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# A Report to Congress on Aging Watershed Infrastructure

An Analysis and Strategy for Addressing the Nation's  
Aging Flood Control Dams

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The FY 2000 Agricultural Appropriations Bill included the following Congressional directive:

*"The Committee is increasingly concerned by the threats to public safety posed by the aging system of flood control structures and the hardships placed on local conservation and flood control districts due to the Department's policy that rehabilitation of such facilities is considered part of the district's operation and maintenance responsibilities. The Committee directs the Department to provide the Committee a detailed analysis of this problem and a strategy to provide comprehensive rehabilitation of endangered structures."*



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# Executive Summary

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More than 50 years ago, the U.S. Department of Agriculture (USDA) was first authorized by Congress to help local communities with upstream flood control and watershed protection.

Today, there is increased interest and a growing national concern that many of the early upstream flood control dams that were built under USDA-assisted small watershed programs are at or near the end of their 50-year planned design life and may pose a public safety concern.

The USDA Small Watershed Program (authorized by the Flood Control Act of 1944 and the Watershed Protection and Flood Prevention Act of 1954) has a 50-year tradition of protecting lives and property and conserving natural resources. Most of these small, upstream flood control dams resemble large farm ponds. They are part of a complete set of soil and water conservation practices on private land aimed at the basic conservation principle of holding the raindrop high in the watershed as close to where it strikes the land as possible.

Administered by the Natural Resources Conservation Service (NRCS), the Small Watershed Program provides technical and financial assistance to local communities to take a comprehensive approach to address local natural resource concerns.

## Public Safety Concerns

Local communities, with NRCS assistance, have constructed more than 10,000 upstream flood control dams since 1948. Many of the older small dams have significant rehabilitation needs. Some pose a threat to public safety to people and towns downstream from the dams or anyone who uses the reservoirs as a source of drinking water. If

action is not taken to rehabilitate the dams, there is a potential for adverse environmental impacts in the downstream floodplain and ecosystem that the dams have been protecting.

## Benefits of Watershed Protection Projects

Watershed projects, which are organized and operated by local sponsors, provide flood control, municipal and irrigation water supply, recreation, erosion control, and wildlife habitat enhancement on more than 130 million acres nationwide.

The Small Watershed Program yields annual benefits of nearly \$1 billion. Projects reduce flooding of prime farmland, highways, communities, and residences, and conserve natural resources. They are an integral part of communities in every State in the Nation. They represent a \$14 billion national infrastructure investment and beneficially impact hundreds of thousands of lives everyday.

## Time Takes Its Toll

Today, many project areas are in a far different setting than when they were originally constructed. Population has grown, residential and commercial development has occurred upstream and downstream from the small dams, land use changes have taken place, sediment pools have filled, structural components have deteriorated, and many structures do not meet State dam safety regulations that have been enacted and revised with more stringent requirements than when the dams were built.

Many of these dams lie in upstream agricultural areas and are unknown to the residents who are protected by them. Many are quietly deteriorating as time and weathering take their toll on the com-

ponents. Unless something is done to rehabilitate these dams or, in some cases, to remove them, they pose a public safety concern.

A recent survey of known rehabilitation needs in 22 States revealed that more than 2,200 dams need rehabilitation at an estimated cost of more than \$540 million. The cost of rehabilitation will only increase with time as deterioration increases, construction costs rise, and more rehabilitation needs are identified.

## **Rehabilitation Opportunities**

In addition to addressing human health and safety issues, rehabilitation provides opportunities for communities to provide new benefits, such as adding municipal and industrial water supplies, fire-fighting water sources, recreation, and wetland and wildlife enhancements.

All rehabilitated dams will be required to meet all State and Federal environmental and safety standards. In limited cases, where flood control can be achieved by other measures or where a flooding risk no longer exists, dams may be removed or decommissioned and the site restored to natural conditions, to the extent possible.

Pilot rehabilitation projects, authorized by appropriation language, are currently underway in Oklahoma, Mississippi, New Mexico, Wisconsin, and Ohio. These projects are demonstrating the wide range of rehabilitation needs and benefits of older watershed projects.

This report provides a summary of the background, the current situation, an overview of the pilot projects being initiated, and opportunities for cooperative efforts with project partners. A strategy for action also is proposed as required by the FY 2000 Agricultural Appropriations Bill.

## Background

The USDA Natural Resources Conservation Service (NRCS) has provided technical and financial assistance to local sponsors for the development of water resource projects since the 1940s. This assistance has been provided primarily through the following four programs.

