

# **FLOODPLAIN MANAGEMENT 1992**

## **State and Local Programs**

**A Report by  
The Association of State Floodplain Managers, Inc.  
1992**

©1992 by the Association of State Floodplain Managers, Inc.

Available from: The Association of State Floodplain Managers, Inc.  
P.O. Box 2051  
Madison, Wisconsin 53701  
\$15.00 (members); \$20.00 (nonmembers)

**ASSOCIATION OF STATE FLOODPLAIN MANAGERS  
BOARD OF DIRECTORS  
1992—93**

**Officers**

**Chair**

Jerry Louthain  
Washington

**Vice-Chair**

Doug Plasencia  
Virginia

**Secretary**

Peter Finke  
Ohio

**Treasurer**

Michael Borengasser  
Arkansas

**Executive Director**

Larry Larson  
Wisconsin

**Regional Directors**

**Region 1**

Victor Parmentier  
Rhode Island

**Region 2**

Tom MacAllen  
URS Consultants  
New Jersey

**Region 3**

Patty McDermott  
Dewberry & Davis  
Virginia

**Region 4**

Donna Hall  
Kentucky

**Region 5**

George Hosek  
Michigan

**Region 6**

Alison M. Nicholson  
Arkansas

**Region 7**

Dick Gaffney  
Missouri

**Region 8**

Bill DeGroot  
Denver Urban Drainage  
& Flood Control District

**Region 9**

Peggy Bowker  
Nimbus Engineers  
Nevada

**Region 10**

James B. Kennedy  
Oregon

**Chapter Directors**

Joe Tram  
Arizona Floodplain  
Management Association

Roy Sedwick  
Texas Floodplain  
Management Association

## FOREWORD

The Association of State Floodplain Managers is pleased to present *Floodplain Management 1992: State and Local Programs*. This report updates and supplements a previous report, *Floodplain Management 1989: State and Local Programs*, and is the most complete national summary of the practice of floodplain management at the state and local levels. We hope the material contained in this report will be useful as a reference for those in the floodplain management community interested in comparing state, and some local programs, throughout the United States. By seeing what others are doing, we can make improvements in all our programs.

By coincidence perhaps, this report is presented 50 years after Gilbert F. White's 1942 dissertation, *Human Adjustment to Floods, A Geographical Approach to the Flood Problem in the United States*. Dr. White stimulated interest in and set the course for the emergence and evolution of floodplain management during the ensuing decades. The issues brought out in his 1942 work still hold true today as effective means of flood damage reduction.

Jerry Louthain  
Chair  
Association of State Floodplain Managers, Inc.

# TABLE OF CONTENTS

List of Tables and Figures . . . . .	vii
Acknowledgements . . . . .	viii
INTRODUCTION . . . . .	1
Division of Responsibility in Floodplain Management . . . . .	2
The Nature of State Floodplain Management . . . . .	2
The Nature of Local Floodplain Management . . . . .	3
STATE AND LOCAL FLOODPLAIN MANAGEMENT ACTIVITIES . . . . .	7
Mapping . . . . .	7
State Activities in Support of the National Flood Insurance Program . . . . .	9
State Activities to Foster Professionalism in Floodplain Management . . . . .	12
ACTIVITIES TO MODIFY SUSCEPTIBILITY TO FLOOD DAMAGE . . . . .	15
Regulations . . . . .	15
Local Authority . . . . .	15
State Assistance to Local Programs . . . . .	16
Regulatory Standards Exceeding NFIP Minimums . . . . .	16
Riverine Standards . . . . .	16
Coastal and Lakeshore Standards . . . . .	18
Other Regulatory Standards . . . . .	18
Special Hazards . . . . .	21
Development and Redevelopment Policies . . . . .	21
Acquisition and Relocation . . . . .	21
Redevelopment Policies . . . . .	23
Standards for Road and Bridge Construction . . . . .	23
Disaster Preparedness and Assistance . . . . .	25
Floodproofing . . . . .	25
Forecasting and Warning Systems . . . . .	27
ACTIVITIES TO MODIFY FLOODING . . . . .	29
ACTIVITIES TO MODIFY THE IMPACT OF FLOODING . . . . .	33
Information and Education . . . . .	33
Insurance . . . . .	35
Tax Adjustments . . . . .	35
Emergency Measures . . . . .	35
Postflood Recovery . . . . .	37

ACTIVITIES TO RESTORE AND PRESERVE  
THE NATURAL AND CULTURAL RESOURCES OF FLOODPLAINS . . . . . 39

    State Projects . . . . . 39

    Local Projects . . . . . 41

    Tools used at the State and Local Levels to  
Restore and Preserve the Natural and Cultural Resources of Floodplains . . . . . 42

        Regulations . . . . . 42

        Development and Redevelopment Policies . . . . . 42

        Information and Education . . . . . 45

        Tax Adjustments . . . . . 45

        Administrative Measures . . . . . 45

    Status of Floodplain Resources . . . . . 46

CONCLUSION . . . . . 49

    Summary of Changes since 1981 . . . . . 49

    Trends in State and Local Floodplain Management . . . . . 52

REFERENCES . . . . . 55

Appendix: State Profiles

## LIST OF TABLES

1.	Staff and Budget Levels of State Programs, 1991 . . . . .	4
2.	State Programs for Mapping Floodplain Areas . . . . .	8
3.	State Activities in Support of the National Flood Insurance Program . . . . .	10
4.	State Programs to Foster Professionalism in Floodplain Management . . . . .	13
5.	Riverine Regulatory Standards that Exceed NFIP Minimums . . . . .	17
6.	Coastal and Lakeshore Regulations . . . . .	19
7.	Other Regulatory Standards for Floodplains . . . . .	20
8.	Regulations for Special Flood Hazards . . . . .	22
9.	State Policies and Programs for Development and Redevelopment . . . . .	24
10.	State and Local Floodproofing Activities . . . . .	26
11.	State Activities to Provide Flood Warnings . . . . .	28
12.	State Activities to Modify Flooding . . . . .	30
13.	Structural Measures used by States and Localities . . . . .	31
14.	State Programs for Floodplain Information and Education . . . . .	34
15.	Flood Emergency and Recovery Activities . . . . .	36
16.	Cooperative Projects to Protect Floodplain Resources . . . . .	40
17.	Regulatory Approaches for the Natural Resources of Floodplains . . . . .	43
18.	State Programs affecting the Natural Resources of Floodplains . . . . .	44
19.	State Coordination of Natural Resources Management Programs . . . . .	47
20.	State Floodplain Management Programs, 1981 vs. 1991 . . . . .	51

## LIST OF FIGURES

1.	Status of the Quality and Quantity of States' Floodplain Resources . . . . .	48
----	--	----

## ACKNOWLEDGEMENTS

This report was produced by Jacquelyn L. Monday under a contract with the Association of State Floodplain Managers. Larry Larson acted as Project Manager for the Association. Diane Watson coordinated administrative details and supervised the printing and distribution. The data-gathering effort was enhanced by funding contributions from the Insurances Services Organization and the Environmental Protection Agency.

Thanks are due for the helpful suggestions provided by Bob Cox, Bill Lesser, Larry Larson, Mary Fran Myers, Ross MacKay, Jeanne Melanson, French Wetmore, and Jim Wright in developing the final questionnaire. The thoughtful reviews of the draft report provided by Fred Eisenbarth, Bill Lesser, Larry Larson, Jerry Louthain, and Mary Fran Myers are gratefully acknowledged. The Association also thanks the many state personnel who generously gave their time to complete questionnaires and respond to requests for additional information and verification.

This report builds upon a foundation laid in the 1989 report, most of which was written by French Wetmore, Larry Larson, and Leslie A. Bond. Their analysis and timeless prose, portions of which are repeated here, are gratefully acknowledged.



## INTRODUCTION

A cooperative effort by the federal, state, and local governments and the private sector is needed to reduce current flood damages in the United States, to prevent future damages, and to protect the natural resources of the nation's floodplain lands. To accomplish this, the Unified National Program for Floodplain Management—the federal government's framework—proposes four strategies designed to alter in some way the relationship between human beings and the hazard posed by flooding:

- modify susceptibility to flood damage and disruption,
- modify flooding,
- modify the impact of flooding on individuals and the community, and
- restore and preserve the natural and cultural resources of floodplains.

Each of the strategies can be implemented by the application of one or more of numerous activities (called "tools" in the Unified National Program). In the decade and a half since details of the Unified National Program were formalized, a tremendous amount of work has been devoted at all levels of government to carrying out its vision. This report is one of a series of periodic documentation of the strengthening capability of state and local floodplain management; it covers activities undertaken during 1989, 1990, and 1991.

Most of the information presented here was obtained through a questionnaire mailed to the National Flood Insurance Program Coordinator in each of the 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam. The first part of the questionnaire consisted of 11 pages of questions about many aspects of state and local floodplain management, including activities in furtherance of each of the tools and strategies in the Unified National Program, budget and staffing levels, coordination techniques, and assessments of the status and future trends in floodplain management in the United States. The second part requested updated information about each of 47 state and local activities, for comparison with data presented in a preceding report, *Floodplain Management 1989: State and Local Programs*, and with that presented in an even earlier document, *Strengthening State Floodplain Management* (Kusler 1982:Appendix I). The third and final part of the survey requested each of the state coordinators to supply a 1–2 page description of those aspects of the state's floodplain management program considered significant for the period 1989–1991. Supplemental information was obtained from various federal, state, and local sources, and from published documents. The response rate to the questionnaire was about 85%: the total number of respondents was 46, including 43 states, the District of Columbia, Puerto Rico, and the Virgin Islands.

It should be noted that two topics have not been thoroughly covered for some states: emergency management and certain aspects of structural flood control. This is because in some states the NFIP state coordinators (the principal respondents to the questionnaire) are only minimally involved with those activities and thus could not provide all the details requested.

This report begins with a discussion of the roles played by the state and local levels of government, then proceeds to a description of some activities that apply to floodplain management as a whole rather than to any one strategy of the Unified National Program. The middle section of the report is organized around the Unified National Program's framework of strategies and tools.<sup>1</sup> The concluding section incorporates a summary of the statewide and national trends identified by state floodplain managers, and an analysis of the changes in the field over the last ten years.

## **DIVISION OF RESPONSIBILITIES IN FLOODPLAIN MANAGEMENT**

Although each level of government is called on to do its share in a nationwide effort to reduce flood losses and protect floodplain resources, some levels are better suited to conduct certain activities. For example, regulating development can best be done by local governments, following the standards and procedures of state enabling authority. Flood insurance is considered a federal role because of the need for a large policy base and because of the infrequency of disasters in any one city or state. A coordination and liaison role falls naturally upon state-level agencies. But past analyses of the practice of floodplain management in the United States have illustrated that governments, organizations, and individuals often work to utilize whatever measures are necessary and feasible in a given situation to reduce flood losses or preserve resources, whether or not it is regarded as their "proper" role or responsibility (see, for example, Association of State Floodplain Managers 1989; Burby and French 1985; L. R. Johnston Associates 1992; and Platt 1987). What is handled by states in one part of the country is handled by localities in another; functions that are separate in one state are intertwined in another; federal criteria sometimes are the maximum achieved and at other times are only stepping stones to more sweeping programs. As noted in the 1989 report, it may no longer be useful to separate state and local activities when examining overall flood risk and measures to reduce it and preserve resources. An ad hoc approach may in fact be the best way to cope with such a complex hazard and resource and any description of the varied efforts should include a recognition of that circumstance.

## **THE NATURE OF STATE FLOODPLAIN MANAGEMENT**

State governments derive their authority to plan and implement floodplain management actions from the police power that is vested in them by the U.S. Constitution. The principal roles played by states in floodplain management today include coordination of the National Flood Insurance Program (NFIP) for the activities within their jurisdictions; planning and implementing programs and projects for managing their own floodplains, including state-level regulations; providing technical expertise of all kinds to individuals and to other levels of governments, especially localities; coordinating local and regional programs within their jurisdictions; entering into agreements with other states to cope with multijurisdictional flood problems; and acting as liaisons with the federal government. Sometimes states compensate for the inability or unwillingness of local governments to take certain actions to reduce their flood risk or preserve the natural functions of their floodplains. Direct state regulation of some aspects of land use, of selected types of lands, and of certain kinds of activities is becoming more typical.<sup>2</sup>

---

<sup>1</sup>It is assumed that the reader is familiar with the strategies and tools of the Unified National Program for Floodplain Management. They are described in detail in Federal Emergency Management Agency and Interagency Task Force on Floodplain Management (1986).

<sup>2</sup>See Federal Emergency Management Agency and Interagency Task Force on Floodplain Management (1986) for a discussion of the role of state government in floodplain management.

Most states have floodplain management "programs" that are a composite of varied activities undertaken by different agencies and other entities within the state. The central office is usually the one that coordinates the National Flood Insurance Program for that state. In 33 states that function is housed in a department for natural resources, water resources, or environmental protection; in nine states it lies with an emergency preparedness agency, in six with a department of community affairs, and in two states with a state planning office. Two states manage their floodplains principally out of a transportation department. Sometimes most or all of the activities related to floodplain management are organized into one office or department, and sometimes they are scattered throughout state government, necessitating careful coordination.

The myriad of programs that affect floodplain management—emergency preparedness and response, natural resources protection, environmental quality, structural control measures, planning, and economic development—along with the wide variety in local and regional efforts, makes the floodplain management picture of each state unique. Table 1 bears this out, when it shows the widely varying levels of support for floodplain management in each state. The first column shows the personnel specifically dedicated to floodplain management activities in each state office; the second column indicates whether those persons have other, non-floodplain management duties assigned to them. Each state's floodplain management funding is shown in the last four columns of the table. Running a total on these figures shows that the nation's floodplain management budget at the state level was about \$14 million in 1991, with about \$3 million of that provided to 36 participating states by the Federal Emergency Management Agency (FEMA) under the Community Assistance Program (CAP) and about \$11 million provided by the states themselves. It should be noted that (1) budget data were not available for 10 states and three territories, and (2) these figures are for budgets that cover only a portion of state floodplain management activities, in most cases the regulatory and technical assistance functions, and do not include many other floodplain-related projects and programs. For example, in many states, budgets for structural control measures are separate from floodplain management, as are funds for flood disaster preparedness and relief, acquisition, and floodplain resource protection.

## THE NATURE OF LOCAL FLOODPLAIN MANAGEMENT

Local government is the foundation of comprehensive floodplain management because that level usually determines and supervises the use of land within its jurisdiction (under the authority of the police power delegated to it by the state) and because the impetus for obtaining financial and technical assistance from the state and federal levels originates with the local community. The willingness and ability of local governments to take steps to manage their floodplains are not automatic, however. They are limited by their legal authority, by financial considerations, by the amount of technical expertise available to them, and by the fact that flooding and resource depletion must take their places among numerous other local concerns.

Local floodplain management programs vary according to the size of the community; the policy, political structure, and economic status of the state in which it is located; the type of flooding it faces; and the amount of development pressure existing in the community as a whole and in its floodprone areas. Typical small communities have no program per se, but only one official, usually a building inspector, who monitors and enforces compliance with the local flood hazard reduction ordinance along with other unrelated duties. In general, the larger the community, the more sophisticated and comprehensive the floodplain management-related technical expertise available to it, including planning, engineering, additional inspection and enforcement capabilities, emergency management, maintenance, parks and recreation support, water treatment facilities, and the like. A few examples of local programs are given on page 5.

# 1. STAFFING LEVELS AND BUDGETS OF STATE FLOODPLAIN MANAGEMENT PROGRAMS, 1991

	Floodplain Management Staff		Floodplain Management Budget			
	No. of FTEs	Other Duties?	State Funds	FEMA Funds	Other Funds	Total Budget
ALABAMA	2	yes	\$ 30,000	\$ 65,000	0	\$ 95,000
ALASKA	1		—	—	—	—
ARIZONA	2.5	yes	60,000	92,000	0	152,000
ARKANSAS	1	yes	21,334	64,000	0	85,334
CALIFORNIA	—		—	—	—	—
COLORADO	3		150,000	50,000	0	200,000
CONNECTICUT	—		—	—	—	—
DELAWARE	5		250,000	40,000	10,000	300,000
DISTRICT OF COLUMBIA	1		25,000	—	—	25,000
FLORIDA	4		63,999	183,000	0	246,999
GEORGIA	2		28,000	84,000	0	112,000
GUAM	—		—	—	—	—
HAWAII	3+	yes	145,000	37,000	172,000 <sup>a</sup>	354,000
IDAHO	1		19,333	58,000	0	77,333
ILLINOIS	22		—	150,000	0	>150,000
INDIANA	8	yes	—	—	—	—
IOWA	5.5		300,000	0	0	300,000
KANSAS	4+		588,000	64,000	117,000 <sup>b</sup>	769,000
KENTUCKY	7+		950,000	84,000	0	1,034,000
LOUISIANA	5.5		44,120	132,358	0	176,478
MAINE	2+		31,675	95,023	~10,000 <sup>c</sup>	136,698
MARYLAND	5+		—	70,000	7 <sup>d</sup>	>70,000
MASSACHUSETTS	3		17,300	130,000	0	147,300
MICHIGAN	15.5	yes	546,800	140,600	170,000 <sup>e</sup>	857,400
MINNESOTA	4+		615,000	85,000	1,700,000 <sup>f</sup>	2,400,000
MISSISSIPPI	1		20,646	61,939	—	82,585
MISSOURI	—		—	—	—	—
MONTANA	2		50,000	50,000	—	100,000
NEBRASKA	3		97,000	60,000	—	157,000
NEVADA	1	yes	16,000	48,841	—	64,841
NEW HAMPSHIRE	—		—	—	—	—
NEW JERSEY	4		97,000	141,000	308,000 <sup>a</sup>	546,000
NEW MEXICO	—		—	—	0	—
NEW YORK	12	yes	620,000	160,000	—	780,000
NORTH CAROLINA	—		—	—	—	—
NORTH DAKOTA	2.5	yes	30,000	60,000	—	90,000
OHIO	4		80,000	110,000	0	190,000
OKLAHOMA	1		30,741	92,223	—	122,964
OREGON	—		—	—	—	—
PENNSYLVANIA	3		200,000	60,000	—	260,000
PUERTO RICO	1.5		—	—	—	—
RHODE ISLAND	—	yes	26,600	19,300	—	45,900
SOUTH CAROLINA	1		16,790	45,200	—	61,990
SOUTH DAKOTA	0		0	—	—	0
TENNESSEE	—		—	—	—	—
TEXAS	3	yes	54,000	162,000	0	216,000
UTAH	2	yes	20,000	60,000	—	80,000
VERMONT	1		20,000	55,000	—	75,000
VIRGIN ISLANDS	0		—	—	—	—
VIRGINIA	4		200,000	100,000	20,000 <sup>h</sup>	320,000
WASHINGTON	7	yes	2,100,000 <sup>i</sup>	90,000	—	2,190,000
WEST VIRGINIA	0		0	0	—	0
WISCONSIN	17		1,000,000	108,000	—	1,108,000
WYOMING	0		0	0	—	0

<sup>a</sup>dam safety

<sup>b</sup>Transportation Department exchange

<sup>c</sup>state funding to Regional Councils

<sup>d</sup>special contracts

<sup>e</sup>transportation funding

<sup>f</sup>flood hazard mitigation activities

<sup>g</sup>Flood Control Bond Act

<sup>h</sup>miscellaneous grants

<sup>i</sup>includes local grants for flood damage reduction

+ = additional personnel have limited or related responsibilities

- = data not available

### Loudoun County, Virginia

Loudoun County, Virginia (population 86,000, area 500 square miles), has locally delineated floodplain districts managed as "major" (watershed > 1 square mile) or "minor" (watershed < 1 square mile) floodplains. More uses are allowed on minor floodplains because the hazard is not as great. Uses are limited to agriculture, fisheries, stream crossings, parking for no more than 500 vehicles (with detention facility), recreation, and the like. The hydrology is based on the "ultimate" development scenario. All new structures on floodplian lots must be located outside of the floodplain.

The county has a geographic information system (GIS) with a floodplain overlay; citizens can purchase GIS-generated maps, and use a GIS terminal at the county offices. The county maintains a local floodplain study more detailed than that produced by the Federal Emergency Management Agency; provides zone determinations for insurance agents and others; has a plan and regulations for stormwater management and the control of erosion and sediment; and participates in the Community Rating System of the National Flood Insurance Program.

### Cripple Creek, Colorado

The City of Cripple Creek (population 600) was administering its flood hazard ordinance guided only by a rough flood hazard boundary map, until it became one of three historic mining communities in Colorado to offer legalized small-stakes gambling. In the latter half of 1991, tremendous growth occurred in the city, necessitating a more sophisticated approach to regulating development. The state prepared an approximate interim map and arranged for the Soil Conservation Service to perform a detailed hydrological study. The city's consulting engineer used that hydrology to prepare a master plan for drainage and floodplain management.

The city is now building some flood control improvements with gambling revenues. When a developer needs to build flood control improvements for a property, the city can prepare a legal recovery agreement to assure that the developer can ultimately recover a share of the project costs from the additional beneficiaries of the improvements—other developers and/or the city.

### Norfolk, Virginia

The City of Norfolk (population 291,000, area 65 square miles, 4,500 policies in effect) administers a complex set of programs for coastal and inland flooding, erosion, stormwater drainage, and wetlands preservation. An Erosion Advisory Commission monitors and manages the beaches and their groins, boardwalks, and other attendant structures. The Wetlands Board regulates uses that affect the primary dunes and wetlands along the coast. The city enforces the Chesapeake Bay Act requirements that protect natural resources functions and establish setbacks. The city's ordinance requires V-zone construction standards in much of the A zones, and has a 1-foot freeboard requirement coupled with a 100-mph wind protection standard. Floodproofing and the purchase of flood insurance are promoted through the city's floodplain management program.

An attempt was made through the questionnaire distributed for this report to obtain an estimate of the level of floodplain management expertise and support at the local level throughout the country. It turned out, however, that the question was too ambiguously worded to elicit consistent responses from each of the states. It could be suggested, however, from the data that was obtained and from the professional judgement of other floodplain managers, that a nationwide average of local staffing probably amounts to less than one full-time equivalent per floodprone locality, largely because of the preponderance of small communities, which typically have only part-time floodplain administrators and little or no other flood-related expertise on staff.

## STATE AND LOCAL FLOODPLAIN MANAGEMENT ACTIVITIES

This section describes efforts undertaken at the state and local levels that influence the implementation of all the tools and strategies of comprehensive floodplain management.

### MAPPING

Nineteen states have independent mapping programs (see table 2). These state programs complement the basic mapping of flood hazard areas conducted by the Federal Insurance Administration, the Corps of Engineers, the Soil Conservation Service, the Tennessee Valley Authority, the U.S. Geological Survey, and state and local governments to support the National Flood Insurance Program. The budgets for the state programs range from \$5,000 to \$500,000 annually. Vermont, which had an ambitious program to map all its flood hazard areas and designate its own floodplains, considers its floodplain maps virtually complete.

- 10 states map to reflect changes in development or hydrology.
- 7 states map to provide more detail than that provided in the Flood Insurance Rate Maps (FIRMs), to supply a more appropriate scale, or make other improvements in the maps.
- 5 states map areas subject to rapid erosion, including coastal erosion. In some cases the mapping effort is funded in part under the federal Coastal Zone Management Program.
- 7 states map floodplain areas of special value, such as wetlands, dunes, or natural habitat.
- 8 states map for other reasons, including to delineate water management districts, aquifer recharge areas, and land use; to do the initial hazard identification for small cities; to contribute data for dam failure analyses or flood control projects; or to help build a statewide geographic information system.
- no states are now mapping alluvial fans or other areas of special flood hazard.

Although these figures are not directly comparable to the 1988 data, there does seem to have been a slight increase overall in state mapping programs, principally in efforts to add natural areas and other special factors to existing maps and mapping programs. Besides the independent mapping programs, some states also carry out activities related to mapping done for the NFIP. These include reviewing and/or approving new mapping studies conducted for the NFIP and distributing the maps provided by FEMA. These activities are shown in table 3, page 10.

Most floodprone communities administer flood damage reduction ordinances based on FEMA's flood hazard maps. Smaller communities tend to take the FEMA maps at face value, without adding new development or obstructions; larger and/or better-staffed communities usually draw on other maps when needed to make flood zone determinations or to add special conditions to a building permit. Occasionally a community will

## 2. STATE PROGRAMS FOR MAPPING FLOODPLAIN AREAS

	Changes in Development or Hydrology	For More Detail or Other Improvements	Areas Subject to Rapid Erosion*	Upstream, Rural, or Rapidly Urbanizing Areas	Areas Below Protective Structures	Natural Areas**	Other
ALABAMA ALASKA ARIZONA ARKANSAS CALIFORNIA	X	X		X		X	
COLORADO CONNECTICUT DELAWARE DISTRICT OF COLUMBIA FLORIDA			X X			X X	X X
GEORGIA GUAM HAWAII IDAHO ILLINOIS							X X
INDIANA IOWA KANSAS KENTUCKY LOUISIANA	X	X		X		X	
MAINE MARYLAND MASSACHUSETTS MICHIGAN MINNESOTA	X		X X	X		X X	X
MISSISSIPPI MISSOURI MONTANA NEBRASKA NEVADA	X X	X		X X	X X		X
NEW HAMPSHIRE NEW JERSEY NEW MEXICO NEW YORK NORTH CAROLINA	X	X					
NORTH DAKOTA OHIO OKLAHOMA OREGON PENNSYLVANIA	X	X					X X
PUERTO RICO RHODE ISLAND SOUTH CAROLINA SOUTH DAKOTA TENNESSEE	X	X					
TEXAS UTAH VERMONT VIRGIN ISLANDS VIRGINIA	X						
WASHINGTON WEST VIRGINIA WISCONSIN WYOMING	X	X	X	X	X	X	

\*Includes coastal areas

\*\*Includes wetlands



undertake or contract for its own flood study to take the place of or supplement the one performed by FEMA. Three Maryland communities, for example, have recently funded their own overlays for their FIRMs, scaled to match the tax maps, which have proven extremely useful in their planning and regulatory activities.

