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**Soil
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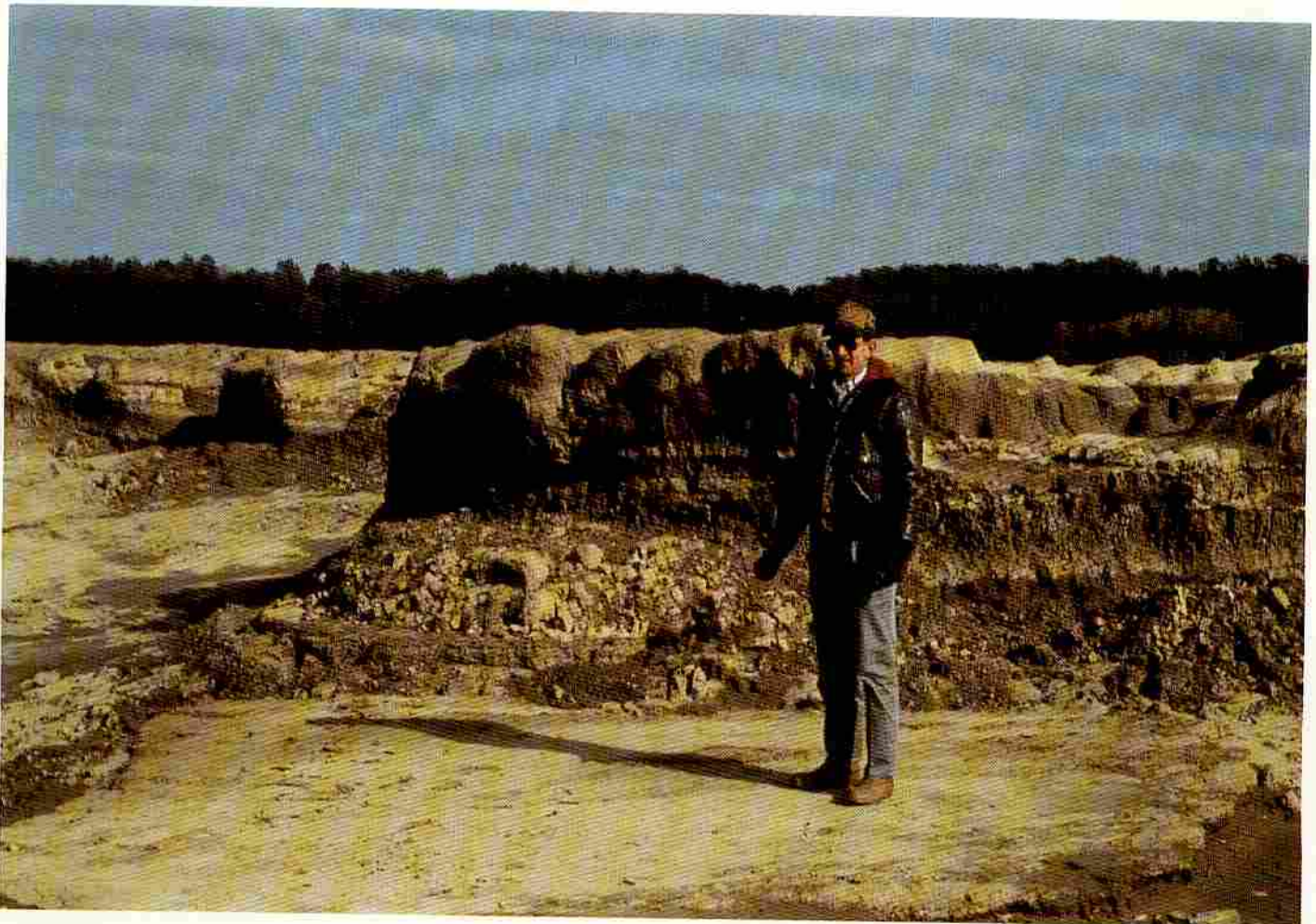


**Economics and
Social Sciences
Division**

Historical Notes
Number 4

The Soil Conservation Service Responds to the 1993 Midwest Floods

Steven Phillips



Cover photo: Ross Braun, Emergency Operations Center Coordinator for Missouri's flood recovery effort, stands amidst badly scoured cropland in Howard County. Photo by Norm Klopfenstein, SCS-Missouri.

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**The Soil Conservation Service Responds to the
1993 Midwest Floods**

Steven Phillips

**United States Department of Agriculture
Soil Conservation Service
Economics and Social Sciences Division
Washington, D.C. 20013**

November 1994

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Foreword

This project began in August of 1994 with the support of National Historian Douglas Helms, Assistant Chief for the Midwest John Peterson, and the Assistant Directors of the Watershed Projects Division, Tom Wehri and Karl Otte. All four were eager to record the Soil Conservation Service's (SCS) flood recovery efforts as they happened in the Midwest and in Washington. This work is also part of a long-term project to chronicle the Service's experience in the field of water resources management.

Besides extensive access to the Service's reports on flood recovery activity, drafts of policy papers, and other documents, I benefited from interviews with many top staff involved in the Midwest effort. I sat in on many of the meetings over topics such as levee repair and wetlands easements. Other important sources included press reports from the Midwest, publications about the flood by other government agencies, the *Congressional Record* and Capitol Hill hearings, and White House press releases.

I made five visits to the Midwest to gather data on the Service's Emergency Watershed Protection program. All together, over fifty people were kind enough to take time out of their busy schedules to talk with me about their efforts. While a small degree of suspicion toward someone from Washington asking questions about progress and problems in their work was natural, almost without exception SCS employees were helpful in providing information. Many were acutely conscious of the historical significance of the flood and their recovery efforts, and were eager to see these developments recorded for posterity.

I want to thank SCS National Historian Douglas Helms for supporting this project. The original idea for this work was his. He helped create interest in the history among top SCS staff and arranged for funding. Perhaps most important was his assistance in the actual research and writing. Based on his experience and contacts in SCS and the field of agricultural history, Douglas Helms provided vital guidance to my work. He read and commented on various drafts, and brought to this work a consistency and coherence it would not have had otherwise. Others in the Economics and Social Sciences Division made contributions to this work: J. D. Ross provided the charts and graphs, Jennifer Harr and Leigh Ann Mayes proof-read this document, and Sheree Gross assisted with the selection of photographs. Stacey Wood, Glenn Lawson, and Lane Price of the Resources Inventory and Geographic Information System Division produced the maps used in this volume. Two other readers, Flora Faye Helms Griffin and Jane Kramer, provided valuable comments on matters of readability and style.