The Flood Control Act of 1944 (P.L. 78-534) authorized 11 watershed projects in the United States. Since 1948, more than 3,400 flood control dams have been constructed in the 320 sub-watershed projects covering more than 35 million acres in 12 States.

The Watershed Protection and Flood Prevention Act of 1954 (P.L. 83-566) has authorized 1,613 watershed projects to date--in every State in the Nation--that cover more than 109 million acres. More than 6,300 flood control dams have been constructed in these projects. These dams are located in all States except Alaska, Delaware, and Rhode Island.

The Pilot Watershed Program provided a transition between the P.L. 78-534 and P.L. 83-566 Acts. More than 400 flood control dams were

constructed in the 62 pilot projects in 33 States covering almost 3 million acres. The Resource Conservation and Development (RC&D) Program also has provided technical and financial assistance to local sponsors in RC&D areas for planning, design, and construction of more than 200 flood control dams since the 1960s.

Figure 1 shows the distribution of small watershed projects that are located in every State in the Nation.

Table 1 shows a State-by-State summary of the number of flood control dams constructed under each program. The 1995 National Dams Inventory is the source of this data. Some States have not updated this inventory; but, due to the relatively small number of dams installed in recent years, it is the most accurate data available.

The primary purpose for the vast majority of the watershed projects has been flood prevention and watershed protection. Other benefits include water management, municipal and industrial water supply, recreation, fish and wildlife habitat improvement, water quality improvement, and water conservation.

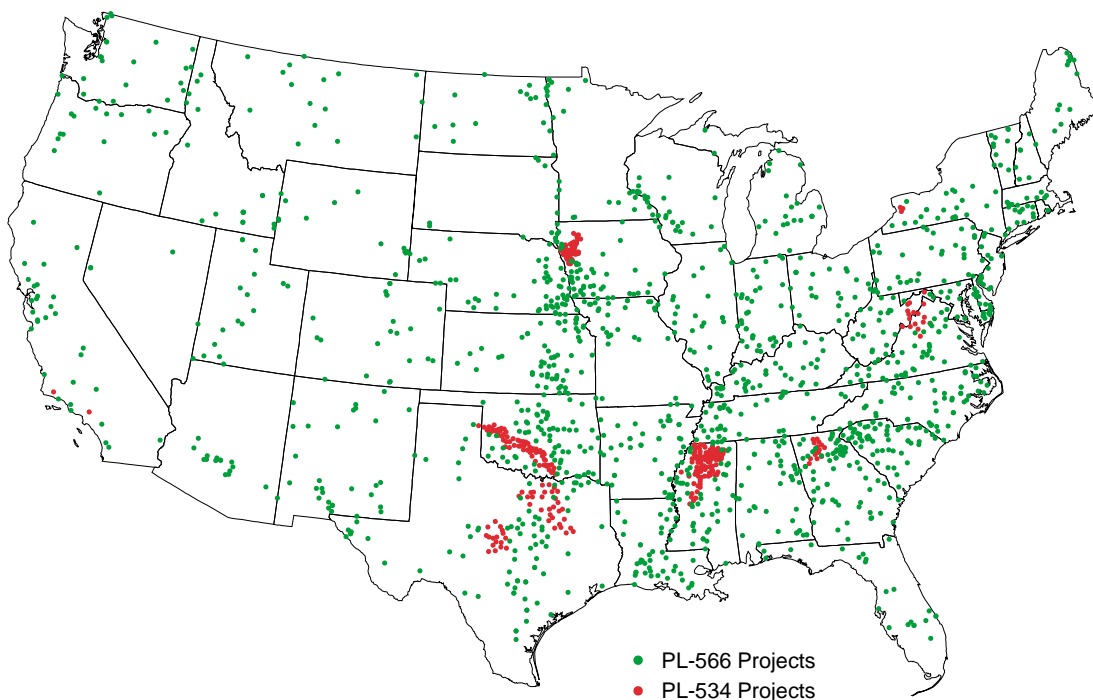
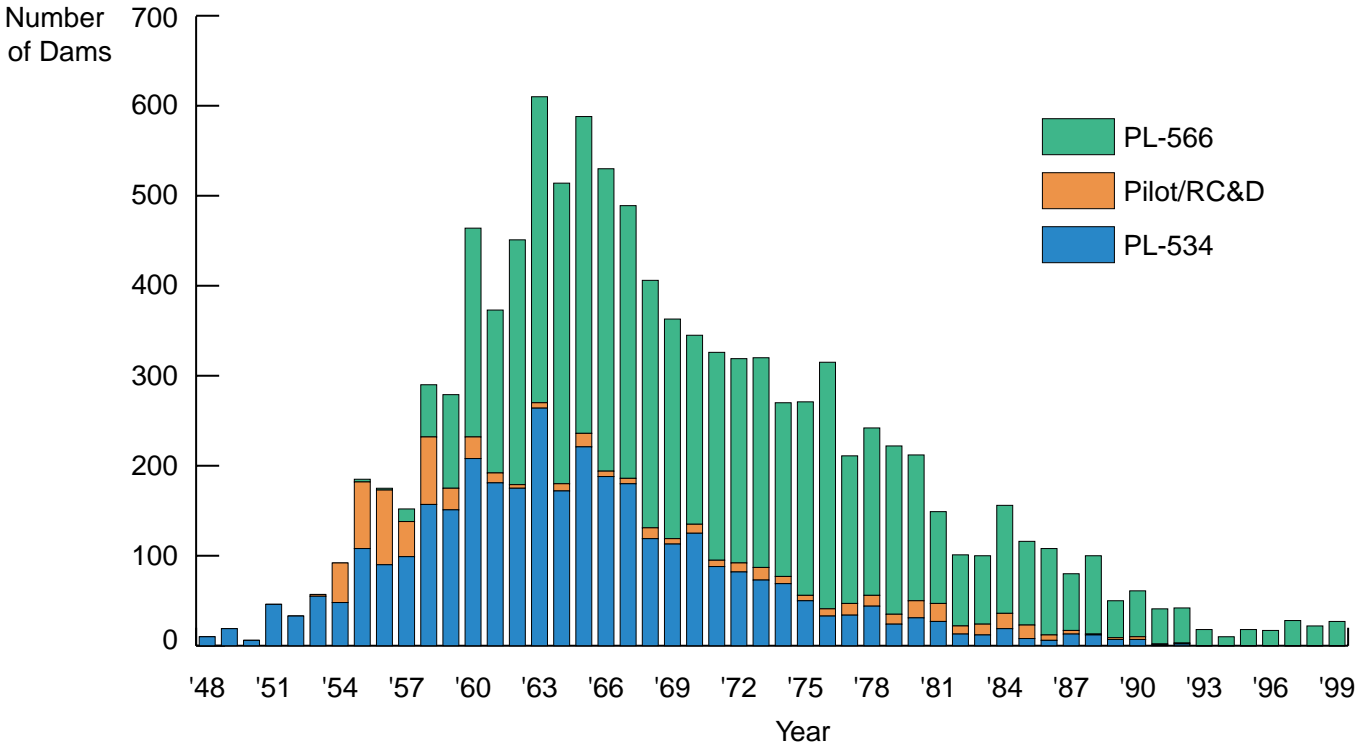


