

A high-speed photograph of water splashing upwards, creating a dense, textured column of water with many small droplets and bubbles. The background is a solid, light blue color.

Volume 2

Chapter 10 Floodplain Management



The Yolo Bypass is an example of successful multi-objective floodplain management. Established as a floodwater corridor, it is also intensively cultivated and parts of the bypass provide outdoor recreation and spawning and rearing areas for native fish. (DWR photo)

Chapter 10 *Floodplain Management*

Floodplain management reduces risks to life and property and benefits natural resources. Floodplain management accepts periodic flooding and generally is a preferred alternative to keeping rivers in their channels and off floodplains. Seasonal inundation of floodplains provides essential habitat for hundreds of species of plants and animals, many of them dependent on periodic floods. There are also benefits to the economy, agriculture and society to keeping rivers and their floodplains connected, including water quality improvements and groundwater recharge. Examples of floodplain management objectives include:

- Minimize impacts of floods on buildings and farmland
- Remove obstacles in the floodplain, voluntarily or with compensation
- Prevent interference with the safe operation of the flood management systems
- Maintain or restore natural floodplain processes
- Educate the public about avoiding flood risks and about planning for emergencies
- Reduce flooding risks to humans

Floodplain Management in California

In the past, many flood management projects within floodplains were mostly developed to reduce property damage. They did not consider the importance of floods in maintaining a healthy environment. Likewise, some ecosystem restoration was done without considering long-term floodway maintenance. Multi-objective projects are more effective than single-purpose projects. Government and the private sector are likely to gain public support for projects with many benefits. Planners now recognize the value of floodplains by directing development away from them, avoiding or minimizing the need for major flood control structures.

An example of successful multiobjective floodplain management is the Yolo Bypass. The bypass was established as a floodwater corridor in the floodplain of the lower Sacramento River basin. It is also intensively cultivated, and its rice fields double as habitat for waterfowl and wading birds. Parts of the bypass are managed for outdoor recreation, including hunting and fishing. Portions have been planted to riparian forest, with no significant loss of flood-carrying capacity. Management of the floodplain also provides spawning and rearing areas for native fishes. In addition, several modifications to water control structures are planned to improve or restore fish passage through the bypass.

The priorities of the CALFED Bay-Delta Program Ecosystem Restoration Program (ERP) include restoration of floodplain habitat, riparian corridors and dynamic river processes such as river meandering. The ERP identifies ways to copy natural flows using reservoir releases; copy natural flows of sediment and woody debris; and provide enough high flows to cover floodplains. The program recognizes that reconnection of rivers with their floodplains may be essential for recovering many at-risk species.

A voter-approved bond issue, Proposition 13, authorized funds for a flood protection corridor program. The program supports projects that provide non-structural flood management and either preservation of agricultural land or preservation or enhancement of wildlife habitat. A second bond issue, Proposition 50, contains additional incentives for watershed-based management approaches.

In California, The Reclamation Board runs the Designated Floodway Program to reduce the impact of floods by preserving the reasonable flood-passage capacities of natural watercourses and floodways in the Central Valley. The program restricts the use of lands in Designated Floodways to agriculture, recreation and habitat, and thus retains the historical patterns of flooding. There are more than 1,300 miles of designated floodways in the Central Valley.

The U.S. Army Corps of Engineers and The Reclamation Board are examining the feasibility of a multipurpose project on the Sacramento River to include ecosystem restoration, flood damage reduction and recreation around Hamilton City. The project could restore natural floodplain processes by construction of a setback levee and restoration of about 1,200 acres of riverine habitat. A similar proposal for the San Joaquin watershed would restore natural flooding to wildlife refuges and other wetlands to cut peak flood flows and improve water quality and habitat values. This concept is under discussion among the U.S. Fish and Wildlife Service, California Department of Parks and Recreation, Grasslands Resource Conservation Districts, U.S. Army Corps of Engineers, State Reclamation Board, San Joaquin River Flood Control Association, and State and federal water contractors.

