SENATE COMMITTEE ON NATURAL RESOURCES AND WATER
Senator Dave Min, Chair
2023 - 2024 Regular

Bill No:	AB 277	**Hearing Date:**	June 22, 2023
Author:	Rodriguez		
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Urgency:	No	**Fiscal:**	Yes
Consultant:	Genevieve Wong		

Subject: Extreme Weather Forecast and Threat Intelligence Integration Center

BACKGROUND AND EXISTING LAW

Background

California began 2023 with as many as nine major storm events in around three weeks. These storms brought 8–15 inches of rain in the valleys, 20–30 inches of rain in the foothills, and 10–15 feet of snow in the Sierra. While this precipitation did provide much-needed drought relief, it was accompanied by intense floods and winds reaching up to 90 mph that caused over $1 billion in damage and the tragic loss of at least 22 lives. The phenomenon responsible for exacerbating the impact of these storms: atmospheric rivers. Atmospheric rivers are long "corridors" in the atmosphere that transport concentrated water vapor through the air from the tropics to California; these events can be either hazardous or beneficial depending on their intensity. When atmospheric river-fed storms approach land and encounter high elevation mountain ranges, such as the Sierra Nevada, moist air rises, vapor condenses, clouds form, and copious amounts of precipitation fall. Some of these atmospheric rivers can contain water vapor amounts that are 7.5–15 times the average flow of the Mississippi River.

Based on forecasts of the high winds, excessive rainfall, and the potential for flooding, local operational areas (counties) began proclaiming local emergencies prior to the damaging New Year's Eve 2022 storm. On January 4, 2023 the Governor requested and secured an Emergency Declaration for direct Federal Assistance from the Federal Emergency Management Agency. As the series of atmospheric rivers continued to cause floods, extend power outages, and displace thousands of residents, a majority of California's counties proclaimed local emergencies and ultimately the Governor requested an Expedited Major Disaster Declaration on January 12, 2023. President Biden approved the Major Disaster Declaration on January 14, 2023.

A History of Floods. California has experienced destructive flood events throughout its history. Before January 2023, the last major and widespread flooding event was 1997 (the New Year's Day floods, when 120,000 people were evacuated and 23,000 homes and businesses flooded). More recently, more local flood disasters include the Oroville Spillway in 2017 and the Russian River floods in 2019. Even before this year's floods, every county in California has been declared a federal disaster area at least once for a flooding event over the last 30 years.

Estimates suggest more than 7.3 million people and structures valued at nearly $600 billion statewide are located in areas that have at least a 1-in-500 probability of flooding

in any given year. In the Central Valley, 1.3 million people, $17 billion in agricultural economic activity, and $223 billion in homes, businesses, and structures are in flood risk areas. Factoring in future development, climate change, and potential losses to key infrastructure, those figures could climb much higher. Current projections indicate that peak flood flows will increase up to five times by 2072 in the Central Valley compared to past records. Despite their damaging potential, in some cases floods can have positive effects including replenishing groundwater basins, creating habitat for fish and wildlife, and improving water quality by flushing out contaminants.

A Future of Extreme Weather. In 2010, the United States Geological Survey (USGS) led a multidisciplinary team of leading earth scientists, engineers, and social scientists to create the ARkStorm Scenario: a detailed and realistic depiction of how a severe winter storm could affect the state. The ARkStrom Scenario shows that atmospheric rivers represent a nearly existential threat to California's people, economy, and culture. A new ARkStorm scenario (ARkStorm 2.0) has recently been analyzed to reflect climate change data and advances in modeling to investigate the impact of a 30-day storm in a future climate (2071-2080), called ARkFuture. This new modeling shows that climate change will increase the severity of storms.

Current DWR extreme weather and flooding programs and services. Year-round, the State-Federal Flood Operations Center (FOC) is responsible for coordinating local, state, and federal flood operations. The FOC is housed within the Department of Water Resources' (DWR's) Division of Flood Management and is the facility from which DWR centrally coordinates emergency response state-wide. The FOC, when activated during a major weather event, operates 24 hours a day to monitor changing conditions, coordinate flood response efforts with local and federal partners, and inform the public. The FOC coordinates with the National Weather Service, among other organizations, to forecast the location, quantity, and timing of expected precipitation and issue river forecasts, high water notifications, flood alerts, and support flood mobilization as appropriate. Responses to this work may include changes in reservoir operations, additional interagency communication, levee patrol, and emergency support. DWR coordinates closely with the California Office of Emergency Services (Cal OES) when emergency operation centers are activated during a flood or other emergency follow the Standardized Emergency Management System protocol.

The California Atmospheric River Program was created by California Senate Bill SB 758 (Block) in 2015. The Atmospheric River Program is housed in DWR in coordination with the Center for Western Weather Extremes (see below) and aims to develop the science of atmospheric rivers to support planning, forecasts and warning elements of flood management and water management in California.

The Flood Emergency Response Information Exchange provides participating agencies an online system to access and exchange current flood information in real-time through Web GIS interface. It integrates geo-referenced databases, a real-time data collection and exchange system, and a decision support system supporting other DWR programs, various hydrologic and hydraulic computer models and tools, and applicable flood-related documents.

The California Data Exchange Center installs, maintains, and operates an extensive hydrologic data collection network including automatic snow reporting gages for the Cooperative Snow Surveys Program and precipitation and river stage sensors for flood forecasting.

Center for Western Weather and Water Extremes, Scripps Institution of Oceanography. Among other initiatives, the Center for Western Weather Extremes coordinates an Atmospheric River Reconnaissance program with U.S. Army Corps of Engineers, DWR, U.S. Air Force 53rd Weather Reconnaissance Squadron, and the National Oceanic and Atmospheric Administration. The goal of this program is to support water management decisions and flood forecasting by developing and testing the potential of targeted airborne and buoy observations over the Northeast Pacific to improve forecasts of the landfall and impacts of atmospheric rivers on the U.S. West Coast at lead times of 1–5 days. Innovations in targeting methods, data assimilation, and regional forecast skill requirements are pursued through collaborative, cross-disciplinary, science-based strategies.

