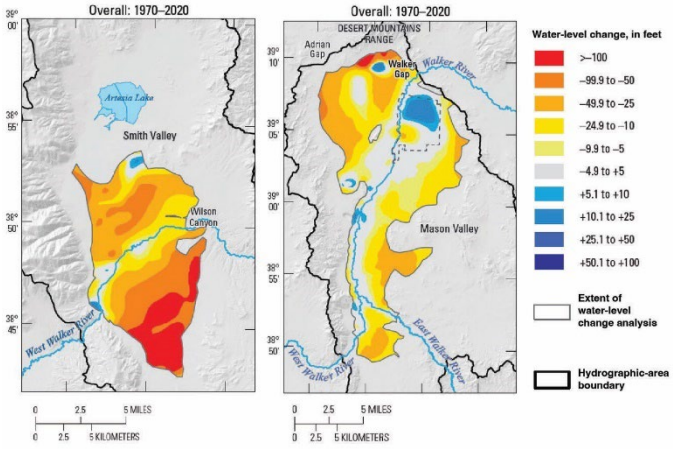
periods 1970-1995, 1996-2006, and 2007-2020; as well as the overall change from 1970-2020. Trends in water-level change corresponded with patterns in groundwater pumping and stream efficiency.

The introduction of supplemental groundwater pumpage in the 1950's was initially intended to offset surface water deficits only during dry years, but pumpage continues even in years when average or above average stream flows meet surface water demands. Reliance on supplemental groundwater pumpage has resulted in widespread groundwater storage decline and decreased stream efficiency. With each successive drought cycle, the ability of Walker River to sustain stream flows and convey water downstream has diminished.

"This report will provide essential information to communicate recent status and trends in water resources in Smith Valley and Mason Valley, and to help the local water users move forward on developing a long-term plan for sustainable water use." said Adam Sullivan, the State Engineer with the Nevada Division of Water Resources.

Above average wet periods have a marginal and short-lived effect on rebounding the groundwater levels outside of the river corridor.

The Walker River originates in the Sierra Nevada Mountains and flows nearly 160 miles to its terminus at Walker Lake in west-central Nevada. The river provides a source of irrigation water for tens of thousands of acres of agricultural lands in California and Nevada and is the principal source of inflow to Walker Lake.



Sources/Usage: Public Domain.
The extent of water-level declines in Smith and Mason Valleys, Nevada, 1970-2020. Large water-level declines are signified by warmer colors.

Upcoming Meetings and Webinars

WestFAST Webinars:

The Western States Water Data Access and Analysis Data Tool: Demo and Testing
January 11, 2023, 10:00 am – 11:00 am MT

Other Federal News

DOD 12/9/2022. Defense Department Launches Innovation Pathways Website

DOI 12/14/2022. Deputy Secretary Beaudreau Announces $228 Million for Wildfire Mitigation and Resilience from Bipartisan Infrastructure Law

EPA 12/1/2022. EPA finds Denver Water's Lead Reduction Program effective

EPA 12/12/2022. EPA Announces $25.7 Million in Grants to Support Water Systems in Rural and Small Communities

EPA 12/19/2022. EPA Announces $263 Million WIFIA Loan to Boise, Idaho to Modernize Wastewater Infrastructure and help recharge the Boise River water supply

EPA 12/20/2022. EPA proposes Clean Water Act settlement on the Blackfeet Indian Reservation in Montana

FWS 12/14/2022. North American Wetlands Conservation Grant Program Announces BIG Changes!

NOAA 12/6/2022. NOAA, NFWF announce record $136 million for coastal resilience

NOAA 12/14/2022. NOAA announces historic funding for fish habitats across U.S.

USDA 12/12/2022. Biden-Harris Administration Announces an Additional $325 Million in Pilot Projects through Partnerships for Climate-Smart Commodities, for Total Investment of $3.1 Billion

USDA 12/16/2022. USDA Invests $102 Million to Create Economic Opportunities, Expand Access to

Water Infrastructure and Rehabilitate Homes for Underserved Rural People Across the U.S.

USGS 12/14/2022. Naturally Occurring Constituents are More Prevalent at Elevated Concentrations in U.S. Groundwater Compared to Human-Caused Constituents

USGS 12/29/2022. Historic Changes in Water Quality or Lake Surface Elevation and Their Impact on Endangered Adult Suckers in the Klamath Basin

Reclamation 12/8/2022. During Visit to Klamath River, Secretary Haaland Announces Four Tribal Water Projects

Reclamation 12/22/2022. Reclamation announces $4.6 million in funding for Basin Studies

Reclamation 12/22/2022. Biden-Harris Administration Invests More Than $84 million in 36 Drought Resiliency Projects

The Western States Federal Agency Support Team (WestFAST) is a collaboration between 13 Federal agencies with water management responsibilities in the West. WestFAST was established to support the Western States Water Council (WSWC), and the Western Governors Association in coordinating Federal efforts regarding water resources.