

COMMITTEES ON GOVERNMENTAL ORGANIZATION AND WATER, PARKS, AND WILDLIFE

GRAY AND E. GARCIA, CHAIRS

JOINT INFORMATIONAL HEARING

Thursday, May 9, 2019

Upon Adjournment of Session – State Capitol, Room 4202

California's Inland Flood Control System and Emergency Preparedness

Background: *Flooding in California.* California has experienced destructive flood events throughout its history. Though the last water year with major, widespread flooding was 1997 (the New Year's Day floods, when 120,000 people were evacuated and 23,000 homes and businesses flooded), there have been several recent local flood disasters such as the Oroville Spillway in 2017 and the Russian River floods this winter. Since 1992, every county in California has been declared a federal disaster area at least once for a flooding event. 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 alone, nearly one-in-three residents and crops worth nearly \$6 billion are in flood risk areas. Factoring in future development and climate change plus potential losses to key infrastructure, those figures could climb much higher. 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.

Flood Management Infrastructure and Responsibilities. Local, federal, and state agencies have developed a variety of physical structures to regulate flood flows including levees, channels, and weirs to convey and control floodwaters as well as dams, reservoirs, and bypasses to collect or store water. Physical structures are sometimes paired with nonstructural approaches – like limiting development in floodplains – for flood management. Flood infrastructure across California includes more than 20,000 miles of levees and channels and more than 1,500 dams and reservoirs. Most of these facilities are owned and managed by local governments, reflecting the history of how the facilities were developed and aligning primary responsibility for the projects with their beneficiaries. A recent report estimated that flood management responsibilities are spread across over 1,300 local agencies across the state.

Over 1,600 miles of levees, four dams, five major weirs, and seven bypasses are overseen by the state and are considered part of the State Plan of Flood Control system (SPFC), a system of flood protection infrastructure along the Sacramento and San Joaquin Rivers and their main tributaries. The Central Valley Flood Protection Board (CVFPB) oversees SPFC facilities and levees (often called project levees) on behalf of the state. For most segments of SPFC levees, the state has developed formal agreements with local governments to handle regular operations and maintenance responsibilities. The Department of Water Resources maintains approximately 300 miles of SPFC levee segments not covered by such agreements.

With the exception of around 20 dams and reservoirs operated by the U.S. Army Corps of Engineers (USACE) or the Bureau of Reclamation, the federal government generally does not directly operate or maintain flood control facilities in California. The USACE does inspect federally constructed levees for compliance with federal standards, while the Federal Emergency

Management Agency (FEMA) operates the National Flood Insurance Program, which includes mapping flood risk and establishing floodplain management standards.

State Actions on Flood Control. In 2003, a state appellate court found the state responsible for the February 1986 Linda Levee failure on the Yuba River just upstream of Marysville. Although the levee was constructed by local entities and improved twice by the USACE, *Paterno v. State of California* held that the state undertook liability when it assumed control of the levee in 1953 from the USACE. As a result of the *Paterno* case, California paid \$464 million in damages to the nearly 3,000 plaintiffs and the standard of care applicable to the State for the protection and maintenance of the levee and flood system was greatly increased.

Hurricane Katrina striking New Orleans in 2005, and serious flooding in Northern California in 2006, served as reminders of the continuing vulnerability of the State's flood control system. As a response to these disasters and the *Paterno* ruling, the Legislature took a series of actions in 2006-2007 which included approving two general obligation bonds and a package of six flood protection bills. The flood legislation package that was signed by former Governor Schwarzenegger in 2007 included state and local planning requirements, higher flood protection standards, local development requirements, and updated flood risk mapping goals.

As part of the legislation, the CVFPB was required to adopt an integrated flood management plan, the Central Valley Flood Protection Plan (Flood Plan), for the Sacramento-San Joaquin River Flood Management System by July 2012. On June 29, 2012, the CVFPB unanimously adopted the Flood Plan, which the CVFPB states, "provides conceptual guidance to reduce the risk of flooding for about one million people and \$70 billion in infrastructure, homes, and businesses with a goal of providing 200-year (a 1-in-200 chance of flooding in any year) protection to urban areas, and reducing flood risks to small communities and rural agricultural lands." The CVFPB's adoption of the Flood Plan triggered the requirement that cities and counties incorporate data and analysis from the Flood Plan into their general plans by 2014 and update their zoning ordinances by 2015 to prohibit development on property within a flood hazard zone unless the required levels of flood protection are met.