A rapidly emerging trend at both state and local levels is the development and use of geographic information systems (GISs), which combine digitized geographic data with computer imagery capabilities. Wisconsin, for example, is working with one county to digitize all its floodplain maps and coordinate them with a computerized hydraulic model so that a new map can be generated if the hydraulics change; another county has all its land use information computerized so that it can be coordinated with its permit request procedure. In Virginia, the state has noticed that when localities begin to develop GISs—for whatever reason—they seek floodplain management overlay information to incorporate into the system and thereby become interested in additional aspects of floodplain management.

### **STATE ACTIVITIES IN SUPPORT OF THE NATIONAL FLOOD INSURANCE PROGRAM**

Because the National Flood Insurance Program has become the foundation for much of the management of floodplains in the United States, many state activities focus on the implementation of its procedures and standards. These activities are summarized in table 3. Many of the activities are funded under FEMA's CAP, but non-CAP states perform many of these services as well. Since 1988 there has been an increase in the number of states conducting each of these activities, with the only exceptions being map distribution and zone determinations.

The first part of the table lists state activities geared toward assisting local governments in their floodplain management ordinance adoption, monitoring, and enforcement. Two basic forms of assistance are providing a model ordinance and assistance in enacting it. Although FEMA has produced model ordinances, state versions that are tied to the state's unique statutory authority, political structure, and flooding conditions are much more useful. Most states give technical assistance in administering the ordinance, monitor local performance, and help local officials deal with violations. Seventeen states have authority to enforce local regulations in some situations.

The second part of the table begins with information distribution. Virtually all states distribute information about the NFIP. Twenty-nine states distribute the NFIP maps that are provided to them by FEMA, down slightly from 33 states in 1988. The maps are distributed—usually only on a "by-request" basis—to other state agencies, to regional commissions, and to other interested parties, such as insurance agents and mortgage lenders. Thirty states make flood zone determinations from the FEMA maps when asked to do so by other state agencies, local governments, or individuals (compared to 26 states in 1988). State policies on this activity vary widely; several states will help others read the maps, but leave the final determination to the locality. Forty-four states conduct training programs for local officials who administer floodplain regulations, compared to 36 in 1988. Additional ways in which states assist local officials are shown in table 14 (page 34).

Twenty-seven states review new flood insurance studies (up from 22 in 1988) to ensure that they are appropriate for the state's use, and provide comments to FEMA. Some states have statutory authority to review maps to be used as the basis for local floodplain regulations. Fifteen states must approve the maps before they are published, the same number as in 1988.

### 3. STATE ACTIVITIES IN SUPPORT OF THE NATIONAL FLOOD INSURANCE PROGRAM

	Flood Hazard Management Ordinances				Enforcement	
	Prepare Model	Help Adopt	Help Administer	Monitor Administration	Help Local Enforcement	State Enforcement
ALABAMA	X	X	X	X	X	
ALASKA	X	X	X	X	X	
ARIZONA	X	X		X	X	X
ARKANSAS	X	X	X	X	X	
CALIFORNIA		X	X	X	X	X
COLORADO	X	X	X	X	X	
CONNECTICUT						
DELAWARE		X	X	X	X	
DISTRICT OF COLUMBIA		X	X			X
FLORIDA		X				
GEORGIA		X	X	X	X	
GUAM						
HAWAII	X	X	X	X		
IDAHO	X	X	X	X	X	
ILLINOIS	X	X	X	X	X	X
INDIANA	X	X	X		X	X
IOWA	X	X	X	X	X	X
KANSAS	X	X	X	X	X	X
KENTUCKY		X	X	X	X	X
LOUISIANA	X	X	X	X	X	
MAINE	X	X		X		
MARYLAND	X	X	X	X	X	X
MASSACHUSETTS	X	X				
MICHIGAN	X		X	X	X	X
MINNESOTA	X	X	X	X	X	X
MISSISSIPPI	X	X	X	X	X	
MISSOURI	X					
MONTANA	X	X			X	
NEBRASKA	X	X	X	X	X	X
NEVADA						
NEW HAMPSHIRE	X	X	X	X	X	
NEW JERSEY	X	X		X	X	X
NEW MEXICO	X					
NEW YORK	X	X	X	X	X	
NORTH CAROLINA	X	X	X	X	X	
NORTH DAKOTA	X	X	X	X	X	
OHIO	X	X	X	X	X	
OKLAHOMA				X	X	
OREGON						
PENNSYLVANIA	X	X	X	X	X	X
PUERTO RICO				X	X	
RHODE ISLAND		X	X	X		
SOUTH CAROLINA		X	X	X		
SOUTH DAKOTA						
TENNESSEE	X			X		
TEXAS	X	X	X			
UTAH		X		X	X	X
VERMONT	X	X	X	X		
VIRGIN ISLANDS						
VIRGINIA	X	X	X	X	X	
WASHINGTON	X	X	X	X	X	X
WEST VIRGINIA				X		
WISCONSIN	X	X	X	X	X	X
WYOMING	X					

**STATE ACTIVITIES IN SUPPORT OF THE NFIP (cont.)**

	Distribute		Flood Zone Determinations	Train Local Officials	FIS Hydrology & Hydraulics		Community Rating System	
	Info	Maps			Review	Approve	Assistance	V. Visits*
ALABAMA	X	X		X	X		D,W,M	6
ALASKA		X	X	X			D	
ARIZONA	X		X	X	X	X	D,W,M	
ARKANSAS	X	X					D,W	
CALIFORNIA	X			X				
COLORADO	X			X	X	X	D	
CONNECTICUT	X							
DELAWARE	X	X		X			D,W,M	
DISTRICT OF COLUMBIA	X		X	X	X	X		
FLORIDA	X	X	X	X			W	
GEORGIA	X	X		X	X		D,W	1
GUAM								
HAWAII	X	X	X	X	X		W	
IDAHO	X	X	X	X			D,W	
ILLINOIS	X			X	X	X	D,W,M	
INDIANA	X		X		X	X	M	2
IOWA	X		X	X	X	X		1
KANSAS	X	X	X	X	X	X	D,W,M	
KENTUCKY	X	X	X	X	X	X	D,W,M	10
LOUISIANA	X	X		X	X		D,W,M	
MAINE	X	X	X	X			D,W	2
MARYLAND	X		X	X		X	D,M	
MASSACHUSETTS	X	X		X			D,W,M	5
MICHIGAN	X		X	X	X	X	D,W,M	
MINNESOTA	X	X	X	X	X	X	D,W	
MISSISSIPPI	X	X	X	X			D,W,M	5
MISSOURI	X				X			
MONTANA	X	X	X	X	X		D,W,M	
NEBRASKA	X		X	X	X		D	
NEVADA	X	X				X		
NEW HAMPSHIRE	X			X				12
NEW JERSEY	X		X	X	X	X	D,W,M	
NEW MEXICO	X							
NEW YORK	X	X		X	X		D,W,M	
NORTH CAROLINA	X			X	X			
NORTH DAKOTA	X	X	X	X	X		D,W	
OHIO	X	X		X	X		D,W,M	
OKLAHOMA	X	X	X	X	X		D,W,M	
OREGON								
PENNSYLVANIA	X		X	X			D,W,M	
PUERTO RICO	X	X	X	X	X			2
RHODE ISLAND	X	X	X	X				
SOUTH CAROLINA	X	X					D,W,M	
SOUTH DAKOTA	X	X	X	X				
TENNESSEE	X			X				
TEXAS	X			X			D,W,M	1
UTAH	X	X	X	X	X	X	D,W,M	
VERMONT	X	X	X	X				
VIRGIN ISLANDS	X	X	X					
VIRGINIA	X		X	X			D,W,M	
WASHINGTON	X	X	X	X	X		D	4
WEST VIRGINIA	X			X				
WISCONSIN	X		X**	X	X	X	D,W,M	
WYOMING	X			X			D	

\*Number of verification visits attended by state staff in 1991  
 \*\*For local officials only, and very rarely  
 D = direct assistance

W = workshops  
 M = other types of assistance (publications, visual aids, etc.)

The last two columns of table 3 show state activities in support of the Community Rating System, a new facet of the NFIP that allows localities to obtain reduced flood insurance premium rates if they undertake activities that go beyond the minimum NFIP requirements to prevent or reduce flood losses. Thirty-three states provide direct assistance to communities in applying for the CRS. Usually this includes answering telephone inquiries and meeting with local officials; some states help localities go step-by-step through the application process. Thirty states held workshops for localities to introduce them to the CRS, its benefits, and the application procedures. In some cases, the CRS was the topic of a session at an already-scheduled floodplain management workshop; in other cases, entire meetings were devoted to the CRS itself. Twenty-three states also found other ways to assist localities, usually with some kind of written material such as press releases, or visual aids for workshops. Pennsylvania produced a brochure entitled *Some Questions and Answers: the Community Rating System*; Illinois published a manual for local officials, called *CRS Made Easy*. Wisconsin developed a model CRS application to help its communities.

### STATE ACTIVITIES TO FOSTER PROFESSIONALISM IN FLOODPLAIN MANAGEMENT

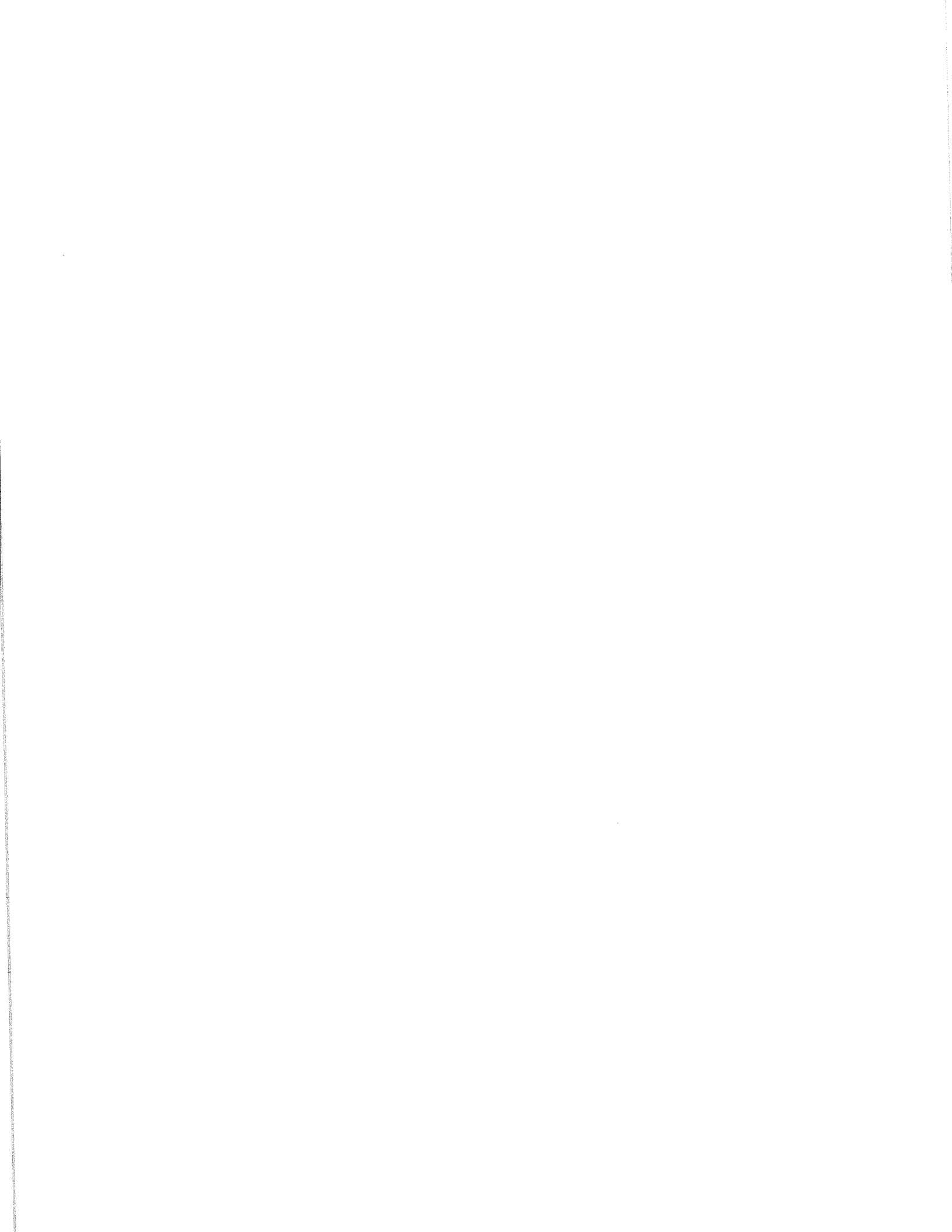
One of the ways in which states contribute to the growth and influence of floodplain management is by undertaking activities that contribute to the level of professionalism in the field. Table 4 shows four ways in which states are doing this. Three states have established certification programs for floodplain managers. Utah's program is a cooperative effort of the state Division of Comprehensive Emergency Management, the University of Utah Department of Geography, and FEMA. Both Maine and New Jersey certify their local code enforcement officers, and floodplain management is included in both programs. Thirteen states now have state- or regional-level floodplain management associations (compared to 7 in 1988), and 8 additional states are considering establishing them. These groups provide opportunities for professional interaction, training and education on special issues, building pride and identity, and fostering communication among people engaged in many different aspects of floodplain management.

Twenty-one states publish newsletters about floodplain management, with a combined circulation of an estimated 22,000 offices; at most of those addresses each issue is shared among readers. All the newsletters are distributed to local officials within the state, and most also go to state and federal agencies and private engineering, environmental, or other consulting firms. Some states distribute their floodplain management newsletters to insurance agents, lenders, appraisers, public interest groups, and other professionals. The last three columns in the table shows that 17 states license building inspectors; most of these programs include some kind of continuing education program. In some states, like Michigan, training in floodplain management can be credited toward the continuing education requirement for building inspectors.

#### 4. STATE PROGRAMS TO FOSTER PROFESSIONALISM IN FLOODPLAIN MANAGEMENT

	Certification in Floodplain Management	State Association		Newsletter (# issues/year)	Building Inspectors		
		In Place	Planned		Licensing	Continuing Education	Recertification
ALABAMA ALASKA ARIZONA ARKANSAS CALIFORNIA		X		4 4 4	X		
COLORADO CONNECTICUT DELAWARE DISTRICT OF COLUMBIA FLORIDA		X X*		3 4	X	X	
GEORGIA GUAM HAWAII IDAHO ILLINOIS			X	2 2 4	X	X	X
INDIANA IOWA KANSAS KENTUCKY LOUISIANA		X	X	2 4 4	X X		
MAINE MARYLAND MASSACHUSETTS MICHIGAN MINNESOTA	X	X* X* X		2-3 4 4	X X X	X X X	X X X
MISSISSIPPI MISSOURI MONTANA NEBRASKA NEVADA			X X	4	X X	X	X
NEW HAMPSHIRE NEW JERSEY NEW MEXICO NEW YORK NORTH CAROLINA	X	X*			X X	X X	X
NORTH DAKOTA OHIO OKLAHOMA OREGON PENNSYLVANIA		X		4 2	X X	X	X
PUERTO RICO RHODE ISLAND SOUTH CAROLINA SOUTH DAKOTA TENNESSEE		X*		4	X	X	X
TEXAS UTAH VERMONT VIRGIN ISLANDS VIRGINIA	X	X X*	X X	4 2	X X	X X	X X
WASHINGTON WEST VIRGINIA WISCONSIN WYOMING			X	4	X		

\*New England Association of Stormwater and Floodplain Managers encompasses six states



# ACTIVITIES TO MODIFY SUSCEPTIBILITY TO FLOOD DAMAGE

## REGULATIONS

Floodplain regulations include all activities to control future development of the floodplain. Although each level of government has some authority over private and public development, traditionally it has been the local governments that implement programs to regulate land use. As with mapping, the nation's common denominator is the NFIP, which depends on local government regulation. Local programs, in turn, are dependent on the state legislature for their legal authority and on state agencies for assistance. In addition to authorizing local regulations, many states mandate special procedures or standards that go beyond the federal minimum requirements.

### Local Authority

Every state has granted its localities enough authority to meet the regulatory requirements of the NFIP. There are two kinds of exceptions to that local authority, however. First, most localities do not have the authority to regulate federal or state property or development by other local governments. These activities are governed by executive order or by other state or federal statutes. All states now regulate their own development activities. Second, many statutory authorities have exempted certain types of activities from regulation, usually those important to the state's economy, such as agriculture or transportation facilities. For example, the Arizona legislature has exempted mining because of the economic significance of the state's copper industry. Of the states surveyed, only a few thought that either of these two categories of exemptions acted to worsen the flood hazard within the state or was detrimental to the state's floodplain resources. Four states specifically stated that the transfer of regulatory authority over certain activities or areas from the locality to a higher level (state, regional, or federal) actually resulted in improved regulation and reductions in potential losses.

Local regulation of flood hazard areas is almost universal. Most communities have zoning ordinances that restrict floodplain development, building standards that govern floodplain construction, and subdivision regulations for residential areas under development. Local sanitary and well codes often have specific provisions for flood hazard areas. In larger communities and urban areas, stormwater management is used to help prevent surface runoff from exacerbating flooding of water bodies or from causing localized street flooding.

## State Assistance to Local Programs

Although federal and state mandates to regulate the flood hazard and local authority to do so have all been established, local regulations, especially in smaller communities, often are not adequately administered unless some technical assistance is provided. In small communities, zoning administrators and building inspectors are usually part-time officials with little or no formal training, and engineering expertise usually is not available within the community. Therefore, considerable state effort goes into helping ensure that local regulatory programs are being as effective as possible. Most of these types of assistance are covered in table 3, because of the NFIP's central role in the process, and they include providing model ordinances tailored to the state and local situation, helping enact them, providing information to and answering questions from local officials, conducting training programs, and publishing handbooks about how to administer floodplain regulations. Most states also monitor local performance and help local officials deal with violations. About half the states regulate some floodplain areas directly, or have the authority to do so if localities fail to adopt or enforce the necessary ordinances (see tables 3, 5, 6, 7, and 8).

## Regulatory Standards Exceeding NFIP Minimums

All states now allow localities to regulate to the federal (NFIP) standard, but some require that their localities regulate to a higher standard for various aspects of floodplain management. Although most localities have ordinances that meet only the minimum NFIP or state criteria, hundreds do have provisions that exceed those standards in one way or another. Specific state and local regulations that go beyond the federal standards are detailed in this section.

### *Riverine Standards*

Table 5 shows that 18 states require local governments to regulate their riverine areas to standards more restrictive than those of the NFIP. Seventeen states have opted to directly regulate some or all of their floodplains instead of or in addition to relying on or mandating local regulations. There has been a slow trend toward stronger state regulatory programs. Since 1989, eight states have taken some steps to strengthen their riverine regulatory programs, either opting for state regulations, or providing for direct state regulation or enforcement, or setting standards for local measures, while only two states took action that may weaken riverine regulatory programs. In one of those cases (New York), the measure was a result of extensive budget cuts, not a shift in floodplain management policy.

Twenty-five states have floodway regulations more restrictive than the NFIP's. States are more likely to regulate some or all of the floodways than the flood fringes, because they require more technical expertise than those that apply to the fringe and because the impacts of floodway development are more extensive, often going beyond the corporate (local regulatory) limits. Twelve states now allow less than a one-foot rise in the floodway (the federal standard). Arizona has adopted a zero-rise provision and Kentucky has recently restricted the allowable rise to less than one foot if it affects existing development. Twenty states have flood fringe standards that exceed those of the NFIP. Some communities exceed mandated levels of protection in dramatic ways: a few towns in Vermont and seven counties in southeast Wisconsin prohibit all floodplain development. Some Ohio localities have used comprehensive plans and zoning to prohibit permanent development in the hazard area.



## 5. STATE RIVERINE REGULATORY STANDARDS THAT EXCEED NFIP MINIMUMS

	Floodway Standards	Floodway Rise	Fringe Standards
ALABAMA ALASKA ARIZONA ARKANSAS CALIFORNIA	L A,S,L,+	0'	L L,+
COLORADO CONNECTICUT DELAWARE DISTRICT OF COLUMBIA FLORIDA	A,S S,L		
GEORGIA GUAM HAWAII IDAHO ILLINOIS	S,L	0.1'	
INDIANA IOWA KANSAS KENTUCKY LOUISIANA	S,L S,L L,+ S,L,+	0.1' D D	L S,L L,+ S
MAINE MARYLAND MASSACHUSETTS MICHIGAN MINNESOTA	A,S,L S,L S,L S L,+ ,P,R	D 0' D D	S,L S,L S L,+
MISSISSIPPI MISSOURI MONTANA NEBRASKA NEVADA	L,+ A,S	0.5'	L,+ A,S
NEW HAMPSHIRE NEW JERSEY NEW MEXICO NEW YORK NORTH CAROLINA	A,S S L	0.2'	S L
NORTH DAKOTA OHIO OKLAHOMA OREGON PENNSYLVANIA	+ L S,L		L L
PUERTO RICO RHODE ISLAND SOUTH CAROLINA SOUTH DAKOTA TENNESSEE	S		S
TEXAS UTAH VERMONT VIRGIN ISLANDS VIRGINIA	S,L		S,L
WASHINGTON WEST VIRGINIA WISCONSIN WYOMING	L,P L	0.01'	L L

A = Rules apply only in certain areas  
D = Depends upon impact to existing development  
L = Local regulations must meet state requirements

P = Buildings or residences prohibited from floodway  
S = State directly regulates development  
+ = State or other agency directly regulates or enforces if locality does not

## ***Coastal and Lakeshore Standards***

As shown in table 6 most coastal states have enacted some regulations governing shoreline development, usually under the state's coastal zone management program. All the Great Lakes states have lakeshore regulatory standards or permit programs. These are usually administered as part of state shoreland management programs, most of which were created before the federal Coastal Zone Management Program. The overall picture for coastal and lakeshore regulation has changed little in the past three years. A few states eliminated some aspects of their programs, while a few others added new provisions.

Sixteen states have regulations or standards to preserve or protect sand dunes. For example, the Maine Department of Environmental Protection enforces a sand dunes regulation that prohibits new construction in V zones where sand dunes have been mapped by the department. Seventeen states regulate areas subject to coastal erosion, a problem that has received considerable attention in the last three years. Hawaii, Louisiana, Massachusetts, Michigan, Minnesota, New York, and Oregon have set standards that local ordinances must meet, while Delaware, Maine, Maryland, Puerto Rico, South Carolina and Utah have assumed direct regulation of some coastal erosion areas. Florida, Georgia, North Carolina, and Ohio adopted a mix of both approaches. Washington was the only state to drop its coastal erosion regulatory requirement.

## ***Other Regulatory Standards***

Table 7 shows the variety of other regulatory activities states have undertaken to restore and preserve their floodplains and reduce flood losses.

Nineteen states have stricter building construction requirements than does the NFIP. The most common additional standard is freeboard—requiring new buildings to be elevated higher than the base (100-year) flood level. This standard may apply to all buildings in the floodplain or only to certain types, such as new jails, hospitals, nursing homes, mobile home parks, or hazardous materials facilities. Another strict construction standard prohibits new buildings or residences in the floodplain or floodway. Since 1988, state building requirements have been strengthened slightly. Two states dropped their freeboard requirements, but another state adopted one. Two additional states have prohibited some new buildings in floodways; Utah and Virginia have set standards for local regulation, and New Jersey has opted for state enforcement of floodplain building standards.

Eleven states directly regulate the handling and storage of stormwater in their jurisdictions, and 13 establish standards to which localities must regulate. Twenty-eight states have regulations or standards for the control of erosion and sediment. Utah, for example, uses a stream alteration permit system to consider the erosion and sediment that would be generated by a proposed action. Wyoming localities must regulate to state standards for the amount of sediment allowed to enter streams.

Construction or development setbacks are used by states and localities for a variety of reasons, including reducing damages in marginally floodprone areas, preventing or minimizing erosion, and preserving habitat or other valuable natural features, such as dunes. Twenty-two states have either direct regulations or state standards to restrict or prohibit some or all development within a certain distance from bodies of water. Thirteen of those have setbacks for coastal (and lakeshore) areas only; four are for inland streams only; and five states have standards for both. There is a wide variety in the purpose and length of the setbacks. New York, Ohio, and South Carolina have setbacks based on the rate of erosion; Texas and Hawaii measure setbacks from the vegetation line; other states measure from the shoreline, the mean high tide line, the seawardmost 10-foot contour, or from structural protective works such as revetments and seawalls.

