HIGHER GROUND

A Report on Voluntary Property Buyouts in the Nation's Floodplains

A Common Ground Solution Serving People at Risk, Taxpayers and the Environment

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July 1998

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Foreword

Mark Van Putten
President
National Wildlife Federation

Higher Ground is a contribution to the National Wildlife Federation's vision for the Nation's rivers and floodplains; a vision that includes restoring landscapes damaged by decades of abuse. This vision seeks to regenerate natural wetlands, to cleanse the water, to return floodplains to their natural functions and, above all, to restore the full panoply of life that thrives in the rich habitat along the banks of rivers and streams.

This vision is founded in the land ethic of the great conservationist Aldo Leopold, who changed forever our view of the rightful role of the human species "from conqueror of the land community to plain member and citizen of it."

The past 60 years provide ample testament to the error of treating rivers, floodplains and floods as forces to be conquered. All too often we've seen rivers straightjacketed into concrete chutes and floodplains transformed into suburbs. Unfortunately, nature's reminders that we are not its master too often produce more flood victims, more damaged property and ever more costly disaster relief and rebuilding obligations assumed by the federal government.

Higher Ground focuses on an important tool for starting to reverse these trends, voluntary property buyouts and relocations in high-risk flood zones. Since becoming an important floodplain management tool following the Great Midwest Flood of 1993, the approach has been used by the Federal Emergency Management Agency, in conjunction with other government agencies, to purchase approximately 20,000 floodprone homes and businesses and to assist their owners to move to higher ground out of harm's way.

By law, all land purchased in voluntary buyouts reverts permanently to open space, recreational use or natural floodplains. No money for disaster relief or rebuilding may be spent in the future on land purchased in voluntary buyouts. These rules make voluntary buyouts not only an investment in averting disaster, but they also enhance urban

and rural environments and provide meaningful help to people living in high-risk floodplains. At the same time, they move us toward a crucial goal of reclaiming floodplains' natural and beneficial functions.

Higher Ground is intended as a tool to help understand how far we have come with this option and how far we still have to go. The analysis of National Flood Insurance Program data on repetitive loss properties (Chapter 3) paints a clear picture of the need to use voluntary buyouts to provide meaningful help to people living in high-risk floodplains and as a way of allocating public revenues responsibly. The need for wise floodplain management will in all probability grow in the face of human-induced climate change. The report will help local citizens, community officials and governors to begin a practical examination of whether voluntary buy-outs can work to solve the repetitive flood problems that they confront. The recommendations in Chapter 4 are a call to action at the federal, state and local levels to not only enhance voluntary buyouts as a tool, but also to rethink and reform the Nation's overall approach to floodplain management.

The National Wildlife Federation has worked hard to make voluntary buy-outs possible and believes that — where appropriate — they exemplify common sense conservation by enhancing the environment, assisting people in need and making better use of public funds.

In terms of the Nation's flood-plains, ***Higher Ground*** poses a challenge of handing off to the next generation an environment that is not just as good as the one we inherited, but one that is better.

The National Wildlife Federation exists to meet just this kind of challenge.

Photo: U.S. Fish & Wildlife Service

Executive Summary

In the decade of the 1990s, with flood damages at an all time high having risen to more than $4 billion annually, and with upwardly spiraling disaster relief costs that are now a continual strain on government budgets, the Nation has begun to seek out new approaches to reduce the damages and human misery associated with floods. The Great Midwest Flood of 1993 has served as catalyst to an awakening of the need to recognize the value and benefits of floodplains *as floodplains*, and has pointed the way toward restoration and wise management of these natural resources as part of an overall strategy to reduce flood losses.

For much of this century, the Nation has pursued a mostly singular course of attempting to control floods with structures — dams, levees, river channelizations, drainage works and manipulation of coastlines — at large expense to the taxpayers, and often with the effect of luring unwise encroachment into floodprone areas, and imbuing communities with a false sense of security that is shattered when substantial floods eventually come. The Nation is now beginning to recognize the significant limitations of this approach.

Thirty years ago, in an attempt to provide new direction that emphasizes *nonstructural* approaches to address flood problems, Congress initiated the National Flood Insurance Program, with the promise that in exchange for making affordable flood insurance available in floodprone communities, the communities would redirect their growth and development away from hazardous areas, and thus reduce the costs of flooding to all sectors. While this program has made significant strides, it still has far to go to reach that original vision.

In the wake of the '93 Midwest Flood, many communities began to develop and implement a new strategy of voluntary buyouts and relocations of homes and businesses out of harm's way. Since then many other communities across the Nation have followed suit. These actions represent a sea-change in attitude and approach toward addressing flood problems, with significant potential to benefit people at risk, the Nation's taxpayers, and the environment.

Higher Ground reviews the status of *voluntary property buyouts and relocations* as a floodplain management option to date. In addition, the report analyzes the 18-year history of repetitive flood

losses from the National Flood Insurance Program to identify communities that may have significant potential to utilize new nonstructural approaches to flood hazard reduction. Finally, the report makes recommendations for program and policy changes to improve floodplain management and to increase the utilization of nonstructural approaches to reduce flood damages.

Voluntary Property Buyouts

Higher Ground presents the first comprehensive study of *voluntary property buyouts and relocations* as a major new floodplain management option.

- Principally since the Great Midwest Flood of 1993, the Federal Emergency Management Agency has tabulated approximately 17,000 voluntary property buyouts in 36 states and one territory, although the actual number may be closer to 20,000.
- Since the '93 Midwest Flood, federal agencies have acquired easements on approximately 400,000 acres of floodprone farmland in 14 states, and easement purchases of an additional 200,000 acres of high-risk farmland are being considered in Minnesota and Illinois. These acquisitions represent a substantial environmental benefit in terms of restoring wetlands habitat and natural floodplain functions.
- Voluntary property buyouts and relocations in high-risk floodzones are based on three principles:
    - People in distress receive meaningful assistance by the voluntary purchase of their property, at predisaster fair market value, so that they can use the funds to acquire new housing on higher ground out of harm's way;
    - Where they are appropriate, voluntary buyouts are a cost-effective use of public funds because in return for one-time purchases, any future expenditure of disaster relief and recovery funds on the properties is prohibited; and,
    - People and the environment benefit because all property acquired in voluntary buyouts reverts permanently to recreational and open space uses or natural wetlands and floodplain functions.

- Structures with a history of repetitive flood losses should be given priority consideration for the buyout option.
- Experience from the '93 Midwest Flood proves that voluntary buyouts can be a cost-effective investment of public funds.

Repetitive Loss Properties

Higher Ground presents in Chapter 3 an analysis of the National Flood Insurance Program's computer databases for *repetitive loss properties* and *repetitive loss communities* from 1978 to 1995. A repetitive loss property is any insured property that has sustained two or more flood losses of at least $1,000 each in any 10-year period. A repetitive loss community is any community containing at least one repetitive loss property.

- Although repetitive loss properties represent only two percent of all properties insured by the National Flood Insurance Program, they claimed 40 percent of all NFIP payments, in the period studied.
- Nationwide, 300 communities are identified in Table 3.I where, because of the clustering of repetitive loss properties with a history of flooding on average approximately every six years, the National Wildlife Federation recommends priority be given to exploring the use of the voluntary buyout option. These communities represent prime opportunities to begin concerted predisaster planning to achieve significant reductions in repetitive flooding costs.
- Nearly one out of every ten repetitive loss homes (5,629 in all) have had cumulative flood insurance loss claims that exceed the value of the house — in some cases many times over. Table 3.III presents the top 200 homes with payments exceeding building value, beginning with a home in Houston, Texas, valued at $114,480 which received $806,591 in flood insurance payments for 16 flood events over the 18 years studied.
- Over half of all the repetitive loss property insurance payments Nationwide have been made in Louisiana and Texas. Fifteen states account for 90 percent of total payments for repetitive loss properties.
- The NFIP rules regarding substantially damaged properties are poorly enforced. Nearly 15 percent of all repetitive loss properties studied had been substantially damaged at least

once, i.e. suffered a loss of 50 percent or more in a single flood event. Despite NFIP rules requiring that such properties be removed or elevated above the 100-year floodplain, NWF's analysis shows that these properties experienced approximately the same number of losses — and accumulated even greater flood insurance payments — *after* being substantially damaged as they experienced before being substantially damaged.

- Properties located outside the designated 100-year floodplain account for 20 percent of the repetitive loss properties studied. This high rate of repetitive losses outside the designated 100-year floodplain suggests significant inaccuracies, for whatever reasons, in the NFIP's floodplain maps and ratings and indicates that some home and business owners or prospective buyers in these areas are probably unaware of the risks associated with that property.

Policy Distortions

Higher Ground discusses the voluntary buyout option in the context of national policy toward floodplain management which is undergoing a fundamental shift away from using *structural* solutions such as levees and floodwalls and toward using *nonstructural* approaches such as voluntary buyouts. For at least the past six decades, the structural approach has dominated floodplain policy, and several policy distortions associated with this approach are identified.

- National disaster policy — including the dominant structural model for floodplain and flood management — saps incentive from individuals, communities and states to act responsibly. It often produces consequences opposite of stated intentions. It encourages development and rebuilding in areas with a predictably high risk of future catastrophic loss. It fosters an unsustainable reliance on the federal government as the source of a limitless guarantee to make whole what nature tears asunder.

- The construction of levees and subsequent floodplain development behind them has created large stocks of housing and business properties which are all a potential liability on federal disaster relief. Some of them will be flooded. Which ones, when and at what cost are the only uncertainties.

- The widespread assumption that the federal government will pay to rebuild flooded-out homes following a disaster

declaration has proven to be a substantial disincentive for homeowners in high hazard areas to purchase or renew federally sponsored flood insurance policies. Typically, less than 30 percent of the properties located in designated floodplains are covered by such policies.

- The public and many communities have come to rely far too heavily on the federal government to indemnify their own poor land use decisions against inevitable flooding.

Financial Distortions

Higher Ground presents an overview of the federal costs of natural disaster preparedness and relief, the costs of flooding and flood relief and the history and financial status of the National Flood Insurance Program and identifies several financial distortions in current policy.

- Over the past 25 years approximately $140 billion in federal tax revenue has been spent preparing for and recovering from natural disasters, including floods which account for the majority of those expenditures. In that time, the U.S. Army Corps of Engineers has spent more than $25 billion on flood control projects. Despite these expenditures, we find that flood damages have not, in fact, decreased but have increased at an alarming rate during the period of greatest federal spending. Long-term average annual flood damages, in constant dollars, are more than double what they were early in this century. In the past five years, flood damages in the United States have exceeded $40 billion, significantly surpassing any similar period.
- By congressional mandate, the National Flood Insurance Program is not actuarially sound — the premiums charged each property do not proportionately reflect the sums needed to cover anticipated losses. Subsidized premiums are one cause of strain on the NFIP's financial stability.
- Between August 1995 and January 1998, the NFIP had a net borrowing from the Treasury of $810 million. If recent trends continue with the flood insurance program expenses exceeding premium revenue, taxpayers face a significant new liability to bail-out the program.

Recommendations

The National Wildlife Federation's recommendations based on *Higher Ground*'s findings appear in Chapter 4, and are in summary:

- The National Wildlife Federation urges the federal and state governments to assist the 300 communities listed in Chapter 3, Table 3.I to review and examine the causes of their repetitive loss problems, and to identify existing and potential programs and policies that can ameliorate their flood losses in the future.
- Federal, state and local governments should coordinate and develop predisaster hazard mitigation plans to facilitate timely, coordinated hazard mitigation efforts before and after flood disasters occur. Congress and the Executive Branch should provide support for programs such as FEMA's *Project Impact*.
- Congress and the Executive Branch should develop a flexible, consolidated and streamlined voluntary buyout and relocation assistance program that can react quickly to assist states and communities after flood disasters, and that can better assist states and communities to mitigate flood risk before disasters occur.
- Congress should support the Corps of Engineers' new *Challenge 21 Initiative for Flood Hazard Mitigation and Riverine Ecosystem Restoration*, proposed in the President's fiscal year 1999 budget.
- FEMA and Congress should revise flood insurance rate schedules and community participation standards for the National Flood Insurance Program to provide increased incentives to reduce flood risks.
- FEMA should vigorously enforce the NFIP's substantial damage requirement for elevation or removal of substantially damaged buildings after floods. FEMA and Congress should consider modifying this requirement to include cumulative substantial damage thresholds and to allow FEMA to make substantial damage determinations, when necessary.
- The responsibility for managing and reducing flood losses and improving floodplain management should be shared more equitably among all levels of government and the private sector.

- The President and Congress should address and implement the key major recommended actions of the Interagency Floodplain Management Review Committee.
- Congress and the Executive Branch should eliminate the present strong bias in federal water resource project planning and evaluation procedures (the *Principles and Guidelines*) that favor structural approaches for flood damage prevention and mitigation over nonstructural approaches.
- Congress should reduce the basic cost-share for federally supported flood control projects to 50 percent, with incremental cost-share incentives to promote flood hazard mitigation ranging to a maximum 65 percent federal cost-share. An analogous, consistent formula should be set for the provision of public assistance disaster relief by FEMA under the Stafford Act.
- Federal and state governments should coordinate follow up reports on all major flood disasters with disciplined reviews and aggressive efforts to mitigate flood hazards.
- Congress and the Executive Branch should increase levels of funding and support for programs that provide technical assistance to states and communities for improving floodplain management and flood loss reduction activities.
- Congress and the Executive Branch should direct federal agencies concerned with flood-related issues to consider prudent steps that take into account current scientific research on climate change and sea-level rise.

1 The Voluntary Buyout Option: History and Context

"We have to change the way America deals with disasters. We can no longer keep paying time and time again for the rising costs of responding to disasters. We must take steps to protect our homes, our businesses and our communities before floods, earthquakes, hurricanes, and tornadoes wreak havoc on them." — James Lee Witt, Director, Federal Emergency Management Agency, testimony to Congress, October 27, 1993.

Farm building flooded out near bank of the Missouri River, Gasconade, MO, July 28, 1993. Photo: FEMA

Chapter I

The Voluntary Buyout Option: History and Context

Part 1
Financial Obligations Spiraling Upward

Despite huge expenditures of public funds, the Nation's natural disaster policy is not working. For a generation, the federal government has spent more than $1 billion a year to prevent flood damage, and even greater sums have been spent on relief and rebuilding in the wake of floods and other natural disasters. Progress has been made to prevent the loss of life from natural disasters.[1] But the costs of floods, hurricanes and other natural catastrophes — in terms of disrupted lives and a depleted treasury — continue to rise.

Current national disaster policy saps incentive from individuals, communities and states to act responsibly. It encourages development and rebuilding in areas with a predictably high risk of future catastrophic loss. It fosters an unsustainable reliance on the federal government as the source of a limitless guarantee to make whole what nature tears asunder.

Higher Ground sets out one alternative to a national policy in need of reform — the buyout of high-risk floodplain properties from willing sellers and the relocation or rebuilding of homes and businesses out of harm's way.

The essentials of the voluntary buyout and relocation option are to:

- **Combine federal, state and local funds for one-time buyouts of high-risk properties from willing sellers;**
- **Return the purchased property to natural floodplain or open space use;**
- **Prohibit the expenditure of any future disaster assistance to that location; and**
- **Assist former property owners and tenants to move to higher ground and out of harm's way, and, as appropriate, relocate homes and businesses outside the floodplain.**

Higher Ground presents the strengths, the early track record and the limitations of the buyout and relocation option. To provide a full picture of the option, ***Higher Ground*** identifies specific, repetitively high-risk locales where the option should be considered for priority implementation; recommends policy reforms to advance the option; and considers the floodplain implications of global climate change. Moreover, ***Higher Ground*** is a source book on how to make the option work for everyone from the flooded-out homeowner to the Mayor or Governor determined to respond effectively when disaster strikes, if not before.

While this report focuses on voluntary buyouts, the option should be understood as only one method to mitigate flood losses. ***Higher Ground*** does not attempt to give a full explanation of other flood mitigation options, including floodproofing and elevating buildings above the floodplain.

The voluntary buyout and relocation option is based on the interlocking win-win-win propositions of:

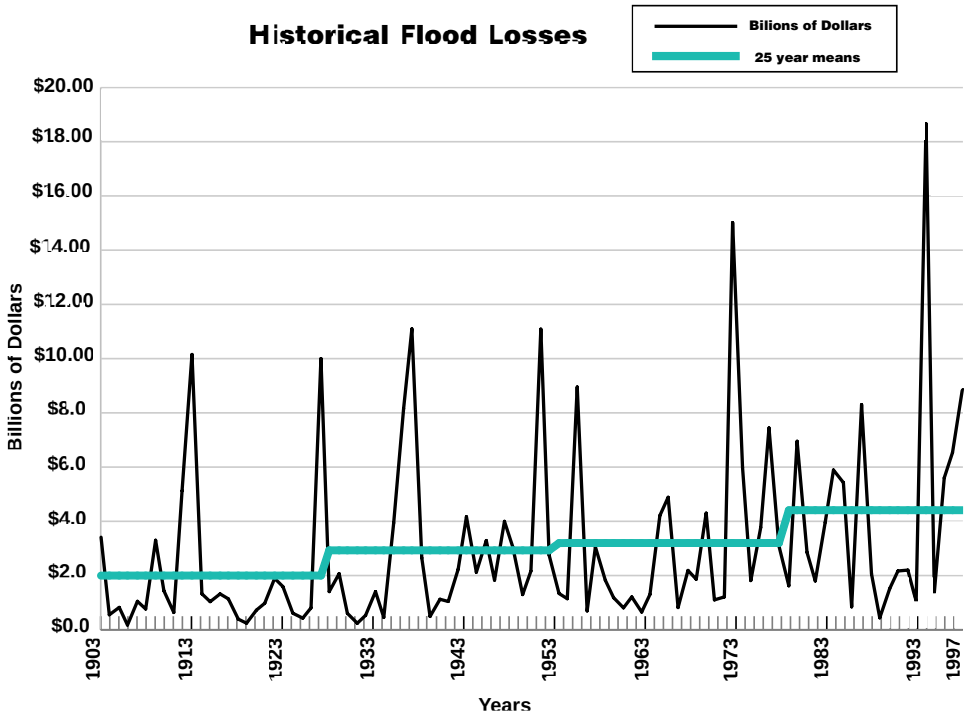
- **Providing permanent help to people in distress,**
- **Ending an unlimited disaster relief obligation on public funds by putting tax dollars to the most cost-effective use possible, and**
- **Restoring floodplains' natural ecological functions and expanding open space, and, where appropriate, recreational availability to all.**

Paying for Disasters

Over the past 25 years, the federal government has spent $140 billion in federal tax revenue preparing for and recovering from natural disasters.[2]

In that time, the U.S. Army Corps of Engineers spent more than $25 billion to build and operate flood control projects.[3] The money has paid for a vast network of levees, dams, riprap, floodwalls and channelization along the Nation's rivers. Despite the investment, average annual flood losses have risen throughout this century.

According to a National Weather Service estimate (see Figure 1.I), flood losses have more than doubled since 1900 to an average of more than $4 billion annually.[4] Floods are the most frequent, most predictable and most expensive natural disasters affecting the Nation.[5] Floods also account for the bulk of federal disaster relief costs.



Source: Historical Flood Loss Cost data provided by Frank Richards, National Oceanic and Atmospheric Administration, February 1998. Dollars amounts are adjusted to constant (1997) dollars using Construction Cost Index. Loss data represent U.S. annual historical flood losses for nontidal flooding since 1903.

Figure 1.I

The Pressure on Floodplains

> *"Floodplains are the lowlands adjoining the channels of rivers, streams or other watercourses, or the shorelines of oceans, lakes, or other bodies of standing water."* — Floodplain Management in the United States, 1992, p. 8.

An estimated 150,000 square miles (94 million acres) of the United States, an area nearly the size of California, lies within floodprone areas,[6] defined as land in the 100-year floodplain (see Box 1.I). Between 9 and 11 million families live in the floodplain[7] and property with an estimated value of $390 billion in 1987 is located there.[8]

Unless national policy changes, the number of people and the value of property in these floodprone areas will grow. The Census Bureau projects that the population of the United States will increase to 322 million by the year 2020, a 23 percent rise. This population increase, combined with the shrinking availability of developable land, will intensify pressure to use high-risk areas.[9]

The* 100-Year Flood*, also known as the 1 percent annual chance flood, or base flood, is a flood of the magnitude that has a 1 percent chance of being equaled or exceeded in any given year. It has a 26 percent chance of occurring over the life of a 30-year mortgage. It is the standard most commonly used in the United States for floodplain management and regulatory purposes. The* standard project flood*, or the flood that can be expected from the most severe combination of meteorologic and hydrologic conditions characteristic of the region involved, is often used to approximate the 500-year flood or the 0.2 percent annual chance flood. — Adapted from government publications.

Marbles and Floods

"a young Missouri farmer provided a correct explanation of the possibility of experiencing a 100-year flood. He described a bag full of marbles with 99 clear marbles and one black marble. Every time you pull one of those marbles out, and it's black, you've got a 100-year flood. After each draw, you put all 100 marbles back in the bag and shake it up. It's possible that you could pull the black one out two or even three times in a row. To represent the uncertainty of estimating a 100-year flood, it's also possible that the bag could hold two or three black marbles." — Sharing the Challenge: Floodplain Management into the 21st Century, p. 60.

Box 1.I

The Cost of Disaster Preparedness and Relief

Federal disaster relief programs have proliferated since the 1930s. Over the past several decades, as power and responsibility shifted to Washington, D.C. from the states, and as the costs of natural disasters mounted, the obligation of federal tax dollars for disaster preparedness and relief has soared to an annual average of more than $7 billion.[10]

This obligation does not include any of the disaster costs borne by individual victims, private relief agencies like the Red Cross, public and private insurers, or state and local governments. The main sources of federal disaster preparedness and relief, and their average annual costs as of 1993 in constant dollars, include the following:[11]

- Farmer's Home Administration emergency loans to farmers to cover disaster losses ($2 billion).
- Army Corps of Engineers design, operation and maintenance of flood control works; emergency preparedness and operations; and flood control and coastal works rehabilitation ($1.548 billion).
- Small Business Administration disaster loans ($1.2 billion).
- Agriculture Department disaster crop loss payments; Great Plains conservation; emergency watershed, food stamp and food distribution programs; and emergency conservation payments ($1.054 billion).
- Federal Emergency Management Agency unemployment and temporary housing benefits, public assistance, individual and family grants; community disaster loans; disaster preparedness and earthquake and hurricane vulnerability improvement grants; floodplain management assistance; fire suppression grants; hazard mitigation; crisis counseling; and mission assignments ($679 million).
- Transportation Department emergency federal aid highway relief ($239.7 million).
- Interior Department earthquake and volcanic hazard reduction; geologic hazard warning; and water resource mapping ($65.2 million).
- Education Department school replacement assistance ($23.8 million).
- Commerce Department disaster recovery grants; geodetic network; disaster investigations; and ocean and coastal zone management ($20 million).

In short, over the past 60 years the federal government has assumed the role of chief subsidizer for disaster relief. As a result, the Federal Interagency Floodplain Management Task Force concludes, "those who choose to live or do business in hazardous areas are not at present paying a proportionate share of the costs of that decision. Instead, the public essentially subsidizes these unwise decisions."[12]

Encouraging High-Risk Development

National floodplain policy often produces consequences opposite of stated intentions. The policy's basic premise is to reduce flood losses. Considerable progress has been made to implement building codes for new floodplain construction to protect against flood losses. Yet, in unforeseen and unintended ways, national policy induces floodplain development.

The availability of federally sponsored flood insurance and the expectation of an entitlement to government relief if disaster occurs encourage floodplain development and repeated rebuilding in high-risk areas each time catastrophe strikes.[13]

In some cases, levee construction has also induced floodplain development.

River channeled by levees in Republican, KS, July 25, 1993. Photo: National Oceanic and Atmospheric Administration

The job of building federal levees and other structures for flood control, such as flood walls and channelization, falls to the U.S. Army Corps of Engineers. The federal government has typically paid 75 percent of the cost of these projects. States or local communities cover the remaining 25 percent, often with in-kind payments, such as providing public land along river banks where the project is located. This generous three-to-one federal match by itself is a powerful inducement for communities to choose structural solutions to their local flood hazards.[14]

> ***"It is clear to many observers of floodplain management issues that flood protection projects do encourage additional development of floodplains."***
>
> — Floodplain Management Assessment, U.S. Army Corps of Engineers, June 1995, p. 10.18.

The current practice is that once 100-year flood levees are in place, communities petition the Federal Emergency Management Agency to have previously floodprone land and properties removed from flood insurance requirements. Development then proceeds as if the area is no longer in the floodplain. Home buyers and business developers in these areas often mistakenly believe that the levee will protect them from a flood that occurs only once in 100 years. Other buyers are completely unaware they are investing in a floodplain. Yet, on average, one-in-four of these areas will experience a 100-year flood within the span of a 30-year mortgage, and greater than 100-year floods, such as the Midwest Flood in 1993, are natural episodes of the climate cycle.

The reliability of levees also needs to be gauged by two additional factors. One is that upstream levees increase downstream flood flows by blocking off the floodplain's natural function of absorbing flood waters. The effectiveness of a downstream levee built to a 100-year standard may be compromised by the construction of new upstream levees that increase flood flows. Secondly, there is often a high degree of uncertainty in the calculation of a 100-year flood due to limited flood history data and other factors. The methods used to establish the 100-year floodplain may be incorrect by as much as 5 to 45 percent.[15]

Levee construction and subsequent floodplain development has created large stocks of housing and business properties that are all a potential liability for federal disaster relief. Some or all of them will be flooded. Which ones, when and at what cost are the only uncertainties.

Even the Corps of Engineers, the primary agency responsible for federal levee construction, acknowledges that levees can induce

floodplain development. A 1995 Corps of Engineers report concluded that "Some community development plans obviously have been designed to achieve the minimum level of protection necessary to gain removal of flood insurance requirements and then to promptly allow new or more intensive development in these areas."[16]

Sapping Local Incentive

The provisions of national floodplain policy that induce development in floodprone areas tend to sap the incentive of states and local communities to prevent or mitigate flood damage in the first place.

It was not always so. Before the expansion of the federal role, which began about 60 years ago, the incentives and responsibilities of dealing with flood hazards fell squarely on individuals, communities and the states.

> ***"If the anticipated availability of federal aid induces (more) individuals to locate social or economic activities in hazard-prone areas, then the total annual economic costs are higher with an aid program than without one."*** — Report of the U.S. Senate Task Force on Funding Disaster Relief, March 1995, p. 70.

In its 1994 report, the U.S. House of Representatives Task Force on Disaster found that: "If state and local governments believe that the Federal Government will meet their needs in every disaster, they have less incentive to spend scarce state and local resources on disaster preparedness, mitigation, response and recovery. This not only raises the cost of disasters to the federal taxpayer, but also to society as a whole, as people are encouraged to take risks they think they will not have to pay for."[17]

Michael Robinson, program coordination branch chief of the Mitigation Directorate of the Federal Emergency Management Agency, cites the shrinkage of state budgets devoted to natural hazard mitigation and a dearth of local and state personnel to coordinate activities as major obstacles in making national hazard mitigation policy effective.[18]

The widespread assumption that the federal government will pay to rebuild flooded-out homes following a disaster declaration has proven to be a substantial disincentive for homeowners in high-hazard areas to purchase or renew federally sponsored flood insurance policies. Typically, less than 30 percent of the properties located in designated floodplains are covered by such policies.

In floodplains converted to farming, the availability of compensation for crop losses caused by flooding provides a strong inducement to plow those lands because so much of the risk is assumed by taxpayers.

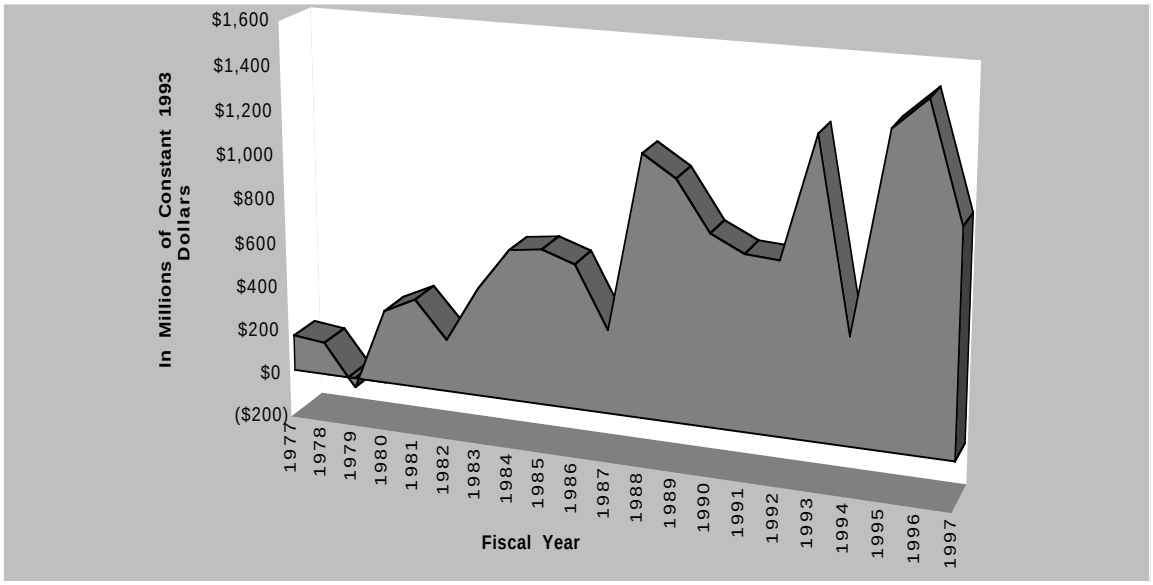
Therefore, farmers do not incorporate the risks naturally inherent in their operation into their business decisions. The practice of encouraging floodplain farming by protecting these areas with levees only designed to withstand a 25-year flood further increases the public liability to pay when damage occurs. As of 1993, the average annual cost to compensate farmers for production losses from disasters was $943 million (see Figure 1.II).[19]

As stated in the October 1995 *National Mitigation Strategy* report prepared by the Federal Emergency Management Agency, "The financial impact of natural hazards has been increasingly transferred to the public-at-large through disaster assistance, insurance subsidies, tax deductions, extraordinary government expenditures for flood control efforts, and disaster response and recovery assistance. People look more and more frequently to government to hold them harmless from the consequences of their risk-taking. The resulting cost to society in terms of death and injury, and property and economic loss, is simply too high."[20]

Awakening to the Need for Change

The staggering costs of our self-defeating national disaster policy have prompted a fundamental rethinking about the Nation's approach to floodplain management.

Taxpayer Costs for Federal Crop Insurance



Taxpayer costs are the total amount of money paid to farmers for crop losses plus insurance premiums paid by the government and administrative costs to run the program, less the total of insurance premiums paid by farmers.
Source: Chart created from data in Federal Disaster Assistance Senate Task Force Report, *March 15, 1995*, with updated figures from U.S. Department of Agriculture.

Figure 1.II

Floodplain Values

Water Resources

Natural Flood & Erosion Control

- Provide flood storage & conveyance
- Reduce flood velocities
- Reduce flood peaks
- Reduce sedimentation

Water Quality Maintenance

- Filter nutrients & impurities from runoff
- Process organic wastes
- Moderate temperature fluctuations

Ground Water Recharge

- Promote infiltration & aquifer recharge
- Reduce frequency & duration of low surface flows

Biological Resources

Biological Productivity

- Support high rate of plant growth in floodplains
- Maintain biodiversity
- Maintain integrity of ecosystem

Fish & Wildlife Habitats

- Provide breeding & feeding grounds
- Create & enhance waterfowl habitat
- Protect habitats for rare & endangered species

Human Resources

Harvest of Wild & Cultivated Products

- Enhance agricultural lands
- Provide sites for aquaculture
- Restore & enhance forest lands

Recreational Opportunities

- Provide areas for active & passive uses
- Provide open space
- Provide aesthetic pleasure

Areas for Scientific Study & Outdoor Education

- Contain cultural resources (historic & archeological sites)
- Provide opportunities for environmental & other studies

Source: Adapted from the Federal Interagency Floodplain Management Task Force's Report. A Unified National Program for Floodplain Management 1994.

Figure 1.III

Two hard-learned lessons, in particular, have spurred a revolution in floodplain policy.

The Corps of Engineers, whose parochial interest, at least in the past, lay in ever continuing appropriations to build structures that control floods, sums up the first lesson in its conclusion that, "The bottom line ... is that individuals and society as a whole cannot have it both ways; i.e., maintaining that development in floodplains is economically viable in a variety of ways and locations and yet seeking outside financial assistance when the extreme flood event strikes."[21]

The second lesson is more incipient and more fundamental. It is the lesson of the value of floodplains *as floodplains* (see Figure 1.III). As a Nation, we are only beginning to realize the extent of harm that has been caused by the wholesale alteration of one of nature's essential ecosystems. Serving their natural functions, floodplains are vast absorptive reservoirs of floodwaters; they are the Earth's primary filter and dissolver of waterborne contaminants; their coastal marshes and riverine wetlands provide the creative essentials for countless forms of life; and left to themselves, floodplains and the life they generate offer enjoyment and recreation.

These two lessons — the natural values of floodplains and the ultimate dependence of floodplain development on taxpayer subsidies — have crystallized in a single insight: to the degree that subsidies and misincentives that drive inappropriate floodplain development can be removed, many fiscal and environmental benefits can be gained while assisting people to move out of harm's way. This is not an urge for a return to some romanticized version of nature as the ideal. Rather, it is a practical appreciation of the benefits of balancing society's economic needs and obligations with society's needs for a healthy, functioning environment.

The keystone document articulating this insight is *Sharing the Challenge: Floodplain Management into the 21st Century*, the 1994 interagency report prepared for the President's Floodplain Management Task Force. *Sharing the Challenge* marked a culmination of decades of pressure to reform floodplain policy.

The report provides a comprehensive blueprint for translating the revolution in floodplain management into reality. Its vision for the next century is that "Human activity in the floodplain will continue, but with the clear understanding that any activity is subject to the residual risk of flooding and that the costs of this risk are to be borne by the sponsors of the activity .... [In urban floodplains] levees and floodwalls will continue to provide part of the vulnerability reduction. Many sections of these communities, where frequent flooding had been a way of life for the residents, will become river-focused parks

and recreation areas as former occupants relocate to safer areas on higher grounds."[22]

A cornerstone of making this vision a reality — and the focus of ***Higher Ground*** — is the option of voluntary property buyouts in high-risk floodzones.

To get where we want to go, we must understand how we got where we are.

PART 2
HISTORY

In 1917, the Corps of Engineers was given the responsibility to build flood prevention works, beginning with what are now 7,000 miles of federally built and maintained levees and 3,500 miles of floodwalls lining the Nation's rivers. Thus began the *structural approach* to floodplains: an era of construction projects to control one of nature's primary forces.

During the hard years of the Great Depression, the structural approach, and the large public works projects associated with it, took hold in earnest. In 1936 President Franklin D. Roosevelt signed the landmark Flood Control Act, inaugurating a sweeping federal responsibility along the Nation's river systems and coastlines. Two years later, federal disaster relief obligations were expanded with the creation of the Federal Crop Insurance Corporation. These actions set the precedent for the federal government to lead the Nation's efforts to control or prevent floods and to compensate disaster victims.

Pouring money into dams, seawalls, levees and other flood control structures in those early years created badly needed public works jobs. It also gave concrete expression to a viewpoint that, in its simplest terms, can be characterized as "People over Nature." The very name Flood Control Act presumes a human capacity, if not a destiny, to master nature.

Even during FDR's presidency, there were people like Gilbert F. White, today recognized as one of the most noted experts on floodplain management, who warned that the federal government was taking on responsibilities it could not meet. White also cautioned that turning rivers into chutes by straightjacketing them with levees and floodwalls would create results opposite of those intended.[23] But these were minority views and easily overwhelmed by a desperate national imperative to give people work and a naive confidence in the conviction that nature can be wrested to human design.

As the decades progressed, public works flood control spending too often became indistinguishable from pork barrel politics. By the

The floodway is a critical element of the NFIP to maintain the flood-carrying capacity of rivers and streams. The floodway is defined as that area of the watercourse plus adjacent floodplain land that must be preserved in order to allow the discharge of the 100-year flood without increasing flood heights more than a designated amount. Communities are required to prohibit any development within the floodway that would cause an increase in flood heights. To identify the floodway, a computer model is used to "squeeze" in the 100-year flood from both sides of the floodplain until there is less than a one-foot rise (the NFIP minimum standard) anywhere in the community. Some states and communities have adopted a more restrictive floodway (e.g. 0.1 foot rise) that generally results in a wider floodway, and thus a greater area of the floodplain, which reduces potential for unwise encroachment.

Source: John H. McShane, Managing Floodplains to Reduce Flood Losses and Protect Natural Resources, 1993.

damages that are covered by insurance premiums. In addition, to enter the program, communities must agree to abide by certain hazard mitigation provisions, such as adopting building codes that require new floodplain structures be protected against flooding or elevated above the 100-year floodplain.

While some costs to taxpayers have been cut, the goal of reducing the amount of money paid each year in disaster assistance remains unmet. Those expenses continue to rise.

Most federal flood insurance covers buildings and their contents in the 100-year floodplain, although the availability of coverage is not restricted to the 100-year floodplain. *Flood Insurance Rate Maps (FIRMs)* that delineate the 100-year floodplain are drawn for each community in the program. To date, approximately $1.2 billion in taxpayer and insurance premium funds have been used to map and delineate the Nation's special flood hazard areas.

As of February 1998, 18,743 communities, representing 85 percent of those located at least partially in floodplains, were in the National Flood Insurance Program.[25] Some 3.8 million policies insuring $431 billion in property are currently in effect.[26]

With policy premiums providing funds to cover insured losses, the program is intended to be self-financing.[27]

"In summary, the [National Flood Insurance Program] fund is not, nor is it required to be, actuarially sound." — General Accounting Office, September 14, 1993, p. 1.

In a reorganization undertaken by the Carter administration, both the National Flood Insurance Program and federal natural disaster assistance were placed within the Federal Emergency Management Agency, which came into existence April 1, 1979.

Problems With Flood Insurance

In some significant respects, the National Flood Insurance Program has succeeded.

Flood insurance premiums covered $10.4 billion in losses and program expenses between 1977 and 1997.[28]

The Federal Insurance Administration estimates that $777 million in annual flood losses are avoided because of the improved building standards applied to new floodplain construction in communities that belong to the insurance program.[29] This achievement, which does not account for human distress, injury or loss of life also avoided, is substantial.

Furthermore, the program has provided the catalyst for the evolution of floodplain management throughout the country.

But even the National Flood Insurance Program's strongest proponents acknowledge that it operates with serious constraints and institutional problems.

> ***"At a September 1993 congressional hearing, the FEMA director stated that structures built after communities join the program suffer 83 percent less damage than those built before the standards were in place."*** — Federal Disaster Assistance, p. 56.

As already noted, the availability of federally sponsored flood insurance can induce floodplain development, which contributes to the long-term national liability for disaster assistance.

As noted, typically less than 30 percent of floodprone structures carry national flood insurance. An estimated 8 million uninsured properties are at risk of flooding.[30] The number of uninsured, at-risk structures can only be estimated because no national inventory of floodprone properties exists.

In 1994, during the first major program overhaul in nearly 20 years, several reforms (more fully discussed in Chapter 2) were enacted that:

- **Tightened the requirements for floodprone structures to carry insurance;**
- **Rewarded policyholders with reduced premiums for community actions to reduce the risks of flood damages;**
- **Extended from 5 days to 30 days the waiting period before insurance becomes effective to avoid the common practice of only purchasing insurance when a storm "is on the horizon";**
- **Created an annual fund from premiums to pay for mitigation measures such as buyouts before disaster strikes;**
- **Established a new insurance program to help cover buyout and relocation costs or elevation of substantially damaged structures to comply with current building codes; and**
- **Limited disaster aid for uninsured floodplain structures.**

Subsidized Insurance Rates

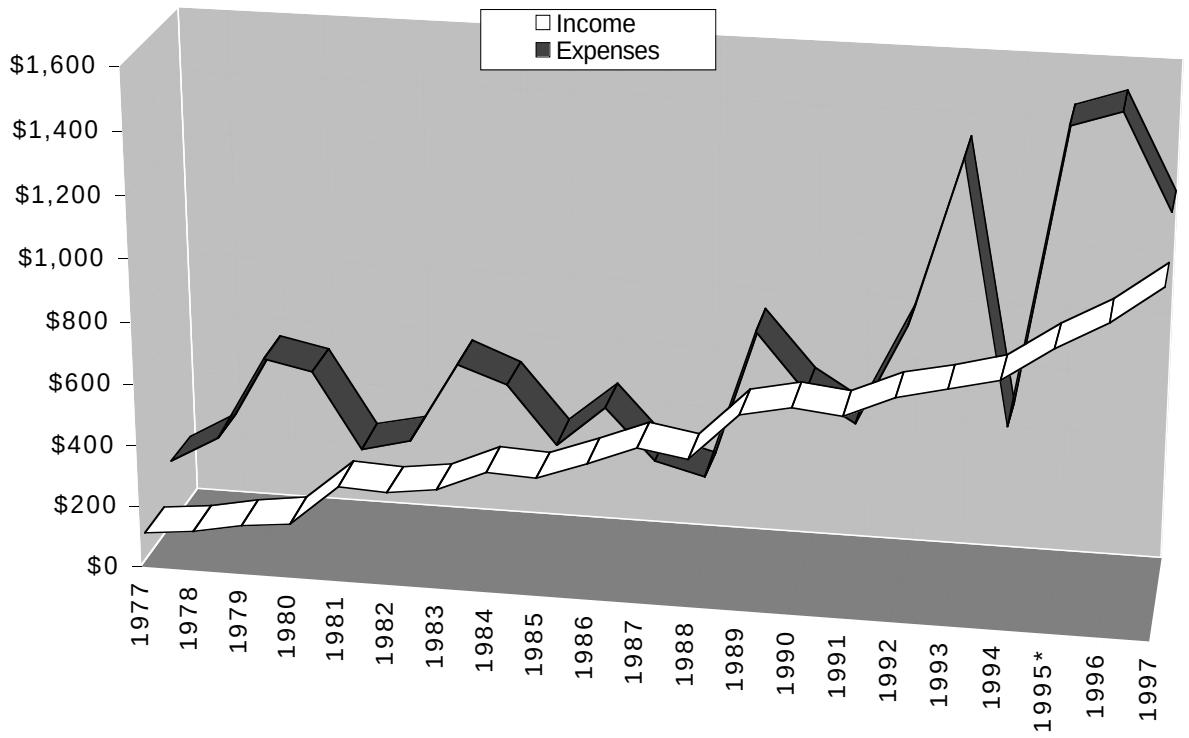
One inherent problem of the National Flood Insurance Program is that it is not actuarially sound — the premiums charged

each property do not proportionately reflect the sums needed to cover anticipated losses.

This is not an accident. Congress purposely wrote the law that way. Homes and other structures that existed in the floodplain before a community joined the program are given subsidized premiums. These structures are typically not elevated above the floodplain, or protected from flood damage. They are often the most damage-prone buildings in high-risk areas. Congress decided it would be unfair to require these structures to pay full risk-based premiums, and opted for subsidized rates. Furthermore, the provision of subsidized insurance rates has served as an inducement for communities to join the program.

The subsidy is enormous for some beachfront homes located along eroding ocean and Great Lakes coastlines. Insurance policies in these coastal areas cost residents from $450 to $900 per year for coverage that from an actuarial standpoint is worth from $10,000 to $18,000 per year.[31]

Flood Insurance Program Income & Expense Fiscal Years 1977–1997 (in millions)



Income: Includes insurance premiums, investment income, other income and federal policy fees.
Expenses: Includes insurance claim payments, underwriting expenses, interest expense, adjustments and deferrals, salaries and expenses and floodplain management expenses.
Note: This chart of program income and expenses does not include an additional $1.894 billion in appropriations from the U.S. Treasury to the National Flood Insurance Program made between fiscal years 1977 and 1986.

Source: Federal Insurance Administration data provided to the National Wildlife Federation.

Figure 1.V

At present, one million homes and commercial buildings, 37 percent of those insured under the program, receive subsidized rates.[32] These buildings are called *pre-FIRM structures*, because they were in place before the Flood Insurance Rate Maps were drawn.

Beyond the fairness issue, eliminating the premium subsidy for these buildings presents other problems. If premiums were based on actuarial rates, average annual premiums triple to between $1,100 and $1,200.[33] Such a steep boost would force many of those now paying the subsidized premiums to drop the insurance, therefore increasing the chance they would require federal disaster assistance after a flood.

The insurance program "may not have sufficient financial resources to meet future estimated losses," because of heavy claims on the insurance fund in recent years, according to a 1993 General Accounting Office finding.[34] The GAO concluded that the Federal Insurance Administration "may have to exercise its borrowing authority [of $1 billion on the U.S. Treasury] to pay claims."[35]

These 1993 GAO forecasts were prescient. Between August 1995 and January 1998, the fund borrowed from the Treasury a net of $810 million.[36]

The same 1993 forecast also noted that in the 1980s the program adopted a premium rate structure designed to at least cover "the expected losses of an average historical loss year based on experience under the program since 1978."[37] But the finding concluded that because the program had not experienced any *catastrophic* loss years since 1978, "premium income does not reflect collections necessary to build reserves for potential catastrophic years in the future."[38]

Again, the GAO forecasts were prescient. The years 1993, 1995 and 1996 were especially high loss years (see Figure 1.V). The fund's costs exceeded its premium income for those three years by $1.725 billion.[39] If losses over the next several years trend downward from the recent highs, the fund may manage to be self-financing with occasional taxpayer loans. However, if the future trend more closely mirrors the recent past, a new and potentially substantial liability could be added to the already mounting public costs of disasters.

> ***"Governments (Federal and State) have decided that in the long run, it is less expensive to purchase flood plain property from willing sellers than to continue repetitively paying insurance claims and/or providing disaster relief."*** — Report of the Governor's Task Force on Floodplain Management, Missouri, July 1994, p. 12.

The Cost of Repetitive Loss Structures

Experience has also revealed several additional weak links in the chain of flood insurance policy.

The subsidized pre-FIRM buildings are four-and-a-half times more likely to be damaged than post-FIRM buildings. When damaged, the losses are one-third more costly than losses to more modern buildings. Overall, pre-FIRM buildings sustain six-times more damage on average than post-FIRM buildings.[40]

Louisiana Flooding, May 1995. Photo: FEMA

Pre-FIRM buildings are also far more likely to suffer repetitive losses. The Federal Insurance Administration defines *repetitive loss structures* as properties that have received two or more insurance payments of at least $1,000 within a 10-year period.

Finally, all repetitive loss structures combined represented only about two percent of the properties covered by flood insurance policies but accounted for 25 percent of the losses paid and 40 percent of total dollars paid from the Flood Insurance Fund between 1978 and 1995.[41]

Two decades of experience demonstrating that a small minority of repetitive loss buildings account for 40 percent of all losses provides a clear basis for policy reform.

A loss reduction strategy should, at least in part, focus on properties with repetitive losses. Purchasing these properties from willing sellers provides the greatest assurance that additional losses will not occur. In this process, people at risk are resettled to higher ground and the acquired property is restored to a natural floodplain.

A New Approach To Floodplain Management

The Federal Emergency Management Agency has had voluntary buyout funds and authority since the 1980s.

Not until the 1993 Midwest Flood, however, was the buyout and relocation option put to a real test. In the aftermath of that 4-month inundation that saw some river stretches crest at the projected 500-year flood level, thousands of Midwesterners turned to the voluntary buyout option. This experience is discussed in the next chapter.

The Midwest Flood also prompted a groundbreaking review of national floodplain policy.

> ***"Repetitive loss buildings account for a disproportionate percentage of [National Flood Insurance Program] losses and represent a significant liability for the program .... Buyouts and other mitigation initiatives should place a high priority on these buildings."***
> — Sharing the Challenge, p. 125.

Drawing on the expertise of professionals and concerned citizens across the country, *Sharing the Challenge* called for a new era of floodplain management, one in which a greater sharing of individual, local, state and federal responsibility would replace the current heavy dependence on the federal government.

In a conceptual break with the view of nature as a force to be conquered, the report recommends that "the President should immediately establish environmental quality and national economic development as co-equal objectives of planning" for floodplain management.[42] The value of floodplains as floodplains should finally be given full consideration in making development and planning decisions.

The report also recognizes the buyout option as a viable alternative to the structural approach of building dams, levees and floodwalls. Among its recommendations, the report called on the Clinton administration to:[43]

- **Fund buyouts of high-risk buildings from willing sellers.**
- **Create a mitigation insurance fund to elevate, demolish or relocate substantially damaged buildings.**

The Federal Emergency Management Agency has moved aggressively to champion voluntary buyouts as a major element in an overall strategy to mitigate flood losses, and in 1993 created a Mitigation Directorate to carry them out.