Figure 1  
Watershed  
Project Locations

Since 1948, the four main USDA water resource programs have resulted in the construction of over 10,450 flood control dams and more than 5,000 grade stabilization structures. Based on water resource appropriations since 1948, more than \$8.5 billion (1997 dollars) of Federal funds have been invested in these projects. In addition, over \$6 billion is estimated to have been provided by local project sponsors. This has resulted in a \$14 billion infrastructure investment across the Nation. These projects provide nearly \$1 billion in benefits annually.

Figure 2 shows the number of flood control dams constructed under these programs each year since 1948. The peak period of construction was from 1960 to 1973 with over 600 dams constructed during 1963.

Figure 2  
 Number of Dams Constructed Each Year by USDA Water Resource Programs



## Description of Flood Control Dam

These flood control dams typically consist of an earthen embankment; heights generally range from 20 to 80 feet. The dams have small drainage areas (generally 1 to 10 square miles). Most are located on intermittent drainageways in the upper reaches of watershed tributaries. The inlet of the principal spillway (generally reinforced concrete pipe, 12 to 72-inch diameter) is placed at an elevation that provides storage in the reservoir for the anticipated sediment to be accumulated during the design life of the structure. An auxiliary spillway (generally a vegetated channel) safely conveys runoff from storms that exceed the design storm. The detention storage available between the principal and auxiliary spillways provides temporary storage of runoff until it can be slowly released through the principal spillway pipe. With several dams in a watershed, this temporary detention of runoff controls flooding to downstream floodplain areas. (See Figure 3.)