The first 5-year update to the Flood Plan was released in 2017 and included recommendations on investments and policies to support comprehensive flood risk management actions locally, regionally, and system wide. The report noted that since 2012 improvements had been implemented to about 220 miles of urban SPFC levees (out of 300 miles) and about 100 miles of non-urban SPFC levees (out of 1,300 miles) but also estimated that investments totaling \$17 to \$21 billion are needed over the next 30 years to maintain adequate flood management.

Flood Control Funding. A 2017 Legislative Analyst's Office report, *Managing Floods in California*, notes that estimating flood management funding needs is difficult for multiple reasons but points to two studies that estimate local, state, and federal spending ranges between \$2.2 and \$2.8 billion annually, with nearly two-thirds the funding coming from local sources.

Since 2006, the Legislature and voters have authorized over \$5.5 billion for flood management activities. These bonds included Proposition 1E, the *Disaster Preparedness and Flood Prevention Bond Act of 2006*, and Proposition 84, the *Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Bond Act of 2006*. Proposition 1E allocated \$3.8 billion for various flood management activities and Proposition 84 provided an additional \$800 million for flood control projects and planning. More recently voters approved Proposition 1, the *Water Quality, Supply, and Infrastructure Improvement Act of 2014*, which allotted \$395 million for flood protection, and Proposition 68, the *California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018*, which included \$550 million for flood protection and repair.

Emergency Preparedness and Response. The California Governor’s Office of Emergency Services (Cal OES) is responsible for addressing natural, technological, or manmade disasters and emergencies, and preparing the State to prevent, respond to, quickly recover from, and mitigate the effects of both intentional and natural disasters. As part of their overall preparedness mission, Cal OES is required to develop a State Emergency Plan (SEP), State Hazard Mitigation Plan (SHMP), and maintains Standardized Emergency Management System (SEMS) and the Emergency Management Mutual Aid System (EMMA). Cal OES, in coordination with FEMA and local partners, has developed four Catastrophic Plans to augment the State Emergency Plan.

State Emergency Plan: The SEP describes how response to natural or human-caused emergencies occurs in California. The plan is a requirement of the California Emergency Services Act, and describes methods for conducting emergency operations, the process for rendering mutual aid, emergency services of government agencies, how resources are mobilized, how the public is informed, and how continuity of government is maintained during emergency. The SEP further describes hazard mitigation, as well as preparedness and recovery from disasters.

State Hazard Mitigation Plan: The 2018 SHMP is the state’s primary hazard mitigation guidance document and builds upon the state’s commitment to reduce or eliminate potential risks and impacts of natural and human-caused disasters to help communities with their mitigation and disaster resiliency efforts. The 2018 plan includes: an updated statewide risk assessment, disaster history, and statistics; recent mitigation progress, success stories, and best practices; updated state hazard mitigation goals, objectives, and strategies; and updated climate mitigation progress and adaptation strategies. Flooding is considered one of the three primary hazards in California, along with earthquake and wildfire.

California’s Standardized Emergency Management System (SEMS): In order to respond to frequent and multiple disasters occurring anytime and anywhere in the state, it is important that emergency response agencies operate within a clear and consistent organizational structure. SEMS is the cornerstone of California’s emergency response system and the fundamental structure for the response phase of emergency management. The system unifies all elements of California’s emergency management community into a single integrated system and standardizes key elements. Elemental to SEMS are:

- 1) Incident Command System (ICS) – A field-level emergency response system based on management by objectives;
- 2) Multi-/Inter-agency coordination – Affected agencies working together to coordinate allocations of resources and emergency response activities;
- 3) Mutual aid – A system for obtaining additional emergency resources from non-affected jurisdictions; and
- 4) Operational Area Concept – County and its sub-divisions to coordinate damage information, resource requests and emergency response.