Voluntary buyouts and other nonstructural mitigation measures are now "the cornerstone of emergency management," according to the Directorate's 1995 report.[44] That conclusion may better express an ambitious goal than a settled achievement, but it certainly points the way to the future.

As now formulated, the key principles governing floodplain buyouts include the following:[45]

- **They must be voluntary and involve willing sellers.**
- **Land and buildings are appraised at their preflood fair market value.**
- **Costs are shared on a 75 percent federal, 25 percent state, local or individual match basis.**
- **Acquired property reverts to the natural floodplain or is maintained as open space.**
- **Future disaster payments are prohibited at the purchased site.**
- **Displaced tenants can receive moving and replacement rental expenses, or use those funds to buy a home.**
- **Relocated structures must be placed outside the 100-year floodplain.**

The buyout option is fundamentally new. It represents a clean break with the philosophy that nature exists to be mastered. Buyouts can help bring the spiraling costs of disaster relief under control. Perhaps most importantly, they can restore people to safe living locations while reviving environmental benefits.

Although buyouts have limitations, they can be effective when combined with additional policy reform.

The task now is to move the policy forward. ***Higher Ground*** helps point the way.

— Ben McNitt, principal writer and researcher.

Endnotes

1. *People Land & Water*, United States Department of the Interior, Volume 3, Number 2, March 1996, p. 5, citing U.S. Geological Survey statistics. For example, during the first decade of this century more than 8,000 deaths in the United States were attributed to hurricanes. In the 1980s, hurricanes caused fewer than 250 deaths. However, "It is known that between 1916 and 1985 there were, on average, 101.4 flood-related deaths annually [in the United States] and that there is no indication that deaths are increasing or decreasing on a per capita basis," *Floodplain Management in the United States: An Assessment Report*, Volume 2, Federal Interagency Floodplain Management Task Force, June 1992, p. 2.
2. *Federal Disaster Assistance*, Document No. 104-4, Bipartisan Task Force on Funding Disaster Relief, United States Senate, March 15, 1995, pp. XIII–XIV. This report estimates the total obligation of federal funds for disaster assistance programs from 1977 through 1993 at $119.7 billion, in current 1993 dollars. This estimate does not include $13 billion in costs for federal disaster insurance programs, approximately $3 billion in federal costs to maintain the National Flood Insurance Program, $10 billion for the U.S. Department of Agriculture's federal crop insurance program, and 1994–1998 federal disaster relief and U.S. Army Corps of Engineers flood prevention construction costs. The $140 billion cited here is an estimate of total federal disaster costs in current dollars over the past 25 years.
3. *Federal Disaster Assistance*, p. XIII.
4. Calculations of annual flood losses during this century necessarily entail best estimates. Frank Richards, Chief, Hydrologic Information Center, National Weather Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, who compiled the data reproduced in this report as Figure 1.I (used with permission), said the findings are "indicative, but not necessarily dispositive." See also, *Floodplain Management in the United States,* Volume 2, p. 2: "there definitely has been an increase in property damages over that 70-year period [from 1916 to 1985]. Per capita flood damages were almost 2.5 times as great from 1951 to 1985 as from 1916 through 1950, after adjusting for inflation."
5. *Floodplain Management in the United States*, p. 25.
6. *A Unified National Program for Floodplain Management 1994*, Federal Interagency Floodplain Management Task Force, p. 3. A higher estimate of 178.8 million floodprone acres in the 50 states, Puerto Rico and the Virgin Islands is given in *Floodplain Management in the United States,* Volume 1 Summary, p. 8, citing a 1977 U.S. Water Resources Council estimate.
7. *A Unified National Program*, p. 3 cites "At least 9.6 million households" as lying within the 100-year floodplain, while an estimate of "9 to 11 million families" living within the floodplain is cited by Howard C. Kunreuther and Gilbert F. White, "The Role of the National Flood Insurance Program in Reducing Losses and Promoting Wise Use of Floodplains," *Water Resources Update*, Number 95, spring 1994, Universities Council on Water Resources. See also, *FEMA: Multi Hazard Identification and Risks Assessment, A Cornerstone of the National Mitigation Strategy,* July 1997, pp. xvii, 136, 142.
8. *FEMA: Multi Hazard Identification and Risks Assessment,* pp. xvii, 136, 142. The estimated 9 million homes are those located within the area subject to the 1 percent-annual chance flood area or 100-year floodplain.
9. *National Mitigation Strategy, Partnerships for Building Safer Communities*, Federal Emergency Management Agency, October 16, 1995, p. 13.
10. *Federal Disaster Assistance*, Table 1.1, p. 5, cited in constant 1993 dollars.

11. *Federal Disaster Assistance*, author's tabulation of figures in Tables 1.1–1.7, pp. 5–12.
12. *A Unified National Program,* p. 26.
13. *Floodplain Management Assessment of the Upper Mississippi River and Lower Missouri Rivers and Tributaries*, U.S. Army Corps of Engineers, June 1995, p. 10.22.
14. In the Water Resources Development Act of 1996 (Public Law 104-303, Oct. 12, 1996), Congress changed the standard cost-sharing formula for U.S. Army Corps of Engineers flood control projects from 75 percent federal/25 percent nonfederal to 65 percent federal/35 percent nonfederal, but applied the formula only to projects authorized after the bill's enactment. The 1996 legislation included dozens of flood control-related authorizations that were grandfathered at the older formula. Local communities must provide all needed lands, easements and rights of way for as much as a 50% statutory cap of total project costs. A considerable backlog of the older projects still exists; however, the 1996 legislation is one of the first indications of Congress' interest in shifting responsibility away from the federal government and toward state and local government and the private sector.
15. *Sharing the Challenge: Floodplain Management into the 21st Century,* Report of the Interagency Floodplain Management Review Committee to the Administration Floodplain Management Task Force, Washington, D.C., June 1994, p. 59.
16. *Floodplain Management Assessment*, p. 10.24.
17. *National Mitigation Strategy*, p. 7.
18. Michael Robinson, interview, March 21, 1996.
19. *Federal Disaster Assistance*, p. 12.
20. *National Mitigation Strategy*, p. 11.
21. *Floodplain Management Assessment*, p. 10.23.
22. *Sharing the Challenge*, p. 188.
23. *Human Adjustment to Floods*, Research Paper No. 29, Gilbert F. White, University of Chicago Geography Department, 1942.
24. *Report of the Task Force on Federal Flood Control Policy*, U.S. Congress, 1966.
25. According to the Federal Emergency Management Agency, there is little or no floodplain development in the remaining 15 percent of communities that have not joined the National Flood Insurance Program.
26. Howard Leikin, chief actuary, Federal Insurance Administration. Figures are as of February 1998, and were graciously provided and discussed in detail during the review process for this report. The $431 billion of total NFIP flood insurance coverage represents total insured property and contents coverage — both within and outside of special flood hazard areas.
27. Leikin, written comment provided during the review process for this report, April 30, 1996: "With regard to losses and other expenses, the Program is currently intended to be actuarially sound over the long term for new construction, and self-supporting up to historical average levels in any one year for all construction."
28. Leikin, February 23, 1998.
29. Leikin, April 30, 1996.
30. *Building on Success: A Report on the National Flood Insurance Program*, Federal Insurance Administration, 1993, p. 10.
31. As cited in January 22, 1994 letter from David Conrad, National Wildlife Federation water resource specialist, to Ron Kucera, Missouri Department of Natural Resources.
32. Leikin, interview, March 21, 1996.

33. September 14, 1993 statement by Judy A. England-Joseph, director, Housing and Community Development Issues; Resources, Community, and Economic Development Division, GAO/T-RCED-93-70, p. 1, and review comments by Leikin, April 30, 1996.
34. England-Joseph, p. 1.
35. England-Joseph, p. 2.
36. Communication to authors by Edward T. Pasterick, Federal Insurance Administration, April 6, 1998.
37. England-Joseph, p. 4.
38. England-Joseph, p. 5.
39. Leikin, comments during conversation with author, February 23, 1998. According to Leikin, while technically speaking there is no specific numerical flood loss threshold that defines a *catastrophic loss year,* in recent years losses have been quite heavy. According to FEMA, annual losses of more than $2 billion, given the current book of business, would trigger the use of the term *catastrophic* in an insurance sense. A near maximum NFIP flood loss year might be the range of $5.5 to $6 billion in losses, but such high losses, it is believed, would have a likelihood of only a 0.1 percent chance of occurrence in a given year. In 1998, the *average historical loss year* is approximately $690 million in NFIP losses.
40. England-Joseph, p. 7.
41. See ***Higher Ground***, Chapter 3, Section IX, "Distribution of Repetitive Losses per Property."
42. *Sharing the Challenge*, p. xi.
43. *Sharing the Challenge*, pp. xi–xii.
44. *Mitigation: Cornerstone for Building Safer Communities, The Report of the Mitigation Directorate*, Federal Emergency Management Agency, Fiscal Year 1995, p. vii.
45. *Hazard Mitigation Grant Program (HMGP), Guidelines for Acquisition and Restoration Projects*, August 1994.

2 The 1993 Midwest Flood: Voluntary Buyouts Come of Age

"The fundamental value of buyouts over structural approaches is that they completely eliminate flood risk for affected individuals and, at the same time, may have environmental and hydrologic benefits."
— Sharing the Challenge, p.113.

Waist high—the 1993 Flood in Festus, Missouri. Photo: FEMA

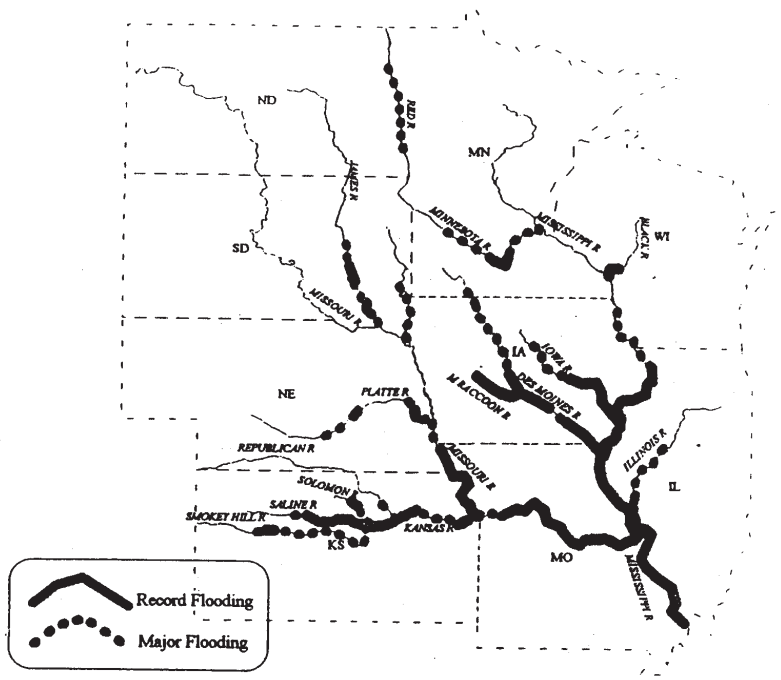
Chapter 2

The 1993 Midwest Flood: Voluntary Buyouts Come of Age

It was the Big One.

In June, after heavy fall showers and spring rains had saturated the ground, the downpour began in earnest. Televised scenes of busted levees, flooded homes and 'round the clock sandbag brigades were beamed out over the nightly news as June turned into July. August saw the Mississippi, Missouri and 15 tributary rivers flood the Midwest, and the rain still fell. Throughout September, after the crests passed, the land — and the flooded homes and businesses on it — stayed soaked.

1993 Upper Mississippi River Basin Flooding



Source: FEMA Mitigation Information Services

Map 2.I

Mobile homes flooded in St. Charles City, Missouri during the '93 Flood along the Missouri River. Photo: St. Louis Post-Dispatch

By the time it was over, the Great Midwest Flood of 1993 took the top line in the record books as the costliest flood in U.S. history.

The toll was staggering. Thirty-eight dead. About 100,000 homes and more than 5,000 small businesses damaged. Roads and bridges destroyed. Approximately 6.6 million acres flooded, about 60 percent of it farmland. Losses totaled 12 to 16 billion dollars, $3 billion in Missouri alone, one of the worst hit states. A billion dollars of Iowa's corn crop gone. Before it was over, President Clinton declared 532 counties in nine states disaster areas.[1]

Large portions of the Upper Midwest river system exceeded the 100-year flood stage, and crests exceeding the 500-year flood mark were recorded at some locations. The 44.5 inches of rain that fell on Iowa in the first nine months of 1993 broke a 121-year record. From the Northern Plains southeastward into the central corn belt, rainfall was 200 to 350 percent more than normal. The July downpour in large areas of the lower Missouri River Basin was 400 percent above the norm.[2]

The U.S. Army Corps of Engineers estimates that levees and floodwalls prevented as much as $19 billion in damage, especially in better-protected urban centers like St. Louis and Kansas City.[3] While Corps of Engineers-built levees generally performed to design standards, the 1993 flood blew out, overtopped or undermined levees at hundreds of sites.[4] Most of these levees protected farmland, but the great majority of them were neither built nor maintained by the Corps of Engineers.

Buyouts Begin to Look Good

Damage statistics do not begin to describe the personal toll from the '93 Flood.

Thousands of people in the Upper Mississippi knew they lived in floodprone areas. They had been hit before and had rebuilt or repaired property after previous washouts. But the enormity and duration of the '93 Flood was different. Thousands of people, scattered over hundreds of miles of the river system's reach, were paralyzed for months on end and hostage to rain that would not stop, then to water that would not recede and finally to the sodden and muddied remains of homes that would never be livable again.

For many people, the old determination to rebuild on the same spot simply wasn't there anymore. This time, they wanted out.

Many other people had the same thought. This time the response to the flood had to be better than simply rebuilding on site and setting people up for it to happen all over again. Mayors, county officials, and governors; disaster workers in the states and in Washington, D.C.; and staffers at organizations like the National Wildlife Federation began a crash course on how to provide solutions for people in immediate need that would stand up in the future. All of them acted in the midst of a human and physical crisis, with no proven roadmap and with an imperative to act immediately.

Democratic institutions worked. Not perfectly, but they worked.

People from more than a dozen federal agencies cobbled together a way to finance buyouts, relocations and other alternatives, such as floodproofing and elevating buildings above the floodplain. Government employees who normally did not talk to one another worked together. Pooling different sources of money — Federal Emergency Management Agency disaster relief, Housing and Urban Development Department community development block grants, Agriculture and Interior Departments wetlands acquisition funds, Transportation Department road repair money — they created a package of government assistance for communities to coordinate buyouts and relocations. Liaisons were set up with governors' offices and with community and county officials. In short, layers of bureaucracy from local to federal levels got together to respond to people who wanted to move to higher ground.

Sandbags held water from further flooding in the '93 Flood in St. Genevieve, Missouri. Photo: FEMA

In Washington, D.C., the President and Congress swiftly approved a $1.75 billion emergency supplemental appropriation for Midwest Flood relief. But under the law governing disaster assistance payments, only about $40 million of that money was available for buyouts, and even then states and communities would have to pay at least half the cost of any given buyout project. It simply was not enough to meet the challenge.

Representative Harold Volkmer (D-MO) proposed a remedy in the form of an amendment to the Stafford Act, which sets out how disaster relief funds can be spent. Senator Tom Harkin (D-IA) sponsored a companion bill in the Senate.

The amendment was short, the idea simple. Passage of the bill would allow as much as 15 percent of both Stafford Act '93 relief funds and *all future Stafford Act disaster grants* to be spent on buyouts and other mitigation projects. The amendment also increased the federal share for these projects from 50 percent to 75 percent. For Midwest Flood victims, this new formula would raise the pool of Federal Emergency Management Agency disaster assistance funds for buyout and mitigation projects from approximately $40 million to $152.3 million.[5]

On Capitol Hill, word spread quickly to back the Volkmer amendment. The National Wildlife Federation, in concert with organizations like American Rivers, enlisted White House support by briefing top Office of Management and Budget staff and helped get the Majority Leader of the House of Representatives on board.

On December 3, President Clinton signed the Hazard Mitigation and Relocation Assistance Act of 1993, making the Volkmer amendment law. Meaningful relocation assistance was now available in the Midwest, and a substantial reservoir of buyout financing was in place for future disaster relief appropriations.

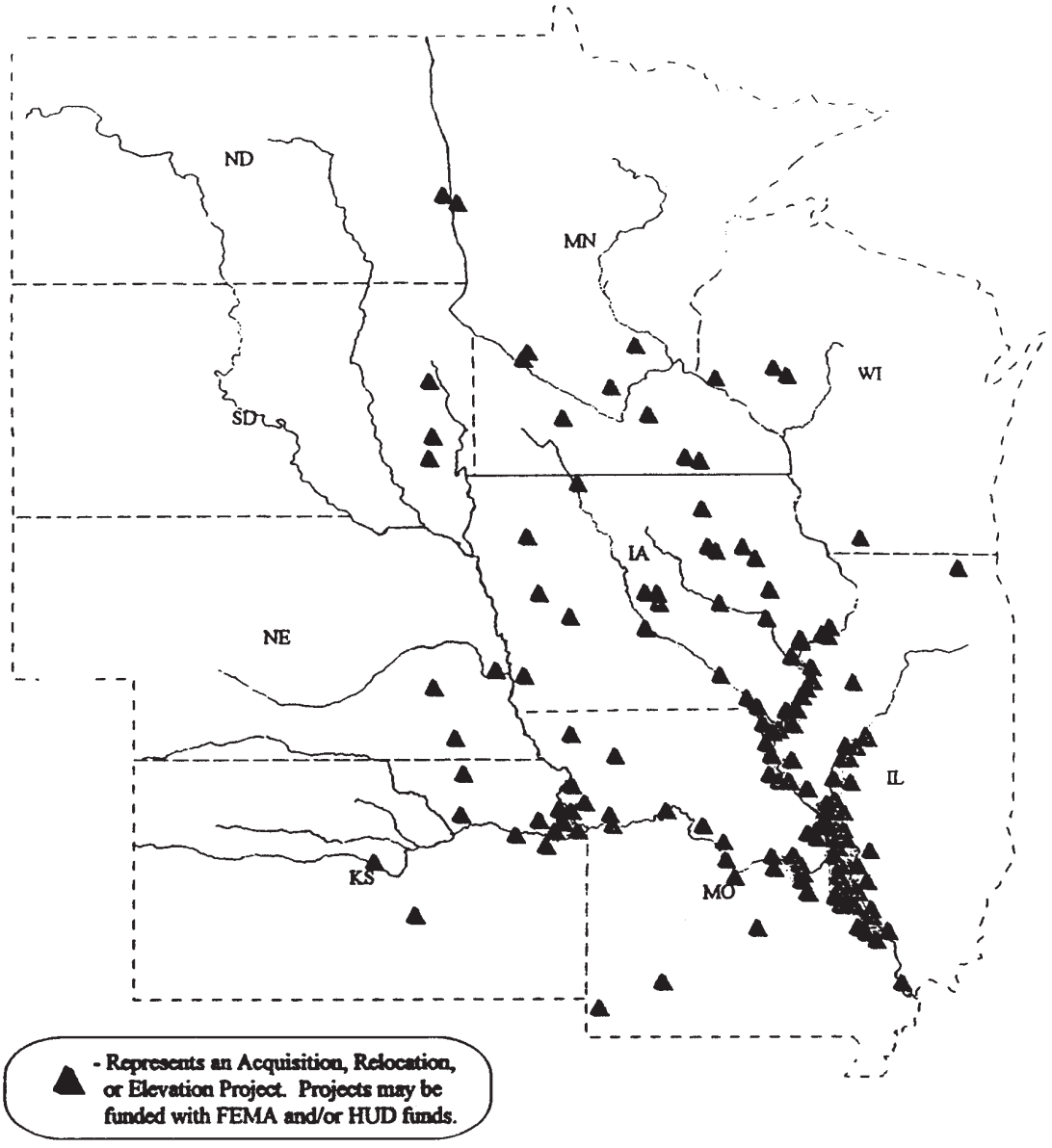
Midwest Buyouts and Relocations

The '93 Midwest Flood was the first major demonstration of how a postdisaster, voluntary buyout option works on a large scale. It involved a considerable number of separate buyouts, each one of them representing a new beginning for the individual homeowners involved. It also showed that a community could package buyouts to eliminate or considerably reduce the costs of repetitive flooding. In the best cases, buyouts gave individual residents a new start while the community as a whole reshaped itself. Low-lying areas of habitual danger and repetitive flood expense were converted into open space — permanent wetlands, restored floodplains or recreational greenbelts that threaten no one and benefit all.

The '93 Midwest buyout experience is a landmark for another reason. In a directly personal and practical sense, it represents an on-the-ground shift away from six decades of thinking that all floods can be controlled by ever more extensive construction projects. The buy-outs are recognition that in many instances the most sensible way to manage high-risk floodplains is to let them be floodplains.

In the two years following the Great Midwest Flood, FEMA approved funding for 170 different mitigation projects in nine states.[6] Nothing remotely close to this scale of effort had ever been attempted before.

Mitigation Projects in the Midwest



Source: FEMA Mitigation Information Services

Map 2.II

The projects took many forms. Some were as modest as elevating one or two homes above the 100-year floodplain. In other cases, large portions of communities, including homes and businesses, were bought out or relocated to higher ground, as was seen in Valmeyer and Grafton, Illinois, and Rhineland and Pattonsburg, Missouri. Where relocation wasn't viable — often because of the extensive flood damage inflicted on a given home — the purchased structure was demolished and the homeowner was given predisaster fair market value compensation to purchase a new home outside the floodplain. The Small Business Administration assisted with low-interest disaster loans to help relocate residences and commercial structures. Additional funds came from the Housing and Urban Development and the Transportation Departments, and Agriculture and Interior Department funds were used to purchase tracts of floodplain agricultural lands that were damaged or had histories of repetitive flooding.

All of these transactions were voluntary, involving only property, with home and business owners who agreed to the buyout and relocation option. Affected renters received assistance that could be used either to move into a new rental unit or to make a downpayment on a home of their own.

Kaskaskia Island, Illinois, Levee before the 1993 Breach. Photo: Corps of Engineers

Kaskaskia Island, Illinois, Levee after the 1993 Breach. Photo: Corps of Engineers

Old Glory flies atop sand bags in the '93 Flood in St. Genevieve, Missouri. Photo: FEMA

The Missouri Example

Years before the '93 Flood struck, Missouri's record of enforcing building code requirements for new structures in floodplains was lax compared with several other states. After the Great Flood, all but two of Missouri's counties were declared disaster areas and Governor Mel Carnahan gave his vigorous support to the buyout option.

Missouri set up 49 buyout and mitigation projects involving 2,427 private homes, 1,178 mobile home pads, 4 apartment buildings and 385 floodplain lots.[7] In addition, easements worth $8.4 million were negotiated on 12,000 acres of farmland under the Emergency Wetlands Reserve Program.

After the flood, Governor Carnahan created a task force that reported, "in the long run, it is less expensive to purchase floodplain property from willing sellers than to continue repetitively paying insurance claims and/or providing disaster relief."[8] The finding lead the task force to recommend that future floodplain management in Missouri should "use a balanced strategy of structural measures, non-structural measures and relocation from the floodplain. The strategy, over time, will allow evacuation of the most vulnerable areas, while restoring areas of the floodplain to a more natural state, and still protecting developed areas."[9]

Photo: U.S. Fish and Wildlife Service

Major Wildlife and Wetlands Benefits From Acquiring Frequently Flooded Farmland

While buying out repetitive loss urban properties will most improve the National Flood Insurance Program's financial stability, the most significant wildlife and flood storage benefits will derive from removing frequently flooded agricultural lands from active production and restoring them to native wetlands and riparian vegetation.

Since the Midwest Flood, more than 400,000 acres of cropland have been returned to natural floodplain uses by a combination of easements and acquisitions. An additional 200,000 acres of frequently flooded farmland may be converted back to natural floodplain under plans being considered in Illinois and Minnesota.

These farmland acquisitions are among, if in fact they are not, the largest recovery of wetlands wildlife habitat occurring in the United States in this decade.

The receding waters of the 1993 Midwest Flood deposited as much as 12 feet of sand on former wetlands and riparian areas where levees failed and agricultural bottomlands were inundated. The Emergency Wetlands Reserve Program was established as an alternative to repairing levees and renovating soil for farmlands that repetitively flood. Congress appropriated $103.8 million following the Midwest Flood for farmland easements in eight Midwest states. Following the 1997 floods, Congress appropriated an additional $15 million to acquire flood damaged and floodprone lands in the Midwest and in six additional states. In all, these funds have been used to purchase permanent easements on 110,179 acres of cropland acquired for restoration of wetlands and riparian ecosystems (as detailed below).

Box 2.I

State	Emergency Wetlands Reserve Acres	Wetlands Reserve Acres	Conservation Reserve Acres	Total Acres
Iowa	46,084	17,052	44,250	107,386
Illinois	8,339	10,376	52,081	70,796
Minnesota	3,600	6,343	52,486	62,429
Missouri	25,702	21,206	7,440	54,348
South Dakota	19,279	8,251	3,100	30,630
California	1,138	19,293	0	20,431
Indiana	190	7,078	10,879	18,147
Kansas	142	5,270	6,926	12,338
Oregon	632	9,790	186	10,608
Nebraska	55	8,332	1,619	10,006
Tennessee	351	7,276	1,423	9,050
North Dakota	3,323	2,910	1,731	7,964
Montana	674	2,386	109	3,169
Idaho	670	1,825	517	3,012
Total	**110,179**	**127,388**	**182,747**	**420,314**

Table 2.I

In addition, acquisitions since 1994 for the Wetlands Reserve Program (127,388 acres) and of filterstrips and riparian buffers for the Conservation Reserve Program (182,747 acres) have augmented the acreage of floodprone agricultural lands that are being restored as native wetlands and riparian ecosystems.

In all, 420,314 acres in the 14 recently flooded states listed above are being restored under a combination of permanent easements, 30-year easements and 10-to-15-year rental contracts. Complete or fee title ownership was acquired of 3,350 acres for addition to the Mark Twain National Wildlife Refuge and 4,130 acres for addition to the Big Muddy National Wildlife Refuge on the Mississippi River. In the future, these lands will be available to safely store floodwaters, reduce soil erosion, improve water quality and increase wildlife habitat.

As ***Higher Ground*** goes to press, plans were announced identifying 200,000 acres of frequently flooded farmland along the Illinois River and the Minnesota River in those two states for possible Conservation Reserve Program easements that would return that land to wetlands and natural floodplain uses.

— Martha Stout

Photo: U.S. Fish and Wildlife Service

VOLUNTARY BUYOUTS: LIMITATIONS AND DRAWBACKS

Voluntary buyouts are one of several tools of sound floodplain management. Buyouts are not panaceas. To be effective, buyouts need broad public support both in the communities where they are implemented and across the country as a whole. Buyout projects must pass scrutiny in terms of responsible tax dollar use. The strategy must be efficient, flexible and fair for the individuals and communities that adopt it. Chapter 4 of ***Higher Ground*** presents policy recommendations to refine these aims.

The 10,000 property buyouts undertaken after the '93 Flood provide a wealth of experience about both the strengths and shortcomings of the buyout option. The major lessons learned about the option's limitations and drawbacks are summarized below.

- **Poor and low-income households are the most frequent victims of flood.** The most hazard-prone floodplains are often where the poorer sections of a community are clustered. The bottom land, where risks are highest, often is where land, home and rental prices are cheapest. Households in these areas are predominantly low-income and include a higher than usual percentage of renters, the elderly and public assistance recipients. Homes in these areas are often worth between $10,000 and $25,000. Even when a buyout gives the owner fair market value, the owner may not be able to afford a new home outside the floodplain. Similarly, buyout assistance to displaced renters may not be sufficient to find suitable new places to live. At the very least, all buyout projects must be sensitive and flexible in light of the economic circumstance of the people most directly affected.

- **Local officials may be tempted to use buyouts to discriminate against the poor.** For the reasons discussed above, some local officials may support a community buyout plan as a way to drive low-income residents out of the community. The requirement that all buyouts be voluntary is the principal bulwark against discrimination. However, it would be naive not to recognize that community pressure can be used to overcome individual resistance. If buyouts are used to discriminate against the least powerful in the community, the entire strategy will rightly lose the broad public support needed to survive.

Box 2.II

- **Buyouts can reduce the local tax base.** By purchasing land and demolishing structures under the voluntary buyout option, a community may lose revenue because of losses in real estate and corporate taxes or assessments and users fees for entities such as the local water district. In many cases, people who opt for voluntary buyouts do not resettle in the same community. In the design of any voluntary buyout plan, local officials and residents must take into account the potential of a lower tax base.
- **Lack of planning on how to use open space can result in renewed development pressure.** When federal funds are used to buyout property, the purchased land must revert to open space or floodplain use. Only limited allowance is made for the construction of new facilities, such as rest rooms for land converted to a park. In many cases, land purchases are designed to augment local greenbelt or park systems. However, purchasing lots without a long-term land use plan can lead to pressure to redevelop them.
- **Voluntary buyouts are more complicated than building levees.** Buyouts involve intensely personal issues, such as leaving a home, and broad community issues, such as altering local land use patterns. To work well, the buyout option needs to combine leadership, community involvement and an open and fair decision-making process. It is far easier for a community to combine these elements by designing a buyout plan before disaster strikes, although, at present, the vast majority of funds to carry out such plans becomes available only after flooding occurs.
- **Voluntary buyouts may not always be the best option.** In some cases, the costs of buyouts may outweigh the benefits, or there may not be sufficient higher ground outside the floodplain to make voluntary buyouts viable on a large scale (see Chapter 5, New Orleans). In these situations, other nonstructural options, including elevating a structure above the 100-year floodplain or floodproofing, may be more appropriate.

Buyouts' Environmental Benefits: The Iowa River Corridor Project

Iowa's recovery from the 1993 Midwest Flood has included the creation of one of the largest natural habitat areas in the state. The Iowa River Corridor Project stretches along the Iowa River from the town of Tama, which is located south of Toledo, for about 50 miles southeastward to the town of Amana. The project is envisioned as a mosaic of private and public lands held together by the common thread of flood-tolerant uses.

As of 1993, this section of the Iowa River had flooded in 28 of the previous 30 years. For the 10 years prior to the '93 Flood, the Agriculture Department had estimated the cost of disaster relief and crop-loss subsidies was more than $750 per acre for farmland in the project area.

Iowa River Corridor Projected Area and Wetland Easements

Source: Iowa River Corridor Project

Map 2.III

As of January 1998, permanent conservation easements on approximately 11,600 acres of farmland within the project area had been purchased with $10 million in federal funds. The easements were purchased and restored with Emergency Wetlands Reserve Program funding after the '93 Flood and through the ongoing Wetlands Reserve Program, both run by the Agriculture Department. The Agriculture Department's Natural Resources Conservation Service also expects to spend another $750,000 on wetlands restoration of conservation easement lands.

Box 2.III

Of the 11,600 acres, 7,544 acres of easement lands and 1,863 acres of other lands have been purchased by the U.S. Fish and Wildlife Service and added to the Mark Twain National Wildlife Refuge with $2.1 million appropriated by Congress following the '93 Flood. Added to an existing 3,370 acres of state and local public lands in the project area, these acquisitions bring the total of public wetland and wildlife lands to almost 17,000 acres, a valuable asset in a state where public wildlands are rare. The lands purchased by the Fish and Wildlife Service will be managed by the Iowa Department of Natural Resources for wildlife and recreation in accordance with requirements of the National Wildlife Refuge System.

Taken together, the easement and purchased lands form a nearly unbroken wetlands filter for the length of the project, comprising one of the largest natural habitat areas in Iowa, according to David DeGues, Iowa River Corridor Project coordinator.

Already, a pair of sandhill cranes — not seen along this stretch of the Iowa River for years — have returned to nest. One of the newly restored wetland sites is now home to rare trumpeter swans. The corridor provides habitat for blue winged teal, mallards, wood ducks, Canada geese and nesting bald eagles: river otters are plentiful; the numbers of white-tailed deer, mink, muskrats and raccoons are high; and the beaver population is on the rise.

Iowa River Riparian Forest during spring flood. Photo: Iowa River Corridor Project

Lessons Learned: Repetitive Loss Structures

Several lessons about voluntary buyouts have been learned in the five years since the Midwest Flood.

The central and most obvious lesson is that structures with a history of repetitive flood losses should be given priority consideration for the voluntary buyout option.

This conclusion is convincingly documented in a FEMA analysis of the '93 buyouts.[10] The study found that the Great Midwest Flood affected 774 communities that had a history of repetitive losses under the National Flood Insurance Program dating back to 1978.[11] From 1978 to 1993, 8,000 structures in these communities received 24,800 insurance payments totaling $291 million.

A closer look revealed that 30 communities accounted for 4,600 of the repetitive loss properties and $191 million of the insurance payouts. The 30 communities comprised only 3 percent of the affected repetitive loss communities, but comprised 56 percent of the repetitive loss properties and 65 percent of the repetitive loss insurance payouts.

After the '93 Flood, 5,100 structures in the 30 communities accounting for the bulk of the historical insurance losses were voluntarily bought out under FEMA's supervision. The total purchase price was $66 million. The FEMA report concluded that "These acquisitions, relocations, and elevations significantly address the [4,600] repetitive loss structures, but go beyond them to acquire additional structures in harm's way. The cost of acquiring, relocating, and elevating these properties is approximately 35 percent of total past claims and results in a 100 percent [future] loss reduction."[12]

Elevated trailer, Adams County, Illinois. Photo: Illinois Department of Natural Resources

Lessons Learned: Cost-Benefit Considerations

The Federal Emergency Management Agency estimates that the '93 Flood voluntary buyouts in the 30 top repetitive loss communities cost $1 for every $2 saved in future insurance claims. This estimate is conservative, in that it does not include additional savings, such as local flood fighting, evacuation, and rescue and recovery expenses that will not be incurred in the future. The additional federal costs precluded by these buyouts include disaster assistance payments and Small Business Administration disaster loans.

These dollar figures, of course, take no account of the human suffering avoided.

> *"The lessons of the 1993 flood are clear. The United States should not continue to tolerate the loss of life and the damage to cities, rural communities, and farms caused by major flooding, nor should the nation carry the burden of massive federal flood disaster relief costs that current policies generate each time a major flood occurs."* — Sharing the Challenge, p. 70.

The compelling evidence from the Midwest Flood is that using voluntary buyouts to deal with the core clusters of high repetitive loss properties can serve two goals simultaneously: the number of people given long-term help is maximized while a fiscally responsible expenditure of federal tax money ensures the elimination of future federal disaster relief and other claims. It's a straightforward case of human and financial benefits clearly outweighing the costs. While the purchase of floodplain farmland is the most effective way to maximize environmental benefits (and reduce future crop insurance losses), in either a farming or community setting the buyout option translates into a net gain for natural floodplain functions and open space.

A Corps of Engineers' study also supports the conclusion that buyouts can be cost effective.[13] Using a computer model to simulate the '93 Flood, the Corps of Engineers studied the cost of improving agricultural levees from the mouth of the Ohio to the mouth of the Missouri Rivers along the main stem of the Mississippi River. The Corps of Engineers found that it would cost $6 billion to improve these levees to a level that would have eliminated or substantially reduced the flood damages that did occur. Another $84 million would be needed to make similar improvements to urban levees. Such improvements, the Corps of Engineers noted, would increase discharges for downstream communities during flood events, decrease existing water storage and wetlands areas and result in the future development of thousands of acres of floodplain land. Such development would present a future liability on disaster relief funds.

In contrast, the Federal Emergency Management Agency estimates that $209 million in federal and state funds spent on voluntary buyouts in the same area "will permanently remove or elevate struc-

tures above the hazard with no adverse impact to the environment and without inducing future development."[14]

Federal buyouts are required to show a positive benefit to cost ratio. In practice, experience from the '93 Flood convincingly demonstrates that they can.

Lessons Learned: Inadequate Flood Insurance Coverage

The '93 Flood provided overwhelming proof of a problem that had long been recognized: most of the buildings located in the 100-year floodplain do not carry federal flood insurance. The low rate of coverage revealed after the '93 Flood showed that the federal insurance program cannot begin to reach its goal of covering flood losses with premium payments unless the number of structures carrying insurance increases considerably.

Photo: Environmental Protection Agency

After the '93 Flood, 16,167 damage claims were filed on National Flood Insurance Program policies.[15] However, 89,734 applications were approved for disaster funds to compensate for flood damage to homes. In addition, 38,423 individual and family disaster payments and 20,285 Small Business Administration individual and business disaster loans were approved.

These figures show that after the '93 Flood, disaster relief payments to repair damaged homes outpaced claims payments for insured homes by more than 550 percent.

It is true that federal flood insurance is primarily designed for homes and businesses within the 100-year floodplain, and the record-breaking '93 Flood spread its damage well beyond those boundaries. However, as noted in *Sharing the Challenge*, the inescapable conclusion is that the flood insurance program "has not achieved the public participation needed to reach its objectives."[16]

Reforming the National Flood Insurance Program

The devastation caused by the Great Flood of 1993 sent a political wave over the Congress in 1994.

Efforts to enact the first major reform of the National Flood Insurance Program in 21 years were already underway from 1989 to 1993. The aftermath of the '93 Flood provided the political momentum to complete the job. Through its Water Resources and Coastal Zone Management Programs, the National Wildlife Federation was directly involved in defining the reforms and securing their passage.

In 1994, reform legislation was sponsored by Senator John F. Kerry (D-MA) in the Senate and Representative Joseph P. Kennedy (D-MA) in the House. After months of debate, negotiation and votes by Congress, President Clinton signed the National Flood Insurance Reform Act into law on September 23, 1994.

The major provisions of this statute, Public Law 103-325, are the following:

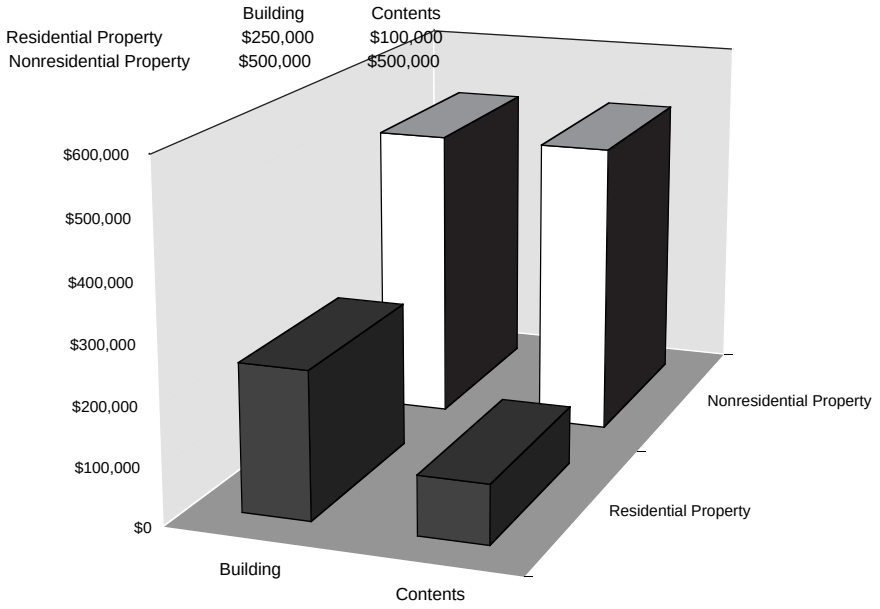
- **Augment predisaster mitigation funds.** While the 1993 reform of the Stafford Act provides that as much as 15 percent of disaster relief funds can be used for buyouts and other mitigation measures, only about $4 million annually had been available to the Federal Emergency Management Agency to proceed with buyouts *before* catastrophe struck. The reform creates a predisaster mitigation fund, the Flood Mitigation Assistance Program, financed by flood insurance premiums. Projects under the program are to be financed by the same 75 percent federal/25 percent nonfederal cost sharing formula approved for postdisaster mitigation in the 1993 reform of the Stafford Act. As much as $20 million annually is authorized for future years. While these sums are small compared with the need, creating the legal framework to pay for buyouts and other proactive, predisaster mitigation measures is a major step forward. In addition, the Federal Emergency Management Agency was authorized to create a new mitigation insurance program and has done so for policies bought or renewed after June 1, 1997.[17]

• **Codify the Community Rating System.** An incentive plan to reward communities that went beyond the law's minimum floodplain requirements with reduced insurance premiums has existed since 1990. The 1994 act codifies the Community Rating System. The CRS is voluntary. None of the 18,000-plus communities enrolled in the flood insurance program has to join. Those that do can earn progressively substantial reductions in flood insurance premiums for structures located in their jurisdictions.

The CRS sets out 18 activities that communities can undertake to qualify for premium reductions. These reductions are graduated into 10 classes, Class 1 being the maximum incentive, Class 10 the least. Under the strengthened CRS, "flood insurance premiums are adjusted to reflect community activities that reduce flood damage to existing buildings, manage development in areas not mapped by the NFIP, protect new buildings beyond the minimum protection level, help insurance agents obtain flood data, and help people obtain flood insurance."[18]

Protecting natural floodplain functions and buying out floodprone buildings are included in the actions communities can use to earn premium reductions. As of May 1, 1997, almost 900 communities, representing 65 percent of all flood insurance policies, were participating in the CRS. Tulsa, Oklahoma, which has one of the best records in the Nation for proactive floodplain management that incorporates the voluntary buyout strategy, has already seen premium rates for its residents decrease by 25 percent (see Chapter 5, The Tulsa Model).

National Flood Insurance Program Coverage Limits



Source: Data from National Flood Insurance Reform Act of 1994.

Figure 2.I

• **Strengthen requirements for floodplain buildings to carry flood insurance.** As already noted, one of the flood insurance program's greatest weaknesses is that the majority of floodplain buildings are not insured against flood damage. Prior to 1994, the law required that floodplain buildings with federally-insured mortgages in communities enrolled in the program must carry flood insurance. But no penalties were attached for violations and compliance ranged from notoriously weak to nonexistent.

The 1994 reforms changed that. Under the act, all private lending institutions regulated by the federal government are required to see that flood insurance is purchased when making, extending or renewing a loan for buildings within the designated 100-year floodplain and that the flood insurance must be maintained for the term of the loan. This requirement also extends to the secondary loan market. Lenders face penalties of $350 per incident for as much as $100,000 for violations. It is too early to determine the effect these provisions will have, but it can be expected that the proportion of floodplain buildings carrying flood insurance will increase in the years ahead.

Texas road damage from flooding. Photo: FEMA

• **Extend waiting period for insurance to become effective.** As noted in Chapter 1, a weakness of the program was the short, 5-day waiting period between the time an individual could purchase a policy and its effective date. This provision fostered a *wait until you see the storm clouds on the horizon* attitude toward buying flood insurance. Those who adopted this widespread strategy reaped the program's maximum benefits while making the absolute minimum contribution to the premium pool. The act increases the waiting period for a policy's effective date to 30 days.

• **Limit disaster assistance.** To strengthen the requirement that individuals living in designated flood hazard areas carry flood insurance, the 1994 act authorized FEMA to deny future disaster relief payments to homeowners who have not purchased and maintained coverage. This provision was intended to remove the incentive for individuals living in the 100-year floodplain not to carry flood insurance with the expectation that the federal government would bail them out for property losses in any case. The provision applies only to property losses and does not limit emergency disaster relief, such as immediate food, shelter and medical attention.

The Buyout Record Since the 1994 Reforms

The full impact of legal reforms, and the extent to which the voluntary buyout option can be used consistent with sound floodplain management, broad public support, and fiscal responsibility cannot yet be fully gauged. What is clear, however, is that a revolution in social policy toward floodplain management is underway in many areas of the Nation.

Since the enactment of the 1994 reforms, hundreds of communities have chosen the buyout and relocation option as a significant part of their efforts to mitigate the risk of flood damages and to restore natural floodplain functions. As ***Higher Ground*** goes to press, FEMA's best tabulation is that it has bought out 16,998 properties nationwide, as detailed in Table 2.II below. However, considering projects in progress, FEMA estimates that it has participated in approximately 20,000 voluntary buyouts since the program began in 1998, the vast majority of them since 1994.

The buyouts were accomplished primarily through funding from FEMA's Hazard Mitigation Grant Program and Flood Mitigation Assistance Program (as well as its predecessor, Section 1362 of the 1968 National Flood Insurance Act, which was repealed in 1994), and the Housing and Urban Development Department's Community Development Block Grant Program. These efforts are primarily coordinated through state governors' offices.

Table 2.II (see opposite) includes FEMA's preliminary estimate of numbers of floodprone structures that have been purchased.

As ***Higher Ground*** goes to press, FEMA's new Hazard Mitigation Grants database was only just becoming operational. The agency has identified 36 states and one territory where federally funded voluntary buyouts of floodprone properties have taken place — again, mostly since 1994. In providing the data in Table 2.II, the agency staff cautioned that in some instances, the data include building elevations as well as voluntary property buyouts because of the manner in which FEMA regional offices originally tracked their HMGP projects. In other cases, additional voluntary buyouts are known to have occurred, but they have not yet been included in the database.

Although the total number of communities that have completed, or are in the process of completing, floodplain buyout projects has not been tallied, it is in the hundreds. Projects range from a handful of structures in dozens of communities to more than a thousand in the city of Grand Forks, North Dakota.

Hazard Mitigation Grant Program
Property Acquisitions for Open Space

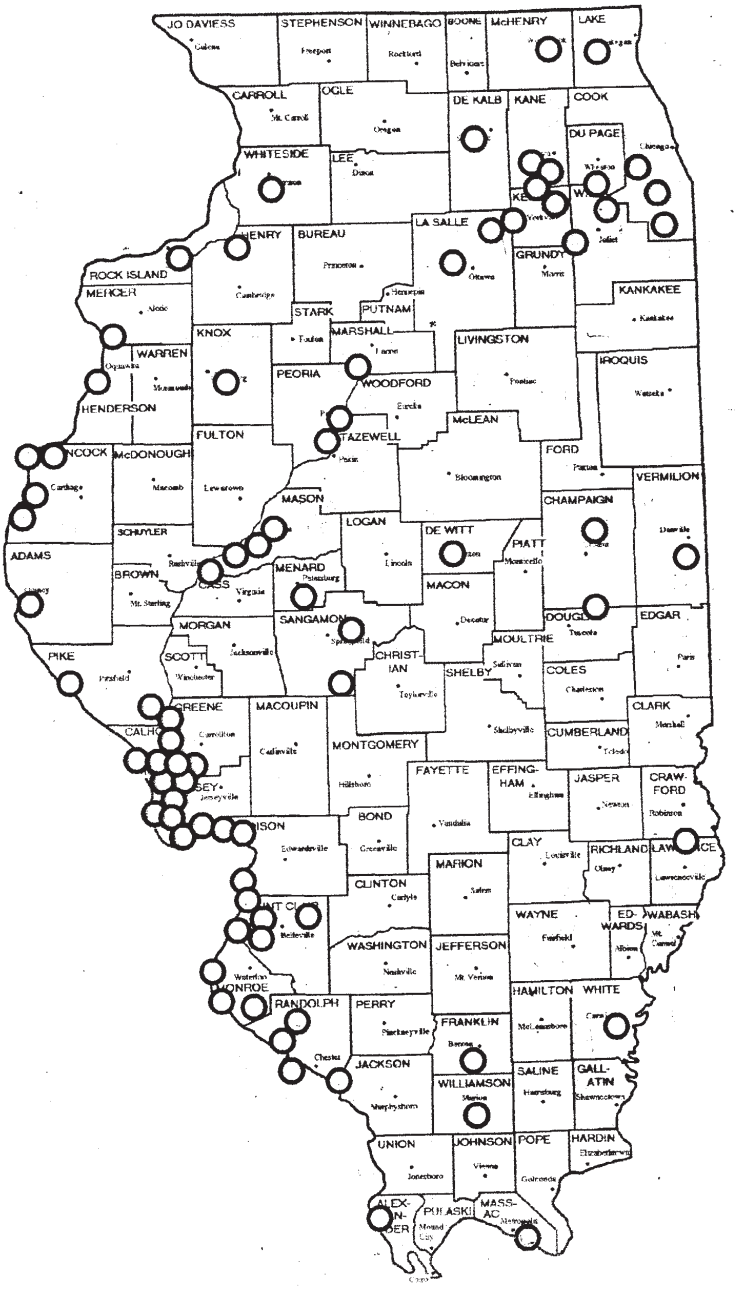
State	Number of Structures	Federal $ Obligated*
Alabama	295	$5,716,900
Arizona	89	769,887
Arkansas	80	1,363,453
California	190	9,272,994
Delaware	1	41,029
Florida	151	3,581,091
Georgia	838	14,538,211
Idaho	82	2,474,786
Illinois	2,657	64,945,562
Indiana	94	3,024,470
Iowa	1,084	27,976,001
Kansas	927	14,422,264
Kentucky	225	4,995,683
Louisiana	30	1,822,272
Maine	31	949,696
Maryland	80	626,850
Massachusetts	2	111,000
Minnesota	883	28,006,509
Mississippi	30	450,239
Missouri	5,111	32,633,106**
Nebraska	237	5,354,354
Nevada	107	2,207,335
New York	148	6,556,560
North Carolina	496	124,649,258***
North Dakota	416	27,439,035
Ohio	347	6,310,413
Oklahoma	70	1,072,610
Oregon	54	3,482,279
Pennsylvania	469	19,601,517
Puerto Rico	299	13,398,425
Tennessee	153	2,793,887
Texas	486	19,493,950
Vermont	7	381,856
Virginia	207	2,333,206
Washington	217	13,276,280
West Virginia	255	44,505****
Wisconsin	150	7,307,091
Total	**16,998**	**$473,424,564**

** HMGP acquisitions are typically funded on a 75 percent federal/25 percent nonfederal basis.*
*** In the case of Missouri's buyout program since the 1993 Midwest Flood, the State matched FEMA's HMGP funds on a 50-50 basis.*
**** This sum includes a significant, but untabulated, number of property elevations.*
***** One acquisition costing $44,505 is complete, and another 254 acquisitions are approved and pending final signature from the State for transfer of the HMGP funds.*

Source: FEMA transmittal to NWF May 27, 1998, noting: This data reflects the approximate number of property acquisitions funded by the Hazard Mitigation Grant Program since its inception in 1988. The HMGP database is a system under development to maintain HMGP project information. This data is subject to change, as the database will not be fully operational until later in 1998. Additionally, many HMGP applications for acquisition are currently being reviewed and approved on an ongoing basis. These data reflect acquisitions funded by the HMGP since its inception in 1988 and constitute acquisitions approved and completed or almost complete as of June 1998.