NRCS assisted project sponsors to develop the original watershed plan and provided technical and financial assistance for implementation. Most of the flood control dams were constructed with 100 percent Federal funding for design and construction. Cost share was provided for structures with multiple purposes (water supply, recreation, etc.). Local sponsors were responsible for financing their share of the installation of the project

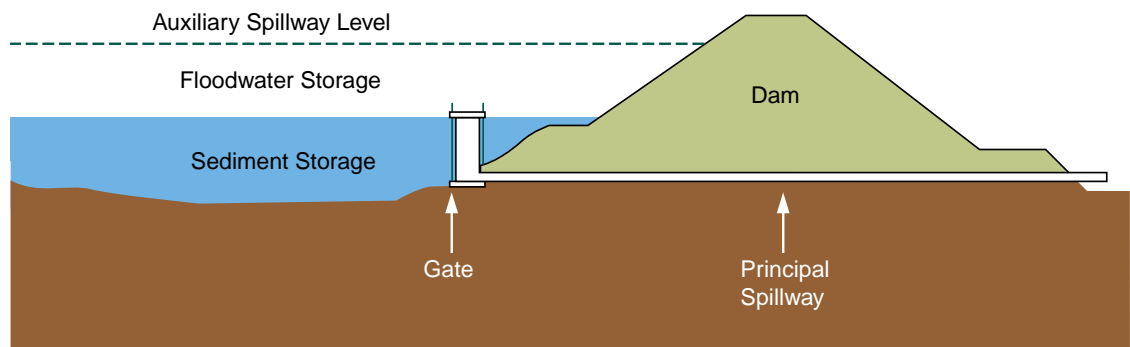
(land rights, etc.) and for 100 percent of the cost of operation and maintenance (O&M). After construction, dams became the responsibility of the sponsors.

Preparation of the watershed work plans involved an economic analysis to compare long-term benefits and costs of the project to assure it was economically feasible. The period of time considered in the economic analysis was called the "evaluated life." The majority of the earlier projects had an evaluated life of 50 years. After the early 1960s, most projects were evaluated for a life of 100 years. The dams within a project were designed with a design life equal to the project's evaluated life. It is estimated that more than two-thirds of the dams constructed to date were components of projects planned prior to the early 1960s, which means they were planned and designed for a 50-year life. For many dams, that 50-year life is at or near the end.

## Potential for Loss of Life Caused by Dam Failures

The threat of loss of life due to a dam failure is a real possibility. A recent publication from the U.S. Department of Interior (DOI), Bureau of Reclamation entitled "A Procedure for Estimating Loss of Life Caused by Dam Failure" (DSO-99-06), authored by Wayne J. Graham, P.E., provides an analysis of dam failures that have resulted in

*Figure 3*  
*Section of*  
*Typical Flood*  
*Control Dam*





fatalities in the United States. It is a common perception that fatalities due to dam failures do not occur in the United States or only occur from failure of larger dams involving large volumes of water. This report indicates that failures of small to medium size dams have resulted in the majority of fatalities in the United States.

The following is a brief summary of the statistics cited in this report.

- More than 300 fatalities resulted from 23 dam failures that occurred in the United States from 1960 to 1998. Seven of the dams had less than 300 acre-feet of water released during the failure.
- Failure of dams between 20 and 40 feet in height caused 86 percent of the deaths.
- Failure of dams with drainage areas less than 2 square miles caused 47 percent of the deaths.
- Failure of dams with drainage areas less than 10 square miles caused 75 percent of the deaths.
- There were more than 400 dam failures in the United States from 1985 to 1994.

The DOI report also summarizes that loss of life resulting from dam failures is highly influenced by the following three main factors.

- The number of people occupying the dam failure floodplain.
- The amount of warning time provided to people exposed to flooding.
- The severity of the flooding.

Although the flood control dams constructed through USDA's Small Watershed Program are likely better designed and maintained than most dams in the United States, the report demonstrates that small to medium size dams can and have failed, and have resulted in significant loss of life and property. To date, there has not been a failure of any dam built under USDA program authorities cited that has resulted in loss of life.

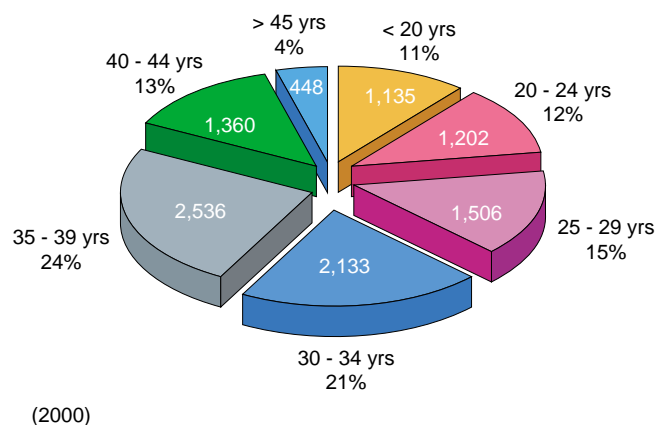
## Current Situation

There is no Federal statutory authority--and only limited State and local funding available--for rehabilitation of USDA-assisted watershed project dams.