## 6. COASTAL AND LAKESHORE REGULATIONS

	Coastal High Hazard Area	Lakeshore	Sand Dunes	Coastal Erosion
ALABAMA ALASKA ARIZONA ARKANSAS CALIFORNIA	S S  S		S  S	
COLORADO CONNECTICUT DELAWARE DISTRICT OF COLUMBIA FLORIDA	S,L S,L  L		S,L S  S,L	S   A,S,L
GEORGIA GUAM HAWAII IDAHO ILLINOIS	S  S	  A,S	S	A,S,L,+  L
INDIANA IOWA KANSAS KENTUCKY LOUISIANA	   L	S S  S		   L
MAINE MARYLAND MASSACHUSETTS MICHIGAN MINNESOTA	A,S,L S S,L L L	S,L  S,L A,S L	A,S,L  L S	S S L L,+ L
MISSISSIPPI MISSOURI MONTANA NEBRASKA NEVADA	S			
NEW HAMPSHIRE NEW JERSEY NEW MEXICO NEW YORK NORTH CAROLINA	L S  L S,L	S  L	L  L,+ S,L	   L,+ S,L
NORTH DAKOTA OHIO OKLAHOMA OREGON PENNSYLVANIA	  L	S,L  L L	  L	S,L  L
PUERTO RICO RHODE ISLAND SOUTH CAROLINA SOUTH DAKOTA TENNESSEE	S S S	S  S	S S S	S  S
TEXAS UTAH VERMONT VIRGIN ISLANDS VIRGINIA	A,S	S,L		S
WASHINGTON WEST VIRGINIA WISCONSIN WYOMING		L		

A = Rules apply only in certain areas  
L = Local regulations must meet state requirements

S = State directly regulates development  
+ = State will regulate directly if localities do not

## 7. OTHER REGULATORY STANDARDS FOR FLOODPLAINS

	Building Standards	Stormwater Management	Erosion & Sediment Control	Setbacks
ALABAMA ALASKA ARIZONA ARKANSAS CALIFORNIA	F:1'		S,A	C
COLORADO CONNECTICUT DELAWARE DISTRICT OF COLUMBIA FLORIDA	A	L S S L	S S S,L	C
GEORGIA GUAM HAWAII IDAHO ILLINOIS	A,P	S	S,L,+	C,R,A C
INDIANA IOWA KANSAS KENTUCKY LOUISIANA	F:2' F:1' F:1' P		L	R
MAINE MARYLAND MASSACHUSETTS MICHIGAN MINNESOTA	F:1' F:1' P F:1',P	S,A S,L S	S S,L L S	C C,A C C,R,A C,R
MISSISSIPPI MISSOURI MONTANA NEBRASKA NEVADA	F:2' F:1'	S,L L	L S,L	R
NEW HAMPSHIRE NEW JERSEY NEW MEXICO NEW YORK NORTH CAROLINA	P,S	L L	L L	C C,A
NORTH DAKOTA OHIO OKLAHOMA OREGON PENNSYLVANIA	A,F:1.5'	L L	L S	R C,R,A R,A
PUERTO RICO RHODE ISLAND SOUTH CAROLINA SOUTH DAKOTA TENNESSEE	S	S S	S L S L	C C
TEXAS UTAH VERMONT VIRGIN ISLANDS VIRGINIA	L	S S,L L	S,L S S,L L	C C C,R,A
WASHINGTON WEST VIRGINIA WISCONSIN WYOMING	P F:2',P	L L	L S L L	C,A

A = Rules apply only in certain areas  
 F = Freeboard  
 L = Local regulations must meet state requirements  
 C = Coastal (and lakeshore)  
 R = Riverine

P = Buildings or residences prohibited from floodway  
 S = State directly regulates development  
 + = State or other agency directly regulates or enforces if locality does not

The use of setbacks among localities varies as widely as it does among the states. About 75% of Maryland's floodprone communities have voluntarily adopted 100' setbacks along FEMA-mapped streams and 50' along unmapped streams. An estimated 10% of Idaho's floodprone localities and 10% of Alaska's have adopted setbacks. Mat-Su Borough, Alaska, has a 75' setback from all water bodies; Chesterfield County, Virginia, has a setback of 100' from the floodplain; Aspen, Colorado, has a setback of 50' from the high water line, while Crested Butte's is 20' and Pitkin County's is 25'; five Wisconsin counties along Lake Michigan have adopted shoreline setbacks; twenty New Jersey oceanfront and barrier island municipalities have established dune and/or building lines.

### ***Special Hazards***

Special hazards are dangers that accompany flooding and cause damage greater than that caused by typical flood waters. Table 8 reveals that, except for hazardous materials and issues of public health (such as avoiding septic systems in floodplains), most states have not yet addressed these hazards. Those that have regulate them directly rather than mandating local regulations.

Thirteen states have special rules for areas that lie below dams or are protected by levees. Alluvial fans and mud floods, usually of concern to western states, are being regulated by only three states, down from four in 1988. Nine states have adopted measures to regulate hazardous materials in floodplains since 1988; 11 states have added public health standards since then.

## **DEVELOPMENT AND REDEVELOPMENT POLICIES**

Although development policies are most often implemented at the local level, every state now has a statute or executive order to govern construction of state projects, such as prisons and universities, that are exempt from local regulations. Most of these were implemented to meet the minimum NFIP requirements but many go beyond them. Many small and even medium-sized communities have no formal development or redevelopment policies or procedures for evaluating the long-term impacts of a proposed action, but larger communities or those with a salient flood problem do take steps to affect future development. More and more communities of all sizes are acquiring their floodplains and dedicating them to open space. States have a variety of other programs and policies that influence the wise development and redevelopment of floodprone lands.

### **Acquisition and Relocation**

Public acquisition of floodprone land and structures is a means of permanently reducing or eliminating susceptibility to flood damages and also yields the additional benefit of the recreational and natural value of the open space that remains. Sixteen states have policies or programs specifically for acquisition and relocation, and 10 of them have funds either for direct state purchase of the land or structure or to assist local purchases (table 9). States have many different kinds of acquisition programs. Some states make a point of promoting the option of acquisition and relocation and helping flooded communities obtain Section 1362 funding from FEMA. Some states have one or more programs for acquisition of public lands for a variety of non-flood-related purposes (such as recreation or habitat preservation), but give priority to floodprone lands when deciding how to spend the funds. Michigan and Massachusetts have programs to purchase structures threatened by erosion or high lake levels, and these result in reduction of floodprone properties. A few states have used community development block grant monies to relocate and rebuild floodprone houses.

## 8. STATE REGULATIONS FOR SPECIAL FLOOD HAZARDS

	Below Dams	Behind Levees	Alluvial Fans	Mud Floods	Public Health	Hazardous Materials
ALABAMA					S	
ALASKA			L		X	X
ARIZONA						
ARKANSAS					X	X
CALIFORNIA	S					
COLORADO					X	X
CONNECTICUT						
DELAWARE						X
DISTRICT OF COLUMBIA					L	L
FLORIDA	S	S				
GEORGIA						
GUAM					X	X
HAWAII						
IDAHO					X	X
ILLINOIS						
INDIANA						
IOWA	S	S			L	X
KANSAS					S+	S+
KENTUCKY					S,L	S
LOUISIANA						
MAINE					X	X
MARYLAND	S				X	X
MASSACHUSETTS					S,L	
MICHIGAN		S			X	X
MINNESOTA	S,L	L			L	L
MISSISSIPPI						
MISSOURI					X	X
MONTANA						
NEBRASKA	A,S	A,S				X
NEVADA						
NEW HAMPSHIRE					X	X
NEW JERSEY					X	X
NEW MEXICO						
NEW YORK					X	X
NORTH CAROLINA						
NORTH DAKOTA						
OHIO					L	
OKLAHOMA	A				X	
OREGON	L	L	L	L		
PENNSYLVANIA					X	X
PUERTO RICO	S	S			S	S
RHODE ISLAND						
SOUTH CAROLINA	S				X	X
SOUTH DAKOTA						
TENNESSEE					X	
TEXAS					X	X
UTAH	S	S		S		X
VERMONT						
VIRGIN ISLANDS						
VIRGINIA					X	
WASHINGTON						X
WEST VIRGINIA						
WISCONSIN	L	L			X	X
WYOMING						

A = Rules apply only in certain areas  
L = Local regulations must meet state requirements  
S = State directly regulates development

X = State has regulatory standards for this special hazard  
+ = State will directly regulate if localities do not

- The Maine State Housing Authority made low interest loans available to flood victims after the April 1988 flood (a 500-year event in many areas). In a recent ice jam flood in Allagash, the Department of Economic and Community Development restructured the community development block grant and allowed the funds to be used to relocate and rebuild houses in compliance with the NFIP regulations.
- Minnesota's acquisition/relocation program, which includes helping localities obtain FEMA Section 1362 funds and making state funding available for local acquisition of floodprone areas, has been activated 10 times in the last four years.
- Maryland's acquisition/relocation program, which includes a state greenway program that provides for direct state acquisition of floodprone property and state matching grants for local acquisition of floodprone homes, has resulted in over 500 homes and 4 nonresidential structures being removed from the floodplain. The state actively encourages flood victims to relocate their structures.
- Florida's acquisition program focuses almost exclusively on acquisition of undeveloped lands in floodplains, which are then dedicated to open space and recreational use. There is very little or no state activity to acquire or relocate structures on improved lands.

Often specific acquisition/relocation projects are planned and implemented at the instigation of the locality; sometimes they are carried out in cooperation with federal and state agencies and private interests.

- County Flood Control Districts in Arizona will acquire floodprone property that is in imminent danger of flood or erosion damage or if such a purchase will enable completion of a flood or erosion control project.
- Frankfort, Kentucky, has a project underway to remove or retrofit about 200 homes in the floodplain and floodway of that city over the next several years.
- The Town of Cheraw, South Carolina, is co-sponsoring with the Corps of Engineers the acquisition and relocation of 11 structures in the floodplain of Wilson Branch, a tributary of the Pee Dee River.

### **Redevelopment Policies**

Sixteen states have taken specific action to take advantage of a postflood period to mitigate future damages by being sure that the reconstructed area is less prone to damages (table 9). Both the state and regional land use development plans in Florida, for example, contain policies to encourage limited rebuilding/redevelopment after a flood disaster. The state is currently developing a more detailed postdisaster recovery plan. In Utah, the State Disaster Relief Board has special appropriations for flood hazard mitigation projects submitted by local governments after Presidentially declared disasters. A few states have reconstruction regulations that are stricter than those of the NFIP. Kentucky, Minnesota, Montana, and Wisconsin treat buildings over 50% damaged as new buildings, so that reconstruction in the floodway is not allowed.

### **Standards for Road and Bridge Construction**

The minimum requirements of the NFIP restrict construction of roads and bridges only if they will create a floodway encroachment, and the Federal Highway Administration requires that any federal-aid highways meet the NFIP standards. Interstate highways, however, must meet higher standards. As shown in the last two

## 9. STATE POLICIES AND PROGRAMS FOR DEVELOPMENT AND REDEVELOPMENT

	Acquisition/Relocation		Redevelopment Policies*	Road & Bridge Standards*	
	Program	Funding		State Roads	Local Roads
ALABAMA ALASKA ARIZONA ARKANSAS CALIFORNIA	A	L L	R	X X X	X
COLORADO CONNECTICUT DELAWARE DISTRICT OF COLUMBIA FLORIDA	H  P	  S,L	M R M,R	X X X	 X X
GEORGIA GUAM HAWAII IDAHO ILLINOIS	   H	   L		   X	   X
INDIANA IOWA KANSAS KENTUCKY LOUISIANA	H   P	   S,L	R	X X X X	X X X X
MAINE MARYLAND MASSACHUSETTS MICHIGAN MINNESOTA	H H,P P,A H,P,A H,P	 S,L  L L	M M M R	X X X X	  X X X
MISSISSIPPI MISSOURI MONTANA NEBRASKA NEVADA	H,P		R	X X X X	X  X X
NEW HAMPSHIRE NEW JERSEY NEW MEXICO NEW YORK NORTH CAROLINA			M  M	X X  X	   X
NORTH DAKOTA OHIO OKLAHOMA OREGON PENNSYLVANIA				X X  X	   X
PUERTO RICO RHODE ISLAND SOUTH CAROLINA SOUTH DAKOTA TENNESSEE	A P	S L	M	X	
TEXAS UTAH VERMONT VIRGIN ISLANDS VIRGINIA	   P,A		M  R	X X X X	X
WASHINGTON WEST VIRGINIA WISCONSIN WYOMING	A		R	X X X	X

\*exceeding NFIP minimums

H = Help localities obtain 1362 funds

P = Give priority to floodplains in acquisition programs

A = Other acquisition program (erosion-prone structures, etc.)

L = Loans or grants for local purchase

S = Direct state purchase

R = Reconstruction of buildings more stringent than NFIP

M = Other policy or program



columns of table 9, 33 states also have established stricter rules for their state highways (down from 35 in 1988), and 18 for their local roads. These standards vary from state to state.

## DISASTER PREPAREDNESS AND ASSISTANCE

Every state has an emergency management or disaster preparedness agency for floods and other natural hazards. Every Gulf and Atlantic-coast state has a hurricane preparedness plan either completed or in progress. These plans are done in association with FEMA, the Corps of Engineers, and the National Weather Service, and are based on computer models of hurricane impacts and evacuation studies.

Most state floodplain managers are not involved in disaster preparedness, simply because of the way in which most state governments are generally organized. Many floodplain managers do, however, distribute information about preparing for floods, and these tasks are incorporated in table 14, page 34. State and local disaster assistance activities are discussed in the sections on Emergency Measures and Postflood Recovery, below.

## FLOODPROOFING

Forty-five states now provide information about floodproofing or retrofitting flood-prone buildings directly to interested property owners (table 10). It is usually in the form either of publications or responses to specific inquiries. Other outreach techniques that have been used include conferences and workshops, demonstrations, videos, and field trips.<sup>3</sup> Seven states directly fund floodproofing through grants or loans, down from eight states in 1988.

Because they have no pertinent in-house technical expertise, most communities rely on the assistance of state or federal agencies for floodproofing. In 20 states, at least some localities distribute information about floodproofing; in five states localities will fund floodproofing.

In spite of the attention devoted to floodproofing, there is still little solid evidence about the extent to which it is applied retroactively, or to the relative success of various techniques. As in previous years, about 1/3 of the states were not able to estimate the number of retroactively floodproofed structures in their jurisdictions. Of those that did give an estimate, 12 thought there were fewer than 50 floodproofed buildings in each of their states, and 8 estimated the number to be between 50 and 1,000. Only five state respondents thought that there were more commercial structures retrofitted than residential ones; in all the other states with floodproofed structures, the vast majority were residences. Elevation in place was by far the most commonly applied technique, followed by berms, and then by elevation of utilities. Some anecdotal evidence of the success of a few measures is available:

- A few homes in Connecticut have been protected with low (1-3 foot) walls, fill, and drainage mechanisms with the existing foundations and permanent closures of low openings.
- Levees and gate closures have worked well for Keystone Steel in Bartonville, Illinois.

---

<sup>3</sup>Some of the information about state and local floodproofing efforts came from a summary of a survey conducted by the Floodproofing/Retrofitting Committee of the Association of State Floodplain Managers in 1992.

## 10. STATE AND LOCAL FLOODPROOFING ACTIVITIES

	State			Local	
	Information and Technical Assistance	Publications	Funding*	Information	Funding*
ALABAMA	X				
ALASKA	X	X			
ARIZONA	X				
ARKANSAS	X				
CALIFORNIA	X				
COLORADO	X	X		X	
CONNECTICUT	X			X	
DELAWARE	X			X	
DISTRICT OF COLUMBIA	X				
FLORIDA	X				
GEORGIA	X	X			
GUAM		X			
HAWAII	X				
IDAHO	X	X	X	X	
ILLINOIS	X				
INDIANA	X	X		X	X
IOWA	X				
KANSAS	X			X	
KENTUCKY	X	X			
LOUISIANA	X				
MAINE	X		X		
MARYLAND	X			X	X
MASSACHUSETTS	X	X		X	
MICHIGAN	X		X	X	
MINNESOTA	X				
MISSISSIPPI		X	X	X	X
MISSOURI	X			X	
MONTANA	X				
NEBRASKA	X			X	
NEVADA	X				
NEW HAMPSHIRE				X	
NEW JERSEY	X			X	X
NEW MEXICO					
NEW YORK	X				
NORTH CAROLINA					
NORTH DAKOTA	X				
OHIO	X			X	
OKLAHOMA	X				
OREGON		X	X		
PENNSYLVANIA	X				
PUERTO RICO	X	X			
RHODE ISLAND		X			
SOUTH CAROLINA	X			X	
SOUTH DAKOTA	X				
TENNESSEE	X				
TEXAS	X	X	X	X	
UTAH	X	X		X	
VERMONT	X				
VIRGIN ISLANDS				X	
VIRGINIA	X				
WASHINGTON	X				
WEST VIRGINIA		X	X	X	X
WISCONSIN	X				
WYOMING	X				

\*Grant or loan, but does not include community development block grants or other general-purpose programs that may be used to fund floodproofing efforts

- Several structures in the vicinity of Green Bay, Wisconsin, have backflow prevention valves that prevented sewer surcharging into basements during the 1990 floods.

## FLOOD FORECASTING AND WARNING SYSTEMS

As shown in table 11, 32 states collect such warning data as rainfall, streamflow, snow pack, and reservoir levels—nine states more than in 1988. Twenty-three states operate flood warning systems (up from 20 in 1988), typically for just a few watersheds rather than for the whole state.

States are also helping set up local or regional warning systems. Thirty-six states now provide information or technical assistance, compared to 27 in 1988, and 20 now provide funding for local warning systems, up from 14 three years ago.

Virtually all floodprone communities have access to NWS severe weather warnings. Even the smaller communities have some sort of response capability, although it may simply be the routine emergency measures taken by the fire and police departments. In general, however, only frequently (or recently) flooded communities and those on the coast have adequate flood or hurricane response plans.

## 11. STATE ACTIVITIES TO PROVIDE FLOOD WARNINGS

	Data Collection	State-operated Warning System*	Help Locals Develop System	
			Information	Funding
ALABAMA	X		X	
ALASKA	X**	X	X	X
ARIZONA	X	X	X	
ARKANSAS				X
CALIFORNIA	X	X	X	
COLORADO	X	X	X	X
CONNECTICUT	X	X	X	
DELAWARE	X			
DISTRICT OF COLUMBIA				
FLORIDA	X	X		
GEORGIA				
GUAM				X
HAWAII	X	X	X	
IDAHO			X	
ILLINOIS	X			
INDIANA	X		X	X
IOWA			X	
KANSAS		X	X	
KENTUCKY	X		X	X
LOUISIANA				
MAINE	X			X
MARYLAND		X	X	X
MASSACHUSETTS			X	
MICHIGAN	X		X	X
MINNESOTA	X	X		
MISSISSIPPI	X		X	X
MISSOURI			X	
MONTANA				X
NEBRASKA	X			
NEVADA				
NEW HAMPSHIRE	X	X		X
NEW JERSEY	X	X	X	
NEW MEXICO	X	X		
NEW YORK	X		X	X
NORTH CAROLINA	X	X	X	
NORTH DAKOTA				
OHIO	X	X	X	X
OKLAHOMA				
OREGON		X	X	X
PENNSYLVANIA	X			
PUERTO RICO	X	X		
RHODE ISLAND			X	
SOUTH CAROLINA	X		X	
SOUTH DAKOTA	X	X	X	
TENNESSEE				
TEXAS			X	X
UTAH	X	X	X	
VERMONT				
VIRGIN ISLANDS			X	
VIRGINIA	X	X		
WASHINGTON			X	X
WEST VIRGINIA	X	X	X	
WISCONSIN	X	X	X	
WYOMING	X		X	

\*Besides those of the National Weather Service  
 \*\*Alaska operates a tsunami warning system.

## ACTIVITIES TO MODIFY FLOODING

Structural projects, intended to alter the nature of the flooding itself, have been an historically popular approach to flood problems. Table 12 summarizes the status of this strategy among states today. Thirty-two states have programs to plan, construct, or implement some kinds of structural control measures, sometimes in cooperation with federal projects. A total of 36 states gives technical assistance to communities that includes advice about structural control alternatives, and 28 states provide full or partial funding for structural projects. All of these figures are slightly higher than they were in 1988.

Table 13 shows which structural measures receive what kind of attention at state and local levels. Twenty-three states regulate the construction of new dams; only seven states and territories do not have programs to periodically inspect dams to ensure that they are well maintained. Nineteen states have special regulations for the construction of levees, up from 13 in 1988.

Twenty-one states have standards for stormwater management, either for direct state regulation or for local compliance. The last four columns in table 13 show a varied array of state and local cooperation in specific measures to modify flooding. In some states all these techniques are left to local determination and implementation; in others the state takes a stronger role, setting standards or even carrying out the technique itself. Fourteen states make some funding available for one or more of these structural measures.

## 12. STATE ACTIVITIES TO MODIFY FLOODING

	Structural Projects*	Technical Assistance**	Project Funding***
ALABAMA	X	X	X
ALASKA		X	
ARIZONA	X	X	X
ARKANSAS	X	X	X
CALIFORNIA	X	X	
COLORADO	X	X	X
CONNECTICUT	X	X	X
DELAWARE	X	X	X
DISTRICT OF COLUMBIA			
FLORIDA	X	X	
GEORGIA		X	X
GUAM			
HAWAII	X	X	X
IDAHO	X	X	
ILLINOIS	X	X	X
INDIANA	X	X	X
IOWA			
KANSAS	X		
KENTUCKY		X	X
LOUISIANA	X	X	X
MAINE		X	
MARYLAND	X	X	X
MASSACHUSETTS	X	X	
MICHIGAN	X	X	
MINNESOTA	X	X	X
MISSISSIPPI			X
MISSOURI			
MONTANA		X	
NEBRASKA		X	X
NEVADA	X		X
NEW HAMPSHIRE			
NEW JERSEY	X		X
NEW MEXICO			
NEW YORK	X	X	X
NORTH CAROLINA	X	X	X
NORTH DAKOTA	X	X	X
OHIO	X	X	X
OKLAHOMA	X	X	X
OREGON			
PENNSYLVANIA	X	X	X
PUERTO RICO	X	X	X
RHODE ISLAND			
SOUTH CAROLINA			
SOUTH DAKOTA			
TENNESSEE		X	
TEXAS	X		
UTAH	X	X	X
VERMONT			
VIRGIN ISLANDS			
VIRGINIA	X	X	X
WASHINGTON	X	X	X
WEST VIRGINIA	X	X	
WISCONSIN		X	
WYOMING			

\*Of any kind; planning, construction, and/or implementation

\*\*In planning for flood control, flood hazard mitigation, or both

\*\*\*Full or cost-share

### 13. STRUCTURAL MEASURES USED BY STATES AND LOCALITIES

	Dams		Regulate Levees	Stormwater Management	Channel Clearance/ Alteration	Onsite Retention	Land Treatment	High-flow Diversions
	Safety Inspections	Regulate New Construction						
ALABAMA	S				L	L	L	
ALASKA	S		S		L	L	L	L,R
ARIZONA	S	S			F,L	L	L	L
ARKANSAS	S	S	S					
CALIFORNIA	S							
COLORADO	S	S		M				
CONNECTICUT	S			R	S,F,R,L			
DELAWARE	S			R	R	R	R	R
DISTRICT OF COLUMBIA				M	L	L	L	L
FLORIDA	S		S					
GEORGIA	S	S		R	L	R,L		
GUAM								
HAWAII	S				S,F,R,L			R
IDAHO	S	S	S				F	
ILLINOIS	S	S	S		S,F,R,L	R		R
INDIANA	S				S,F,R,L		S,F	
IOWA	S				R	L	L	R
KANSAS	S		S		R,L	F,R,L	L	F,R,L
KENTUCKY	S	S	S		R	L	L	R
LOUISIANA	S				S,R,F,L	L	L	S,F
MAINE				R	R	R		
MARYLAND	S	S	S	R,M	R	R	L	R
MASSACHUSETTS	S	S	S		S,R	S,R	S,L	
MICHIGAN	S	S	S		F,R,L	F,R,L	F,L	F,R,L
MINNESOTA	S	S	S	R				
MISSISSIPPI	S			R,M				
MISSOURI	S			M				
MONTANA	S				R,L	R,L	F	R
NEBRASKA	S					L	L	L
NEVADA								
NEW HAMPSHIRE	S							
NEW JERSEY	S	S		M	F,R,L	R,L	L	L
NEW MEXICO	S							
NEW YORK	S	S		M	F,L	F,L	F,L	F,L
NORTH CAROLINA	S							
NORTH DAKOTA	S		S		F,L	L	F,L	F
OHIO	S	S	S	M	F,L	L		F,L
OKLAHOMA	S	S			S,F	S,F		
OREGON	S							
PENNSYLVANIA	S		S	M	F,R	R,L	L	
PUERTO RICO	S	S	S	R	S,F,R,L	S,R	S,F	S,F
RHODE ISLAND	S				R	L	L	
SOUTH CAROLINA	S			R	L	L	L	L
SOUTH DAKOTA	S							
TENNESSEE	S							
TEXAS	S	S	S					
UTAH	S	S	S		R,L	R,L	R,L	R,L
VERMONT	S	S			R			
VIRGIN ISLANDS				R				
VIRGINIA	S	S		M	S,R,F,L	S,R,L	F,L	L
WASHINGTON	S	S		M	F	F		
WEST VIRGINIA	S	S			S		S	S
WISCONSIN	S	S	S	M	R,L	R,L	R,L	R,L
WYOMING	S	S			R	L		

S = State conducts activity, at least in some areas  
R = State regulates, at least in some situations  
M = State sets standards for local regulation

L = Local initiative and implementation  
F = State funds (full or cost-share)





# ACTIVITIES TO MODIFY THE IMPACT OF FLOODING

## INFORMATION AND EDUCATION

Table 14 displays five types of floodplain information and education activities carried out by the states: replying to specific inquiries; publishing manuals, handouts, or similar written materials; conducting training workshops or conferences; issuing press releases; and producing or distributing video tapes. Each column indicates the recipients of the various kinds of information.