Table 2.II

State of Illinois Hazard Mitigation Grant Program Projects



As of March 1, 1998, approximately 2,500 voluntary buyouts in 69 Illinois counties, cities and towns (as indicated above) had either been completed or were planned using FEMA Hazard Mitigation Grant Program funds. More than 100 property buy-outs are included in each of the towns of Grafton, Keithsburg and Valmeyer and in Monroe and St. Clair Counties.

Source: Illinois Emergency Management Agency.

Map 2.IV

Major Voluntary Buyout Programs

While federal, state and local agencies have often been resourceful at finding funding for voluntary buyout and relocation projects, since 1994 the bulk of funding has come from the following federal programs:

FEMA's Hazard Mitigation Grant Program (HMGP)

This program originated in the 1988 Robert T. Stafford Disaster Assistance Act and provides funds for hazard mitigation after presidentially declared disasters. With the modifications after the 1993 Midwest Flood that made an additional 15 percent of the disaster relief funds spent on FEMA Public Assistance and Individual Assistance programs available to states for hazard mitigation, the HMGP has substantially increased the amount of funding for voluntary property buyouts and other nonstructural flood hazard mitigation approaches. The grant funds are on a 75 percent federal/25 percent nonfederal cost-share basis. Projects must be cost effective, meet federal environmental requirements and be consistent with the overall State Hazard Mitigation Plan. In October 1997, FEMA broadened the scope of the mitigation regulations, allowing mitigation funds to be spent statewide instead of being limited to counties in declared disaster areas. Thus, funding can be used to develop thoughtful, comprehensive predisaster planning and to provide postdisaster assistance, both within and outside declared disaster areas.

FEMA's Flood Mitigation Assistance Program (FMAP)

As noted earlier in Chapter 2, this program was created in the 1994 Flood Insurance Reform Act and is the only program dedicated primarily to predisaster flood hazard mitigation. The act authorizes as much as $20 million annually from national flood insurance funds to be used for grants to states or communities for planning and implementation of nonstructural flood hazard mitigation projects. The program focus is to protect or remove insured structures from the floodplain. Eligible projects include elevation, acquisition and relocation of insured structures. Grant funds are made available on a 75 percent federal/25 percent nonfederal cost-share basis. Because funding is allocated to states and territories by formula, the amount of funds in any one year for a state is limited.

HUD Community Development Block Grants (CDBG)

The CDBG entitlement program annually allocates funds to cities and urban counties to provide decent housing and a suitable living environment and to expand economic opportunities, principally

for low- and moderate-income persons. In recent years, after disasters, Congress has often made specific appropriations to supplement these funds for use in disaster recovery and for hazard mitigation. State and local governments have the option to use the CDBG funds to make relocation payments to property owners for the cost of comparable housing outside of the floodplain. CDBG funds may also be used to acquire flood-damaged properties at preflood market value if FEMA funds are not available.

Small Business Administration (SBA) Physical Disaster Loans and Economic Injury Disaster Loans

The SBA provides loans to nonfarm disaster victim home and business owners, generally with an interest rate of 4 percent and terms as long as 30 years, depending on the borrower's ability to repay. These loans help owners fund the repair or replacement of uninsured or otherwise uncompensated losses. In situations of voluntary buyouts or substantial damage (loss of at least 50 percent of a building's value in a disaster), the loans may be used to help fund acquisition of a replacement property at a site outside the 100-year floodplain.

Department of Agriculture Programs

There are a number of disaster assistance programs managed by the Agriculture Department that assist rural flood victims with voluntary buyouts, floodplain easements and other flood hazard mitigation activities.

Other Initiatives With Potential to Assist Voluntary Buyouts

FEMA's Project Impact

With FEMA's fiscal year 1997 budget, the agency initiated a new program called *Project Impact* to foster coordinated, community-based planning to make communities disaster-resistant. The program brings together resources from all levels of government and the private sector to identify the natural and structural hazards that communities face, to assess community vulnerability to those hazards and to identify cost-effective means to manage and reduce those risks. FEMA is seeking $50 million per year from Congress to support the program, with an initial goal of identifying at least one *Project Impact* community in each state to begin the planning process. Since flooding is a well-recognized hazard in many communities, the program can help communities explore innovative approaches to reduce the risk of flood damages and improve floodplain management.

Corps of Engineers' Challenge 21 Program — Flood Hazard Mitigation and Riverine Ecosystem Restoration

As a complement to the agency's structural flood control programs, the Corps of Engineers has proposed in its fiscal year 1999 budget a program that will focus on nonstructural flood damage reduction alternatives that help "move families and businesses out of harm's way and strive[s] to return the floodplains and rivers and creeks to a condition where they can naturally moderate floods as well as provide other benefits to communities and the environment." The program is intended to be coordinated closely with FEMA, the Agriculture Department and other federal agencies responsible for flood-related problems. The Corps of Engineers requested $25 million for the program's first year. The Corps of Engineers and Clinton administration officials have identified the program as a top priority for the Corps of Engineers' budget and for the 1998 Water Resources Development Act, which is the legislation that authorizes Corps of Engineers' programs. Congress is expected to consider the initiative in the summer and fall of 1998. This is an important initiative because it will allow the Corps of Engineers to increase its participation in voluntary buyouts and relocations and other nonstructural flood damage reduction projects.

Photo: U.S. Fish and Wildlife Service

Proof That Buyouts Work

Renewed flooding in 1995 demonstrated the effectiveness of the voluntary buyout program that began in the wake of the Great Midwest Flood of 1993.

In 1995, large sections of Missouri that had been hit by the '93 Flood were inundated again by river crests that at some locations reached the 200-year flood stage.

The difference between these two floods was the state's energetic pursuit of the buyout and mitigation strategy.

The bare statistics help tell the tale. In 1993, 37,000 Missouri residents applied for flood disaster assistance. In 1995, only 3,700 flood disaster applications were filed.[19]

While the two floods were not identical in intensity or scope, the huge reduction in disaster claims provides an on-the-ground indicator of the substantial savings that buyouts, relocations and other nonstructural mitigation measures will have on future requirements for disaster aid.

And, of course, statistics cannot tell the story of lives, families, homes and businesses kept whole by moving out of harm's way.

Wetland Restoration along the Napa River, west of the city of American Canyon will be expanded by hundreds of acres when the Napa Flood Management Plan is completed. Photo: Karen Rippey

Innovative Buyouts in California's Wine Country

Napa County, California, recently voted by more than a two-thirds majority to impose a half-cent sales tax (raising $120 million over 20 years) to support a flood damage reduction project that was jointly developed by citizens, local government agencies and the Corps of Engineers. The project incorporates innovative plans for the voluntary buyout and relocation of homes and businesses.

Paul Bowers of the Corps of Engineers called the plan's emphasis on river restoration rather than destruction "truly unique." He said, "The plan is considered revolutionary because it eschews concrete channels for environmentally friendly alternatives such as removing homes and businesses from perennially flooded areas and creating meander belts, broad riparian zones where the river can wander during floods without causing damage."[20]

Napa County has been among California's highest repetitive flood loss communities for many years. "We've dammed just about every river throughout the U.S. and still haven't provided the protection the public wants," said Brandon Muncy, the Corps of Engineers' deputy commander for civil works in Sacramento.

A Napa County supervisor called the plan "ground breaking" because it cleans up several riverside toxics sites, restores riverine forests and removes homes and commercial buildings from flood zones. It will also authorize the construction of a large bypass culvert to shunt floodwater away from downtown Napa.

The Napa project will lower dikes and setback levees; restore river meanders, marshlands, wetlands and wildlife habitat; support the purchase and removal of highly floodprone structures; and open floodplains where practicable to restore the Napa River's natural floodplain functions.

Grand Forks: The Nation's Single Most Ambitious Buyout Project

In April 1997, the Red River flood devastated the adjoining cities of Grand Forks, North Dakota, and East Grand Forks, Minnesota, and ultimately produced the most ambitious effort in the Nation to use buyouts and relocations to resolve a community's flooding problem. Under current plans, 1,085 homes and businesses will be removed from the floodplain — more than one in every ten single family homes in Grand Forks. As of spring 1998, 750 homes and businesses have already been bought out or are slated for removal from the floodplain. Through the communities' efforts, plans have been created to convert 830 acres of developed land into greenways and floodplain through a levee realignment. Three hundred additional buildings in Grand Forks and 35 in East Grand Forks will need to be bought out or moved in order to implement the levee realignment.

After the brutal winter blizzard and the spring thaw in 1997, Red River floodwaters crested to 54 feet in Grand Forks. Approximately 85 percent of the 52,000 residents were forced from their homes. A huge electrical fire destroyed a portion of downtown businesses in Grand Forks.

In the flood's wake, citizens decided against uniformly rebuilding on site in the floodplain and began planning to reshape the landscape of the city and resolve the flooding problem once and for all. National, state and local leaders merged recommendations from economists, engineers and environmentalists to create the plan. The federal government assisted with $1 billion in flood relief for North Dakota and Minnesota, with more than half of it concentrated in the Grand Forks area.

Part of the plan includes a valleywide water retention project and additional levee removal. But the most striking feature, if implemented, is that the plan will constitute the largest buyout conducted by a single community (considering Grand Forks and East Grand Forks together) ever attempted in the Nation's history.

While it may take years to complete, the plan provides the community with recreational areas, a golf course, picnic areas, recreated historic sites, nature trails and environmental sites to be built on the 830 acres of greenway floodplain.

— Ben McNitt, principal writer and researcher.

Endnotes

1. The major sources used in this report for summary information on the 1993 Midwest Flood are *The 1993 and 1995 Midwest Floods: Flood Hazard Mitigation Through the Property Acquisition and Relocation Program*, Donna Erat, Mitigation Directorate, FEMA Headquarters, September 15, 1995; *Sharing the Challenge: Floodplain Management into the 21st Century*, Report of the Interagency Floodplain Management Review Committee to the Administration Floodplain Management Task Force, Washington, D.C., June 1994, especially Chapter 1; and *Midwest Flood, Information on the Performance, Effects and Control of Levees*, General Accounting Office, GAO/RCED-95-125, August 1995.
2. *Sharing the Challenge*, p. 11.
3. *Sharing the Challenge*, p. 21.
4. *Science for Floodplain Management into the 21st Century*, Part V, Preliminary Report of the Scientific Assessment and Strategy Team, Report of the Interagency Floodplain Management Review Committee to the Administration Floodplain Management Task Force, Washington D.C., June 1994, p. 165. *Midwest Flood*, General Accounting Office, notes on page 3 that, "According to Corps [of Engineers'] records, 157 of the 193 Corps levees found in areas affected by the 1993 flood prevented rivers from flooding about 1 million acres and causing $7.4 billion in damage. Another 32 levees withstood floodwaters until the water rose above the levees and overtopped them. Four other levees were breached or otherwise allowed water into protected areas before the levees' design capacity was exceeded. The Corps estimated the damage caused by the overtoppings and breachings of these 36 levees at about $450 million."
5. Donna Erat, Federal Emergency Management Agency's Mitigation Directorate, provided these figures during the review process for this report.
6. *The 1993 and 1995 Midwest Floods*, p. 5. The authors have drawn heavily on this source in preparing Chapter 2 of this report, and wish to thank Donna Erat of the Federal Emergency Management Agency for providing it to us in draft and final form and for discussing its findings with us.
7. *Report and Recommendations of the Governor's Task Force on Flood Plain Management*, July 1994, Missouri, p. 15.
8. *Report and Recommendations*, p. 12.
9. *Report and Recommendations*, p. 1.
10. *The 1993 and 1995 Midwest Floods*, pp. 8-9.
11. For the purposes of the National Flood Insurance Program, a repetitive loss structure is defined as any insured structure that has suffered two or more flood losses over any 10-year period since 1978, in which each loss totaled at least $1,000. A repetitive loss community is any community that contains one or more repetitive loss properties.
12. *The 1993 and 1995 Midwest Floods*, p. 8.
13. *The 1993 and 1995 Midwest Floods*, p. 17.
14. *The 1993 and 1995 Midwest Floods*, p. 17.
15. *Sharing the Challenge*, p. 131.
16. *Sharing the Challenge*, p. 131.
17. Section 555 of the National Flood Insurance Reform Act of 1994 authorized new NFIP *increased cost of compliance* ("ICC") insurance coverage to assist building owners in bringing structures into compliance with current state or community floodplain management laws or ordinances after sustaining *substantial damage* (damage of at least 50 pecent of building value in a singe event) or if the building is a *repetitive loss structure* (defined as *cumulative*

substantial damages or having 2 flood-related damages to a structure within 10 years, totaling at least 50 percent of building value). FEMA published a final rule implementing this provision on February 25, 1997 (62 FR 8391 - 8400), which provides basic, mandatory NFIP coverage in the standard flood insurance policy for up to a maximum of $15,000 for increased costs of compliance. Cost of the coverage ranges from $6 - $75 per policy. Concerns have been raised, however, that the rule as promulgated may considerably limit its own effectiveness in reducing flood risk.

The coverage is made available to the insured claimant only if the state or participating community has a specific ordinance in place that requires a *repetitive loss structure* to be elevated, floodproofed, or relocated in order to bring the building up to the community's current code and floodplain management requirements or otherwise to demolish the building. Few communities have such ordinances in place, and FEMA decided not to require communities to promulgate such ordinances, but to leave this as a voluntary matter for states and local communities. The coverage *is* allowed to be paid in any instance where a building is declared *substantially damaged* from a single event. Few communities know about these provisions, and, as of March, 1998, only a handful of ICC claims for repetitive losses had been filed or approved.

Finally, in FEMA's Flood Mitigation Assistance Program interim final rulemaking (62 FR 13346 -13349), issued March 20, 1997, the agency decided to spread the quite limited pre-disaster flood hazard mitigation funds (authorized up to $20 million annually) to all 50 states and U.S. territories, such that the most any state received in FY 1997 (in this case, Florida) was approximately $2.5 million. Most states received less than $200,000, which will be helpful for planning activities, but will not go far in implementing mitigation projects, such as voluntary buyouts. The establishment of the Flood Mitigation Assistance Program is an important floodplain management milestone. To be truly effective on a national basis, however, considerably more funding for predisaster mitigation will be required.

18. *CRS Coordinator's Manual*, NFIP Community Rating System, July 1996, Federal Emergency Management Agency, p.110-1. The 18 community activities beyond basic NFIP community participation requirements that are credited for flood insurance rate reductions through the Community Rating System (CRS) are as follows: (Public Information) building elevation certificates, map determinations, outreach projects, hazard disclosur by real estate agents, flood protection library, flood protection assistance; (Mapping and Regulatory) additional flood data, open space preservation, higher regulatory standards, flood data maintenance, stormwater management; (Flood Damage Reduction) floodplain management plans, property acquisition and relocation, retrofitting floodprone properties, drainage system maintenance; (Flood Preparedness) flood warning program, levee safety, and dam safety. Under the CRS, varying levels of credit points are given for activities based on their contribution to flood damage reduction and wise floodplain management. In January 1998 FEMA announced plans to update the CRS in January 1999, with major increases in credit points likely to be included for the following activities: floodprone property acquisition and relocation, open space preservation, more restrictive floodway standards, higher regulatory standards (higher building elevation freeboard, protection of community critical facilities, limits on lower level enclosures), and retrofitting (especially building elevation and floodproofing). These changes will provide important new incentives to communities seeking to improve the management of their floodplains.
19. *The 1993 and 1995 Midwest Floods,* p.9.
20. Glen Martin, *San Francisco Chronicle*, March 6, 1998.

3 Analysis of Repetitive Losses in the National Flood Insurance Program

"Floods are an act of God; flood damages result from the acts of men. Those who occupy the floodplain should be responsible for the results of their actions."
— Gilbert F. White, Report of the President's Task Force on Federal Flood Control Policy, 1966.

Families rescued in rowboats from floodwaters. Photo: NOAA

Chapter 3

Analysis of Repetitive Losses in the National Flood Insurance Program

Part I
Summary

In the spring of 1996, to prepare this report and to further understand the cost of flood-related problems for the National Flood Insurance Program (NFIP), the National Wildlife Federation obtained a copy of the Federal Emergency Management Agency 's National Flood Insurance Program database of *repetitive loss properties*. The NFIP defines repetitive loss properties as properties that have received two or more flood insurance loss payments of at least $1,000 within a 10-year period. These are properties with among the highest flood loss frequencies and represent a disproportionately high percentage of flood insurance claims paid by the NFIP nationwide. The NFIP repetitive loss database was initiated by FEMA in 1978 and is continually updated. The National Wildlife Federation has conducted an extensive analysis of approximately 18 years of data, covering the NFIP's repetitive flood loss history from 1978 - August 1995. Part 2 of this chapter contains the complete analysis of this data. The following summarizes the major findings of the analysis:

Higher Ground *identifies the Nation's Top 300 U.S. communities which the National Wildlife Federation recommends should be considered as top potential candidates for utilization of new voluntary buyout or other nonstructural flood hazard mitigation approaches to reduce future flood risks, based on their extraordinary flood loss histories. The National Wildlife Federation urges that responsible local, state and federal agencies examine the potential for use of nonstructural*

flood hazard mitigation approaches, such as voluntary buy-outs, elevations or relocations of homes and businesses from flood hazard areas to assist these properties due to their disproportionately high costs and flood loss frequencies.

These 300 communities, located in 35 states, represent only 1.6 percent of the 18,700 U.S. communities enrolled in the NFIP. Their 31,574 repetitive loss properties are less than one percent of all NFIP insured properties. Yet, from 1978 to August 1995, the repetitive loss properties in these communities received approximately $1.3 billion in flood insurance payments — 49.8 percent of all NFIP repetitive loss payments and *20 percent of all NFIP loss payments nationwide*. The repetitive loss properties in these communities had an average of three losses each over the 18 years studied — meaning many are located for practical purposes in the 5 - 10 year floodplain. Over the period, each property on average received more than $40,000 in NFIP payments. A number of these communities, especially in the Midwest, have already begun significant efforts to address repetitive loss problems, and some may even have eliminated problems through mitigation projects. However, substantial numbers of these and other repetitively flooded structures continue to remain at high risk. The 300 communities are identified in ***Table 3.I*** of this chapter.

From 1978 to August 1995, almost 10 percent of all repetitive loss, single family residential properties have had cumulative flood insurance payments that exceed the building value — in some cases many times over.

To determine if insurance payments have exceeded property value, ***Higher Ground*** compares cumulative NFIP payments over the 18 years studied for repetitive loss, single family homes with the highest building value recorded for each property during the period. For 5,629 homes, or almost 10 percent of the 58,975 single family homes with repetitive losses, the cumulative payments have exceeded the building's value — in some cases several times over. Payments for these properties totaled $416 million. In addition, the report lists the Top 200 single family homes with payments exceeding building value (see ***Table 3.III***). Over the 18 years studied, the property with the highest flood insurance payments ($806,591) was a home valued at $114,480 and located in Houston, Texas.

Repetitive loss properties have received a disproportionate share of NFIP payments for flood losses. While NFIP repetitive loss properties represent only two percent of all insured properties, they experienced 25 percent of the losses and claimed 40 percent of all NFIP payments. In addition, less than one percent (0.8 percent) of floodprone properties — those repetitive loss properties with three or more losses — received more than one fifth (21.5 percent) of all flood insurance payments costing the NFIP almost $1.4 billion.

Although repetitive loss properties are only two percent of all NFIP properties, they experienced 25 percent (200,182) of NFIP losses and received 40 percent ($2.58 billion) of all flood insurance payments. These flood losses represent a large and continuing drain on the National Flood Insurance Program, and contribute to its financial instability. Approximately two-thirds of repetitive loss properties flooded twice in 18 years, with payments totaling $1.2 billion, or slightly less than half of all payments to repetitive loss properties. More than a third (37 percent) of the repetitive loss properties were flooded three or more times (ranging up to 34 times) over the 18-year period. These 27,423 properties cost the NFIP almost $1.4 billion, or 53 percent of all repetitive loss payments. ***Figure 3.II*** contains a profile of repetitive loss properties and total costs categorized by number of losses.

The analysis indicates that the enforcement of the NFIP's substantial damage requirements has been lax.

FEMA's regulations direct that all communities participating in the NFIP must adopt and enforce local ordinances requiring that *substantially damaged properties* (properties that sustain building damages in a single event of at least 50 percent of building value) must be elevated (or floodproofed in the case of nonresidential structures) to the 100-year flood level or be removed from the flood hazard area. FEMA has operated the NFIP on the assumption that the Nation's floodplains would be gradually cleared of the higher-risk stock of *pre-FIRM* properties (properties located in the floodplains before flood insurance rate maps were drawn), as pre-FIRM buildings, when substantially damaged by floods, would be abandoned, removed from the floodplain completely or elevated above the 100-year flood level (for a discussion of pre- and post-FIRM properties, see Chapter 1, pp. 17-18).

The National Wildlife Federation's analysis indicates that large numbers of substantially damaged properties have apparently not been elevated or removed as required, and substantial damage requirements

have often not been enforced in many communities. The evidence indicates that many buildings have been rebuilt in place and at original elevations, continue to be classified as pre-FIRM properties and remain eligible for subsidized insurance. The analysis also shows that almost 11,000 repetitive loss properties had sustained substantial damage at least once during the 18 years studied — many more than once — yet on the whole they continued to suffer additional losses much as they did before they were substantially damaged, but at even higher cost. This suggests a strong need to review how FEMA's substantial damage regulations are implemented and enforced. The substantial damage data analysis is summarized in ***Tables 3.VII and 3.VIII***.

Twenty percent of repetitive losses occur outside the designated 100-year floodplain. This raises concerns that flood insurance rate maps may often be inaccurate, and the public is not being adequately informed of the risks of living in the vicinity of floodplain areas.

The National Wildlife Federation's analysis shows that over the 18 years studied, and consistent with patterns previously observed in a 1990 FEMA study, slightly more than 20 percent of NFIP repetitive loss properties, losses and payments occured outside the officially mapped and designated 100-year floodplain. This raises concerns about the accuracy of some flood insurance rate maps, and further concerns that some home buyers may be critically uninformed about a building's flood history and risks and the need for flood insurance at a key juncture — the point of purchase. Greater attention by FEMA is needed to assure that flood insurance maps and ratings accurately reflect flood risk. ***Table 3.IX*** summarizes the distribution of repetitive loss properties by Zone.

Substantially damaged home in Calhoun County, Illinois bought out after 1993 flood.
Photo: Illinois Department of Natural Resources

Full Costs of Repetitive Loss Flooding Far Exceed Costs of Insurance Payments

Despite the Nation's having spent huge sums for decades on projects to control floods, during the 1990s the Nation's average annual flood damages have risen to an all-time high of $4 - $5 billion. It is largely the increasing magnitude of these costs and the experience of several major recent floods that are currently spurring the Nation to explore alternative approaches to addressing flood-related problems.

While the primary purpose of this chapter is to present an analysis of the 18-year record of NFIP repetitive loss properties, it is critical to note that the full or true costs of repetitive flood losses are far more than the $2.6 billion in flood insurance payments documented here. These additional costs come in many different forms, including the following: federal disaster relief, including food and emergency assistance, search and rescue, temporary housing, crisis counseling, public infrastructure repair, and hazard mitigation; community development; Small Business Administration and Department of Agriculture disaster loans; floodfighting, channel clearing, debris removal, and levee repairs; unemployment and dislocated worker assistance; analogous state and local assistance; uninsured casualty loss income tax deductions, and uncompensated lost wages and business income. Less quantifiable costs can include: social costs of disrupting families and education, environmental costs, and exacerbation of downstream flood impacts due to additional flood control projects. The ultimate question is what can and should be done now and in the future to address the Nation's mounting flood costs and the human suffering they bring.

Home flooded in October 1994 in Southeast Texas. Photo: FEMA

In general, ***Higher Ground*** concludes that the Nation should significantly expand current efforts to address repetitive loss flooding through cost-effective, non-structural approaches. These nonstructural approaches, such as the voluntary buyout and relocation option, are key *first steps* to help reduce these unacceptable and unnecessarily high levels of flood-related costs and to improve floodplain management.

FEMA recently expressed a similar conclusion in testimony to Congress. On May 7, 1998, FEMA's associate director for mitigation, Michael J. Armstrong, testified that the NFIP's 75,000 repetitive loss properties have already cost $2.8 billion in flood insurance payments and numerous other floodprone properties continue to remain at high risk in the Nation's floodplains. He recounted that the agency, based on recent experience, had concluded that the voluntary buyout and removal of frequently flooded buildings had generated at least $2 in *benefits* for each dollar invested, even with benefits being limited to reduction of future flood insurance payments. He added that FEMA believes that dedicating an additional $300 million for continued voluntary buyout and relocation efforts could make substantial strides in reducing the large costs of repetitive loss properties to the NFIP and other disaster relief programs by permanently removing many of these chronic loss properties from harm's way.[1] [2]

Bulldozer removes mobile home in Perrine, Florida. Photo: NOAA

While no one has attempted to quantify the myriad costs of repetitive loss flooding to federal, state and local governments, the private sector and individuals, it is clear that after major floods, the costs of flood disaster assistance alone often far exceed the costs of flood insurance payments. It is also clear that significant savings in disaster assistance for subsequent floods can accompany voluntary buyout and relocation projects. For example, in the wake of a major flood in Missouri in 1995, the Missouri Emergency Management Agency reported that because of the voluntary buyout program initiated after the 1993 Midwest Flood, St. Charles County, realized a *99 percent savings* in federal, state and local

disaster assistance costs when compared with flooding in 1993. Disaster assistance costs for repetitively flooded areas dropped from $26.1 million in 1993 to only $283,094 in 1995.[3]

Overall, $11.4 billion, or 55 percent of all FEMA disaster assistance costs in the past 10 years (1989 - February, 1998), have been associated with flood-related storms and hurricanes.[4] NWF's analysis of FEMA's data show that 10 of the top 15 NFIP repetitive flood loss states (see ***Table 3.IV***) are also among the top 15 states receiving Stafford Act disaster assistance for flood-related events. Over this period, total Stafford Act payments for flood-related storms in these 10 states amounted to $5.8 billion ($2.7 billion for floods and severe storms and $3.1 billion for hurricanes).[5] While there is considerable variability among types of flooding and the associated costs of disaster relief, it can be anticipated that most voluntary buyout and relocation projects will also result in substantial savings in disaster assistance costs.

For purposes of this report, the National Wildlife Federation has focused on repetitive loss properties in particular because the properties are generally located in the 5 - 20 year floodplain, and their location is often an indicator of areas that are suffering chronic and significant flood losses. Considering the cost of repetitive loss properties to the NFIP and other disaster-related programs and the impending taxpayer obligation if the NFIP is unable to repay the hundreds of millions of dollars currently owed to the Treasury, the National Wildlife Federation believes it would be wise policy to significantly increase hazard mitigation efforts for repetitive loss properties. Finally, the National Wildlife Federation believes that the problem of repetitive loss properties is not a problem of unfathomable dimensions, but instead constitutes a manageable number of individual and community circumstances that, with increased attention by federal, state, and local governments, can be addressed over the next 5 to 10 years to significantly reduce the risk and cost of flooding and also improve the environment and the Nation's floodplain management.

Part II
Analysis of NFIP Repetitive Losses

This chapter analyzes the status of repetitive loss properties in the National Flood Insurance Program.

While working on flood insurance reform legislation from 1988 to 1994, the National Wildlife Federation began to focus increased attention on the history of repetitive flood loss claims in the National

Flood Insurance Program (NFIP). During these years, FEMA, the General Accounting Office, and the House and Senate Banking Committees began to analyze repetitive loss properties and draw some preliminary conclusions about emerging patterns of repetitive loss. Some of the conclusions contributed to the formation of the Flood Mitigation Assistance Program and Increased Cost of Construction Program that were included in the 1994 National Flood Insurance Reform Act.

In 1996, for purposes of this report, the National Wildlife Federation obtained a copy of the NFIP repetitive loss database to do the following:

- **To further analyze the dimensions of repetitive losses.**
- **To identify new approaches to address repetitive loss problems and to alert affected communities.**
- **To update the information provided in FEMA reports in 1989 and 1990 that covered the first 10 years of repetitive loss and substantial damage information and to broaden the analysis of these issues.**

Grafton Trailer Park. Bought out after 1993 flood.
Photo: Illinois Department of Natural Resources

The National Wildlife Federation has conducted extensive analysis of this database which spans almost two decades of flood insurance claims and payment histories for approximately 75,000 insured repetitive loss properties in the United States. As part of its overall flood insurance data, FEMA created the database to identify NFIP insured properties with at least two paid losses of at least $1,000 during any 10-year period. FEMA created the database in 1978 and continues to update it. The National Wildlife Federation's analysis of this data confirms that although repetitive loss properties make up a very small percentage of all insured properties, these properties have been, and continue to be, the source of a disproportionately large share of claims and payments made through the NFIP.

This chapter also shows that the vast majority of repetitive loss properties were built before the Flood Insurance Rate Maps were completed in the mid-1970s. Key findings include:

- **Many of the repetitive loss properties have a history of three or more flood losses (ranging up to 34 losses) from**

1978 to August, 1995. This surprisingly high frequency (at least one flood every six years) is a substantial and continual drain on the National Flood Insurance Fund.

- Thousands of properties had cumulative flood insurance payments exceeding the property value (and some had cumulative payments many times the property value).
- Repetitive loss properties occur in all 50 states, but have particularly high concentrations in a small number of states, which include Louisiana and Texas. Total repetitive loss flood insurance payments for these two states are $1.1 billion dollars — 40 percent of all repetitive loss claims paid nationwide during the 18-year period studied.

Flooded out homes near New Orleans, Louisiana. Photo: U.S Army Corps of Engineers

- The National Wildlife Federation's analysis shows that a large number of repetitive loss properties have sustained *substantial damage* (damage to the building in a single event of at least 50 percent of the property's market value). The NFIP stipulates that a substantially damaged property must either be removed from the flood hazard area or be elevated at least to the community's approved base (100-year) flood elevation to conform with the community's NFIP requirements for new (*post-FIRM*) construction. The National Wildlife Federation's analysis shows that over the 18 years studied approximately 15 percent of all repetitive loss properties sustained substantial damage at some time during the period, with significant numbers more than once. Many apparently were not elevated or relocated and continue to sustain large amounts of damage. As a result, these properties — many of which continue to receive heavily subsidized insurance — are major contributors to the financial instability of the flood insurance program.

The Database

The repetitive loss database is a record of payments by the National Flood Insurance Program for properties with two or more insured losses, each greater than $1,000, which have occurred within a 10-year period. Any insured property that meets these conditions is added to the database and its claims history is continually updated. The National Wildlife Federation's analysis of the database covers nearly 18 years of data from January 1, 1978, to August 19, 1995.

The database includes extensive information about each insured property and its flood loss and claims history. The data can be analyzed by state, community, total damages, dates of loss, value of structures, dollar amounts of claims paid and flood zone designations of the insured properties.

Due to Privacy Act considerations, the properties studied in this report were located by five digit zipcode and community only. Names and street addresses were excluded from the data the National Wildlife Federation received from FEMA.

It is important to note that in the NFIP, the *community* refers to the local jurisdictional entity (e.g., county, city, township) that has elected to participate in the program and has agreed to maintain and enforce the NFIP land use and building code requirements for that area. There is substantial variability among the sizes and populations of communities participating in the NFIP.

It is also important to note that the NFIP repetitive loss properties do not represent the entire universe of properties that experience repetitive flood losses. Many properties that suffer repeated flooding are not included in the database because of the relatively low percentage of structures that are usually insured within flood hazard areas, the requirements that properties be insured and have made at least two claims within a 10-year period to be identified in the database and the relatively short history of flood loss experience. The National Wildlife Federation believes, however, that analysis of NFIP repetitive loss properties and their loss histories can provide significant insights to repetitive loss problems which can serve as a basis for planning flood hazard mitigation projects and improving floodplain management.

If repetitive loss properties meet the minimum criterion for flood frequency and were insured for the entire 18-year period, their flood recurrence may be as long as 18 years for two floods (one every nine years). The minimum criterion for repetitive loss properties (two losses in 10 years) screens out many properties with longer recurrence intervals, even though they remain vulnerable to large floods.

Box 3.I

NFIP Totals Over 18 Years

		Losses	Payments
Repetitive Loss Properties (as of 8/19/95)	74,501	200,182	$2,581,260,251
NFIP Policies (as of 11/30/95)	3,323,590	770,352	$6,376,869,372

Properties flooded by high tides, overbank flow or urban stormwater on a monthly-to-annual or annual-to-biennial cycle are more likely to be included among repetitive loss properties than properties flooded by hurricanes because such storms are less frequent even though the wind and waves of a hurricane can equal or exceed the destructive power of a flooding river.

Only a very small percentage of the Nation's homes suffer repetitive flood losses. Between 1978 and 1995, 74,501 repetitive loss properties experienced 200,182 losses. There are 18,700 cities and counties participating in the National Flood Insurance Program. Most of the Nation's communities (15,415) have had at least one flood loss affecting at least one property, but only 4,543 communities have had two or more floods within 10 years affecting at least one repetitive loss property. In the NFIP, these are referred to as *repetitive loss communities*.

More than 80 percent of repetitive loss properties are single family homes. There were 58,975 properties consistently classified as single family homes and an additional 1,914 properties classified both as single family homes and some other occupancy classification, in the database. For this report, cross-classified properties are considered to be the higher occupancy classification — either two to four family home, other residential property or nonresidential property. There were 4,814 two to four family homes, 1,795 other residential properties, and 8,769 nonresidential properties. The remaining 148 properties had unspecified or uninterpretable occupancy classifications.

Frequently flooded homes have relatively modest property values. Claims adjusters estimate property value in an on-site, postdisaster inspection of damages. More than 95 percent (71,823) of repetitive loss properties had attached property values, the remaining 2,678 properties filed contents-only claims without attached property values.

Over the 18 years studied, the median value for all repetitive loss properties was $70,400. The median value of single family homes was $65,000; 25 percent of single family homes were valued at less than $43,000 and 75 percent less than $104,200.

The median value of two to four family residences was $96,000; other residential properties $250,000; and nonresidential properties $145,200.

Values of repetitive loss single family homes increased gradually, reflecting, in part, inflation in building materials and labor. Calculating a linear regression, the median value of repetitive loss single family homes increased $2,155 per year from $39,208 to $73,688 from 1979 to 1995.

I. 300 U.S. Communities With High Repetitive Flood Loss Rates That May Have Potential for Reducing Flood Losses Through New Voluntary Buyout and Relocation Initiatives

The National Wildlife Federation recommends special attention be paid to help reduce the high rates of repetitive losses in the Top 300 U.S. communities with significant flood loss histories.

Of the 4,543 repetitive loss communities in the United States that have at least one repetitive loss property in the NFIP repetitive loss database, certain communities have had particularly high numbers of repetitive loss properties, high frequencies of losses for repetitive loss properties or especially high average cumulative payments per property. Based on statistical studies showing these higher numbers or rates, and without judging the potential for reducing flood hazards on a community-by-community basis (which would have been far beyond the scope of this study), the National Wildlife Federation's analysis has identified 300 U.S. communities, large and small, where, because of their special flood loss histories, there may be a greater need for and greater potential to use new federal and state flood hazard mitigation programs that emphasize nonstructural approaches to flood damage reduction. Recent history has shown that these programs are often the most cost-effective in areas where repetitive loss rates are the highest.

Flood damaged mobile homes in E. Harden, Illinois in October 1993. Since that time the homes were bought out. Photo: Illinois Department of Natural Resources

The purpose of identifying the communities with high rates of losses is not only to raise awareness of the special flood-related problems that the communities are facing, but also to recognize that there are a number of new approaches and new forms of assistance that can help communities alleviate the human suffering, reduce the costs of flooding and often at the same time enhance the communities' environment. Because these programs are relatively new, many communities are not yet aware of their existence and have not evaluated the potential for these programs to help in their own situations (for a list of relevant programs, see Chapter 2).

Flooding in Slidell, Louisiana, May 1995. Photo: U.S. Army Corps of Engineers

The problems of repeated flood damages are often difficult and wrenching for communities to address, even under the best of circumstances. There are usually no easy answers. The National Wildlife Federation hopes the results of this study will encourage many communities to review their approaches to floodplain management — to take greater care in planning for the use of their floodplains, to consider expanded *pre-disaster mitigation* efforts and to recognize the importance of the natural and beneficial functions and values that their floodplains can serve when they are wisely managed.

Table 3.I of this chapter lists alphabetically, by state, the Top 300 U.S. communities with high rates of repetitive flood losses based on special enumerated criteria developed by the National Wildlife Federation. ***Table 3.II*** ranks the Top 200 U.S. repetitive flood loss communities by total NFIP payments over the 18 years studied.

In considering these two tables, certain key caveats should be recognized:

- **The lists of repetitive loss communities in this chapter are based on the exceptional flood loss histories of the communities included in the repetitive flood loss database.**
- **It should particularly be noted that some of the listed communities have already begun substantial efforts to address**

their repetitive loss problems, and some may have even eliminated problems through their mitigation activities. This is especially the case in certain Midwestern communities that experienced the Great Flood of 1993. Much of this mitigation was made possible through voluntary buyout and relocation programs and other mitigation measures described in Chapter 2.[6]

New Valmeyer, Illinois under construction. After the 1993 Midwest Flood, residents of Valmeyer decided to move their town off the Mississippi bottoms to higher ground.
Photo: Illinois Department of Natural Resources

For example, FEMA recently reported that in the wake of the 1993 Flood, in the top 30 Midwest repetitive loss communities that between 1978 and 1995 had a total of 4,621 repetitive loss properties with 14,654 NFIP payments totaling $191 million, a total of 5,100 structures were acquired or elevated, with an estimated cost to FEMA of $66.3 million.[7] Although as of this writing, it is not possible through database analysis to crosswalk the repetitive loss properties with those properties that were recently purchased and removed from floodplains after flood disasters, FEMA believes, in this instance, that there is "considerable overlap between the two."[8] FEMA further points out that:

> *"The cost of acquiring or elevating these properties is approximately 35 percent of total past claims (over the 17 year period studied). In addition to reducing the potential for future flood damages, the acquisition or relocation of properties in floodplains and the conversion of the property into open space provides an opportunity for the return of the natural function of the floodplain and the re-establishment of wetlands. In many communities, parks and recreation areas will occupy lands where flood-prone homes once stood."*[9]

Therefore, some of the counties and cities on these lists have made significant strides in alleviating flood problems that have adversely affected their growth and development and the lives of their citizens for decades. Large numbers of repetitive loss properties, however, continue to remain at high risk.

- New repetitive loss properties are still surfacing. FEMA has recently estimated that the number of new repetitive loss properties has been increasing by an average of more than 1,500 properties per year.[10] FEMA estimates between 9 and 11 million homes are at risk from a 100-year flood,[11] and two million homes are at risk from coastal storm surge.[12] While 94 percent of the 74,501 repetitive loss properties are pre-FIRM properties, six percent are post-FIRM. Therefore, not only are many repetitive loss properties continuing to accumulate significant losses, but new repetitive loss properties are still surfacing, and even post-FIRM properties are experiencing repetitive flood losses.
- Repetitive loss communities experience a varying mix of urban stormwater, riverine and coastal flooding with different periodicities and impacts. In some communities, voluntary buyouts and relocations are the best, most cost-effective mitigation options; in others, elevation of buildings is more cost-effective because there is limited land for new development or redevelopment. For example, in some Louisiana parishes, rainfall and runoff accumulate in low-lying neighborhoods located behind levees, overwhelming drainage and pumping systems. In these communities, there may be limited land at higher elevations and the traditional elevated construction may be one of the only means to reduce flood risk and vulnerability (see Chapter 5).
- Repetitive flood losses are certainly not the only significant category of flood-related problems. Repetitive flood losses have generally resulted more often from riverine and stormwater flooding — although more recently there has been a notable increase in repetitive losses from hurricanes and coastal storms. While coastal storm surge flooding tends to occur with lower frequency than river flooding, flood damages from such storms can be quite large.
- Finally, what most characterizes the communities identified in the following two tables is the high degree of repeated flooding and associated high cumulative costs.

