

FINAL  
RECOMMENDATIONS  
REPORT



CALIFORNIA  
FLOODPLAIN  
MANAGEMENT  
TASK FORCE

December 2002



December 12, 2002

Thomas Hannigan, Director  
California Department of Water Resources  
1416 9th Street, 11th Floor  
Sacramento, California 95814

Dear Director Hannigan:

Attached is the final California Floodplain Management Task Force "California Floodplain Management Report." These consensus recommendations reflect the members' commitment to public safety and the State's agricultural, economic, and environmental resources. Implementing these recommendations will help California residents live and work in a safer, healthier, and more productive State.

Task Force members represented local and State jurisdictions, agriculture, building and real estate industries, environmental and emergency management organizations, and Native Americans. Our diverse interests included flood protection, ecosystem health, economic development, conservation of agricultural lands, housing, local land-use authority, public trust, and private property rights. Representatives of federal agencies provided insight and advice to the group.

The Task Force had available to it recommendations from 39 previous reports, including the Flood Emergency Action Team Report (FEAT Report), Sharing the Challenge – Floodplain Management into the 21st Century (the "Galloway Report"), government agency publications, books, published papers, Web sites, and specific recommendations from Task Force members. Over 30 Task Force small work group meetings and six public plenary sessions were held between April and December of 2002 to achieve consensus on the recommendations presented in the attached report.

Our recommendations are focused on floodplain management and are organized into three categories: Better Understanding of and Reducing Risks from Reasonably Foreseeable Flooding; Multi-Objective Management Approach for Floodplains; and Local Assistance, Funding, and Legislation. The Task Force also recognized that floodplain management measures interrelate, frequently overlap, and often rely on other floodwater management measures to reduce losses within the floodplain. This is especially pressing within the context of the growing understanding of climate change and the ramifications for location, amount, and temporal impact to California's snowpack and snowmelt. History shows that pursuing floodplain management or floodwater management without melding the two in a multi-objective context may be less effective and ultimately more costly with respect to achieving public safety and ecosystem health.

The Task Force took note of the Federal Emergency Management Agency's (FEMA) concerns about California's compliance status with FEMA's National Flood Insurance Program (NFIP), recognized that there may be risks to the State if FEMA finds the State out of compliance, and makes a number of recommendations to the State and its political subdivisions aimed at addressing NFIP standards.

We believe that proper funding sources will be essential to implementing the recommendations addressed in this report. The State should examine and use all available resources and consider what resources will be available in the future.

While the Task Force completed a remarkable amount of work in a short time, several issues remain for further discussion. We believe there is an ongoing role for our group, or a group similar to ours, to provide advice beyond what we have accomplished. We encourage the Department to explore new funding sources to continue efforts similar to those performed by this Task Force.

As a final note, we want to thank you for your leadership as chair and the excellent staff, consultant, and facilitator support you provided to this process. We hope to provide continuing support to the Department and look forward to your next steps as you consider our recommendations.

Sincerely,

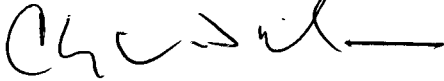
The California Floodplain Management Task Force

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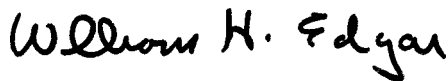
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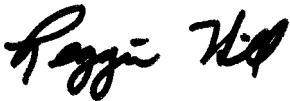
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**Hardesty, T. Michael** California Central Valley Flood  
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**Jacobs, Diana** Department of Fish and Game



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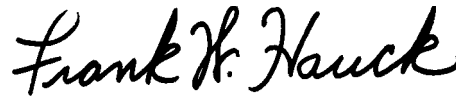
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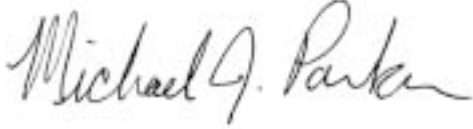
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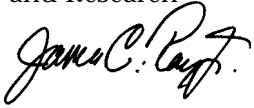
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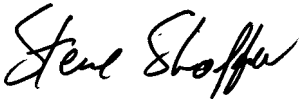
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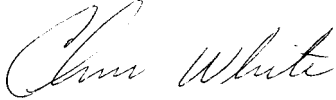
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**Shaffer, Steve** Department of Food and Agriculture