Watershed projects have become an integral and irreplaceable part of the communities they were designed to protect. While some residents understand the importance of these projects, many do not. Rural and urban communities, socially disadvantaged groups, and floodplain residents have benefited from these projects for nearly two generations. These dams have become a part of the landscape and, although unknown and unappreciated by many residents, the dams have reduced flooding of prime farmlands, highways, utilities, homes, businesses, and transportation routes for many years. They also have provided significant benefits for wildlife, wetlands, and local recreation.

As shown in Figure 4, almost two-thirds of the small flood control dams constructed to date are more than 30 years old. Thirty-five dams already have reached the end of their design life. About 450 of the dams will reach the end of their design life within the next 5 years. More than 1,800 dams will reach the end of their life span within the next 10 years.

Figure 4 Age of Watershed Dams



## Survey of Known Rehabilitation Needs

In April 1999, a rapid survey of rehabilitation needs in 22 States was conducted. More than 10,000 of the small flood control dams are located in these States. The survey concluded that more than 2,200 of the dams have rehabilitation needs that are estimated to cost more than \$540 million. (See Table 2.)

Over 650 of these dams pose a threat to public health and safety. Most of these dams were designed to protect agricultural areas in downstream floodplains. In numerous communities, homes and businesses eventually were built downstream from the dams. Since the dams now pose a potential threat to life and property if a failure should occur, most do not meet the higher design standards required by current State dam safety laws. Therefore, the majority of these 650 dams need to be rebuilt and upgraded at an estimated cost of almost \$400 million in order to protect the existing population.

The remaining 1,600 dams identified in the rapid survey need to extend their life and avoid future environmental damage and loss of flood control. It is estimated this rehabilitation work will cost more than \$150 million.

This survey was just a preliminary "snapshot" of known information today; a detailed field assessment of the nationwide situation must be completed to obtain a more accurate, complete analysis prior to implementation of any rehabilitation program. The numbers of dams and cost of rehabilitation likely will increase when detailed onsite assessments of the dams are conducted.

## Common Rehabilitation Needs

Many of the dams can function beyond the original design life with continued maintenance and rehabilitation. The following are some issues that must be addressed for this aging infrastructure.

1. Replacement of deteriorating components, such as principal spillway pipes, slide gates, valves, and trash guards. Over 1,800 dams have metal conduits that are generally considered to have a life expectancy of less than 50 years.



*Figure 5  
Deterioration of Metal Pipes in Dams*



*Figure 6  
Deterioration of Metal Slide Gates in Dams*

2. Unanticipated residential and commercial development downstream from the dam increases potential for loss of life or significant economic damage in the event of a dam failure which results in a higher hazard classification than considered in the original design. Also, upstream development has increased runoff volumes from the original design assumptions due to parking lots, streets, rooftops, etc.



Figure 7  
*Homes Built Upstream From a Dam and . . .*



Figure 8  
*. . . Homes Built Downstream From a Dam  
Can Adversely Affect Public Safety*

3. Reservoirs are filling with sediment. Since reservoirs are designed to store the normal sediment anticipated to accumulate during the design life of the dam, all reservoirs will be filled with sediment at some time in the future. If modifications are not performed, continued delivery of sediment to the site would encroach on the flood storage resulting in more frequent flows through the auxiliary spillway, increased maintenance needs, and the increased threat of dam failure. If the dam fails, the stored sediment will be released into downstream riparian areas that provide fish and wildlife habitat.

4. Some dams do not meet current State dam safety regulations. Typically, these requirements have increased since the original construction as a result of Federal legislation and/or State laws. Essentially, all the State dam safety laws were enacted or significantly revised after dam safety concerns were raised in the 1970s. Over 70 percent of the USDA-assisted project dams were in place by that time. Since many dam safety laws were retroactive, conflicts with the design of the existing dams and the new laws were unavoidable.

5. Since many of the projects were planned 50 years ago, there are many resource needs of the watershed that were not addressed by the original work plan. By the time the National Environmental Policy Act (NEPA) became law in 1969 and was functional in its present form in 1974, approximately 70 percent of the dams had been installed.