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
PELHAM, TOWN OF	AL	58	166	2.86	$2,273,815	$39,204
PICKENS COUNTY *	AL	8	25	3.13	175,593	21,949
HELENA, CITY OF	AR	38	121	3.18	910,353	23,957
HOT SPRINGS, CITY OF	AR	13	36	2.77	722,085	55,545
JEFFERSON COUNTY *	AR	11	41	3.73	383,453	34,859
LITTLE ROCK, CITY OF	AR	59	172	2.92	1,935,627	32,807
PINE BLUFF, CITY OF	AR	20	61	3.05	777,113	38,856
WEST HELENA, CITY OF	AR	10	45	4.50	429,995	42,999
HEALDSBURG, CITY OF	CA	6	24	4.00	296,850	49,475
MALIBU, CITY OF	CA	125	347	2.78	5,754,959	46,040
SAN DIEGO, CITY OF	CA	11	40	3.64	533,129	48,466
SONOMA COUNTY *	CA	544	1,487	2.73	30,370,946	55,829
LAKEWOOD, CITY OF	CO	7	20	2.86	226,098	32,300
EAST HAVEN, TOWN OF	CT	100	344	3.44	4,776,510	47,765
NORWICH, CITY OF	CT	18	53	2.94	664,387	36,910
ORANGE, TOWN OF	CT	13	39	3.00	418,628	32,202
OXFORD, TOWN OF	CT	11	31	2.82	259,343	23,577
DEWEY BEACH, TOWN OF	DE	20	56	2.80	755,915	37,796
KENT COUNTY *	DE	16	44	2.75	467,981	29,249
WILMINGTON, CITY OF	DE	7	21	3.00	339,619	48,517
LAFAYETTE COUNTY*	FL	12	33	2.75	378,193	31,516
MADISON COUNTY*	FL	7	19	2.71	204,117	29,160
SANTA ROSA COUNTY *	FL	22	65	2.95	915,901	41,632
TALLAHASSEE, CITY OF	FL	28	83	2.96	1,279,497	45,696
ATLANTA, CITY OF	GA	68	190	2.79	2,765,509	40,669
AUGUSTA, CITY OF	GA	6	21	3.50	357,878	59,646
COLLEGE PARK, CITY OF	GA	8	36	4.50	603,781	75,473
DEKALB COUNTY *	GA	27	78	2.89	810,142	30,005
DOUGLAS COUNTY *	GA	10	29	2.90	461,607	46,161
SAVANNAH, CITY OF	GA	48	144	3.00	1,482,325	30,882
HAWAII COUNTY *	HI	30	96	3.20	1,859,816	61,994
ADDISON, VILLAGE OF	IL	25	81	3.24	1,111,991	44,480
AURORA, CITY OF	IL	6	21	3.50	224,720	37,453
CALHOUN COUNTY *	IL	211	623	2.95	4,590,312	21,755
CHAMPAIGN, CITY OF	IL	11	46	4.18	453,259	41,205
CHILLICOTHE, CITY OF	IL	23	74	3.22	636,599	27,678
DECATUR, CITY OF	IL	11	30	2.73	353,173	32,107
DUPAGE COUNTY*	IL	18	49	2.72	476,827	26,490
FULTON COUNTY*	IL	10	33	3.30	211,376	21,138
GRAFTON, CITY OF	IL	87	245	2.82	2,193,257	25,210
HAMBURG, VILLAGE OF	IL	16	50	3.13	434,778	27,174
HARDIN, VILLAGE OF	IL	56	189	3.38	1,551,541	27,706
JERSEY COUNTY *	IL	250	705	2.82	5,897,580	23,590
KAMPSVILLE, VILLAGE OF	IL	33	100	3.03	1,342,293	40,676

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
LIVERPOOL, VILLAGE OF	IL	51	159	3.12	$1,362,007	$26,706
LOCKPORT, CITY OF	IL	7	31	4.43	301,662	43,095
MARION, CITY OF	IL	14	50	3.57	566,709	40,479
MASON COUNTY *	IL	35	110	3.14	835,248	23,864
MONROE COUNTY*	IL	11	31	2.82	799,426	72,675
PEORIA COUNTY *	IL	216	718	3.32	6,025,423	27,895
PEORIA HEIGHTS, VILLAGE OF	IL	41	147	3.59	1,184,425	28,888
PEORIA, CITY OF	IL	50	180	3.60	1,322,147	26,443
PIKE COUNTY*	IL	39	127	3.26	1,325,521	33,988
RANDOLPH COUNTY *	IL	7	20	2.86	192,433	27,490
SKOKIE, VILLAGE OF	IL	13	37	2.85	551,298	42,408
TAZEWELL COUNTY *	IL	26	84	3.23	548,947	21,113
TUSCOLA, CITY OF	IL	9	41	4.56	191,528	21,281
WILL COUNTY *	IL	71	209	2.94	2,123,209	29,904
WILMINGTON, CITY OF	IL	23	69	3.00	815,662	35,464
WOOD DALE, CITY OF	IL	21	63	3.00	545,338	25,968
WOODFORD COUNTY *	IL	42	127	3.02	1,038,198	24,719
ALEXANDRIA, CITY OF	IN	14	40	2.86	500,414	35,744
FULTON COUNTY *	IN	33	90	2.73	721,282	21,857
KOSCIUSKO COUNTY*	IN	16	48	3.00	472,757	29,547
MERRILLVILLE, TOWN OF	IN	6	21	3.50	188,618	31,436
KANSAS CITY, CITY OF	KS	23	70	3.04	2,242,324	97,492
BOYD COUNTY *	KY	6	17	2.83	312,215	52,036
FRANKLIN COUNTY *	KY	8	23	2.88	474,310	59,289
HOPKINSVILLE, CITY OF	KY	61	239	3.92	2,301,221	37,725
JEFFERSON COUNTY*	KY	70	269	3.84	2,266,656	32,381
LOUISVILLE, CITY OF	KY	17	57	3.35	398,371	23,434
WAYLAND, TOWN OF	KY	6	19	3.17	134,616	22,436
WOODFORD COUNTY*	KY	13	46	3.54	1,186,548	91,273
BOSSIER CITY, CITY OF	LA	13	36	2.77	486,727	37,441
CALCASIEU PARISH*	LA	127	362	2.85	4,061,476	31,980
CALDWELL PARISH *	LA	24	67	2.79	692,072	28,836
CONCORDIA PARISH *	LA	199	641	3.22	5,239,522	26,329
EAST BATON ROUGE PARISH	LA	727	2,165	2.98	33,359,698	45,887
EUNICE, CITY OF	LA	6	20	3.33	198,213	33,035
FRANKLINTON, TOWN OF	LA	10	29	2.90	259,292	25,929
FRENCH SETTLEMENT, VILL.	LA	6	25	4.17	181,564	30,261
GRANT PARISH*	LA	54	152	2.81	1,206,757	22,347
GRETNA, CITY OF	LA	462	1,325	2.87	12,996,219	28,130
JEFFERSON PARISH *	LA	5,153	14,608	2.83	178,657,009	34,670
KENNER, CITY OF	LA	381	1,090	2.86	11,400,838	29,923
KILLIAN, VILLAGE OF	LA	11	31	2.82	277,827	25,257
LAFAYETTE PARISH*	LA	77	211	2.74	1,685,591	21,891
MANDEVILLE, TOWN OF	LA	26	79	3.04	1,048,238	40,317

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
MORGAN CITY, CITY OF	LA	12	36	3.00	$280,398	$23,367
MORGANZA, VILLAGE OF	LA	6	20	3.33	146,132	24,355
NEW ORLEANS/ORL PARISH	LA	4,023	12,427	3.09	129,135,382	32,099
PINEVILLE, CITY OF	LA	15	41	2.73	393,238	26,216
POINTE COUPEE PARISH *	LA	314	1,086	3.46	7,996,929	25,468
RAPIDES PARISH*	LA	123	377	3.07	2,856,119	23,220
SHREVEPORT, CITY OF	LA	86	273	3.17	3,114,253	36,212
ST. BERNARD PARISH*	LA	757	2,117	2.80	21,460,234	28,349
SULPHUR, CITY OF	LA	18	54	3.00	482,123	26,785
TENSAS PARISH *	LA	27	81	3.00	603,950	22,369
UNION PARISH*	LA	9	27	3.00	345,824	38,425
WESTLAKE, CITY OF	LA	15	44	2.93	503,699	33,580
WESTWEGO, CITY OF	LA	114	329	2.89	3,129,124	27,448
FT. FAIRFIELD, TOWN OF	ME	19	52	2.74	958,214	50,432
HARFORD COUNTY *	MD	6	18	3.00	161,443	26,907
MONTGOMERY COUNTY *	MD	7	20	2.86	166,671	23,810
BRAINTREE, TOWN OF	MA	7	23	3.29	191,679	27,383
EASTHAM, TOWN OF	MA	8	25	3.13	284,039	35,505
PEABODY, CITY OF	MA	11	32	2.91	723,537	65,776
WORCESTER, CITY OF	MA	15	41	2.73	858,160	57,211
FRENCHTOWN, TOWNSHIP OF	MI	19	54	2.84	397,183	20,904
KALAMAZOO, CITY OF	MI	6	19	3.17	274,137	45,690
CLAY COUNTY *	MN	16	46	2.88	706,352	44,147
MARSHALL COUNTY*	MN	10	32	3.20	338,790	33,879
MOORHEAD, CITY OF	MN	13	38	2.92	407,145	31,319
NORMAN COUNTY*	MN	7	21	3.00	151,607	21,658
BELZONI, CITY OF	MS	7	24	3.43	245,492	35,070
BOLIVAR COUNTY *	MS	111	314	2.83	2,544,241	22,921
CANTON, CITY OF	MS	44	189	4.30	1,235,703	28,084
COLUMBUS, CITY OF	MS	47	142	3.02	996,584	21,204
DREW, CITY OF	MS	8	26	3.25	228,138	28,517
FLOWOOD, TOWN OF	MS	8	28	3.50	411,783	51,473
GREENVILLE, CITY OF	MS	32	94	2.94	867,160	27,099
GULFPORT, CITY OF	MS	108	342	3.17	3,600,417	33,337
HARRISON COUNTY *	MS	130	370	2.85	5,981,516	46,012
HUMPHREYS COUNTY *	MS	22	74	3.36	529,642	24,075
MADISON COUNTY *	MS	15	76	5.07	562,613	37,508
MADISON, CITY OF	MS	8	48	6.00	237,404	29,676
MARION COUNTY *	MS	43	136	3.16	1,481,702	34,458
MENDENHALL, CITY OF	MS	16	59	3.69	653,666	40,854
MERIDIAN, CITY OF	MS	6	20	3.33	309,872	51,645
PASS CHRISTIAN, CITY OF	MS	30	85	2.83	684,246	22,808
QUITMAN COUNTY *	MS	11	35	3.18	341,139	31,013
ROSEDALE,CITY OF	MS	6	18	3.00	144,217	24,036

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
VICKSBURG, CITY OF	MS	131	417	3.18	$6,322,699	$48,265
WARREN COUNTY*	MS	295	826	2.80	8,216,422	27,852
WILKINSON COUNTY *	MS	190	604	3.18	6,041,075	31,795
ALTON, CITY OF	MO	11	33	3.00	377,928	34,357
ARNOLD, CITY OF	MO	178	535	3.01	8,043,899	45,190
BRENTWOOD, CITY OF	MO	47	141	3.00	4,537,005	96,532
BUCHANAN COUNTY	MO	7	21	3.00	517,004	73,858
CAPE GIRARDEAU, CITY OF	MO	104	314	3.02	3,193,140	30,703
COLE COUNTY	MO	19	61	3.21	1,064,855	56,045
CRYSTAL CITY,CITY OF	MO	51	173	3.39	2,726,953	53,470
DONIPHAN, CITY OF	MO	6	20	3.33	238,920	39,820
EXCELSIOR SPRINGS, CITY OF	MO	8	27	3.38	591,828	73,978
FENTON, CITY OF	MO	100	331	3.31	4,266,425	42,664
FERGUSON, CITY OF	MO	6	17	2.83	319,302	53,217
GASCONADE COUNTY*	MO	25	87	3.48	713,205	28,528
HERMANN, CITY OF	MO	23	74	3.22	2,700,333	117,406
JEFFERSON CITY, CITY OF	MO	50	136	2.72	2,270,623	45,412
JEFFERSON COUNTY*	MO	328	1,003	3.06	11,691,807	35,646
LINCOLN COUNTY *	MO	150	445	2.97	5,251,959	35,013
MANCHESTER, CITY OF	MO	6	19	3.17	175,655	29,276
MOKANE, VILLAGE OF	MO	7	23	3.29	151,004	21,572
PIKE COUNTY *	MO	22	73	3.32	529,816	24,083
PORTAGE DES SIOUX CITY	MO	74	283	3.82	3,646,370	49,275
ROCK HILL, CITY OF	MO	6	20	3.33	1,776,881	296,147
ST. CHARLES COUNTY *	MO	1,382	4,561	3.30	58,017,815	41,981
ST. CHARLES, CITY OF	MO	60	182	3.03	2,653,160	44,219
ST. LOUIS COUNTY *	MO	376	1,197	3.18	18,063,537	48,041
ST. LOUIS, CITY OF	MO	33	90	2.73	1,364,287	41,342
ST. PETERS, CITY OF	MO	7	31	4.43	402,227	57,461
STE. GENEVIEVE COUNTY*	MO	7	21	3.00	182,354	26,051
STE. GENEVIEVE, CITY OF	MO	131	399	3.05	3,647,237	27,842
SUNSET HILLS, CITY OF	MO	14	56	4.00	696,412	49,744
VALLEY PARK, CITY OF	MO	396	1,200	3.03	24,170,704	61,037
FREMONT, CITY OF	NE	18	49	2.72	419,413	23,301
ABSECON, CITY OF	NJ	14	39	2.79	1,092,611	78,044
ATLANTIC CITY, CITY OF	NJ	286	806	2.82	6,678,862	23,353
AVALON, BOROUGH OF	NJ	129	386	2.99	4,184,402	32,437
DOVER,TOWN OF	NJ	14	48	3.43	450,792	32,199
EASTAMPTON, TOWNSHIP OF	NJ	8	27	3.38	171,870	21,484
EGG HARBOR, TOWNSHIP OF	NJ	35	106	3.03	2,394,328	68,409
FAIRFIELD, BOROUGH OF	NJ	37	105	2.84	883,381	23,875
HACKENSACK MEADOWLANDS	NJ	7	23	3.29	517,399	73,914
HAWTHORNE, BOROUGH OF	NJ	12	73	6.08	1,557,254	129,771
JERSEY CITY, CITY OF	NJ	13	40	3.08	712,041	54,772

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
KEARNY, TOWN OF	NJ	6	55	9.17	$4,853,790	$808,965
LINCOLN PARK, BOROUGH OF	NJ	136	474	3.49	4,242,839	31,197
LODI, BOROUGH OF	NJ	36	133	3.69	2,636,071	73,224
LONGPORT, BOROUGH OF	NJ	47	129	2.74	1,959,089	41,683
LOWER, TOWNSHIP OF	NJ	10	40	4.00	687,567	68,757
MARGATE CITY, CITY OF	NJ	57	161	2.82	2,439,455	42,797
MONMOUTH BEACH, BOR. OF	NJ	106	289	2.73	6,189,564	58,392
NEWARK, CITY OF	NJ	7	34	4.86	237,932	33,990
NORTH WILDWOOD, CITY OF	NJ	319	896	2.81	8,165,220	25,596
PEQUANNOCK, VILLAGE OF	NJ	28	77	2.75	909,648	32,487
PLEASANTVILLE, CITY OF	NJ	14	38	2.71	599,330	42,809
POMPTON LAKES, BORO OF	NJ	76	273	3.59	2,643,139	34,778
ROSELLE, BOROUGH OF	NJ	6	77	12.83	5,906,067	984,345
SEA ISLE CITY, CITY OF	NJ	162	464	2.86	4,265,800	26,332
STONE HARBOR, BOROUGH OF	NJ	112	334	2.98	4,033,725	36,015
TRENTON, CITY OF	NJ	12	59	4.92	2,401,314	200,109
UNION BEACH, BOROUGH OF	NJ	7	19	2.71	339,270	48,467
VENTNOR, CITY OF	NJ	153	494	3.23	4,586,011	29,974
WAYNE, TOWNSHIP OF	NJ	292	959	3.28	7,983,775	27,342
W. WILDWOOD, BOROUGH OF	NJ	255	856	3.36	8,307,325	32,578
WILDWOOD, CITY OF	NJ	186	602	3.24	8,433,506	45,341
ARDSLEY, VILLAGE OF	NY	33	111	3.36	1,012,381	30,678
BRONXVILLE, VILLAGE OF	NY	14	41	2.93	672,521	48,037
CHEEKTOWAGA, TOWN OF	NY	10	28	2.80	502,528	50,253
EAST ROCKAWAY, VILLAGE OF	NY	9	29	3.22	440,967	48,996
ELMSFORD, VILLAGE OF	NY	20	69	3.45	2,529,752	126,488
FREEPORT, VILLAGE OF	NY	278	787	2.83	7,250,996	26,083
GREAT NECK, VILLAGE OF	NY	6	19	3.17	148,879	24,813
GREENBURG,TOWN OF	NY	24	73	3.04	532,769	22,199
ISLAND PARK, VILLAGE OF	NY	65	188	2.89	2,647,783	40,735
MOUNT PLEASANT, TOWN OF	NY	7	28	4.00	289,490	41,356
PORT CHESTER, VILLAGE OF	NY	10	28	2.80	241,938	24,194
SILVER CREEK, VILLAGE OF	NY	6	17	2.83	125,894	20,982
WESTHAMPTON BEACH, VILL	NY	117	319	2.73	10,762,940	91,991
EDEN, CITY OF	NC	7	19	2.71	155,892	22,270
NAGS HEAD, CITY OF	NC	99	269	2.72	4,090,950	41,323
CAMBRIDGE, CITY OF	OH	9	28	3.11	1,713,026	190,336
CINCINNATI, CITY OF	OH	34	92	2.71	896,110	26,356
INDEPENDENCE, CITY OF	OH	9	27	3.00	828,247	92,027
LAKE COUNTY *	OH	7	23	3.29	158,026	22,575
VALLEY VIEW, VILLAGE OF	OH	32	100	3.13	1,404,347	43,886
VERMILION, CITY OF	OH	28	81	2.89	1,047,345	37,405
BARTLESVILLE, CITY OF	OK	25	86	3.44	1,531,340	61,254
CLAREMORE, CITY OF	OK	6	17	2.83	203,406	33,901

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
GUTHRIE, CITY OF	OK	48	162	3.38	$1,671,052	$34,814
KINGFISHER, CITY OF	OK	23	63	2.74	715,358	31,103
LAWTON, CITY OF	OK	29	89	3.07	710,617	24,504
MIAMI, CITY OF	OK	90	253	2.81	4,939,344	54,882
NORMAN,CITY OF	OK	7	21	3.00	152,350	21,764
OKLAHOMA CITY, CITY OF	OK	72	195	2.71	2,132,853	29,623
SHAWNEE, CITY OF	OK	9	34	3.78	435,070	48,341
SKIATOOK, TOWN OF	OK	14	47	3.36	405,004	28,929
TULSA COUNTY *	OK	22	71	3.23	863,518	39,251
ALLENTOWN, CITY OF	PA	32	92	2.88	1,374,072	42,940
BETHLEHEM, CITY OF	PA	6	26	4.33	1,082,616	180,436
BRISTOL, TOWNSHIP OF	PA	6	20	3.33	298,219	49,703
BUTLER, TOWNSHIP OF	PA	6	22	3.67	183,476	30,579
CHELTENHAM, TOWNSHIP OF	PA	8	24	3.00	615,395	76,924
DARBY, BOROUGH OF	PA	20	61	3.05	491,964	24,598
EAST BRADFORD, TOWNSHIP OF	PA	13	42	3.23	465,106	35,777
FORWARD, TOWNSHIP OF	PA	9	31	3.44	188,581	20,953
HOLLIDAYSBURG, BOR. OF	PA	7	22	3.14	299,841	42,834
MIDDLETOWN, TOWNSHIP OF	PA	16	49	3.06	444,123	27,758
NORRISTOWN, BOROUGH OF	PA	11	30	2.73	298,230	27,112
PHILADELPHIA, CITY OF	PA	25	76	3.04	1,610,293	64,412
PITTSBURGH, CITY OF	PA	9	31	3.44	200,656	22,295
STRASBURG, TOWNSHIP OF	PA	9	44	4.89	510,123	56,680
TURBOT, TOWNSHIP OF	PA	7	19	2.71	395,331	56,476
UPLAND, BOROUGH OF	PA	7	23	3.29	178,219	25,460
UPPER DARBY, TOWNSHIP OF	PA	7	22	3.14	170,754	24,393
UPPER PROVIDENCE, TWP OF	PA	17	47	2.76	424,689	24,982
W. NORRITON, TOWNSHIP OF	PA	48	167	3.48	2,013,632	41,951
CRANSTON, CITY OF	RI	10	28	2.80	306,585	30,659
N. PROVIDENCE, TOWN OF	RI	8	25	3.13	245,109	30,639
PROVIDENCE, CITY OF	RI	14	66	4.71	2,446,268	174,733
WESTERLY, TOWN OF	RI	29	96	3.31	1,739,178	59,972
GEORGETOWN, CITY OF	SC	7	19	2.71	455,074	65,011
CARTHAGE, CITY OF	TN	14	60	4.29	523,979	37,427
CHEATHAM COUNTY *	TN	10	28	2.80	233,908	23,391
KNOXVILLE, CITY OF	TN	9	25	2.78	347,145	38,572
NASHVILLE, CITY/DAVIDSON	TN	66	185	2.80	1,732,580	26,251
TRENTON, CITY OF	TN	6	18	3.00	294,917	49,153
ARANSAS PASS, CITY OF	TX	38	114	3.00	1,042,889	27,444
BAYTOWN, CITY OF	TX	171	475	2.78	8,933,848	52,245
BEAUMONT, CITY OF	TX	328	898	2.74	9,523,427	29,035
BROOKSIDE VILLAGE, CITY	TX	10	29	2.90	760,084	76,008
CONROE, CITY OF	TX	22	86	3.91	1,802,677	81,940
DAYTON, CITY OF	TX	14	38	2.71	684,923	48,923

Table 3.I Top 300 Communities with Potential for Voluntary Buyouts of Repetitive Loss Properties, Alphabetically by State

Community	State	Repetitive Loss Properties	Losses	Losses per Property	Total Pmt**	Avge Cum. Pmt***
EDNA, CITY OF	TX	8	23	2.88	$364,890	$45,611
FORT WORTH, CITY OF	TX	33	99	3.00	1,014,210	30,734
FRIENDSWOOD, CITY OF	TX	314	873	2.78	29,384,522	93,581
GRAND PRAIRIE, CITY OF	TX	44	130	2.95	4,482,220	101,869
HALTOM CITY, CITY OF	TX	13	43	3.31	2,102,875	161,760
HARRIS COUNTY*	TX	1,651	4,766	2.89	97,400,994	58,995
HOUSTON, CITY OF	TX	2,030	5,909	2.91	114,118,850	56,216
HUMBLE, CITY OF	TX	49	162	3.31	3,148,852	64,262
HURST, CITY OF	TX	9	25	2.78	513,758	57,084
JEFFERSON COUNTY *	TX	42	132	3.14	1,402,405	33,391
KEMAH, CITY OF	TX	98	346	3.53	6,569,231	67,033
LUMBERTON, CITY OF	TX	16	47	2.94	805,816	50,363
MCALLEN, CITY OF	TX	6	17	2.83	127,370	21,228
MONTGOMERY COUNTY*	TX	577	1,675	2.90	33,629,140	58,283
OAK RIDGE NORTH, CITY OF	TX	9	33	3.67	272,925	30,325
ORANGE COUNTY *	TX	41	120	2.93	1,130,851	27,582
PASADENA, CITY OF	TX	242	785	3.24	14,070,937	58,144
ROSE HILL ACRES, CITY OF	TX	13	37	2.85	792,288	60,945
SEABROOK, CITY OF	TX	145	421	2.90	8,071,710	55,667
SHERMAN, CITY OF	TX	41	129	3.15	1,555,985	37,951
SOUTH HOUSTON,CITY OF	TX	21	85	4.05	1,720,651	81,936
TAYLOR LAKE VILLAGE, CITY OF	TX	38	116	3.05	3,260,781	85,810
TYLER, CITY OF	TX	10	41	4.10	566,520	56,652
VIDOR, CITY OF	TX	62	214	3.45	1,691,166	27,277
WEBSTER, CITY OF	TX	13	39	3.00	914,722	70,363
WICHITA FALLS, CITY OF	TX	125	353	2.82	3,750,753	30,006
WILLIAMSON COUNTY *	TX	9	25	2.78	344,333	38,259
HENRICO COUNTY *	VA	13	49	3.77	800,677	61,591
HENRY COUNTY *	VA	12	35	2.92	429,245	35,770
LYNCHBURG, CITY OF	VA	8	22	2.75	896,877	112,110
PIERCE COUNTY*	WA	16	50	3.13	849,030	53,064
SULTAN, TOWN OF	WA	11	31	2.82	430,265	39,115
TACOMA, CITY OF	WA	6	17	2.83	314,194	52,366
GRANTSVILLE, TOWN OF	WV	7	19	2.71	327,975	46,854
LOGAN COUNTY *	WV	140	414	2.96	5,703,777	40,741
PARKERSBURG, CITY OF	WV	6	24	4.00	497,074	82,846
TOTALS/AVERAGE		**31,574**	**94,952**	**3.01**	**$1,285,304,430**	**$40,708**

** County*

*** Includes content and building payments*

**** Average cumulative payment per property*

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

The National Wildlife Federation's analysis identified 300 repetitive loss communities where a close examination for potential flood hazard mitigation is especially warranted because the communities share three basic criteria:

1) **Each community has six or more repetitive loss properties. As such, they are among the top 28 percent of repetitive loss communities in numbers of repetitive loss properties per community.**
2) **The average number of losses per property in these communities is greater than the average number of losses (2.7) for all repetitive loss properties nationwide.**
3) **The average cumulative loss for repetitive loss properties in these communities is greater than the median cumulative loss paid ($20,500) for all repetitive loss properties nationwide.**

In other words, based on a combination of high numbers of repetitive loss properties, high frequencies of losses for these properties and high average cumulative payments for the properties, these are the Top 300 repetitive loss communities in the Nation.

The Top 300 communities listed in ***Table 3.I*** have a total of 31,574 repetitive loss properties — 42 percent of all repetitive loss properties — that have experienced 94,952 losses (47.4 percent of all repetitive losses) over the 18 years studied.

The 300 communities represent 1.6 percent of the 18,700 communities enrolled in the National Flood Insurance Program. Their repetitive loss properties are less than one percent of all NFIP insured properties. Yet, from 1978 to 1995, the repetitive loss properties in these communities cost the National Flood Insurance Program $1,285,304,430, or 49.8 percent of all repetitive loss payments, and 20 percent of all NFIP flood loss payments. The 31,574 repetitive loss properties in the communities in **Table 3.I** *had an overall average of 3.01 losses per repetitive loss property, with an average cumulative loss paid of $40,708 per property during the period. This average cumulative loss is 17.5 percent greater than the average for all repetitive loss properties and is nearly double the median cumulative payment of $20,500 for all repetitive loss properties.*

The communities in the Top 300 list vary widely in their individual circumstances and extent of repetitive loss problems. They are located in 35 states. The list includes many communities with large

numbers of repetitive loss properties and extraordinary flood loss histories by any measure. These communities provide a good starting point for the consideration of implementing nonstructural flood mitigation approaches such as the voluntary buyout and relocation option. The list also includes many smaller communities — not necessarily the high profile flooding instances — where there are relatively few repetitive loss properties, but the buildings have high payments and frequent losses. The National Wildlife Federation believes the National Flood Insurance Program should focus keenly on flood hazard mitigation for even these less dramatic, but still quite unfortunate, situations because they contribute substantially to the financial weakness of the program and because, in many instances, mitigation efforts such as voluntary buyouts could be accomplished with potentially less overall community disruption than might occur in other communities with more extensive flooding problems.

Most of the communities on the Top 300 list are located in the eastern half of the Nation. Ranked by number of repetitive loss communities per state in the Top 300 list, the top 10 states are the following:

Texas — 33 repetitive loss communities;
New Jersey — 31;
Illinois and Missouri — 30 each;
Louisiana — 28;
Mississippi — 21;
Pennsylvania — 19;
New York — 13;
Oklahoma — 11;
and Kentucky — 7.

Twenty-five other states have six or fewer communities identified in ***Table 3.I***.

Ranked by total numbers of repetitive loss properties in the Top 300 communities by state, the Top 10 states are:

Louisiana — 12,795 repetitive loss properties;
Texas — 6,242;
Missouri — 3,634;
New Jersey — 2,582;
Illinois — 1,433;
Mississippi — 1,268;
California — 686;
New York — 589;
Oklahoma — 345;
Pennsylvania — 263.

Ranked by total NFIP payments made from 1978 to 1995 for repetitive loss properties in the ***Table 3.I*** communities, by state, are the following:

Louisiana — $422 million in total NFIP payments;
Texas — $356 million;
Missouri — $164 million;
New Jersey — $100 million;
Mississippi — $41 million;
Illinois — $39 million;
California — $37 million;
New York — $27 million;
Oklahoma — $14 million; and
Pennsylvania — $11 million.

As explained above, the repetitive loss properties in the communities listed in ***Table 3.I*** have especially high numbers of losses over

the 18-year period. The table lists the average number of losses per repetitive loss property in each community. This demonstrates, for comparative purposes, the overall levels of repetitive flooding in these communities. But, to varying degrees, the average loss frequency for the community masks the variety of situations among different properties within these communities. Some properties flood more often than others, and some have accumulated much larger losses than neighboring repetitive loss properties.

For example, looking at all 31,574 repetitive loss properties in the Top 300 communities shows that 48 percent have three or more NFIP losses over 18 years; 6.5 percent have six or more losses in 18 years; and 1.8 percent have eight or more such losses.

The National Wildlife Federation believes it should be the responsibility of federal, state and local floodplain officials to work more closely with insured property owners to reduce the burden of these continuing flood damages on the homeowners and the Nation.

While the overall average cumulative NFIP payments for repetitive loss properties in the Top 300 communties is $40,708, more than 100 communities exceed this average — many quite substantially. Some communities exceed an average of $100,000 in payments for the repetitive loss properties. Two communities in New Jersey exceed $800,000 in average cumulative payments (these appear to be primarily for commercial properties with extraordinary loss histories).

Among the highest average cumulative payments for all properties in the Top 300 communities, by state, are the following:

California — $53,871 (686 properties);
Connecticut — $43,090 (142 properties);
Florida — $40,256 (69 properties);
Hawaii — $61,994 (30 properties);
Kansas — $97,492 (23 properties);
Maine — $50,432 (19 properties);
Missouri — $45,125 (3,634 properties);
New York — $45,340 (599 properties);
North Carolina — $40,064 (106 properties);
Pennsylvania — $42,758 (263 properties);
Texas — $57,026 (6,242 properties);
Virginia — $64,448 (33 properties);
Washington — $48,288 (33 properties).

These extraordinarily high average payments accompanied by high frequency levels of claims, suggest there is potential value in further exploring voluntary buyouts and other mitigation approaches.

Lower average cumulative payments for Top 300 communities in states with large numbers of repetitive loss properties, for comparison, include the following: Illinois — $27,360 (1,433 properties); Louisiana — $33,000 (12,795 properties); Mississippi — $32,835 (1,268 properties); and New Jersey — $38,909 (2,582 properties). While in these states, overall average cumulative NFIP payments for repetitive loss properties have been slightly lower, it may, in part, be due to lower property values or other factors. This still may suggest many of these communities would have significant potential for voluntary buyouts and other flood loss mitigation efforts.

II. Top 200 Communities Ranked by Payments for Repetitive Losses, 1978 - 1995

The Top 200 repetitive loss communities ranked by total NFIP losses paid represent only one percent of NFIP communities, but represent 71 percent (or $1.8 billion) of the $2.58 billion in losses paid for repetitive loss properties and 29 percent of all NFIP losses paid nationwide over the 18 years studied.

Table 3.II presents a more standard list of U.S. repetitive loss communities — the Top 200 communities ranked by total NFIP losses paid for the repetitive loss properties in each community. Over the 18-year period studied, these are the communities with the greatest NFIP repetitive losses. This is also an important list for identifying communities with substantial potential to benefit from new flood hazard mitigation programs.

The Top 200 communities list contrasts with the Top 300 communities in ***Table 3.I***, in that many of the communities have larger numbers of repetitive loss properties, but somewhat lower repetitive loss frequencies, and, with exceptions, somewhat lower average cumulative losses for their repetitive loss properties.

The Top 200 list includes more coastal communities that are subject to hurricane and Atlantic nor'easter storm surge flooding. These storms are often characterized by lower frequencies than inland riverine or urban stormwater flooding, but can result in much higher damages per flooding event.

The repetitive loss properties located in the Top 200 communities have experienced a large percentage of all the repetitive losses and received a large percentage of repetitive loss payments made by the NFIP. These 200 communities constitute one percent of the 18,700

Table 3.II Top 200 Repetitive Loss Communities Ranked by Payments

Community Name	State	Repetitive Loss Properties	Losses	Losses Per Property	Total Payment**
JEFFERSON PARISH *	LA	5,153	14,608	2.83	$178,657,009
NEW ORLEANS/ORL. PARISH	LA	4,023	12,427	3.09	129,135,382
HOUSTON, CITY OF	TX	2,030	5,909	2.91	114,118,850
HARRIS COUNTY*	TX	1,651	4,766	2.89	97,400,994
ST. CHARLES COUNTY *	MO	1,382	4,561	3.30	58,017,815
MONTGOMERY COUNTY*	TX	577	1,675	2.90	33,629,140
EAST BATON ROUGE PARISH	LA	727	2,165	2.98	33,359,698
SCITUATE, TOWN OF	MA	547	1,377	2.52	31,512,659
SONOMA COUNTY *	CA	544	1,487	2.73	30,370,946
FRIENDSWOOD, CITY OF	TX	314	873	2.78	29,384,522
ST. CHARLES PARISH *	LA	426	926	2.17	28,979,345
PUERTO RICO	PR	1,354	3,939	2.91	25,366,126
NEW YORK, CITY OF	NY	2,232	5,659	2.54	24,590,874
VALLEY PARK, CITY OF	MO	396	1,200	3.03	24,170,704
ST. BERNARD PARISH*	LA	757	2,117	2.80	21,460,234
GALVESTON COUNTY*	TX	650	1,642	2.53	20,076,944
JACKSON, CITY OF	MS	362	852	2.35	18,518,042
TERREBONNE PARISH *	LA	546	1,191	2.18	18,394,416
GEORGETOWN COUNTY *	SC	272	568	2.09	18,273,330
ST. LOUIS COUNTY *	MO	376	1,197	3.18	18,063,537
BRAZORIA COUNTY *	TX	499	1,239	2.48	16,523,302
ST. TAMMANY PARISH *	LA	380	1,001	2.63	14,175,038
SOUTHAMPTON, TOWN OF	NY	208	514	2.47	14,078,681
PASADENA, CITY OF	TX	242	785	3.24	14,070,937
MOBILE, CITY OF	AL	292	766	2.62	13,248,414
GRETNA, CITY OF	LA	462	1,325	2.87	12,996,219
JEFFERSON COUNTY*	MO	328	1,003	3.06	11,691,807
MONROE, CITY OF	LA	363	871	2.40	11,558,095
KENNER, CITY OF	LA	381	1,090	2.86	11,400,838
HEMPSTEAD, TOWN OF	NY	413	1,048	2.54	11,313,206
OCEAN CITY, CITY OF	NJ	432	1,129	2.61	11,096,318
WESTHAMPTON BEACH, VILL.	NY	117	319	2.73	10,762,940
KANSAS CITY, CITY OF	MO	130	341	2.62	10,642,071
PEARLAND, CITY OF	TX	197	525	2.66	10,548,257
LIVINGSTON PARISH*	LA	370	891	2.41	10,304,622
BEAUMONT, CITY OF	TX	328	898	2.74	9,523,427
BAYTOWN, CITY OF	TX	171	475	2.78	8,933,848
BROOKHAVEN,TOWN OF	NY	203	492	2.42	8,494,511
WILDWOOD, CITY OF	NJ	186	602	3.24	8,433,506
WEST WILDWOOD, BOR. OF	NJ	255	856	3.36	8,307,325
WARREN COUNTY*	MS	295	826	2.80	8,216,422
NORTH WILDWOOD, CITY OF	NJ	319	896	2.81	8,165,220

Table 3.II Top 200 Repetitive Loss Communities Ranked by Payments

Community Name	State	Repetitive Loss Properties	Losses	Losses Per Property	Total Payment**
SEABROOK, CITY OF	TX	145	421	2.90	$8,071,710
ARNOLD, CITY OF	MO	178	535	3.01	8,043,899
REVERE, CITY OF	MA	323	840	2.60	8,026,138
POINTE COUPEE PARISH *	LA	314	1,086	3.46	7,996,929
WAYNE, TOWNSHIP OF	NJ	292	959	3.28	7,983,775
ISLIP, TOWNSHIP OF	NY	226	511	2.26	7,664,822
HORRY COUNTY *	SC	110	242	2.20	7,647,439
DARE COUNTY*	NC	171	411	2.40	7,599,137
NASSAU BAY, CITY OF	TX	101	234	2.32	7,490,001
DENHAM SPRINGS, CITY OF	LA	184	456	2.48	7,385,047
FREEPORT, VILLAGE OF	NY	278	787	2.83	7,250,996
ST. PETERSBURG, CITY OF	FL	301	627	2.08	7,227,661
NORTH MYRTLE BEACH, TOWN	SC	165	359	2.18	7,180,160
OYSTER BAY, TOWN OF	NY	182	446	2.45	6,867,147
RICHMOND, CITY OF	VA	67	162	2.42	6,810,684
SEA BRIGHT, BOROUGH OF	NJ	130	320	2.46	6,684,731
ATLANTIC CITY, CITY OF	NJ	286	806	2.82	6,678,862
KEMAH, CITY OF	TX	98	346	3.53	6,569,231
SALEM, CITY OF	VA	59	142	2.41	6,527,819
VICKSBURG, CITY OF	MS	131	417	3.18	6,322,699
ROANOKE, CITY OF	VA	85	211	2.48	6,271,748
LEAGUE CITY, CITY OF	TX	196	468	2.39	6,249,046
MONMOUTH BEACH, BOR. OF	NJ	106	289	2.73	6,189,564
MARSHFIELD, TOWN OF	MA	154	366	2.38	6,185,183
WILKINSON COUNTY *	MS	190	604	3.18	6,041,075
PEORIA COUNTY *	IL	216	718	3.32	6,025,423
ASCENSION PARISH *	LA	203	543	2.67	6,023,251
GALVESTON, CITY OF	TX	223	519	2.33	5,991,460
HARRISON COUNTY *	MS	130	370	2.85	5,981,516
MILFORD, CITY OF	CT	146	379	2.60	5,912,482
ROSELLE, BOROUGH OF	NJ	6	77	12.83	5,906,067
JERSEY COUNTY *	IL	250	705	2.82	5,897,580
MALIBU, CITY OF	CA	125	347	2.78	5,754,959
LOGAN COUNTY *	WV	140	414	2.96	5,703,777
HULL, TOWN OF	MA	274	679	2.48	5,671,514
WEST MONROE, CITY OF	LA	84	218	2.60	5,633,303
LINCOLN COUNTY *	MO	150	445	2.97	5,251,959
CONCORDIA PARISH *	LA	199	641	3.22	5,239,522
CHARLESTON, CITY OF	SC	125	302	2.42	5,205,323
SARASOTA COUNTY *	FL	155	385	2.48	5,135,724
LIBERTY COUNTY*	TX	143	364	2.55	5,096,612
MIAMI, CITY OF	OK	90	253	2.81	4,939,344

Table 3.II Top 200 Repetitive Loss Communities Ranked by Payments

Community Name	State	Repetitive Loss Properties	Losses	Losses Per Property	Total Payment**
KEARNY, TOWN OF	NJ	6	55	9.17	$4,853,790
SLIDELL, CITY OF	LA	146	368	2.52	4,778,997
EAST HAVEN, TOWN OF	CT	100	344	3.44	4,776,510
MONTEREY COUNTY *	CA	83	169	2.04	4,762,308
MYRTLE BEACH, CITY OF	SC	36	81	2.25	4,607,650
CALHOUN COUNTY *	IL	211	623	2.95	4,590,312
VENTNOR, CITY OF	NJ	153	494	3.23	4,586,011
LAKE CHARLES, CITY OF	LA	179	420	2.35	4,570,530
TEXAS CITY, CITY OF	TX	239	708	2.96	4,545,617
BRENTWOOD, CITY OF	MO	47	141	3.00	4,537,005
CATAHOULA PARISH*	LA	253	669	2.64	4,507,367
CAPE MAY CITY, CITY OF	NJ	145	378	2.61	4,491,461
GRAND PRAIRIE, CITY OF	TX	44	130	2.95	4,482,220
PIKE COUNTY *	KY	100	268	2.68	4,393,815
FENTON, CITY OF	MO	100	331	3.31	4,266,425
SEA ISLE CITY, CITY OF	NJ	162	464	2.86	4,265,800
LINCOLN PARK, BOROUGH OF	NJ	136	474	3.49	4,242,839
LINDENHURST, VILLAGE OF	NY	173	423	2.45	4,229,945
HARAHAN, CITY OF	LA	110	283	2.57	4,208,446
AVALON, BOROUGH OF	NJ	129	386	2.99	4,184,402
SHOREACRES, CITY OF	TX	80	177	2.21	4,144,246
NAGS HEAD, CITY OF	NC	99	269	2.72	4,090,950
CALCASIEU PARISH*	LA	127	362	2.85	4,061,476
STONE HARBOR, BOR. OF	NJ	112	334	2.98	4,033,725
BALTIMORE COUNTY*	MD	65	163	2.51	3,983,319
BABYLON,TOWN OF	NY	173	387	2.24	3,969,471
TULSA, CITY OF	OK	122	295	2.42	3,807,465
CLEAR LAKE SHORES, CITY OF	TX	103	266	2.58	3,797,378
GARLAND, CITY OF	TX	59	152	2.58	3,756,244
WICHITA FALLS, CITY OF	TX	125	353	2.82	3,750,753
HOLDEN BEACH, TOWN OF	NC	161	351	2.18	3,736,548
OIL CITY, CITY OF	PA	39	100	2.56	3,721,903
MADEIRA BEACH, CITY OF	FL	150	358	2.39	3,681,358
STE. GENEVIEVE, CITY OF	MO	131	399	3.05	3,647,237
PORTAGE DES SIOUX, CITY OF	MO	74	283	3.82	3,646,370
MOBILE COUNTY*	AL	125	273	2.18	3,600,998
GULFPORT, CITY OF	MS	108	342	3.17	3,600,417
BELLEAIR BEACH, CITY OF	FL	44	96	2.18	3,577,575
BRIGANTINE, CITY OF	NJ	156	401	2.57	3,446,720
HARDIN COUNTY *	TX	68	171	2.51	3,437,442
OUACHITA PARISH *	LA	86	210	2.44	3,430,898
AMARILLO, CITY OF	TX	56	135	2.41	3,403,943

Table 3.II Top 200 Repetitive Loss Communities Ranked by Payments

Community Name	State	Repetitive Loss Properties	Losses	Losses Per Property	Total Payment**
SACRAMENTO COUNTY *	CA	69	170	2.46	$3,401,193
CLEARWATER, CITY OF	FL	74	165	2.23	3,341,337
TAMPA, CITY OF	FL	112	255	2.28	3,303,465
DES MOINES, CITY OF	IA	68	154	2.26	3,284,219
OCEAN BEACH, VILLAGE OF	NY	98	200	2.04	3,274,961
TAYLOR LAKE VILLAGE, CITY OF	TX	38	116	3.05	3,260,781
LONG BEACH, TOWN OF	NC	127	303	2.39	3,230,963
CAPE GIRARDEAU, CITY OF	MO	104	314	3.02	3,193,140
HUMBLE, CITY OF	TX	49	162	3.31	3,148,852
WESTWEGO, CITY OF	LA	114	329	2.89	3,129,124
SHREVEPORT, CITY OF	LA	86	273	3.17	3,114,253
LONG BEACH, CITY OF	NY	103	258	2.50	3,054,985
NAPA, CITY OF	CA	53	117	2.21	3,040,393
GREENWICH, TOWN OF	CT	62	139	2.24	3,006,449
WASHINGTON COUNTY	MS	86	229	2.66	3,001,162
BEACH HAVEN, BOROUGH OF	NJ	62	144	2.32	2,988,146
OCEANPORT, BOROUGH OF	NJ	43	95	2.21	2,987,472
PASCO COUNTY *	FL	86	184	2.14	2,949,399
ALEXANDRIA, CITY OF	LA	116	297	2.56	2,925,417
CORPUS CHRISTI, CITY OF	TX	89	205	2.30	2,914,676
BABYLON, VILLAGE OF	NY	101	247	2.45	2,892,835
RAPIDES PARISH*	LA	123	377	3.07	2,856,119
NANTUCKET, TOWN OF	MA	37	80	2.16	2,844,230
LOS ANGELES, CITY OF	CA	110	252	2.29	2,834,538
FOLLY BEACH, TOWNSHIP OF	SC	68	159	2.34	2,829,952
ATLANTA, CITY OF	GA	68	190	2.79	2,765,509
RYE, CITY OF	NY	86	219	2.55	2,750,664
CRYSTAL CITY, CITY OF	MO	51	173	3.39	2,726,953
OCEAN CITY, TOWN OF	MD	60	128	2.13	2,712,845
HERMANN, CITY OF	MO	23	74	3.22	2,700,333
ISLE OF PALMS, CITY OF	SC	42	89	2.12	2,687,290
KEY BISCAYNE, VILLAGE OF	FL	32	67	2.09	2,664,699
ST. CHARLES, CITY OF	MO	60	182	3.03	2,653,160
LODI, BOROUGH OF	NJ	36	133	3.69	2,636,071
POMPTON LAKES, BORO OF	NJ	76	273	3.59	2,643,139
ISLAND PARK, VILLAGE OF	NY	65	188	2.89	2,647,783
HONOLULU COUNTY*	HI	69	165	2.39	2,627,051
LOS ANGELES COUNTY*	CA	74	188	2.54	2,616,459
HANOVER, TOWN OF	NY	164	478	2.91	2,599,012
SARPY COUNTY*	NE	110	270	2.45	2,589,173
LAFOURCHE PARISH *	LA	102	242	2.37	2,552,419
BOLIVAR COUNTY *	MS	111	314	2.83	2,544,241

Table 3.II Top 200 Repetitive Loss Communities Ranked by Payments

Community Name	State	Repetitive Loss Properties	Losses	Losses Per Property	Total Payment**
GRAND ISLE, TOWN OF	LA	126	312	2.48	$2,538,921
ELMSFORD, VILLAGE OF	NY	20	69	3.45	2,529,752
WINTHROP, TOWN OF	MA	150	356	2.37	2,524,993
AUSTIN, CITY OF	TX	53	126	2.38	2,517,913
AMITYVILLE, VILLAGE OF	NY	79	186	2.35	2,469,269
PROVIDENCE, CITY OF	RI	14	66	4.71	2,446,268
MARGATE CITY, CITY OF	NJ	57	161	2.82	2,439,455
NAHANT, TOWN OF	MA	52	119	2.29	2,419,130
DUNEDIN, CITY OF	FL	60	123	2.05	2,416,039
QUINCY, CITY OF	MA	129	328	2.54	2,402,279
TRENTON, CITY OF	NJ	12	59	4.92	2,401,314
JACKSONVILLE, CITY OF	FL	42	101	2.40	2,399,028
EGG HARBOR, TOWNSHIP OF	NJ	35	106	3.03	2,394,328
NORWALK, CITY OF	CT	70	167	2.39	2,361,983
FRANKFORT, CITY OF	KY	79	179	2.27	2,357,826
CITRUS COUNTY *	FL	56	133	2.38	2,331,208
LA PORTE, CITY OF	TX	66	167	2.53	2,320,324
VIRGINIA BEACH, CITY OF	VA	78	209	2.68	2,307,609
HOPKINSVILLE, CITY OF	KY	61	239	3.92	2,301,221
WESTPORT, TOWN OF	CT	82	215	2.62	2,286,778
DALLAS, CITY OF	TX	56	136	2.43	2,274,437
PELHAM, TOWN OF	AL	58	166	2.86	2,273,815
JEFFERSON CITY, CITY OF	MO	50	136	2.72	2,270,623
JEFFERSON COUNTY*	KY	70	269	3.84	2,266,656
FORT WAYNE, CITY OF	IN	75	162	2.16	2,251,296
KANSAS CITY, CITY OF	KS	23	70	3.04	2,242,324
PINELLAS COUNTY *	FL	71	176	2.48	2,233,845
DUXBURY, CITY OF	MA	42	105	2.50	2,229,102
LONGBOAT KEY, TOWN OF	FL	85	210	2.47	2,219,268
TREASURE ISLAND, CITY OF	FL	110	250	2.27	2,208,252
LASALLE PARISH *	LA	112	308	2.75	2,205,032
LONG BEACH, TOWNSHIP OF	NJ	72	171	2.38	2,200,682
TOTALS		**48,288**	**133,698**	**2.77**	**$1,839,474,610**

** County*

*** Includes content and building payments*

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

U.S. communities that are participating in the National Flood Insurance Program, and only 4.4 percent of the 4,543 communities that have at least one repetitive loss property. The communities have a combined total of 48,295 repetitive loss properties, or 65 percent of the NFIP's repetitive loss properties from 1978 to 1995. The repetitive loss properties in these communities have suffered a total of 133,711 losses, or 67.8 percent of all NFIP repetitive losses. They have received a total of $1,839,474,610 in NFIP payments, which amounts to 71.3 percent of all payments for repetitive loss properties, and 29 percent of total NFIP flood insurance payments. Thus, with two-thirds of all NFIP repetitive loss properties receiving almost three-quarters of all payments for repetitive losses, it is likely that these 200 communities could benefit significantly from new flood hazard mitigation programs.

Overall, the repetitive loss properties in the Top 200 communities have experienced an average of 2.77 losses per property over the 18 years studied.

The Top 10 of the Top 200 communities account for 28.5 percent of all NFIP payments for repetitive losses. They are the following:
Jefferson Parish, Louisiana — $178 million in payments for repetitive losses;
New Orleans/Orleans Parish, Louisiana — $129 million;
Houston, Texas — $114 million;
Harris County, Texas — $97 million;
St. Charles County, Missouri — $58 million;
Montgomery County, Texas — $34 million;
East Baton Rouge Parish, Louisiana — $33 million;
Scituate, Massachusetts — $32 million;
Sonoma County, California — $30 million; and
Friendswood, Texas — $29 million.
Cumulatively, NFIP payments for repetitive losses in these 10 communities total more than $735 million, or nearly $44,000 in average cumulative payments per property.

The total payments for repetitive loss properties by community on the Top 200 list range from $2.2 million in Long Beach Township, New Jersey, to more than $178.6 million in Jefferson Parish, Louisiana.

The Top 200 communities are located in 28 states, and most are located in the Nation's eastern half. The analysis shows that 30 percent of the Top 200 communities are found in the two states with the greatest number of repetitive losses — Louisiana and Texas. The Top 10 states in terms of numbers of communities on the Top 200 list are:

Texas — 30 communities;
Louisiana — 29;
New Jersey — 25;
New York — 18;
Missouri — 16;
Florida — 14;
Massachusetts — 9;
Mississippi — 8;
California — 7; and
South Carolina — 7.

Finally, there are only 83 communities that are found on both the preceding lists (***Tables 3.I and 3.II***). Again, this is largely because the Top 300 list emphasizes those communities with especially high frequencies of repetitive losses and high average cumulative payments per repetitive loss property, while the Top 200 list simply ranks communities by total repetitive loss payments received. When repetitive losses are viewed geographically, it is apparent that certain low-lying areas along the Nation's larger rivers and coasts have experienced the greatest repetitive loss problems. In particular, these areas include: Southeast Louisiana, mainly the greater New Orleans, Jefferson Parish, and Baton Rouge areas; Southeast Texas, mainly the greater Houston, Beaumont, and Galveston Bay areas; Western Florida, particularly the greater Tampa/St. Petersburg area; communities in Missouri, Illinois, and Mississippi, especially along the Mississippi, Missouri and Illinois Rivers; and coastal areas in California, Mississippi, South Carolina, North Carolina, New Jersey, New York, Connecticut and Massachusetts.

III. Homes With Repetitive Losses Exceeding Their Property Value

Almost 10 percent of repetitive loss single family residential properties, 5,629 homes nationwide, have had cumulative flood insurance loss claims that exceed the building value — in some cases many times over.

Private insurance companies may deny insurance coverage in cases with unacceptable risk or may require supplemental premiums for items of unusual value. The National Flood Insurance Program has no specific policies to identify individual properties as highly floodprone or to establish payment limitations for highly floodprone structures. In the absence of specific policies to limit the costs of repetitive losses, such losses accumulate over time.

The National Wildlife Federation compared cumulative payments from 1978 to 1995 for single family homes with the highest building value recorded for that property during that period.[13]

For 5,629 single family homes or almost 10 percent of the 58,975 single family homes with repetitive flood losses, payments exceeded building value — in some cases several times over. Cumulative payments on these 5,629 properties totaled $416 million.

The median value ($46,000) of these properties was lower — and the median cumulative loss ($59,776) was higher — than the median value ($65,000) and the median cumulative loss ($20,500) for all single family homes with repetitive losses.

Table 3.III lists the 200 single family, detached homes from the repetitive loss database with the greatest difference between property value and cumulative payments to identify the location and frequency of flooding occurence. The median home value of the Top 200 was $105,000 (greater than median value for all single family homes in the repetitive loss database), median number of losses was five, and median cumulative payment was $217,464. Cumulative flood insurance payments for these 200 properties totaled $47.8 million.

The highest ranking single family property is located in Houston, Texas, valued at $114,480. This house experienced 16 losses between 1989 and 1995, totaling $806,590. In effect, the building's value has been paid for seven times over with flood insurance claims on the building and its contents.

A property in Canton, Mississippi, valued at $49,300, was flooded the most frequently. It has experienced 25 losses over the 18-year period (on the average one loss every eight months) totaling $161,279. The Top 200 residential properties are located in 55 communities in 11 states. More than 70 percent of these properties (143) are located in Texas, 15 percent in Louisiana, 3.5 percent in Missouri, and 3 percent in Mississippi. The remaining seven percent are located in seven additional states.

More than half of the Top 200 homes are located in three communities near Houston, Texas — 57 in Harris County, 36 in Houston and 18 in Friendswood. The top three communities in Louisiana account for 10 percent of the top 200 homes — nine in Jefferson Parish, eight in New Orleans and three in East Baton Rouge Parish.

Total payments to the Top 200 homes are even more concentrated in Texas than the properties. Payments for the Top 200 homes in four Texas communities (Harris County, Houston, Friendswood, and Montgomery County in rank order) total $30,881,660; payments in two Louisiana communities (New Orleans and Jefferson Parish) among the Top 200 homes are one-tenth as much, at $3,548,003.

Part of the explanation for the prominence of Texas and Louisiana among the Top 200 single family detached homes lies in the sheer number and value of homes located in floodprone areas in these states. In New Orleans and Jefferson Parish, thousands of repetitive loss properties flood every other year on average during the spring.