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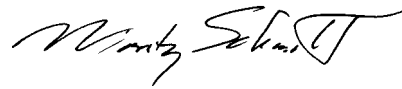
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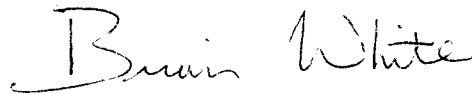
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**White, Brian** California Building Industry Association



# **CALIFORNIA FLOODPLAIN MANAGEMENT REPORT**

## **RECOMMENDATIONS OF THE CALIFORNIA FLOODPLAIN MANAGEMENT TASK FORCE**

**DECEMBER 12, 2002**





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## EXECUTIVE SUMMARY

In 2000, Governor Gray Davis signed Assembly Bill 1147, which recommended the creation of the California Floodplain Management Task Force (Task Force).

In February 2002, the Governor delegated authority to the Department of Water Resources (DWR) to convene a Floodplain Management Task Force. The Task Force focused on the intent of Assembly Bill (AB) 1147. In this bill “The Legislature finds and declares that the impacts of flooding can be reduced through better coordination of floodplain management decisions. It is the intent of the Legislature that the Governor establish a floodplain management task force with broad membership from the local, state, and federal government and stakeholders with an interest in flood control. If the task force is established, it is the intent of the Legislature that it examine specific issues related to state and local floodplain management, including, but not limited to, features that substantially reduce potential flood damages, and make recommendations for more effective statewide floodplain management policies.”

The newly formed Task Force sought to recommend floodplain management strategies designed to reduce flood losses and maximize the benefits of floodplains. The Task Force found that existing programs are inadequate to accomplish these goals and that time is of the essence. They moved forward with an understanding that failure to take action may result in loss of life, increased economic, agricultural, and property losses, continued environmental decline, and the need for ecosystem restoration.

The Task Force identified the need for the State of California to comply with the National Flood Insurance Program (NFIP). It also developed recommendations for improving floodplain

### FLOODPLAIN MANAGEMENT

*Floodplain management includes actions to the floodplain to reduce losses to human resources within the floodplain and/or protect benefits to natural resources associated with floodplains and flooding. Sample actions include:*

1. *Minimizing impacts of flows;*
2. *Maintaining or restoring natural floodplain processes;*
3. *Removing obstacles within the floodplain voluntarily or with just compensation;*
4. *Keeping obstacles out of the floodplain*
5. *Educating and planning for emergency preparedness; and*
6. *Ensuring that operations of floodwater management systems are not compromised by activities that interfere with, or are damaged by, design floods of these systems.*

management by adopting Best Management Practices (BMPs) and integrating multi-objective-management (M-O-M) approaches.

In developing its recommendations, the Task Force considered an array of previously identified options drawn from thirty nine reports on the subject, including the *Flood Emergency Action Team Report* (FEAT Report) (Resources Agency of California, 1997) and *Sharing the Challenge – Floodplain Management into the 21st Century* (“Galloway Report”) (Interagency Floodplain Management Review Committee, 1994), and from government agency publications, books, published papers, Web sites, and specific recommendations from stakeholders. Recommendations developed along three basic themes:

## REASONABLY FORESEEABLE FLOOD

*A reasonably foreseeable flood is a flood event that is realistically probable for a particular area. In many cases, this event could exceed a predicted “100-year” flood. It is important to note that the determination of a reasonably foreseeable flood can vary depending on its use and application for any given area. Sources of information on reasonably foreseeable floods may include historic floods, paleo-floods, hydrologic modeling using transposition, historical flood damage data, and hydrologic models. Communities such as Sacramento, West Sacramento, Yuba City, Marysville, Los Angeles, and Orange County are all working toward protection against floods that exceed the “100-year flood.” It is up to each community to consider all information on reasonably foreseeable floods in making land-use and flood management decisions.*

- **Better Understanding of and Reducing Risks from Reasonably Foreseeable Flooding** – Local, State and federal agencies should consider the risk to life and property from reasonably foreseeable floods when making their land use and floodplain management decisions. To accomplish this objective, decision makers need better information and improved tools. In addition, better tools are needed to comply with the federal National Flood Insurance Program.
- **Multi-Objective-Management Approach for Floodplains** – State, local, and federal agencies should implement multi-objective floodplain management on a watershed basis. Where feasible, projects should provide adequate protection for natural, recreational,

residential, business, economic, agricultural, and cultural resources and for water quality and supply.