6. In some cases, there may be a lack of adequate land rights under current easements to conduct future rehabilitation work. Water rights issues will be critical in rehabilitation alternatives--especially in western States. Land use control (upstream and downstream from the structure) must be addressed prior to development of a rehabilitation plan.



Figure 9  
*Reservoir Filling With Sediment in Oklahoma, 1982*



Figure 10  
*Reservoir Filling With Sediment in Oklahoma, 1995*

## Common Rehabilitation Approaches

There are many approaches to rehabilitation of flood control dams. Any alternative considered and the final selected approach must be determined on the economic, environmental, and social merits of the site-specific project; there is no single solution for rehabilitation of all flood control dams. Common approaches to consider include the following.

- **Remove sediment from the reservoir:**  
Removing the sediment from the reservoir and disposing of it at an environmentally safe location can extend the life of a flood control dam. The sediment must be tested for potential contaminants, such as pesticides, oil field waste, and other toxins.
- **Increase the height of the dam:** Raising the embankment to provide additional storage for future sediment accumulation can extend the life of the dam and accommodate other resource needs. This generally requires rebuilding the entire dam.
- **Remove the dam (sometimes referred to as decommissioning):** In some projects, removal of the dam in an environmentally safe manner is an option. Obvious challenges include providing adequate grade control in the drainage-way if significant sediment has been deposited in the reservoir. Social, economic, and legal ramifications of the loss of downstream flood control must be evaluated.
- **Increase or replace the principal spillway:**  
This approach would address greater amounts of runoff from the watershed above the dam due to residential and/or commercial development, or provide higher capacity discharge due to changed safety or design criteria. Social, economic, and legal ramifications of the increased flows downstream must be evaluated.

## National Pilot Rehabilitation Project: Sergeant Major Creek Watershed, Oklahoma in FY 1998

In July 1998, NRCS provided funding for a national pilot rehabilitation project in Oklahoma. Authority was provided in the FY 1998 Agricultural Appropriations Bill.

The objectives of this project were as follows.

- Facilitate and provide technical assistance to a locally led planning effort to address all resource needs within the watershed.
- Document a streamlined process to develop a rehabilitation plan.
- Rehabilitate selected existing dams.

Sergeant Major Creek Watershed in Roger Mills County in western Oklahoma was selected as the pilot project from nine requests from watershed project sponsors. This 19,650-acre project involves six small flood control dams ranging in age from 34 to 52 years old. One dam had a hazard classification change due to residential development downstream. The sediment pool of another dam is used as a sole source water supply for the town of Cheyenne (population 1,000).

A 15-member local coordinating group has spearheaded the locally led effort. The group is comprised of landowners within the watershed, representatives from the City of Cheyenne, and other interested citizens. The group has identified local community and resource needs. This work group has developed the following six objectives.

- Rehabilitation of high priority flood control dams.
- Protection of the city's sole source drinking water supply.
- Improvement of rangeland conditions and wildlife habitat.
- Rehabilitation of aging conservation practices.
- Education of oil and gas company representatives on erosion control methods around well sites.
- Solving stormwater problems within the city.

The coordinating group has applied for grants to conduct workshops and demonstration projects, and to complete a comprehensive inventory of rangeland conditions in the entire watershed.

The watershed planning effort has resulted in the original watershed work plan being supplemented. An environmental assessment has been completed and a "Finding of No Significant Impact" issued to address the rehabilitation of two of the oldest dams. Site 2 was originally designed and constructed in 1949 as a low hazard dam. Since that time, downstream residential development has occurred that has resulted in this site being reclassified as a high hazard. Rehabilitation of the dam involved installing a new principal spillway conduit, inlet, and impact basin; widening the auxiliary spillway; raising the top of the dam; and installing a dam foundation drain. The rehabilitation was completed in March 2000. The design for the rehabilitation of Site 1, originally built in 1948, has been completed; construction began in March 2000.