Table 3.III Top 200 Single Family Homes with Payments Exceeding Building Value

Community Name	State	Zipcode	Losses	Total Payment**	Building Value***	Payment in Excess of Building Value
HOUSTON, CITY OF	TX	77338	16	$806,591	$114,480	$692,111
HARRIS COUNTY*	TX	77073	8	649,042	160,000	489,042
GRAND PRAIRIE, CITY OF	TX	75050	5	655,280	187,000	468,280
HOUSTON, CITY OF	TX	77338	12	465,033	106,000	359,033
HARRISON COUNTY *	MS	39532	7	441,242	120,000	321,242
HOUSTON, CITY OF	TX	77338	11	416,806	110,000	306,806
HOUSTON, CITY OF	TX	77096	4	527,177	249,550	277,627
FRIENDSWOOD, CITY OF	TX	77546	5	414,794	141,563	273,231
HARRIS COUNTY*	TX	77073	9	416,912	144,000	272,912
FRIENDSWOOD, CITY OF	TX	77546	5	439,585	209,000	230,585
FRIENDSWOOD, CITY OF	TX	77546	6	416,017	194,405	221,612
NEW ORLEANS/ORLEANS PARISH	LA	70115	6	370,185	150,165	220,020
HARRIS COUNTY*	TX	77073	7	366,214	147,360	218,854
HOUSTON, CITY OF	TX	77338	7	291,834	80,000	211,834
HARRIS COUNTY*	TX	77073	7	314,253	106,139	208,114
BRAZORIA COUNTY *	TX	77566	5	333,774	129,560	204,214
HOUSTON, CITY OF	TX	77015	5	381,480	185,000	196,480
TERREBONNE PARISH *	LA	70395	5	336,961	144,600	192,361
HOUSTON, CITY OF	TX	77096	5	433,375	245,000	188,375
HOUSTON, CITY OF	TX	77339	3	420,425	232,908	187,517
MONTGOMERY COUNTY*	TX	77357	6	340,869	155,000	185,869
HARRIS COUNTY*	TX	77562	4	326,727	149,478	177,249
HARRIS COUNTY*	TX	77388	6	354,204	177,340	176,864
JEFFERSON COUNTY*	KY	40209	12	260,382	83,914	176,468
HARRIS COUNTY*	TX	77339	5	300,416	125,000	175,416
HUMBLE, CITY OF	TX	77339	9	283,971	110,000	173,971
HOUSTON, CITY OF	TX	77044	4	286,373	120,000	166,373
FRIENDSWOOD, CITY OF	TX	77546	5	347,734	181,609	166,125
FRIENDSWOOD, CITY OF	TX	77546	6	302,577	137,000	165,577
HARRIS COUNTY*	TX	77598	7	290,022	125,000	165,022
ST. LOUIS COUNTY *	MO	63128	8	230,667	66,000	164,667
NEW ORLEANS/ORLEANS PARISH	LA	70125	5	301,257	137,200	164,057
HARRIS COUNTY*	TX	77530	5	231,400	68,000	163,400
JEFFERSON PARISH *	LA	70001	12	225,093	63,340	161,753
HARRIS COUNTY*	TX	77073	5	302,779	144,200	158,579
HARRIS COUNTY*	TX	77073	5	260,572	102,768	157,804
HOUSTON, CITY OF	TX	77015	5	253,958	97,600	156,358
HARRIS COUNTY*	TX	77379	7	253,684	99,000	154,684
JONES CITY, TOWN OF	OK	73049	5	266,688	114,400	152,288
GRAND PRAIRIE, CITY OF	TX	75050	4	297,221	146,900	150,321
EULESS, CITY OF	TX	76039	4	248,888	100,000	148,888
JEFFERSON PARISH *	LA	70001	9	227,359	79,200	148,159
MENDENHALL, CITY OF	MS	39114	14	184,728	40,000	144,728

Table 3.III Top 200 Single Family Homes with Payments Exceeding Building Value

Community Name	State	Zipcode	Losses	Total Payment**	Building Value***	Payment in Excess of Building Value
HARRIS COUNTY*	TX	77396	6	$242,063	$97,750	$144,313
HOUSTON, CITY OF	TX	77015	5	272,488	129,000	143,488
HARRIS COUNTY*	TX	77429	14	217,964	75,700	142,264
FRIENDSWOOD, CITY OF	TX	77546	8	262,467	121,500	140,967
MENDENHALL, CITY OF	MS	39114	14	180,872	40,000	140,872
TAYLOR LAKE VILLAGE, CITY OF	TX	77586	7	271,338	130,500	140,838
ST. TAMMANY PARISH *	LA	70460	7	257,422	117,880	139,542
DALLAS, CITY OF	TX	75220	3	323,046	185,000	138,046
HARRIS COUNTY*	TX	77339	5	301,840	165,000	136,840
HARRIS COUNTY*	TX	77073	5	227,488	91,575	135,913
HARRIS COUNTY*	TX	77429	3	327,212	195,000	132,212
HOUSTON, CITY OF	TX	77339	5	254,444	122,500	131,944
FRIENDSWOOD, CITY OF	TX	77546	3	245,079	113,726	131,353
HARRIS COUNTY*	TX	77562	11	261,257	130,000	131,257
HARRIS COUNTY*	TX	77073	4	216,240	85,500	130,740
HOUSTON, CITY OF	TX	77090	4	323,420	195,184	128,236
FRIENDSWOOD, CITY OF	TX	77546	4	386,929	260,000	126,929
HARRIS COUNTY*	TX	77339	4	226,216	100,000	126,216
HOUSTON, CITY OF	TX	77015	4	208,907	83,400	125,507
NEW ORLEANS/ORLEANS PARISH	LA	70117	6	217,667	93,500	124,167
HARRIS COUNTY*	TX	77388	5	277,364	153,200	124,164
FRIENDSWOOD, CITY OF	TX	77546	4	228,446	105,000	123,446
HARRIS COUNTY*	TX	77073	5	227,828	104,504	123,324
HARRIS COUNTY*	TX	77520	4	200,393	77,626	122,767
EAST BATON ROUGE PARISH	LA	70818	11	152,358	30,000	122,358
HARRIS COUNTY*	TX	77073	4	232,347	110,000	122,347
HARRIS COUNTY*	TX	77375	2	262,000	140,000	122,000
MONTGOMERY COUNTY*	TX	77380	10	203,180	81,371	121,809
NEW ORLEANS/ORLEANS PARISH	LA	70125	8	250,983	129,600	121,383
GRETNA, CITY OF	LA	70053	8	228,906	108,000	120,906
WALLER COUNTY*	TX	77484	11	219,466	100,500	118,966
FRIENDSWOOD, CITY OF	TX	77546	5	206,617	88,000	118,617
PETALUMA, CITY OF	CA	94952	4	224,336	106,000	118,336
JEFFERSON PARISH *	LA	70123	7	209,925	91,773	118,152
HARDIN COUNTY *	TX	77656	4	198,893	80,850	118,043
WEST NORRITON, TOWNSHIP OF	PA	19403	9	246,131	129,600	116,531
EAST BATON ROUGE PARISH	LA	70814	6	194,679	79,290	115,389
JEFFERSON PARISH *	LA	70001	10	179,969	65,000	114,969
HARRIS COUNTY*	TX	77073	7	205,828	91,100	114,728
MONTGOMERY COUNTY*	TX	77357	2	184,628	71,003	113,625
HARRIS COUNTY*	TX	77073	5	262,516	149,150	113,366
HOUSTON, CITY OF	TX	77088	4	194,851	81,672	113,179
EDMOND, CITY OF	OK	73013	5	319,262	206,601	112,661

Table 3.III Top 200 Single Family Homes with Payments Exceeding Building Value

Community Name	State	Zipcode	Losses	Total Payment**	Building Value***	Payment in Excess of Building Value
CANTON, CITY OF	MS	39046	25	$161,279	$49,300	$111,979
HOUSTON, CITY OF	TX	77013	4	271,400	160,000	111,400
JEFFERSON COUNTY*	KY	40222	6	209,554	98,280	111,274
FRIENDSWOOD, CITY OF	TX	77546	3	280,893	170,000	110,893
ST. CHARLES COUNTY *	MO	63386	11	219,550	109,000	110,550
BAYTOWN, CITY OF	TX	77520	9	216,403	107,000	109,403
ST. TAMMANY PARISH *	LA	70460	7	208,576	99,200	109,376
HARRIS COUNTY*	TX	77090	4	254,679	145,500	109,179
SARALAND, CITY OF	AL	36571	5	159,151	50,000	109,151
KENNER, CITY OF	LA	70065	7	148,931	40,100	108,831
CHATTANOOGA, CITY OF	TN	37419	6	143,629	35,000	108,629
HOUSTON, CITY OF	TX	77028	9	217,464	109,120	108,344
HARRIS COUNTY*	TX	77339	7	284,353	177,000	107,353
FRIENDSWOOD, CITY OF	TX	77546	4	184,703	77,500	107,203
MOBILE, CITY OF	AL	36607	3	198,380	91,500	106,880
MONTGOMERY COUNTY*	TX	77301	10	183,115	76,356	106,759
FRIENDSWOOD, CITY OF	TX	77546	4	237,912	131,300	106,612
HARRIS COUNTY*	TX	77339	4	306,260	200,000	106,260
HOUSTON, CITY OF	TX	77096	2	334,166	228,446	105,720
MONTGOMERY COUNTY*	TX	77357	3	196,204	91,200	105,004
FRIENDSWOOD, CITY OF	TX	77546	3	209,360	104,400	104,960
JEFFERSON PARISH *	LA	70001	10	176,503	72,000	104,503
FRIENDSWOOD, CITY OF	TX	77546	4	205,368	101,040	104,328
PASADENA, CITY OF	TX	77503	7	180,402	76,800	103,602
KENNER, CITY OF	LA	70062	13	155,349	52,250	103,099
HOUSTON, CITY OF	TX	77096	2	207,965	105,000	102,965
HARRIS COUNTY*	TX	77388	4	264,946	163,000	101,946
MIAMI, CITY OF	OK	74354	8	191,748	90,000	101,748
TAYLOR LAKE VILLAGE, CITY OF	TX	77586	5	231,521	130,000	101,521
HARRIS COUNTY*	TX	77073	6	177,080	75,800	101,280
PASADENA, CITY OF	TX	77503	7	188,561	87,780	100,781
HOUSTON, CITY OF	TX	77339	11	273,962	173,900	100,062
HOUSTON, CITY OF	TX	77015	4	209,804	110,000	99,804
HARRIS COUNTY*	TX	77073	2	174,058	75,000	99,058
HOUSTON, CITY OF	TX	77338	9	173,926	75,000	98,926
MONTGOMERY COUNTY*	TX	77302	4	274,903	176,000	98,903
JEFFERSON PARISH *	LA	70072	3	168,861	70,100	98,761
HARRIS COUNTY*	TX	77375	5	166,155	67,500	98,655
HOUSTON, CITY OF	TX	77015	4	214,827	116,300	98,527
HOUSTON, CITY OF	TX	77028	7	145,289	47,000	98,289
HARRIS COUNTY*	TX	77357	5	166,406	68,200	98,206
HARRIS COUNTY*	TX	77090	4	202,987	105,000	97,987
HARRIS COUNTY*	TX	77073	4	314,386	216,640	97,746

Table 3.III Top 200 Single Family Homes with Payments Exceeding Building Value

Community Name	State	Zipcode	Losses	Total Payment**	Building Value***	Payment in Excess of Building Value
MONTGOMERY COUNTY*	TX	77380	5	$183,914	$86,600	$97,314
GARLAND, CITY OF	TX	75041	3	227,493	130,500	96,993
SHAWNEE, CITY OF	OK	74801	7	144,172	47,500	96,672
BROOKSIDE VILLAGE, CITY OF	TX	77581	5	158,194	61,776	96,418
RAPIDES PARISH*	LA	71328	12	126,090	29,700	96,390
HARRIS COUNTY*	TX	77396	5	153,125	57,600	95,525
FRIENDSWOOD, CITY OF	TX	77546	2	255,396	160,000	95,396
HARRIS COUNTY*	TX	77388	5	210,676	115,300	95,376
JEFFERSON PARISH *	LA	70058	6	154,041	58,800	95,241
NEW ORLEANS/ORLEANS PARISH	LA	70115	6	249,025	154,000	95,025
ORANGE COUNTY *	TX	77630	2	130,000	35,000	95,000
FRIENDSWOOD, CITY OF	TX	77546	4	225,734	131,450	94,284
PEARLAND, CITY OF	TX	77581	6	218,993	124,927	94,066
HOUSTON, CITY OF	TX	77015	6	201,583	108,405	93,178
HOUSTON, CITY OF	TX	77339	4	159,427	66,300	93,127
MONTGOMERY COUNTY*	TX	77380	2	161,173	68,218	92,955
HARRIS COUNTY*	TX	77049	2	193,194	100,750	92,444
HARRIS COUNTY*	TX	10000	12	206,669	114,626	92,043
NEW ORLEANS/ORLEANS PARISH	LA	70114	8	143,555	51,620	91,935
HOUSTON, CITY OF	TX	77396	6	160,295	68,400	91,895
HOUSTON, CITY OF	TX	77015	5	201,651	110,000	91,651
HARRIS COUNTY*	TX	77388	3	234,577	143,000	91,577
DAYTON, CITY OF	TX	77535	5	153,530	62,500	91,030
EAST BATON ROUGE PARISH	LA	70814	6	141,148	50,600	90,548
HARRIS COUNTY*	TX	77090	4	202,098	111,600	90,498
NEW ORLEANS/ORLEANS PARISH	LA	70115	10	168,486	78,000	90,486
HARRIS COUNTY*	TX	77373	6	202,925	112,500	90,425
HOUSTON, CITY OF	TX	77338	2	158,519	68,160	90,359
HARRIS COUNTY*	TX	77338	5	172,839	82,500	90,339
HARRIS COUNTY*	TX	77073	3	185,798	95,808	89,990
OZARK, CITY OF	AL	36860	2	181,827	92,000	89,827
HARRIS COUNTY*	TX	77388	4	189,659	100,000	89,659
VICKSBURG, CITY OF	MS	39180	6	129,563	40,965	88,598
GLOUCESTER, CITY OF	MA	99999	3	300,308	212,000	88,308
HOUSTON, CITY OF	TX	77045	4	145,878	58,100	87,778
HOUSTON, CITY OF	TX	77015	5	175,315	87,875	87,440
ST. CHARLES PARISH *	LA	70047	2	215,232	128,092	87,140
HOUSTON, CITY OF	TX	77096	2	320,897	234,000	86,897
HARRIS COUNTY*	TX	77562	5	354,316	267,568	86,748
HOUSTON, CITY OF	TX	77088	4	175,314	89,000	86,314
HARRIS COUNTY*	TX	77090	4	226,087	140,040	86,047
ST. CHARLES COUNTY *	MO	99999	9	135,200	49,700	85,500
HOUSTON, CITY OF	TX	77088	4	166,000	81,000	85,000

Table 3.III Top 200 Single Family Homes with Payments Exceeding Building Value

Community Name	State	Zipcode	Losses	Total Payment**	Building Value***	Payment in Excess of Building Value
GARLAND, CITY OF	TX	75041	2	$206,983	$122,000	$84,983
UNIVERSITY CITY, CITY OF	MO	63130	13	167,485	82,782	84,703
HARRIS COUNTY*	TX	77090	3	164,237	80,000	84,237
WEBSTER, CITY OF	TX	77598	3	185,553	102,600	82,953
NEW ORLEANS/ORLEANS PARISH	LA	70125	11	202,781	120,000	82,781
BARTLESVILLE, CITY OF	OK	74006	6	242,572	160,000	82,572
HARRIS COUNTY*	TX	77562	2	215,504	132,990	82,514
LIVINGSTON PARISH*	LA	70726	4	138,136	55,650	82,486
HARRIS COUNTY*	TX	77357	7	162,459	80,000	82,459
HARRIS COUNTY*	TX	77429	3	205,786	123,640	82,146
HARRIS COUNTY*	TX	77015	3	137,026	55,000	82,026
HARRIS COUNTY*	TX	77073	5	184,826	102,900	81,926
MONTGOMERY COUNTY*	TX	77302	4	218,262	136,500	81,762
CLEAR LAKE SHORES, CITY OF	TX	77565	10	142,860	61,100	81,760
JEFFERSON PARISH *	LA	70003	6	162,005	80,300	81,705
PASADENA, CITY OF	TX	77505	9	156,900	75,544	81,356
LAKE CHARLES, CITY OF	LA	70663	12	139,324	58,000	81,324
HOUSTON, CITY OF	TX	77015	5	227,063	145,860	81,203
HARRIS COUNTY*	TX	77396	5	173,855	92,750	81,105
ST. LOUIS COUNTY *	MO	63129	4	135,344	54,700	80,644
HARRIS COUNTY*	TX	77073	6	192,826	112,368	80,458
HOUSTON, CITY OF	TX	77015	5	143,448	63,000	80,448
WARREN COUNTY*	MS	39180	5	132,897	52,500	80,397
SHOREACRES, CITY OF	TX	77571	2	235,877	155,800	80,077
FRIENDSWOOD, CITY OF	TX	77546	4	229,874	150,000	79,874
ST. CHARLES COUNTY*	MO	63301	15	119,825	40,000	79,825
JEFFERSON PARISH*	LA	70001	7	140,308	60,500	79,808
ARNOLD, CITY OF	MO	63010	5	151,355	71,700	79,655
TOTALS				**$47,816,066**	**$22,191,410**	**$25,624,657**

** County*

*** Includes content and building payments*

**** Highest recorded building value*

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

In Houston and Harris County, fewer homes flood at any particular time, but they can flood several times a year during almost any season. Twelve times in the 18-year period, hundreds of homes from the repetitive loss database in these Texas communities (an average of 664) flooded on a single day sometime between March and October.

The higher costs of flooding associated with Texas properties among the Top 200 homes are partly attributable to higher property values. In Texas, 143 of the top 200 homes were worth an average of $121,046 and flooded 5.2 times, for an average cumulative payment of $254,173. In Louisiana, 30 homes in the Top 200 were worth an average of $84,950 and flooded 7.7 times for an average cumulative payment of $199,704.

From the NFIP data, more than 75 percent (155) of the Top 200 homes were apparently substantially damaged at some time during the 18-year period. (Substantial damage issues are discussed in greater detail subsequently in this chapter.)

Strict enforcement of substantial damage requirements might curb losses to such high-risk properties. The extent to which substantial damage has been enforced is unknown. The repetitive loss data indicate that at least 20 of the 155 homes were rerated from pre-FIRM to post-FIRM at sometime during the 18-year period, yet the properties experienced subsequent flood losses.

IV. Analysis of Repetitive Losses by State

Repetitive losses occur in every state and territory; more than half of repetitive loss properties and claims payments have been made in Louisiana and Texas. Fifteen states account for 90 percent of total payments for repetitive loss properties. These are, in rank order: Louisiana, Texas, Missouri, New Jersey, New York, Florida, Massachusetts, Mississippi, California, Illinois, South Carolina, Pennsylvania, Connecticut, Virginia and North Carolina.

Table 3. IV shows states ranked by payments for repetitive losses. The table shows that repetitive losses should be viewed as a national concern, occurring in all states and territories, and affecting the NFIP's insurance pool as well as the health and well-being of citizens across the United States.

Table 3.IV States Ranked by Payments for Repetitive Losses

States	Properties	Losses	Total Payments*
Louisiana	17,941	50,356	$585,253,556
Texas	11,410	31,000	$525,711,289
Missouri	4,626	14,136	$200,584,982
New Jersey	5,094	14,278	$174,425,839
New York	6,544	16,609	$156,996,670
Florida	3,087	7,136	$95,528,321
Massachusetts	2,407	5,920	$90,194,351
Mississippi	2,938	8,097	$88,991,505
California	2,041	5,047	$88,161,581
Illinois	2,492	7,081	$63,583,356
South Carolina	1,064	2,379	$57,911,853
Pennsylvania	1,432	3,726	$38,063,046
Connecticut	1,083	2,825	$37,319,697
Virginia	690	1,728	$35,190,200
North Carolina	1,054	2,544	$31,906,470
Alabama	864	2,147	$29,848,287
Oklahoma	679	1,853	$25,615,749
Puerto Rico	1,354	3,939	$25,366,126
Kentucky	758	2,102	$23,701,494
West Virginia	886	2,162	$22,230,753
Ohio	826	2,060	$20,258,525
Georgia	401	1,081	$15,463,126
Washington	354	863	$13,804,439
Iowa	322	722	$12,883,466
Indiana	519	1,262	$11,791,383
Maryland	277	649	$11,377,921
Tennessee	358	970	$10,081,475
Kansas	267	674	$9,592,604
Arkansas	316	878	$9,442,019
Michigan	479	1,185	$8,395,366
Rhode Island	153	431	$8,057,821
Maine	176	412	$7,561,226
Nebraska	271	660	$6,536,801
Hawaii	112	291	$6,424,290
Minnesota	244	616	$6,285,284
Arizona	211	470	$5,949,053
Delaware	175	435	$5,672,446
North Dakota	133	358	$4,603,229
Virgin Islands	64	155	$1,928,602
New Hampshire	79	176	$1,500,119
Wisconsin	85	220	$1,451,118
Utah	24	61	$1,138,641
Oregon	34	82	$957,320
Colorado	28	70	$674,852
Nevada	19	41	$569,025
Montana	33	73	$440,387
Vermont	27	60	$438,120
New Mexico	17	42	$353,550
South Dakota	18	40	$343,396
Alaska	10	23	$224,998
Wyoming	10	21	$194,341
Idaho	12	28	$168,335
District of Columbia	3	8	$111,845
TOTALS	**74,501**	**200,182**	**$2,581,260,251**

**Includes building and contents*
Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

The expanse of floodplain areas and the extent of development vary from state to state, creating disparities in repetitive losses, properties and payments. Most repetitive losses, properties and payments occur disproportionately in a handful of states. Two states — Louisiana and Texas — each receive more than 20 percent of total payments, costing the NFIP more than a half billion dollars each over 18 years. The payments to three states — Louisiana, Texas and Missouri — exceed payments to all other states and territories combined.

Fifteen states (Louisiana, Texas, Missouri, New Jersey, New York, Florida, Massachusetts, Mississippi, California, Illinois, South Carolina, Pennsylvania, Connecticut, Virginia and North Carolina) account for almost 90 percent of total payments for repetitive loss properties. Maps showing the location of repetitive loss properties in these 15 states are included in the ***Appendix***.

In general, state repetitive loss properties, losses and payments are highly correlated with few exceptions. An exception that should be noted is the State of New York, which ranks third in repetitive loss properties and losses but fifth in total payments. This is, in part, because approximately two-thirds of the losses in New York occurred from 1978 to 1981, during the early years of the NFIP when the Federal Insurance Administration provided a more expansive level of coverage for basement flooding than is allowed today. Restrictions on basement flooding coverage in later years and the lower construction costs in the early years help explain the larger number, yet lower costs, of flood losses in New York. Another exception, Puerto Rico, ranks twelfth in repetitive loss properties and eleventh in losses but eighteenth in total payments. This is because building values in Puerto Rico are lower than the national median and cumulative payments per property are lower than the national average.

V. Repetitive Loss Properties Per Community

The profile of the number of repetitive loss properties per repetitive loss community suggests certain classifications that could assist federal and state agencies and policy-makers to effectively target their flood hazard mitigation efforts.

Figure 3.I shows the distribution of repetitive loss properties per community. Most communities have only a few repetitive loss properties; a few communities have large numbers of repetitive loss properties.

Figure 3.I shows the distribution of NFIP repetitive loss properties per community, or — put another way — of the 4,543 communities with repetitive losses, the number of communities that have one

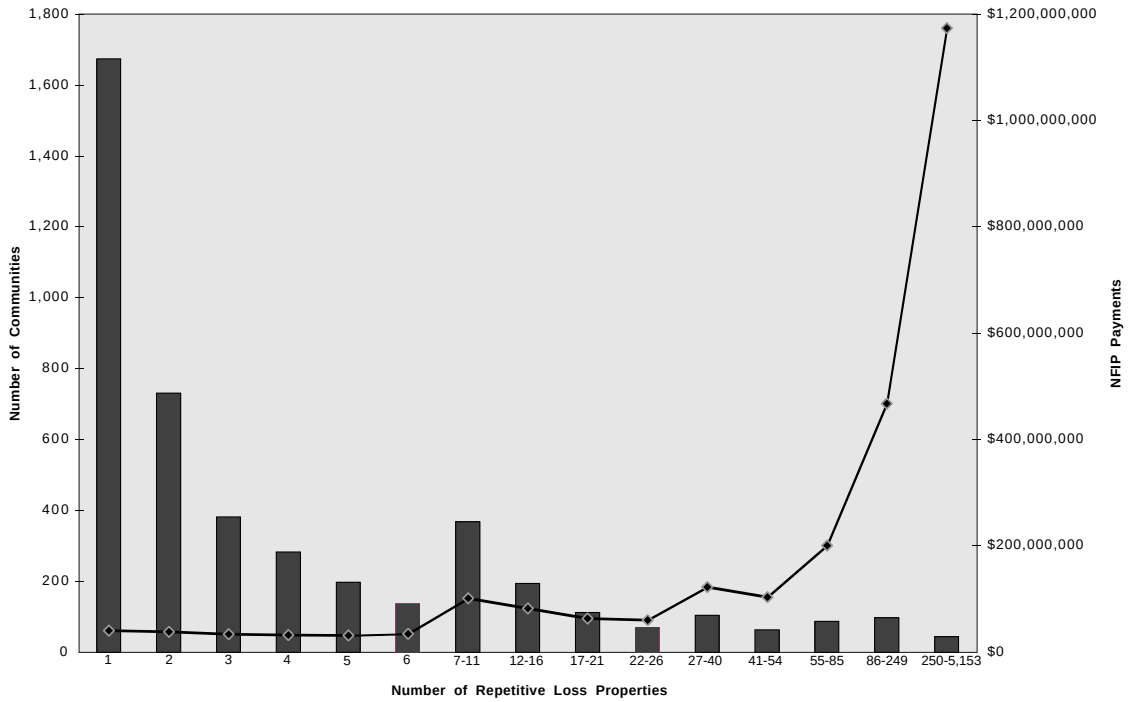
repetitive loss property, two repetitive loss properties, and so on, to the number of communities that have from 250 to 5,153 repetitive loss properties (at the highest end of the distribution). In addition, ***Figure 3.I*** correlates the cumulative cost in claims paid for each of the identified classes of repetitive loss communities.

Figure 3.I shows that while most repetitive loss communities have a small number of repetitive loss properties, the majority of repetitive loss properties are located in approximately one-fourth of the repetitive loss communities. Not surprisingly, most repetitive loss damages and claims are also concentrated in these areas.

Seventy-five percent of the 4,543 repetitive loss communities have six or fewer repetitive loss properties. The communities with six or fewer repetitive loss properties have a total of 7,208 repetitive loss properties, with total accumulated NFIP payments of $209 million over the 18 year period and an average cumulative claim of $29,063. For example:

- **1,647 (or 37 percent) of the 4,543 repetitive loss communities have only one repetitive loss property.**
- **731 (or 16 percent) of the communities have only two repetitive loss properties.**
- **381 (or 8.4 percent) of the communities have only three repetitive loss properties.**

Figure 3.I Repetitive Loss Properties per Community



Includes building and contents payments
Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

Figure 3.I

The National Wildlife Federation's analysis found the cumulative claim per property is fairly constant across broad groupings of repetitive loss properties per community.[14]

Significantly, one-fourth of the repetitive loss communities have seven or more repetitive loss properties, but account for the bulk of NFIP repetitive loss payments. Communities with 7 to 54 repetitive loss properties have a total of 15,953 repetitive loss properties, with total NFIP payments of $531 million and an average cumulative payment per property of $33,282.

Five percent of repetitive loss communities have 55 or more repetitive loss properties. Communities with between 55 and 249 repetitive loss properties, collectively, have 19,330 repetitive loss properties that received $668 million in NFIP payments, with an average cumulative payment per property of $34,536.

Communities with between 7 and 250 repetitive loss properties account for nearly half the total repetitive NFIP losses paid (approximately $1.2 billion).

Only one percent of the repetitive loss communities have 250 or more repetitive loss properties. These communities have a total of 32,010 repetitive loss properties, with total claims of $1.173 billion, and an average cumulative payment of $36,652.

At the high extreme, New Orleans and Jefferson Parish in Louisiana have, respectively, 4,023 and 5,153 repetitive loss properties. To keep these numbers in perspective, the number of repetitive loss properties represents only 2.7 percent of the 188,235 households in New Orleans,[15] and 2.4 percent of the 166,398 households in Jefferson Parish.[16]

Certain Classifications Suggested by the Analysis

The National Wildlife Federation believes the profile in ***Figure 3.1*** suggests certain classifications that may help federal and state agencies and policy-makers to effectively target their flood hazard mitigation efforts.

For communities with less than seven repetitive loss properties, most of them should be able to take the lead in mitigation efforts. This will require additional technical and financial assistance from state and federal agencies and specific direction from the NFIP.

For the communities with between 7 and 250 repetitive loss properties, it will be critically important for federal and state governments to provide significantly greater levels of technical and other assistance than are currently available to help communities effectively address their repetitive loss problems and improve their overall floodplain management. Such efforts should provide multidisciplinary technical assistance and involve a broad range of federal, state and

local agencies and the private sector in development of community based, comprehensive floodplain management plans.

For the one percent of repetitive loss communities with greater than 250 repetitive loss properties, the problems should be recognized as nationally significant and specific efforts should be developed to address their individual circumstances.

Finally, recent FEMA initiatives represent first steps that correspond to some of the issues raised in this analysis. Through recent changes in the Community Rating System, FEMA is requiring community applicants with 10 or fewer repetitive loss properties to implement an outreach program to owners of repetitive loss properties — advising them that the property is subject to flooding and identifying possible property protection measures. In addition, communities with more than 10 repetitive loss properties must prepare a floodplain management plan covering at least the repetitive loss areas.[17] FEMA has also emphasized addressing repetitive flood loss problems in selected cities through the agency's new Project Impact. While community participation is voluntary, the efforts represent a growing awareness of the need to help communities address the problem of repetitive loss properties.

VI. Repetitive Loss Payments by Year

The average annual payments for repetitive loss properties are increasing faster than inflation in construction costs.

Table 3.V, Total Flood Insurance Payments for Repetitive Loss Properties By Year 1978 - 1995, shows trends in payments for repetitive losses over the period studied.

Viewed on an annual basis, over the 18-year period, the number of losses and claims to repetitive loss structures decreased slightly, but the decline was not statistically significant. Building payments and total payments increased slightly, but the increase was not statistically significant. Contents payments were essentially constant over the 18-year period, with 70 percent of total payments for building damages and 30 percent for contents.

The slight decrease in losses and slight increase in payments suggest that fewer repetitive loss properties may be experiencing greater losses. The average loss (total payments divided by losses) increased significantly.

After adjusting total payments for inflation in building costs to constant 1992 dollars, the payments decreased slightly over the 18-year

Table 3.V Total Flood Insurance Payments for Repetitive Loss Properties By Year 1978 - 1995.

Year	Losses	Building	Contents	Total	Average Loss	Adjusted Total*	Average Adjusted Loss*
1978	9,855	$52,743,279	$28,373,372	$81,116,651	$8,231	$151,055,216	$15,328
1979	21,814	$148,264,549	$72,951,477	$221,216,027	$10,141	$370,546,109	$16,987
1980	16,169	$89,898,646	$45,651,710	$132,550,356	$8,198	$200,227,124	$12,383
1981	7,716	$42,472,123	$28,036,245	$70,508,368	$9,138	$98,475,374	$12,762
1982	13,665	$76,807,787	$43,677,871	$120,485,657	$8,817	$159,583,652	$11,678
1983	21,074	$158,235,630	$72,191,154	$230,426,784	$10,934	$298,480,290	$14,163
1984	9,075	$63,323,120	$38,175,635	$101,498,755	$11,184	$127,832,185	$14,086
1985	13,529	$104,077,192	$53,498,244	$157,575,436	$11,647	$193,344,093	$14,291
1986	5,594	$44,322,031	$19,866,808	$64,188,839	$11,475	$75,605,229	$13,515
1987	5,612	$36,589,397	$20,829,129	$57,418,527	$10,231	$65,026,644	$11,587
1988	3,532	$20,872,527	$10,261,479	$31,134,007	$8,815	$33,804,568	$9,571
1989	13,077	$174,225,907	$66,451,317	$240,677,224	$18,405	$253,078,048	$19,353
1990	6,450	$58,347,929	$26,752,822	$85,100,751	$13,194	$87,015,083	$13,491
1991	11,901	$137,790,215	$41,769,816	$179,560,031	$15,088	$181,740,922	$15,271
1992	13,156	$179,838,480	$57,021,121	$236,859,600	$18,004	$236,859,600	$18,004
1993	10,927	$154,662,802	$53,978,945	$208,641,747	$19,094	$201,197,442	$18,413
1994	7,837	$112,768,824	$44,733,377	$157,502,201	$20,097	$147,198,319	$18,782
1995	9,199	$146,646,362	$58,152,927	$204,799,288	$22,263	$187,373,548	$20,369
Totals	**200,182**	**$1,798,886,801**	**$782,373,450**	**$2,581,260,251**			

**Adjusted for inflation to constant 1992 dollars*

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

period, but were not statistically significant. Notably, the average adjusted losses increased signficantly, suggesting that costs are increasing for those repetitive loss properties that continue to suffer damages.

Interestingly, 1993 ranks fifth in total repetitive loss payments despite the prolonged, catastrophic flooding in the Midwest. The lower ranking is probably the result of fewer losses to highly floodprone properties in Louisiana, Texas, New Jersey and other states that year and because Midwest property values are generally lower than the national median.

Despite efforts to reduce flood risks to properties in floodplains, it appears that payments for repetitive loss properties are increasing faster than inflation in construction costs.

VII. Distribution of Cumulative Payments for Repetitive Loss Properties

An analysis of cumulative payments made to repetitive loss properties shows that a significant number of repetitive loss properties in the Nation's floodplains are accumulating substantial cumulative loss payments over time.

Cumulative payments for 74,501 repetitive loss properties suggest that certain floodprone properties will continue to accumulate substantial losses if they remain in the floodplain. Extremely large payments to some properties raise the average cumulative payment to $34,647. Half the properties have cumulative payments of less than $20,500, and only 25 percent of the properties have cumulative payments greater than $41,500. Twenty-four repetitive loss properties have cumulative payments of more than $1,000,000.

In its 1990 report on repetitive loss data, FEMA analyzed the distribution of individual loss events for repetitive loss properties and concluded that "most repetitive losses are for relatively small dollar amounts even though there are sufficient high value losses to warrant concern."[18] The National Wildlife Federation believes that it is critically important to analyze the cumulative losses of repetitive loss properties over time, particularly given the longer history that is now available. For high-risk floodprone structures, these losses have mounted rapidly and suggest the need for new approaches to curb losses.

TABLE 3.VI Cumulative Payments for Repetitive Loss Properties 1978-1995

Cumulative Payment Range*	All Properties**	Single Family Properties	Non-Residential Properties	Total Payment*
$0 - 4,999	6,421	5,178	541	$24,118,435
5,000 - 9,999	12,658	10,151	1,135	93,647,304
10,000 - 14,999	9,783	7,792	987	121,156,129
15,000 - 19,999	7,716	6,232	822	134,340,184
20,000 - 24,999	6,257	5,088	629	140,184,776
25,000 - 29,999	4,968	4,083	493	136,250,248
30,000 - 39,999	7,597	6,147	842	263,421,886
40,000 - 49,999	5,017	4,087	554	224,181,030
50,000 - 59,999	3,591	2,882	432	196,412,636
60,000 - 69,999	2,435	1,943	327	157,515,045
70,000 - 79,999	1,681	1,296	262	125,699,718
80,000 - 89,999	1,231	928	206	104,263,566
90,000 - 99,999	953	712	167	90,362,443
100,000 - 114,999	1,012	716	220	108,347,149
115,000 - 129,999	698	474	168	85,133,983
130,000 - 144,999	479	321	125	65,603,434
145,000 - 159,999	391	235	126	59,596,016
160,000 - 179,999	341	186	119	57,704,205
180,000 - 199,999	281	168	86	53,317,858
200,000 - 224,999	238	125	88	50,281,724
225,000 - 249,999	158	81	58	37,254,973
250,000 - 274,999	141	60	60	36,968,063
275,000 - 299,999	73	30	40	20,894,976
300,000 - 349,999	106	31	62	34,175,161
350,000 - 399,999	75	9	59	27,942,718
400,000 - 499,999	92	15	71	40,678,036
500,000 - 749,000	64	4	56	38,388,141
750,000 - 999,999	20	1	14	16,931,973
1,000,000 - 1,499,999	16	0	14	18,930,004
1,500,000 - 1,999,999	5	0	4	8,207,943
> $2,000,000	3	0	2	9,350,496
TOTALS	**74,501**	**58,975**	**8,769**	**$2,581,260,251**

** Includes content and building payments*

*** Includes single family, 2-4 family, other residential, and non-residential properties*

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties.

VIII. Distribution of Repetitive Losses Per Property (Grouped by Number of Losses)

Although repetitive loss properties represent only two percent of all properties insured by the National Flood Insurance Program, they experienced 25 percent of the losses and claimed 40 percent of total NFIP payments. Fewer than one percent (0.8) of floodprone properties — those repetitive loss properties with three or more flood losses — claimed over a fifth (21.5 percent) of all flood insurance payments. Over the 18 years studied, these 27,423 properties received almost $1.4 billion in flood insurance payments.

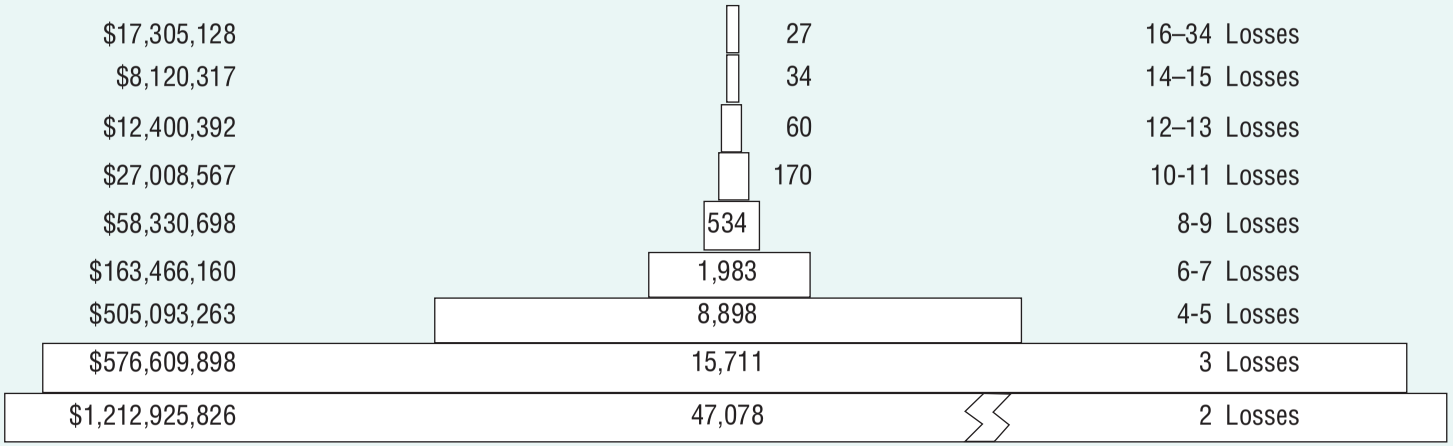
The pyramid in ***Figure 3.II*** shows the frequency distribution of repetitive losses per property. Totals for repetitive loss properties and all NFIP properties are included. *Although repetitive loss properties are only two percent of all NFIP properties, they experienced 25 percent (200,182) of NFIP losses and claimed 40 percent ($2.58 billion) of NFIP payments. Fewer than one percent (0.8%) of floodprone properties — the subset of repetitive loss properties with three or more flood losses — claimed 21.5 percent of all flood insurance payments.*

Approximately 63 percent of repetitive loss properties flooded twice, with payments totaling $1.2 billion, or 47 percent of all payments to repetitive loss properties. Approximately 37 percent of repetitive loss properties flooded three or more times with payments totaling $1.4 billion (53 percent of repetitive loss payments).

Repetitive loss properties that flooded three or more times claimed a disproportionate share of all payments to repetitive loss properties.

- **Twenty-one percent (15,711) of repetitive loss properties experienced flood losses exactly three times in the 18 years studied (approximately once every six years) and claimed 21.5 percent of payments (approximately $577 million) for repetitive losses.**
- **Almost four percent (2,808) of repetitive loss properties flooded six or more times (approximately once every three years) accounting for 11 percent of total payments (approximately $287 million) to repetitive loss properties.**
- **There were 492 properties (0.7 percent) that flooded nine or more times, or more frequently than once every two years and almost qualifying to be regulated as wetlands. These properties resulted in $88,661,511 of NFIP losses (3.4 percent of payments for all repetitive losses).**

Figure 3.II Frequency Distribution of Repetitive Losses Per Property



TOTALS

Repetitive Loss Properties		
$2,581,260,251	**74,501**	**200,182**
All NFIP Policies		
$6,376,869,372	**3,323,590**	**770,352**

* Includes single family, 2–4 family, other residential, and non-residential properties
** Includes building and contents
Note: Pyramid drawn as an approximation of scale.

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties

- **Eighteen properties flooded more than 18 times in 18 years and totaled more than $14 million in NFIP payments.**

Although individual losses to repetitive loss properties are mostly small (half of losses over the 18 years studied are less than the median loss of $6,241 and the average loss is $12,894), some properties experience large individual losses and even small, cumulative individual losses have often exceeded the building value over the 18 years studied.

Extraordinary Flooding and Losses: The 18 Properties that Flooded More than 18 Times

Some of the most extraordinary examples of repetitive loss properties in the NFIP database are the 18 properties that experienced more than 18 flood losses in 18 years.[19] These 18 properties included nine nonresidential properties and nine single family homes.

Some of the nonresidential properties had extremely high contents losses but only minimal building losses. In New Jersey, five nonresidential properties flooded 22 to 34 times each, with total payments ranging from $464,012 to as much as $3,870,001. The NFIP paid more than $10 million for damage to building contents and only $213,081 for damage to the buildings.

In Roselle, New Jersey, FEMA files identified three nonresidential properties as a corrugated box factory and two warehouses. They flooded 25, 22, and 23 times, respectively, between 1980 and 1994. Although flooding occurred, on average, every seven or eight months, claims were made in every month of the year.

The location of the single property with the greatest number of flood losses is between the Passaic and Hackensack Rivers in Kearny, New Jersey. Kearny had one nonresidential property (in a use category not identified in FEMA files) which flooded 34 times between 1978 and 1989, or flooding on average every four months. Most of the $3.9 million in losses for this building (99 percent) were for contents damage.

An auto repair shop in Hawthorne, New Jersey, had 31 losses in 15 years, or two to three losses per year. The NFIP paid the repair shop a total of $464,012, of which 94 percent was for contents.

Flooding in May 1995 caused heavy rains in Southeast Louisiana. Louisiana has the most repetitive loss properties in the U.S. Photo: U.S. Army Corps of Engineers

Finally, a factory in Providence, Rhode Island, had 18 losses totaling $742,300. The damage to the building contents accounted for 90 percent of the NFIP payments.

These six properties account for almost $11 million in losses on contents alone. Because there were no significant damages to the buildings, these properties escaped any possible scrutiny triggered by substantial damage provisions and were therefore not required to bring the building up to code to reduce the losses.

Examining the nine single family homes with more than 18 losses, the National Wildlife Federation's analysis showed the NFIP paid the owners more than the building value for eight of the nine properties. Four single family homes sustained substantial flood damages (receiving payments for building damage in a single event exceeding 50 percent of the building value) for one or more losses. Examples include the following:

A single family home in Montgomery County, Texas, had 18 losses between 1978 and 1994 totaling $286,552 — more than twice the property value of $129,000.

A single family home in Point Coupee Parish, Louisiana, had 23 losses totaling $140,214. FEMA identifies the property as a single family, seasonal dwelling. It appears to be a house and detached

Missouri River Great Flood 1993. Photo: FEMA

garage or boat house. This structure is valued at $37,800.

A single family home in East Baton Rouge, Louisiana, had 23 losses totaling $264,443. It was retrofit or reclassified between May 1, 1991, and February 15, 1992, but had greater flood losses subsequently. As a pre-FIRM building, it flooded 14 times in nine years, with an average loss of $8,932; as a post-FIRM building, it flooded nine times in four years with an average loss of $15,488. Although retrofitting is supposed to reduce subsequent flood losses, elevation is not foolproof and significantly enlarged buildings may have increased flood losses in subsequent floods.

IX. Substantially Damaged Repetitive Loss Properties

The National Wildlife Federation's analysis shows that contrary to the NFIP's long-standing requirement that when properties are substantially damaged (i.e. when damage to a building in a single event exceeds 50 percent of building value) the buildings will be either elevated or removed from the floodplain, this apparently has often not been enforced. The statistics indicate that in many instances, the buildings have been repaired in the same location and have continued to be classified as pre-FIRM properties, therefore remaining eligible for subsidized flood insurance rates. The buildings continue to suffer damages as they did before they were substantially damaged. This calls into question the basic assumptions about the eventual phase-out of pre-FIRM subsidized insurance rates that were expected to make the NFIP more actuarially sound. It also suggests a need for stronger enforcement of substantial damage rules, and for more aggressive efforts to help people move out of high risk, floodprone areas to higher ground.

FEMA's regulations direct that communities participating in the National Flood Insurance Program must adopt and enforce local ordinances requiring that *substantially damaged* buildings must be elevated (or floodproofed in the case of nonresidential structures) to at least the 100-year flood level or be removed from the flood hazard area.

FEMA delegates the responsibility of implementing and enforcing substantial damage requirements to local communities, whose officials make their own determinations of building value and flood damages before issuing permits to rebuild flood-damaged buildings.

FEMA has long operated the National Flood Insurance Program on the assumption that the Nation's floodplains would be gradually cleared of the higher-risk stock of pre-FIRM properties, particularly through enforcement of the NFIP's substantial damage rules.[20]

The National Wildlife Federation has analyzed the repetitive loss database to determine how many repetitive loss properties sustained substantial damages over the 18-year period, and whether repetitive loss histories provide evidence that FEMA's substantial damage requirements are being enforced.

> *The National Wildlife Federation's analysis indicates that large numbers of substantially damaged properties have apparently not been elevated or removed as envisioned, and in all likelihood, substantial damage requirements have not been enforced in many communities. The evidence indicates that many buildings have been rebuilt in place at original elevations, and they continue to be classified as pre-FIRM properties, therefore remaining eligible for subsidized insurance.*

Many substantially damaged buildings continue to suffer repetitive flood damages. The analysis shows that substantially damaged properties experienced approximately the same number of losses — and accumulated even greater flood insurance payments — after being substantially damaged as they had experienced before being substantially damaged.

Table 3.VII presents flood histories of 18 year cohorts (or year-classes) of properties that were first substantially damaged in the successive years 1978 through 1995.

To identify repetitive loss properties that had been substantially damaged over the 18 year period, the National Wildlife Federation utilized the information in the repetitive loss database that is provided by insurance adjustors in on-site, postdisaster assessments of flood damages to buildings, NFIP insurance payments for building damages, and estimated cash value of buildings to calculate substantial damage.

The methodology used by the National Wildlife Federation for identifying substantially damaged properties is similar to, but more conservative than, the methodology used by FEMA in its 1989 study, titled *A Report on Structures Substantially Damaged by Floods in the United States (1978-1988)*, in which FEMA evaluated 10 years of experience in implementing substantial damage requirements.[21]

In ***Table 3.VII,*** the boldfaced diagonal entries, running from upper left to lower right, give the numbers of repetitive loss properties that were first substantially damaged in each year (identified by inter-

Table 3.VII Substantially Damaged Repetitive Loss Properties

Flood History	Year Cohort First Substantially Damaged																	
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1978	**458**	105	90	10	23	24	42	27	12	5	4	36	6	110	31	5	15	78
1979	115	**1814**	104	42	164	328	55	57	31	12	3	60	38	41	12	142	129	12
1980	128	289	**382**	44	56	189	68	35	7	7	6	39	17	35	43	7	6	119
1981	15	148	35	**175**	32	82	25	9	17	6	1	47	10	15	22	10	25	24
1982	53	413	109	35	**523**	105	35	86	44	18	11	36	36	26	12	193	22	37
1983	68	894	119	44	234	**774**	95	57	80	17	10	96	47	51	34	235	152	145
1984	50	201	14	18	48	106	**360**	99	10	12	4	71	24	83	166	45	19	5
1985	23	189	24	9	127	68	48	**541**	46	14	9	34	14	109	210	202	55	8
1986	5	66	5	11	59	32	15	19	**257**	14	3	28	16	13	7	350	8	64
1987	39	22	11	9	28	11	38	23	12	**158**	9	195	25	144	24	17	16	6
1988	18	6	25	3	5	20	1	40	2	5	**51**	37	12	18	16	9	2	45
1989	55	185	25	27	17	57	70	20	11	46	10	**678**	60	96	87	27	238	160
1990	22	60	24	9	27	92	15	12	16	31	8	64	**340**	113	19	210	50	44
1991	112	62	20	7	18	35	19	15	12	19	6	66	90	**1089**	201	59	57	75
1992	59	11	8	5	6	14	43	124	2	9	6	49	24	570	**794**	64	61	16
1993	11	82	5	4	82	77	34	49	76	12	7	30	59	110	50	**1295**	192	52
1994	15	94	8	3	48	57	24	26	11	9	6	108	56	136	158	148	**678**	37
1995	30	25	33	4	22	54	2	10	57	6	5	62	23	41	18	214	45	**554**
TOTAL																		**10921**

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties

secting row and column). The vertical column is the flood history of the year cohort. Above the diagonal in the vertical columns are the number of properties from each year cohort of substantially damaged properties that suffered flood losses in years before the first substantially damaging flood. Below the diagonal are the number of properties from the substantially damaged year cohorts that suffered flood losses in all subsequent floods.