- **Local Assistance, Funding, and Legislation** – DWR should identify and actively pursue funding opportunities, technical assistance to local governments and other organizations, and legislative proposals to implement Task Force recommendations and ensure successful floodplain management, recognizing that local governments have the primary responsibility and authority for land use decisions.

An additional but key element was to establish a common understanding of the issues, terms, and definitions associated with floodplain management. The language associated with floodplain management often varies among different professional disciplines and governmental bodies. Defining terms became a critical element of Task Force discussion. Table 1 of the introduction includes the working terms and definitions used by the group for this process.

The Task Force’s consensus recommendations are not in priority order and are summarized hereafter.

## BETTER UNDERSTANDING OF AND REDUCING RISKS FROM REASONABLY FORESEEABLE FLOODING

1. **Awareness Floodplain Mapping** – The State should expand its Awareness Floodplain Mapping Program for use by local governments and the public.
2. **Future Build-Out Mapping** – Local and State agencies preparing floodplain maps should consider current and future planned development.

3. **Watershed-Based Mapping** – Wherever practical, floodplain maps should be prepared on a watershed basis.
4. **Geographic Information System (GIS)-Based Flood Maps** – Local, State, and federal agencies should create, develop, produce, and disseminate compatible GIS-based flood maps.
5. **Alluvial Fan Floodplains** – Priority for alluvial fan floodplain mapping should be given to those alluvial fan floodplains being considered for development. The State should convene an alluvial fan task force to review information on alluvial fan floodplains, determine future research needs, and develop recommendations specific to alluvial fan floodplain management.
6. **Stream Gaging and Monitoring** – DWR and other agencies should sponsor projects in cooperation with the United States Geological Survey (USGS) to install real-time gages in priority locations throughout California.
7. **Repetitive Losses** – Local agencies should work with the Governor's Office of Emergency Services (OES) and DWR to identify repeatedly flooded structures and inform qualifying residents of voluntary programs to prevent future flood losses.
8. **Flood Warning and Local Community Flood Response Programs** – The State should increase assistance to local agencies to improve flood-warning programs specific to each watershed.
9. **Flood Insurance Rate Map Issues** – Decision-makers should gather information and data beyond Flood Insurance Rate Maps (FIRMs) to better assess reasonably foreseeable floods.
10. **Exceeding NFIP Floodplain Management Requirements** – Local communities should be encouraged to require new and substantially improved buildings to have their lowest floor elevations to be at least one foot above the NFIP's base flood elevation, factoring in the effect of full build out of the watershed. The effects of new or additional flood management measures should be reflected in an updated base flood elevation.
11. **Executive Order** – The Governor's 1977 Executive Order for Floodplain Management should be updated.
12. **State Multi-Hazard Mitigation Plan** – DWR, OES, and other agencies should incorporate into the State Multi-Hazard Mitigation Plan floodplain management measures that will meet Federal Emergency Management Agency (FEMA) requirements.
13. **Multi-Hazard Mapping** – OES should coordinate with other hazard mapping efforts to develop GIS-based multi-hazard advisory maps and distribute them to local governments and the public.
14. **State Building Codes** – Ensure that the California Building Standards Code meets, at minimum, NFIP requirements. Ensure that other State codes applicable to public buildings meet, at a minimum, NFIP requirements. Ensure that any local code adoptions or amendments and any development approvals meet, at a minimum, NFIP requirements.
15. **Multi-Objective-Management** – A M-O-M approach to flood management projects should be promoted.

**MULTI-OBJECTIVE-MANAGEMENT  
APPROACH FOR FLOODPLAINS**



**16. Flood Management Approaches to Ecosystem Restoration and Agricultural Conservation** – Flood management programs and projects, while providing for public safety, should maximize opportunities for agricultural conservation and ecosystem protection and restoration, where feasible.