## Four State Pilot Rehabilitation Projects in FY 2000

The FY 2000 Agricultural Appropriations Bill included the following directive—

*"Provided further, that of the funds available for the Emergency Watershed Program activities, \$8,000,000 shall be available for Mississippi, New Mexico, Ohio, and Wisconsin for financial and technical assistance for pilot rehabilitation projects of small upstream dams built under the Watershed and Flood Prevention Act and the Pilot Watershed Program."*

NRCS in these four States is working with local project sponsors, State dam safety officials, and community leaders to identify high priority projects that will address rehabilitation of those flood control dams in critical need of rehabilitation. Most projects have been selected and detailed planning is underway. Priority projects include those where there is population at risk, the condition of the structure is impaired, municipal water supply is potentially impacted, or potential adverse environmental impacts could result if the

dam should fail. During FY 2000, community leaders and local project sponsors will work with NRCS technical staff to develop a plan for rehabilitation. These plans will address other resource needs in the community, the National Environmental Policy Act (NEPA) procedures, and possible cultural/historic preservation issues. Also, there will be an economic analysis of the costs and benefits of the various rehabilitation alternatives considered. By late calendar year 2000, designs of the reconstruction of selected dams should be completed and construction should begin. The construction of most of these pilot projects should be completed during FY 2001.

## Opportunities for Future Joint Cooperative Efforts

There are numerous opportunities for residents, community leaders, agencies, and interest groups to work together during rehabilitation of watershed projects. This will allow many projects that were initially single purpose flood control to be rehabilitated and to consider all the resource needs within the watershed. The following are examples of these opportunities.

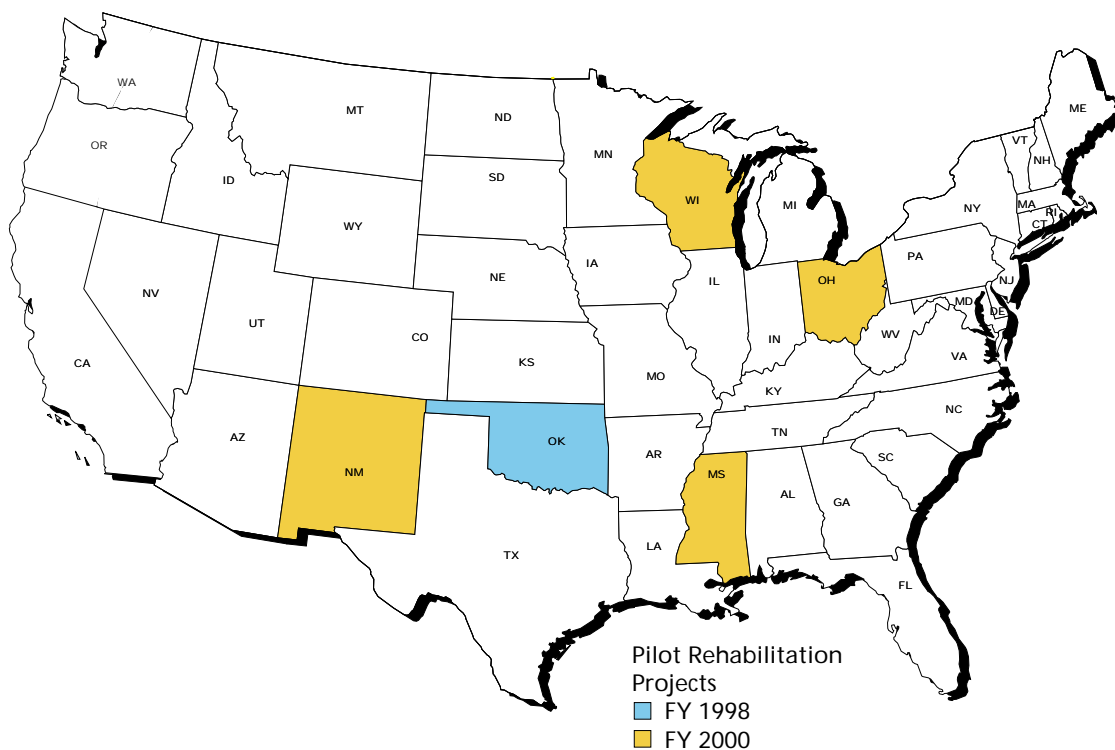


Figure 11  
States With Pilot  
Rehabilitation  
Projects

1. **Wildlife and Wetland Enhancement:** During the redesign of the flood control dams, additional features could be added to enhance wildlife and wetland areas. This has included water level fluctuation devices to better manage the reservoir area for wetland and wildlife habitat. Also, areas downstream and surrounding the reservoir can be enhanced to improve the quality of wildlife habitat.
2. **Municipal Water Supply:** Many of the flood control dams that were originally designed for single purpose flood control could be modified during rehabilitation to provide water supply for local communities with water shortages. This will be especially important in small rural communities where future economic development depends on a dependable water supply.
3. **Rural Fire Protection:** The droughts of the 1990s resulted in large uncontrolled wild fires. One of the main factors in control of these fires was lack of water to fight them, especially in drought prone areas. The rehabilitation of flood control dams could include provisions to add additional water storage that, with agreements of the landowners and sponsors, could provide a source of emergency water for fire fighting to protect homes and businesses.
4. **Floodplain Management and Hazard Mitigation:** There are many opportunities for local communities, responsible State agencies, USDA, and the Federal Emergency Management Agency (FEMA) to coordinate efforts to address future planning for floodplain management and to provide better disaster preparedness for communities.