Almost every state is active in informing and educating local officials about floodplain management, usually those responsible for enforcing the local building codes (see previous section on assisting local programs). Thirty-two states maintain a list of the local floodplain management administrators in the state, and 20 of them make the list available for others' use, either in a routine distribution or upon request. Maine videotaped a workshop for local code enforcement officers for review by those who could not attend. The Ohio Department of Natural Resources has put together an interdisciplinary "stream team" to provide guidance to localities on multi-objective management of river corridors.

The general public and owners of floodprone property (column 2) are another large group that receives information from the state. Twenty-five states issue press releases about flood hazards, awareness activities, or similar flood-related issues. Of the states that do not issue public statements, many said they did not have staff resources (time or expertise) to do so. A few indicated that their agency's policy did not emphasize public relations. Hawaii and Arizona both consider the press releases a matter best handled at the local level, but Arizona staff will assist the localities in compiling them.

Property owners need information about the NFIP, floodproofing, emergency preparedness, and other techniques for protecting themselves from flood loss. Many states that advise property owners use publications, which not only helps reach a large audience but also avoids the common concern about the state's liability if the state gives specific advice directly to a property owner who is later flooded.

Thirty-three states provide information to building contractors. This usually comes in the form of answering specific questions, and next most often by providing publications or holding training sessions. Six states use videotapes (produced by FEMA or by the state itself) to convey information about flooding to building contractors.

Insurance agents and mortgage lenders also receive information from the states, mostly in response to direct inquiries. Ten states conduct training sessions for real estate agents or lenders. Most states will answer questions from the public about flood insurance, and several have published manuals or handouts about the NFIP.

## 14. STATE PROGRAMS FOR FLOODPLAIN INFORMATION AND EDUCATION

	Local Officials	Public & Property Owners	Building Contractors	Insurance Agents & Mortgage Lenders	Public Inquiries about Insurance
ALABAMA	I,T,L	I,N	I,T		I
ALASKA	I,T,P,L+	I,V,N,P	I,T	I,T	I
ARIZONA	I,T,P,L+	I,V	I,T,P,V		I
ARKANSAS	I,T,P,L+	I	I,P	I	I
CALIFORNIA	I,T,P	I,T,P		I,T	I,T,P
COLORADO	I,T,P,L+	I,T,P,N	I,P	I	I
CONNECTICUT	I,T,P	I		I	I
DELAWARE	I,T,L+,V	I,N	I,T,V	I	I
DISTRICT OF COLUMBIA	L	I,N	I,P		I
FLORIDA	I,T,L+		I,T,P	I	I
GEORGIA	I,T,P,L	I,P	I,T,P	I,T,P	I,P
GUAM					
HAWAII	I,T	I	I,P	I	I
IDAHO	I,T,P,L+	I,N		I	I
ILLINOIS	I,T,P,L	I,P,N	I,T,P	I	I,P
INDIANA	I,T,L	I,P,V,N	I	I,P	I,P
IOWA	I,T	I		I	I
KANSAS	I,T,L+	I	I		I,P
KENTUCKY	I,T,P,L+	I,T,P,N	I,T,P	I	I,P
LOUISIANA	I,T,P,L+	I,P	I,T,P,V		I,P
MAINE	I,T,P,V	I,N	I,T,P	I	I
MARYLAND	I,T,P,L	I,P			
MASSACHUSETTS	I,T,P,L	I,P	I,T	I	I
MICHIGAN	I,T,P,L	I,P,N	I	I,P	I,T,P
MINNESOTA	I,T,P,L	I,P,N	I,T,P	I	I
MISSISSIPPI	I,T,P	I,P,N	I,T,P,V	I,T,P	I,T
MISSOURI	I,T,P	I,T,P			P
MONTANA	I,T,P,L+	I,P,V,N	I,P	I,T	I,P
NEBRASKA	I,T,P	I,P,N	I,T,P,V	I,T	I,T
NEVADA	I,L+			I	I
NEW HAMPSHIRE	I,T				I
NEW JERSEY	I,T	I,T,N		I	I
NEW MEXICO					I
NEW YORK	I,T,P,L+	I,N	I	I	I
NORTH CAROLINA	I,T,P	I		I,T	I
NORTH DAKOTA	I,T,P,L+	I		I	I
OHIO	I,T,P,L	I,N	I,T,P	I	I
OKLAHOMA	I,T,P,L+	N	I	I	I,P
OREGON	I,T				
PENNSYLVANIA	I,T,P,L,V	I,P,V	I,P		I,P
PUERTO RICO		I,T,P	I,T,P	I,T,P	
RHODE ISLAND	I,T,P,L+	I	I,P	I	I
SOUTH CAROLINA	I,T,P,L+	I,T,P,N			I
SOUTH DAKOTA	I,T,L+			I	I
TENNESSEE	I,T	I			I
TEXAS	I,T,P,L+	I,P		I,T	I,P
UTAH	I,T,P,L	I,P,V,N	I,P,V	I,T	I
VERMONT	I,T,P	I	I	I	I
VIRGIN ISLANDS			I		I
VIRGINIA	I,T,P	I,T,P,N		I,P	I,P
WASHINGTON	I,T,P,L	I,N		I	I
WEST VIRGINIA	I,L	I		I	I
WISCONSIN	I,T,P,L+,V	P,N	P		I
WYOMING	I,L	I,N	I	I	I

I = Provides information in response to inquiries  
P = Issues publications or manuals  
L = Maintains list of local floodplain administrators  
+ = Makes list available to others

T = Holds training workshops or conferences  
N = Issues news releases  
V = Provides videotapes

Overall, the provision of information and education by the states has been expanded in the last three years, especially in the area of helping property owners and the general public. Only two states indicated that they had stopped providing a certain type of informational or educational service, and those cuts were minor.

Localities usually do not actively promote their floodplain management efforts or the NFIP. There are exceptions, however. Some localities have notification programs to let potential property owners know about (and to remind existing residents of) the flood hazard. Two Ohio communities—Marietta and Reynoldsburg—recently prepared short brochures explaining the flood hazard and their regulatory programs. Marietta's explains the basic building and zoning regulations and how the floodplain permit fits in, and what must be done to obtain one; Reynoldsburg's brochure targets the floodplain specifically, and includes a question-and-answer section. The City of West Carrollton, Ohio, recently sent a letter to all floodplain residents and property owners explaining the flood hazard, some of the city's stormwater management projects, the availability of flood insurance through the NFIP, and how to obtain more information from the city library.

## INSURANCE

Most state flood insurance activities (map assistance, information provision, and education) are discussed above or in the section on the NFIP. Besides providing information about the NFIP, most states promote the purchase of flood insurance. A few assist people who have questions about claims. Thirty states self-insure their own structures that lie in floodprone areas, but not all the states' self-insurance programs are NFIP-qualified. Vermont carries a policy with a private insurance company.

## TAX ADJUSTMENTS

Seven states (Georgia, Illinois, Indiana, Maryland, Minnesota, South Carolina, and Virginia) provide property, income, or inheritance tax adjustments for land that is kept undeveloped or is donated to a public agency. In none of those states had the provision been used specifically to prevent flood damages, although floodplain open space has been created partly as a result of the existence of those programs. These activities are described more fully in the section on using tax adjustments to restore or preserve the natural resources of floodplains, below.

## EMERGENCY MEASURES

Virtually all states assist localities and special districts during flood emergencies, although some only do so upon request (table 15). The assistance comes from different state agencies and takes dozens of different forms, including road and bridge repair; providing food and temporary housing; issuing warnings; communications; flood fighting; loaning equipment such as boats, trucks, and pumps; predicting flood elevations; helping with evacuation and cleanup; and conducting preliminary damage assessments. The Kentucky Department of Transportation supplies gravel and helps with road and bridge repair. The Florida Marine Patrol helps with evacuation; the Florida Department of Health and Rehabilitative Services provides food and temporary living assistance. The Ohio Emergency Management Agency conducts damage assessments. The Idaho Bureau of Disaster Services helps localities in flood fighting.

## 15. FLOOD EMERGENCY AND RECOVERY ACTIVITIES

	During Emergency Phase		For Recovery	
	Assist Localities or Special Districts	Assist Federal Agencies	Financial Assistance in State-Declared Disaster	Technical Assistance
ALABAMA	X	X	L,I,B,G,A,M	X
ALASKA	X	X	L,I,G	X
ARIZONA	X	X	L,G,A	X
ARKANSAS	X	X	L,I,B,G,A	X
CALIFORNIA				
COLORADO	X	X	L,A	X
CONNECTICUT	X			X
DELAWARE	X	X	I,B,A	X
DISTRICT OF COLUMBIA	X	X	L,I,B,G,M	X
FLORIDA	X			
GEORGIA	X		L,A	X
GUAM				
HAWAII	X	X	L,I,B,G,A,M	X
IDAHO	X			X
ILLINOIS				
INDIANA	X	X	L,G	X
IOWA	X		L,I,G,A	X
KANSAS	X	X	L,G,A	X
KENTUCKY	X	X	L,M	X
LOUISIANA	X	X		X
MAINE	X	X	L,I,B,G,A	X
MARYLAND	X		L,G	X
MASSACHUSETTS	X		L,G	X
MICHIGAN	X	X	L,I,A	X
MINNESOTA	X	X	L,A,M	X
MISSISSIPPI	X	X	I,A	X
MISSOURI				
MONTANA	X	X	L,G	X
NEBRASKA	X		L,G	X
NEVADA	X		L,I,B,G	X
NEW HAMPSHIRE				
NEW JERSEY	X	X	L,G	
NEW MEXICO				X
NEW YORK	X			
NORTH CAROLINA				
NORTH DAKOTA	X		L,I,A	X
OHIO	X	X	L,M	X
OKLAHOMA	X	X	L,M	X
OREGON				
PENNSYLVANIA				
PUERTO RICO	X	X	L,I,B,G	X
RHODE ISLAND	X	X	L,I,B,G	X
SOUTH CAROLINA				
SOUTH DAKOTA	X	X	L,G	X
TENNESSEE				
TEXAS	X	X	L,G,M	X
UTAH	X		L,G,A	X
VERMONT	X	X	L,G,A	X
VIRGIN ISLANDS		X	A	X
VIRGINIA	X		L,G	X
WASHINGTON	X		L,I,B,G,A,M	X
WEST VIRGINIA	X		L,I,G,A,M	X
WISCONSIN	X	X	L,A	X
WYOMING	X		L,I,B,G	X

X = State provides this service  
 L = To local governments  
 I = To individuals  
 B = To businesses

G = Funds from Governor's emergency fund  
 A = Funds from special appropriations  
 M = Funds from other sources

About half the states work with federal agencies during Presidentially declared disasters. The most common types of assistance are helping staff and manage the Disaster Application Centers, and helping conduct disaster assistance surveys. Wisconsin helps federal agencies during floods by giving engineering advice about emergency measures and flood flow information. New Jersey and Maine conduct damage assessments and building inspections.

## POSTFLOOD RECOVERY

All states contribute some of the nonfederal share of assistance for Presidentially declared disasters. Thirty-eight states also provide assistance, usually out of a governor's emergency fund, in a state-declared disaster (compared to 28 in 1988). In most cases the funds go to local governments, but in some states provisions are made for loans, grants, or other relief for individuals and businesses. Financial assistance is sometimes provided through special appropriations (table 15).

Most states provide technical assistance to localities, businesses, and individuals in the postdisaster period. This help comes in the forms of handouts, manuals, workshops, on-the-spot assistance, training, and advice. The Maine Attorney General's Office distributes information about avoiding consumer fraud in the rebuilding effort. Several states actively help localities obtain federal funding for restoration. Delaware advises localities about beach restoration. Kentucky, Wyoming, Wisconsin, Virginia, and Michigan provide information on cleanup and safety procedures. Maryland can dispatch teams of engineers to help the local government issue emergency building permits. After six disaster declarations in 12 years, Puerto Rico developed an island-wide Natural Hazards Mitigation Plan, which aims to improve training, preparedness, and management at state and local levels.



## **ACTIVITIES TO RESTORE AND PRESERVE THE NATURAL AND CULTURAL RESOURCES OF FLOODPLAINS**

The Unified National Program for Floodplain Management calls for efforts to restore and preserve the water resources, living resources, and cultural resources of floodplains. Although floodplain management regulations have resulted in the preservation and protection of large amounts of floodplain lands throughout the nation, carrying out this strategy has not been the principal focus of most state and local floodplain management programs, which have been designed primarily to protect property and public health and safety instead. By the same token, protecting floodplains is not the principal goal of most environmental protection or natural resources agencies, which typically manage the state's natural resources wherever they happen to occur. As a result, most activities to restore and preserve the natural attributes of floodplains have been the result of cooperative programs or projects that involve several state or local agencies and/or other governmental and private entities. Local governments have been particularly important in these types of projects, largely because of the localized benefits that accrue. This section describes first, some cooperative efforts undertaken by states to protect floodplain resources; second, some locally initiated projects; third, ways in which each of the tools for the strategy of restoring and preserving the natural resources of floodplains is used at the state level; and finally, estimates by state floodplain managers of the status of the floodplain resources in their states.

### **STATE PROJECTS**

Table 16 shows some of the types of resource protection projects in which states have been involved. These projects take many forms, from simply providing technical assistance about floodplain management during the development of plans for protection efforts to full-scale funding and implementation. The most popular has been multi-objective management of watersheds or river corridors, a process that seeks to manage the functions, resources, and benefits of rivers and streams as complete systems, rather than treating only specific problems or jurisdictions. Multi-objective watershed management has been promoted by the federal government in recent years, and probably has received more state support than other projects because of that and because it is so inextricably linked to flood hazards. Twenty-two states have carried out multi-objective management activities in the last three years. The state of Oklahoma has been engaged in a cooperative project with the U.S. Army Corps of Engineers to provide hiking trails and horse trails along the Arkansas River. The next most popular projects, with 13 states participating, have been those related to wetlands. Kentucky's floodplain management staff is coordinating with the state's fish and wildlife group to restore a several-hundred acre wetland which had been filled and used as a tree farm for paper mill pulp; the restored wetland will be a wildlife refuge. Other projects included those geared specifically to a state's coastal area, and those that covered the whole range of resources for a specific floodplain.

## 16. COOPERATIVE PROJECTS TO PROTECT FLOODPLAIN RESOURCES

	MOM* of Watersheds	Forestry	Wetlands	Fish & Wildlife	Water Quality	Other
ALABAMA	X	X	X	X	X	
ALASKA	X			X	X	
ARIZONA				X	X	
ARKANSAS	X				X	
CALIFORNIA						
COLORADO			X	X		
CONNECTICUT						
DELAWARE						
DISTRICT OF COLUMBIA						
FLORIDA	X					
GEORGIA	X	X	X	X	X	
GUAM						
HAWAII						
IDAHO						
ILLINOIS						
INDIANA			X	X		
IOWA			X			
KANSAS			X	X		
KENTUCKY	X			X		
LOUISIANA	X			X	X	
MAINE	X					
MARYLAND	X					
MASSACHUSETTS			X			X
MICHIGAN	X	X	X	X	X	X
MINNESOTA	X	X	X	X	X	X
MISSISSIPPI			X			
MISSOURI						
MONTANA	X					
NEBRASKA						
NEVADA						
NEW HAMPSHIRE						
NEW JERSEY	X					
NEW MEXICO						
NEW YORK	X					
NORTH CAROLINA						
NORTH DAKOTA						
OHIO	X					
OKLAHOMA	X		X			X
OREGON						
PENNSYLVANIA	X					
PUERTO RICO						
RHODE ISLAND						
SOUTH CAROLINA						
SOUTH DAKOTA						
TENNESSEE						
TEXAS	X		X	X	X	X
UTAH	X	X	X	X	X	
VERMONT						
VIRGIN ISLANDS						
VIRGINIA	X					
WASHINGTON	X					
WEST VIRGINIA						
WISCONSIN	X				X	X
WYOMING						

\* Multi-objective management

X = State floodplain management agency works with other state, local, regional, or federal agencies or other entities on this kind of project



## LOCAL PROJECTS

Locally initiated projects to restore and preserve the natural resources of floodplains have been numerous and impressive. In some cases the motivation for such programs was a combination of desire to reduce losses, restrict development and manage resources. In many the desire for an open space or park was combined with a desire to eliminate a chronic flooding problem. In a few localities outspoken citizens and flood victims acted as leaders to get the projects implemented.

- Anchorage, Alaska, has greenbelts along many urban creeks and wetlands protection areas designated as critical habitats. The greenbelts have miles of bike paths that double as ski trails in the winter.
- King County, Washington, has passed a sensitive areas ordinance to protect some of its floodplain.
- Various local governments in Michigan, Ohio, Pennsylvania, and South Carolina have acquired their floodprone areas for recreation and open space.
- In Chilhowie, Virginia, floodprone structures were relocated and the vacant land was established as a park.
- Many Maryland and Pennsylvania localities have used open space and conservation district zoning in their floodplains.
- Evanston, Wyoming, has established a city park within its Bear River Beautification Project; Cheyenne, Wyoming, has created a greenway.
- Several Kentucky local governments have invested in multi-objective management for streams and associated floodplains, and have adopted ordinances to severely restrict random development in those corridors.
- Some Idaho communities have 100-foot setbacks from the river's floodway boundary.
- Seven counties in southeast Wisconsin prohibit all development in the entire floodplain; Milwaukee County is buying all its floodplain land and removing the structures.
- Greenbelts are becoming popular in localities in Utah.
- Cass County, North Dakota, is working toward establishment of a natural park along the Red River of the North.
- The principal developer of Peachtree City, Georgia, deeds all floodplains and wetlands over to the city to be used as part of their natural city park lands. The City has over 50 miles of bike trails in these areas.

## TOOLS USED AT THE STATE AND LOCAL LEVELS TO PRESERVE AND RESTORE THE NATURAL AND CULTURAL RESOURCES OF FLOODPLAINS

### Regulations

Table 17 shows the regulatory approaches used to protect the natural and cultural resources of floodplains. When they review permits, 36 states examine the natural qualities of the floodplain that would be affected by proposed projects. In those states, either the floodplain management agency conducts the review, or it circulates the permit requests to other appropriate agencies. For example, in Florida, all proposed construction or development seaward of the "coastal construction control line" is reviewed by the floodplain management personnel for its impact on the beach and dune system before a permit is issued. The Maryland floodplain management staff routinely sends certain types of permit applications for activities in nontidal floodplains to other state units for their comments and recommendations, which typically are included in the floodplain permit or project design.

Wetlands are the most widely regulated floodplain resource, with 43 states having some kind of regulatory controls in place, either at the state or local level. About one third of the states have regulations covering floodplain habitat and open space. Additional regulations in some states protect other natural resources of floodplains. Delaware, Massachusetts, New York, and Virginia all have state or local regulations to protect coastal features such as dunes, barriers, bluffs, and beaches. Hawaii, Louisiana, Maine, and Minnesota have regulations to protect other natural aspects of their coastal areas. Florida regulates aquifer recharge areas; Hawaii regulates stream channels, Kentucky and New Jersey regulate wild or scenic rivers.

### Development and Redevelopment Policies

The main kinds of state resource protection programs that affect or include floodplains are listed in table 18, along with a tally of the states that participate in each. The programs themselves vary, of course, and may be composed of an array of techniques directed toward a particular resource, such as habitat for an endangered species, or natural protective features like dunes and beaches. The techniques employed may range from regulation of development that could affect the resource, to formal or informal policies that promote protection without actually requiring it, to funding public purchase of land in order to fully protect the resource. Examples of some of these programs are presented in the sections of this report describing State and local projects, acquisition and relocation, and regulatory standards that exceed NFIP minimums.

An interesting and complicating aspect of the development and redevelopment programs is that in any given state the programs may each be housed in separate agencies. For example, among the states, wetlands management programs are usually housed in an agency for natural resources or environmental quality, but in some states the wetlands programs can be found under the water resources commission or an agency for marine resources. State programs to protect rare and endangered species are housed in departments for environmental conservation or quality, under the fish and wildlife department, within a biological survey at a state university, in parks and recreation, or even under a department for economic and community development. This situation makes intrastate coordination of these programs vital (see subsection on Administrative Measures, below).

States have a wide variety of techniques for protecting and restoring the numerous resources of natural floodplains. Virginia's floodplain program specifically promotes open space use of floodplains, multi-objective management for resources; the state also has a natural heritage reserve program and a conservation easement

## 17. REGULATORY APPROACHES FOR THE NATURAL RESOURCES OF FLOODPLAINS

	Permit Review	Wetlands	Habitat	Open Space	Other Resources
ALABAMA	X	AS	M	M	
ALASKA	X	A,L	M		
ARIZONA	X				
ARKANSAS	X	F			
CALIFORNIA		S			
COLORADO	X	L	L		
CONNECTICUT		AS+,AL			
DELAWARE	X	+ S			S
DISTRICT OF COLUMBIA	X	S,L	S	S	S
FLORIDA	X				
GEORGIA		A			
GUAM					
HAWAII		S			S
IDAHO					
ILLINOIS	X				S
INDIANA	X	AS	M		
IOWA			S		
KANSAS	X	F			
KENTUCKY		S			S
LOUISIANA	X		S	S	S
MAINE	X	S	M	M	S
MARYLAND	X	AS,L	M	M	
MASSACHUSETTS	X	S,L	M	M	S
MICHIGAN	X	S	S	S	S
MINNESOTA	X	S	M	M	S
MISSISSIPPI	X	AS			
MISSOURI					
MONTANA	X	F			
NEBRASKA	X				
NEVADA	X	I	I		
NEW HAMPSHIRE		S			
NEW JERSEY	X	S	M	M	S
NEW MEXICO					
NEW YORK	X	AS			S,L
NORTH CAROLINA		AS			
NORTH DAKOTA		AS			
OHIO	X	I	I	I	
OKLAHOMA	X	AS			
OREGON		L			
PENNSYLVANIA	X	S,I			
PUERTO RICO	X	S	S	S	
RHODE ISLAND	X	S			
SOUTH CAROLINA	X	S			
SOUTH DAKOTA		S			
TENNESSEE					
TEXAS	X	S	I	I	
UTAH	X	S	S		
VERMONT		S			
VIRGIN ISLANDS	X	F			
VIRGINIA	X	A,S	L		L
WASHINGTON	X	L			
WEST VIRGINIA	X				
WISCONSIN	X	L	M	M	
WYOMING	X	A			

X = State conducts this activity  
 S = State directly regulates development  
 A = Rules apply only in certain areas  
 L = Local regulations must meet state requirements

+ = State will regulate directly if localities do not  
 F = State regulates to federal standards  
 I = Regulations are at local initiative  
 M = Mix of federal, state, regional, or local standards

## 18. STATE PROGRAMS AFFECTING THE NATURAL RESOURCES OF FLOODPLAINS

	Wetlands Management	Natural Heritage Protection *	Wild & Scenic Rivers	Watershed Management	Lakeshore Management	Coastal Zone Management
ALABAMA		X				X
ALASKA	X	X	X	X		X
ARIZONA		X		X		
ARKANSAS		X	X			
CALIFORNIA						
COLORADO	X	X				
CONNECTICUT						
DELAWARE	X		X	X		X
DISTRICT OF COLUMBIA	X	X	X			
FLORIDA	X	X	X	X	X	X
GEORGIA		X	X	X		X
GUAM						
HAWAII	X	X	X			X
IDAHO			X	X	X	
ILLINOIS	X	X	X	X	X	
INDIANA	X	X	X			
IOWA						
KANSAS		X				
KENTUCKY	X	X	X	X		
LOUISIANA	X	X	X			X
MAINE	X	X	X	X	X	X
MARYLAND	X	X	X	X		X
MASSACHUSETTS	X	X	X	X	X	X
MICHIGAN	X	X	X		X	X
MINNESOTA	X	X	X	X	X	
MISSISSIPPI	X	X				X
MISSOURI						
MONTANA	X	X	X	X		
NEBRASKA		X				
NEVADA	X	X	X	X	X	
NEW HAMPSHIRE						
NEW JERSEY	X	X	X	X		X
NEW MEXICO						
NEW YORK	X	X	X			X
NORTH CAROLINA						
NORTH DAKOTA	X		X			
OHIO	X	X	X	X	X	X
OKLAHOMA	X	X	X	X	X	
OREGON						
PENNSYLVANIA	X	X	X			X
PUERTO RICO	X	X	X		X	X
RHODE ISLAND	X	X		X		X
SOUTH CAROLINA	X	X	X	X	X	X
SOUTH DAKOTA						
TENNESSEE						
TEXAS		X				X
UTAH						
VERMONT	X	X				
VIRGIN ISLANDS	X	X				X
VIRGINIA	X	X	X	X		X
WASHINGTON	X		X	X	X	X
WEST VIRGINIA						
WISCONSIN	X	X	X	X	X	X
WYOMING	X	X				

\*Threatened and endangered species programs

program and a use assessment program. Florida has several land acquisition programs, such as Save Our Coast, Save Our Rivers, and Conservation and Recreational Lands. New Jersey has a Green Acres program for acquisition of floodprone lands. Georgia has the Chattahoochee River Corridor Protection Program. Maryland's programs for state parks and open space are targeted toward river corridors. Kentucky's Fish and Wildlife department has a funding pool to buy and preserve wetlands and other properties with valuable natural resources; its Wild Rivers Program establishes reaches of streams for preservation; and the state's Division of Waters WaterWatch Program is nationally recognized for its educational efforts. Massachusetts has a policy for the preservation of areas of historical significance, which sometimes includes floodplains.