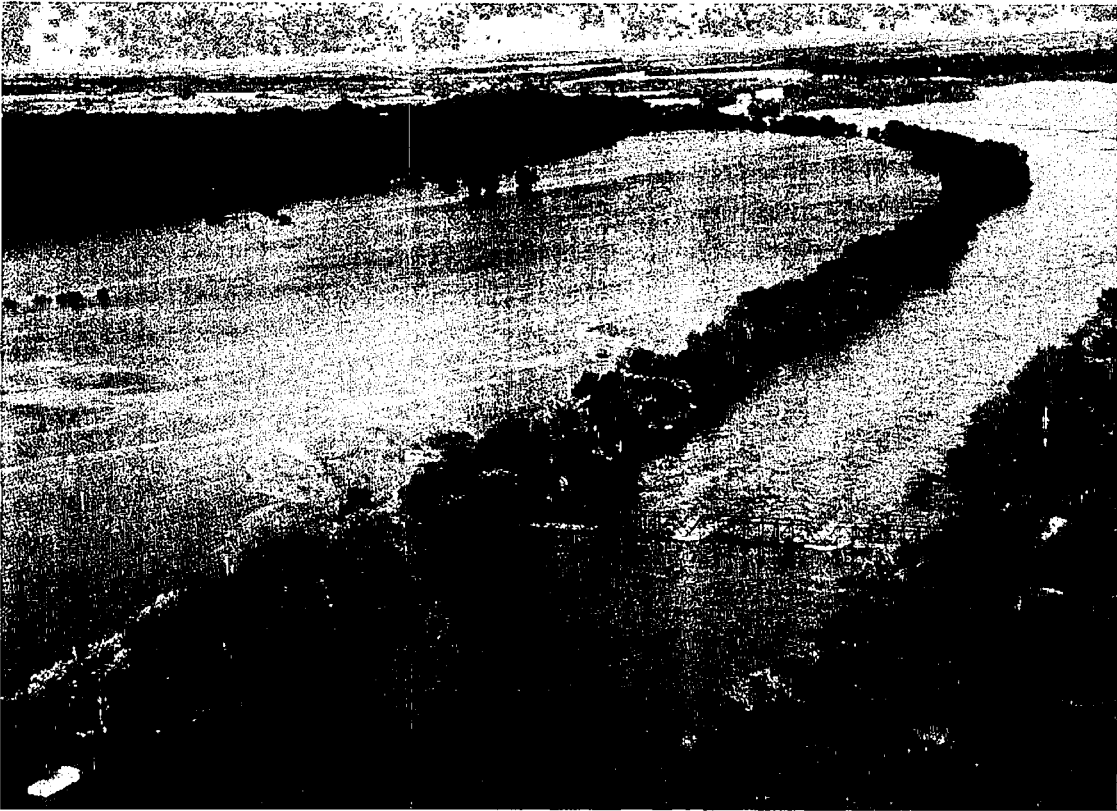
Introduction

For many reasons, the 1993 Midwest flood proved unique to both its victims and the Soil Conservation Service (SCS). First, highly unusual meteorological conditions caused the greatest deluge of water ever recorded in this region. In July, many parts of the Midwest were devastated by rain more than four hundred percent above normal. Second, this disaster lasted months; recovery will take years. For example, Cape Girardeau in southeastern Missouri was at flood stage almost every day between early April and early August. As late as mid-November, heavy rains brought yet another round of flooding to central Missouri and, in many areas, standing water remained even into the winter. In early April of 1994, flooding hit an area stretching from Oklahoma to Indiana. The third defining characteristic of the flood was the large area affected--nine important agricultural states stretching from the Canadian border to the confluence of the Ohio and Mississippi rivers in southeastern Missouri.¹ Fourth, the time and resources SCS devoted to recovery efforts far exceeded any previous emergency response. Congress allocated \$60 million to the Service in August of 1993, and another \$340 million in March of 1994 for flood recovery and related work. Through its Emergency Watershed Protection (EWP) program, SCS used these funds to assist communities in the Midwest. The Service's flood recovery work is expected to last well into 1995. Finally, the flood brought to a head many long-running debates over flood control and floodplain management policies. In this political environment, SCS attempted to satisfy the often conflicting demands of commercial agricultural interests and increasingly powerful environmental groups. This situation was further complicated by the arrival of a new presidential administration, its attempt to reorganize the USDA, long-term interagency rivalries, and budgetary pressures.²

Several other phenomena become clear when examining the progress of repair work and the development of flood recovery policies by the Service. Coordinating the political and policy struggles of SCS at the national level with field-level flood recovery activity was difficult at times. Most of those in the Midwest inside and outside of the government focused on restoring the economic health of the region by returning the floodplains and the structures which protect them to pre-flood conditions. At the same time, the deluge of 1993 led to a re-evaluation of floodplain management policies in the

¹ These states are Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin. Kentucky and Indiana also suffered some relatively minor flood damage.

² This attempt to improve the organizational structure of the federal government was commonly known as "Re-invention." Vice-President Albert Gore led this effort.



Flooding in the Red Rock Dam area along Iowa's Des Moines River. Photo by Ken Hammond, USDA.

United States. Many long-running SCS activities, such as the Small Watershed Program, were scrutinized by experts in the bureaucracy, academia, and media. The flood thus led to a major reassessment of policies, but may bring about major changes in the floodplain only after another huge flood wipes out the structures rebuilt in late 1993 and 1994. Another important issue was the great variation in flood damages and recovery work throughout the region. These differences were based on factors both physical--like geography or meteorology, and human--such as the goals and approaches of individual SCS state conservationists or field level employees. If one measures success in flood recovery by the consistency and uniformity of SCS efforts--focusing on the *process* of performing the work--the Service may come up short. If, on the other hand, one concentrates on the *results*, the numbers of projects completed which met the needs of local communities in the Midwest, SCS staff has reason to feel proud.

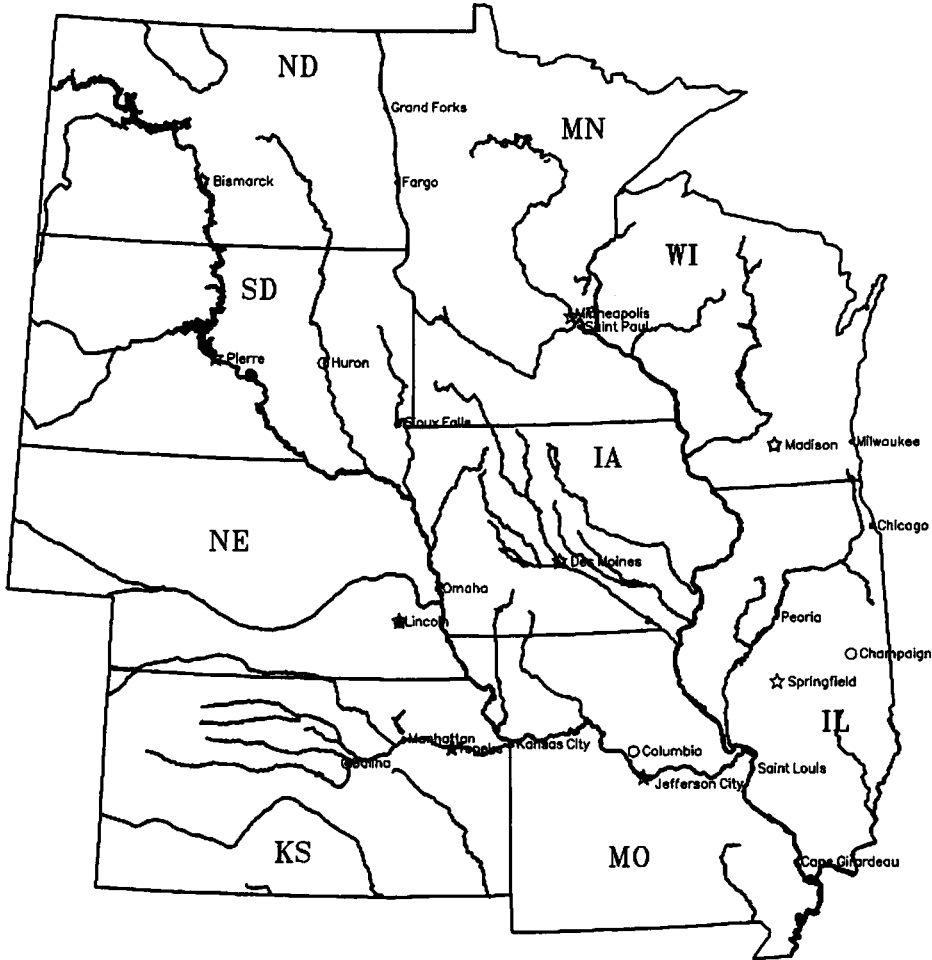
The goal of this study is not simply to chronicle recent history or revel in SCS's success, but rather to assist in program management by pointing out problems, both recurring and unique to 1993, which hamper an effective response to natural disasters. Starting from a historical summary of flooding on the upper Mississippi and lower Missouri rivers, it then describes 1993's disaster. Next, the general approach of the White House and

Congress to flood recovery is examined. The activities of individual U. S. Department of Agriculture (USDA) agencies also receive attention. Most of this document focuses on the Soil Conservation Service's flood recovery program, new wetlands and levee policies, and the vexing problems encountered in this work. A fascinating part of this story is how SCS, an agency which had built very few levees, ended up repairing many of them. Finally, the Service's work in each of the nine flood states will be discussed in detail.