Emergency Management Mutual Aid (EMMA) System: The purpose of EMMA system is to provide emergency management personnel and technical specialists to support the disaster operations of affected jurisdictions during an emergency. One of the primary objectives is to provide emergency management personnel and technical specialists from unaffected areas to support local jurisdictions, Operational Areas, and regional emergency operations during emergencies.

United State Geological Survey’s ARkStorm Scenario. In 2010, the 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 ARkStorm Scenario shows that atmospheric rivers represent a nearly existential threat to California's people, economy, and culture. It is well established that climate change is raising the ocean temperatures that power atmospheric rivers, making an event like the ARkStorm more realistic, the threat more grave, and the likely losses greater. California has recently experienced the same levels of precipitation postulated by the scenario. The main difference between the recent storms and ARkStorm was one of duration – the number of days over which the rainfall occurred – not the total amount of precipitation.

The ARkStorm storm is patterned after the 1861-62 historical events but uses modern modeling methods and data from large storms in 1969 and 1986. The ARkStorm draws heat and moisture from the tropical Pacific, forming a series of atmospheric rivers that approach the ferocity of hurricanes and then slam into the U.S. West Coast over several weeks. Atmospheric rivers are relatively narrow regions in the atmosphere that are responsible for most of the horizontal transport of water vapor outside of the tropics.

In contrast to U.S. East and Gulf Coast hurricanes, only recently have scientific and technological advances documented the ferocity and strength of possible future West Coast storms. ARkStorm is intended to elevate the visibility of the very real threats to human life, property, and ecosystems posed by extreme storms on the U.S. West Coast. This enhanced visibility will help increase the preparedness of the emergency management community and the public to such storms.

The plausibility of ARkStorm was demonstrated during winter-spring 2017, when a drought-busting and record-breaking series of 68 atmospheric-river storms reached the West Coast to produce as much precipitation as simulated in the 23-day ARkStorm scenario. Because the 2017 precipitation fell over 80 days instead of 23 days, the Central Valley was not flooded 200 miles long and 12 to 20 miles wide as expected under the ARkStorm. However, the cascading consequences associated with the atmospheric rivers, floods, wildfire fuel production, and fire and debris-flows, aligned closely with the ARkStorm scenario.

Northern California Catastrophic Flood Response Plan (NCFRP). The NCFRP is the latest and fourth catastrophic plan for California and provides a framework outlining how local, state, and federal governments will respond and coordinate in anticipation of and following a catastrophic flood event, with emphasis on impacts to the Sacramento-San Joaquin Delta. This framework has structured objectives that enable a phased response approach to meet the needs of the affected communities. The plan focuses on establishing response organizations with the readiness to act in support of affected communities.

This plan was developed in accordance with the Sacramento-San Joaquin Delta Emergency Preparedness Act of 2008. That act required Cal OES to develop an emergency preparedness and response strategy for the Delta Region to include the development of a catastrophic flood plan. Cal OES developed this plan in coordination with the Department of Water Resources, numerous state agencies, FEMA, and other federal agencies, and expanded the planning to the following ten counties: Butte, Colusa, Contra Costa, Glenn, Sacramento, San Joaquin, Solano, Sutter, Yolo and Yuba.

KEY STATE, FEDERAL AND LOCAL ENTITIES IN CALIFORNIA WITH FLOOD MANAGEMENT FUNCTIONS

California Central Valley Flood Control Association (CCVFCA) – The CCVFCA represents many local flood control partners. The CCVFCA was established in 1926 to promote the common interests of its membership in maintaining effective flood control systems in California's Central Valley for the protection of life, property and the environment. Membership in the CCVFCA is limited to public agencies such as reclamation, flood control, levee maintenance, drainage and other special districts, and local government agencies.