## **Information and Education**

State efforts to inform and educate the general public and interested professionals about the natural resources of floodplains are generally included with other floodplain management education efforts or in the information campaigns of state agencies focused on protecting a particular resource that sometimes occurs in floodplains. But sometimes the educational activity deals solely with the floodplain management subject. For example, Utah produced a video about the development of the Virgin River Parkway in St. George. Multi-objective river corridor management has been the subject of several special state efforts: Virginia's floodplain management staff has made public presentations about river corridor management, Michigan publicizes its plans for management of natural rivers, Washington promotes multi-objective management in its guidebook for comprehensive planning for flood hazards, Oklahoma held four training workshops during 1991 at which multi-objective management was a topic, Louisiana helped plan and host a national workshop on river corridor management, Wisconsin includes the technique in its hazard mitigation training materials for local officials, and Georgia has written detailed scopes of work for a tri-state river basin study.

## **Tax Adjustments**

Although tax adjustments have not been specifically used to prevent flood losses, provisions that allow tax breaks for leaving land undeveloped or for donating it to a public agency have contributed to the preservation of floodplain resources. In Virginia, the acquisition of floodprone lands for open space is promoted by the state and sometimes achieved through existing open space acquisition programs that offer tax breaks as incentives. In South Carolina, undeveloped floodprone lands can be candidates for tax breaks if they lie in designated scenic river areas. Georgia passed a law in 1991 to allow tax breaks for "environmentally sensitive lands such as wetlands or designated floodplains" that remain undeveloped, although its purpose was to benefit the state's timber industry; it may result in the preservation of some floodplains.

## **Administrative Measures**

Two ways in which states use administrative techniques to preserve or protect the natural resources of floodplains are through executive orders and by establishing procedures to coordinate the functions of the various agencies that deal with specific resources.

Six states (Alaska, Arizona, Minnesota, Ohio, Washington, and Wyoming) have executive orders to govern activities in wetlands; Georgia has guidance criteria for wetlands; Florida has a state statute; and Virginia has a formal "wetlands policy." Massachusetts has an executive order for the protection of barrier beaches. Most of the rest of the resource protection activities have taken the form of regulations, as was shown in table 17.

Because of the wide variety of programs for protecting natural resources and the fact that such programs are housed in different agencies, to be effective states have had to adopt mechanisms for coordinating the various programs. Table 19 lists the states that have developed one or both of two kinds of coordination mechanisms. The first two columns shows that 26 states have a procedure for coordinating the management of natural resources (including floodplains), including a written policy, plan, or supporting documents and/or an oversight board or committee responsible for coordination and for resolving conflicts. For example, implementation of the Pennsylvania Environmental Master Plan is coordinated by several regulatory review boards and coordinating committees. Utah does not yet have a written plan (although one is being developed), but it does have the Utah Resource Development Coordinating Committee, which meets every month to review projects affecting or involving the state's natural resources. Virginia has just organized and hopes to expand an informal department-level roundtable. North Dakota likewise holds informal quarterly meetings with representatives from the state's natural resources agencies.

A second type of coordination is that carried out routinely by the floodplain management personnel in order to coordinate their activities with the activities, policies, and regulations of other federal, state, regional, or local agencies responsible for certain natural resources. In some states, the coordination consists of mutual review of permits, proposed actions, and other documents; in others, floodplain management personnel contact or are contacted by other state personnel on an ad hoc basis when a particular type of resource or concern is raised. A few states, like South Carolina, have joint state-federal permitting processes for protecting certain resources. In Georgia, a semiannual state/federal agency coordination meeting is held to discuss planned and ongoing activities. The last six columns of table 19 show the 32 states that routinely coordinate their floodplain management activities with those of at least some other agencies responsible for various resources that may occur in floodplains. An equal number of state floodplain management offices (25) coordinates with agencies responsible for fish and wildlife, wetlands, and water quality; somewhat fewer state offices coordinate with forestry agencies (10), and with agencies responsible for the whole range of natural resources (20).

## STATUS OF FLOODPLAIN RESOURCES

As a way of obtaining a rough idea of whether or not efforts to restore and preserve the natural and cultural resources of floodplains are being successful, the state personnel surveyed for this report were asked to assess the status of the quantity and quality of certain floodplain resources within their states. They were asked to estimate whether each of nine natural resources common to floodplains was "quickly being lost," "being lost," "holding steady," "being restored," or "quickly being restored." Their responses indicate that, on the whole, floodplain resources are holding their own against the various pressures that would contribute to their deterioration. When each resource is examined individually, however, some seem to be faring better than others (figure 1). Two states thought that their recreation opportunities and riverine access were being quickly restored. One state had a similarly positive estimate about its open space and another about its coastal access. Of course, these estimates do not account for the differing sizes of the states or for how widely the kinds and amounts of natural resources vary among the states. In addition, several of the respondents couched their responses with warnings that they were only making guesses. Nevertheless, the results do provide some insight into the relative status of some of the resources—which is otherwise almost completely unquantified—and confirm the sense that the strategy to preserve and restore the natural resources of floodplains is not a losing battle.

## 19. STATE COORDINATION OF NATURAL RESOURCES MANAGEMENT PROGRAMS

	Intrastate Coordination		Floodplain Management Office Coordination				
	Written Plan	Coordinating Committee	Forestry	Natural Resources	Wetlands	Fish & Wildlife	Water Quality
ALABAMA			X	X	X	X	X
ALASKA		X		X	X		X
ARIZONA		X		X			X
ARKANSAS	X	X		X	X	X	X
CALIFORNIA							
COLORADO		X			X	X	X
CONNECTICUT							
DELAWARE			X		X		X
DISTRICT OF COLUMBIA							
FLORIDA	X	X					
GEORGIA	X	X	X	X	X	X	X
GUAM							
HAWAII					X	X	X
IDAHO	X	X					
ILLINOIS							
INDIANA	X	X	X		X	X	X
IOWA						X	X
KANSAS			X			X	X
KENTUCKY				X	X	X	X
LOUISIANA		X					
MAINE	X	X					
MARYLAND	X				X	X	X
MASSACHUSETTS					X		
MICHIGAN	X	X	X	X	X	X	X
MINNESOTA			X	X	X	X	X
MISSISSIPPI					X		X
MISSOURI							
MONTANA	X	X		X		X	X
NEBRASKA						X	
NEVADA							
NEW HAMPSHIRE							
NEW JERSEY	X		X	X	X	X	X
NEW MEXICO							
NEW YORK	X	X					X
NORTH CAROLINA							
NORTH DAKOTA		X					
OHIO				X	X	X	X
OKLAHOMA	X	X		X		X	
OREGON							
PENNSYLVANIA	X	X	X	X	X	X	X
PUERTO RICO	X			X	X	X	
RHODE ISLAND							
SOUTH CAROLINA	X	X	X	X	X	X	X
SOUTH DAKOTA							
TENNESSEE							
TEXAS	X	X					
UTAH		X			X	X	X
VERMONT	X				X		
VIRGIN ISLANDS	X	X		X	X	X	X
VIRGINIA	X	X		X	X	X	
WASHINGTON				X	X	X	X
WEST VIRGINIA							
WISCONSIN		X		X	X	X	X
WYOMING							

Floodplain Resource	Quickly Being Lost	Being Lost	Holding Steady	Being Restored	Quickly Being Restored
<i>AQUATIC HABITAT</i>		***** ***	***** ***** ****	***** **	
<i>RIPARIAN HABITAT</i>	*	***** *	***** ***** *****	***** ****	
<i>RIVERINE ACCESS</i>	*	****	***** ***** **	***** *****	**
<i>RECREATION OPPORTUNITIES</i>		***	***** ***** ****	***** *****	**
<i>OPEN SPACE</i>	*	***** *****	***** ***** **	****	*
<i>INLAND WETLANDS</i>	*	***** ****	***** ***** *	*****	
<i>COASTAL WETLANDS</i>	*	*****	***** **	****	
<i>COASTAL ACCESS</i>	*	**	***** *****	****	*
<i>COASTAL HABITAT</i>	*	*****	***** *****	*	

Figure 1. State respondents' estimates of the status of the quality and quantity of floodplain resources within their own states. One symbol equals one state.



## CONCLUSION

The types and numbers of floodplain management activities undertaken by each state vary according to a number of factors, including the financial status of the state government and the regional economy, the types of flooding common to the area, the political situation, and prevalent attitudes toward regulation and resource preservation. Each state's program is unique: two or more states may have taken the same approach to a floodplain problem but for entirely different reasons and with different results.

Some generalizations can be made about what activities are more typical. (Note that the data presented here have not in most cases attributed a level of staff support, funding, or effectiveness to a state's participation in a given activity.) Almost all states help local governments in NFIP-related activities, conduct some kind of information and education program about flood hazards and about floodproofing, monitor the safety of dams and participate in other structural approaches, and regulate wetlands. More than half the states regulate or require localities to regulate floodplain areas to some standards stricter than those of the NFIP, provide disaster assistance to local governments and businesses, and have some kind of program to protect natural resources of floodplains. About one-third of the states do some floodplain mapping on their own.

Federal standards have been compelling local and, to a lesser extent, state governments to take certain measures to cope with flood hazard. In some cases, the state and/or local activity would not be taking place if not for the fact that it is required by the federal government; in other instances, complying with the federal requirements has been the first step that set the state or locality off on its own tailored effort. Federal standards are sometimes weaker than state ones. When asked whether any federal regulations or policies were contributing to damages in their jurisdictions, three states specifically mentioned the lack of a freeboard requirement in the NFIP standards (all three states had adopted their own freeboard requirements), and two states mentioned the failure of federal policy and programs to take future floodplain development into account. Two states explained that the granting of LOMRs works against their regulatory efforts, and three states mentioned the inadvisability of the NFIP's allowing fill in the flood fringe. The number of states (12) that have adopted less-than-one-foot-rise standards for their floodways demonstrates the extent of state misgivings about the adequacy of that federal standard. Eleven states explained that their problems lay not with the federal regulations themselves but with overall coordination among agencies and inconsistency in enforcement: Corps Section 404 and Section 10 permits were thought to be unevenly and sometimes inadequately enforced; the Federal Highway Administration was mentioned by three states as having overridden or ignored local flood hazard regulations and permitting requirements; the Farmers Home Administration and the Soil Conservation Service also had engaged in practices that one state thought were detrimental to flood loss reduction.

## SUMMARY OF CHANGES SINCE 1981

Information collected by the ASFPM about state activities in 1981, 1988, and 1991 shows that the variety of activities states undertake is becoming wider and that more states are participating in each of them. In fact, of all the state programs and activities for which information was gathered in both 1988 and 1991, only three showed a net decrease in participation: distributing NFIP maps, regulating special hazards, and funding floodproofing. In each case the decrease was small. For all the other programs, policies, and activities, a

net increase in participation was recorded. Occasionally one or two states had dropped an activity or two, but in each instance more states had added the measure to their programs, resulting in a net gain.

The biggest changes in state and local floodplain management have probably been in the area of restoring and preserving the natural resources of floodplains. Little information about these kinds of state and local programs was gathered in previous surveys, partly because of a perception that there was little activity to report, and partly because only during recent years have such activities been widely considered an integral part of floodplain management. The response to this survey indicates that that situation has changed dramatically in the past three years. Not only are a sizeable number of states participating in activities to restore and preserve the natural and cultural resources of floodplains, but many have identified the environmental benefits of floodplain management programs as the key to obtaining wide public support (see section on trends, below).

Between 1981 and 1988, there had been a dramatic increase in the number of states undertaking activities in support of the NFIP (see table 3), doubtless because of the introduction of FEMA's programs<sup>4</sup> to fund measures to help increase local capabilities in participating states. Since 1988, FEMA's assistance programs have continued, and even more states have undertaken such activities, but the increase was only about half that of the 1981-1987 period. The main reason for the slowed increase is probably that many states are already participating almost as fully as possible. Of the five activities on table 3 (excluding CRS, which was not in existence in 1988) that do not now have at least 66% participation, one requires legislative action (direct state enforcement of violations), two require considerable technical expertise (reviewing and approving the hydrology and hydraulics of new flood insurance studies), and one (making flood zone determinations) entails a risk for some state agencies of liability or of inappropriately overriding local authority. Another encouraging note is that among all the NFIP support activities surveyed in all the states and territories, only 13 were dropped since 1988, while 75 were added. Thus, the net increase is not a result of massive shifts in activity type or number from state to state, but rather indicates a steadily strengthening capability.

Note that simple participation in an activity does not reflect the level of state funding, the size of the staff devoted to implementing it, or the effectiveness of the activity. These factors continue to be difficult to assess. Table 20 shows the floodplain management budget and staffing levels estimated by states in 1981 and in 1991. These figures show a total of about 200 FTEs in 1981 and 177 in 1991. The apparent decline, which is not borne out by any other information, is probably the result of differing descriptions of floodplain management personnel in the 1981 and 1991 data. In 1981, floodplain management personnel were considered by some states to be those "involved" with floodplain management; the 1991 survey asked for the number of staff persons "specifically dedicated" to floodplain management—a much narrower category. Therefore, some of the FTEs counted in 1981 likely would not have been included under the 1991 definition. The budget figures tell a different story. State budgets in 1981 totalled a little over \$4 million, while 1991 budgets reached over \$14 million, a significant increase, even when inflation is taken into account (see table 1 for a breakdown of the source of these funds).

There was little difference from 1981 to 1991 in the types of agencies housing state floodplain management programs. In 1981, as today, 33 states housed their floodplain management programs in a department for natural resources, water resources, or environmental protection, and the spread among the other types of agencies was about the same as in 1991, with one exception. In 1981 nine states had assigned floodplain management and NFIP coordination to a state planning office; by 1991, all but three of those had been moved to another type of agency. Although in 19 states the floodplain management program appears to have shifted

---

<sup>4</sup>The State Assistance Program from FY1981 to FY1985 and the Community Assistance Program from FY1986 to the present.

20. STATE FLOODPLAIN MANAGEMENT PROGRAMS, 1981 vs. 1991\*

	1981		1991	
	Staff	Budget	Staff	Budget
ALABAMA	2	\$ 75,000	2	\$ 95,000
ALASKA	<1	0	1	—
ARIZONA	1	65,000	2.5	152,000
ARKANSAS	6	"limited"	1	85,334
CALIFORNIA	3.5	164,400	—	—
COLORADO	—	—	3	200,000
CONNECTICUT	2	35,000	—	—
DELAWARE	<1	—	5	300,000
DISTRICT OF COLUMBIA	4	33,000	1	25,000
FLORIDA	<1 +	—	4	246,999
GEORGIA	1	24,000	2	112,000
GUAM	—	—	—	—
HAWAII	—	—	3+	354,000
IDAHO	<1	0	1	77,333
ILLINOIS	19.5	1,200,000	22	> 150,000
INDIANA	6	100,000	8	—
IOWA	12.5	350,000	5.5	300,000
KANSAS	1.8	53,192	4+	769,000
KENTUCKY	9	280,000	7+	1,034,000
LOUISIANA	3	70,000	5.5	176,478
MAINE	—	—	2+	136,698
MARYLAND	—	—	5+	> 70,000
MASSACHUSETTS	1	"limited"	3	147,300
MICHIGAN	20	570,000	15.5	857,400
MINNESOTA	2+	200,000	4+	2,400,000
MISSISSIPPI	—	—	1	82,585
MISSOURI	1	"limited"	—	—
MONTANA	2	"limited"	2	100,000
NEBRASKA	3	144,000	3	157,000
NEVADA	<1	"limited"	1	64,841
NEW HAMPSHIRE	1	"limited"	—	—
NEW JERSEY	35	—	4	546,000
NEW MEXICO	1.5	5,000	—	—
NEW YORK	7.5	150,000	12	780,000
NORTH CAROLINA	6.5	—	—	—
NORTH DAKOTA	1	24,000	2.5	90,000
OHIO	2	45,000	4	190,000
OKLAHOMA	1	"limited"	1	122,964
OREGON	—	"limited"	—	—
PENNSYLVANIA	12	—	3	260,000
PUERTO RICO	0	0	1.5	—
RHODE ISLAND	1.5	14,000	—	45,900
SOUTH CAROLINA	<1	—	1	61,990
SOUTH DAKOTA	1	"limited"	0	—
TENNESSEE	—	—	—	—
TEXAS	3	80,000	3	216,000
UTAH	2	—	2	80,000
VERMONT	2	"limited"	1	75,000
VIRGIN ISLANDS	—	—	0	—
VIRGINIA	—	—	4	320,000
WASHINGTON	5	100,000	7	2,190,000
WEST VIRGINIA	1	20,000	0	0
WISCONSIN	19	400,000	17	1,108,000
WYOMING	<1	0	0	0

\*Because different definitions of "floodplain management personnel" were used in 1981 and 1991, direct comparisons of staff levels for those two years are unreliable.

Data for 1981 from Kusler (1982)

— = data not available

from one type of agency to another between 1981 and 1991, the net result in the distribution of the locations of the program was very little change. This suggests that most of the changes were due to governmental reorganizations and possibly to simple renaming of some agencies, rather than to a trend in the assignment of floodplain management responsibilities.

## TRENDS IN STATE AND LOCAL FLOODPLAIN MANAGEMENT

State involvement in floodplain management is increasing, and shows no signs of reversing itself. The same appears to be true of local action both to reduce flood damages and to restore and preserve the natural resources of floodplains, although increases in local activity may not be as dramatic or as well-documented.

State coordinators responding to this survey identified improved public awareness as the single most visible trend in floodplain management today. This improvement has taken several different forms. About a dozen states noted the increased attention given to flood hazards by the public. Of those, several linked the improvement to specific outreach programs. Utah attributes some of it to the addition of the Community Rating System; Mississippi to increasingly aggressive enforcement efforts by FEMA; and Ohio to more comprehensive enforcement by lenders of the mandatory purchase requirement. Arizona state and county fairs have been displaying flood hazard videos and printed materials; Colorado, Utah, and Virginia noted the effectiveness of their educational efforts. Maine's training program for code enforcement officials has improved awareness in that state.

Most compelling was the number of states that identified increased public awareness of environmental resources of all kinds, including floodplains. The tendency on the part of the public to endorse environmental protection—and the benefit to floodplain management of that endorsement—was noted by Arkansas, Colorado, Illinois, Kansas, Kentucky, Michigan, Mississippi, North Dakota, Oklahoma, Utah, and Virginia. The respondent from Virginia explained that "floodplain programs get more attention from local and regional governments and from private nonprofit organizations when they are linked with open space, scenic rivers, and the like."

A related trend is the increasing capability of local officials to manage their floodplain programs, along with a growing acceptance of the need to regulate land uses. Delaware, Idaho, Iowa, Kansas, Maryland, Minnesota, Vermont, and Wisconsin all described improved willingness and proficiency on the part of localities and their officials to learn about, implement, and enforce floodplain management programs. Vermont's coordinator explained that there is "much less objection to floodplain regulations than in the past; most people do not object to reasonable regulations." Improved mitigation planning and active efforts by local officials to discourage floodplain construction were mentioned by a couple of states. Nebraska noted a "tremendous" increase in local requests for technical assistance; Colorado made a similar observation. These trends suggest that local regulation of floodplains may be coming into its own.

This apparent trend is not universal, however. During 1991, Kansas and Wisconsin both weathered attempts to weaken or eliminate state regulatory authority over floodplain issues. In the state of Washington, a strong property rights movement succeeded in reducing state regulations that exceeded federal minimum standards. (New York's regulatory powers were diminished also, but that was a result of the state's financial status rather than a philosophical objection to regulation.) In addition, in both Minnesota and North Dakota, at least, there is still insufficient enforcement by small communities, along with continued attempts by property owners to "get around" the regulations. It is too soon to tell whether these are isolated instances of resistance or the beginnings of change.

Two other trends were noted by the states, both of them cyclical: the weather and the economy. States from all over the country noted that serious floods since 1988 have temporarily boosted the visibility and effectiveness of their programs. North Dakota and Pennsylvania, on the other hand, noted the lack of interest in floodplain management in their states, because of the absence of recent flooding. Pennsylvania noted that "the situation will change when the next big one hits." Budgetary woes were cited by eight states as having had a detrimental effect on their floodplain management programs; two states related the situation to the national recession, and one to falling energy prices.



## REFERENCES

Association of State Floodplain Managers 1989. *Floodplain Management 1989: State and Local Programs*. Madison, Wisconsin: Association of State Floodplain Managers, Inc.

Burby, Raymond J. and Steven P. French 1985. *Flood Plain Land Use Management: A National Assessment*. Studies in Water Policy and Management 5. Boulder, Colo.: Westview Press.

Federal Emergency Management Agency and Interagency Task Force on Floodplain Management 1986. *A Unified National Program for Floodplain Management*. FEMA 100. Washington, D.C.: Federal Emergency Management Agency.

Kusler, Jon A. 1982. *Regulation of Flood Hazard Areas to Reduce Flood Losses, Volume 3*. Washington, D.C.: U.S. Water Resources Council.

L. R. Johnston Associates 1992. *Floodplain Management in the United States: An Assessment Report*. Volume 2, Full Report. FIA/18. Prepared for the Federal Interagency Floodplain Management Task Force. Washington, D.C.: Federal Emergency Management Agency.

Natural Hazards Research and Applications Information Center 1992. *Floodplain Management in the United States: An Assessment Report*. Volume 1, Summary. Prepared for the Federal Interagency Floodplain Management Task Force. Washington, D.C.: Federal Emergency Management Agency.

Platt, Rutherford H., ed. 1987. *Regional Management of Metropolitan Floodplains, Experience in the United States and Abroad*. Program on Environment and Behavior Monograph 45. Boulder, Colo.: Institute of Behavioral Science, University of Colorado.





**Appendix A**

**STATE PROFILES**



## **ALABAMA**

State-level floodplain management activities in Alabama continue to fall into two categories: routine actions by state departments and agencies to comply with state regulations, and efforts to meet National Flood Insurance Program requirements. Federal assistance is provided by the Federal Emergency Management Agency under the Community Assistance Program.

As a result of a governor's executive order in 1991, the Office of Water Resources was created within the Alabama Department of Economic and Community Affairs. The governor's action provided additional emphasis on water and floodplain issues. The new office is charged with coordination of the development and protection of Alabama's water resources, including floodplain management. Floodplain management formerly was a function of the Planning Division.

A comprehensive program of floodplain management assistance is being carried out. This includes assessments of 30 communities to determine the adequacy of their floodplain management programs. Technical assistance was provided to help eliminate deficiencies. A total of 14 communities were aided in updating their local ordinances.

A visitor center is being completed at the Weeks Bay Estuary. This is significantly increasing public awareness of this protected wetland.

For more information, contact:

Randy Snider  
Alabama Department of Economic and Community Affairs  
Office of Water Resources  
401 Adams Avenue  
P.O. Box 5690  
Montgomery, Alabama 36103-5690  
(205) 242-5505  
FAX (205) 242-5515

## ALASKA

The Department of Community and Regional Affairs (DCRA) is the state coordinating agency for the National Flood Insurance Program. DCRA has seven regional offices throughout the state. During the past year, personnel in these offices have been receiving additional training about the variety of floodplain management assistance requests that so far have been handled by the Anchorage-based coordinating officer.

DCRA provides technical assistance to boroughs, cities, and villages in coping with floodplain management and erosion problems. Mortgage lender workshops, assistance in flood hazard determinations, and help for property owners, insurance agents, and developers are also provided. Specific activities conducted under a cooperative agreement with the Federal Emergency Management Agency include community assessment visits, community assistance contacts, publication of a newsletter, *Alaska Flood Report*, and constant assistance on ordinance revisions and updates.