Challenge and impact of forecasting extreme weather. Although western U.S. forecasting of floods and the precipitation that causes them has improved over time, major gaps remain. The current science of weather forecasts can generally only support a 0–4-day lead time for decisions that would support water management and hazard mitigation. Many of these challenges result from errors in the prediction of atmospheric river landfall position, intensity, orientation, duration, and temperature.[1]

Flooding disasters caused by extreme storms disproportionally impact vulnerable communities. According to a report by the Legislative Analyst's Office, "much of the new housing construction in the state has occurred in areas that are at significant risk of the effects of climate change…[which means] in many cases, impacts will be felt most acutely by low-income households who disproportionately live in areas of the state that will be exposed to higher risks and [live in the] types of housing that are typically less resilient."[2] Sufficient disaster preparedness may be too costly for people of low socioeconomic status, and there are barriers for vulnerable communities to have agile communication with government agencies.[3]

PROPOSED LAW

This bill codifies the State-Federal Flood Operations Center in DWR and tasks it with submitting a report regarding forecasting to the Legislature. Specifically, this bill:

1) Codifies the FOC in DWR to function as the focal point for gathering, analyzing, and disseminating flood and water-related information to stakeholders.

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[1] Ralph, M. F. "West Coast Forecast Challenges and Development of Atmospheric River Reconnaissance," Bulletin of the American Meteorological Society, (101) 2020. https://journals.ametsoc.org/view/journals/bams/101/8/bamsD190183.xml

[2] Petek, G. LAO, Climate Change Impact Across California, (2022) https://lao.ca.gov/Publications/Report/4584#Major_Climate_Change_Impacts_on_Housing

[3] Substance Abuse and Mental Health Services Administration. "Disaster Technical Assistance Center supplemental Research Bulletin, Greater Impact: How Disasters Affect People of Low Socioeconomic Status" 2017

2) Authorizes FOC to do all of the following:
   a) Function during emergency situations to enable DWR to centrally coordinate statewide emergency responses.
   b) Coordinate with the National Weather Service to provide river forecasts based on expected precipitation and reservoir operations.
   c) Declare flood alerts and support those activities in coordination with relevant cooperating agencies and academic partners, including the Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program.
   d) Provide timely updates on activities relevant to cooperating agencies.

3) Requires FOC and Cal OES, in consultation with cooperating agencies, to develop and submit a report to the Legislature that outlines necessary technological advancements for agile forecasting and identifies all of the following:
   a) Regions that are and were underserved.
   b) Gaps in data that would improve flood response.
   c) Strategies for improving communication and emergency response to identified regions.

4) Defines “cooperating agencies,” as federal, state, and local agencies that engage in water and emergency management.

ARGUMENTS IN SUPPORT
According to the author, “[t]he recent series of atmospheric rivers brought unanticipated devastation across California and has led to multiple fatalities. In response to the storms, over 40 counties proclaimed a local emergency. Subsequently, the Governor declared a state of emergency and ultimately requested a major disaster declaration from the President to provide federal assistance to communities and individuals who suffered damages. Clearly, California would benefit from more accurate forecasts to determine the extent to which extreme weather events, such as atmospheric rivers and extended periods of extreme heat would result in significant damages or disruptions to lifeline infrastructure systems.

Earlier this year, the Committee on Emergency Management, the Committee on Water, Parks and Wildlife, and the Committee on Utilities and Energy Committee, convened a joint oversight hearing to evaluate California's preparedness for extreme atmospheric river incidents. The hearing was an opportunity to hear from the leading climate scientists and researchers on what type of incidents our emergency managers should be prepared for and how the State could improve local forecast models to more accurately predict local impacts and the need to quickly warn residents of any danger from flooding or extended power outages. The ultimate goal of this bill is identifying ways to improve California's forecasting capabilities and provide state and local emergency management with the information they need to prepare for these extreme atmospheric river incidents.”

ARGUMENTS IN OPPOSITION
None received

COMMENTS

Double referral. This bill is double referred with the Senate Governmental Organization Committee, with this committee being the committee of first referral. Elements of this bill under the jurisdiction of the Senate Governmental Organization Committee are included here for context and completeness only and will be discussed before that committee.

Planning for the future. This bill is about planning for the future. It refers to the *Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program*, which is the subject of another bill, AB 30 (Ward). AB 30 proposes to rename the *Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program* as the *Atmospheric Rivers Research and Forecast Improvement Program: Enabling Climate Adaptation Through Forecast-Informed Reservoir Operations and Hazard Resiliency (AR/FIRO).* While it is unknown if AB 30 will pass the Legislature and get signed by the Governor, the committee may wish to amend the bill to also refer to the successor agency of the Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program to account for any future potential name changes, whether made by AB 30 or another legislative proposal. (See Amendment 1).

Related legislation
AB 30 (Ward, 2023) of the current legislative session, renames and reconfigures the *Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program* as the *Atmospheric Rivers Research and Forecast Improvement Program: Enabling Climate Adaptation Through Forecast-Informed Reservoir Operations and Hazard Resiliency (AR/FIRO) Program*. AB 30 is pending before this committee.

SUGGESTED AMENDMENTS

AMENDMENT 1
Amend Water Code § 347.5(b)(3) as follows:

(3) Declare flood alerts and support those activities in coordination with relevant cooperating agencies and academic partners, including the Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program***, or its successor***.

SUPPORT
None Received

OPPOSITION
None Received

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