To illustrate, for example, in the year 1985, nationwide, there were 541 repetitive loss properties that first sustained substantial damages that year. The vertical column above shows the number of NFIP losses sustained by the 1985 year cohort in each of the years before the 541 properties were substantially damaged (i.e. in 1984, 99 of the 541 substantially damaged structures sustained NFIP losses; in 1983, 57 sustained losses, and so on). Similarly, in 1986, 19 of the 541 substantially damaged properties sustained NFIP losses again; and in 1987, 23 of the 541 properties sustained NFIP losses, and so on. The sum of the bold diagonal entries gives the total number of substantially damaged repetitive loss properties over the 18 years studied.

The National Wildlife Federation's analysis found that 10,921 repetitive loss properties (approximately 15 percent of all repetitive loss properties) had been substantially damaged at least once over the 18-year period.

Ninety-four percent of these properties were classified as pre-FIRM properties. If substantial damage requirements had been rigorously enforced, one would expect there would be very few, if any, properties experiencing flood losses in years after properties are first substantially damaged. ***Table 3.VII*** shows this is not the case. Substantially damaged repetitive loss properties have long histories of flood losses, both *before* and *after* being substantially damaged.

Of the 10,921 properties that were substantially damaged at least once during the 18-year period, 10,459 were single-unit residential or nonresidential properties. Of single-unit properties, 9,185 were substantially damaged only once. There were 1,162 properties substantially damaged twice and 112 properties substantially damaged three or more times. Of these, 90 were substantially damaged three times, 17 were substantially damaged four times, four were substantially damaged five times, and one was substantially damaged six times.

Table 3.VIII summarizes the history of each year cohort of substantially damaged properties over the 18 years studied. It lists the number of properties substantially damaged for the first time in each of the years 1978 through 1995. It also includes total payments and losses to properties during

the year the properties were first substantially damaged, as well as total payments and losses in the years before and after the first substantial damage.

Substantial damage, of course, is calculated only on the basis of payments for damage to buildings. To give a fuller picture, however, of the total costs incurred for substantially damaged properties, in ***Table 3.VIII*** losses and payments also include payments for building and contents damages in less severe floods, as well as payments for contents-only claims.

Each row of ***Table 3.VIII*** summarizes the flood history of a year cohort of substantially damaged properties. The second column lists the number of properties substantially damaged for the first time in each of the years 1978 through 1995. *Previous losses* are all losses experienced by the year cohort of substantially damaged properties in the years before the properties were substantially damaged. *Immediate losses* are all losses experienced by the cohort in the year it is first substantially damaged, including substantial damage losses and losses from less severe floods. *Subsequent losses* include all losses in ensuing years to the cohort of substantially damaged properties after being first substantially damaged. The table also includes summaries of NFIP payments for previous years, the immediate year and subsequent years for each year cohort of substantially damaged properties.

Table 3.VIII shows that total payments to properties that were substantially damaged at least once during the 18-year period is $674,097,438. This total is 26 percent of all payments for repetitive loss properties and 10.6 percent of all NFIP payments over the period.

If FEMA enforced regulations on substantial damages one would expect losses and payments in years *following* substantial damage to be significantly less than in years *before* substantial damage. However, ***Table 3.VIII*** shows the total number of subsequent losses to substantially damaged properties increased slightly, by 0.5 percent from 9,523 to 9,568.

> *The total payment for subsequent flood losses is $167,191,968 — 65 percent higher than the total $101,118,730 in payments for flood losses prior to the initial substantial damage.*

Inflation obviously accounts for some of the increase in costs. However, in FEMA's 1989 study of substantial damages, the agency had already recognized there were numerous instances of *repetitive substantial damages*, that had resulted in increased subsequent costs, including cases of properties that had suffered substantial damage on two or three separate occasions between 1978 and 1988. In the 1989 study, the agency did not offer a definitive explanation as to why the

Table 3.VIII Summary for Cohorts of Substantially Damaged Properties

COHORT	SUBSTANTIALLY DAMAGED PROPERTIES	PREVIOUS LOSSES	IMMEDIATE* LOSSES	SUBSEQUENT LOSSES	TOTAL LOSSES	PREVIOUS PAYMENTS**	IMMEDIATE* PAYMENTS**	SUBSEQUENT PAYMENTS**	TOTAL PAYMENTS**
1978	458	0	542	867	1409	$0	$9,607,309	$16,463,088	$26,070,398
1979	1814	116	2436	3081	5633	$687,803	$49,153,901	$46,291,577	$96,133,282
1980	382	205	432	497	1134	$1,854,586	$9,201,840	$8,097,353	$19,153,779
1981	175	127	207	201	535	$1,678,042	$5,849,632	$5,991,052	$13,518,726
1982	523	298	588	813	1699	$2,959,803	$14,522,541	$11,515,342	$28,997,686
1983	774	804	882	663	2349	$7,696,860	$27,368,300	$10,602,590	$45,667,749
1984	360	348	394	353	1095	$2,442,029	$10,985,312	$8,063,057	$21,490,399
1985	541	405	683	355	1443	$2,736,746	$15,444,083	$5,218,625	$23,399,455
1986	257	267	274	242	783	$1,825,994	$7,136,627	$6,750,974	$15,713,596
1987	158	114	194	145	453	$877,762	$5,511,833	$4,847,534	$11,237,130
1988	51	66	57	50	173	$560,924	$1,856,609	$704,265	$3,121,798
1989	678	721	858	420	1999	$9,603,984	$42,400,605	$13,150,257	$65,154,846
1990	340	343	407	291	1041	$4,485,017	$10,486,518	$4,217,850	$19,189,385
1991	1089	892	1216	945	3053	$7,889,923	$35,651,284	$16,179,761	$59,720,967
1992	794	933	1021	232	2186	$10,918,598	$35,627,279	$3,016,858	$49,562,734
1993	1295	1704	1862	368	3934	$14,409,643	$58,369,951	$5,581,004	$78,360,598
1994	678	1192	732	45	1969	$19,500,308	$40,311,523	$500,781	$60,312,612
1995	554	988	621	0	1609	$10,990,708	$26,301,590	$0	$37,292,298
TOTAL	**10921**	**9523**	**13406**	**9568**	**32497**	**$101,118,730**	**$405,786,740**	**$167,191,968**	**$674,097,438**

* Includes all floods for the year
** Includes building and contents

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties

structures were not elevated or floodproofed after the initial substantial damage occurred, as required by FEMA's regulations.[22] The FEMA report did, however, offer an explanation for increasing payments to substantial damage properties:

> *"In almost every repetitive substantial damage case examined, the owner of the structure increased the insurance coverage after the initial substantial damage. Also, the property value of the structure increased between the first and second and/or second and third substantial damage events. In fact, in some cases, the property value doubled and even tripled during the interim, apparently as a result of significant improvements made to the structures. Typically, because of these increases in property value and coverage, the losses and claims paid from the second and third substantial damages were greater than the initial losses."* [23]

In the report, FEMA further speculated that among the possible explanations for the failure to remove, elevate or floodproof substantially damaged buildings was the possibility that "the local official did not understand the regulation, failed to recognize the structure as substantially damaged, or simply neglected the responsibility of enforcement."[24] The National Wildlife Federation's analysis suggests that these problems have not been resolved.[25]

Figure 3.III compares actual cumulative expenditures for substantially damaged repetitive loss properties with the expenditures that would have resulted if substantial damage requirements were enforced, ensuring that no flood insurance claims were filed after the initial claim for substantial damages. The figure shows that enforcement of substantial damage rules could potentially have saved the NFIP as much as $167,504,268 over the 18 years studied. This amounts to approximately 25 percent of total expenditures for substantially damaged repetitive loss properties, and 6.5 percent of expenditures for repetitive loss properties.

Communities with Repetitive Loss Properties Sustaining Repetitive Substantial Damages

The National Wildlife Federation's analysis identified repetitive loss properties that sustained repetitive substantial damage based on the NFIP repetitive loss data. The National Wildlife Federation identified 1,274 properties in 358 communities, located in 36 states, that have been substantially damaged two or more times. Texas had the

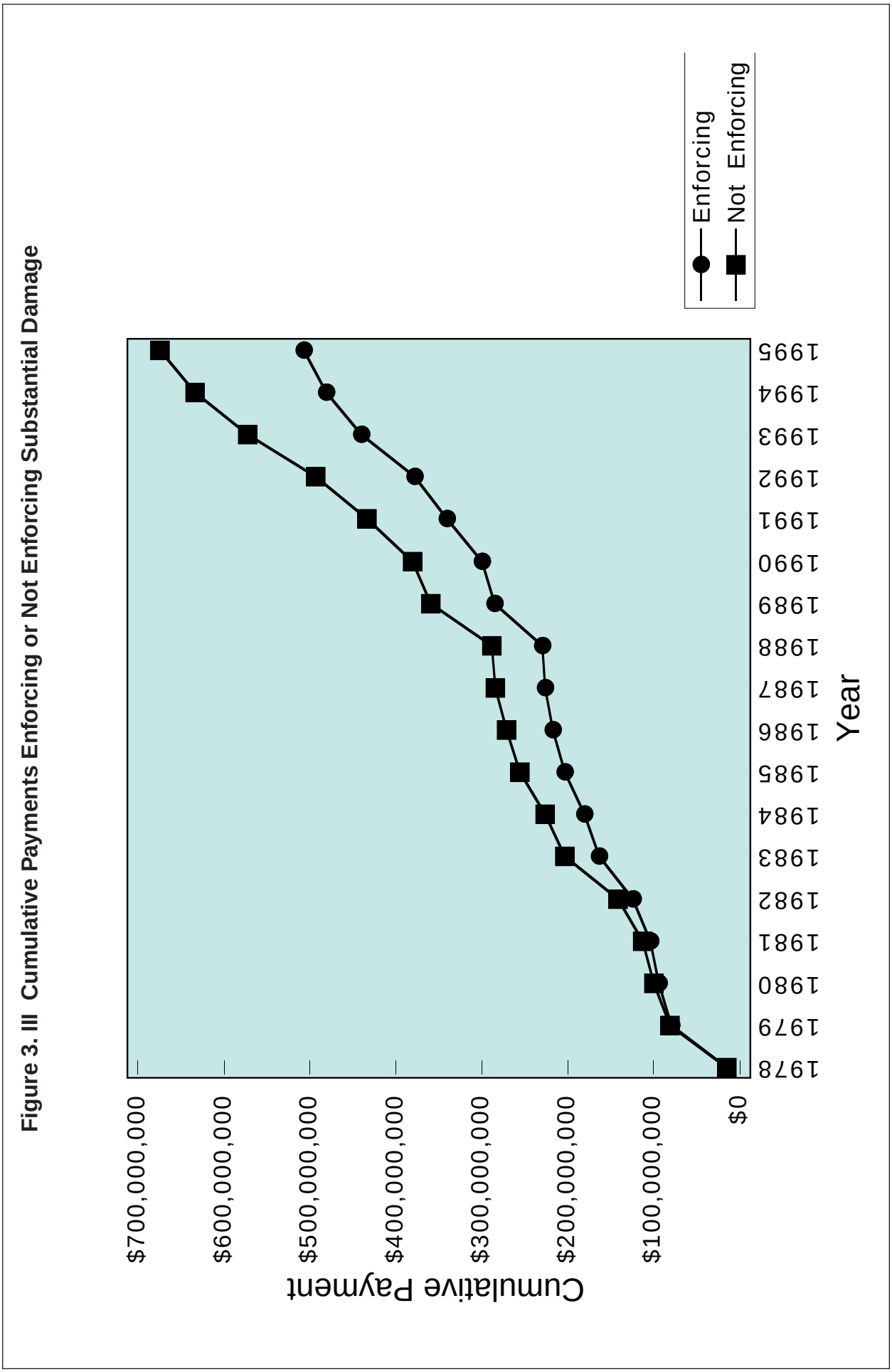


Figure 3. III Cumulative Payments Enforcing or Not Enforcing Substantial Damage

most communities — 58 — with a total of 209 properties that were substantially damaged two or more times. Louisiana had 49 communities with a total of 293 properties that were substantially damaged two or three more times. Other states with at least 10 communities with properties that sustained substantial damage two or more times are:

Missouri — 33 communities,
New Jersey — 24,
Mississippi — 24,
Illinois — 19,
New York — 18,
Massachusetts —12,
California —11, and
Florida —10.

The Top 10 communities with 30 or more properties that have been repetitively substantially damaged are the following:

St. Charles County, Missouri;
St. Louis County, Missouri;
Wilkinson County, Mississippi;
Warren County, Mississippi;
Point Coupee Parish, Louisiana;
Houston, Texas;
Terrebonne Parish, Louisiana;
Harris County, Texas;
Jackson, Mississippi; and
Concordia Parish, Louisiana.

X. Distribution of Repetitive Loss Properties Among Flood Risk Zones

While the total number of repetitive loss properties (and the total number of insured properties) has increased, the distribution among flood risk zones has remained constant when compared with past FEMA studies, including FEMA's 1990 repetitive loss report. The large number of repetitive loss properties (20 percent) that are identified as being located outside special flood hazard areas raises serious concerns that accurate information on flood risk may not be available to the NFIP and the public.

Although the number of NFIP policies has increased steadily, the distribution of repetitive losses and repetitive loss properties among flood risk zones has remained relatively constant. ***Table 3.IX*** shows the distribution of repetitive loss structures by NFIP flood insurance zones.

Approximately two-thirds of repetitive loss properties, losses and payments occur in the designated 100-year flood zone, or *special flood hazard area* (identified as *A-Zone* in the NFIP). This is the area that is subject to the NFIP's mandatory requirement to purchase flood insurance. The A-Zone particularly includes areas adjacent to rivers, streams, lake shores, and

Table 3.IX Distribution of Repetitive Loss Structures By Zone

Zones	Losses	Number of Repetitive Loss Properties	Percent of Repetitive Loss Properties	Losses per Property	Total Payments**
A	133,444	48,457	65%	2.75	$1,795,088,661
B	11,994	4,469	6%	2.68	149,265,387
C	24,610	9,030	12%	2.72	316,167,868
D	690	278	0.4%	2.48	7,469,648
X	3,537	1,498	2%	2.36	56,936,587
V	5,588	2,323	3%	2.4	101,415,786
Unknown*	20,319	8,446	11.6%	2.4	154,916,314

* Emergency Program (Pre-FIRM) policies for which no zone was identified
** Includes building and contents

Source: Compiled by Dr. Martha L. Stout from FEMA's database on repetitive loss properties

seacoasts, as well as isolated depressions where rainfall and runoff collect.

An additional 3 percent of all repetitive loss properties, with a slightly lower percentage of losses (2.8 percent) but slightly higher percentage of payments (4 percent), occur in the *coastal high hazard flood zone* (*V-Zone*). This is the portion of the *special flood hazard* area that is subject to damages associated with wind, waves, and storm surges, and is defined as the area that is inundated by *tidal floods with velocity*. In the coastal cities, often only frontline properties are mapped as V-Zone; most other coastal properties in the designated 100-year floodplain are rated as A-Zone. As an example, in the coastal cities and barrier islands of North and South Carolina, only 25 to 54 percent of repetitive loss properties are designated in the V-Zone.

Over the 18 years studied, slightly more than 20 percent of repetitive loss properties, losses and payments occurred in zones designated as B, C, D and X or outside *the designated 100-year floodplain. These zones are characterized as having moderate to minimal risks of flooding, and within these areas there is no mandatory requirement to purchase flood insurance.*

On older Flood Insurance Rate maps, the *B-Zone* lies between

the 100-year and 500-year flood zones, and is characterized as having a moderate risk of flooding; and the *C-Zone* lies above the 500-year flood zone, and is characterized as having a minimal risk of flooding.

The *D-Zone* includes unstudied areas where flood hazards are undetermined, but presumed minimal. On maps produced after January 1, 1986, zones B, C, and D are combined into a single *X-Zone*.[26]

> *The large number of repetitive losses (20.4 percent) that were sustained by properties in the B, C, and D and X - Zones, that are identified as having minimal to moderate flood risk, indicates that accurate information on flood risk may not be available to the NFIP and the public. Consequently, some home and business buyers are critically uninformed about a building's flood history, and its risk of future flood damage, at a key juncture — the point of purchase. Also, owners or potential owners of buildings at high risk of flooding are neither required to buy flood insurance, nor are they even required to be informed of the desirability of buying flood insurance. Finally, for many of these structures, the flood insurance rates charged may not accurately reflect the flood risk involved.*[27]

It is clear from this analysis that greater attention is needed to assure that FEMA's flood insurance rate maps and property ratings accurately reflect the risk of flooding.

— Martha Stout, chief researcher.
— David Conrad and Martha Stout, principal writers.

Endnotes

1. Michael J. Armstrong, Associate Director for Mitigation, Federal Emergency Management Agency, testimony to the Water Resources and Environment Subcommittee of the House Transportation and Infrastructure Committee, U.S. House of Representatives, May 7, 1998.
2. *The 1993 and 1995 Midwest Floods: Flood Hazard Mitigation Through Property Acquisition and Relocation Program*, Donna Erat, September 1995. In reviewing the property acquisition and relocation program after the 1993 Midwest Flood, the FEMA Mitigation Directorate recently wrote "The acquisition of property has proven to be most cost-effective when flood damage is repetitive and severe," p. 7; "The cost of acquiring, relocating, and elevating these properties is approximately 35 percent of total past claims and results in a 100 percent loss reduction," p. 8; "FEMA's experience leads it to conclude that it is highly likely that the acquisition of flood-prone properties (at a net cost of 50% of replacement value) within the 10-year floodplain is always cost-effective," p. 9; and, "For every one mitigation dollar spent in these 30 communities, two dollars will be saved in future NFIP claims. This savings is an extremely conservative estimate, and does not consider other costs to communities that will also be avoided, such as flood fighting, evacuation, rescue and recovery costs. Neither does this projected savings reflect other Federal disaster assistance that will be avoided, such as other FEMA programs administered under the Stafford Act, Small Business Administration disaster loans, and Farmers Home Administration emergency loans to farmers. The potential savings to local, State, and the Federal government is tremendous," p. 9.
3. *Out of Harm's Way: The Missouri Buyout Program*, Missouri State Emergency Management Agency, 1995. p. 4. The report details the costs of repetitive loss flooding and the benefits of voluntary buyouts in Missouri in the wake of major flooding in May of 1995. Most of the flood-prone lands along the Missouri, Mississippi, and lower Meramec Rivers in the greater St. Louis area that flooded during the 1993 Midwest Flood, flooded again to considerable depth in May of 1995. In St. Charles County, Missouri, where 1,374 flood damaged properties were voluntarily bought out — many of which were repetitive loss properties — total disaster assistance costs for FEMA disaster housing, FEMA Individual or Family Grants and SBA disaster loans dropped from $26.1 million after the 1993 Flood to only $283,094 in 1995. This was a 99 percent reduction in disaster assistance costs for St. Charles County in comparison to 1993. The state of Missouri found that with the expenditure of $13.7 million in Hazard Mitigation Grants Program (HMGP) and Community Development Block Grant (CDBG) funds for the 1,374 voluntary property buyouts, it had removed the vast majority of repetitive loss properties from harm's way, ensured that virtually no additional disaster assistance would be granted in the future, and provided the local community with open space riverlands in perpetuity.
4. *Data on Disaster Declarations, 1989 through February 28, 1998*, FEMA, Program Policy Branch, Response and Recovery Directorate, Washington D.C., electronic spreadsheet provided to authors on 4/15/98.
5. National Wildlife Federation repetitive loss database analysis and NWF analysis of FEMA *Data on Disaster Declarations*. The 10 states from the top 15 repetitive loss states that are also among the top 15 states receiving FEMA disaster assistance for flood-related storms and hurricanes (since 1989) are: California, Florida, Illinois, Louisiana, Missouri, North Carolina, New York, Pennsylvania, South Carolina and Texas.

6. Some smaller Midwest communities, such as Grafton, Illinois, and Arnold and Hermann, Missouri, have initiated substantial relocation efforts since the 1993 Midwest Flood. The City of Valmeyer, Illinois, has sought broad state and federal assistance to completely relocate the town to bluff lands well above the Mississippi River floodplain, (see also Endnote 3, above).
7. *Report on Costs and Benefits of Natural Hazard Mitigation*, Federal Emergency Management Agency, March 1997, p. 27. The mitigation was accomplished with funds primarily from FEMA's HMGP, HUD CDBG, and FEMA's Section 1362 program.
8. *National Flood Insurance Program (NFIP) Repetitive Loss Buildings* (draft), FEMA, January 1998, p. 5.
9. *Report on Costs and Benefits of Natural Hazard Mitigation*, FEMA, p. 27.
10. Mike Robinson, FEMA Mitigation Directorate, interview, April 16, 1998.
11. *Multi Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy*, FEMA, July 1997, pp. xvii, 136, 142.
12. *Multi Hazard Identification and Risk Assessment*, p. xvii.
13. National Wildlife Federation repetitive loss database analysis. As an example, a single family home in Kauai County, Hawaii, was valued at $311,000 in November 1982 and at $2 million in September 1992.
    In this case, the total payment of $448,181 was less than the building value of $2 million, and thus the property was excluded from Table 3. II.
    Note: in Table 3.II, to ensure that cumulative claims for a multiunit condominium or a farm and outlying building(s) were not compared with the building value for a single family home, all properties classified as other than single family homes, with multiple contemporaneous claims, or different building values for contemporaneous claims, were eliminated.
14. National Wildlife Federation repetitive loss database analysis. Repetitive loss communities with 7 to 54 repetitive loss properties and communities with 55 to 248 repetitive loss properties have, respectively, 21.4 percent of the properties and 20.6 percent of the total claims, and 25.9 percent of the properties and 25.9 percent of the total claims. Communities with six or fewer repetitive loss properties have 9.7 percent of the properties and slightly less (8.1 percent) of the total claims, while communities with more than 250 repetitive loss properties have 43 percent of the properties and slightly more (45.4 percent) of the total claims.
15. U.S. Department of Commerce, Bureau of the Census, 1990 Census Data.
16. U.S. Department of Commerce, 1990 Census Data.
17. *National Flood Insurance Program, Community Rating System (CRS) Coordinator's Manual*, FIA-15, July 1996, p. 500-9.
18. *Summary and Assessment of National Flood Insurance Program (NFIP) Repetitive Loss Data (1980- 1989)*, Federal Insurance Administration, Office of Loss Reduction, June 26, 1990.
19. National Wildlife Federation repetitive loss database analysis. Although both residential and nonresidential properties had overlapping numbers of losses and average payment per loss, several nonresidential properties in extremely floodprone locations accumulated millions of dollars in payments. Ten of the 18 properties were multiunit or tenant-occupied properties with large numbers of contemporaneous claims. Comparing building value with accumulated flood insurance payments for multiunit properties is difficult and the difficulty is compounded by contents-only claims without property values, especially for nonresidential properties and in several records by apparent data entry errors. Obvious decimal place errors (such as one $564,000 entry accompanied by two for $56,400) were hand-corrected. Payments and property values for contemporaneous claims were added so total payment for each flood loss was

compared with total property value experiencing the loss.

20. FEMA regulations provide that if buildings are *substantially improved* with additions or remodeling that increases the building value by 50 percent above the value of the original building, the requirement to elevate or relocate also applies.
21. National Wildlife Federation repetitive flood loss database analysis and Federal Insurance Administration, *A Report on Structures Substantially Damaged by Floods in the United States* (1978-1988), March 29, 1989. To calculate whether substantial damage had occurred, the National Wildlife Federation used the actual NFIP payment for damages to the building, rather than using total damages (which includes deductibles and disallowed claims) as was done in the 1989 FEMA study. Also, in contrast to the 1989 study, NWF eliminated any multiunit properties where individual units suffered substantial damages, but damage to the entire multiunit property was less than 50 percent of building value. The NWF methodology was intended to correspond as much as possible with a common sense interpretation of substantial damage. Using these more restrictive criteria reduced by approximately 3,500 properties the number considered as having been substantially damaged, when compared with the 1989 study criteria.
22. *A Report on Structures Substantially Damaged by Floods in the United States (1978 - 1988)*, p. 5.
23. *A Report on Structures Substantially Damaged by Floods in the United States (1978 - 1988)*, pp. 3-5.
24. *A Report on Structures Substantially Damaged by Floods in the United States (1978 - 1988)*, p. 5.
25. Additional detailed analysis of substantial damage enforcement issues can be found in *An Assessment of Floodplain Management in Georgia's Flint River Basin*, Elliott Mittler, Institute of Behavioral Science, University of Colorado, 1997, p. 130. In a thorough, postdisaster analysis of major Georgia floods in July 1994, Elliott Mittler reviewed FEMA's guidance and the procedures used by local government to determine whether substantial damage had occurred for numerous properties in Albany, Georgia. He identified numerous instances where NFIP and Small Business Administration data apparently showed that building damages exceeded 50 percent of building value (often significantly), yet the local government finding often fell in the 40 - 49.9 percent range. He concluded that: "Although it appeared on the surface to be rather simple and straight forward, the entire process for determining substantial damage, as carried out in Albany, seemed fraught with ambiguity and subject to both error and bias, possibly permitting several substantially damaged residences to be rebuilt rather than elevated before rebuilding, bought out, or removed from the floodplain. If what occurred in Albany is typical, then the process should be thoroughly reviewed and more precise methods should be mandated for use by local agencies."
26. National Wildlife Federation repetitive loss database analysis. Eighteen percent of claims were filed before detailed maps of flood risk were available. Whenever possible, the National Wildlife Federation used more specific information on flood zones from subsequent claims to classify these properties. Similarly, for purposes of ***Table 3.IX*** for properties with recent X-Zone designations and prior B, C, or D-Zone designations, the earlier and more specific flood zone was substituted. Consequently, it is possible to distinguish properties that filed claims in the early years of the program but not subsequently (designated as Unknown) and properties that filed claims only recently and not previously (designated as X-

4 Conclusions & Recommendations

"It is the responsibility of all levels of government, business and industry, as well as citizens — particularly those located in floodplains — to reduce flood damages and the soaring flood-related disaster costs. We all have a stake in properly managed floodplains." — Western Governors' Association, December 1997.

Yellowstone River, Hayden Valley. Photo: John McShane, FEMA

Chapter 4

Conclusions and Recommendations

From the preceding chapters, it is clear that there is a shift toward improving the management and restoring the functions of the Nation's floodplains. There is considerable evidence of increasing federal, state and community emphasis on managing floodplains for their natural flood-carrying functions, using more *nonstructural* measures such as open space designation to limit flood damages and reducing emphasis on traditional structural flood control strategies, which have often had unanticipated adverse results.

Rural home surrounded by flood waters in St. Genevieve, Missouri. Photo: FEMA

Since the Great Midwest Flood of 1993, an estimated 20,000 flood-damaged homes and businesses in at least 36 states have been or are in the process of being voluntarily bought out or relocated through a variety of federal and state disaster relief and mitigation programs. Hundreds of damaged and floodprone structures are currently being

removed or relocated or are being considered for removal or relocation as a result of the massive spring 1997 floods in North and South Dakota and Minnesota.

Photo: U.S. Fish and Wildlife Service

Such efforts stem largely from community-led (and federal- and state-assisted) efforts to address recent major losses, longstanding flood damage histories and known risks. The communities have recognized the value of floodplains for open space land uses, fish and wildlife habitat, improved water quality, and recreational, agricultural, and aesthetic benefits, as well as for their flood control functions.

Will the Recent Changes in Approach Be Sustained?

At no time in history has the Nation had more information or been better positioned to rethink our basic flood damage prevention and mitigation strategies and to improve floodplain and watershed management. The question is whether and to what degree these changes in approach are likely to become more widely accepted and institutionalized. This will depend on the commitment of federal, state and local governments and the public to seek sustainable solutions for flooding problems and to change the patterns that have led to the Nation's cycle of ever increasing flood damage costs.

This chapter summarizes the important findings and conclusions of ***Higher Ground*** and identifies actions and program changes that are needed, particularly at the federal level. In particular, the National Wildlife Federation recommends much greater use of the voluntary buyout option and other nonstructural approaches to reduce flood damages and to promote wise floodplain management.

Higher Ground's Key Findings

- Historically, the United States has relied almost exclusively on structural flood control approaches to reduce flood damage.
- Despite the billions of dollars invested by federal, state and local governments for structural flood control projects, we find overall that flood damages have not, in fact, decreased but have increased at an alarming rate during the period of greatest federal spending. In the past five years, flood damages in the United States have exceeded $40 billion, significantly surpassing any similar period.
- Today, long-term average annual flood damages, in constant dollar terms, are more than double what they were early in this century.
- Despite notable efforts by the National Flood Insurance Program, many areas have large and increasing amounts of residential and commercial development in floodprone areas and at substantial flood risk. Only 20 to 30 percent of buildings in regulated 100-year floodplains are insured and large numbers of buildings in floodplains behind levees and other structural barriers are not insured for *residual risks* associated with such projects.
- The public and many communities have come to rely far too heavily on the federal government to indemnify their own poor land use decisions, individually and collectively, against inevitable flooding.

Army Corps of Engineers removes a barge loosened from its moorings from the force of floodwaters. It sank in the Houston Ship Channel and became a navigational hazard. Photo: U.S. Army Corps of Engineers

- Reliance on the federal government has come in the form of an endless stream of flood control projects, and funding to repair damaged levees and other flood structures, an ever increasing demand for disaster relief and an unsustainable level of federal insurance funds.
- The Nation has also failed to view flooding from a system-wide perspective. Communities and the federal government

have spent huge sums on levees, dams, river channelizations and land drainage works to shunt floodwaters downstream, which often exacerbates flood-related problems for downstream farmers and communities.

- Congress has already had to bail out the NFIP, forgiving more than $1 billion in funds borrowed from the Treasury that were never repaid. Today, once again, the program is $810 million dollars in debt to taxpayers, and there are serious questions about whether it can generate enough funds to ever repay the debt. This is especially a concern because the NFIP's *historical average loss year* has risen more than $100 million, to $670 million, in the past two years (1996 –1997). Unless the rise of the historical average loss year is accounted for in insurance premium rates, the NFIP is in danger of going further into debt.

Flooding in Texas. Photo: FEMA

- In recent years, Congress and the Executive Branch have begun to increasingly support the use of the voluntary buyout and relocation option, restoration of floodplain functions, purchase of flood easements and wetlands and promotion of wise floodplain management as major new tools to reduce flood risk and protect the environment. *In subsequent flooding, these investments have proven to be extremely effective*.
- The Federal Emergency Management Agency has concluded that for many of its nonstructural hazard mitigation projects, at least two dollars in reduced damages and losses can be saved for every dollar invested. This does not count the intangible benefits of reduced anguish, reduced disruption of lives and communities and increased benefits of protection and restoration of the environment that can result.
- In 1994, with the completion of the Report of the Interagency Floodplain Management Review Committee, titled *Sharing the Challenge: Floodplain Management into the 21st Century*, and the experience after the Great Midwest Flood of 1993, much of the groundwork was laid to

identify changes in policies and procedures and set a new course for flood damage prevention and mitigation. Yet action on this groundwork has proceeded slowly.

- ***Higher Ground*** stresses that the National Flood Insurance Program provides a history of almost two decades of *repetitive loss properties* that should be recognized as a potential indicator of where nonstructural flood damage prevention and mitigation efforts could begin for a large number of the Nation's communities.
- The history of the National Flood Insurance Program shows that a relatively small number of high-risk, insured properties are generating a large percentage of flood loss. The repetitive loss properties, amounting to two percent of all properties with federal flood insurance, are generating approximately 25 percent of all loss claims and 40 percent of total flood insurance payments. These payments amounted to almost $2.6 billion over the 18-year period, 1978–1995. Approximately 40 percent of repetitive loss properties (0.8 percent of all insured properties) have three or more losses within this 18-year period, and some have as many as 34 losses. From 1978 to 1995, properties with three or more losses had total flood insurance payments of more than $1.4 billion, or 20 percent of total flood insurance claims.
- While the flood insurance program was premised on the assumption that high-risk properties in floodplains built before *flood insurance rate maps* were completed — generally before 1974 (referred to as *pre-FIRM* properties) — would be destroyed, elevated or relocated from the floodplain when they suffered damage of at least 50 percent of their value (*substantial damage*), it appears that destruction, elevation or removal frequently has not occurred for repetitive loss properties. Thus, the flood insurance program continues to sustain high losses and is unable to operate on an actuarially sound financial basis.
- The Nation needs a fundamental change in the allocation of responsibilities for flooding and floodplain management. More states and communities seem willing to pursue nonstructural flood damage prevention and mitigation strategies with the encouragement and support of programs designed to help floodprone communities help themselves.

National Wildlife Federation Recommendations

The National Wildlife Federation urges the federal and state governments to assist the 300 communities listed in Chapter 3, Table 3.I to review and examine the causes of their repetitive loss problems and to identify existing and potential programs and policies that can ameliorate their flood losses in the future.

While there are more than 4,500 communities in the United States that have at least one property with a history of repetitive flood losses under the NFIP, the 300 communities in Chapter 3, Table 3.I have experienced nearly half of the total number of losses (94,952) and have recorded almost half the flood insurance claims payments made ($1.3 billion) for insured repetitive loss properties over the 18-year period studied. In addition, flooding of these and other properties and public infrastructure in repetitive loss areas has resulted in substantial additional cost through emergency and disaster relief programs at all levels of government. The National Wildlife Federation, in addition, urges these communities to review their repetitive flood loss areas, the current plans for mitigation or disaster response and the potential to reduce flood risk through nonstructural flood damage reduction programs and approaches.

Beyond the communities listed in Chapter 3, Table 3.I, Congress, the Executive Branch and Governors should pursue programs aimed at reducing the risk associated with repetitive loss properties.

The analysis in Chapter 3 shows that repetitive flood loss properties under the National Flood Insurance Program, which have received payments of more than $2.5 billion over 18 years, represent an enormous cost to the National Flood Insurance Fund. The extraordinary level of claims and the fact that more than 90 percent of repetitive loss structures are pre-FIRM properties receiving heavily subsidized insurance rates make these properties a significant drain on the fund and a significant cause of its overall deficit problem.

These properties are also located where disaster relief costs are extraordinarily high.

After the Midwest Flood of 1993, the public realized that many of the buildings subject to the greatest damage had been repeatedly flooded in the past. This was one of the strongest motivating factors that led Congress to increase and provide authorized funding for voluntary buyout and relocation projects through the Hazard Mitigation Grants Program under the Stafford Act.

The history of repetitive losses also motivated the creation of FEMA's Flood Mitigation Assistance Program, which provides pre-

disaster planning and flood mitigation project grants, and the establishment of the Increased Cost of Construction insurance provisions in the 1994 Flood Insurance Reform Act, which provide payments up to $15,000 to insured property owners to meet codes requiring the removal or elevation of repetitive loss or substantially damaged properties after flood disasters. Despite the addition of these new tools, it is clear that without greater attention and planning, particularly at the state and community levels, the benefits of these programs will be limited and the major drain on government disaster relief and insurance funds will continue.

Glasgow, Missouri railroad bridge destroyed in flooding. Photo: NOAA

Decreasing the financial burden of repetitive loss properties should be a high priority for all levels of government.

Federal, state and local governments should coordinate and develop predisaster hazard mitigation plans to facilitate timely, coordinated hazard mitigation efforts before and after flood disasters occur. Congress and the Executive Branch should provide support for programs such as FEMA's Project Impact.

States, tribes and communities, in coordination with federal agencies, should identify, before a disaster, those areas and properties that are at particularly high risk of flood damages and develop plans for appropriate mitigation measures to reduce the risks. FEMA should work closely with states, tribes and communities to focus more attention on reducing the risk associated with repetitive flood loss properties. States should take the lead in helping communities develop flood hazard mitigation plans, with substantially increased technical assistance from FEMA, the U.S. Army Corps of Engineers and other federal agencies. Within a practical period of time, FEMA should require communities to develop mitigation plans for repetitive flood loss properties as a basic condition of community participation in the NFIP.

In addition, Congress and the Executive Branch should encourage the expansion of efforts, such as FEMA's Project Impact program, that facilitate public and private collaborative planning to foster *disaster resistant communities*.

Congress and the Executive Branch should develop a flexible, consolidated and streamlined voluntary buyout and relocation assistance program that can react quickly to assist states and communities after flood disasters and that can better assist states and communities to mitigate flood risk before disasters occur.

Overall direction is needed at the federal and state levels to assist in coordinating multiagency flood hazard mitigation projects. While many federal departments and agencies are often involved in postdisaster (and even predisaster) flood mitigation voluntary buyout and relocation activities, agency missions and procedures sometimes diverge, which hinders coordination efforts. Broad, overarching authority to coordinate agencies and departments for these complicated and time-sensitive projects could make it easier for communities to plan and implement nonstructural flood damage reduction. Authorities should be clarified to promote collaboration on flood hazard mitigation efforts. For instance, the Corps of Engineers should be granted authority to assist states and communities with the planning and implementation of nonstructural flood hazard mitigation projects in coordination with FEMA, the Agriculture Department and other federal agencies.

Congress should support the Corps of Engineers' new Challenge 21 Initiative for Flood Hazard Mitigation and Riverine Ecosystem Restoration, proposed in the President's fiscal year 1999 budget.

This initiative would provide funding and expanded authority for the Corps of Engineers to coordinate with federal, state and local agencies to plan and implement nonstructural flood damage reduction projects, such as voluntary buyouts and purchase of floodplain easements, and at the same time restore natural floodplain functions and riverine ecosystems. Such a program would allow the Corps of Engineers to assist communities in developing nonstructural flood damage reduction projects that in the past have often been eliminated from consideration because of antiquated planning procedures.

FEMA and Congress should revise flood insurance rate schedules and community participation standards for the National Flood Insurance Program to provide increased incentives to reduce flood risks.

Many of the rates for federal flood insurance are not actuarially sound because premiums paid do not accurately reflect the risk. Subsidized rates discourage actions to mitigate flood risk. Rate structures for pre-FIRM properties should be revised by FEMA to provide greater incentives to reduce risk. FEMA's flood insurance underwriting should be modified to more closely resemble the standards of the private insurance industry. Particularly when structures have received three or more losses, flood insurance premium rates should be increased to reflect the higher flood frequency and the cumulative cost of flood losses associated with that property. Congress should also eliminate the artificial 10 percent annual rate increase cap that was set in the 1994 Flood Insurance Reform Act. The cap further hampers setting rates on an actuarial basis and establishing rates that encourage flood-risk mitigation.

In addition, FEMA should strengthen NFIP building and floodplain mapping standards to further reduce future flood risks. FEMA should consider:

- Increasing the *first floor elevation new construction standard* to above (not at) the 100-year flood elevation;
- Adopting (and encouraging states to adopt) a *zero-rise* standard (instead of the current 1-foot rise) for floodway fill and construction;
- Requiring dry-land access to buildings in special flood hazard areas during 100-year floods to protect public safety and to discourage construction of new residences and businesses in floodprone areas; and
- Requiring floodplain maps to be updated much more frequently and requiring the maps to reflect reasonably foreseeable future hydrological conditions in the associated watersheds.

FEMA should vigorously enforce the NFIP's substantial damage requirement for elevation or removal of substantially damaged buildings after floods. FEMA and Congress should consider modifying this requirement to include cumulative substantial damage thresholds and to allow FEMA to make substantial damage determinations, when necessary.

In fall, 1994, some houses were built on stilts to avoid flooding in Galveston, Texas. Photo: FEMA

Strict enforcement of elevation requirements for flooded buildings that are *substantially damaged* (i.e., suffer damages of at least 50 percent of the building value) is needed to help break the unfortunate cycle of repeated flood damages and the associated human suffering. In Chapter 3 of this report, data analysis of substantially damaged repetitive loss structures shows that, over the 18 years studied, the enforcement of the NFIP's substantial damage requirement has been lax, and there has been little progress in lowering rates of losses and subsequent costs associated with repetitive loss structures in the NFIP.

Many experts point to the wide latitude that FEMA allows for communities to calculate whether *substantial damage* has occurred and to the difficult social pressures within the community after flood events occur that cause local officials to avoid making substantial damage determinations, as some of the key problems. It is hoped that new programs, such as the Increased Cost of Construction and Flood Mitigation Assistance Programs, will make it easier for local officials to enforce the substantial damage rules, yet problems continue with the effectiveness of these programs (see discussion in Chapter 2). FEMA should be directed to review the causes of lax enforcement and to identify necessary remedies, including whether FEMA needs additional enforcement authority. In addition, FEMA and Congress should establish a cumulative substantial damage threshold that would identify when a building's history of repetitive losses and claims would trigger the removal or elevation of the building out of harm's way.

The responsibility for managing and reducing flood losses and improving floodplain management should be shared more equitably among all levels of government and the private sector.

This broad recommendation applies to all citizens and government entities, and reflects the need for a considerable shift in our collective view of flood hazards and how we relate to them. It represents a key theme reflected in virtually every study and report of the past decade on flood damage reduction. The responsibility for flood-related problems must be more equitably shared among all sectors. Over the years, the federal government has assumed a greater and greater responsibility for nearly every phase of flood-related activity. In hindsight, this may have exacerbated flooding problems in numerous and unintended ways.

In its recent draft report to Congress, titled *Reducing Disaster Relief Expenditures*, FEMA's Panel on Streamlining and Disaster Cost Savings concluded that, with regard to providing community disaster relief, "Both Congress and the Federal Government have attempted to

meet the needs of victims in each incident; however, expanding eligibility to meet one particular need has resulted in the permanent expansion of eligibility for all future events." The panel viewed the expansion of federal disaster relief entitlements as a key factor in the overall explosion of federal disaster costs. The panel also concluded that "The current system of disaster relief tends to discourage state and local governments from assuming primary responsibility for initiating appropriate mitigation, preparedness, response and recovery measures before disaster strikes . . . . Incentives need to be provided to help state and local governments to invest in hazard reduction."[1] These conclusions are applicable to nearly all federal flood control and disaster relief programs.

Boulder Creek Bikeway: Boulder, Colorado has transformed its flood hazard areas into community assets by creating greenways with wildlife preserves, parks and bike paths. Photo: John McShane

The National Wildlife Federation believes that to increase the sharing of responsibility, the federal government must begin to limit the dependence of floodprone communities and property owners on federal sources for compensation and after-the-fact solutions to flooding problems. In many cases, this means basic federal disaster relief cost-shares should be substantially reduced. Also, federal flood insurance premiums must be actuarially sound — taking into account the costs of flood hazard risk. To encourage more active involvement of state and local governments in flood-risk management, the federal government should adopt a policy of providing a broad range of technical support to states and communities, but granting a larger federal share of flood disaster relief and other assistance only where states and communities that have implemented strong hazard mitigation, floodplain management and risk reduction programs before flood disasters.

The President and Congress should address and implement the key major recommended actions of the Interagency Floodplain Management Review Committee.

Congress and the Executive Branch should implement the recommendations of *Sharing the Challenge*, which was produced by the Interagency Floodplain Management Review Committee. The report provides a blueprint for improving floodplain management nationwide by reducing flood risks and flood damages and recognizing and utilizing the natural and beneficial functions of the Nation's floodplains. Some four years after release of this report, however, only limited steps have been taken to bring its recommendations to reality.

Sharing the Challenge contains more than 100 actions and recommendations that should be implemented by federal and state governments — some of which are highlighted or elaborated on as separate recommendations in this chapter of ***Higher Ground***. Among its key overarching recommendations that should be given immediate attention are the following:

- The President should issue a new Executive Order to reaffirm and expand the federal government's commitment to floodplain management (Action 5.4).
- The administration should propose to Congress a National Floodplain Management Act to define governmental responsibilities, strengthen federal-state coordination and ensure accountability (Action 5.1).
- The administration should establish, in the Executive Branch, an effective coordinating mechanism for flood management policy.
- The NFIP should be modified to require *residual risk* flood insurance behind all levees that provide protection at less than the level of the *standard project flood* (Action 9.6). This would apply to buildings which are landward of levees and located at or below the 100-year flood elevation.

These actions would give direction to and strengthen the commitment of all federal agencies and states to expand the use of nonstructural and more environmentally sound approaches to flood prevention and mitigation and to promote wise floodplain management. They would provide needed policy guidance and direction to federal, state, tribal and local governments with regard to flood-related decisionmaking and would bolster community and state efforts to use a variety of hazard mitigation measures, including voluntary buyouts and relocations.

Rescuers save pet after Texas Flood. Photo: FEMA

Congress and the Executive Branch should eliminate the present strong bias in federal water resource project planning and evaluation procedures (the Principles and Guidelines) that favor structural approaches for flood damage prevention and mitigation over nonstructural approaches.

The current procedures used by federal water resource development agencies — principally the Corps of Engineers and the Agriculture Department's Natural Resources Conservation Service — to plan and evaluate flood damage reduction projects, called the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)*,[2] have not been revised since they were adopted in 1983. As they are generally applied, these procedures favor structural projects and are biased against nonstrucutral projects, such as buyout and relocation, purchase of flood easements and floodplain management. As a result, all too often, the planning process is predestined to recommend levees, dikes, channelization or dam projects or no project at all.

The greatest impediment to nonstructural projects is a guideline for benefit/cost analysis that counts benefits for future flood damages avoided for buildings that are *protected* by struc-

tural projects but does not count a benefit if a building is evacuated from the floodplain — even if the building has a demonstrated history of flood damages. Under the existing P&G, few buyout and relocation projects can ever have enough benefits to overcome the costs involved. The reason given for the exclusion is a simple assumption that the market automatically discounts the future costs of flood damages in a floodprone building's price, and that it would be double-counting to allow flood damage reduction benefits if the purchase price is already reduced because of its location.

Strip mall closed in Albany, Georgia after floodwaters reach waist high. Photo: U.S. Army Corps of Engineers

Recent studies call this economic assumption into serious question. In a broad review of existing empirical studies, a Corps of Engineers economic study team concludes that "A general discount for floodplain location … does not exist."[3] It recognizes that often, for a variety of reasons, consumers will not discount the price of floodplain property (some don't recognize the hazard, some just like to live there). This is intuitively clear to many noneconomists. The team recommends, in light of the findings, that the Corps of Engineers "assess the theoretical framework and underlying assumptions in the P&G's explanation that primary damages are already accounted for in the market value for floodplain properties." The federal water agencies should respond to these findings — and what many view as obvious — and acknowledge that benefits should be allowed for reduced primary flood damages from nonstructural buyout relocation projects.[4]

Recently, the Corps of Engineers has been moving toward recognizing that voluntary buyout and relocation projects serve important ecosystem restoration purposes by restoring critical floodplain hydrologic functions for areas such as floodways and high-risk repetitively flooded areas.[5] Such an approach would allow the Corps of

Engineers to work with local communities and other federal agencies to develop nonstructural projects that emphasize a wide range of benefits of floodplain management.

The Congress and the Executive Branch should eliminate the bias against nonstructural approaches in project planning procedures and encourage the Corps of Engineers and other federal agencies to cooperate toward an explicit objective of actually reducing flood risk and flood damages by promoting wise floodplain management.

Cutthroat Trout swimming upstream to spawn in Yellowstone Lake. Photo: John McShane

Congress should reduce the basic cost-share for federally supported flood control projects to 50 percent, with incremental cost-share incentives to promote flood hazard mitigation ranging to a maximum 65 percent federal cost-share. An analogous, consistent formula should be set for the provision of public assistance disaster relief by FEMA under the Stafford Act.

Current formulas for federal flood control projects are so generous that they weaken incentives for states and communities to implement wise floodplain management. Rather than reducing flood losses, federal flood control programs have encouraged development in floodprone areas and have too often had the unintended effect of increasing flood problems downstream.

In 1996, as a follow up to a rejected budget proposal that would have phased out future Corps of Engineers' involvement in local structural flood protection projects, the Clinton administration proposed capping the federal cost-share for Corps of Engineers' flood control projects at 50 percent, instead of the exisiting 75 percent formula. In the 1996 Water Resources Development Act, Congress countered by authorizing substantial numbers of new structural flood control projects with the standard 75 percent federal cost-share. Congress, however, did reduce the standard federal cost-share for subsequently authorized projects to 65 percent and required local floodplain management plans to be implemented within one year of completion of project construction.

The National Wildlife Federation believes flood control project formulas should be modified to provide incentives for state and local

governments, communities and private individuals to reduce risk and more carefully manage development in floodprone areas and to decrease the liability of the federal government to bail out those who do not implement wise floodplain managment. Ironically, the current formulas discriminate against those communities that are carefully managing floodplain development.