**17. Nonstructural Approaches, Restoration, and Conservation of Agriculture and Natural Lands** – In planning new or upgraded floodwater management programs and projects, including structural projects, local and state agencies should encourage as part of the design, where appropriate, non-structural approaches and the conservation of beneficial uses and functions of the floodplain.

**18. Tools for Protection of Flood Compatible Land Uses** – The State should identify, develop, and support tools to protect flood-compatible land uses.

**19. Protection of Floodplain Groundwater Recharge Areas** – Permitting agencies should consider the impacts of land-use decisions on the capacity of the floodplain to recharge groundwater.

**20. Vector Control** – During the planning and development of ecosystem restoration projects, the costs and impacts involved with vector control and with monitoring related to mosquito-transmitted diseases should be considered.

**21. Multi-Jurisdictional Partnerships** – The State should encourage multi-jurisdictional partnerships when floodplain management projects are planned and implemented.

**22. Watershed Monitoring** – The State and others should financially support the moni-

toring of flood management projects on a watershed level.

**23. Proactive and Adaptive Management of Floodplains** – State and local agencies should manage floodplains proactively and adaptively by periodically adjusting to current physical and biological conditions, new scientific information, and knowledge.

**24. Best Management Practices** – DWR should work with stakeholders to identify, monitor, and update voluntary BMPs for multi-objective floodplain management.

**25. Training, Education, and Professional Certification for Multi-Objective Floodplain Management** – The State should encourage the inclusion of multi-objective floodplain management curricula in college and university degree programs.

**26. Coordination among Agencies and Groups** – The State should encourage and create incentives for additional coordination among stakeholders.

**27. State General Plan Guidelines** – The State General Plan Guidelines should be updated to reflect the California Floodplain Management Task Force recommendations, as applicable, and to reflect other programs, policies, and standards, including the NFIP, for floodplain management.

#### LOCAL ASSISTANCE, FUNDING, AND LEGISLATION

**28. New and Existing Funding Sources** – The State and local governments should encourage federal, State, local, nongovernmental, and other private cost sharing to achieve equitable and fair financing of multi-objective floodplain management actions and planning.



- 29. Task Force Recommendation Priorities** – DWR and The Reclamation Board should lead the development of a consensus process, involving appropriate stakeholders, to identify criteria and prioritize the implementation of Task Force recommendations, given the expected expenditures, using existing and new funding sources.
- 30. Department of Water Resources Outreach Programs** – DWR should expand outreach programs to include public service announcements to increase public awareness of floodplain values, flooding hazards, public safety, and hazard mitigation measures.
- 31. Designated Floodways** – DWR and The Reclamation Board should include, in the Community Assistance Workshops, information on the Reclamation Board's current authority to adopt and update designated floodways in the Central Valley. The Reclamation Board should work with stakeholders to identify, if any, a list of Reclamation Board regulations that are impediments to flood-compatible uses within the floodway and recommend specific revisions.
- 32. State Floodplain Management Assistance to Local Governments** – The State should provide additional resources to continue and expand implementation of the State's floodplain management programs, including full support of the Community Assistance Contact program.
- 33. National Flood Insurance Program Compliance Encouragement** – Public agencies not subject to local government floodplain management requirements or the Governor's Executive Order on Floodplain Management should comply with NFIP requirements.
- 34. Community Rating System** – DWR should educate local officials and the public about the elements and benefits of the Community Rating System (CRS) insurance-rate adjusting program.
- 35. State Community Rating System Program Coordinator** – DWR should designate a State level CRS Program Coordinator familiar with State agencies and local governments that use the CRS program.
- 36. Interagency Barriers** – The Reclamation Board should work with the Corps of Engineers, State agencies, local sponsors and interested parties to identify interagency barriers to efficient implementation of multi-objective flood management projects and to develop options to overcome those interagency barriers.
- 37. California Environmental Quality Act Local Analysis Improvement** – DWR should provide technical assistance to local agencies and practitioners with a practical, step-by-step CEQA flood hazard and impacts assessment guide. The CEQA Guidelines, Appendix G, should be modified to include the changes shown in Appendix D of this report.
- 38. Establishment of a California Floodplain Management Advisory Committee** – DWR should sponsor a floodplain management advisory committee composed of local and State government representatives, floodplain managers, and other stakeholders, to develop additional recommendations to improve floodplain management practices.
- The Task Force worked with and considered diverse and conflicting interests and developed many consensus recommendations. None of the

Task Force recommendations in the report preclude Task Force organizations or their members from raising issues that differ from items in the report.