U. S. Department of Agriculture

Soil Conservation Service

States Affected by the 1993 Flood



- ☆ State Capitol
- SCS State Office
- Major City

Scale 1:20,000,000

Map generated by the National GIS Applications Lab,
Washington, D.C., August 1994

Map ID: SAW.949

Map ID: SAW 949

Historical Background

Human habitation, agriculture, and water control structures have existed in the Mississippi and Missouri regions for millennia. The archaeological record shows that Native Americans inhabited the lower Missouri River basin as early as ten thousand years ago.³ Recent literature on the pre-Columbian period forms part of a great debate among experts over the impact of Native Americans upon the natural environment. Some scholars have attacked what they deem the "pristine myth" of Native Americans in perfect harmony with a natural environment unchanged by human activity.⁴ One example of Native Americans modifying their natural environment was Cahokia, which was a city near today's East St. Louis. It supported 30,000 people. Huge projects in that area also included agricultural landforms, settlements, causeways, and ritual mounds. The largest remaining mound is 30.5 meters high and covers 6.9 hectares (about seventeen acres).⁵ This is not to suggest that Native Americans built structures on the same scale or caused the same types or scope of environmental degradation as the European immigrants did, but rather to emphasize that the drive to control and use these waters was a long-term one that cuts across cultural boundaries.

Upper Mississippi River

Besides the rich archeological record, written materials also discuss life on the Mississippi and document the presence of massive floods. Annals of the ill-fated attempt by Spaniard Ferdinand De Soto to explore the Mississippi River region from the mouth of the Arkansas River southward provide evidence of Indian settlements along the river. Ironically, these explorers welcomed a large flood. The remaining 350 of De Soto's men (of the original one thousand in his expedition) were protected in 1543 due to a flood that separated them from their Native-American attackers.⁶ The water was out of its banks for eighty days between March and May of that year. Overall, the Spanish were a sporadic presence in the Mississippi valley. They focused on trade, not settlement, and did nothing to develop water control structures.

³ Henry Hart, *The Dark Missouri* (Madison: The University of Wisconsin Press, 1957), 25.

⁴ See Karl W. Butzer, "The Americas before and after 1492: An Introduction to Current Geographical Research," and William M. Denevan, "The Pristine Myth: The Landscape of the Americas in 1492," both in *Annals of the Association of American Geographers* 82, 3 (1992): 345-368 and 369-385 respectively.

⁵ William Doolittle, "Agriculture in North America on the Eve of Contact: A Reassessment," *Annals* 82, 3 (1992): 386-401. Even these structures were minor compared to the massive public works projects of the central Mexican and Andean civilizations.

⁶ John W. Monette, *History of the Discovery and Settlement of the Valley of the Mississippi* (New York: Harper & Brothers Publishers, 1946), 58-61.

By the late 1600's, the French had moved into the Great Lakes region and had begun to explore the upper reaches of the Mississippi. By 1699, they realized that the river they had explored in the north emptied into the Gulf of Mexico. After Napoleon Bonaparte's victory over the Spanish, the French also took control of the land that would become New Orleans. Levee construction began in the early 1700's around this vital trading center near the mouth of the Mississippi River. By 1735 approximately forty-two miles had been completed below and above the city. In order to promote flood control, the French declared in 1743 that any land not protected by levees by the next year would be claimed by the Crown. From this humble beginning, flood control efforts generally spread northward, following the development of sizable towns and infrastructure in the major river bottoms.

While these events set precedents in levee building and helped develop the lower Mississippi, President Thomas Jefferson's Louisiana Purchase of 1803 was the single most important step toward opening the Mississippi and Missouri regions to permanent, non-Native American, settlement. Migrants, mainly farmers, pressed westward by land. The marriage of agricultural commodities and inexpensive river transport quickly made this region vital for the young Republic's economic development. By the late 1800's, the upper Mississippi also had become an important waterway for lumber, grain, and other commodities.⁷ The river has played a role not only in the nation's economic life, but also in its cultural development, as shown by the works of Samuel Clemens (Mark Twain).⁸

As settlements grew into towns, then into cities, concerns over flooding grew and the construction of levees increased. The more developed and populated lower Mississippi continued to be the focus of most attention. The Swamp Acts of 1849 and 1850 represented the Congress' first attempt to enable the individual states of the lower Mississippi to undertake flood control. The Acts granted swamp and overflow lands to the states. The land then could be sold to finance drainage or flood control projects. The program achieved relatively little due to the lack of coordination across state lines and the enormity of the task it confronted. Massive floods in 1858 led to a turning point in the development of flood control strategies. This can be seen clearly in an 1861 report by Army Corps of Engineers' Captain A. A. Humphreys and Lieutenant Henry L. Abbot. Their rejection of reservoirs, cutoffs, and outlets led to what has been deemed the "levees only" policy of the Corps.⁹ The Corps (sometimes abbreviated as COE) moved

⁷ For a history of navigation and flood control on the Upper Mississippi, see Ronald Tweet, *A History of the Rock Island District, Corps of Engineers* (Washington: U.S. Government Printing Office, 1975).

⁸ As one essayist writes, "One might say, paraphrasing Herodotus, that American literature is a gift of the Mississippi." Andrei Codrescu, "Down in the Flood," *Sierra* (March-April 1994): 85-86.

⁹ *The Mississippi River: A Short Historic Description of the Development of Flood Control and Navigation on the Mississippi River* (Vicksburg: Office of the President, Mississippi River Commission, 1940), 16.

away from this singular focus on levees by the early 1900's. The legacy of this policy was the Corps' alleged over-emphasis upon flood control structures, of which levees were among the most visible. This became a key point of contention in the aftermath of the 1993 flood.

It was not until 1866 that Congress authorized funds for navigational improvements on the upper Mississippi. The next major step in flood control was the creation of the Mississippi River Commission by Congress in 1879. Congress charged the Commission with improving navigation and flood control under the leadership of the Corps. The bulk of this work occurred in the area south of Cairo, Illinois, but did go as far north as Keokuk, Iowa. Focusing on structural measures, the extent and size of levees increased steadily. In 1895 the Corps of Engineers began its first flood control project in the area, the Flint Creek Levee. Before this time, local communities constructed and maintained their own levees. For example, one of the largest projects was in the Sny Drainage District in southern Illinois. The district built a fifty-mile levee in the late 1800's. Much of the responsibility for flood control structures on the upper Mississippi and its tributaries was and remains in the hands of private citizens or local government. This lack of central authority was an important issue after the 1993 flood and received a great deal of attention from those discussing the future of floodplain management policies.¹⁰

While flood control efforts have expanded gradually due to increasing population and infrastructure in the floodplain, large floods have been the vital catalysts for significant increases in financial and legislative support from the federal government. Major developments in Mississippi River flood control, however, remained focused on the lower reaches. As a result of the devastating floods of 1927, which overtopped many levees, Congress passed the Flood Control Act of 1928 which authorized structural work, including levees, from Cape Girardeau, Missouri, southward to the Gulf of Mexico.¹¹ The Army Corps of Engineers had designed and built structures, and had enforced standards for flood control structures in this region. The next step was the Flood Control Act of 1936, which clearly stated that flood control was a federal responsibility. Perhaps most importantly, the 1936 law connected smaller local projects in the upstream tributaries with the task of flood control along the major rivers. The key requirement for these projects was that benefits exceed costs.¹²

¹⁰ The one field where the Corps has had the most authority has been in the creation and maintenance of navigable channels on America's major rivers.