Dealing with the Upton-Jones Amendment and erosion problems throughout the state continues. Detailed assistance has been provided to local governments and individuals trying to utilize the Upton-Jones provision to relocate or demolish structures undermined by erosion. Coping with condemnation requirements in local jurisdictions that lack uniform building codes, the associated land use issues and setback standards, and public awareness has been a primary task for the DCRA.

Anchorage has taken the lead in developing a revegetation guide for use in construction-related projects in southcentral Alaska. The city has become increasingly concerned about the lack of consistently applied revegetation guidelines associated with the permitting process. Vegetation along streams and lakes is particularly important for public health and safety, for recreation, for fish and wildlife, and for the health of the waterbody itself. Riparian vegetation also reduces erosion and stabilizes streambanks and lakeshores to prevent property loss. Municipal involvement in state and federal permit reviews has emphasized the need for appropriate revegetation measures, because no one state or federal agency is able to emphasize permit-associated revegetation efforts.

Numerous map revisions and amendments have been undertaken as culvert, bridge, and other urban drainage improvements occur in Juneau. The city has completed its wetlands protection ordinance and local wetlands management plan.

Alaska continues to maintain a statewide inventory of dams, classified according to the frequency with which they require inspection. The database includes information on the dam's height, size of reservoir, and location in relation to population and property. The state has the authority to require that dam owners correct any unsafe conditions discovered during periodic inspections.

For more information contact:

Christy L. Miller  
Department of Community and Regional Affairs  
Municipal and Regional Assistance Division  
333 West 4th Avenue, Suite 220  
Anchorage, Alaska 99501-2341  
(907) 269-4567  
FAX (907) 269-4520

## ARIZONA

The Arizona Department of Water Resources continues to hold quarterly workshops for local officials. During the past year three of these were held in different parts of the state in conjunction with meetings of the Arizona Floodplain Management Association. The fourth was a special workshop for a county's officials to encourage coordination with its floodplain administrator in issuing building permits in flood-prone areas. The state helped the county establish a procedure whereby the floodplain administrator reviews all permit applications for new construction or substantial improvements.

*The Handbook for Arizona Communities on Floodplain Management and the National Flood Insurance Program* continues to be a valuable part of the state's assistance efforts. It is updated annually. The Department of Water Resources no longer produces a newsletter on behalf of the Arizona Floodplain Management Association. Rather, it does a separate one so that information can be shared in a more timely manner.

State personnel are helping communities strengthen their floodplain ordinances to prevent unwise development in hazardous areas, e.g., alluvial fans and migrating channels. Several communities have modified their ordinances to include erosion zones and setbacks from migrating channels.

Flood control districts in the two counties with populations over 300,000 (Maricopa and Pima) are required by statute to prepare a review of their flooding problems every five years. A mitigation plan is required, taking into consideration the recommendations in the report. The smaller counties must make an assessment of their hazard areas and make a report to their flood control advisory board.

Most communities in Arizona have grading and drainage ordinances. New subdivisions are required to retain storm water. No more drainage is allowed to flow off property after development than did in its natural, undeveloped state. Single-lot development is required to retain its own storm water. All communities require that the lowest floor be one foot above BFE. Willcox, which is subject to shallow flooding, requires 18 inches. This seems to keep property damage to a minimum.

For more information, contact:

Terri Miller  
Arizona Department of Water Resources  
15 South 15th Avenue  
Phoenix, Arizona 85007  
(601) 255-1541

## **COLORADO**

Over the past three years the Flood Control and Floodplain Management Section of the Colorado Water Conservation Board (CWCB) has improved its computer capabilities, both for data management and for engineering applications. The state has continued to coordinate hydrologic and hydraulic analyses by federal, state, local, and private entities throughout the state. The section has tried valiantly to convince the Federal Emergency Management Agency of the need to cost-effectively revise FISs using all available resources. Updating of outdated maps is a priority for the state, even in the face of reduced FEMA funding. With various federal, state, local, and private entities, the staff helped supervise the design and construction of several structural projects. One interesting trend has been an increase in the number of subsurface drainage projects.

For some reason, real estate agents, lenders, insurance agents, and property owners have identified the CWCB as the place to phone for information related to flood determinations. The increase in phone calls has significantly impacted state staff.

The staff has participated actively in the Colorado Association for Stormwater and Floodplain Management and in the Colorado Natural Hazards Mitigation Council.

Several public education efforts have been conducted. The staff continued to publish newsletters on flood hazard management. The newsletter readership has been surveyed annually to obtain comments and ideas for improving the publication. The annual Flood Awareness Week activities, including a poster contest for school children (with the governor presenting awards) have continued. Section staff constructed a working hydraulic model demonstrating floodplain management concepts to be used for public education in schools.

Along with other western states, Colorado has continued working on ways to cope with flood problems peculiar to the arid West, such as the regulations and management of debris flows, alluvial fans, and unstable channels.

Through its role as coordinator of the Community Rating System initiative, Colorado now has one of the highest CRS participation rates in the nation.

For more information, contact:

Brian R. Hyde  
Flood Control and Floodplain Management Section  
Colorado Water Conservation Board  
721 State Centennial Building  
1313 Sherman Street  
Denver, Colorado 80203  
(303) 866-3441  
FAX (303) 866-4474

## **DELAWARE**

The Delaware Department of Natural Resources and Environmental Control recently added the Sediment and Erosion Control Program to its floodplain management efforts. This program requires that new development receive state approval for runoff, siltation of adjacent streams, and erosion.

The department continues to administer regulations governing beaches and construction within 1,000 feet of the ocean and Delaware Bay. Also, the state employs a full-time administrator for the Community Assistance Program to assist local communities in remaining compliant with National Flood Insurance Program building regulations.

For more information, contact:

Michael S. Powell  
Soil and Water Program Manager  
Division of Soil and Water Conservation  
Delaware Department of Natural Resources and Environmental Control  
Richardson and Robbins Building  
P.O. Box 1401  
Dover, Delaware 19903  
(302) 736-4411

## DISTRICT OF COLUMBIA

The District of Columbia entered the Emergency Program of the National Flood Insurance Program in 1976 under the provisions of D.C. Law 1-64, "The District of Columbia Applications Insurance Implementation Act." Final regulations setting standards for flood hazard control were promulgated in 1985.

Most of the designated flood hazard areas in the District lie along the Potomac River, Rock Creek, the Anacostia River, Oxon Run, and a number of small streams, and are essentially under the jurisdiction of the National Park Service. However, about 38 parcels in these areas are directly under local jurisdiction. The assessed premium for those properties is about \$313 million.

The Department of Consumer and Regulatory Affairs operates the program through the Environmental Control Division's Soil Resources Branch. A staff member from the Soil Resources Branch is designated by the mayor's office as acting state coordinator and is in charge of all matters relating to the District's program. Six staff members assist him on a part-time basis in daily operations. The District provides about \$25,000 annually for the program's operation.

The District's program emphasizes information dissemination. About 15-20 calls are received each month by citizens inquiring about flood insurance and regulations applicable to the purchase of properties in designated flood hazard areas. Efforts to reach the public were stepped up during 1991 by distributing Federal Emergency Management Agency brochures and with flash flood awareness workshops hosted by the Office of Emergency Preparedness, which also helps improve public participation by mailing brochures to citizens along with their water bills. An annual report to the mayor apprises him or her of the program's progress.

A major recent initiative was the installation of stream gages and telemetric equipment in Watts Branch, a tributary of the Anacostia River, for flash flood warning and emergency response.

For more information, contact:

Timothy J. KariKari  
Acting State Coordinator, National Flood Insurance Program  
Department of Consumer and Regulatory Affairs  
2100 Martin Luther King, Jr. Avenue, S.E., Room 307  
Washington, D.C. 20020  
(202) 404-1146  
FAX (202) 404-1150



## FLORIDA

The state assistance office for the National Flood Insurance Program is housed within the Department of Community Affairs, Division of Emergency Management. The office serves as a liaison between local governments and the Federal Emergency Management Agency in the implementation, administration, and enforcement of floodplain management regulations. Additionally, the office provides technical assistance to the NFIP constituency groups: residents, architects, builders and contractors, developers, engineers, land use planners, real estate agents, surveyors, insurance agents and brokers, and lending institutions. Finally, the office helps and encourages local governments to participate in the Community Rating System.

The CRS was well received by Florida's local governments because it recognizes many activities and efforts that were initiated by the state legislature in the Local Government Comprehensive Planning and Land Use Development Act. As such, many Florida local governments have already adopted provisions that now can be used to reduce the cost of annual insurance premiums.

Housing the state assistance office for the NFIP within the lead land use planning and emergency response agency is very important. It affords opportunities for significant and direct input to furthering flood loss reduction strategies.

For more information, contact:

Charles H. Speights  
Planning Manager  
State Assistance Office for the National Flood Insurance Program  
Division of Emergency Management  
Department of Community Affairs  
2740 Centerview Drive  
Tallahassee, Florida 32399-2100  
(904) 487-4915  
FAX (904) 488-6250

## GEORGIA

The Floodplain Management Office is organized as part of the Water Resource Management Program of the Environmental Protection Division of the Department of Natural Resources. The office functions primarily as a liaison between community officials and the Federal Emergency Management Agency in the administration of the National Flood Insurance Program. Community officials are aided in interpreting the federal regulations and in specific site location problems. Multi-community workshops have been carried out successfully; several communities in the state have requested them.

About 400-500 flood maps are distributed each month. Numerous phone calls are handled each day, ranging from insurance agents wanting zone information to simple complaints about flooding problems. Federally funded or permitted projects are reviewed along with specific state-funded projects such as the construction of schools, libraries, or parks. The office has recently automated its community status list, which is updated as needed, usually when new maps are printed or when communities are converted into the regular phase of the NFIP. The office also assists other state agencies with NFIP information.

The location of the floodplain office within the Environmental Protection Division enables coordination of reviews of projects within the comprehensive permitting process whereby water withdrawal, safe dams, wastewater, and other environmental permits are all issued by the same agency. This helps to ensure compliance with NFIP requirements, and also with Executive Order 11988.

All participating Georgia communities have adopted their own flood damage prevention ordinances and most have added freeboard requirements, with many exceeding two feet. Most communities perform an adequate job of floodplain management.

Georgia has traditionally been a state with strong home-rule attitudes; in fact, land use and zoning powers are constitutionally reserved to local governments. However, with rapid growth (fifth in the nation over the last decade), the need for state action in some land use matters has become clear. A governor-appointed Growth Strategies Commission is looking at the numerous challenges posed by the rapid growth. The commission is expected to recommend mandatory local land use plans with state overview. Floodplain management will certainly be an integral part of that planning process.

For more information, contact:

Napoleon Caldwell  
Program Manager  
Water Resources Management Branch  
Environmental Protection Division  
Georgia Department of Natural Resources  
205 Butler Street, S.E.  
Floyd Towers East, Suite 1166  
Atlanta, Georgia 30334  
(404) 656-3111

## **HAWAII**

In Hawaii, considerable floodplain land has been utilized for urban development and for agriculture. When floods occur, the normal activities of these areas are disrupted, production impaired, transportation lines cut, property and crops damaged, soils eroded and in some cases completely lost, and human life endangered.

Tsunami and storms that produce heavy rainfall or high surf are the major causes of flooding in Hawaii. Damage from storm runoff includes losses to agricultural lands and to public property such as roads, bridges, and parks. Besides inundating land, the tremendous force of a tsunami is capable of destroying everything in its path, extensively eroding beach and coastal areas. Flooding from ocean water, with its high salt content, can also damage vegetation and farm crops.

Flood problems in Hawaii generally occur in older areas that were developed without any flood protection measures. Some areas have flood control improvements that, by present standards, are inadequate to contain or control larger floods.

### **Storm Flooding**

Heavy rainfall creates three types of flooding in Hawaii: channel overflow, overland stormwater flow, and standing water in poorly drained areas. Some factors that contribute to flooding are:

- inadequate drainage facilities due to changing drainage conditions caused by continued development;
- undefined stream flow patterns;
- clogging of streams by debris, sediment, and overgrown vegetation; and
- isolated topographic depressions.

Flash floods predominate where drainage areas are small and slopes are relatively steep. A flash flood is caused by rainfall of high intensity and short duration, which produces maximum runoff and recession within a short period of time. It is not uncommon in Hawaii for a flash flood to occur in a sunny, dry area from intense rainfall in the upper reaches of the drainage area.

### **High Surf and Tsunami**

High surf conditions that occur with less than annual frequency can cause considerable damage along beaches and in low-lying areas. High waves caused by storms and hurricanes may last a long time and cause excessive erosion damage. High surf generally affects the exposed northern section of each island. Damage has been heaviest on Oahu because of extensive development in the coastal areas of the north shore.

Tsunami, caused by underwater seismic disturbances such as earthquakes and volcanic activity, are one of the most destructive natural forces to reach the Hawaiian islands. Although tsunami are infrequent, they are a serious threat because of their devastating damage potential.

## **Floodplain Management**

As the designated flood control coordinating agency of the state, the Department of Land and Natural Resources is part of a group of government agencies involved in the overall program of preventive and corrective measures for reducing damages in floodprone areas. Proper management consists of identifying the nature of flooding for an area, evaluating the available alternatives, and implementing the appropriate measures to solve the flooding problem or lessen its impacts.

There are numerous strategies available to the contemporary floodplain manager with which to develop an effective and balanced program. These are often divided into structural and nonstructural approaches. Nonstructural approaches do not attempt to control flood waters, but rather emphasize reducing the susceptibility to floods and reducing the impacts of floods on the individual and the community. Some of the more important nonstructural strategies include zoning ordinances, subdivision regulations, building codes, land acquisition, relocation, tax incentives, and emergency preparedness. Nonstructural approaches should be pursued by the floodplain manager before or in conjunction with structural ones. Structural approaches attempt to modify the course of flood waters through dams, levees, channel alterations, spillways, and other physical measures.

## **Land Use**

Land use in Hawaii is determined by both state and county action. The state Land Use Commission classifies land as urban, agricultural, or conservation. Agricultural land uses are prescribed by state law; lands classified for conservation are regulated by the Department of Land and Natural Resources; and county governments must plan for and regulate the use of urban areas. Counties have authority to use development plans, subdivision regulations, building codes, and shoreline management regulations to ensure wise flood hazard management.

## **National Flood Insurance Program**

The Department of Land and Natural Resources undertakes floodplain management activities, some of which are funded through Federal Emergency Management Agency grants for the National Flood Insurance Program. Over the last few years these have included annual community assistance visit contacts to the four counties of Hawaii, regional state coordinators' meetings, flood loss reduction workshops, public informational displays on flood loss reduction, general technical assistance, and other floodplain management activities such as disaster assistance to the counties, assistance for restudy for Flood Insurance Rate Map revisions, and flood information dissemination.

## **Dam Safety**

For dam safety, the department reviews applications for approval for the repair, enlargement, construction, or abandonment of dams to conform with dam safety regulations; conducts dam safety workshops; updates the Hawaii National Dam Inventory for Phases I and II; assists in emergency actions; and conducts dam safety inspections.

## Recent Floods

The most recent flood occurred in December 1991 on the Island of Kauai, where \$7 million in damages and four deaths occurred. Before that, the City and County of Honolulu (on Oahu) experienced floods in November and March 1991. Two deaths occurred in November when an Army Humvee turned over as it was crossing a stream and the driver and occupant drowned. The March 1991 flooding did an estimated \$6.4 to \$10.3 million in damages in the City and County of Honolulu. Shortly after the storm, a young boy drowned in a drainage inlet where he was swimming. Presidential disaster declarations were not made for the County of Kauai or the City and County of Honolulu for the December or March events, even though these storms exceeded the 100-year level and fatalities occurred.

Severe flooding on New Year's Eve and New Year's Day 1988 resulted in a Presidential disaster declaration for the City and County of Honolulu. Over \$34 million in property damage resulted from flooding that was exacerbated by landslides, which sent massive amounts of rock, vegetation, and sediment into already-swollen channels, blocking them, diverting flows, and scouring embankments. The Interagency Hazard Mitigation Team's recommendations, which are being implemented now, included improving warning systems, reviewing landslides and debris flow risks within the state, and a variety of measures to increase public flood awareness. The Department of Land and Natural Resources' mitigation efforts continue today and are part of its everyday coordinated activities of floodplain management.

For more information, contact:

Manabu Tagomori  
Manager-Chief Engineer  
Department of Land and Natural Resources  
Division of Water and Land Development  
P.O. Box 373  
Honolulu, Hawaii 96809  
(808) 587-0230  
FAX (808) 587-0219

## IDAHO

The Department of Water Resources has been designated by executive order to be the state coordinating agency for the National Flood Insurance Program. Idaho does not have any state laws or regulations that govern the development of floodplains, but relies on community participation in the NFIP for regulation and enforcement of floodplain development and reduction of flood losses. In Idaho, 147 communities have adopted ordinances and participate in the NFIP; 20 communities have designated floodplains but have opted not to participate. Idaho has been in a drought for the last seven years and has experienced only small, isolated floods.

Idaho's floodplain management program focuses on conducting community assistance visits; helping communities update their floodplain ordinances; publishing and distributing a quarterly newsletter called *The Idaho Waterlog* to approximately 750 community officials, insurance agents, lenders, and state and federal agencies; publishing the *Guidebook for Local Floodplain Ordinance Administrators*; and conducting NFIP Community Rating System workshops for local officials and floodplain administrators. Floodplain information is disseminated to communities, lenders, and insurance agents throughout the state by means of a report entitled *Floodplain Management in Idaho*, which is updated periodically. The report contains a floodplain map inventory; list of communities participating in the NFIP; the names, addresses, and phone numbers of local administrators; and flood insurance information (number of policies issued and claims paid for each community).

For more information, contact:

Fred Eisenbarth  
State Coordinator, National Flood Insurance Program  
Idaho Department of Water Resources  
1301 North Orchard  
Boise, Idaho 83706  
(208) 327-7993  
FAX (208) 327-7866

## ILLINOIS

In addition to providing routine flood insurance coordination, community assistance, and public education, the state directly regulates development within floodways of rivers and streams and in public waters including Lake Michigan, inspects dams, and helps plan and fund structural flood control projects.

State legislation provides clear legislative authority to consider storage effects when defining floodways and also for restricted uses in northeastern metropolitan floodways (which are directly regulated by the state) to those designated as "appropriate uses." These uses are deemed to include flood control structures, functionally dependent uses, some recreational facilities and parking lots, and detached accessory structures that do not block flood flows.

For more information, contact:

David R. Boyce  
Floodplain Management Section  
Department of Transportation  
3215 Executive Park Drive  
Springfield, Illinois 62794-9484  
(217) 782-3862

## INDIANA

A variety of floodplain management activities have been undertaken by the state's Division of Water since 1988. One major achievement was the development of an Indiana model ordinance for local officials. The model meets all current federal and state requirements for compliance in the National Flood Insurance Program and gives local officials a guide for proper floodplain management procedures in regulating their communities' special flood hazard areas.

Other notable achievements since 1988 were the development of a working floodplain demonstration model for the division's annual state fair display, conducting a number of Community Rating System and NFIP workshops throughout the state, and publishing a biannual newsletter for distribution to local officials and the general public.

Indiana has had a number of flood disaster declarations in the past few years. The Division of Water's response to these declarations has included participating on Hazard Mitigation teams, staffing Disaster Assistance Centers, and assisting local officials and the public on floodproofing and flood prevention techniques. Continued efforts are being made to ensure local compliance through community assistance visits and contacts. These visits and contacts have resulted in an increased understanding of proper floodplain management by local officials. In addition, a significant number of new communities have enrolled in the NFIP as a result of recent floods and staff efforts to encourage enrollment.

One last change is that now all flood insurance determinations are handled by written request or by self-serve check out of the Division's Flood Insurance Rate Maps. Assistance had been available by telephone request but this has been discontinued due to staff reorganization and liability concerns.

For more information, contact:

Jacqueline M. Bell  
National Flood Insurance Program State Coordinator  
Division of Water  
Department of Natural Resources  
402 West Washington Street, Room W264  
Indianapolis, Indiana 46204



## IOWA

Iowa's floodplain management program, administered by the Department of Natural Resources, revolves around four main functions: a state-level floodplain permit program, dam safety, coordination of the National Flood Insurance Program, and community assistance and oversight (for communities with delegated permitting powers). Despite several across-the-board cuts and hiring freezes, the level of effort in most of these areas has remained relatively constant over the last several years. The exception is dam safety. Inspection of large and high-hazard dams has been curtailed dramatically because of insufficient staff.

One hundred twenty-six Iowa communities are now enforcing the state and NFIP regular program floodplain management standards. Floodplain development in the other floodprone communities and counties is still subject to state permitting requirements regardless of NFIP status. One encouraging development in recent years is the growing sophistication and competence of local floodplain management officials. Many communities appear to have developed an appreciation of the benefits of good floodplain management and are approaching the matter more aggressively. Many of the larger cities are establishing greenbelts consistent with delineated floodways as areas develop. Even though there are no state or federal regulations requiring that floodways be preserved in their natural states, cities have found that such a concept makes good sense and enhances property values in the vicinity of the greenbelt. Several Iowa cities have also voluntarily implemented stormwater management standards.

For more information, contact:

Jack Riessen  
Iowa Department of Natural Resources  
Wallace State Office Building  
Des Moines, Iowa 50319  
(515) 281-5029  
FAX (515) 281-8895

## KANSAS

Statutory activities and responsibilities related to floodplain management are carried out by the Water Structures Section of the Division of Water Resources (DWR). This section has review and regulatory responsibility for dams, levees, channel changes, watershed plans, and locally adopted floodplain management regulations. Federally funded flood insurance studies are a major source of flood data for these reviews.

The DWR became a participant in the Community Assistance Program funded by the Federal Emergency Management Agency in 1989. Additional staff were added with the CAP funding, and a regular schedule of visits and contacts with communities participating in the National Flood Insurance Program has been initiated. Community awareness of the NFIP and of flood hazards and flood loss reduction techniques has been enhanced through the CAP.

All activities or developments in floodplains requiring state permits or approvals are subject to an environmental review whereby comments are requested from seven named agencies about the environmental impact of each project. The environmental comments received must be considered by the Chief Engineer in any permit decision. This allows environmental as well as the usual hydraulic and hydrologic factors to be considered, but the decisionmaking authority still resides with the Chief Engineer. The environmental review requirement creates a certain tension between the floodplain regulations, the convenience of having floodplain fill serve as a levee, and environmental concerns.

The proportion of Kansas floodplain residents with access to flood insurance remains stable at about 85%.

For more information, contact:

Donald F. Kostecki  
Water Structures Section  
Division of Water Resources  
Kansas State Board of Agriculture  
901 South Kansas Avenue, 2nd Floor  
Topeka, Kansas 66612-1283  
(913) 296-2933  
FAX (913) 296-1176

## KENTUCKY

In addition to routine floodplain management activities, the Kentucky Division of Water of the Department of Environmental Protection administers both a stream construction and a dam construction permitting program. Any activity in a floodplain must be authorized by a permit. As part of these programs, the Division of Water makes periodic safety inspections of dams and responds to complaints of unpermitted floodplain construction. The division also administers the Community Assistance Program grant and conducts workshops on floodplain management and the Community Rating System.

The Division of Water carries out a detailed program to help localities manage their floodplain areas. Targeting one area at a time and coordinating with a local "advisory committee," the program identifies current floodplain management activities; inventories floodprone structures and developing areas; develops permit procedures, forms, and enforcement measures; and provides for public information and education.

For more information, contact:

Donna Hall  
Division of Water  
18 Reilly Road  
Frankfort, Kentucky 40601  
(501) 564-3410 x424  
FAX (502) 564-4245

## LOUISIANA

The Floodplain Management Regulations Section is located in the Division of Flood Control and Water Management of the Department of Transportation and Development. This location provides for active coordination with other sections in that division, such as the Statewide Flood Control Program, Federal Projects, Flood Control Design and Development, Hydraulics, Dam Safety, and Highway and Bridge Design. This allows for floodplain management input into the design decisions on flood control and bridge projects throughout the state, including developmental standards for areas affected by new and improved structural projects, regulatory standards above and below proposed dams, and bridge embankments in floodplains.

In conjunction with this, floodplain management staff members have served on the Governor's Interagency Task Force on Flood Control and Mitigation, river commission advisory groups, and local community task forces developing more restrictive standards for floodplain development. Staff members have also worked with the state's real estate agents' association, and testified before the state legislature to enact a statewide flood disclosure law. Staff members also have been actively involved in developing and implementing the Community Rating System of the National Flood Insurance Program.

The Floodplain Management Section performs community assessment contacts for the NFIP, assists communities in the CRS application process, develops publications and brochures, prints and distributes a quarterly floodplain management newsletter, and actively supports the state's floodplain management association.

For more information, contact:

Dan Hawkins  
Floodplain Management Section  
Division of Flood Control and Water Management  
Department of Transportation and Development  
P.O. Box 94245  
Baton Rouge, Louisiana 70804-9245  
(504) 379-1408  
FAX (504) 379-1394

## MAINE

Maine's floodplain management program has two full-time staff with two additional staff that serve the program at levels of 40% and 33% of their time, respectively. The program has grown during each of the last three years, with increased funding and the addition of a second full-time staff person one year ago. The funding has increased, and there has been a steady rise in the state's flood insurance policy base. About 90% of Maine's municipalities participate in the National Flood Insurance Program. Maine is a relatively low policy count state, with only 5,505 policies in effect as of the end of 1991, but in spite of the low numbers, the state has shown a significant interest in the Community Rating System. Seven communities, representing about 20% of the state's policy base, have joined the CRS.