Due to the time, nature, and format of the Task Force and the numerous issues related to floodplain management, it was not reasonably possible to form recommendations on all of the issues identified as important by the Task Force members. In some cases, issues were not discussed; others were discussed, but no consensus emerged; and more definitive resolution of some issues was deferred to subsequent analysis and discussion processes recommended by the Task Force.

Examples of these three types of remaining issues include: coastal floodplain management, some elements of alluvial fan floodplain management, elements of the effort to ensure that the State is judged to be in full compliance with the NFIP, floodwater management, floodwater storage, floodplain management programs in protected floodplains still subject to flooding, certification of the competence of floodwater management systems for floodplain management purposes, life-cycle costing, disclosure and map availability, actions to conserve agriculture and rural floodplains, urbanization of floodplains, benefits and risks to floodplains from structural flood control, and methods needed to address adverse impacts to adjacent property.

These topics are important and worthy of discussion by future State task forces, appropriate State and local agencies, and the Legislature.

# CHAPTER I

## INTRODUCTION



## INTRODUCTION

Floodplain management involves proactive measures to obtain maximum benefits and minimize losses associated with flooding.

Flooding is an important ecological function of every river, alluvial fan, and coastal area in California. Flooding has seasonally inundated California for thousands of years, generating unique ecosystems. Floodplain ecosystems provide essential habitat for multiple species of plants and wildlife (some dependent on the recurrence of periodic flooding), and there are economic, ecological, agricultural, and societal benefits to maintaining connections between rivers, bays, and coasts and their floodplains.

At the same time, floods also cause loss of life, property, and economic activity. In January 1997, California experienced one of the most geographically extensive and costly floods in the State's history. Of the State's 58 counties, 48 were declared disaster areas. Nine people were killed, 120,000 people were evacuated from their homes, and 300 square miles were flooded. Damages approached \$2 billion, and floods impacted over 23,000 homes as well as numerous businesses, agricultural lands, bridges, roads, and floodwater management infrastructures. Estimated indirect costs and costs associated with the disruption of the State's economy exceeded \$5 billion.

While it was the most costly, the 1997 flood was not the most deadly. Previous floods caused 74 deaths in 1955, 35 deaths in 1964 (11 from a tsunami), 13 deaths in 1986, and 28 deaths in 1995. Since 1950, all 58 California counties have been declared flood disaster areas at least three times. The 1995 and 1997 floods prompted the initiation of a Governor's Flood Emergency Action Team (FEAT) and a recommendation for the development of a statewide task force composed of broadly represented key stakeholders.

## FLOODPLAIN

*Any land area susceptible to inundation by floodwaters from any source.*

In 2000, Governor Gray Davis signed Assembly Bill (AB) 1147, which recommended the creation of the California Floodplain Management Task Force (Task Force).

In February 2002, the Governor delegated authority to the Department of Water Resources (DWR) to convene a Floodplain Management Task Force. The Task Force focused on the intent of AB 1147. The bill states, "The Legislature finds and declares that the impacts of flooding can be reduced through better coordination of floodplain management decisions. It is the intent of the Legislature that the Governor establish a floodplain management task force with broad membership from the local, state, and federal government and stakeholders with an interest in flood control. If the task force is established, it is the intent of the Legislature that it examine specific issues related to state and local floodplain management, including, but not limited to, features that substantially reduce potential flood damages, and make recommendations for more effective statewide floodplain management policies."

The newly formed Task Force sought to recommend floodplain management strategies designed to reduce flood losses and maximize the benefits of floodplains. The Task Force found that existing programs are inadequate to accomplish these goals, and that time is of the essence. They moved forward with an understanding that failure to take action may result in loss of life, increased economic, agricultural, and property losses, continued environmental decline, and the need for ecosystem restoration.