¹¹ This flood inundated about eighteen thousand square miles of territory in the Lower Mississippi.

¹² Luna B. Leopold and Thomas Maddock, Jr., *The Flood Control Controversy: Big Dams, Little Dams, and Land Management* (New York: The Ronald Company, 1954), 101-102.

The focus of flood control work gradually shifted to the Ohio, Missouri, Arkansas-White-Red and upper Mississippi basins in the 1960's.¹³ Much of the structural work centered on the construction of dams and reservoirs on tributaries to the Mississippi, such as the Cedar River, Des Moines River, and the Grand River.¹⁴ In 1962 Congress attempted to coordinate flood control efforts by authorizing what became only one of many commissions, committees, or interagency studies--the Upper Mississippi River Comprehensive Basin Study. This project, led by the Corps of Engineers in consultation with other federal agencies and individual states, was completed in 1972. Historically, the problem this and other groups have faced has not been developing rational, long-term solutions to floodplain management problems. Instead, change has been stymied by the lack of political support that could be translated into legislative and financial backing.

It is important to remember that, on the upper Mississippi, more than in the lower reaches, flood control did and does reflect a mixture of local, state, and federal efforts. Most levees remain in private or local government hands. Further, there has been a strong emphasis on upstream land treatment for flood prevention, an area of particular SCS expertise, in the upper Mississippi region.¹⁵ For these reasons, the Corps has been much less powerful as a centralizing force in the upper Mississippi than it has been downstream.

The most common floods in the upper Mississippi result from snow melt and rainfall in the spring of each year. These are not sudden floods, but rather gradual and steady rises in the water level.¹⁶ Just as the 1993 event proved to be unusual, however, the largest floods in the past were more than simply expanded versions of the common annual events. Major floods occurred in 1951, 1965, 1969, and 1973. The 1951 event hit in late April and early May due to exceptionally warm weather in March which led to fast snowmelt upstream, as well as six major storms. The Corps credited its flood control works with limiting damage. Only about five thousand people required evacuation. The 1965 flood was caused almost exclusively by snowmelt. The ground was wet when the winter freeze occurred in late 1964, thus preventing any water from soaking into the soil. Then, above-average snowfall hit the upstream areas of the Mississippi. This flood,

¹³ Beatrice Holmes, *History of Federal Water Resources Programs and Policies, 1961-1970*, U.S. Department of Agriculture, Economic, Statistics, and Cooperative Service, Misc. Pub. No. 1379 (Washington: U.S. Government Printing Office, 1979), 9.

¹⁴ Ellis L. Armstrong, ed., *History of Public Works in the United States, 1776-1976* (Chicago: American Public Works Association, 1976), 259.

¹⁵ See the section on SCS and the Emergency Watershed Protection program, as well as state sections, for more detail on the Service's work in this area.

¹⁶ A study of another kind of disaster, flash floods caused by sudden storms in Iowa, showed that June was the most dangerous month. These floods, although severe, covered a relatively small area (a few counties) for a limited duration. Harlan H. Schwob, "Floods in Iowa," in Merwin D. Dougal, ed., *Flood Plain Management: Iowa's Experience* (Ames: The Iowa State University Press, 1969).

lasting from early April through mid-May, was greater than in 1951. Another event was the April flood of 1969, which devastated South Dakota, Minnesota, Wisconsin, Illinois, and Iowa, caused \$147 million in damages, and took eleven lives. In many areas, the recurrence levels exceeded that of a fifty-year flood. This disaster was the result of heavy rains in the fall of 1968 and blizzards in early 1969. In fact, March and April rainfall in the region was below normal; this event was almost solely the result of previous precipitation. The 1973 flood was caused by rain, not snowmelt. Rainfall over much of the Midwest was two hundred and twenty percent above normal for the first six months of 1973. Hannibal, Missouri, was at flood stage for one hundred days in the spring and early summer. About one hundred and eighty thousand acres were inundated.¹⁷ These were the floods for which the people of the upper Mississippi and its tributaries had prepared. Each of these events was smaller than the 1993 flood.

Lower Missouri River

European or American exploration, settlement, and control of the Missouri River occurred slightly later than on the Mississippi. In 1673, French explorers Father Jacques Marquette and Louis Joliet traveled down the Mississippi to its confluence with the Missouri. They later wrote:

As we were gently sailing down the still clear water (of the Mississippi River), we heard a noise of the rapid into which we were about to fall. I have seen nothing more frightful, a mass of large trees entire with branches...We could not without great danger expose ourselves to pass across...The water was all muddy, and could not get clear.¹⁸

This description raised an important distinction between the Mississippi and Missouri rivers. The latter flows through loessial soils of the central United States, constantly eroding and carrying these soils into the lower Mississippi. The Missouri River is nicknamed the "Big Muddy" due to its chocolate brown color--it carries up to five times as much sediment as the Mississippi River north of Cairo, Illinois.

¹⁷ Tweet, *A History of the Rock Island District*, chapter IX, "Flood Control."

¹⁸ Quoted in Frances Cushman and Gordon MacGregor, *Harnessing the Big Muddy: The Story of the Missouri River Basin* (The United States Indian Service, 1948), 33.

The first non-Native Americans to see the source of the Missouri were members of the expedition led by Meriwether Lewis and William Clark, who traveled up the river from St. Louis in 1804-1806. For much of the nineteenth century, people passed through the Missouri region and settled farther west in California. By the late-1800's, however, the region began to "fill-in" with growing agricultural settlements.¹⁹

Flood control followed roughly the same pattern as on the upper Mississippi River, although at a later date.²⁰ Congress created the Missouri River Commission in 1884. The Commission focused on "bank protection and similar construction."²¹ It did little of lasting importance and its work was hampered by a lack of funds and the fact that political and economic interests focused on local protection of structures on the banks rather than on developing a navigable channel.²² The Commission existed until 1902, when the Corps of Engineers took responsibility for the region. As mentioned earlier, after the great flood of 1927 on the lower Mississippi River, Congress passed the Flood Control Act of 1928, which charged the Corps with investigating and planning for all major tributaries. Only then did the Corps begin significant flood control work in the Missouri River basin. The Corps of Engineers became particularly active in the 1950's through the Pick-Sloan Plan.²³ This program grew from separate investigations by the Corps and the Bureau of Reclamation authorized by the 1936 Flood Control Act and later combined in the 1944 Flood Control Act. The Corps constructed a series of reservoirs stretching from Missouri to Montana. In 1972, the work of coordinating flood control efforts was placed in the hands of the Missouri River Basin Commission.²⁴ Overall, the Missouri River, like the Mississippi, has been manipulated and governed by a wide variety of federal, state and local governments, as well as through the efforts of levee districts and individual landowners along the river.

¹⁹ For a detailed account of settlement in the Missouri Basin, see Hart, *The Dark Missouri*, Chapter III, "The Planned Frontier."

