Date of Hearing: March 14, 2023

ASSEMBLY COMMITTEE ON WATER, PARKS, AND WILDLIFE
Rebecca Bauer-Kahan, Chair
AB 30 (Ward) – As Introduced December 5, 2022

SUBJECT: Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program

SUMMARY: Reconfigures the existing Atmospheric Rivers: Research, Mitigation, and Climate Forecasting Program (Atmospheric Rivers Program) within the Department of Water Resources (DWR). Specifically, **this bill**:

1) Makes legislative findings and declarations regarding the significance of atmospheric rivers (AR) to California's water supply.

2) Renames the Atmospheric Rivers Program the "Atmospheric Rivers Research and Forecast Improvement Program: Enabling Climate Adaptation Through Forecast-Informed Reservoir Operations and Hazard Resiliency (AR/FIRO) Program" (Revised Program).

3) Requires DWR to develop and implement new methods to better predict the impact of ARs on water supply, flooding, post-wildfire debris flows, and the environment.

4) Requires DWR to take all actions within its existing authority to implement forecast-informed reservoir operations (FIRO).

5) Provides that the goals of implementing FIRO shall be to increase water supply, hydropower availability, and water supply reliability.

EXISTING LAW: Establishes the Atmospheric Rivers Program within DWR and requires DWR, upon appropriation of special funds, to research climate forecasting and the impacts climate change has on ARs. Further, requires DWR to take all actions within its authority to re-operate reservoirs to capture water generated by ARs (Water Code § 347).

FISCAL EFFECT: Unknown. This bill is keyed fiscal.

COMMENTS:

1) **Purpose of this bill**. Over the past 15 years, a growing body of research has identified the benefits and risks of ARs and led to increased skill in forecasting these events. This enhanced predictive capability improves public safety and water management while enabling the deployment of innovative approaches such as FIRO. Funding from the existing Atmospheric Rivers Program has supported much of this research and innovation; the author asserts that it is necessary to update the existing program in order to "align investments in AR forecast development, support FIRO implementation, and enhance California's ability to leverage federal agency support and funding."

2) **Background**. ARs are long narrow bands of atmospheric water vapor pushed along by strong winds. They transport large amounts of water vapor from the tropics to higher latitudes and strike coastlines globally from California to Europe to Antarctica. They can transport moisture equivalent to more than 25 times the amount of liquid water flowing through the mouth of the Mississippi River.

ARs and their intense precipitation can be both beneficial and hazardous, presenting a special challenge to California's water managers and flood control planners. According to the Scripps Institution of Oceanography (Scripps) at the University of California, San Diego and the National Oceanic and Atmospheric Administration (NOAA), a small number of ARs supply on average between 40 to 50 percent of California's precipitation and snowpack annually. A single AR event can provide up to 30 percent of annual precipitation in southern California. Problems occur when AR events last for more than a day or several occur back-to-back such as occurred in January 2023; several ARs in sequence can cause hazards like flooding, mudslides, and ash flows in areas of recent wildfires. NOAA and Scripps research has shown ARs are implicated in most of the extreme precipitation and flooding events in California. Nearly 80 percent of levee breaches in the Central Valley have been associated with AR events.

A recent study by researchers at the Center for Western Weather and Water Extremes (CW3E) housed at Scripps examined the February 2017 AR event that contributed to the Oroville crisis and found that "California's reliance on precipitation from (ARs) is expected to increase as our climate warms." Similarly, research published in August 2022 ("ARkFuture") shows how climate change is leading to more extreme AR events. ARkFuture models a 30-day "megastorm" event in which "ARs are the primary storm mode" causing extremely high precipitation and associated runoff that is two to four times higher than historical averages.[1] Such an event would result in a "megaflood." Better modeling and forecasting could help to mitigate the risks associated with such an event.

FIRO. FIRO is a reservoir operations strategy that, in effect, allows reservoirs to be managed in "real-time" so that operators can keep water in the reservoir if the weather forecast shows no imminent precipitation in a reservoir's watershed or, alternatively, release water from the reservoir to free up space for additional flow (thereby maintaining flood protection) when the forecast indicates an AR is headed towards a reservoir's watershed. Sonoma Water Agency has piloted and implemented FIRO at Lake Mendocino since 2019 and has been able to increase water stored in that reservoir by nearly 20 percent while maintaining flood protection. This additional water was immensely helpful in 2021 when the Russian River basin experienced extreme drought conditions.

DWR Atmospheric Rivers Program. The Legislature has made previous appropriations to support this research, including $3 million in the 2016-17 Budget, $9.25 million in the 2019-20 Budget, $10 million in the 2021-22 Budget, and $16.75 million in the 2022-23 Budget. Previously appropriated funding has allowed DWR to leverage resources and participation from federal and local agencies to deepen the understanding of ARs and implement FIRO at Lake Mendocino. DWR and water agencies are also seeking to implement FIRO in the Feather-Yuba River basin and the Santa Ana River basin.

3) **Arguments in support**. A number of water agencies support this bill arguing that the existing Atmospheric Rivers Program is due for an update given that FIRO was still a concept when the program was enacted by SB 758 (Block) in 2015. Since then, FIRO has

---

[1] Xingying Huang and Daniel Swain, "Climate change is increasing the risk of a California megaflood," Science Advances, 8 (2022): eabq0995, https://www.science.org/doi/10.1126/sciadv.abq0995.

been put into practice and provided real water supply benefits at Lake Mendocino. These water agencies assert that this bill will strengthen California's drought resilience by explicitly incorporating FIRO into the Atmospheric Rivers Program while helping to leverage additional federal funding. Finally, these agencies maintain that "with improved precipitation and snow-level forecasting, full implementation of FIRO could allow the conservation of an additional 500,000 acre-feet of water in some years."

4) **Related legislation**. AB 2078 (Flora), 2021-22 Session, was substantially similar to this bill. AB 2078 died in Assembly Appropriations Committee.

SB 129 (Skinner), Chapter 69, Statutes of 2021, appropriates $10 million to DWR for the Atmospheric Rivers Program and $10 million to DWR to pilot FIRO at three reservoirs, among other provisions.

AB 74 (Ting), Chapter 23, Statutes of 2019, appropriated $9.25 million to DWR for the Atmospheric Rivers Program, among other provisions.

AB 557 (Wood), 2019-20 Session, would have made minor revisions to the Atmospheric Rivers Program and appropriated $9.25 million to DWR to implement it. AB 557 died in the Assembly Appropriations Committee.

SB 758 (Block), Chapter 682, Statutes of 2015, established the Atmospheric Rivers Program at DWR to research the causes and effects of atmospheric rivers in order to increase California's water supply and water reliability and improve flood control.

AB 1623 (Committee on Budget), Chapter 318, Statutes of 2016, appropriated $3 million to DWR for research on atmospheric rivers, among other provisions.

REGISTERED SUPPORT / OPPOSITION:

Support

Sonoma Water (sponsor)
Association of California Water Agencies
California Chamber of Commerce
California Farm Bureau Federation
California Municipal Utilities Association
California Special Districts Association
Contra Costa County
Irvine Ranch Water District
Mojave Water Agency
Northern California Water Association
Orange County Water District
San Bernardino Valley Water District
San Diego County Water Authority
Santa Clara Valley Water District
Santa Rosa, City of
Turlock Irrigation District

Upper San Gabriel Valley Municipal Water District
Yuba Water Agency

Opposition

None on file

Analysis Prepared by: Pablo Garza / W., P., & W. / (916) 319-2096