California Office of Emergency Services (Cal OES) – Cal OES is responsible for the coordination of overall state agency response to major disasters. The office is responsible for assuring the state's readiness to respond to and recover from all hazards – natural, manmade, and war-caused emergencies and disasters – and for assisting local governments in their emergency preparedness, response, recovery, and hazard mitigation efforts. In that role, Cal OES is a critical partner in preparing for flood and in coordinating state and local flood response efforts.

California Water Commission (CWC) – The CWC provides a public forum for discussing water issues, advises the Director of the Department of Water Resources on matters within the Department's jurisdiction, approves rules and regulations, and monitors and reports on the construction and operation of the State Water Project. The *Water Quality, Supply, and Infrastructure Improvement Act* (Proposition 1), approved by voters in 2014, gave the CWC responsibilities regarding the distribution of public funds for the public benefits of water storage projects. The CWC presents its views to the U.S. Congress appropriations committees on funding for flood control or reclamation projects being planned or constructed in California by the United States Army Corps of Engineers or the Bureau of Reclamation.

Central Valley Flood Protection Board (CVFPB) – The CVFPB is responsible for planning, managing and protecting the State Plan of Flood Control. These are the flood control features (levees, floodways, etc.) for which the State government has statutory responsibilities, also called project levees. Levees that are private or belong to local agencies are called non-project levees. The CVFPB helps plan new flood control features, maintains existing features, and enforces against incompatible projects and activities in the flood way or on (or in) flood control structures. This can include things such as pipes through levees or backyard swimming pools that encroach into State-held easements next to levees.

Delta Protection Commission (DPC) – The DPC promotes the protection of life and property through the maintenance and improvement of Delta levees, and by facilitating coordinated emergency preparedness and response. This includes long-term planning for ongoing, cumulative levee improvements to address new issues as they arise over time. As directed by SB 27 (Simitian, 2008), the DPC continues to work to facilitate an inter-agency unified command system and response strategy for the Delta region, as well as on implementation of an all-hazard emergency response exercise in the Delta.

Delta Stewardship Council (DSC) – The Sacramento-San Joaquin River Delta is an expansive inland river delta and estuary in Northern California. Much of the water supply for central and

southern California is derived from here via pumps located at the southern end of the Delta, which deliver water for irrigating about 3 million acres in the San Joaquin Valley and municipal water supply for about 25 million people in southern California. The Sacramento-San Joaquin Delta Reform Act of 2009 (SB X7-1, Simitian, 2009), among other actions, created the DSC and tasked it with coming up with a long-term plan for the Delta (the Delta Plan) that balances water supply and ecosystem restoration while respecting the Delta's intrinsic value as a place. The Act also required the DSC, in consultation with the CVFPB, to recommend priorities in the Delta Plan for state investments in both project and non-project Delta levees. In response, the DSC launched the Delta Levees Investment Strategy.

Department of Water Resources (DWR) – The DWR manages California's water resources, systems, and infrastructure. With regard to floods, the DWR plans for and improves the flood management system; maintains levees; provides emergency preparedness and response; and forecasts river levels based on weather conditions. The DWR administers bond dollars for both Integrated Regional Water Management Projects, some of which can have stormwater or flood components, as well as flood subventions funds.

Federal Emergency Management Agency (FEMA) – FEMA's primary purpose is to coordinate the response to a disaster that has occurred in the United States and that overwhelms the resources of local and state authorities. In addition, FEMA provides state and local governments with experts in specialized fields and funding for rebuilding efforts. FEMA provides funds for training of response personnel throughout the United States and its territories as part of the agency's preparedness effort.

United States Army Corps of Engineers (USACE) – The USACE is the State's federal partner for project levees. The USACE's roles include funding, building projects, fighting floods, and helping rebuild after floods. Under Public Law 84-99 Flood Control and Coastal Emergencies (PL 84-99), the Chief of the USACE, acting for the Secretary of the Army, is authorized to undertake activities including disaster preparedness, advance measures, emergency operations (flood response and post flood response), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storm, and provisions of emergency water due to drought or contaminated source. PL 84-99 also sets certain construction and maintenance requirements for flood control structures, with consequences for states and local agencies for failing to meet these standards.