TABLE 2

NATIONAL FLOOD INSURANCE PROGRAM PAID CLAIM DATA BY CALENDAR YEAR

Calendar Year	Policies	Average Insurance Per Policy	Number of Paid Claims	Total Losses	Claim Frequency (Per 100 Exposure Units)	Average Paid Claims Cost
1972	105,231	$16,140	2,745	$ 6,510,654	2.6	$2,250
1973	232,677	17,060	15,485	12,694,833	6.7	2,548
1974	342,529	21,950	10,949	23,208,853	3.2	1,936
1975	495,585	25,440	19,982	34,968,535	4.0	3,588
1976	682,386	28,690	12,135	50,114,420	1.8	4,454
1977	996,553	30,100	13,477	74,761,406	1.4	5,678
1978	1,298,383	33,150	28,859	99,456,110	2.2	5,016
1979	1,518,210	37,650	69,175	117,069,208	4.6	6,458

Source: Data provided by the Federal Emergency Management Agency

lations as a condition to entering the program. Despite amendments in 1977[13] which weakened the 1973 act by permitting federally insured banks to insure conventional loans in communities not participating in the program, few communities chose to withdraw.

Enhanced disaster assistance conditioned on postflood hazard mitigation. Prior to 1970, a variety of disaster assistance grants and loans were available to victims of federally declared disasters. The President was then (as now) authorized to declare disasters at the request of a state governor if the necessary assistance exceeded the resources of the state or local government. The Disaster Relief Act of 1970[14] (adopted in response to the San Fernando earthquake) made five new types of disaster assistance available to private individuals, states, and local governments: free temporary housing for one year, disaster unemployment insurance, food stamps, grants to local governments with major loss of tax revenue, and forgiveness of up to $2,500 in Small Business Administration (SBA) loans.

The Flood Disaster Protection Act of 1973,[15] adopted after Tropical Storm Agnes, broadened assistance to forgive federal loans up to the first $5,000 and lowered interest rates on additional balances to 1%. This money is available after a Presidentially declared disaster or after SBA and the Federal Housing Administration make their own disaster declarations in smaller disasters. Under the 1973 law, the federal government assumed costs previously assumed by the Red Cross for goods and services such as bulk cleaning supplies, temporary housing, and household accessories. It also introduced provisions for withholding federal benefits from flood-prone communities that chose not to participate in the NFIP.

The Disaster Relief Act of 1974[16] (Section 406) made available disaster loans and grants to states and local governments on condition

that recipients evaluate and mitigate hazards. FEMA adopted hazard mitigation regulations to implement this act in 1979.[17]

Increased local regulation of flood hazard areas. Encouraged by the National Flood Insurance Program, strengthened state regulatory programs and environmental concerns, most communities with flood problems adopted at least preliminary regulations. In 1970, only about 300 to 400 communities had adopted floodplain regulations. By May 1981, over 17,000 had adopted or indicated an intent to adopt regulations in order to qualify for the NFIP.

Strengthened state floodplain management programs. In 1970, 24 states had adopted either direct state floodplain regulations or state standards for local regulations. By 1980, 31 states had adopted programs. Many states significantly strengthened and expanded existing programs during this period.

Accelerated floodplain mapping. In 1970, only a small portion of the nation had flood hazard maps. During the 1970s, the U.S. Geological Survey prepared "approximate" floodplain maps for 20,000 flood-prone communities. FEMA and its study contractors prepared more detailed maps for 3,500 communities. New FEMA maps for 6,500 communities are in various stages of completion. Maps for some areas were also prepared by the SCS, the Corps, and the Tennessee Valley Authority (TVA). California, Iowa, Maryland, Nebraska, New Jersey, and Wisconsin have prepared maps for some areas and many local communities prepared their own larger-scale maps to facilitate regulation.

Hazard mitigation requirements for public uses. In 1970, public uses were rarely protected from flooding, despite the 1966 Executive Order 11296, Evaluation of Flood Hazards. This order directed federal agencies to encourage "a broad and unified effort to prevent uneconomic use and development of the Nation's floodplains." In 1977, President

House threatened by erosion from flash flooding in Big Thompson Canyon, Larimer County, Colorado.

Photo by Rutherford Platt.

Carter issued Executive Order 11988, Floodplain Management, which strengthened and superseded E.O. 11296 by requiring federal agencies to avoid public investment in the floodplain, including grants in aid to local governments, if alternatives exist. In the 1970s, many states also amended state regulations or issued executive orders to control public uses of the floodplain.

Emphasis on nonstructural approaches. In the 1970s, all levels of government shifted attention to nonstructural measures to reduce flood losses, although some dikes, dams, levees and channelization projects continued to be built. Congress emphasized nonstructural approaches in the National Flood Insurance Act of 1968[18] and its subsequent amendments as well as in the disaster assistance acts cited above. Congress enacted Section 73(a)[19] of the Water Resources Development Act of 1974, which required agencies to consider nonstructural alternatives, including floodplain regulation, acquisition, and relocation, "with a view of formulating the most economically, socially, and environmentally acceptable means of reducing or preventing flood damages." Executive Order 11988, cited above, emphasized nonstructural measures as did the President's Water Policy Message of June 6, 1978, and Executive Order 12113, Independent Water Project Review. The latter directive required that whenever water resources projects or programs are considered, a nonstructural plan must be evaluated as one alternative.