## FLOODPLAIN MANAGEMENT

*Floodplain management includes actions to the floodplain to reduce losses to human resources within the floodplain and/or protect benefits to natural resources associated with floodplains and flooding.*

*Sample actions include:*

- 1. Minimizing impacts of flows;*
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- 5. Educating and planning for emergency preparedness; and*
- 6. Ensuring that operations of floodwater management systems are not compromised by activities that interfere with, or are damaged by, design floods of these systems.*

Between April and December of 2002, the Task Force held over 30 small group meetings and 6 public plenary sessions to achieve consensus on the recommendations presented in this report.

In developing their recommendations, the Task Force considered an array of previously identified options drawn from 39 reports on the subject, including the *Flood Emergency Action Team Report* (FEAT Report) (Resources Agency of California, 1997) and *Sharing the Challenge – Floodplain Management into the 21st Century* (“Galloway Report”) (Interagency Floodplain Management Review Committee, 1994), and from government agency publications, books, published papers, Web sites, and specific recommendations from stakeholders. Recommendations were developed along three basic themes:

- **Better Understanding of and Reducing Risks from Reasonably Foreseeable Flooding** – Local, State and federal agencies should consider the risk to life and property from reasonably foreseeable floods when making their land-use and floodplain management decisions. To effectively consider the risk to life and property from reasonably foreseeable floods, decision-makers need better tools and information and specific methods to comply with the federal National Flood Insurance Program (NFIP).
- **Multi-Objective-Management Approach for Floodplains** – State, local, and federal agencies should implement multi-objective floodplain management on a watershed basis. Where feasible, projects should provide

## REASONABLY FORESEEABLE FLOOD

*A reasonably foreseeable flood is a flood event that is realistically probable for a particular area. In many cases, this event could exceed a predicted “100-year” flood. It is important to note that the determination of a reasonably foreseeable flood can vary depending on its use and application for any given area. Sources of information on reasonably foreseeable floods may include historic floods, paleo-floods, hydrologic modeling using transposition, historical flood damage data, and hydrologic models. Communities such as Sacramento, West Sacramento, Yuba City, Marysville, Los Angeles, and Orange County are all working toward protection against floods that exceed the “100-year flood.” It is up to each community to consider all information on reasonably foreseeable floods in making land use and flood management decisions.*



adequate protection for natural, recreational, residential, business, economic, agricultural, and cultural resources and for water quality and supply.

■ **Local Assistance, Funding, and Legislation**

– DWR should identify and actively pursue funding opportunities, technical assistance to local governments and other organizations, and legislative proposals to implement Task Force recommendations and ensure successful floodplain management, recognizing that local governments have the primary responsibility and authority for land-use decisions.

An additional but key element was to establish a common understanding of the issues, terms, and definitions associated with floodplain management. The language associated with floodplain management often varies among professional disciplines and governmental bodies. Defining terms became a critical element of the Task Force discussion. Table 1 includes the working terms and definitions used by the group for this process.

The group grew to appreciate the knowledge, wisdom, and thoughtfulness of its members. Through long hours of work and deliberation, it was possible to create common ground and recommendations that will benefit all Californians if implemented.

## TABLE 1

### TERMS

**Flood management** is an overarching term that encompasses both floodwater management and floodplain management.

**Floodwater management** includes actions to modify the natural flow of floodwaters to reduce losses to human resources and/or protect benefits to natural resources associated with flooding. Sample actions include:

1. Containing flows in reservoirs, dams, and natural basins;
2. Conveying flows via levees, channels, and natural corridors;
3. Managing flows through reservoir re-operation; and
4. Managing watersheds by decreasing rainfall runoff and providing headwater stream protection.

**Floodplain management** includes actions to the floodplain to reduce losses to human resources within the floodplain and/or to protect benefits to natural resources associated with floodplains and flooding. Sample actions include:

1. Minimizing impacts of flows (e.g., flood-proofing, insurance);
2. Maintaining or restoring natural floodplain processes (e.g., natural community succession, meander corridors);
3. Removing obstacles within the floodplain voluntarily or with just compensation (e.g., relocating at-risk structures);
4. Keeping obstacles out of the floodplain (e.g., planning, mapping, and zoning land-use decisions);
5. Educating and planning for emergency preparedness (e.g., emergency response plans, data collection, outreach, insurance requirements); and
6. Ensuring that operations of floodwater management systems are not compromised by activities that interfere with, or are damaged by, design floods of these systems.