²⁰ For an interesting and comprehensive overview of man's effect upon the Lower Missouri River, see John L. Funk and John W. Robinson, *Changes in the Channel of the Lower Missouri River and Effect on Fish and Wildlife*, (Jefferson City: Missouri Department of Conservation, 1974).

²¹ O. V. P. Stout, "The Relation of Power and Irrigation at the Headwaters of the Missouri to Floods in the Lower Courses of the River," in *The Control, Development, and Utilization of the Missouri River and Its Tributaries: Report of a Symposium Held at the State University (Nebraska)*, May 20, 1908.

²² Hart, *The Dark Missouri*, 82.

²³ Flood control in the Midwest, especially Kansas, has been an important part of the "big dam-little dam" debate. For an outline of the debate, see Douglas Helms, "Small Watersheds and the USDA: Legacy of the Flood Control Act of 1936," in *Readings in the History of the Soil Conservation Service*, Historical Notes No. 1 (Washington: Soil Conservation Service, 1992), 96-109.

²⁴ For more historical information concerning debates over flood control on the Missouri, see Richard G. Baumhoff, *The Damned Missouri Valley: One Sixth of Our Nation* (New York: Alfred A. Knopf, 1951).

Rufus Terral, in his history of the Missouri Valley, describes two types of "normal" flooding on this river.²⁵ First are the brief floods due to the rapid melting of snow on the Great Plains in March and April. Second is the "June rise" when snow in the mountains melts and heavy rains hit the lower basin. The worst floods appear when these two crests occur simultaneously. No previous floods caused the destruction nature wrought in 1993. One of the longest floods was in 1915. It lasted two and a half months. One of the most extensive floods was in 1943. It covered 2.26 million acres of Missouri River bottom lands, which was less than the area flooded in the state of Missouri alone in 1993.

One major flood was the 1951 event in Kansas and Missouri. As in 1993, heavy rains over an extended period of time were the chief cause. Greater than average precipitation fell in May, June and early July. Then on July 10, the heaviest rainfall since 1844 hit, dumping up to fifteen inches of rain in two days. Fifteen people died and property damage was estimated to be over one billion dollars. The actual time during which towns or farms were inundated, however, was only a few days. Foreshadowing 1993, the problems of scouring (topsoil being removed by rushing water) and sand deposits were prevalent along the Missouri River. Also, a USDA publication admitted that its work in straightening and improving channels sped up the water and increased flood crests.²⁶ This became an extremely contentious environmental issue in the 1960's and after.

Another large flood resulted from rains around Kansas City on September 12 and 13, 1977. The same weather pattern which produced between ten and sixteen inches of rain over two days in 1977 would reappear and remain over the Midwest for months in 1993. While a low pressure system was centered over Kansas, warm, moist air from the Gulf of Mexico pushed northward. The resulting precipitation led to stream flows greater than those estimated for a one hundred-year flood.²⁷ In 1977, the disaster affected only ten counties around Kansas City, yet twenty-five people died and the area suffered over \$80 million in damages.

²⁵ Rufus Terral, *The Missouri Valley: Land of Drought, Flood, and Promise* (New Haven: Yale University Press, 1947), 84.

²⁶ *The Great Flood*, Agriculture Information Bulletin No. 81 (Washington: U.S. Government Printing Office, 1952).

²⁷ For further details on this flood, see Leland D. Hauth and William J. Carswell, Jr, and Edwin H. Chin, *Floods in Kansas City, Missouri and Kansas, September 12-13, 1977*, U.S. Geological Survey and National Oceanic and Atmospheric Administration, Geological Survey Professional Paper P1169 (Washington: U.S. Government Printing Office, 1981).

The deluge of 1993 and SCS's response must be considered in the context of these previous floods and the resulting flood control efforts. Over the past one hundred years, a variety of federal, state, local, and private entities have built flood control structures on the upper Mississippi, the lower Missouri, and their tributaries. Usually, modifications to America's flood control policies were direct and immediate responses to major floods. While experts, advocates, and visionaries have called consistently for new approaches, the vital political and economic backing for change came only after large disasters. Unlike the lower Mississippi, Congress never authorized a single agency to enforce a unified system of floodplain management on the upper Mississippi and lower Missouri. Nevertheless, the region was prepared for the "regular" spring floods and had endured and recovered from less frequent, but much larger events. The debacle of 1993, however, was beyond anyone's expectations.

An Unprecedented Flood Event

There are a variety of ways to illustrate the incredible rainfall, flooding, and damages suffered in 1993:

- Three National Weather Service (NWS) weather stations in the Midwest reported receiving over four hundred percent of the normal July rainfall.
- NWS stated that, in eight of the nine flood states, July of 1993 was among the three wettest months since complete records were first kept in 1895.²⁸
- This was the wettest June and July in history for Wisconsin, Iowa, and Illinois. Parts of Kansas and Missouri received 3.5 feet of rain between April and the end of July.²⁹
- At the four USGS stream flow gauging stations with the longest complete records, peak discharge exceeded that expected with a one hundred-year recurrence interval. The peak discharge at Van Meter, Iowa, along the Raccoon River, was twice as great as any measurement taken in the gauging station's eighty-year history.³⁰
- Over the course of the flood, fourteen rivers, including the Mississippi, Missouri, Illinois, Iowa, Minnesota, Des Moines, Rock, Raccoon, and Skunk, reached historic highs.
- SCS estimated that 12.8 million acres were flooded.

²⁸ Much of this weather data comes from Kenneth L. Wahl, et. al., *Precipitation in the Upper Mississippi River Basin, January 1 through July 31, 1993*, U.S. Geological Survey Circular 1120-B (Washington: U.S. Government Printing Office, 1993).

²⁹ One inch of rain over one acre equals 27,143 gallons of water.

³⁰ Charles Parrett, et. al., *Flood Discharges in the Upper Mississippi River Basin*, 1993, U.S. Geological Survey Circular 1120-A (Washington: U.S. Government Printing Office, 1993), 8. Perhaps the best explanation of a one hundred-year flood comes from a 1992 floodplain management report:

Probably the most misunderstood floodplain management term is the "100-year flood."...[T]he "100-year flood" is simply another term to refer to the one percent annual chance flood--the flood that has a one percent chance of being equaled or exceeded each year...Unfortunately, the term is often taken literally, with individuals believing that if they have experienced a "100-year" flood, another flood of that magnitude will not occur for another 100 years.

A one hundred-year flood is often called a "base flood." It becomes the standard which structures and flood control measures are built to contain. See chapter 9, "Perception, Awareness and Response," in *Floodplain Management in the United States: An Assessment Report, Volume 2: Full Report* (Federal Interagency Floodplain Management Task Force, 1992), 9-7.



Virgil Eichelberger inspects a center-pivot irrigation system on his farm in Muscatine County, Iowa. Photo by Ken Hammond, USDA.