The National Wildlife Federation recommends that Congress and the Executive Branch reduce the standard federal cost-share for Corps of Engineers' flood control projects to 50 percent (or less) but include incentive levels rising up to a 65 percent federal cost-share for communities and states that institute a broad range of nonstructural measures to better manage flood risk and implement floodplain management. The NFIP's Community Rating System identifies and rates 18 different types of nonstructural measures that could serve as a basis for such an incentive system.[6] Incentives would be awarded only to communities that have implemented flood hazard mitigation measures that exceed minimum requirements for Corps of Engineers projects and minimum requirements for community participation in the NFIP. Projects for nonstructural flood damage reduction that permanently reduce flood risks and benefit the environment should receive higher levels of federal cost-sharing as a further incentive for better floodplain management.

Congress should also adjust the federal cost-share for federal public assistance disaster relief under Section 404 of the Stafford Act. In recent years, and with increasing frequency, FEMA has issued Public Assistance Grants to cover as much as 90 percent of damage costs to community public infrastructure, often allowing other federal sources to serve as the *nonfederal* match.[7] With such huge federal expenditures, state and local governments have virtually no incentive to minimize flood damages or to wisely manage floodplain development. In its recent Stafford Disaster Relief Act reform legislation, the Clinton administration proposed setting the basic federal (Section 406) Public Assistance Grant percentage at 75 percent, rising to a 90 percent cap, only for communities that take extra measures to manage and control flood damage risks.[8]

The National Wildlife Federation strongly endorses providing federal cost-share incentives to encourage hazard mitigation, but believes that Congress should set the basic federal Public Assistance share at a more balanced level of 50 percent with an incentive-based increase rising incrementally to 75 percent for those communities and states that support and implement strong hazard mitigation plans, including wise floodplain management and with incentives based on a rating of activities such as those described in the NFIP Community

Rating System. Special cost-sharing exceptions could be included to accommodate poorer communities and communities facing exceptionally severe hazards. Any formula, however, should encourage states and communities to develop effective hazard mitigation efforts.

Federal and state governments should coordinate follow up reports on all major flood disasters with disciplined reviews and aggressive efforts to mitigate flood hazards.

After flood disasters, despite long histories of flooding in many locations, the public is often left with the impression that each new flood is a unique and unprecedented event. Flooding, however, is one of the most predictable types of natural disaster, yet human memories are short and definitive records are often lacking.

In almost every major flood disaster, damages result from both natural and structural causes. For example, weather has an impact, but so do human decisions regarding land use and development and the design and operation of flood control systems. After each large flood, these issues should be carefully reviewed in a coordinated, interdisciplinary and interagency fashion by federal and state officials, scientists and academics. A flood review should determine the causes of the event and identify what can be done to reduce the likelihood of repeated high losses. Just as the National Transportation Safety Board reviews air traffic disasters to discern their causes and to identify corrective measures, the Nation should similarly institute regular, disciplined reviews of major floods that the public can rely on to develop appropriate responses. While such reviews have been undertaken on an *ad hoc* basis after several recent floods, this recommendation urges that these actions become more institutionalized and become a central part of hazard mitigation nationwide.

Flooding wreaks havoc for a homeowner along a river in Texas. Photo: FEMA

Congress and the Executive Branch should increase levels of funding and support for programs that provide technical assistance to states and communities for improving floodplain management and flood loss reduction activities.

While the National Wildlife Federation believes the federal government must relinquish some of its accumulated responsibility for flood-related problems to other levels of government and the private sector, a key role that should be maintained and expanded is the federal technical assistance provided to states and communities to help deal with these problems. The Corps of Engineers' **Floodplain Management Services** and **Planning Assistance to States** programs, FEMA's **Community Assistance** and **Flood Mitigation Assistance** programs, and the National Park Service's **Rivers, Trails and Conservation Assistance** Program are examples of federal technical assistance programs.

Nature meanders on. Tributary of Gardiner River, Yellowstone National Park, Wyoming. Photo: John McShane

The Corps of Engineers' **Floodplain Management Services** program provides floodplain management technical assistance free of charge to states, Indian tribes and regional and local governments (and on a reimbursable basis to private entities), and the **Planning Assistance to States** program provides a broader range of water resources assistance through the states to a similar range of entities on a 50 percent federal/50 percent nonfederal cost-share basis. These programs typically fund the following studies: flood damage reduction, comprehensive floodplain management plans, watershed assessments and wetlands restoration, inventories of floodprone structures, flood warning and evacuation planning and workshops and seminars on nonstructural floodplain management. FEMA's **Community Assistance** Program funds FEMA and state personnel to assist local

officials in more than 4,000 floodprone communities annually to implement NFIP community floodplain management plans and requirements. The **Flood Mitigation Assistance** Program provides as much as $20 million each year from flood insurance premiums for predisaster planning and implemention of buyout and relocation, floodproofing and other nonstructural flood hazard mitigation projects. The programs are cost-shared on a 75 percent federal/25 percent nonfederal matching basis. The National Park Services' **Rivers, Trails and Conservation Assistance** Program assists communities to plan for appropriate recreation, habitat and other open space uses of floodplains including development of community-based, multi-objective floodplain mangementt plans and plans for beneficial community use of floodprone lands after voluntary buyouts.

Each of these programs should be funded at considerably higher than current levels. Such funding and assistance is critical to help states, tribes and communities develop the experience and expertise to address flooding problems and develop and implement sound floodplain management planning.

Congress and the Executive Branch should direct federal agencies concerned with flood-related issues to consider prudent steps that take into account current scientific research on climate change and sea-level rise.

Chapter 6 of ***Higher Ground*** discusses the scientific consensus on global climate change and sea-level rise and the possible implications for flood-related problems. In researching the background for this report, the authors found very little evidence that agencies responsible for flood-related problems have integrated the scientific consensus into their planning. It is clear that governments worldwide are making efforts to avoid and mitigate the buildup of greenhouse gases that contribute to global climate change. Congress, the Executive Branch and the states should consider the implications of climate change in the formulation of their programs and policies and anticipate where future flood losses might be practicably minimized, given the probability of wider swings in weather-driven floods and increases in sea-level.

— David R. Conrad, principal writer and researcher.

Endnotes

1. Draft report to Congress, *Reducing Disaster Relief Expenditures*, Panel on Streamlining and Disaster Cost Savings, Federal Emergency Management Agency, March 1997, p. 14.
2. These are usually referred to as the *Principles and Guidelines* or the P&G. These are the basic procedures used by federal water development agencies to determine benefits and costs of water projects. The current P&G for Corps of Engineers flood damage reduction projects aim at maximizing *national economic development*, consistent with protection of the environment. In recent years, under the P&G, the Corps of Engineers has justified only a handful of nonstructural buyout and relocation projects, while at the same time supporting hundreds of levees, dam, and channelizations. Many floodplain managers have pointed out that Corps of Engineers structural projects have promoted more floodplain development, thus contributing to increased risk and damages.
3. Philip T. Chow, James L. Floyd, and William Holliday, *Empirical Studies to the Effect of Flood Risk on Housing Prices — Are Prices of Floodplain Properties Discounted for Primary Flood Damages?* review draft, Institute For Water Resources, U.S. Army Corps of Engineers, Report Number 96-PS-2, March 1997.
4. It is important to note that other federal agencies, such as FEMA, which does not follow the P&G, apply different economic tests of the worthiness of buyout and relocation projects. Because most structures are *potentially insurable*, and therefore could result in flood insurance or disaster relief costs, FEMA's primary economic test in hazard mitigation projects is to ensure that the benefits of reduced damages over the life of the structures involved (and supporting infrastructure) plus re-lated environmental and social benefits, exceed the costs of the buyout or floodproofing project. Recently, FEMA has identified a number of categories of floodprone areas where the agency can assume, based on experience and without detailed calculation, that the benefits of a buyout project would exceed the costs. In general, FEMA counts the benefits of avoiding primary flood damages for evacuation projects in its cost-effectiveness calculations and a broader range of environmental and social benefits, while the Corps of Engineers does not.

   Other commonly criticized Corps of Engineers' benefit-cost analysis procedures that result in bias against nonstructural approaches are the following:

- Failure to fully consider the catastrophic costs associated with failure of structural flood control projects (such as costs resulting from future induced development).
- Failure to consider the flood control benefits of temporary storage of floodwaters of the floodplain.
- Failure to fully include the environmental benefits of undeveloped floodplains (such as habitat for wildlife, and improved water quality) and the environmental costs of flood control projects.
- Conservative estimates of recreation benefits.
- Corps of Engineers' reluctance to include the nonmarket or intrinsic value of natural resources in benefit calculations. See Scott Faber, "Flood Policy and Management: A Post-Galloway Progress Report," *River Voices*, Volume 8, Number 2, Summer, 1997.

5. For additional background see Leonard Shabman, Ann Riley, and Gerald Stedge, *Evaluation of Floodplain Permanent Evacuation Measures: An Alternative Approach for the U.S. Army Corps of Engineer*s, Institute for Water Resources, prepared for U.S. Army Corps of Engineers, July 1997.

6. See Chapter 2 of this report for a description of the Community Rating System.
7. Draft report to Congress, *Reducing Disaster Relief Expenditures*, Panel on Streamlining and Disaster Cost Savings, Federal Emergency Management Agency, March 1997, p. 14.
8. Section 7 (b), S.1007, 105th Congress, 1st Session, introduced by Senator Chafee, by request of the Clinton administration.

5 A Tale of Three Cities

"The wake of a flood is an emotional time and the tendency is to rush in and fix what's been ruined and damaged. But people should think hard first. In our experience, rushing to rebuild is not always the best course of action. It's time to ask if rebuilding in an area prone to flooding is worth it, or if it's just reinvesting in disaster."

— Charles L. Hardt, Tulsa Public Works Director, 1993.

Heavy rains cause knee high water in the 1995 Flood in New Orleans. Photo: U.S. Army Corps of Engineers

Chapter 5

A Tale of Three Cities: Tulsa, Houston and New Orleans

All communities are unique, with their own character, specific geographic location and a host of distinguishing variables. A computer database analysis necessarily obscures the uniqueness of any given community. ***Higher Ground***'s central findings are the database analysis presented in Chapter 3. To illustrate the variety of realities behind the statistics, this chapter briefly examines the voluntary buyout option in three cities.

Tulsa, Oklahoma, was chosen because it is a premier example of a community that has adopted a progressive, proactive approach to floodplain management.

Houston, Texas, and New Orleans, Louisiana, are illustrative because they are at the top of the list of all communities nationwide in terms of flood insurance payments made to repetitive loss structures. Together, Houston and New Orleans account for almost a third of the $1.8 billion in National Flood Insurance Program payments of the top 200 repetitive loss communities between 1978 and 1995.

On closer examination, Houston and New Orleans also illustrate why the voluntary buyout option may, or may not, apply to a given situation. Both have significant flooding problems. But while buyouts may suit Houston's needs, buyouts may not be the solution for New Orleans, where a different approach to flood mitigation may serve the community better.

Overall, this chapter is intended to emphasize that no matter what the statistics are, the people in each community, who know their own situation best, are the essential starting point for serious on-the-ground consideration of the voluntary buyout option.

The Tulsa Model

In the middle of the night on Memorial Day, 1984, more than a foot of rain fell on Tulsa, Oklahoma, in a few hours. Walls of water barreled down the creeks and over lowlands, sweeping away cars, trucks and mobile homes. People trying to flee drove into 10-foot walls of water and were washed downstream. Forty people on the rooftops of their mobile homes had to be rescued by an outstretched hand from a helicopter.

When morning came, Tulsa had lost 14 citizens and 288 were injured. The property toll included damage to more than 6,800 buildings and 7,000 cars and trucks, and 10,000 buildings were without power. The cost was a staggering $180 million.[1]

Until the mid-1980s, when it developed an aggressive floodplain management program, Tulsa was America's most flooded city. It had been declared a federal flood disaster area nine times in 15 years, and during the 1960s and 1970s, floods every two to four years were destroying many of the same reconstructed buildings over and over. Some homes had been flooded and rebuilt as many as five times in six years.

Tulsa's reaction to the '84 flood, however, has proven to be an outstanding example of how a community can use modern floodplain management to assist its citizens and the environment. Tulsa's proactive approach has reduced losses from repeated flooding, enhanced the quality of life by expanding open space recreational areas and created a better environment by returning floodplains to wetlands and open spaces and reclaiming important wildlife habitat.

"The wake of a flood is an emotional time and the tendency is to rush in and fix what's been ruined and damaged. But people should think hard first. In our experience, rushing to rebuild is not always the best course of action. It's time to ask if rebuilding in an area prone to flooding is worth it, or if it's just reinvesting in disaster." — Charles L. Hardt, Tulsa Public Works director, 1993.

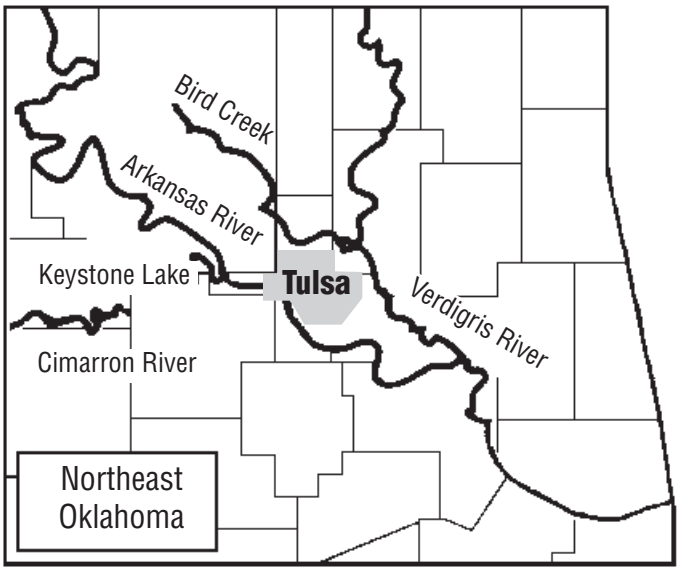
Why Tulsa?

Tulsa is situated on the banks of the Arkansas River in Oklahoma (see Map 5.I). Following World War II, the city's expanding population combined with a lack of land use planning to create substantial areas of

urban sprawl. This development fanned out onto the floodplains of the Arkansas River and several of its local tributaries, particularly during development booms in the '50s and '60s, creating a situation ripe for floods. Currently, between 10 and 15 percent of the community of 378,490 is located on floodplains.[2]

Further compounding the flood problem is Tulsa's location at the convergence of three distinct weather systems — a hot, arid zone to the west; temperate climate to the north; and a hot, humid zone to the south. The weather from these systems collides periodically, resulting in heavy downpours and frequent flooding. Normal rainfall averages approximately 36 inches a year, but when big storms gather, they can dump nearly half that in a few hours.

Map of Northeast Oklahoma: Tulsa's Watersheds



Source: From Rooftop to River: Tulsa's Approach to Floodplain and Stormwater Management, *p. 1.*

Map 5.I

The Era of Floodplain Management

> ***"Perhaps the idea [of floodplain management] was carried on the flood of June 8, 1974, while Bob and Ann Miller celebrated their daughter's ninth birthday on the roof of their house, watching their cat drown."*** — Ann Patton, manager of community affairs, Tulsa Department of Public Works.

The idea of floodplain management reached Tulsa in the wake of a severe flood on June 8, 1974, although this flood was not Tulsa's worst. As the year came to a close there had been a total of three damaging floods, and 1974 had been coined the "Year of the Floods," with more than $42 million in damage. People realized that rebuilding only meant they'd be flooded again. Citizens who owned some of the most flooded properties petitioned the city to relocate their homes.

The first buyouts in Tulsa took place following the 1974 flood, when 33 homes were cleared off some of the most frequently flooded properties in the city for a channel project. The site was on Mingo Creek, a lowland tributary of the Arkansas River. This marked Tulsa's

first major response to flood damage that included getting people out of harm's way.

Over the next nine years, Tulsa argued about floodplain management: regulation versus development rights, downstream channels versus upstream detention and structural versus nonstructural measures. During this period, Tulsa acquired and relocated approximately 30 more buildings. The city also built detention basins, imposed a moratorium on floodplain development and developed drainage plans for many of Tulsa's creeks. But the main postflood strategy for dealing with flood loss remained to rebuild. It was not until the devastating flood in 1984, which was a presidentially declared disaster, that people realized their response needed to be more comprehensive.

Within days of the 1984 flood, Tulsa assembled its first flood hazard mitigation team. Critical rebuilding decisions are typically made within a few days following a disaster, so the team was ready with a comprehensive local mitigation plan to hand off to the federal disaster relief team when it arrived. To best leverage available funds, including insurance payments, the goal was to clear the worst flooded homes before they were rebuilt. After identifying 300 of the worst flooded homes at nine sites, Tulsa began a major voluntary buyout and relocation effort (see Figure 5.I).

The 1984 flood routed thousands, killed 14, injured 288 and caused $180 million in damages to almost 7,000 buildings. Photo: ©Jim Wolf

Tulsa Flood Acquisition Cost
1974–1984

Year	1974–1976	1979–1982	1984–1985
Parcels	33	30	284[a]
Purchase price	$867,731	$1,347,032	$16,460,916
Appraisals/legal	$7,993	$5,600	$157,476
Relocation/moving	$4,981[b]	$394,993[c]	$647,156[d]
Administration	$22,560	$33,459	$364,634
TOTAL COST	**$903,265**	**$1,781,084**	**$17,630,182**
LESS:			
Sale of structure/ salvage & rental	$104,306	$83,529	$865,496
Insurance claims	N/A	N/A	$3,375,411
Section 1362 funds	N/A	N/A	$1,864,428
CITY'S NET COST	**$798,959**	**$1,697,555**	**$11,524,847**
CITY % OF TOTAL COST	**88.50%**	**95.30%**	**65.40%**

a) As of October 15, 1985
b) Actual moving expenses
c) Uniform relocation assistance
d) Moving expense and reimbursement

Source: From Harm's Way, *p.19.*

Figure 5.I

Purchasing Flooded Properties

The city and each seller obtained an appraisal, based on a preflood fair market value of the damaged or destroyed property. All purchases were made from willing sellers.

The city designated high-hazard areas and imposed a rebuilding moratorium in these areas until the city could complete its mitigation plan. The city announced that permits would be required to rebuild any structure with more than 18 inches of flooding or repair costs of more than $5,000, based on recommendations by the Federal Emergency Management Agency and the Small Business Administration. The SBA provided loans to help repair or relocate damaged buildings.

The actual relocation of homes took several courses. Some owners bought land outside the floodplain while the city and FEMA purchased their former homes and sold them back at scrap value for

relocating. In other cases, the city moved flooded but structurally sound homes to new sites. Cleared floodplains were used for flood control works, open space, reclaimed wildlife habitat and recreation. Numerous parks and hiking trails have been created, as well as recreation fields, wetlands and urban wildlife enclaves.

Funding

Finding the money to purchase properties on such a large scale was the first hurdle. At the time of the 1984 flood, Tulsa had available unallocated sales tax funds. Some people advocated spending the funds for other purposes such as streets, but instead, Tulsa used these funds for a revenue bond sale. The city used the *interest* from the funds, FEMA funds and SBA-assisted homeowners' funds to finance part of the voluntary property buyout.

In addition, Tulsa got permission to use FEMA federal flood insurance checks and SBA loans for property acquisition. The city also negotiated with FEMA for federal funds specifically allocated to buyout and relocate flooded homes.

With these funds, FEMA agreed to fund 50 percent of the acquisition cost after deducting flood insurance claims. Tulsa further reduced actual costs to the city by using federal temporary housing assistance and SBA involuntary relocation loans. The 1984 acquisitions cost the city 65 percent of the total cost, a significantly lower cost than the relatively few buyouts the city had previously undertaken.

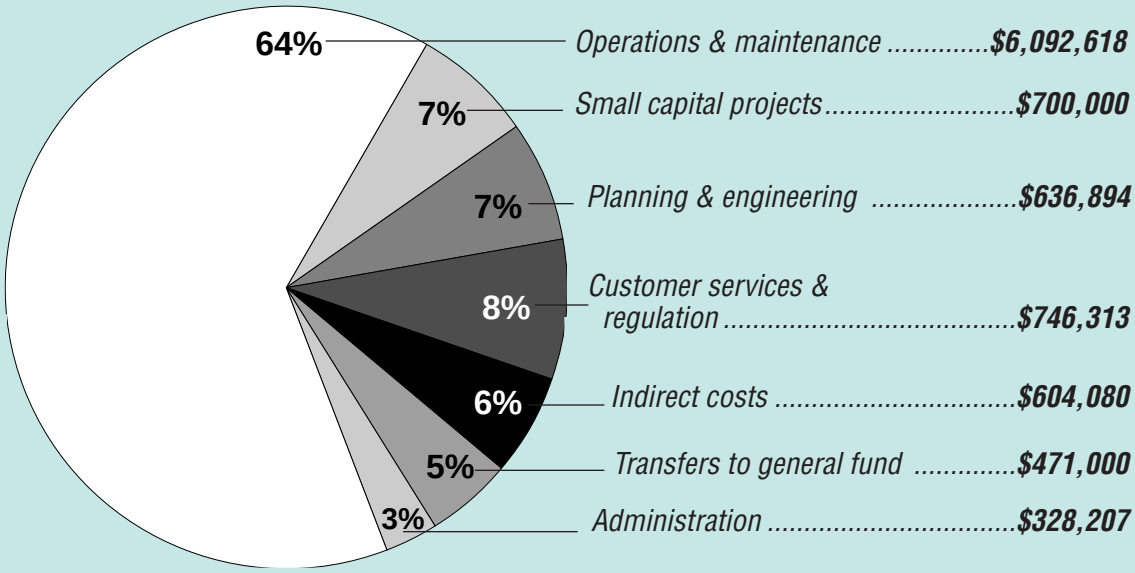
"We have a variety of funding sources and are always looking for others. FEMA is a critical player. After a flood, we apply for mitigation money from FEMA for acquisitions. FEMA provides up to 15 percent more than the total damage costs for mitigation projects."
— Ann Patton, City of Tulsa, Department of Public Works.

Tulsa realized this initial response to the 1984 flood was only the first step to make the city flood-safe. Therefore, Tulsa developed a comprehensive stormwater management program, supervised by the city's Public Works Department. Moreover, the city created an important source of future funding through a stormwater utility fee, established by city ordinance in 1986 (see Figure 5.II). This fee requires Tulsa residents to pay $2.95 per month and businesses according to their runoff. This fee brings in more than $10 million per year.

In addition, each year the city puts aside capital funds specifically for

Stormwater Utility Fee

Most of the Stormwater Utility Fee is budgeted for maintenance and operations. In addition, Tulsa spends approximately $10 million per year in local capital funds for flood projects.



Total stormwater expenditures, FY 94–95.....$9,579,112

Source: From Rooftop to River: Tulsa's Approach to Floodplain and Stormwater Management, *p. 21.*

Figure 5.II

acquisitions of frequently flooded properties.[3]

Since 1984, Tulsa has invested $200 million in structural, nonstructural and other flood projects, $80 million of which has come from federal funds.[4] The city estimates that more than $300 million is still needed to protect Tulsa's homes and businesses. Tulsa is slowly meeting these capital needs and removing high-risk floodprone structures using funds from a variety of sources. Since in all but a very few cases disaster funds only arrive following a flood, Tulsans are ready with prepared buyout and relocation plans so that any disaster relief funds that become available can be used efficiently. In addition, Tulsa spends approximately $700,000 annually from its utility fee for small, localized flood mitigation projects.

Floods Test the Floodplain Management Program

In September and October 1986, a series of storms dumped enough rainfall to fill Keystone Reservoir, an Arkansas River flood control dam, located 15 miles upstream from Tulsa, that was built by the U.S. Army Corps of Engineers in 1964. The Corps of Engineers was

forced to release so much water that it caused flooding downstream.

While much of the area surrounding Tulsa was flooded, levees and the new open space preserves created by cleared buildings reduced significant damage to most areas of the city.

One low-income, industrial neighborhood, however, suffered flooding of 64 structures, including 39 mobile homes, costing $1.3 million. Thirteen parcels of land and seven homes were bought out in this neighborhood and a new levee was built to help protect the remaining buildings.[5]

Since 1986, Tulsa has not been hit by a massive storm. But several moderately large rainfalls have demonstrated the effectiveness of Tulsa's floodplain management system:

- **Mother's Day 1993, a flood comparable to the Mother's Day flood of 1970 that caused $1 million in damage, caused virtually no damage.**
- **May 1995, the Corps of Engineers was again forced to release large amounts of water from the Keystone Reservoir. Precautionary evacuations were ordered, but no serious flood damages occurred.**
- **According to the National Flood Insurance Program database, from 1978 to 1995 there were 93 repetitive loss properties that flooded in Tulsa in 1984, 32 in 1986, and only five in 1995.**

Tulsa's Ongoing Flood Hazard Mitigation Plan

Tulsa is currently updating its comprehensive watershed management plan to prevent new flood hazards, correct existing problems and enhance the surrounding environment and quality of life. The key aspects of Tulsa's ongoing floodplain and watershed management program include the following:

Buyout and Relocation. Whenever possible, Tulsa purchases and relocates buildings out of harm's way as the surest method of reducing flood hazards. The success of this strategy depends on four key elements:

- **Baseline information. Tulsa has researched more than 10,000 floodplain buildings and has information about the viability of purchasing and relocating each one. The information includes community right-of-way, open space potential and the level of recurrent flood damage the structure has suffered.**
- **Funding. Tulsa has an aggressive program that searches for new funding sources for buyout and relocation of**

Volunteers sandbag on the Arkansas River, 1986 flood. Photo: Tulsa Tribune

floodprone properties.

- Priority setting. Tulsa's first priority for relocations are residences, critical facilities, such as hospitals, and sites housing hazardous materials.
- Acquisition. Purchases are based on preflood fair market value. Options include demolition or relocation of a building to a dry site. Tulsa covers moving expenses and as much as $1,000 for relocation outside a floodplain.

Structural Projects. Tulsa uses structural projects to provide spot protection to floodprone sites. However, the city realizes that structural solutions may tend to transfer problems elsewhere, change the environment, encourage unwise use of the floodplain and create a false sense of security. To avoid creating future problems, development must follow guidelines that include the following:

- Floodwater storage areas. If any development project encroaches on a channel or floodplain, Tulsa requires detention to preserve or compensate for floodwater storage areas lost because of development.
- Watershed development permits. Any development within city limits requires a permit before building, excavating,

paving, grading or landfilling. Permits are based on floodplain maps and watershedwide master drainage plans.

- Drainage plans. A citywide master plan ranks and prioritizes hundreds of projects, taking into account existing conditions, objectives and costs and benefits.
- Maintenance and operations. The stormwater utility fee allows the city to keep its system operating at full capacity. This system includes hundreds of miles of surface channels, underground sewers, public detention basins, pump stations and bridges.

Floodplain Management: A Success Story

As a result of its proactive floodplain management program, in 1992 Tulsa received the Nation's highest rating in the National Flood Insurance Program's Community Rating System. Its flood insurance rates have dropped by 25 percent and are now the lowest in the Nation. The only other community to share this distinction is Sanibel Island, Florida. In 1992, FEMA awarded Tulsa its Outstanding Public Service Award because of the city's "significant contribution and distinguished leadership" in floodplain management.[6]

Buyout and relocation in a two mile area of Mingo Creek is now the site of lakes stocked with fish, jogging paths and recreational areas. The U.S. Army Corps of Engineers District Headquarters in Tulsa overlooks the site.
Photo: City of Tulsa

Tulsa is continuing its buyout program. In 1996, a rural area of Tulsa called Hagar Creek was flooded. "We dedicated the entire sales tax acquisition allocation on this project, and asked FEMA to match us," said Carol Williams, Tulsa's public involvement coordinator. So far, nine homes have been cleared at a cost of $630,000.[7]

Since the 1970s, more than 900 buildings have been acquired and cleared from Tulsa's floodplains.[8] The total cost has been slightly more than $20 million. While the city has not put a dollar value on the amount of damages the buyout program has averted, one thing is certain: none of the relocated homes have flooded again.

Environmental Benefits

In every flood control project, Tulsa seeks to improve the quality of life for its citizens by enhancing the quality of the surrounding

environment. This may include turning land where at-risk buildings once stood into open space for recreation and wildlife, creating small fish-stocked lakes from stormwater detention facilities or turning small parcels of land into urban wildlife enclaves for migrating birds and other small animals. Moreover, every project includes the planting of trees. In 1995 alone, Tulsa's Public Works Department planted 751 trees on public lands.

A 1995 project called the Heatherridge Stormwater Detention Basin exemplifies Tulsa's floodplain management philosophy. Heatherridge is the city's first constructed wetland. The 25-acre pond sits near a turnpike, but it provides both flood runoff containment and important habitat for migrating and nesting birds. "The unique nature of Heatherridge is an example that dual-purpose projects can benefit citizens — and the environment," according to Ruben Haye, Tulsa's chief of Projects Administration.

With this goal in mind, Tulsa has created more than 50 miles of trails along its stormwater channels. Necessary for maintenance, these trails serve as biking, walking and jogging paths, while the land alongside these trails is frequently left in a natural state, providing habitat for birds and small animals.

— Jules Reinhart, principal writer and researcher.

Houston, Texas

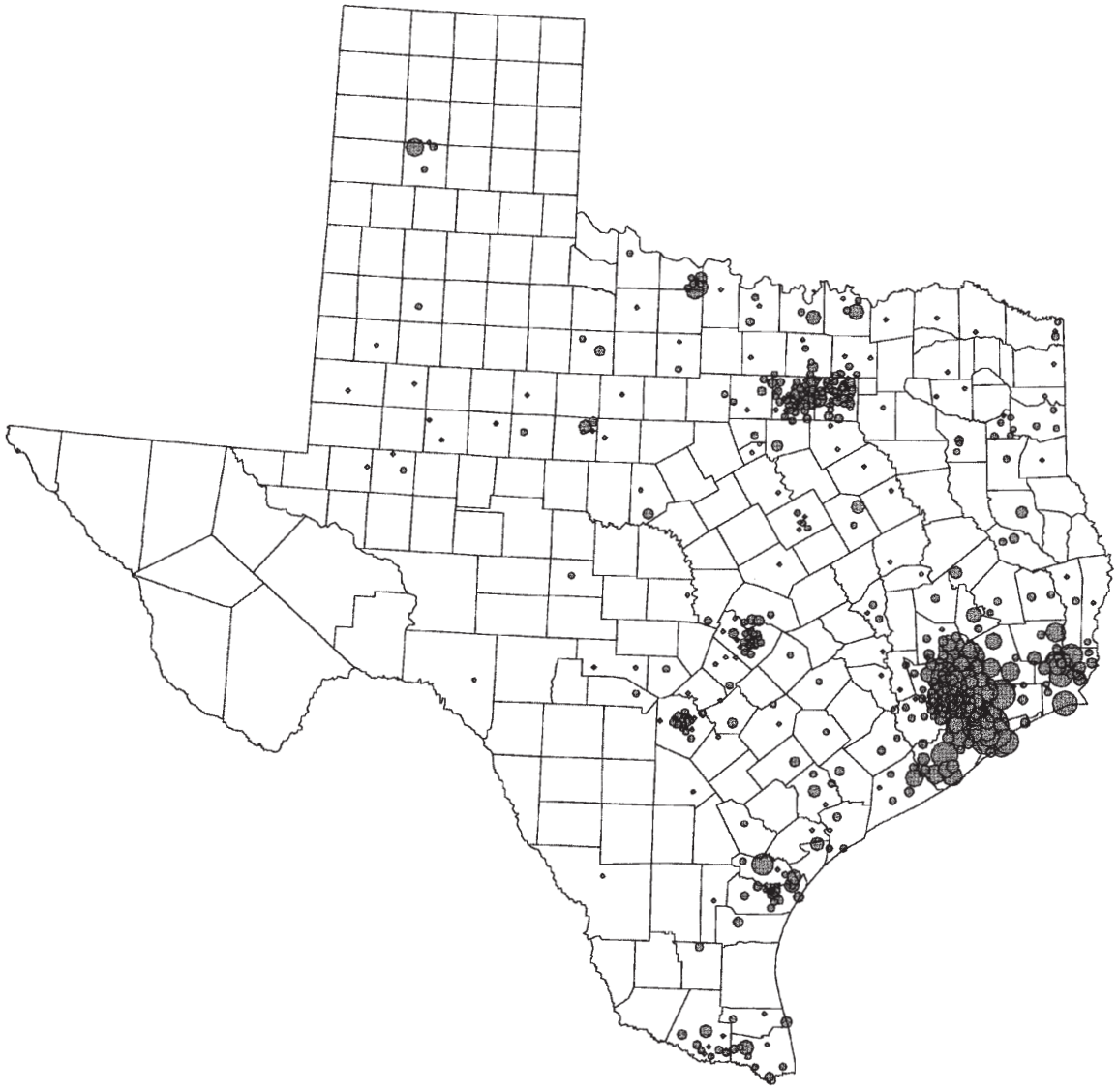
The buyout and relocation option holds high promise in Houston and the surrounding area. Fifteen percent of all the repetitive loss properties covered by the National Flood Insurance Program in the United States are located in Texas, which is second only to Louisiana.[9] What is even more striking is that within Texas, the city of Houston and surrounding Harris County accounted for 41 percent of the state's claims paid by the NFIP (see Map 5.II).[10]

"The state has no comprehensive plan. We have no real power at the state level to work on Texas' 23 river basins where there is significant flooding." — James Kowis, floodplain manager for the Texas Natural Resource Conservation Commission.

The following statistics help illustrate the magnitude of the problem in Texas:

- **Residents of Texas, Louisiana and Florida buy more federal flood insurance policies and make more claims than all the other states combined.[11]**
- **In Texas, $518 million in repetitive loss property flood damage occurred from 1978 to 1995.[12]**

Properties with Repetitive Loss Claims Paid by the National Flood Insurance Program 1978-1995 —Texas



KEY:

All properties with at least two paid claims of $1,000 for building and contents during any 10-year period from 1978 to 1995. Properties are plotted at the 5 digit zipcode centroid. This map has been prepared using different sized dots (exponentially scaled) to represent the range in the number of repetitive loss properties located within any given zipcode area.

Scale for the State of Texas:

Compiled by Martha Stout, National Wildlife Federation, and mapped by the National Center for Resource Innovations, Chesapeake Inc.
Data supplied by the Federal Emergency Management Agency.

Map 5.II

"Some see flooding as a way of life. I have to understand — until they put out their hand to the taxpayer and say 'Pay me for this.' It's not fair for the taxpayer to do this over and over again. We need to break the cycle." — Wayne Fairley, former FEMA regional hazard mitigation officer in Houston.

- Texas has $36 billion worth of property in 100-year floodplains. Only California and Florida have more in harm's way.[13]
- Residential zoning in Texas only exists in five counties. This has allowed housing developments in the lower elevations of the floodplain and even into the floodways.[14]
- Houston's flooding is caused primarily by heavy rainfalls that overflow the capacity of surrounding creeks and bayous.[15]
- Just one flood in October 1994 resulted in a declaration of 25 counties within the Houston area as total or partial disaster areas, inundation of more than 20,000 homes and businesses, the evacuation of 10,000 people and a loss of 20 lives. [16]

With an average of 46 inches of rainfall per year, Houston/ Harris County area is characterized by highly impermeable soils, typically clays that allow only 0.01 to 0.1 inches infiltration per hour. The generally flat terrain, sloping an average of one foot in one mile, makes drainage difficult. In addition, the Harris County Flood Control District estimates that between 35 and 40 percent of the area has impervious cover, such as asphalt, and that the percentage of impervious cover may range much higher in some areas.[17]

The Interstate east of Houston was closed when only the overpasses were above water. Photo: U.S. Army Corps of Engineers

The Problem

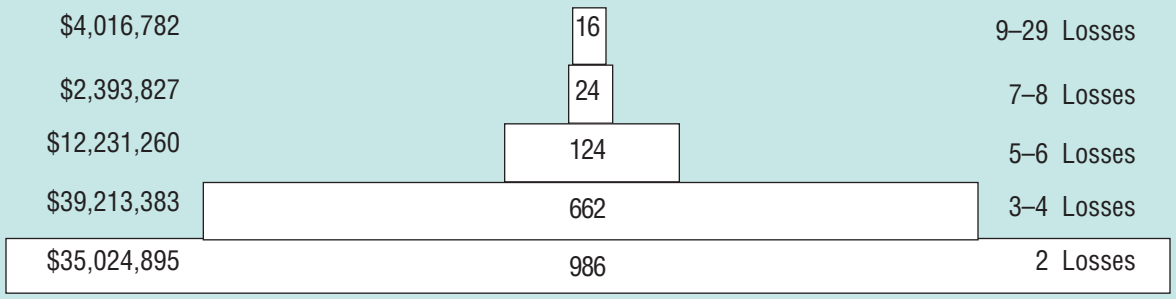
During periods of heavy rainfall in the Houston/Harris County area, water does not quickly soak into the ground, and instead collects in local bayous and creeks. As seen during the Southeast Texas floods of 1994, bayou and creek capacities can be overrun one by one.[18] This caused a chain reaction throughout the surrounding water-

sheds and resulted in massive flooding.

The lack of floodplain development zoning in the counties surrounding Houston has allowed development in floodplains and, more important, in floodways.

A floodway consists of the channel of a river and the adjacent section of floodplain that becomes part of the flowing river during floods.[19]

Houston
Distribution of Repetitive Loss Properties
Single Family Homes 1978–1995



TOTALS		
$92,880,146	**1,812**	**5,209**
All Properties**		
$114,118,850	**2,030**	**5,909**

* Includes contents & building claims
** Includes single family, 2–4 family, other residential properties
Note: Pyramid drawn as an approximation of scale.

In Houston alone, 826 single family homes received three or more flood losses, totaling $58 million in NFIP claims paid between 1978 and 1995. One hundred sixty-four properties have flooded five or more times in that period.
Sixteen properties have been damaged at least nine times. One property declared 29 losses. The repetitive loss properties in Houston that received three or more losses from 1978 to 1995 accounted for more than 60 percent of repetitive loss NFIP payments on single family homes.

Source: National Wildlife Federation data analysis.

Figure 5.III

According to FEMA, these areas "must be reserved in an unobstructed condition in order to discharge the base flood." Thus, the removal of existing floodway structures is critical in helping discharge floodwaters and protecting people and their property from the flood waters.

Several other factors contribute to area flooding. Narrow interpretation of wetland delineation definitions and extensive use of development exemptions for 10-or-fewer acre wetlands have resulted in paving over large parts of wetlands. Houston also has tended to rely on straightening, widening and concrete-lining of streams, which

increases the speed and volume of runoff. Detention and retention ponds have tended to be too small and too poorly coordinated to offset the speed and volume of runoff. Overpumping of the Chicot and Evangeline aquifers under Houston and subsequent compaction of the clay substrate have led to subsidence of 10 feet or more in parts of the city, leading to negative stream gradients, ponding in mid-basin areas and coastal submergence. Virtually all responsibility for controlling runoff has been placed on public agencies, rather than on private developers who could capture runoff on site and reduce runoff by designing cisterns, berms and highly permeable cover into their development plans. As a result, the physical geography, combined with rapid development, has expanded flooding problems well beyond the boundaries represented on floodplain maps. These problems have converged to create the region's massive repetitive loss record (see Figure 5.III and Figure 5.IV).[20]

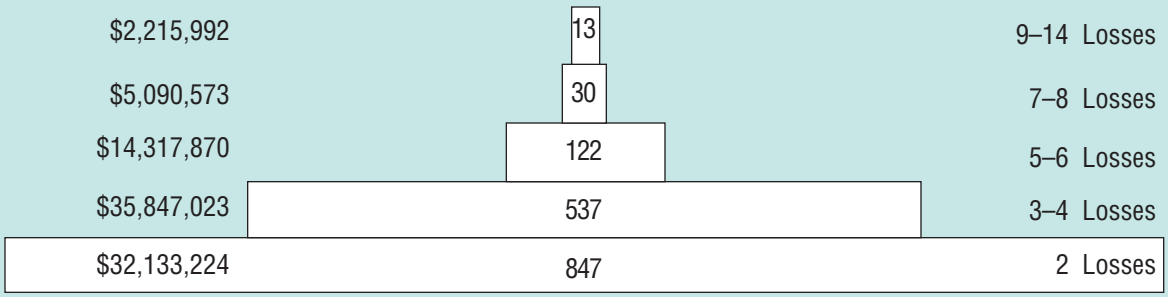
Who Deals With Flood Control?

On the federal level, both FEMA and the Corps of Engineers play important, but different, roles in flood prevention and protection in the state of Texas. FEMA's involvement in the past has mainly consisted of overseeing the NFIP. FEMA continues to play this role, but recently has become much more involved in mitigating flood hazards in the floodways and floodplains of Hardin, Harris, Liberty, Montgomery, and Polk counties. Since the 1994 flood, FEMA has provided the state of Texas with Hazard Mitigation Grant funding of approximately $19.07 million for voluntary buyout and removal of damaged structures — 75 percent of the total costs. In addition, FEMA used the remaining funds from the Section 1362, Flooded Property Purchase Program (formerly part of the NFIP, but now superseded by the Mitigation Assistance Program) to acquire and remove 141 structures in the floodway and floodplain at a cost of $4.7 million.[21]

Only rooftops were visible in some neighborhoods as the flood waters peaked. Photo: U.S. Army Corps of Engineers

The Corps of Engineers, on the other hand, has been involved in the construction of various flood protection and pre-

Harris County
Distribution of Repetitive Loss Properties
Single Family Homes 1978–1995



TOTALS		
$89,604,681	**1,549**	**4,454**
All Properties**		
$97,400,993	**1,651**	**4,766**

* Includes contents & building claims
** Includes single family, 2–4 family, other residential properties
Note: Pyramid drawn as an approximation of scale.

NWF's analysis of the repetitive loss data shows that in Harris County, 702 single family homes with three or more losses have accounted for $57.5 million in NFIP claims over 18 years, and 165 properties have suffered five or more losses. Those 702 home losses represented 64 percent of all the repetitive loss NFIP payments made to single family homes in Harris County.

Source: National Wildlife Federation data analysis.

Figure 5.IV

vention projects. Currently, in the Houston area, the Corps of Engineers is working on the construction of flood detention basins, stream diversion channels, stream enlargements, stream clearing and channel enlargement and rectification.[22] Several of these projects address problem watersheds that were overrun during the October 1994 floods. They are Brays Bayou, Greens Bayou, Sims Bayou, Clear Creek, and Cypress Creek.

On the state level, Texas has established, within its Department of Public Safety, a Division of Emergency Management, which administers the state's responsibilities under FEMA's Section 404 Hazard Mitigation Grant Program. In developing a buyout list for the Hazard Mitigation Grant Program, DEM focused primarily on residences that were substantially damaged (50 percent or more) and located within the floodway. Most of the properties involved also had sustained repeated flood damage.[23]

"All of the potential buyout properties chosen by DEM were floodway properties that were constructed before the NFIP was established (pre-FIRM properties)," according to Wade Nofziger, FEMA hazard mitigation officer in Texas. (For a discussion of pre- and post-Flood Insurance Rate Map structures, see Chapter 1) Under the Hazard Mitigation Grant Program, DEM has targeted buyouts of 560 properties, of which 452 had been purchased by March 1998.[24]

> ***"I am proud that our staff has jumped through all the hoops to get this bank going. It is the right thing to do for flood control, for the environment, and the community — everybody wins."*** — Art Storey, executive director of the Harris County Flood Control District.

At the county level, for example, the Harris County Engineering Department's Permitting Office, as FEMA's local partner, has handled a major buyout project. As FEMA's local partner, the office was responsible for negotiating purchases, destroying purchased structures and maintaining the land thereafter.

The Harris County Flood Control District is another local agency working closely with the federal government. It has served as local sponsor with the Corps of Engineers on local flood control and prevention projects. As local sponsor, it is responsible for providing the land, easements and rights-of-way; and for modifying or relocating buildings, pipelines, utilities, roads and other facilities, except railroad bridges, where necessary for the construction.[25]

The Harris County Flood Control District is also taking the lead in the development of its first wetlands mitigation bank, which is a 1,500-acre project. A wetlands mitigation bank devotes tracts of land to preserve, enhance and create wetlands. However, mitigation banking, in its infancy in Texas and the rest of the Nation, is complex and risky. Only extraordinary care in the formation of a mitigation bank can guarantee its success.[26] To date, 38 acres of forest wetlands have been completed in the Harris County project, which is located at the confluence of Greens and Garners bayous.[27] A detention basin incorporated into the plans will also provide additional flood protection for the Greens Bayou watershed.

Only the rails can be seen above water along the Trinity River during the Flood of 1994. Photo: U.S. Army Corps of Engineers

Nongovernmental Involvement

Wetlands and riparian areas play a critical role in the storage of floodwaters. Numerous nongovernmental organizations in Texas are actively engaged in protecting wetlands and the wildlife associated

with them. The Bayou Preservation Association, now located in Houston, was founded in 1966 to protect Buffalo Bayou. Today, the association is working in 23 different watersheds and has earned a reputation as an effective advocate for the protection and conservation of bayous. One of the association's primary goals is to preserve and restore riparian lands along bayous. In the Houston area, the association is working to establish programs near Clear Creek, Cypress Creek, and in the Greens, Buffalo and White Oak bayous (see Map 5.III).[28]

The Nature Conservancy of Texas is another organization that has been working throughout Southeast Texas to preserve and protect wetlands and their wildlife. For almost 10 years, the Nature Conservancy has struggled to preserve and manage sections of Texas' endangered coastal wetlands. Through generous donations and property acquisitions, thousands of acres of ecologically valuable wetlands, marshes and estuaries are currently protected on Conservancy preserves. In the Houston area, the Conservancy is involved in projects along the San Jacinto River and Trinity River, Pierce Marsh, Galveston Bay Preserve, and along the Interstate 45 corridor.[29]

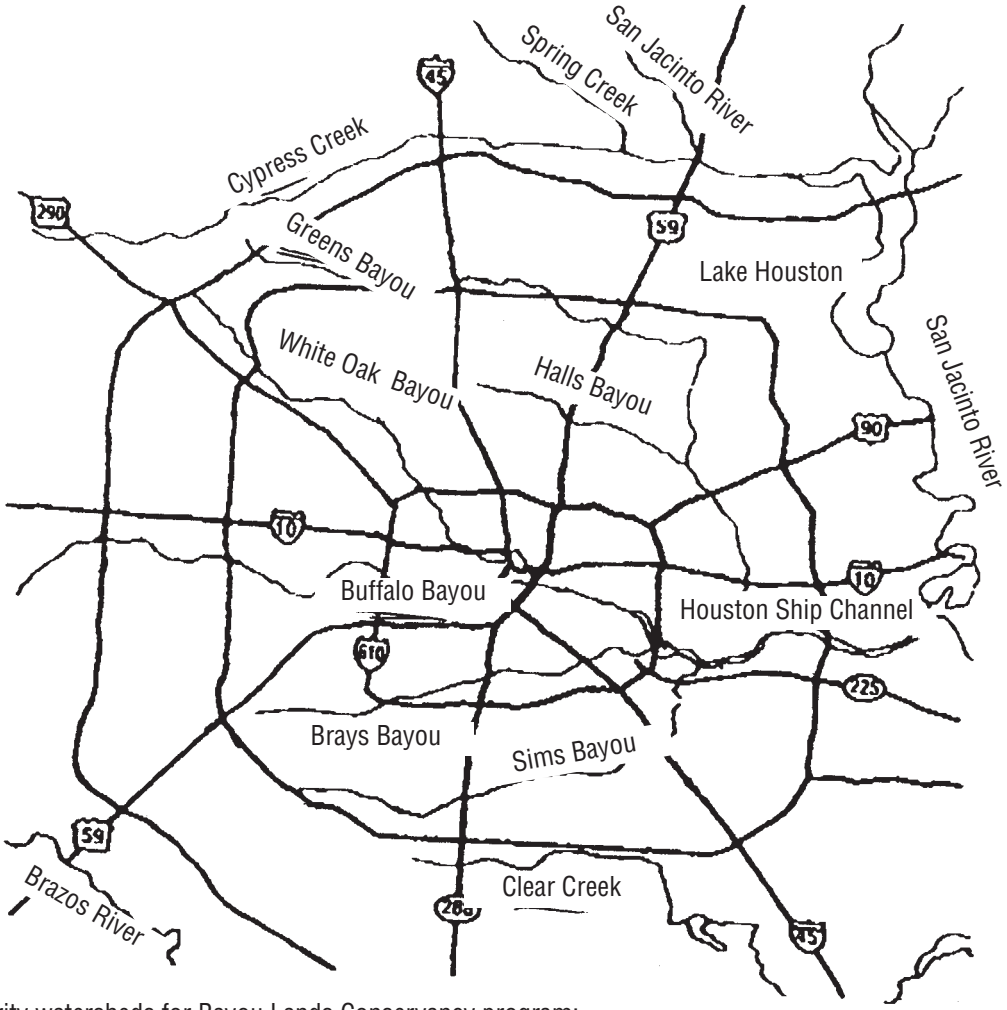
The Solution

In the past, Houston and its surrounding counties have experienced numerous severe flooding events. This has placed Texas as the state ranked second in the Nation in repetitive loss properties. It is clear that a greater use of the voluntary buyout and relocation option is one solution to combat property damage. This approach, which in the past was often shunned or simply overlooked in favor of more and more structural flood control projects, has been embraced by a growing number of residents, community leaders and regional flood agencies as the most practical way to reduce flood losses, especially in

"Thirty-one percent of the repetitive losses in the City of Houston are outside mapped floodplains." — Fred Garcia, Harris County Flood Control District, planning department manager.

floodways and deep floodplain areas. Said Colleen O'Brien, the Harris County Flood Control District Buyout Project manager, "We have recognized that there are some areas in which we could never protect the people. We can never lower the San Jacinto River 10 feet, not feasibly nor economically."