Floodplain management measures interrelate and frequently overlap with floodwater management measures, such as the following, to reduce losses within the floodplain:

1. Emergency response activities;
2. Realigning levees;
3. Reconnecting historical floodplains; and
4. Re-operation of reservoirs.





## CHAPTER II

### FLOODPLAIN MANAGEMENT KEY ISSUES



## **FLOODPLAIN MANAGEMENT – KEY ISSUES**

The Task Force identified the three major impediments to effective floodplain management: Insufficient understanding of the risks from reasonably foreseeable flooding; single-purpose approaches to floodplain management issues; and insufficient technical assistance and funding to local agencies.

### **INSUFFICIENT UNDERSTANDING OF THE RISKS FROM REASONABLY FORESEEABLE FLOODING**

The first challenge to effective floodplain management is the misunderstanding by the public and decision-makers of the real risks of flooding.

The phrase “100-year flood” is a concept used by the NFIP to calculate flood insurance premium thresholds and rates. Many people have heard the term 100-year flood, and they believe that it means their home will not be flooded for 100 years. In actuality, the 100-year flood is a flood with a one percent chance of occurrence each year. It is therefore possible that a 100-year flood or larger can occur more than once per year or in back-to-back years. In other words, over the lifetime of a 30-year mortgage, there is a 26 percent chance of being flooded by a 100-year flood.

Many communities use the 100-year flood as the basis for making floodplain management decisions, whereas, in truth, they may still experience floods of larger magnitudes. In these circumstances, floodplain management decisions based on the 100-year flood may fail to achieve the expected goals of preventing flood damage and loss of life.

Areas that have a designed protection from the 100-year flood are not protected from more

severe floods. An increasing number of communities, including Sacramento, West Sacramento, Yuba City, Marysville, Los Angeles, and Orange County, are working toward protection against floods that exceed the 100-year flood.

Another problem the public experiences is that areas identified as flood-prone keep changing. One year, a property is considered to be outside of the regulated floodplain; a few years later, the same property may be considered in the regulated floodplain, perhaps requiring owners to pay for flood insurance. There are several reasons for such changes. The modeled hydrology of a watershed may change. For example, since the 100-year flood is a hypothetical flood magnitude that is derived from mathematical procedures using existing storm and stream flow records, it changes as the amount of flood data accumulates through the years.

Sometimes the way in which the watershed is modeled is changed as updated assessments of floodplain topography, stage/flow relationships, and ways of modeling the performance of flood-water management systems are implemented. In other cases, the watershed itself changes. For example, in many areas of the State, maps of flood-prone areas only reflect the impacts of current development in that watershed. As new development occurs, more hard surfaces, such as roads and roofs, accelerate and increase flood runoff, increasing the size and often the depth of the floodplain. The problem is compounded by the use of California floodplain maps that do not reflect today's development in many areas. On the average, these maps have not been updated for over a decade. In addition, there are thousands of square miles of floodplains that have not been mapped at all.

Currently, many communities allow the lowest floor of new residences to be constructed at the

100-year base flood elevation, as shown on Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs). The mapping technology and methods used to map and define base flood elevation are, at best, accurate to only plus or minus one foot. In addition, changes in the watershed can alter the level of flooding shown on the issued FIRMs. Therefore, residences built to minimum standards are subject to damages from the 100-year flood as encroachment takes place in the watershed.

### ALLUVIAL FAN

*An alluvial fan is a gently sloping, fan-shaped landform created over time by the deposition of eroded sediment. Alluvial fans are common at the base of mountain ranges such as the American West.*

Alluvial fans present unique challenges to floodplain management. Alluvial fan flooding is unpredictable, given its geologic and geomorphic nature. The principal hazards associated with alluvial fan flooding are the high velocity, debris-laden flows and the uncertainty of the flow path. Many of the alluvial fan floodplains in Southern California have experienced development and are projected for additional development. To prevent future loss of life and damage to property, it is important that alluvial fans throughout the State be accurately identified, and that landforms be evaluated to identify fan surfaces subject to flooding.

For riverine and coastal flooding, bank stabilization is frequently used to protect developed areas. However, for alluvial fan flooding, this approach can actually concentrate flood risks in neighboring areas.