- Due to rainfall and subsequent flooding, USDA's Economic Research Service lowered its 1993-4 national corn production estimate by eight percent (650 million bushels) and soybean estimate by three percent (seventy million bushels) in July.³¹ These figures proved optimistic. Based on November estimates, the Midwest flood and Southeast drought were blamed for a thirty-one percent drop in corn production and a sixteen percent drop in soybean production compared to 1992. Corn yields declined from 131.4 bushels per acre in 1992 to 103.1 bushels in 1993.
- The Midwest suffered \$12 billion in flood damages and forty-seven deaths.³²

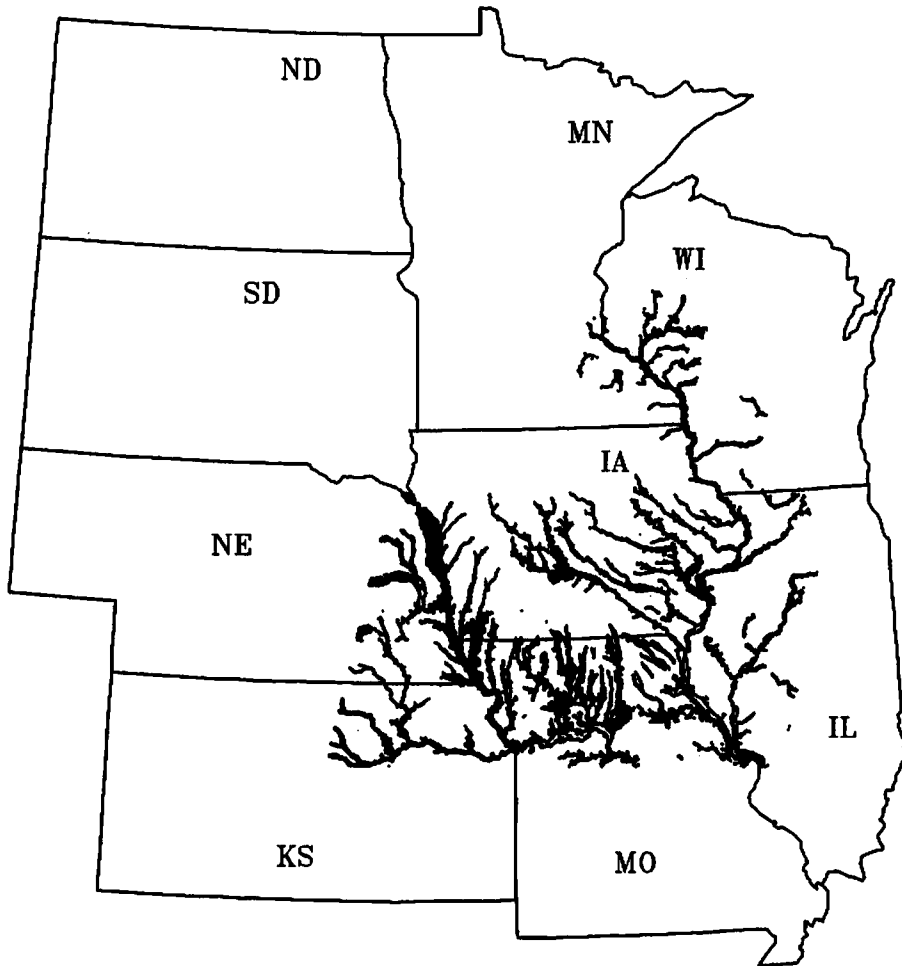
³¹ It is important to remember that many upland areas away from the rivers suffered crop damage due to excess rainfall and saturated soil, not flooding. "Flooding in the Midwest Pushes Down Production Forecasts," July 19, 1993, Cooperative Extension Service (CES), available from IDEA Information Client through the Internet.

³² Richard Meryhew, "Nation's Pain May Be Flood Plain's Gain," *Star-Tribune* (Minneapolis), December 5, 1993. See also a news release from the American Red Cross, "Fact Sheet: Midwest Floods." Total damage estimates in the media ran from \$10 to \$20 billion. The \$12 billion figure was cited most frequently. For a brief overview of the economic consequences of the flood, see John Boyd, "Year Later, Flood Costs Continue to Climb," *Journal of Commerce*, June 27, 1994.

U. S. Department of Agriculture

Soil Conservation Service

Area Inundated



Source: Earth Resource Observation System Data Center

Scale 1:20,000,000

Map generated by the National GIS Applications Lab,
Washington, D.C., August 1994

Map ID: SAW.949

With the benefit of hindsight, the disaster of 1993 does not appear to have been a complete surprise. For example, on March 6, 1993, a report buried on page 6B of the Minneapolis *Star-Tribune* contained a warning by a NWS hydrologist that the potential for minor to moderate flooding existed in the region.³³ In the late summer of 1993, the United States Geological Survey (USGS) reported that "The areal extent and magnitude of the 1993 Mississippi River flood was due to a persistent wet-weather pattern that was throughout the upper Mid-western United States for at least six months preceding the flood."³⁴ The pattern was due to the position of the jetstream, which steadily drew warm moist air from the Gulf of Mexico northward, where it clashed with cooler air from Canada, thus resulting in heavy rainfall. While the upper Midwest sat under this convergence zone and was drenched, the East from Alabama to Vermont suffered from heat and drought.³⁵ The flood was limited to the area north of the confluence of the Ohio and Mississippi rivers due to abnormally low rainfall over the Ohio basin during the spring and summer. The National Oceanic and Atmospheric Administration (NOAA) reported that the persistent weather pattern over the United States set several different types of records in three regions: Midwest (wettest), Northwest (coldest), and Southeast (hottest and driest).³⁶

Many reasons were offered to explain the wet weather of 1993. The September issue of *Farm Journal* contained an interesting article on some possible reasons for the record-setting rain, including El Niño over the Pacific Ocean, the effects of the 1991 eruption of Mt. Pinatubo in the Philippines, greenhouse warming, lunar cycles, and sunspot cycles.³⁷ Scientists with the Greenland Ice Core Project, who investigate long-term temperature change by examining layers of ice thousands of years old, suggested that the 1990's marked the beginning of a period of large climatic shifts.³⁸ In late 1993, NOAA said

³³ For an excellent chronology of early flood predictions, see Robert Dvorchak, "The Life and Death of a Natural Disaster," *Columbia Missourian*, August 8, 1993. This article was part of a special insert in the newspaper which contained a great deal of information about the flood and damages in Missouri.

³⁴ Parrett, *Flood Discharges in the Upper Mississippi River Basin*, 1-3.

³⁵ The month of August was among the ten driest on record in Florida, Ohio, Maine, and Rhode Island.

³⁶ The month of August was among the ten coldest on record in Montana, Colorado, Idaho, and Utah.

³⁷ El Niño is a warm air current along the coast of Peru which develops in February or March of each year. It is a major factor in the weather of the West Coast. The Greenhouse Effect is based upon the controversial theory that carbon dioxide emissions from the burning of fossil fuels trap heat in the upper atmosphere, thus raising the earth's temperature and bringing about climatic change. Others claim that pollution in the upper atmosphere will in fact block the sun's rays and aid in cloud formation, thus lowering temperatures. The eruption of Mount Pinatubo in the Philippines is also part of this debate. It spewed forth tons of particles into the upper atmosphere. Further, some scientists believe that sunspot cycles (eleven years) or magnetic cycles (twenty-two years) have a measurable effect upon weather patterns.