In 2000, the governor signed AB 1147, which recommended the creation of the California Floodplain Management Task Force. In February 2002, the governor delegated authority to DWR to convene the task force. With broad membership from government and stakeholders, the task force looked for ways to reduce flood damage and maximize the benefits of floodplains. The task force submitted its report in December 2002 with many recommendations (see Box 10-1 on the following pages) to promote multi-objective management of floodplains.

Benefits of Floodplain Management

Floodplain management provides many safety, ecosystem and economic benefits. By encouraging wise land use decisions along river corridors, floodplain management can save lives, improve ecosystems and reduce property and livestock losses. By making better land use decisions, more open space, such as agriculture and native habitats, could be maintained. Controlling development within the floodplain, and even removing some property from the floodplain, can significantly reduce potential future flood risk to people and property. Periodic flooding of the floodplain can provide rearing habitat that favors native fish over exotics. Reconnecting rivers to floodplains helps ecosystems and increases groundwater recharge, benefiting groundwater supplies.

Costs of Floodplain Management

Proposition 13 set aside \$57 million for a Flood Protection Corridor Program. The program has funded or allotted funds to 19 projects on about 20,000 acres of habitat and agricultural

lands. Many of the costs of floodplain management are associated with planning, mapping, maintenance, and emergency preparations. Construction costs depend on local conditions but can include improvements such as setback levees and elevating, or removing, buildings. Total estimated floodplain costs to year 2030 are about \$475 million.¹

Issues in Floodplain Management

Single-Purpose Approach to Floodplain Management

Due to the uncertainty of predicting floods, it is difficult to plan a flood damage reduction project that could assure long-term protection. In addition, it is difficult to obtain permits for single-purpose projects. Although integration of public safety, flood damage reduction, agricultural conservation and ecosystem protection and restoration require more time and collaboration among diverse interests, it is easier to obtain permits, funding, and more likely to achieve goals than with single-purpose projects.

Floodplain Connectivity and Inundation

Common flood management and erosion control measures, such as levees and bank armoring, separate river channels and flows from historic floodplains. A challenge for floodplain and riparian ecosystem restoration is to reconnect the floodplain with the stream and still prevent damage from floods and soil erosion. This is especially difficult and costly where houses, highways, and other encroachments could potentially sustain damage and reduce flood-carrying capacity. Restoration of large river flows is constrained below dams where regulated maximum release levels are too low to produce desired results.

Coordination

Administration, financial, and data coordination among State, federal, and local agencies is often difficult for floodplain management projects and programs. Local involvement in development of a multi-objective project is essential to satisfy the diverse interests of the stakeholders.

Recommendations for Floodplain Management

After fully considering and prioritizing all of the Governor's Floodplain Management Task Force recommendations, the following recommendations are particularly relevant to statewide and regional water management.

¹ Cost estimate = \$475 million, as follows: (\$57 million for Flood Protection Corridor Program, disbursed over 3 years) = (\$19 million/yr) X (25 years until 2030) = \$475 million

1. The State should expand its Awareness Floodplain Mapping Program for use by local governments and the public.
2. Wherever practical, floodplain maps should be prepared on a watershed basis.
3. 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.
4. Decision-makers should gather information and data beyond Flood Insurance Rate Maps (FIRMs) to better assess reasonably foreseeable floods. 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.
5. A Multi-Objective-Management approach to flood management projects should be promoted. Flood management programs and projects, while providing for public safety, should maximize opportunities for agricultural conservation and ecosystem protection and restoration, where feasible.

Selected References

- CALFED Bay-Delta Program. 2000. Strategic Plan for Ecosystem Restoration.
- California Floodplain Management Task Force, 2002. California Floodplain Management Report.

Box 10-1 California Floodplain Management Task Force Recommendations Summary (December 2002)

The Task Force recommendations 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.

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, 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 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. *continued*

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11. Executive Order — The Governor’s 1977 Executive Order 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.

Multi-Objective-Management Approach for Floodplains

15. Multi-Objective-Management — A “M-O-M” approach to flood management projects should be promoted.
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, where appropriate, nonstructural 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 monitoring 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 — 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. *continued*

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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 CRS 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 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.
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.