Repetitive losses within California's floodplains

are another problem. Repetitive losses are defined by FEMA as two or more losses that occur to the same property within a 10-year period. Approximately 40 percent of all FEMA's NFIP claims nationally result from repetitive losses.

Many of the areas where repetitive flooding has occurred remain unmapped and unregulated. Consequently, flood management measures to reduce loss of life and property damage in these areas are seldom practiced. Although programs are available to assist homeowners in reducing repetitive losses, many communities do not take advantage of them.

California's policies for building State facilities within floodplains have not been updated for 25 years. Therefore, the policies do not reflect current knowledge of the risks associated with such development. Furthermore, these policies fail to direct State agencies owning structures or property in floodplains to cooperate with other stakeholders in multi-objective floodplain management.

FEMA has notified the State that its existing Executive Order for floodplain management issued in 1977 does not effectively bring the State and its political subdivisions into compliance with the NFIP. According to FEMA, continued noncompliance could endanger the State's ability to obtain federal financing from FEMA and other federal sources for State building construction and improvement projects located in floodplains and for disaster recovery.

California faces multi-faceted challenges associated with the impacts of climate change. Recent scientific studies suggest that climate changes might increase flood frequency and could exacerbate the uncertainty of flood-flow prediction. California's dependence on reservoir storage and snow pack for flood management

and water supply make the State particularly vulnerable to these potential changes. Climate change could impact regional hydrology and hydraulics directly, resulting in an increase in temperature, rise in sea level, change in precipitation patterns, and changes in storm frequency and intensity.

### **SINGLE-PURPOSE APPROACHES TO FLOODPLAIN MANAGEMENT ISSUES**

In the past, many projects within floodplains have been developed and implemented to carry out single-purpose objectives, without considering the importance of flooding in maintaining a healthy environment. Conversely, some ecosystem restoration projects have been implemented without sufficient consideration of long-term floodway maintenance requirements. While achieving single-purpose objectives, these approaches may have adversely impacted other beneficial uses of the floodplains.

While single-purpose flood management projects were acceptable in the past, they no longer are considered the preferable approach to floodplain management. Increasingly, floodplains are seen as valuable resources by our society. They provide opportunities for flood protection, agricultural production, open space, valuable native habitat, ecosystem protection, recreation, economic development, and housing.

Financial limitations are another disadvantage of single-purpose projects. Governmental agencies and the private sector typically do not have the resources or public support to fund projects that do not achieve multiple benefits. In recognition of these limitations, greater incentives are now available for multi-objective projects.

AB 1147, which authorized the creation of the Task Force, provides significant financial incentives for multi-purpose flood management projects that also address ecosystem and recreational needs. The Safe Drinking Water, Watershed Protection, and Flood Protection Act of 2000 (Proposition 13) funded projects that combine flood protection with agricultural conservation and ecosystem protection. The Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Proposition 50) contains additional incentives for watershed-based management approaches.

### **INSUFFICIENT TECHNICAL ASSISTANCE AND FUNDING TO LOCAL AGENCIES**

Local governments have the primary responsibility and authority for regulating land development. However, in most cases, they lack the necessary resources to fully implement floodplain management strategies. Information on the numerous potential funding sources available for implementing floodplain management strategies is difficult to access.

Unlike other issues of statewide concern, there is no unified public information or education program for floodplain management. Independently, each agency has had to develop public awareness programs and disseminate information on all floodplain values, flooding hazards, public safety and hazard mitigation measures.

One important program that assists local areas is FEMA's Community Assistance Program (CAP), which is administered and cost-shared by DWR and FEMA. This program, which includes technical assistance and incentives for enhanced floodplain management, could provide the critical assistance needed by local communities

to develop multi-objective floodplain management. Currently, CAP funding is insufficient to provide this assistance to communities in need.

Without specific legislative authority, the State's ability to participate in and leverage federal and local cost-share funds for multi-objective flood management projects is limited. As a result, the State is unable to fully support its interests in ecosystem restoration, responsible floodplain management, and comprehensive flood management planning.

In response to the challenges mentioned above, the Task Force presents recommendations in Chapter III for providing local governments, landowners, and others with floodplain management tools to maximize the benefits of floodplains and minimize flood-related losses.