³⁸ Charlene Finck, et. al., "Big Weather: Recovery from 1993's Disaster Could Take a Decade," *Farm Journal* (September 1993): 11-13.

that there was insufficient data to blame Mt. Pinatubo or greenhouse gases.³⁹ It did not address the other issues. In early 1994, NOAA stated that the ENSO (El Niño-Southern Oscillation) was a major culprit of the 1993 Midwest floods.⁴⁰ It spawned the weather pattern that dumped heavy rain week after week over the central United States.⁴¹

James A. Smith, in the newsletter of the National Research Council's Water Science and Technology Board, put the 1993 flood into the context of the convergence of several inter-related factors. First, global atmospheric conditions increased the number and severity of storms moving eastward across the central United States. Second, wet soil conditions in the spring of 1993 increased run-off into streams and rivers. Third, increased soil moisture actually may have affected weather patterns and led to more thunderstorms in the region. Thus, the heavy rainfall became almost self-perpetuating.⁴²

Whatever the cause, persistent rain, punctuated by a series of extremely powerful storms, wracked the upper Mississippi and lower Missouri river regions through the late spring and summer of 1993. In early June, heavy rain hit Minnesota, Iowa, North Dakota, and South Dakota. On June 17 and 18, between two and seven inches of rain fell in southern Minnesota, southwestern Wisconsin, and northern Iowa. Two major storms in early July were key to the floods in Iowa. On July 4 and 5, as much as five inches of rain fell in the central part of the state. On July 8 and 9 yet another eight inches fell in roughly the same area. Next, on July 15 and 16 two to seven inches of rain hit parts of North Dakota and Minnesota. Finally, the Missouri River, already at flood stage, flowed out of its banks in many areas due to a two- to thirteen-inch rainfall between July 22 and 24 across Nebraska, Kansas, Iowa, Missouri, and Illinois.

In mid-June, the national press took notice. The Associated Press reported that a "record wet spring in the Midwest is washing some of the nation's most productive soil into the Mississippi River and its tributaries."⁴³ By the end of the month, the Corps of Engineers had closed almost five hundred miles of the Mississippi River to traffic, covering an area from St. Paul, Minnesota, to Alton, Illinois.⁴⁴ On July 3, the Missouri River closed to barge and boat traffic. Along hundreds of miles of the Mississippi and Missouri rivers, highway bridges were closed, cutting vital transportation links and

³⁹ *Special Climate Summary 93/3*, September 14, 1993, National Weather Service, National Meteorological Center, Climate Analysis Center.

⁴⁰ Southern Oscillation indicates the changes in air pressure caused by El Niño.

⁴¹ "Pacific Ocean Warming a Major Cause of Floods," *The Bismark Tribune*, September 17, 1993.

⁴² James A. Smith, "Mississippi River Flooding of 1993: Lessons Learned," *WSTB* 11, no. 2 (April 1994): 1-2. WSTB stands for Water Science and Technology Board.

⁴³ Robert Greene, "Wet Spring Causes Erosion Along with Crop Delays," AP wire, June 19, 1993.

Note: Many of the news reports cited in this history can be obtained in full from the "Ag-AM" press clipping file. These materials are held for six months at the NAL's Reference Room.

⁴⁴ "Hundreds of Miles of US Mississippi River Closed Due to Flooding," UPI wire, June 27, 1993.

preventing people from reaching their jobs.⁴⁵ Flood conditions would continue to worsen through August.⁴⁶ In July and August, it was as though a sixth Great Lake, centered around northern Iowa, had sprung up in the Midwest.

It was not just the amount, but also the content of the water that brought danger to the people of the Midwest and their neighbors in the lower Mississippi and the Gulf of Mexico. The flood waters carried pesticides, fertilizers, and all manner of debris downstream. A USGS expert stated that "We thought that concentrations [of agricultural chemicals] would be diluted by the record-high flows, but this did not turn out to be the case."⁴⁷ In fact, the total atrazine (an herbicide) load carried into the Gulf of Mexico between April and August of 1993 was 235 percent greater than during the same period in 1992 and eighty percent over the 1991 figure. The total nitrate load was 112 percent higher than 1992, and thirty-seven percent greater than in 1991. USGS also warned that the increased flow of freshwater and nitrates into the Gulf could lead to increased phytoplankton growth.⁴⁸

Fortunately, the period from October of 1993 through May of 1994 was slightly dryer than normal for much of the Midwest.⁴⁹ Although spring run-off in the region was normal or below normal in the spring of 1994, flooding returned in a few areas due to heavy localized rains falling upon ground still saturated from 1993.⁵⁰ On April 21, President Bill Clinton again declared parts of Missouri a disaster area "to help individuals and families in that state recover from severe storms, tornadoes, and flooding which began on April 9 and have continued to date."⁵¹ Flooding also spread as far east as Ohio in mid-April. The Soil Conservation Service in Illinois reported significant flooding and

⁴⁵ Usually, the bridges were high enough to remain dry in the center. However, the highway approaches to the bridges were flooded.

⁴⁶ Although the story of the heroic flood fighting efforts and personal losses of Midwesterners is a fascinating one, it is beyond the scope of this study. For more information and photos of the flood and its effect, see publications by the staff of the *St. Louis Post Dispatch*, *High and Mighty: The Flood of 1993* (Kansas City: Andrews and McMeel, 1993) and *The Des Moines Register*, *Iowa's Lost Summer: The Flood of 1993* (Des Moines: Des Moines Register and Tribune Company, 1993).

⁴⁷ Press release, "Agricultural Chemicals Reported in Mississippi Floodwaters," Department of Interior, U.S. Geological Survey, August 30, 1993.

⁴⁸ For statistics on the flood and agricultural chemicals, see Donald A. Goolsby, et. al., *Occurrence and Transport of Agricultural Chemicals in the Mississippi River Basin, July through August 1993*, U.S. Geological Survey Circular 1120-C (U.S. Government Printing Office, 1993).

⁴⁹ See *Special Climate Summary 94/1: Early Season Growing Report*, dated June 1, 1994. National Weather Service, National Meteorological Center, Climate Analysis Center.

⁵⁰ Pringle Pipkin, "Floods Menace Battered Lands," *Kansas City Star*, April 13, 1994.

⁵¹ Press release, "President Clinton Declares Major Disaster in Missouri," The White House, Office of the Press Secretary, April 21, 1994. The President also declared part of Oklahoma a disaster area based upon damage brought about by the same storms that hit Missouri.

damage to structures already weakened by the previous year's disaster. Up to eleven inches of rain fell in some areas, raising fears that 1994 would equal or surpass the devastation of 1993.⁵² This eventuality did not come to pass, as the summer of 1994 proved to be relatively hot and dry.

It was in the context of this severe and widespread flooding that the federal government, including the Soil Conservation Service, responded to requests for assistance from individuals, local governments, and states.

⁵² Carol J. Castaneda, "In Wet Midwest, High Anxiety," *USA Today*, April 14, 1994.

President Clinton, Congress and Flood Relief

By the late spring of 1993, it had become clear that this disaster required resources greater than the individual states could marshal. In mid- and late June, state governors in the Midwest began to call for federal assistance. On June 28 Governor Terry Branstad of Iowa declared a disaster area in fifteen counties and called out the National Guard to assist with sandbagging operations.⁵³ The Governor of South Dakota requested that Secretary of Agriculture Mike Espy declare twenty-five counties in his state a disaster area. On July 1, the governors of Wisconsin, Minnesota, South Dakota, Iowa, and Illinois announced that they were seeking federal disaster aid.⁵⁴ By July 26, President William F. Clinton had declared that major disasters existed in nine states.⁵⁵

The statements and actions of Congress and President Clinton concerning the Midwest flood paralleled the rest of America's: a restrained first reaction in June and early July followed by re-evaluation and a heightened response as the full magnitude of the disaster became apparent. Shortly before traveling to Iowa for a town meeting about the flood on July 8, President Clinton released \$100 million from his disaster fund. He also announced his intention to sign a bill making available another \$297 million and to request additional money from Congress. At that time the President stated that "we know that the damage from this flood is going to be somewhere in the neighborhood of a billion dollars"⁵⁶ He also promised that "We are going to ask that the producers here receive the same benefits as the people who were affected by Hurricane Andrew and other major disasters last year...." Such statements opened the door to a steadily increasing bill for flood recovery.