Concern with dam safety. A number of dam failures with catastrophic losses of life increased national and state concern about dam safety during the 1970s.[20] When a dam formed from coal mine waste gave way in Buffalo Creek, West Virginia, in 1972, 118 people were killed. Two hundred thirty-six died in Rapid City, South Dakota, when an earthen dam burst after a severe rainfall. In reaction to these failures, Congress adopted the 1972 National Dam Inspection Act,[21] which authorized the Corps

of Engineers to inspect dams. Other dam failures added impetus to the national dam inspection program. These included the spectacular rupture of the Teton Dam on June 9, 1978, which killed 11, left 25,000 homeless, and totally or partially inundated a 300 square-mile area. Thirty-eight died in Taccoa, Georgia, in November 1977 when heavy rains ruptured an earthen dam. In addition to the federal dam inspection program, which now covers 9,000 large dams, 44 states require state permits for dams.

Community and state innovation. In the 1950s and 1960s, state and local authorities often applied regulations alone to accomplish floodplain management goals. During the 1970s, many states and hundreds of local communities adopted innovative combinations of different types of regulations and in some instances combinations of regulations and non-regulatory measures such as acquisition and flood warning systems. These innovative programs have tested new approaches and now serve as models.*

Growing expertise. During the 1950s and 1960s, few local governments, regional planning agencies, or private contractors had expertise in floodplain management. Many groups lacked expertise in mapping, map interpretation, drafting and administering regulations, backwater computations, acquisition, environmental impact analysis, wetland analysis, and other related topics. In the 1970s, expertise at all levels of government and in the private sector increased, although lack of expertise is still a common problem. City councils, architects, engineers, insurance agents, bankers and others sought information on flood hazards, floodproofing, and similar subjects in order to adopt wise regulations, design low risk structures, and reduce hazards to existing uses. States, federal

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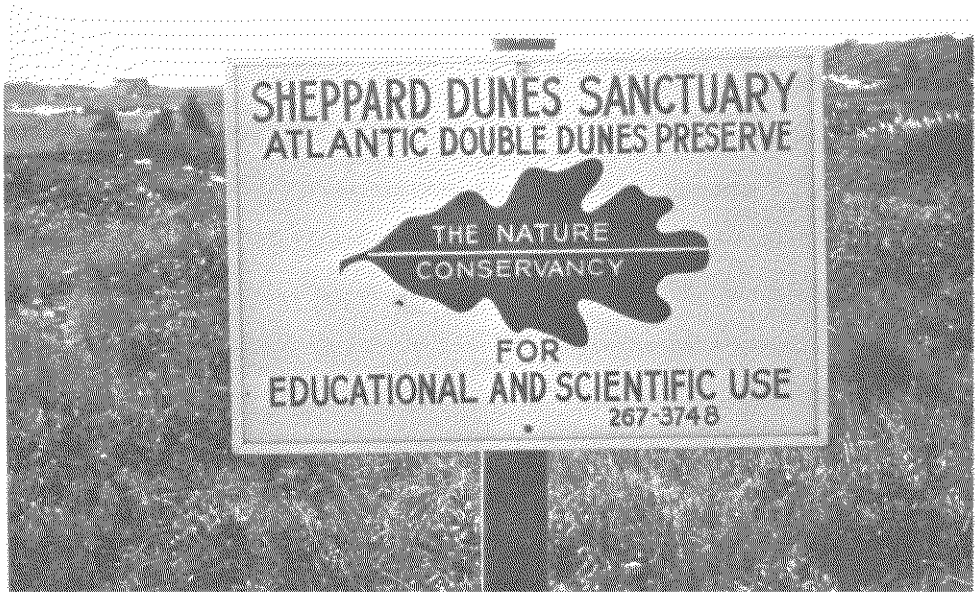
*See Appendix A, Strengthening State Floodplain Management, and Appendix B, Innovation in Local Floodplain Management, for descriptions of some of these programs.



The East Hampton chapter of the Nature Conservancy purchased over 600 acres of coastal wetlands, dunes, and floodplains in East Hampton, New York.

Photo by Jon Kusler.

agencies, regional planning agencies, and universities provided training through workshops, technical assistance, guidebooks, and consultations.

Growing public awareness. Public awareness of flood problems grew during the 1970s due in part to widespread press coverage of flood disasters; floodplain mapping by FEMA, other agencies, and states; flood insurance requirements; public notice and hearings accompanying the adoption of regulations; and public education programs at all levels of government. Despite a growing general level of awareness, many floodplain occupants underestimated floods which did occur such as those from Hurricane Frederic.