From 1988 through 1991 there were four flood-related Presidential disaster declarations in Maine: two coastal storms, one ice jam, and one riverine flood.

Although recent economic downturns have forced the state legislature to repeal part of the Growth Management Program, which included the state's Comprehensive Planning Program, the Code Enforcement Officer Training and Certification Program survived. The legislation required the code enforcement officers to become certified by 1993. The floodplain management program has succeeded in making floodplain management a part of that certification, not only at the basic training level but also in advanced training and certification.

The program's principal funding comes from the Community Assistance Program. The staff conducts 15-20 community assistance visits per year and 40-45 community assistance contacts per year. About four workshops are scheduled each year, and for the last two years the program has offered workshops for registered land surveyors to improve the quality of elevation certificates and address lender compliance. The floodplain management program participates in four flood awareness seminars conducted each spring around the state, with the northernmost being shared with our Canadian neighbors. Current endeavors include the development of a combined model shoreland and floodplain management ordinance.

For more information, contact:

W. Louis Sidell, Jr.  
State Floodplain Management Coordinator  
Department of Economic and Community Development  
Office of Community Development  
State House Station 130  
Augusta, Maine 04333  
(207) 624-6800  
FAX: (207) 624-6810

## MARYLAND

Maryland's floodplain authority was originally established in 1933 in an act that followed a series of floods, dam breaks, and periods of drought. Specific regulations implementing a state waterway construction permit for nontidal waterways were promulgated in 1978. Jurisdiction includes the 100-year floodplain based on the assumption of complete future build-out in accordance with existing zoning.

The state's floodplain management activities are conducted pursuant to the Maryland Flood Hazard Management Act of 1976. This act established a comprehensive program focused on identification of flood hazards, delineation of floodplains, evaluation of alternatives to address identified problems, planning to avoid exacerbation of flood hazards, and a cost-shared grant program to encourage local jurisdictions to undertake mitigation projects. Due to budgetary constraints, these activities were suspended late in 1991. The program is expected to be revived in the event of widespread damaging floods.

The state coordinating office of the National Flood Insurance Program is an integral component of floodplain management in Maryland. Virtually all flood-prone communities participate and have been deemed to be satisfactorily implementing the requirements of the program. The Community Assistance Program assures sufficient staff to visit every community at least every three years. Larger jurisdictions with permit activity and development pressure are visited more frequently. Communities found to be experiencing problems receive annual followup visits.

Floodplain impacts of proposed activities are evaluated as part of the state's authority to regulate and manage water resources. Projects that increase the frequency or magnitude of flooding are prohibited unless the additional area impacted is purchased, placed in flood easement, or otherwise protected through approved mitigation measures.

The Maryland Department of Natural Resources includes separate programs for waterway-floodway permits, dam safety, tidal wetlands permits, nontidal wetlands permits, shore erosion control, and coastal resources management. The Chesapeake Bay Critical Area Commission manages the state's program to guide activities within the critical area, which is all land within 1,000 feet of the inland extent of high tide or tidal wetlands.

For more information, contact:

Rebecca C. Quinn  
Chief, Floodplain Management Division  
Water Resources Administration  
Tawes State Office Building E-2  
Annapolis, Maryland 21401-2397  
(410) 974-3825  
FAX (410) 974-3907

## MASSACHUSETTS

Since 1988, the state Flood Hazard Management Program has visited nearly 150 communities and made phone contact with over 200 local building and conservation officials in performing tasks under the Community Assistance Program. Workshops on floodplain management continue to be held for building, engineering, and conservation officials statewide. The program is targeting regional planning organizations for outreach on such topics as local floodplain bylaws and the Community Rating System.

*A Handbook for Local Officials for Projects in the Floodplain* was completed and distribution has begun on a small scale. An update of the publication is planned for 1992.

Under the aegis of the Executive Office of Environmental Affairs, the Flood Hazard Management Program has access to a computer network enabling it to establish a database for community floodplain management activities, incorporating flood insurance data; records of prior contact with localities; officials' names, addresses, and phone numbers; and information about nonconforming structures, among other items.

Flood Hazard Management Program staff have participated in the creation and organization of the New England Floodplain and Stormwater Managers Association, expected to have its first annual meeting in October 1992.

Trends for future activity are pointing toward hazard mitigation, both before and after disasters. Environmental and other state agencies are learning quickly, in the wake of Hurricane Bob and the October 1991 northeaster, about the importance of mitigation initiatives.

Staffing patterns have fluctuated in recent years because of budgetary considerations. There is no longer a state-paid position on the Flood Hazard Management Program staff; state-paid personnel in other areas help to fill in the gaps. There is currently a vacancy in the state coordinator's position, that is expected to be filled in the summer of 1992.

For more information, contact:

Michele Steinberg, Regional Planner  
Office of Water Resources  
Department of Environmental Management  
100 Cambridge Street  
Boston, Massachusetts 02202-0001  
(617) 727-3267 x589  
(617) 727-2630

## MICHIGAN

Michigan's Flood Hazard Management Program is based on several state and federal statutes and executive orders. The state regulates the placement of encroachments, including bridges and culverts, in riverine floodplains. State regulations require a hydrologic analysis of flood risk for proposed water-related subdivisions. Flood elevations are established and building requirements imposed to assure that structures will be reasonably free of flooding.

Flood hazard technical services are provided to individuals who are considering buying, selling, building on, or approving construction on any parcel of property throughout the state. The state Flood Hazard Management Plan requires that state agencies take flood hazards into account when planning new facilities, repairing flood-damaged buildings, disposing of land, or approving land use plans. Technical assistance is also provided to individuals and communities by recommending methods, materials, and techniques that will reduce future flood losses.

The basic data for identification and regulation of flood hazard areas are provided by a floodplain delineation study and related maps. Study results are reviewed by the Land and Water Management Division hydrologic engineers to assure that the technical data meet minimum state criteria.

The Michigan Stormwater-Floodplain Association, now in its fifth year, consists of 125 consulting engineers, local elected officials, zoning administrators, building officials, state officials, and university faculty. The Michigan Stormwater-Floodplain Association sponsors topic-specific workshops each year to improve members' familiarity with floodplain issues.

The Flood Hazard Management Unit of the Michigan Department of Natural Resources has been combined with other land-water interface regulatory programs to provide a more unified and responsible organization. This new section has authority in the areas of inland lakes and streams, floodplain control, wetlands, natural rivers, bridges and culverts, and subdivisions. This arrangement has allowed the department to provide a coordinated permitting function. Through close coordination between the various land and water regulatory requirements, permits are issued to support the multiobjective mission of the division.

For more information, contact:

George Hosek  
Michigan Department of Natural Resources  
P.O. Box 30028  
Lansing, Michigan 48909  
(517) 335-3182



## MINNESOTA

In the spring of 1989 major flooding occurred in the City of Breckenridge in the headwaters of the Red River of the North in western Minnesota. The flood caused record flood stages in Breckenridge (ice-assisted) 1.5 feet above the previous record even though the flow was only equivalent to a 37-year event. This immediately led to a massive flood fight downstream but cool weather slowed the thaw and downstream (north) of Breckenridge the flood diminished to a 10-year (or less) event to the Canadian border.

This flood was declared a disaster by President Bush on May 8, 1989 (more than a month after the Breckenridge flooding) and this represented the state's first foray into mitigation assistance under Section 404 of the Stafford Act. There were inevitable delays because it was a new program at the time but, to date, only two small projects have been funded. A number of other projects that will use the lion's share of the approximately \$300,000 available from Section 404 are still not approved.

Additional flooding occurred in July 1991 when 10-12 inches of rain over a small watershed in southeastern Minnesota caused a 500-year flood through the small community of Stockton. This flood did not receive a Presidential declaration, but did receive a lot of local, regional, state, federal, and private disaster relief attention. Of the approximately 200 homes in the community, over 100 received damages and over 50 were severely damaged. Four homes were acquired and one elevated immediately after the flood with the assistance of state flood hazard mitigation funds. Only four property owners in the community had flood insurance; only one of those structures suffered severe damage. Numerous other small floods occurred throughout the summers of 1990 and 1991 but damages were minimal.

From 1988 to 1991 about \$6 million has been made available from the state's Flood Hazard Mitigation Grant Program to help communities prevent future flood damages. These funds have helped to implement about 45 projects including watershed studies, floodproofing, acquisition, small impoundments, and Corps of Engineers Flood Control Projects. Funds are provided on a 50% state, 50% local basis. We have a backlog of requests totalling more than \$12 million. Unfortunately, state budget problems have also reduced the amount of funds available for flood damage reduction projects for the near future.

In 1988 we had just finished negotiating a new model floodplain management ordinance with the Federal Emergency Management Agency to come into compliance with the 1986 rule changes. Since then we have been working with communities to amend their ordinances. Currently about 260 communities have adopted amended ordinances and the remaining, low-priority communities will be completed in 1992. This is all occurring at a time when we are also requiring communities to amend their shoreland management ordinances and to modify some wild and scenic river management ordinances as well.

Since 1988 we have redone our internal operations manuals for floodplain, shoreland, and wild and scenic rivers programs. They have all been combined into one manual containing the policies, procedures, forms, and related information for all three land use management programs operated by the Department of Natural Resources.

We have also been working to update and improve our "bible," *Floodplain Management—A Handbook for Local Officials*. This document was first developed in 1984 and had not been updated since then even though the program has undergone numerous changes. The new version will be distributed to local officials in a series of training sessions across the state in 1992.

Several attempts have been made to establish a computerized database to store information about all of the communities participating in the floodplain, shoreland, or wild and scenic rivers management programs. The database eventually will have a number of components: basic community data (ID numbers, locations, population, contact persons); ordinance data (first ordinance, most recent ordinance, approval dates, special provisions); monitoring data (dates of community assistance visits and contacts, problems identified, followup required); FIS data (elevations, cross-sections, discharges, floodways); historical flood data (years, elevations, discharges); and administrative information (variances, conditional uses, violations). It is hoped that in the near future this will be tied into a GIS system to allow on-screen map displays.

*Water Talk* continues to grow in size, we hope in quality, and we know in distribution. It is now circulated to over 2,500 individuals, organizations, and agencies every quarter. Although it was started strictly as a floodplain management newsletter, we have continued to expand and improve it because floodplain management does not occur in a vacuum and many floodplain managers in Minnesota are involved in other aspects of water resources management as well.

The Department of Natural Resources continues to act as the coordinating agency for the National Flood Insurance Program, along with coordinating floodplain management activities with other local, state, and federal agencies. NFIP coordination has involved identifying the need for new flood insurance studies and restudies, public information and training, and monitoring and enforcement of NFIP standards. Considerable effort has been directed toward educating local officials and monitoring compliance with NFIP and state standards.

For more information, contact:

Ogbazghi Sium  
Supervisor, Land Use Management Unit  
Minnesota Department of Natural Resources  
Division of Waters  
500 Lafayette Road  
St. Paul, Minnesota 55155-4032  
(612) 296-0444  
FAX (612) 296-0445

## **MISSISSIPPI**

The primary responsibility of the floodplain management staff, which consists of the National Flood Insurance Program coordinator and a planner, is to encourage municipal and county officials to adopt effective floodplain management ordinances in order to reduce flood hazards, prevent loss of life and property, and to provide flood insurance to their citizens. The staff provides general and technical assistance to local officials in the administration and enforcement of their ordinances.

During the past year, the staff held 15 comprehensive community assistance visits and contacted 20 cities and counties to determine their assistance needs. Ordinance assistance was provided to 28 cities and counties.

The staff responded to over 500 requests for information about adopting ordinances, completing the biennial reports, developing permit procedures, recordkeeping, processing variances, completing elevation certificates, interpreting special flood hazard boundary maps and flood insurance studies and rate maps, and letters of map amendment. The staff also provided technical assistance to local zoning, building, and planning officials, as well as providing information to lending institutions and insurance agencies.

For more information, contact:

Jim Wingrove  
Mississippi Emergency Management Agency  
P.O. Box 4501  
Jackson, Mississippi 39296-4501  
(601) 960-9033  
FAX (601) 960-9983

## MONTANA

Floodplain management activities carried out by the Department of Natural Resources and Conservation include providing technical assistance to local governments and other state agencies and coordinating activities of the National Flood Insurance Program. The Floodplain and Floodway Management Act provides enabling authority for counties and municipalities to adopt floodplain development regulations. It places the responsibility for designating floodplains/floodways and adopting minimum standards for implementing the statutes with the Board of Natural Resources and Conservation. These standards exceed NFIP standards. The department provides model ordinances, helps local governments set up floodplain management programs, and oversees local programs to ensure that the board's standards are being enforced.

Activities carried out under the Community Assistance Program include publishing a directory of state, local, and federal floodplain management officials, publishing a *Guidebook for Local Floodplain Administrators*, and conducting floodplain management workshops for local officials in addition to providing technical and administrative assistance on request.

For more information, contact:

Karl Christians  
Acting Supervisor, Floodplain Management Section  
Department of Natural Resources and Conservation  
1520 East 6th Avenue  
Helena, Montana 59620-2301  
(406) 444-6646  
FAX (406) 444-0533

## NEBRASKA

The last few years have been busy ones for the Nebraska Natural Resources Commission Floodplain Management Section. Devastating spring flooding in 1990 and 1991 resulted in two Presidentially declared flood disasters. In the aftermath of these disasters, the floodplain management staff participated actively on Interagency Hazard Mitigation Teams and worked closely with other state agencies to identify and review projects for the Section 404 Hazard Mitigation Grant Program.

Daily coordination of the National Flood Insurance Program continues, including assisting community officials, insurance agents, lending institutions, and other government agencies and departments dealing with the NFIP. In 1991, Nebraska applied for funding under the Federal Emergency Management Agency Community Assistance Program.

In the past three years the commission has mapped approximately 155 stream miles of floodplains and associated floodways in four studies. These studies are provided to local officials for their use in planning and administration. The floodplain management section is exploring innovative approaches to accelerate the floodplain delineation process.

The demand for providing technical services to communities has increased dramatically in the last year. State review of permit applications, hydraulic modeling, and site-specific flood hazard determinations are a few of the technical services that the floodplain management staff provides.

For more information, contact:

Brian Dunnigan  
Head, Floodplain Management Section  
Nebraska Natural Resources Commission  
301 Centennial Mall South  
P.O. Box 94876  
Lincoln, Nebraska 68509-4876  
(402) 471-2081  
FAX (402) 471-3132

## **NEW JERSEY**

### **Flood Control**

Under the Emergency Flood Control Bond Act of 1978, \$22 million was provided for matching grants to county and municipal governments to construct flood control projects. Grants totalling \$21.2 million have been made to construct 36 projects, of which 28 have been completed. Detailed coordination and design for structural flood control projects in the Green Brook subbasin of the Raritan River and the Passaic River basin, authorized for construction by the Water Resources Act of 1986 (HR-6) have been initiated between the state and the Corps of Engineers. The Corps and the state are also cooperating on flood control feasibility studies in the Delaware and Raritan River basins.

### **National Flood Insurance Program**

According to New Jersey statute, all construction code enforcement officials must be licensed and satisfactorily complete workshops and seminars developed by Rutgers, the State University, designed to maintain their level of competence. Formal training in flood-resistant construction is now provided under this program to code officials to teach them the fundamentals of floodproofing, retrofitting, and flood damage repair, as well as the basic floodplain management requirements of the NFIP, because many of these code officials act as local NFIP administrators. A workshop especially designed to help Professional Engineers and Land Surveyors use Flood Insurance Rate Maps and prepare elevation certificates is also being conducted.

The state is actively encouraging over 80 of its municipalities to apply for the Community Rating System. Twelve applied in 1990 and another 31 applied in 1991. If all these municipalities apply and receive at least a Class 9 rating, flood insurance policy holders will save \$1.6 million annually. Five CRS workshops were held in 1991 and will be repeated in 1992. A simplified application has been developed to assist interested communities.

### **Flood Hazard Mitigation**

On August 1, 1988, the state dedicated the world's most advanced flood warning system. The satellite-linked, computer-operated system was planned and funded as a Corps of Engineers project before being turned over to the state for operation and maintenance. It was designed to enhance the existing Passaic River basin system by providing more accurate and timely flood warnings. The cost of maintaining this system has proven to be excessive and its operational efficiency marginal due to equipment failures and radio interference. System modifications are now being planned to reduce costs and increase efficiency. Although there has been no major flooding within the basin since the system was installed, record flash flooding did occur on Molly Anns Brook, a small tributary of the Passaic River, on May 16, 1990. In spite of the fact that a flash flood warning device had been installed along the creek, the system provided no warning.

The New Jersey Hurricane Evacuation Study has been completed by the Corps of Engineers, Philadelphia District, in cooperation with the Federal Emergency Management Agency, Region II and the New Jersey State Police, Office of Emergency Management. The technical data report will be distributed in June 1992 in time for county and local governments to modify their existing evacuation plans and adopt the recommended hurricane evacuation decisionmaking procedures before the most critical part of this hurricane season.

For more information, contact:

Clark Gilman  
Chief, Floodplain Management Section  
Engineering and Construction Element  
Department of Environmental Protection and Energy  
CN 401  
Trenton, New Jersey 08625  
(609) 292-2296  
FAX (609) 292-1231

## **NEW YORK**

### **Floodplain Management Section**

The section continued to participate in the Federal Emergency Management Agency's Community Assistance Program, performing about 100 community assistance visits per year and workshops on both floodplain management and the Community Rating System. A handbook for local officials on the National Flood Insurance Program was published and distributed to 1,450 local governments. State legislation to rescind the direct regulatory authority of the department over communities failing to qualify for the NFIP was signed into law in April 1992 as a budget reduction measure. About four staff years of floodplain management staff time were lost in the 1990-91 budget.

### **Flood Control Section**

Although portions of the state were in the throes of a drought emergency or warning during two of the past three years, local flood protection projects prevented an estimated \$18 million in flood damages during that period. To date, the total investment by federal, state, and local governments in construction of these projects has been about \$150 million, while the benefits measured in damages prevented have been about \$900 million.

Since 1988, three major rehabilitation projects have been completed through state contracts:

A 2-year project to reconstruct and rehabilitate the Hammondsport Flume at a total cost of \$3.5 million. This was the largest rehabilitation project undertaken by the section.

Completion of a modification to a ponding area in the Village of Ardsley at a cost of \$70,000. The modification allows more frequent use of the ponding area for parking, which benefits the Village and local merchants.

Completion of a small pump station at Port Dickinson, at a cost of \$163,000. The pump station will prevent water levels in a ponding area from reaching nearby homes without operating portable pumps during periods of high water on the Chanango River.

During the year, the staff completed joint annual inspections with the Corps of Engineers of 80 completed local protection projects, and coordinated planning and development of 60 potential projects. Construction was started on two new projects and one was completed during the year.

### **Dam Safety Section**

The staff inspected 413 high-hazard and 336 moderate-hazard dams. Repair work was completed on 11 unsafe dams. Applications for 177 permits for dam construction, reconstruction, or repair were reviewed and approved during the past three years.

### **Coastal Erosion Section**

Coastal erosion hazard areas have been officially identified in 44 Great Lakes shoreline municipalities and 39 fronting on the Atlantic Ocean or Long Island Sound, including New York City. To date, 30 municipalities have adopted their own local coastal erosion hazard area management programs. New York's Department



of Environmental Conservation has assumed regulatory authority over some 25 non-complying communities, with an additional 15 underway.

The state regulations restrict new development on such critical coastal features as beaches, dunes, and bluffs. The regulations also require that, where shorelines are receding one foot or more per year, construction landward of dunes and bluffs must be designed and built to be relocated farther landward when threatened by the approaching shoreline.

For more information, contact:

Frank J. Dwyer  
Chief, Floodplain Management Section  
Department of Environmental Conservation  
50 Wolf Road  
Albany, New York 12233-3507  
(518) 457-3157  
FAX (518) 457-1088

## **NORTH DAKOTA**

State law concerning floodplain management adopts the minimum standards of the National Flood Insurance Program by reference and the state currently does not employ floodplain management criteria more stringent than NFIP standards.

North Dakota has a staff equivalent of 2.5 people working in floodplain management. The floodplain management activities are funded through a combination of state and federal resources. The state participates in the Community Assistance Program; those activities generally focus on educational efforts with communities participating in the NFIP. State-funded activities have generally been concerned with the technical aspects of floodplain management, such as flood hazard identification, mapping, or refinement of the identified hazard. Since 1988, personnel changes and consolidation of job duties have resulted in the reduction of half of a position working in floodplain management.

On an annual basis, state floodplain management personnel conduct visits and contacts with NFIP communities, publish a quarterly newsletter, hold floodplain management workshops, and provide technical assistance to situations that arise in the administration of community floodplain management programs.

North Dakota has a population of 638,800 people according to the 1990 Census. An estimated 8.5% (or 54,364 people) reside in identified floodplains. Two large federally authorized, designed, and funded structural flood protection projects currently underway will reduce the number of state floodplain residents by about 20,000.

For more information, contact:

Jeff Klein  
North Dakota State Water Commission  
900 East Boulevard  
Bismarck, North Dakota 58505  
(701) 224-2750

## OHIO

Ohio's floodplain management program concentrates on providing technical advice and assistance to local governments and to the general public about floods and floodplain management. Administration and enforcement of floodplain regulations take place at the local level of government.

The Ohio Department of Natural Resources, Division of Water, is the state coordinating agency for the National Flood Insurance Program. Most of the division's floodplain management workload focuses on NFIP-related activities and is supported by funding through the Community Assistance Program cooperative agreements. The division undertakes community assistance visits and contacts, ordinance reviews, Community Rating System assistance, and general technical assistance.

After the catastrophic June 14, 1990, flood near Shadyside in eastern Ohio in which 26 people died, the Ohio General Assembly enacted legislation expanding the division's floodplain management responsibilities. The legislation also requires state agencies that fund, finance, or undertake floodplain development to comply with the floodplain management criteria of the NFIP. The new law further states that before receiving any state flood disaster assistance, a community shall participate in the NFIP and adequately administer floodplain regulations.

The division is currently drafting rules to implement the legislation, which became effective April 11, 1991. The additional floodplain management responsibilities assigned to the division have not brought about an increase in staff, because no funds were provided with the legislation. The division is striving to receive additional funding for 1993-94 in order to carry out the new duties.

For more information, contact:

Peter G. Finke  
Supervisor, Floodplain Management Unit, Division of Water  
Ohio Department of Natural Resources  
1939 Fountain Square, Building E-3  
Columbus, Ohio 43224-1360  
(614) 265-6755  
FAX (614) 447-9503

## OKLAHOMA

The Planning Division of the Oklahoma Water Resources Board guides state floodplain management and coordinates Oklahoma's activities in the National Flood Insurance Program. Division personnel provide flood hazard information to communities and assist them in adopting sound floodplain regulations and land use practices. Through a cooperative agreement with the Federal Emergency Management Agency, the board has administered the CAP in Oklahoma for 11 years.

Oklahoma has 347 communities currently participating in the NFIP, and last year the board conducted several meetings to encourage other communities to join. The community assistance visits and community assistance contacts were areas of emphasis last year, with 40 visits being conducted. The board also investigated complaints about construction in floodplains and assisted eight communities with their ordinances.

In October 1991, the board participated in an NFIP workshop to acquaint city and county officials with the requirements of the NFIP and with the Community Rating System. Oklahoma has 10 communities participating in the CRS. The City of Tulsa recently received the best CRS rating in the nation.

In October 1990, the board and numerous officials from several other city, county, state, and federal agencies established the Oklahoma Floodplain Management Association. The OFMA held its first annual meeting in September 1991 at Western Hills Guest Ranch at Ft. Gibson Reservoir. Association membership is now over 70.

The Planning Division staff represented the board at national gatherings and brought back updated information about floodplain management. These meetings included the biennial NFIP Coordinators' Conference in Washington, D.C. and the Association of State Floodplain Managers Conference in Denver, Colorado.

For more information, contact:

William Ken Morris  
Planning Division  
Oklahoma Water Resources Board  
600 North Harvey, P.O. Box 150  
Oklahoma City, Oklahoma 73101-0150  
(405) 231-2576  
FAX (405) 231-2600

## **PENNSYLVANIA**

Floodplain management responsibilities in Pennsylvania are divided among three state agencies: the Pennsylvania Department of Community Affairs, which coordinates the National Flood Insurance Program, and also administers the Pennsylvania Floodplain Management Act; the Department of Environmental Resources, which has responsibility for stormwater management, coastal zone management, and engineering and natural resource concerns; and the Pennsylvania Emergency Management Agency, which handles the state's disaster response effort.

Floodprone municipalities are required by state law to join the NFIP. There are more than 2,300 floodprone municipalities currently participating. Communities that fail to maintain their eligibility in the NFIP are penalized by having all state funds withheld until they regain their good standing in the program.