⁵³ John Dowling, "Guard, Volunteers Called Out to Contain Surging Mississippi," AP wire, June 28, 1993.

⁵⁴ Philip Brasher, "Clinton Promises Aid to Swamped Midwestern Farmers," AP wire, July 1, 1993.

⁵⁵ The last state was North Dakota. The presidential declaration makes selected counties within a state eligible for a wide range of assistance such as Small Business Administration and Farmers Home Administration loans, unemployment assistance, and help rebuilding infrastructure. These nine states included over five hundred individual counties as part of the disaster area. Only in Iowa did the presidential declaration cover every county. The presidential declaration is generally reserved for the most serious disasters and often, though not always, overlaps with an SCS state conservationist's EWP area or a USDA disaster declaration. Since most disasters which require a state conservationist to invoke EWP are in rural areas and are limited in nature, they rarely benefit from a presidential disaster declaration.

⁵⁶ "Remarks by the President in Iowa Town Meeting," The White House, Office of the Press Secretary, July 8, 1993.

The President unveiled his initial \$2.482 billion flood relief plan on July 14.⁵⁷ It included the following amounts:

- \$600 million for the Commodity Credit Corporation
((\$300 million extra upon Presidential request)
- 550 million for the Federal Emergency Management Administration
((\$250 million extra available)
- 153 million for the Department of Housing and Urban Development (HUD)
- 100 million for the Economic Development Administration (EDA)
- 100 million for the Federal Highway Administration
- 70 million for the Small Business Administration (SBA)
- 45 million for the Army Corps of Engineers
((\$20 million extra available)
- 25 million for SCS's watershed and flood prevention operations
- 20 million for the Agricultural Stabilization and Conservation Service's
(ASCS) Emergency Conservation Program (ECP)
- 5 million for the Coast Guard.⁵⁸

On July 17 President Clinton, Vice President Albert Gore, Director of the Federal Emergency Management Administration (FEMA) James Lee Witt, Secretary Espy, Secretary of Transportation Frederico Peña, Secretary of Commerce Ron Brown, Secretary of Health and Human Services Donna Shalala, Secretary of Housing and Urban Development Henry Cisneros, Secretary of Labor Robert Reich, head of the Corps of Engineers Lieutenant General Arthur Williams, the Director of the Office of Management and Budget Leon Panetta, and five state governors met in Arnold, Missouri. The tone was more somber than at the previous town meeting, as the unprecedented damage from the flooding became clear.

At this meeting, there was little talk of levees or poor floodplain management policies as possible factors in worsening the flood. Vice President Gore stated that "an extremely unusual weather pattern" was responsible for the floods. Espy also stressed that this was

⁵⁷ It included another \$824 million in contingency funding.

⁵⁸ For more information, see the White House press releases and fact sheets, "President Proposes New Flood Assistance," dated July 14, 1993.

the wettest season on record.⁵⁹ Governors, members of Congress, and local officials at the meeting stated that they did not consider these amounts adequate.⁶⁰ A request to raise this supplemental appropriation was made on July 29.⁶¹

As federal assistance offered to the Midwest increased, a variety of news reports examined the amount of aid sought by politicians, farmers and residents of the Midwest. One article pointed out that the federal government could actually save money, since the disaster relief payments to farmers (estimated at one billion dollars at that time) were more than offset by the expected reduction in agricultural subsidies.⁶² Some questioned the amount of relief payments or the method of disbursing aid.⁶³ Other writers examined the claim that early damage estimates are often unreliable and exaggerated.⁶⁴ In mid-July, a *USA Today* article detailed flood losses in nine states. According to figures gathered from various state agencies, Missouri was among those suffering the worst with thirty to thirty-five percent of the state's cropland affected, crop damage of \$700 million, and property damage of \$2.7 billion. In Iowa, twenty-nine percent of the farmland was flooded, crop damage was approximately one billion dollars, and property damage was \$1.7 billion.⁶⁵ The article stated, however, that the overall economic impact of the floods would be minor compared to Hurricane Andrew.⁶⁶ Such observations were overshadowed by the images of devastation broadcast across the country by television news.⁶⁷

Representative William Natcher, a Democratic member of Congress from Kentucky, first sponsored the relief bill that became law. Public markup was held on July 20. On Tuesday, July 28 the House passed a \$2.77 billion relief bill (H.R. 2667). The most contentious portion of the bill was an amendment offered by Representative Maxine Waters. The California Democrat, who represented the area devastated by the Los Angeles riots of 1992, sought to fund temporary employment in her district. Vocal

⁵⁹ "Remarks by the President in Meeting for Flood Relief and Recovery Mobilization," Arnold, Missouri, July 17, 1993.

⁶⁰ "Remarks by the President in Meeting for Flood Relief and Recovery Mobilization," Arnold, Missouri, July 17, 1993, Office of the Press Secretary. See also "Mississippi Flooding Leaves More Land under Water: Clinton Promises Aid," UPI wire, July 15, 1993.

⁶¹ See Memo from the President of the United States to the President of the Senate, July 29, 1993.

⁶² George Anthan, "Disaster is Saving Money for USDA," *Des Moines Register*, July 20, 1993.

⁶³ See "Opinion Line: Floods, a Taxpayer Bailout?" *USA Today*, July 21, 1993.

⁶⁴ Beth Belton, "Disaster Impact Often Overestimated," *USA Today*, July 21, 1993.

⁶⁵ It is unknown whether these figures were gathered in similar manners in each state.

⁶⁶ James Cox, "Midwest Deluge is No Andrew," *USA Today*, July 21, 1993.

⁶⁷ In fact, Hurricane Andrew was the costliest disaster in history. Most of the recovery costs, however, were covered by private insurance. Recovery cost insurers \$17.5 billion and the federal government \$2.12 billion. Estimating damages in the wake of the 1993 flood was made more difficult since the water was still above flood stage in many areas into autumn. Charmain Kosek, "U.S. Flood Toll at Least \$10.3 Billion," UPI Business and Financial Wire, August 5, 1993.

objections of Republican congressmen were overridden and the bill continued to wend its way through Congress. Another potential roadblock was an amendment by a representative from Ohio to prohibit illegal aliens from receiving any benefits from the relief bill. Beyond humanitarian considerations, when the logistical difficulties of implementing this policy became clear, the amendment was dropped.

The Senate then considered a \$4.3 billion aid plan. The increase from the previous figure stemmed from Clinton's commitment to the governors of nine flood states (Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin) to provide adequate assistance. The relief package was designed to reimburse farmers ninety percent for losses in excess of seventy-five percent of their crop and fifty percent for any other portion. The Emergency Conservation Program, watershed repair, and the Wetlands Reserve Program (WRP) received a total of \$102 million. The Corps of Engineers received \$235 million for flood control work.⁶⁸ The *Chicago Tribune* reported that \$60 million would go to SCS for rebuilding flood control structures.⁶⁹ In fact, the \$60 million was divided among flood control structures, wetlands, erosion control, streambank protection, and a host of other uses.

The amount had increased to \$4.7 billion when the bill was approved by the Senate Appropriations Committee. Even as this occurred, President Clinton asked that \$1.3 billion be added to that. The final version of the bill was passed on August 10. On August 12, the President signed H.R. 2667, "Emergency Supplemental Appropriations for Relief from the Major, Widespread Flooding in the Midwest Act of 1993." It authorized a total of \$5.8 billion of Federal assistance.

⁶⁸ Robert Greene, "Clinton Raises Flood Aid Request to \$4.3 Billion," AP wire, July 30, 1993.

⁶⁹ Constance Hunt, "Returning the Wetlands to the Water," *Chicago Tribune*, July 31, 1993.