Enhanced role for the private sector. Before 1970 the private sector played a limited role in hazard mitigation. The federal government, states, or localities were expected to remedy flood problems or provide disaster assistance. During the 1970s, industries and private homeowners floodproofed existing structures in some areas and helped establish flood warning systems.[22] Local conservation organizations promoted floodplain acquisition and regulation. National organizations such as the Nature Conservancy and the Audubon Society educated the public and acquired wetlands, floodplains, and barrier islands. Banks also indirectly enforced floodplain regulations by notifying potential mortgagees of regulations and by refusing mortgages for flood hazard areas unless flood insurance was purchased and minimum local and state standards were met.[23]

Recognition that flood hazard reduction must be a cooperative effort. In the 1950s, flood problems were addressed primarily by the federal government through flood control works. In the 1960s, at least 24 states adopted regulations or standards for local regulations. Although local programs grew in the 1970s, the decade also confirmed that the partnership of all three levels of government is needed to effectively reduce

flood losses. This partnership is the basis for A Unified National Program for Flood Plain Management[24] adopted by the U.S. Water Resources Council and member agencies in 1976, revised and sent by President Carter to Congress in 1979. This partnership is reflected in the cooperative work of FEMA, the WRC and the Coastal Zone Management Program to strengthen state and local programs, and in requirements of OMB and Congress that states and local governments cost share in floodplain management.

Growing awareness of floodplains as natural resources. In the 1950s and early 1960s, concern about the value of floodplain land for recreation, farming, forestry, wildlife, and pollution control was limited. During the 1970s, widespread recognition of these resource values[25] led to: (1) the adoption of Executive Order 11990, Wetland Protection and Executive Order 11988, Floodplain Management; (2) the Federal 404 permit program providing protection for navigable waters and wetlands;[26] (3) state wetland statutes in most coastal and some inland states; (4) state shoreland zoning programs in seven states; and (5) thousands of local resource protection programs, including shoreland zoning, wetland regulation, agricultural land zoning, and mineral resource zoning. Coastal states became concerned about barrier island and beach protection and comprehensive coastal zone management. Where complete protection of resource values was not feasible, floodplain and resource protection regulations often required measures to reduce environmental impact as a condition of development permits.

Combining regulatory and nonregulatory measures. Prior to 1970, only a small number of communities had combined regulations with non-regulatory measures. Now perhaps 30% of flood-prone communities have combined regulations with acquisition, flood warning systems, evacuation plans, marking flood hazard areas, or flood control works.[27]

Coordinated floodplain management. Until 1970, federal, state, and local flood control, floodplain regulation, disaster assistance, and open space programs were poorly coordinated and often contradictory. Real progress in coordination was made in the 1970s in large measure as a result of executive decisions such as issuance of the Floodplain Management and Wetland Protection Executive Orders, the creation of the Federal Emergency Management Agency, and adoption of a Unified National Program for Flood Plain Management. Congressional cross-referencing of disaster assistance,[28] flood insurance, and regulations also helped. Coordination at state and local levels was strengthened through state executive orders, improved state floodplain management programs, and more aggressive local programs.

Revisions in cost sharing. In the 1960s and early 1970s, the federal government subsidized federal flood control works and some types of disaster assistance at near-100% levels. Flood insurance received an overall 70% to 90% subsidy. During the 1970s, OMB, WRC, and Congress worked to develop consistent cost-sharing policies for flood control, disaster assistance, and other hazard reduction measures.[29] State and local cost-sharing increased from zero to 20%.

Improved review for structural projects. During the 1960s, WRC and its member agencies developed federal criteria ("principles and standards") to formulate and evaluate the economic costs and benefits of water resources projects.[30] During the 1970s, these criteria were refined and revised[31] and Executive Order 12113 proposed an independent executive project review function for water resources projects. Federal environmental impact review procedures for projects were strengthened, and many states and localities adopted their own environmental impact review procedures.

Research. During the 1950s and 1960s, floodplain research focused on general policy issues; during the 1970s, it shifted to implementation. Many reports, manuals, and other materials addressed the flood insurance program, disaster preparedness, postdisaster response, floodplain regulations, flood warning systems, and floodplain acquisition.[32] The effectiveness of state and local floodplain regulations was examined by several major studies.[33] More than a dozen manuals and reports dealt with floodproofing techniques.[34]

Improved education and technical assistance efforts. Before 1970, federal agencies and states did little to educate elected officials, planners, architects, lawyers, and others in the specifics of floodplain management. During the 1970s, federal and state agencies distributed manuals, ordinances, and other materials and conducted hundreds of workshops with local governments. A variety of floodplain management films and slideshows were developed and more technical assistance was provided to local governments in map interpretation and case-by-case evaluation of floodplain permits. The Corps, NOAA, SCS, TVA, and USGS strengthened their assistance programs.

Emphasis on improved disaster preparedness and postdisaster hazard mitigation. Until 1970, the goal of most federal, state, and local disaster response efforts was rapid "return to normalcy," which usually meant reestablishment of the status quo. In the 1970s, federal agencies improved their disaster preparedness and postdisaster hazard mitigation to reduce flood damage potential after flood losses and to break the cycle of repeated flood losses. The Disaster Assistance Acts of 1973 and 1974, which made mitigation a condition of disaster assistance, were important first steps. Additional measures[35] included federal funding for state and local disaster preparedness and evacuation plans; postflood assessment (e.g., Scituate, Massachusetts; Jackson, Mississippi); evaluation