Greater Houston Area, Texas (In Harris County)



Priority watersheds for Bayou Lands Conservancy program:

Buffalo Bayou
Clear Creek
Cypress Creek
Dickinson Bayou
Greens Bayou
Dickinson Bayou is located in North Galveston County

Source: Bayou Preservation Association.

Map 5.III

What emerges from conversations with flood damage experts in the region is that funding is the greatest constraint in furthering the buyout and relocation programs. There are more offers from flood victims to sell than funds available, and in the meantime, many residents remain at-risk of additional flood damage. According to Wade Nofziger, the Texas state hazard mitigation officer, there are numerous poorer communities and neighborhoods where residents with repetitive loss and substantially damaged properties have signed up for buyouts, but

the communities have no funds to provide the 25 percent nonfederal match required under FEMA's Hazard Mitigation Grants Program.

Other key concerns include the need for stricter building codes to keep new development out of floodplains and the need for watershed approaches for new permitting and siting of subdivisions in growing areas. Flooding problems in the region continue to be exacerbated by developments upstream and outside floodplains that contribute to increasing flood heights and resulting damage downstream.

— Todd Rogow, principal writer and researcher.

A Tale of Two Cities

An insight into how National Flood Insurance Program subsidies work can be gained by comparing premiums and claims for Jefferson Parish, Louisiana, and Ann Arbor, Michigan. Ann Arbor is bisected by the Huron River, but is planned such that 90 percent of the length of the river and its tributary streams are designated for floodproof uses, such as golf courses, ball fields, public parks, arboretums, and greenways with natural or naturalized vegetation. Jefferson Parish has 73,816 flood insurance policies in force with premiums of $23,449,514. Between 1978 and 1995, a total of $433,640,441 in claims were paid out for an average payment of $24,091,135 per year. The flood insurance program in Jefferson Parish runs a deficit of 2.7 percent without including overhead at an average annual premium of $317.68. The average premium in Ann Arbor is $430.95 — 35 percent higher than in New Orleans despite a history of claims that shows a very low risk of flooding. Ann Arbor has 131 flood insurance policies in force with total premiums of $56,454, even though from 1978 to 1995 there was only one loss with total payout of $930. The extensive development of greenways along the river and its tributaries makes the floodplain almost fail safe. A recent small leak in Barton Dam at the worst case would only have necessitated the evacuation of a dozen homes and small businesses. Fortunately, the dam was repaired without flooding.

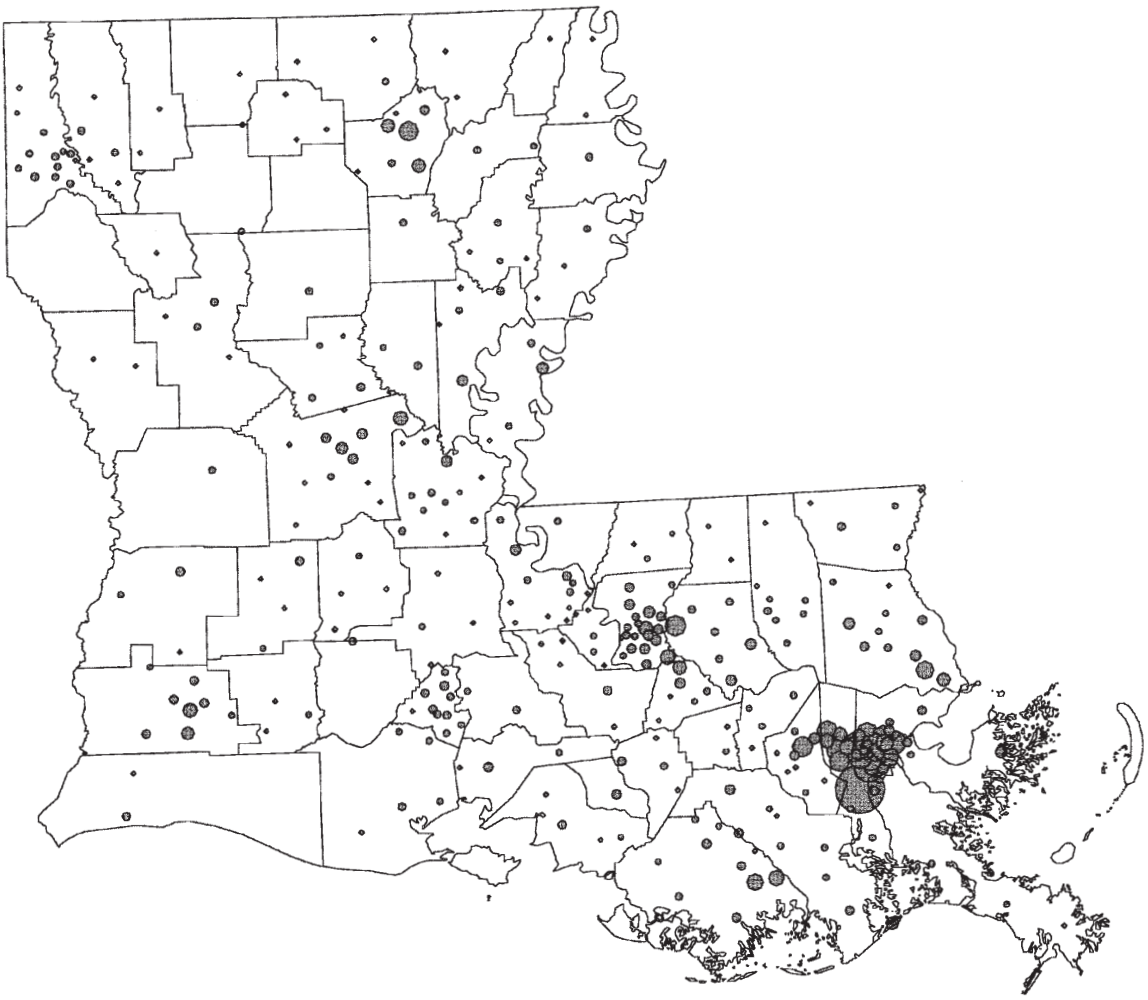
— Martha Stout

Box 5.I

New Orleans, Louisiana

Slightly more than one-in-five of all the National Flood Insurance Program's repetitive loss properties damaged between 1978 and 1995 are in Louisiana, which has the highest statewide concentration of flood losses in the Nation (see Map 5.IV). No other state has a higher number of repetitive flood losses during this time period, or

Properties with Repetitive Loss Claims Paid by the National Flood Insurance Program 1978-1995 —Louisiana



KEY:

All properties with at least two paid claims of $1,000 for building and contents during any 10-year period from 1978 to 1995. Properties are plotted at the 5 digit zipcode centroid. This map has been prepared using different sized dots (exponentially scaled) to represent the range in the number of repetitive loss properties located within any given zipcode area.

Scale for the State of Louisiana:

Compiled by Martha Stout, National Wildlife Federation, and mapped by the National Center for Resource Innovations, Chesapeake Inc.
Data supplied by the Federal Emergency Management Agency.

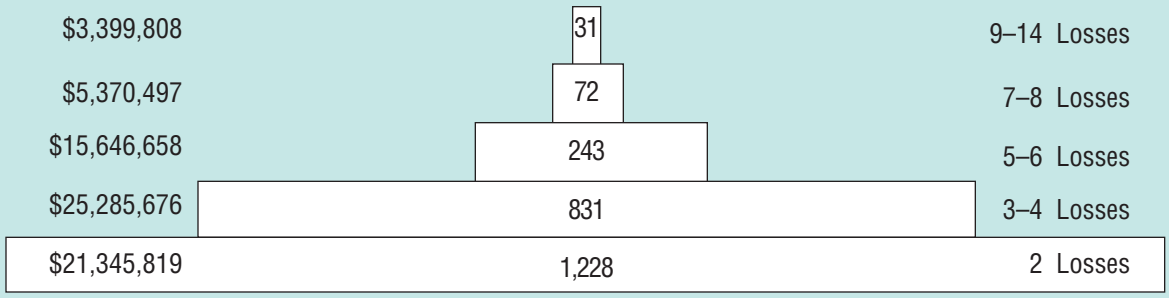
Map 5.IV

a higher dollar total for payments made by the insurance program.[30] The following statistics illustrate the magnitude of the problem:

- In Louisiana, $573 million in repetitive loss property flood damage occurred from 1978 to 1995, 20 percent of the total repetitive loss properties in the NFIP.[31]
- More than 50 percent of the repetitive loss properties in Louisiana are located in New Orleans and Orleans and Jefferson Parishes (see Figure 5.V and Figure 5.VI).[32]
- In Jefferson and Orleans Parishes, 54,000 flood insurance claims were filed between 1978 and 1995; payments totaled $312 million.[33]
- 70 percent of Louisiana homes are built on concrete slabs, a method of construction that is highly prone to flood damage in floodprone areas.[34]
- Flooding in New Orleans is caused primarily when heavy rainfall, trapped within the levee system surrounding the city, overwhelms the capacity of drainage pumps to remove it.[35]
- In most areas of New Orleans and Orleans and Jefferson Parishes, land elevations are lower than the surrounding water surface elevations.[36]
- The flood of May 1995 resulted in the loss of seven lives, the inundation of 40,000 homes and $1 billion of flood damage

Tow trucks rescue cars that are stuck in the Flood of 1995 in New Orleans. Photo: U.S. Army Corps of Engineers

New Orleans/Orleans Parish
Distribution of Repetitive Loss Properties
Single Family Homes 1978–1995



TOTALS		
$71,048,458	**2,405**	**7,391**
All Properties**		
$129,135,382	**4,023**	**12,427**

* Includes contents & building claims
** Includes single family, 2–4 family, other residential properties
Note: Pyramid drawn as an approximation of scale.

In New Orleans and Orleans Parish, 1,177 single family homes have suffered three or more flood losses costing a total of $49.7 million over 18 years, according to NWF's analysis of NFIP repetitive loss database. These homes account for 49 percent of the single family home repetitive loss properties in the New Orleans/Orleans Parish area, but represent 70 percent of all NFIP single family home repetitive loss payments in the area. The repetitive loss properties in Orleans Parish account for more than five percent of the total repetitive loss properties covered by the NFIP nationwide. Those frequent repetitive loss properties merit consideration for other mitigation options.

Source: National Wildlife Federation data analysis.

Figure 5.V

for Jefferson, Orleans and St. Tammany Parishes.[37] The $585 million in claims from this event from insured homes resulted in the greatest insurance cost from a single flood in NFIP history.

Current Flood Protection

Both Jefferson and Orleans Parishes are located in Southeast Louisiana between Lake Pontchartrain and the Gulf of Mexico. New Orleans is located in Orleans Parish next to the Mississippi River, with Jefferson Parish bordering New Orleans to the southwest. Levees protect most of the developed areas in Jefferson and Orleans Parishes from river and hurricane-related flooding. Within the levee structures, land is further divided by natural and structural barriers, forming sub-basins that are webbed with drainage canals terminating at pumping

Flood inundates a street in North Forest, Louisiana. Photo: U.S. Army Corps of Engineers

stations. The New Orleans drainage system is composed of a network of subsurface piping attached to enclosed or open canals. Unlike conventional drainage systems, which generally rely on gravity flow and free fall discharge, the drainage system in New Orleans must pump canal water upwards into surrounding water bodies.

The Problem

New Orleans receives an average of 60 inches of rain each year.[38] Storms can cover the entire area or be localized in nature, inundating one subbasin without affecting another.[39] The drainage canals and city streets provide some additional storage capacity for excess storm water runoff during a typical rain event. Less frequent, higher intensity storms can drop one inch per hour for five hours or more. When these storms occur, the area experiences extensive flooding and overbank flow between subbasins. The levees that keep river and sea water out also have the adverse effect of trapping rainfall.

The problem is exacerbated because New Orleans has a contour much like that of a saucer. The land near the Mississippi River and Lake Pontchartrain is relatively high (approximately five to six feet above sea level), and the interior areas of the city are relatively low (approximately four feet below sea level).[40] New Orleans' dense development is located

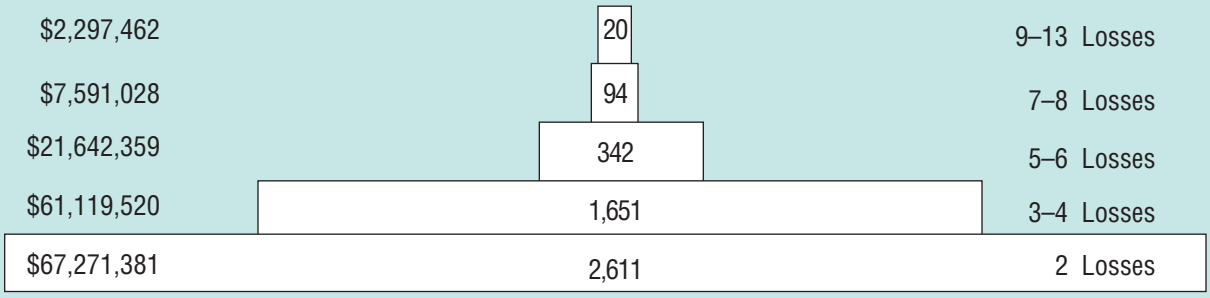
in a low-lying area that effectively functions as a catchment basin, therefore making it especially susceptible to flood damage.

Response to the Problem

At the federal level, flood prevention in the New Orleans area has been mostly overseen by the Corps of Engineers. Over the past several decades, the Corps of Engineers has been involved in a range of projects, such as building levees to hold back river and coastal flooding, dredging river bottoms, combating coastal beach erosion and creating new canal and pumping systems throughout New Orleans and the surrounding parishes.

Today, the Corps of Engineers has taken on a slightly different role in Jefferson and Orleans Parishes — one of comprehensive urban flood control. In these parishes, the Corps of Engineers is planning the construction of new pumping stations and channels, removal of obstructions from existing channels, modifying existing channels and increasing the capacities of existing pumping stations.[41] Without the levees and their associated channels and pumping systems, a large

Jefferson Parish
Distribution of Repetitive Loss Properties
Single Family Homes 1978–1995



TOTALS		
$159,921,749	**4,718**	**13,364**
All Properties**		
$178,657,009	**5,153**	**14,608**

* Includes contents & building claims
** Includes single family, 2–4 family, other residential properties
Note: Pyramid drawn as an approximation of scale.

In Jefferson Parish, 2,107 single family homes suffered three losses or more, accounting for $92.7 million in NFIP claims from 1978 to 1995, according to NWF's analysis of NFIP repetitive loss database. These homes account for 58 percent of the flood insurance program claims for this period, although they represent only 45 percent of the repetitive loss homes in the area. The repetitive loss properties in Jefferson Parish account for seven percent of the repetitive loss properties covered by the NFIP nationwide.

Source: National Wildlife Federation data analysis.

Figure 5.VI

portion of New Orleans would be underwater.

In addition to the Corps of Engineers' structural approach to flood control in New Orleans, FEMA works with local agencies to educate the public about floodproofing homes and mitigation planning. FEMA has also begun collecting applications from individuals in the New Orleans area who are interested in home elevation or buyout. "Our phones were ringing off the hook with people interested in home elevation and buyout possibilities," according to Mark Howard, director of Louisiana's Office of Emergency Preparedness. Although there is a tremendous local interest in home elevation or buyout, both mitigation options are expensive and provide limited environmental and flood prevention benefits within New Orleans.

On the local level, the New Orleans Sewerage and Water Board is responsible for the drainage system that serves Orleans Parish and many of the urban flood control projects in New Orleans. This canal system serves approximately 55,000 acres of industrial, commercial and residential development through hundreds of miles of canals and 21 major pumping stations.[42] The board's counterpart in Jefferson Parish, the Department of Streets and Drainage, oversees all urban flood control projects for the parish and conducts routine maintenance

Sandbagging in New Orleans, May 1995. Photo: U.S. Army Corps of Engineers

of all canals and pumping stations in Jefferson Parish. Both agencies have been active in local mitigation projects and flood control efforts. They also have the potential to serve as local funding sponsors for future Corps of Engineers or FEMA flood mitigation and flood prevention projects in the two parishes.

Development Feeling the Pinch

Virtually no undeveloped land remains in New Orleans. "There is so little space for new development in New Orleans that people are tearing down $100,000 houses just for the space to build new million dollar homes," according to Gordon Hebert, district engineer for the Corps of Engineers in New Orleans. Rather than cluster new development with intervening open space, pressure is mounting to allow construction in the remaining undrained wetlands near New Orleans. Mark Davis, of the Coalition to Restore Coastal Louisiana, said that "The real key in reducing flood damage is to keep development out of the floodprone areas. We need to look toward systemic rather than individual solutions of flood protection."

Jackson Square, New Orleans, LA. Photo: © Alex Demyan

The Solution

Repetitive loss flooding in New Orleans and Jefferson and Orleans Parishes presents a complex problem that will require a combination of mitigation and flood protection solutions to resolve. The voluntary buyout option is unlikely to be a major part of the solution in New Orleans, given the city's unique circumstances.

While the voluntary buyout option may have limited utility in New Orleans, and has clearly aroused considerable local interest, other mitigation options, such as elevating buildings, improving structural drainage measures, floodproofing and keeping new development out of floodprone areas are most likely to reduce repetitive losses.

— Todd Rogow, principal writer and researcher.

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6 A Climate Change Warning

"We are evaporating our coal mines into the air." — Svante Arrhenius, Swedish chemist who, in 1896, predicted that carbon dioxide emissions would increase average global temperature.

Chapter 6

A Climate Change Warning

Higher Ground's preceding chapters present the voluntary buyout option as a possible solution to the mounting damage caused by repetitive flooding. This brief closing chapter presents a warning that damage may mount further because of human-induced climate change.

The term *climate change* has largely overtaken that of *global warming,* and for good reason. Global warming carries only a descriptive connotation of a gradual rise of temperature around the Earth. Climate change, however, embraces a broader and more complex horizon of concern, which includes temperature increases; extreme drought, rain and snowfall events; implications for world agricultural production, new disease vectors, and migration of vegetative zones; and alterations of the surface-to-deep-water ocean conveyor system that profoundly influences the habitability of various parts of the planet.

The consideration of climate change in this chapter is limited to only those aspects with direct implications for people and property located in and along the Nation's floodplains.

As noted, this chapter is intended as a warning — not a complete explication. The preceding pages of this report describe a set of challenges, problems and possible solutions set against a relatively known, stable and fixed background: the Nation's climate pattern, the definition of the 100-year flood, the determination of premium rates for flood insurance based on past records of actual flood risk and the geographic location and extent of the Nation's floodplains.

This chapter's warning is that those things previously considered known, stable and fixed will change, because of climate change, in ways that cannot now be determined.

The Intergovernmental Panel on Climate Change

In 1988, the United Nations invited more than 2,500 scientists from around the world to form the Intergovernmental Panel on Climate Change (IPCC). The world's foremost climate scientists —

including atmospheric physicists, meteorologists, computer modelers and paleoclimatologists — contributed to the IPCC's work. After seven years of study and two preliminary reports, the IPCC, in December 1995, took a clear stand on human-caused climate change. The IPCC concluded that "The balance of evidence suggests there is a discernible human influence on global climate."[1]

Among the climate change forecasts now accepted by mainstream climate scientists are the following:

Temperature. The IPCC's best estimate is that global average temperature is likely to rise by 3.6° F by the year 2100, or approximately 0.3° F per decade.[2] Regional variations will be more extreme, especially in high latitude areas, such as Alaska. In some areas, local warming during certain times of the year may be two to three times greater than the annual global average.

Precipitation/Floods. Warmer temperatures are expected to cause an increase in total precipitation, averaged across the globe. Moderate to light rainfall events will likely be less frequent, while extreme snowfall and rainfall events will be more frequent. Regional effects will be highly variable. More extreme rainfall and snowfall events are expected to result in more intense floods.

Sea Level. By the year 2100, the IPCC's best estimate is that sea level will rise by almost 20 inches.[3]

U.S. Sources of Carbon Dioxide Emissions in 1995
(Millions of Metric Tons)

Sources and Sinks	CO_2 Emissions (Carbon Equivalent)
Sources	1,422.1
Fossil Fuel Consumption	**1,403.1**
Residential	*271.3*
Commercial	*218.6*
Industrial	*466.0*
Transportation	*436.6*
U.S. Territories	*10.6*
Fuel Production and Processing	**1.7**
Cement Production	**10.5**
Lime Production	**3.7**
Limestone Consumption	**1.2**
Soda Ash Production and Consumption	**1.6**
Carbon Dioxide Manufacture	**0.4**
Sinks	(117.0)
Forestry and Land Use	**(117.0)**
Total Emissions	**1,422.2**
Net Emissions	**1,305.2**

Source: U.S. Climate Action Report, *1997, p. 60.*

Figure 6.I

Is Climate Changing?

Over the past century, the globe's average temperature has been increasing. Most of this increase has occurred since the late 1970s. The increase is slight — a global average of about 1° F. The best scientific evidence available suggests that this change in global average temperature is within, but at the outer limit of, normal climate variability. There is no certainty

whether the increase in average global temperature over the past century can be explained entirely by normal climate variation or if it is partly a consequence of human-caused climate change. However, judged on the balance of the evidence rather than scientific certainty, the world's leading climate scientists have concluded that a human hand is already apparent in the upward trend of global average temperature. Studies of the causes of climate variability and climate record over the past century "show that the observed warming trend is unlikely to be entirely natural in origin," according to the IPCC's December 1995 conclusions.

In this regard, it comes as no surprise, therefore, that globally 1997 was the warmest year on record, and that 9 of the warmest 11 years this century occurred in the past decade.[4]

"We are evaporating our coal mines into the air." — Svante Arrhenius, Swedish chemist who, in 1896, predicted that carbon dioxide emissions would increase average global temperature.

What is the Greenhouse Effect?

The Earth's atmosphere acts like an insulating blanket. This blanket is a layer of gases that, like the glass in a greenhouse, lets heat from the sun in but prevents some of it from radiating back into space, effectively creating a warm ring around the Earth. The Earth's average mean surface temperature today is about 57° F. Without the atmosphere's natural greenhouse effect, it would be about –3° F.

Almost 99 percent of the Earth's atmosphere is composed of nitrogen and oxygen. But the greenhouse effect is caused by a few additional trace gases, such as carbon dioxide, and water vapor.

Since the onset of the industrial revolution in the middle of the last century, atmospheric concentrations of carbon dioxide and other greenhouse gases have been rising.

Carbon Dioxide as a Greenhouse Gas

The main source of increasing atmospheric concentrations of carbon dioxide, the principal greenhouse gas, is the burning of fossil fuels, such as oil, coal and natural gas. In 1860, annual global carbon dioxide emissions were about 93 million tons, compared with the current annual rate of six billion tons. Slightly more than half of these carbon dioxide emissions remain in the atmosphere, contributing to the total atmospheric concentration of greenhouse gases. The remainder is absorbed by the oceans, or taken up by trees and plants during photosynthesis.

Precipitation and Floods

There is high confidence among scientists that a warming climate will lead to increased average global precipitation. The warmer the temperature, the more water vapor the air can hold. And the warmer the temperature, the more water is evaporated from oceans, lakes, rivers and soils into the air. In a warmer climate, storm systems contain more moisture that falls either as more snow or more rain, according to research meteorologist Tom Knutson of the National Oceanic and Atmospheric Administration.[5]

A troubling trend forecast by climate scientists is an increase in the proportion of both extreme rainfall and snowfall events. Scientists expect a warmer climate will be characterized by more intense precipitation. "In the high carbon dioxide climate, we do see increased incidence of extreme rainfall events," Knutson says.[6]

Evidence of this trend already exists. Thomas Karl, one of the Nation's preeminent climate researchers, has written: "In the U.S.A., it is quite apparent that the proportion of precipitation that comes from very heavy rates (more than two inches per day) has significantly increased as the climate has warmed."[7]

In the United States, the number of extreme precipitation events, such as blizzards and heavy rainstorms, has increased 20 percent since 1990.[8]

More intense flooding is the predicted consequence of an increase in extreme rainfall and snowfall events.

Higher Sea Level

Climate scientists forecast that as global temperatures increase, oceans will warm and expand, melting glaciers and ice-sheets and causing sea level to rise. The IPCC predicts that by the year 2100 sea levels will have risen by almost 20 inches.

Along much of the U.S. coast, sea level is already rising at a rate of approximately 0.1 inches per year (10 to 12 inches a century). This compares with a total sea level rise of four to six inches over the past century. By the year 2100, the U.S. Environmental Protection Agency predicts that the rate of sea level rise will increase to 0.16 inches per year. This rate translates to an increase in sea level along the coast of New York, which is representative of the coastal United States, of 18 inches by 2100.

What does this mean to the United States? James Titus, a lead author of an Environmental Protection Agency report on sea level rise, suggests that the United States is more vulnerable than previously thought. "The sea level is already rising, the coast is already eroding and people are building 30 miles of bulwarks along the Maryland coast every year," Titus says.[9] He points out that Louisiana, though a low-lying area, has already lost 50 square miles to sea level rise in the past century. Climate change is expected to increase the vulnerability of some coastal populations to flooding and land erosion. The IPCC estimates that about 46 million people per year worldwide are now at risk of flooding because of storm surges. Unless appropriate actions are taken, a 20-inch sea level rise would increase this number to approximately 92 million.[10] This figure does not account for population growth.

Increased Hurricane Intensity

As yet there is no scientific consensus on how a warming climate may affect hurricanes. However, a leading researcher in this field, Massachusetts Institute of Technology meteorologist Kerry Emanuel, suggests that warmer sea temperatures created by climate change may result in more intense hurricanes. "If there is global warming and it results in an increase in tropical sea temperatures, the hurricane speed limit goes up," Emanuel says.[11]

A 3.6° F increase in sea temperatures could increase the destructive potential of more intense hurricanes (category Three and above) by 15 to 20 percent, Emanuel says. He has calculated that the maximum wind speeds of these tropical hurricanes could increase from 175 mph to 220 mph.

El Niño Events

As ***Higher Ground*** went to press, the most extreme El Niño event on record is causing extensive flooding and consequent loss of life and damage to homes and property, principally in California and Florida as well as a variety of effects in other parts of the world. Severe forest fires in Indonesia during early 1998, for example, are attributed to earlier El Niño–induced drought. Heavy El Niño–induced precipitation in Eastern and Central Africa has resulted in thousands of flood- and disease-related deaths and has severely disrupted agriculture, transportation and tourism.

El Niño events are a normal part of the globe's climate — a periodic increase in the mass of warm water in the eastern tropical Pacific Ocean that influences weather patterns over a considerable extent of the Earth. There is no scientific consensus whether climate change will have any effect on El Niño events, or their counterpart, La Niña events (a cooling of the eastern tropical Pacific).

However, some research gives rise to caution. For example, Kevin Trenberth and Timothy Hoar of the National Center for Atmospheric Research have published a statistical analysis of the 1990–95 El Niño event. They found that such an event would be expected to occur only once in about 2,000 years if the climate were unchanging. "These results raise questions about the role of climate change," they wrote. "Is this pattern of change a manifestation of the global warming and related climate change associated with increases in greenhouse gases in the atmosphere? Or is this pattern a natural decadal-timescale variation? We have shown that the latter is highly unlikely."[12]

Warning

More frequent extreme weather events — not just slightly warmer global average temperature — are part of the future scientists foresee as a result of human-caused climate change. When, with what frequency and exactly where these events will occur is beyond current scientific predictive ability. But the recent past hints at what *might* be in store.

The nearly back-to-back 100-year-plus Midwest floods of 1993 and 1995; the 700 deaths attributed to the heat wave that smothered Chicago in July 1995;[13] the Dust Bowl–like drought that struck Texas, Oklahoma and Eastern Kansas two years ago; the dry soil conditions that contributed to wild fires in New Mexico and Arizona last year; and the extreme snow accumulation in the Upper Midwest that resulted in the early spring floods that devastated Grand Forks, North Dakota, a year ago may have had nothing to do with human-caused climate change. Scientists cannot be certain. What is certain is that these episodes are entirely consistent with the pattern of more intense weather events caused by the change in global climate that is underway.

A hint at the possible implications for people and property located in floodplains may be gathered by considering the following:

- **If climate change produces more intense flooding events, will urban levees built to withstand a 100-year flood actually provide that degree of protection, or will the definition of a 100-year flood be altered?**
- **Will insurance premium rates for National Flood Insurance, which are based on a baseline-average that does not include a catastrophic year, be adequate to cover losses incurred by more extreme weather events caused by climate change, or will taxpayers be responsible for even greater obligations? (For a discussion of the National Flood Insurance Program, see Chapter 1, p. 13.)**

- **What new steps need be taken to safeguard life and property along the Nation's coastlines if more intense hurricanes and more intense or more frequent El Niño events occur because of climate change, and if sea level continues to rise in response to climate change?**
- **Should greater erosion-based setbacks or rolling shoreline easements be set? Should building moveability and higher elevation requirements be established along low-lying coastlines?**

These are but a few of the questions that loom ahead as the reality of climate change takes hold. In preparing this report, however, the authors found that the federal government was neither prepared to respond to increasing flood intensity because of climate change, nor considered the consequences of climate change to be its responsibility.

International Action on Climate Change

Under the terms of the international Climate Change Convention signed at the Earth Summit in 1992, the United States and most of the world's other nations committed themselves to "achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." That commitment, however, has no binding force.

In December 1997, the United States and 158 other nations met in Kyoto, Japan, where they negotiated the first binding agreements under the Climate Change Convention. Under this agreement, the United States and 37 other industrialized nations committed themselves to reduce greenhouse gas emissions by 2012 to an average of 5.2 percent below 1990 levels. The Clinton administration has not submitted the Kyoto agreement to the U.S. Senate for ratification, and does not intend to do so until after additional negotiations in the fall of 1998, when it is hoped that nonindustrialized nations will join the emissions reduction regime.

Photo: NASA

The Kyoto agreement is a landmark because it creates an international structure by which the nations of the world can begin to address climate change. It is an important first step. However, even if ratified and completely enforced, its emission reduction targets are so modest that "it would barely dent the world's output of greenhouse gases, which are projected to continue soaring through the 21st century and beyond," according to an assessment reported by Joby Warrick in *The Washington Post*.[14]

The challenge of climate change has only begun to dawn on us.

— Jules Reinhart and Ben McNitt, principal writers and researchers.

Endnotes

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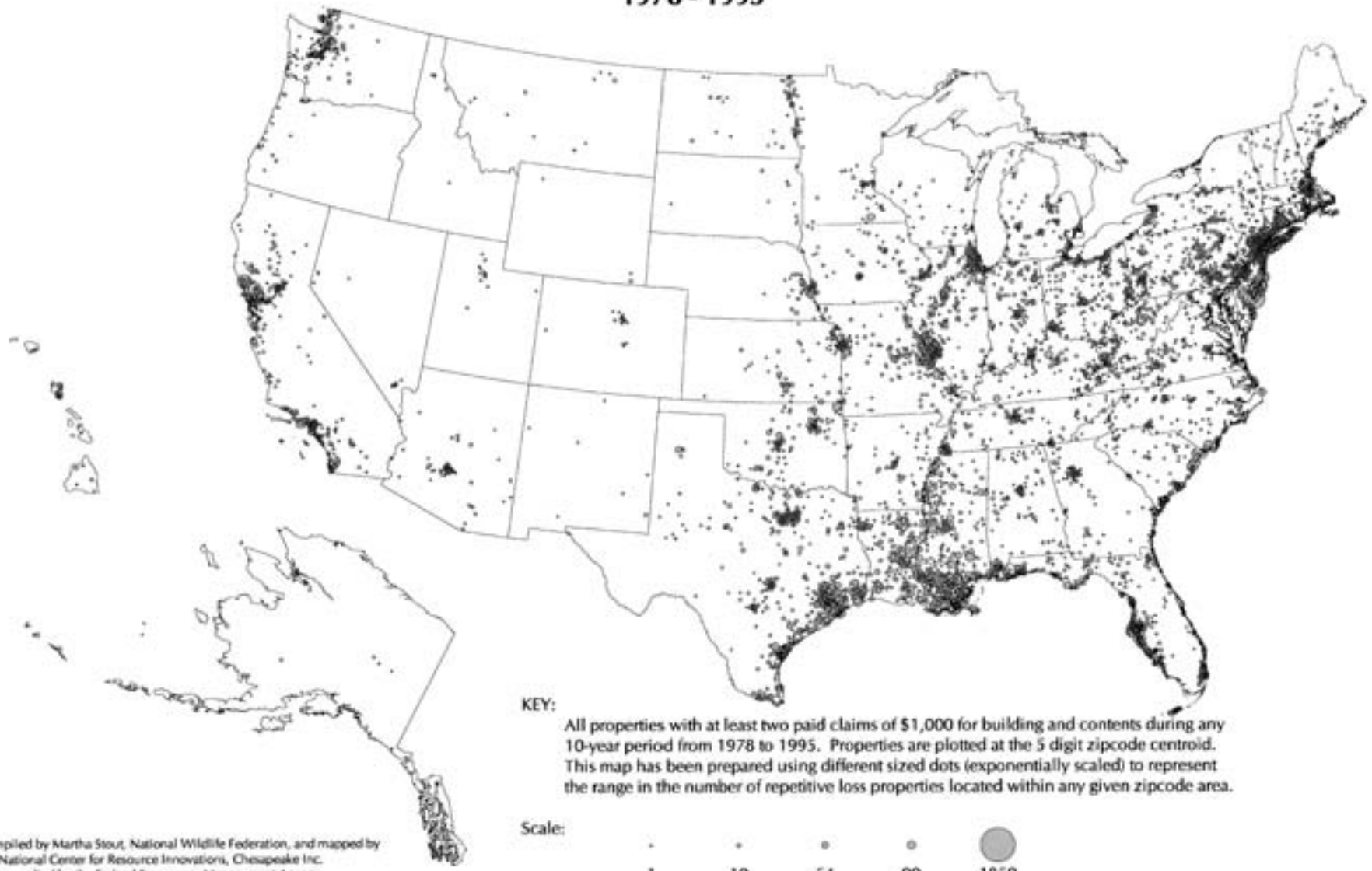
9. J.G. Titus, U.S. Environmental Protection Agency, interview, June 1996.
10. *IPCC Second Assessment Synthesis of the Scientific-Technical Information Relevant to Interpreting Article 2 of the UN Framework Convention on Climate Change, 1995*, article 3.14.
11. Kerry Emanuel, Research Meteorologist, Massachusetts Institute of Technology, interview, June 1996.
12. Kevin Trenberth and Timothy Hoar, National Center for Atmospheric Research, "The 1990–1995 El Niño-Southern Oscillation Event: Longest on Record," *Geophysical Research Letters*, January 1, 1996.
13. Tom McNamee, *Chicago Sun-Times*, September 21, 1995, p. 20, citing Heath Department analysis presented to the Chicago Board of Health.
14. Joby Warrick, *The Washington Post*, February 13, 1998.

Appendix

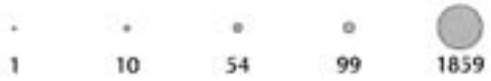
U.S. Properties with Repetitive Loss Claims Paid by the National Flood Insurance Program 1978 - 1995



KEY:

All properties with at least two paid claims of $1,000 for building and contents during any 10-year period from 1978 to 1995. Properties are plotted at the 5 digit zipcode centroid. This map has been prepared using different sized dots (exponentially scaled) to represent the range in the number of repetitive loss properties located within any given zipcode area.

Scale:



Compiled by Martha Stout, National Wildlife Federation, and mapped by the National Center for Resource Innovations, Chesapeake Inc.
Data supplied by the Federal Emergency Management Agency.

Properties with Repetitive Loss Claims Paid by the National Flood Insurance Program 1978 - 1995

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Scale for the State of California:

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Scale for the State of Florida:

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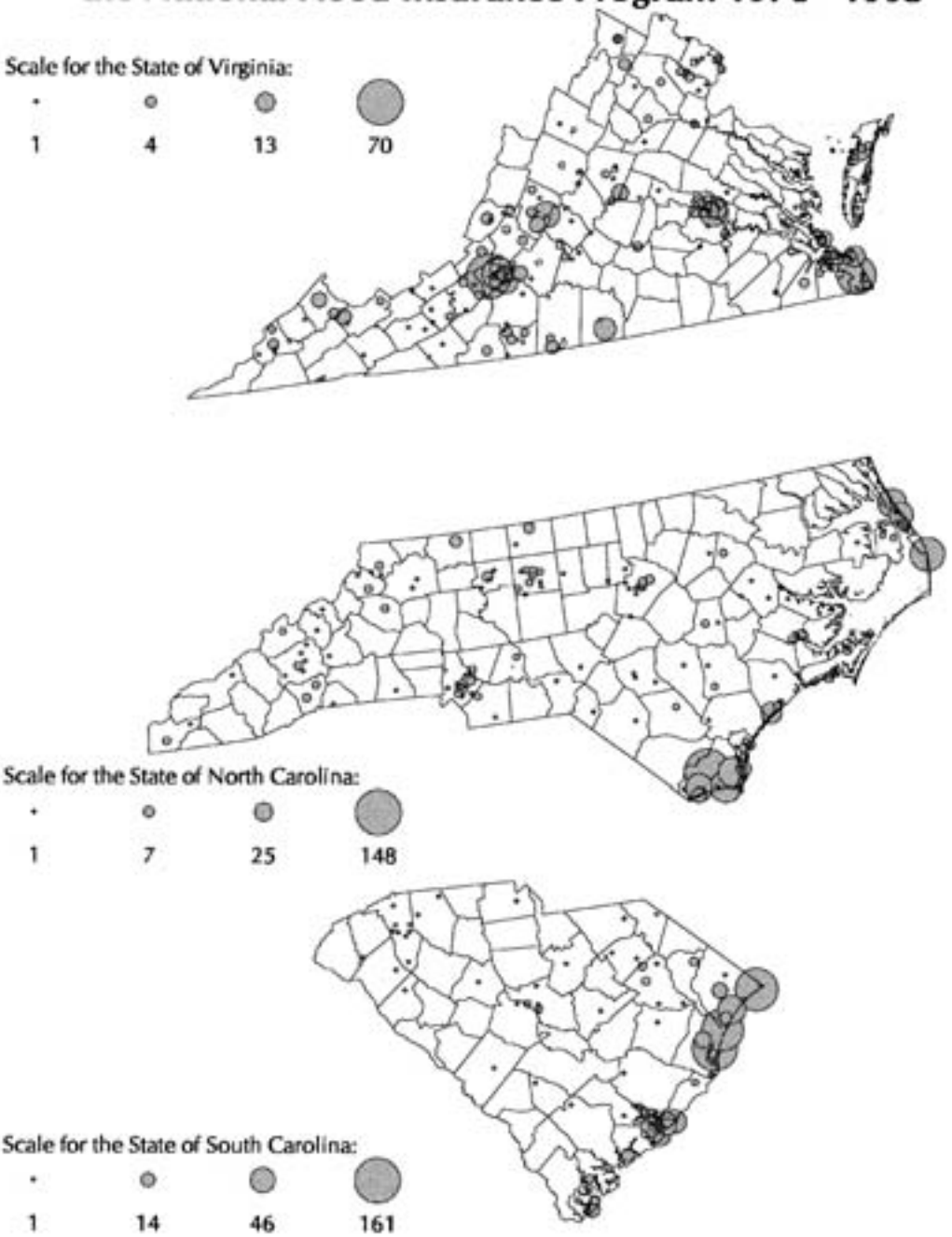

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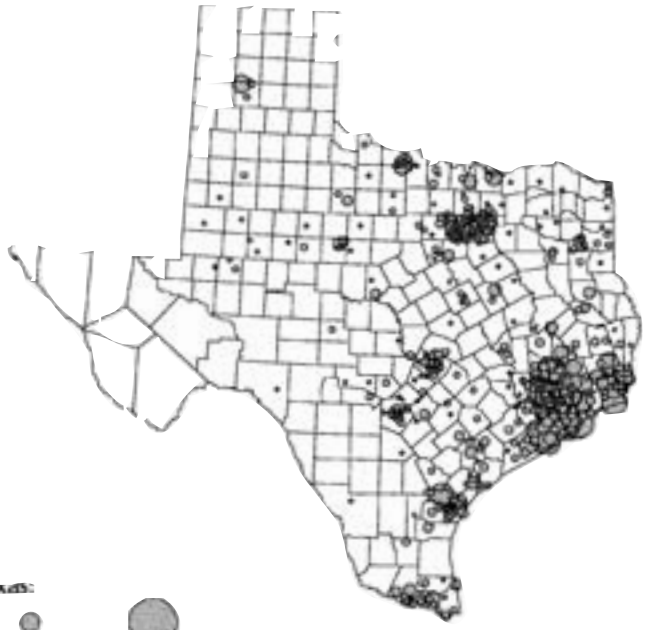

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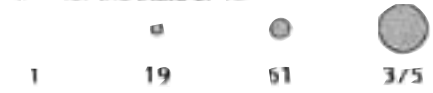

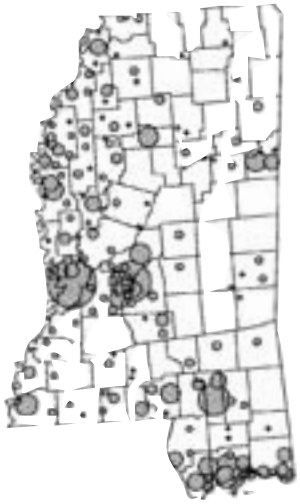

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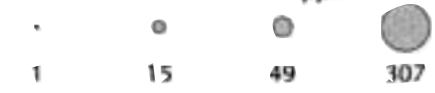
Scale for the State of Mississippi:



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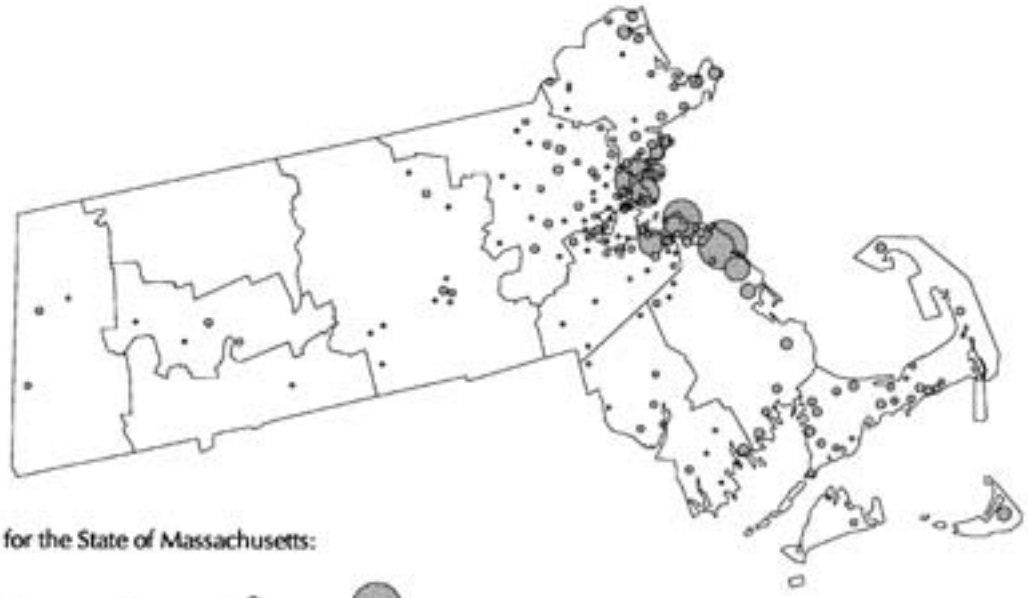

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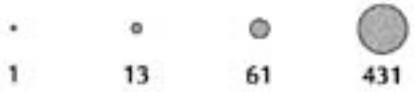

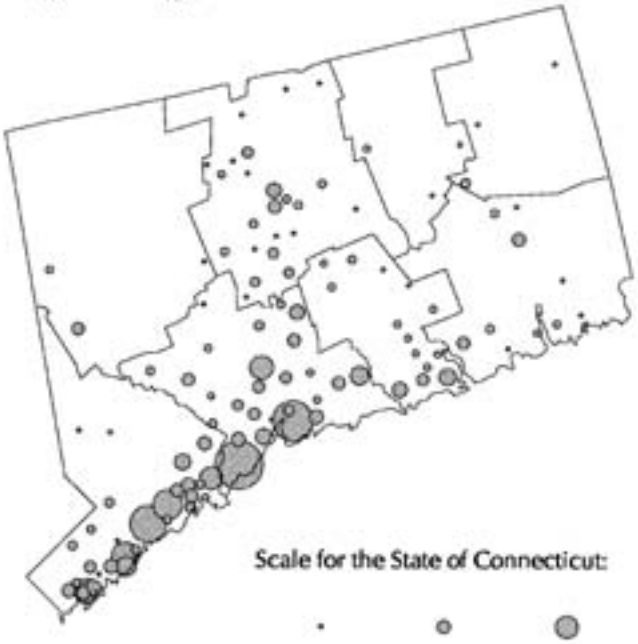

Scale for the State of Connecticut:

KEY:

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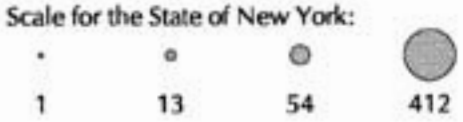
Properties with Repetitive Loss Claims Paid by the National Flood Insurance Program 1978 - 1995

Scale for the State of New York:



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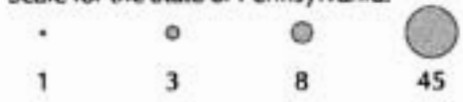

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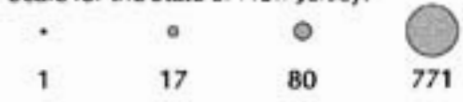

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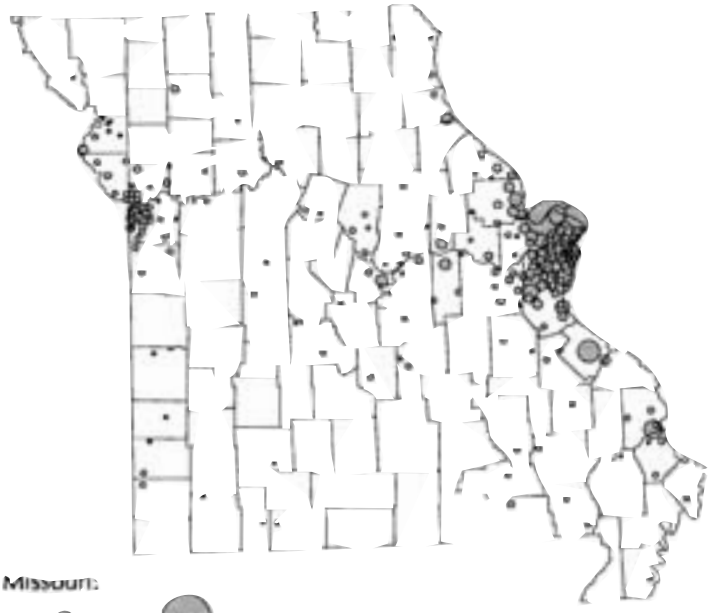
Properties with Repetitive Loss Claims Paid by the National Flood Insurance Program 1978 1995



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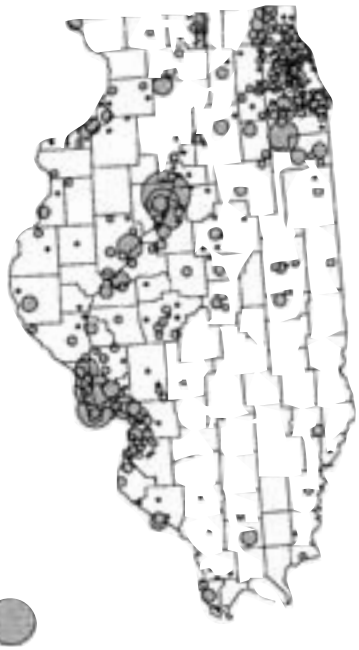

Scale for the State of Illinois:

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KEY:

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