The Pennsylvania Floodplain Management Act directs the department to provide financial and technical assistance to local governments to help them maintain their eligibility in the NFIP and properly regulate floodplain development. Through its Floodplain Management Division, the department offers training sessions, publications, and a variety of consulting services relating to the preparation and administration of local floodplain management regulations. The department also reimburses municipalities for up to 50% of eligible costs incurred to prepare, enact, administer, and enforce floodplain management regulations.

In addition to meeting the minimum requirements of the NFIP, municipalities must enact more stringent regulations for hospitals, nursing homes, jails, new manufactured home parks, and structures used in the production, supply, or storage of 18 particularly dangerous and hazardous substances.

June 1992 will mark the 20th anniversary of Tropical Storm Agnes, the most devastating flood disaster to strike Pennsylvania. The Pennsylvania Emergency Management Agency, in cooperation with the department, is planning an emergency management conference to focus on the lessons learned in the decades since the Agnes disaster.

For more information, contact:

Bruce Hearn  
Floodplain Management Division  
Pennsylvania Department of Community Affairs  
551 Forum Building  
Harrisburg, Pennsylvania 17120  
(717) 787-7403

## PUERTO RICO

Puerto Rico's floodplain management program is divided into four areas: review of regulations for flood zones, review of flood zone maps, participation in the Community Assistance Program, and public education.

Physical planning and land use control are centralized at the state level. The Puerto Rico Planning Board is responsible for land use determinations and for preparing related regulations. The board's Planning Regulation No. 13 for Floodable Zones established the land use criteria applicable to 100-year floods. This regulation was revised and adopted by the board after Federal Emergency Management Agency approval.

Thirty-three major basins have been studied by FEMA and 165 flood maps prepared. An educational program was developed for the officials of the Regulations and Permits Administration, which is the agency responsible for implementing the regulations.

The Land Use Bureau of the board has been conducting the CAP in coordination with the FEMA Region II office. Through this program the bureau monitors the procedures followed by the corresponding agencies for granting construction permits in floodable areas. Last year two basins were selected for investigation, including an inventory of new development; field work to determine lowest floor elevations; seminars for developers, state officials, and the public; a review of records; and a slide presentation and general orientation to the NFIP. In addition, a brochure was prepared in Spanish to provide information about flooding.

The Governor's Executive Order No. 5537 created the Office for the Development and Implementation of the Permanent Housing Program for the people affected by Hurricane Hugo (September 1989). The program was approved by FEMA and by the end of 1991 had completed 4,316 new housing units (96.5% of those needed).

For more information, contact:

Lina M. Dueño  
Vice President  
Puerto Rico Planning Board  
Minillas Governmental Center, North Building  
De Diego Avenue, Stop 22  
P.O. Box 411119  
San Juan, Puerto Rico 00940-9985  
(809) 727-4444  
FAX (809) 724-3270

## RHODE ISLAND

The state responds to inquiries about the National Flood Insurance Program. The Community Rating System is not catching on in Rhode Island; to date, only one community is participating. The state continues to monitor how effectively the communities are administering and enforcing their local ordinances.

Rhode Island has maintained its statewide dam safety inspection program, and the state continues to regulate development in or on coastlines, sand dunes, and wetlands.

In November 1989, the voters approved a \$74.5 million bond issue, of which \$16 million was allocated to the state for the purchase in fee simple or development rights for the preservation of coastal access and shoreline open space. The legislation also indicated that up to 10% of these funds could be provided by the state to nonprofit conservation organizations for the purpose of preserving coastal and shoreline open space. In addition, \$6.75 million was allocated to cities and towns for the same purpose. The local allocation was in the form of grants which equal 50% of the cost of acquisition.

Congress and the state added approximately 30 areas to the coastal barrier resources system, including new areas as well as additions to existing ones. There are now approximately 50 Rhode Island areas in the system.

In 1991, the Rhode Island Supreme Court handed down a decision reaffirming state ownership of filled tidal land. The decision in *Hall vs. Nascimento* could affect the title to thousands of acres of filled tidal land. The court's restatement of the "public trust doctrine" gives the state an opportunity to require owners of such land to provide or improve public access to public waters.

For more information contact:

Victor Parmentier  
Division of Planning  
Rhode Island Department of Administration  
One Capitol Hill  
Providence, Rhode Island 02908-5872  
(401) 277-6478  
FAX (401) 277-3809

## **SOUTH CAROLINA**

The South Carolina Water Resources Commission conducts community assistance visits in communities with significant development pressure, serious flooding, high or repetitive flood insurance claims, or other indicators of difficulty with National Flood Insurance Program requirements. A second major activity is the community assistance contact technical assistance meeting to determine which localities should be visited and whether any program-related problems exist. In 1990, the commission conducted statewide workshops on the Community Rating System. The commission also responds to requests for technical assistance, publishes a quarterly newsletter, and attends the regional meetings each year.

### **Stormwater Management and Sediment Reduction Act of 1991**

On May 27, 1991, Governor Campbell signed into law the state's first comprehensive Stormwater Management and Sediment Reduction Act. Under the Act, watershed master plans are now required in watersheds that are urbanizing or where water pollution problems exist. The Act ensures that postdevelopment stormwater runoff in subdivisions, shopping centers, industrial sites, and construction sites does not exceed predevelopment levels. The Act is administered by the South Carolina Land Resources Conservation Commission.

### **South Carolina Beachfront Management Act**

The South Carolina Coastal Council administers the state's Coastal Zone Management Program and the South Carolina Beachfront Management Act. In 1988, the General Assembly passed the SCBMA to limit ill-planned development in beachfront (critical) areas as defined by the Act. A finding of the General Assembly embodied in the legislation is that many miles of the state's 180 miles of coastline are being seriously eroded. Without regulation, development has been unwisely sited in the coastal system that provides a natural barrier from high tides, storm surges, hurricanes, and normal erosion. The Act establishes two beachfront construction zones: a "no build" zone and a "setback" zone. If a structure is destroyed by fire or natural causes, it must be relocated beyond the setback zone or as far landward as possible. The setback zone is based on the area's average annual erosion rate for the past 40 years. Within the setback zone, all activities and/or facilities are subject to state permit. Habitable structures may be permitted within the zone only if they are of 5,000 square feet or less in size. In 1990, amendments to the Act curbed "no-build" zone provisions.

### **Dam Safety**

There are an estimated 2,200 high-hazard dams in South Carolina that directly threaten life and property, and the number increases by one or two every year. Frequently, the increase is due to downstream development and the consequent reclassification of a significant- or low-hazard dam to the high-hazard category as more lives and property are threatened. As South Carolina's population grows, residential development below dams increases. When this occurs, the potential for loss of life and significant property damage becomes greater.

In October 1990, two tropical storms resulted in extremely heavy rainfall (up to 15 inches) in the state. As a result, 81 dams were overtopped and 18 dams actually failed. At least three dams in Kershaw County failed. The failure of the Lake Kendell Dam caused the deaths of four people in a car that washed off U.S. highway 1 near Camden. In Darlington County, 2,000 people were notified to evacuate the floodplain of Black Creek, which crested at over twice the expected 100-year flood level below Lake Robinson Dam.



The South Carolina Land Resources Conservation Commission has the responsibility for inspecting significant- and high-hazard dams in the state. As a result of the catastrophe, the commission individually checked and evaluated 977 dams in the worst affected counties.

For more information, contact:

Billy McKinnon  
South Carolina Water Resources Commission  
1201 Main Street, Suite 1100  
Capitol Center  
Columbia, South Carolina 29201  
(803) 737-0800  
FAX (803) 765-9080

## **SOUTH DAKOTA**

During the past year South Dakota continued its efforts to mitigate flood hazards through a variety of ongoing programs. The state has begun regulating development in wetlands and along the shores of lakes. Regulations to control erosion are adopted and enforced at the local level, but the state has established minimum standards, which all localities must meet. Detailed mapping of flood and related hazards continued.

State staff continued to inspect dams statewide to ensure their safety in protecting downstream communities from flooding. The state worked on expanding its flood warning system, including the network of gages for gathering data about stream flow. Communities were advised about design and implementation of warning systems specific to their local conditions.

Although South Dakota does not presently administer National Flood Insurance Program activities (participating communities coordinate directly with the Federal Emergency Management Agency's regional office in Denver), the state's Division of Disaster and Emergency Service provides information on request and refers localities and individuals to sources of further information.

For more information, contact:

Richard Smith  
Division of Emergency and Disaster Service  
500 East Capitol  
Pierre, South Dakota 57501  
(605) 773-3231

## TENNESSEE

The Local Planning Assistance Office of the Department of Economic and Community Development maintains a program of technical floodplain management assistance for all cities and counties throughout the state. Included in this program are ordinance assistance, map and ordinance interpretation, permit procedures, and variances, and help with the Community Rating System.

For more information, contact:

Don Waller  
Director, Community Planning  
Department of Economic and Community Development  
320 6th Avenue, North  
Nashville, Tennessee 37243-0405  
(615) 741-2211

## TEXAS

The Texas Water Commission, with funding from the Federal Emergency Management Agency, continues to conduct community assistance visits, provide flood ordinance assistance, and conduct local floodplain management workshops and regional Community Rating System seminars. In addition, a quarterly newsletter concentrating on floodplain management and flood loss reduction is published and distributed to community floodplain administrators, state legislators, state agencies, and other individuals involved in floodplain management. A new *Floodplain Administrators Manual* was published and distributed in 1991.

One of the most dramatic new projects in the state is occurring in San Antonio. The San Antonio River Authority is nearing completion of two underground diversion tunnels, one on San Pedro Creek and the other on the San Antonio River. The tunnels are just over 24 feet in diameter and one mile and three miles long, respectively. They will divert over 85% of a 100-year flood 150 feet under the high-value, high-density development in the downtown area, and then return it to the surface channels farther downstream. The San Pedro Creek Tunnel is completed. The San Antonio River tunnel boring is done and only the interior finishing and construction of the surface facilities remain.

For more information, contact:

Jesús Garza  
Executive Director, Texas Water Commission  
Attn.: Dam Safety and Flood Management Section  
1700 North Congress Avenue  
P.O. Box 13087  
Austin, Texas 78711-3087  
(512) 463-8000  
FAX (512) 463-8000

## UTAH

The Utah Division of Comprehensive Emergency Management, Flood Loss Reduction Section, combines the Community Assistance Program with the Hazard Mitigation Assistance Program to provide maximum flood hazard mitigation capability. Utah did not participate in the CAP during the last four years, but since FY 1992 has had two staff members—a University of Utah adjunct faculty member and a certified floodplain manager—responsible for the CAP and the flood hazard mitigation assistance program. Utah helps localities develop and update their floodplain management ordinances, meet the requirements of those ordinances, and train their personnel. The state staff also provides general technical assistance to local governments in both the CAP program and also in overall flood hazard mitigation.

The Flood Loss Reduction Section trains student floodplain management interns through a cooperative program involving the Federal Emergency Management Agency, the state Division of Comprehensive Emergency Management, and the University of Utah Department of Geography (Center for Natural and Technological Hazards) by offering a Certificate in Community Floodplain Management. An optional training program for local floodplain administrators throughout the state is planned, with certification as the outcome.

Utah is establishing a state Floodplain Management Committee to address ongoing needs in CAP and also in multi-objective management of river corridors. The Flood Loss Reduction Section monitors stream alteration permit applications for National Flood Insurance Program compliance, including issuance of floodplain development permits, and works with the state engineer's office in coordinating this activity.

Partly as a result of several years of serious flooding in the 1980s, including a major dike breach in 1989, Utah directly regulates development in floodplains, along lakeshores, in erosion-prone areas, and in areas below dams and behind levees. There are also state regulations to protect wetlands, reduce susceptibility to damage from mudflows and floods, and to govern transport and disposal of hazardous materials. A new state law requires all owners of high-hazard and moderate-hazard dams to develop emergency action plans by 1994.

The division has conducted a nationally recognized flood hazard mitigation program since 1983. Four Presidentially declared disasters have required the development of four state hazard mitigation plans, mainly addressing floods. Several plans have also been prepared for floodprone communities.

Utah provides the *Utah Floodplain Advisory* newsletter to local and state government agencies and to lending institutions and insurance companies. The newsletter contains agenda items for city councils.

For more information, contact:

Fred May, Ph.D.  
Nancy Barr  
Division of Comprehensive Emergency Management  
Flood Loss Reduction Section  
State Office Building, Room 1110  
Salt Lake City, Utah 84114  
(801) 538-3758  
FAX (801) 538-3770

## **VERMONT**

Until 1990, Vermont's Floodplain Management Section consisted of two engineering/planning positions within the Water Quality Division. On retirement of one of the individuals a position was eliminated for budgetary purposes. The remaining position is funded primarily with Federal Emergency Management Agency Community Assistance Program funds and work is primarily as spelled out in the annual agreement. Little state-level mapping, land acquisition, or flood control is done.

For more information, contact:

Karl Jurentkuff  
Floodplain Management  
Division of Water Quality  
Agency of Natural Resources  
10 North Building  
103 South Main Street  
Waterbury, Vermont 05676  
(802) 244-6951

## VIRGINIA

Floodplain management responsibilities lie within the Commonwealth's Department of Conservation and Recreation, Division of Soil and Water Conservation, Bureau of Flood Protection. The bureau coordinates floodplain management and dam safety activities.

The 1987-1989 period could be characterized as a period of transition in Virginia. Flood protection responsibilities were brought from other agencies and placed with the Department of Conservation and Recreation. In 1988 a joint legislative study was initiated to study flood protection programs and policies. In 1989 state legislation designated that department as the coordinating agency for all flood protection issues in the commonwealth. Specifically, it directed the department to implement a state stormwater management program, authorized a flood protection grant/loan fund that can provide up to 50% of the nonfederal cost share of federal projects, and directed the department to write a comprehensive floodplain management plan. Since a full staff was obtained in 1989-90, these all were accomplished and implementation continues.

So far, the department has not assumed a regulatory role in floodplain management, but coordinates its efforts through local ordinances and through the Uniform State Building Code. The state building code is required of all localities in Virginia and by law is a minimum and maximum standard. The positive side of this arrangement is that all communities, whether they are in the National Flood Insurance Program or not, must comply with floodplain construction standards. The negative side is that to reach proactive floodplain standards requires changes to the state building code. Current policy is to avoid deviating significantly from the model BOCA code.

In the past three years the state floodplain management program has evolved from one that exclusively supported efforts of the NFIP to one that is now much more broadly based. Significant effort has been expended in developing community-based flood mitigation plans, natural and beneficial function/open space management concepts, better coordination of flood control projects, and programs on floodproofing and coastal hazards. Work has been initiated with scenic river advisory boards to better define the floodplain resource and flood protection issues. Planning District Commissions have been used as a vehicle to pull together efforts on the Community Rating System, flood mitigation, and multiobjective management planning. The division has a great deal of interaction with Soil and Water Conservation Districts, which are potentially important players in developing flood protection plans, especially in rural areas now being urbanized.

The commonwealth has developed a program with a significant level of technical expertise and the ability to provide good technical assistance. The primary setbacks have been the adverse economic climate and the difficulty of establishing implementation funding.

Improved coordination with federal agencies other than the Federal Emergency Management Agency has been important. One Section 22 project on coastal flood hazards has been accomplished with the Corps of Engineers, Norfolk District, and a floodproofing handbook for Virginia localities and citizens has been initiated. The Tennessee Valley Authority provides significant technical input in the southwestern watersheds, and was a partner in the development of *The Floodplain Management Plan for the Commonwealth of Virginia*. The commonwealth has begun the early coordination of watershed plans with the Soil Conservation Service. Recently, through Virginia's state coastal zone management grant, we unsuccessfully sought funding from the National Oceanic and Atmospheric Administration to develop a state coastal hazards management strategy. The state program needs to be expanded to interact with the National Park Service's Rivers and Trails Program, as well as with the Environmental Protection Agency. Future goals will be the improvement of

coordination with federal agencies and the initiation of annual meetings with agency representatives to discuss flood protection needs.

Two state-level roundtable meetings have been initiated. The plan is to meet quarterly to discuss current topics and coordination needs. One round table is with the Department of Emergency Services, and the other is a natural resources forum primarily limited to the recreation/scenic rivers and natural heritage staff. In the future other natural resources management staff, such as those involved with wildlife and with forestry, will be included. Future round tables would involve housing and community development staff who handle zoning, building codes, and community block grants; and transportation personnel. Other groups may evolve with time. These meetings have been useful in breaking down barriers to efficient daily work, and in finding ways to jointly solve common problems.

For more information, contact:

Doug Plasencia  
Division of Soil and Water Conservation  
Department of Conservation and Recreation  
203 Governor Street, Suite 206  
Richmond, Virginia 23113  
(804) 371-6095



## WASHINGTON

Washington's floodplain management program has as its primary emphasis administration of the Flood Control Assistance Account Program (FCAAP). FCAAP is a state-funded program of \$4 million per biennium (2-year period), which involves providing grant funds to local governments. The \$4 million is a fixed amount specified in state law that is transferred from the state general fund to the account at the beginning of each biennium. The amount transferred is that which, when added to that remaining in the account from the previous biennium, will bring the total up to \$4 million.

Grant funds are made available for developing comprehensive plans for flood damage reduction with 75% state matching funds, constructing flood control maintenance projects with a 50% state match, and performing emergency projects with an 80% state match. Examples of maintenance projects are channel clearing, streambank and levee bank protection against erosion, and maintaining the cross section of levees. Limits of \$500,000 for plans and projects and \$150,000 for emergency work per biennium per county have been established to help ensure that all counties have the opportunity to compete for the funds.

The administrative costs of running the program are taken from the \$4 million fund. A major staff effort is required in working with local governments to develop their applications and administer the comprehensive plan grants. Approximately five people are funded under this program.

Another principal activity relates to work done under the annual contract with the Federal Emergency Management Agency under the Community Assistance Program. The standard activities eligible for funding under the CAP are performed. Included with this activity is administration of our state law on floodplain management which adopts the minimum criteria of the National Flood Insurance Program as a state requirement. In addition, the state law contains a provision that prohibits residential structures in mapped floodways.

Within the last three years the state law has changed from the state having authority to adopt rules which exceeded the minimum NFIP criteria, to only meeting the minimum NFIP criteria. Rules had been adopted for a one-foot freeboard above the 100-year flood level, additional restrictions for critical facility construction in floodplains, and prohibition of residences in coastal high hazard areas (V zones); these rules were repealed as required when the state law was changed. This was the result of public objections expressed to local officials and state legislators.

Although there was a setback to floodplain management with the law change, there is optimism because of the FCAAP, which has been extremely successful and popular with local officials. Another encouraging note is that after record flooding in December 1990 a legislative committee was formed to determine how to reduce flood damages. It is scheduled to complete its work in 1992 and to provide a report to the legislature, which could include major improvements in state legislation to reduce flood damages.

The state has recently become active in bioengineering—using plant materials to control erosion. Interest in this technique is very high, and lots of activity is expected for the future.

For more information, contact:

Jerry Louthain  
Floodplain Management  
Department of Ecology  
MS PV-11  
Olympia, Washington 98504  
(206) 459-6791  
FAX (206) 438-7537

## WEST VIRGINIA

The principal function of the West Virginia floodplain management program is to provide information and assistance to local governments, businesses, and the general public about the National Flood Insurance Program and floodplain management. Actual administration and enforcement of floodplain management regulations takes place at the local—county or municipal—level.

West Virginia does not participate in the Federal Emergency Management Agency's Community Assistance Program, but does assist, to the extent possible, federal personnel in their oversight of local floodplain management procedures.

Although the last Presidentially declared flood disaster took place in November 1985, there have been several smaller floods that have served to remind state and local officials of the potential for future large-scale disasters. The state is working on a comprehensive State Flood Assessment and Mitigation Plan that will serve as a basis for recommendations to the governor and legislature for improvements in the state's flood hazard mitigation efforts. In addition, legislation was recently passed to make it easier for citizen groups to fund local flood hazard mitigation projects.

For more information, contact:

Carl L. Bradford  
Director, West Virginia Office of Emergency Services  
Department of Military Affairs and Public Safety  
Building 1, Room EB-80  
1900 Kanawha Boulevard, East  
Charleston, West Virginia 25305-0360  
(304) 558-5380  
FAX (304) 344-4538

## **WISCONSIN**

### **Background**

The Department of Natural Resources administers the State Floodplain Management Program and coordinates the National Flood Insurance Program activities. Approximately 17 full-time equivalent staff in the central office (Madison) and six district offices provide technical assistance to local officials, developers, insurance and real estate agents, lenders, and the general public. This assistance covers state and federal minimum standards, model local regulations, guidance on adoption and administration, engineering expertise, and informational and educational materials. There are 565 floodprone communities in Wisconsin.

In 1986 the Floodplain Management Program and the Dam Safety Program were combined into the same section. This has greatly enhanced the ability to tie the use of lands below dams to the hazard posed if the dam fails. There are eight staff members in the dam safety unit.

The 1985 Governor's Executive Order 73 has been implemented. It directs all state agencies to insure that all their construction, funding, and permitting actions consider flood hazard standards. Flood hazard mitigation plans have been developed for all state-owned facilities in the 100-year floodplain. In March 1986, Wisconsin Administrative Rule NR 116 was revised to include a zero-rise floodway standard (0.0 feet), zoning below dams, stormwater management, no basements allowed below the 100-year level, and wave runup required along the Great Lakes shoreline. Over 400 community audits have been performed to date to review local administration of floodplain management ordinances and technical assistance needs.

Numerous training and guidance materials have been developed for local communities, including a floodplain/shoreland/wetland management guidebook, a planning and zoning committee handbook, a board of appeals handbook, and a model ordinance to regulate floodplains and combined floodplain/wetland ordinances.

### **Important Activities since 1988**

Twelve communities have applied for and received credit under the Community Rating System. The state developed a guide for communities applying for CRS credit that provides information about the credit given to Wisconsin communities based on state standards that provide greater flood protection than do the NFIP minimum standards.

#### ***Mitigation***

Assistance was provided at the Disaster Application Center to applicants for assistance after the 1990 flooding in the City of Green Bay. We also reviewed 10 applications for the hazard mitigation grant program under Section 404 of the Stafford Act. Two communities may receive that funding: DePere for repair of a lift station and Darlington for relocation of the fire station outside of the floodplain. The state flood hazard mitigation committee was convened as a result of the Presidential disaster declaration in August 1990. The results of that are reflected in a revised flood hazard mitigation report (Section 409).

### ***Training Locals***

Regional training sessions were conducted in 1989, 1990, and 1991 for local zoning officials and planning and zoning committee members. In the peak year (1991), 600 local officials attended these sessions. In 1990 the state received the Association of State Floodplain Managers' Tom Lee Award for this training activity.

### ***Dam Repair Grant Fund***

The state has provided \$5.5 million on a 50-50 cost-share grant program for repair or removal of municipally owned dams. To date, 30 dams had been funded for the first two years of this program.

### ***Mapping***

The Wisconsin Land Information Association was formed in the 1990 budget bill. A surcharge on the local land transaction fee was enacted in each county. Monies are earmarked for improvements in mapping and, in particular, digital storage of geographic information within each county. As counties develop updates to county maps and geographic information, floodplain zoning maps will be reviewed and revised, if necessary, based on better contour information.

### ***Monitoring Local Communities***

We have proposed a new effort to monitor communities in the administration of their floodplain ordinances. In 1989 these visits became known as "super" community assistance visits (superCAVs). These audits are more extensive than those presented in the Federal Emergency Management Agency guidelines. We are spending 150-200 staff hours documenting the data where extensive problems exist in a community—such as where administration of the floodplain ordinance has been lacking. We have also developed a 5-year cycle to visit or contact all communities in the state to determine the quality of administration of their ordinances.

### ***Integrated Databases***

We are in the final stage of developing an integrated database for all flood insurance study engineering data, and information about the status of locally adopted ordinances. Enhancement of the system will allow us to verify electronic data previously submitted by Flood Insurance Study contractors and to relate that data to other state information about stream corridors that relates to water resources. This database is made available to localities and their consultants for map revisions.

For more information, contact:

Larry A. Larson  
Chief, Dam Safety/Floodplain Management  
Department of Natural Resources  
P.O. Box 7921  
Madison, Wisconsin 53707  
(608) 266-1926  
FAX 608 264-9200

## WYOMING

Since 1988, the Wyoming Emergency Management Agency has utilized the governor's proclamation of the first full week in April as Wyoming's Hazards Awareness Week. The goals of this program are to protect people and property from hazard-related losses by making information about life-saving and property-protection actions available to everyone. Through this program Wyoming also will be reducing its exposure to the financial and legal aftermath of these events.

The Wyoming Emergency Management Agency, the National Weather Service, the Wyoming Department of Criminal Investigation, and the Wyoming State Planning Coordinator's Office began work in 1989 to improve the statewide distribution system for weather warnings. A new computer interface between the Department of Criminal Investigation and the NWS is being implemented and should be on line in early 1992. This link will allow important weather information, such as warnings, watches, and weather statements, to go directly to a printer or teletype in each county and many cities throughout the state.

For more information contact:

Ed Wallace  
Natural Hazards Planner/Mitigation Officer  
Wyoming Emergency Management Agency  
P.O. Box 1709  
Cheyenne, Wyoming 82003-1709  
(307) 777-7566  
FAX (307) 635-6017