A Memorandum of Understanding (MOU) between FEMA and USDA has been signed to identify specific agency programs and activities that will expand and enhance working relationships between the two agencies. This MOU will result in better utilization of FEMA's Project Impact Initiative and the USDA-NRCS community-based network of natural resource conservation expertise, practices, and programs in a partnership effort to help communities reduce their vulnerability to natural disasters.

## Strategy for the Future

With appropriate authorization and funding, the following strategy is proposed to address rehabilitation of USDA-assisted aging flood control dams.

- **Assessment:** Conduct a detailed field assessment of the condition of all watershed dams, as well as population at risk, hazard classification, and risk of failure across the Nation. This assessment is needed to identify the condition of dams and prioritize the rehabilitation needs that threaten public health and safety and/or result in adverse environmental impacts. Estimated Cost: \$15 million
- **Expand Pilot Projects:** Select several pilot rehabilitation projects where local sponsors presently are ready to address rehabilitation needs, and direct resources needed for planning and implementation of a rehabilitation project. This will allow sponsors and staff to gain experience in working with other agencies and organizations to address other resource needs within the watershed, as well as address safety issues of the specific dams. Estimated Cost: \$40 million

- **Partnering:** Support State funding initiatives to meet State dam safety requirements and increasing maintenance needs. Work with other agencies, organizations, sponsors, dam safety officials, and other partners to develop a priority ranking system that identifies the highest priority rehabilitation needs to ensure that funds are used efficiently. Estimated Cost: \$2 million
- **Hazard Mitigation Planning:** Implement activities identified in USDA's MOU with FEMA to help communities reduce their vulnerability to natural disasters and support comprehensive planning in completed watersheds to address public health and safety needs, as well as other resources not addressed in the original projects. Estimated Cost: \$15 million (annually)
- **Funding Rehabilitation:** Secure funding for the rehabilitation effort that could be provided by the following options which require authorizing legislation.

—**Loan Program** – The Administration's FY 2001 budget proposes new legislative authority that allows funds to be used to offer subsidized loans through USDA's Rural Housing Service for rehabilitation.

*Up to \$4,170,000 is for the costs of loans, as authorized by the Watershed Protection and Flood Prevention Act (16 U.S.C. 1006a), for rehabilitation of small, upstream dams built under the Watershed Protection and Flood Prevention Act (16 U.S.C. et. seq.), section 13 of the Act of December 22, 1944 (Public Law 8-534, 58 Stat. 905), and the pilot watershed program authorized under the*

*heading "Flood Prevention" of the Department of Agriculture Appropriations Act, 1954 (Public Law 83-156, 67 Stat 214): Provided further, That such costs, including the cost of modifying such loans, shall be defined in Section 502 of the Congressional Budget Act of 1974: Provided further, That none of the cost for such rehabilitation activities (including any technical assistance costs such as planning, design, and engineering costs) shall be borne by the Department of Agriculture: Provided further, That the Department may provide technical assistance for such rehabilitation projects to the extent that the cost of such assistance shall be reimbursed by the borrower, and such reimbursements shall be deposited into the accounts that incurred such costs, and shall be available until expended without further appropriations. In addition, for expenses necessary to administer the loans, such sums as may be necessary shall be transferred to and merged with the appropriation for "Rural Development, Salaries and Expenses."*

—**Cost-Share Assistance Proposed** – Legislation under consideration in the 106th Congress, H.R. 728 and S.1762 "Small Watershed Rehabilitation Amendments of 1999," would provide authorization for \$60 million per year for 10 years to USDA-NRCS for rehabilitation of dams constructed by P.L. 78-534, P.L. 83-566, RC&D, and pilot watershed projects. The bill requires local project sponsors to provide 35 percent of the total project costs.



**Table 1. Small Flood Control Dams Installed  
by NRCS Programs \***

1948 - 1995

State	Pilots	RC&D	PL-566	PL-534	Total	State	Pilots	RC&D	PL-566	PL-534	Total
AL		7	100		107	NE	93	18	541		652
AK					0	NV			8		8
AR	24	2	144		170	NH			24		24
AZ	2	2	21		25	NJ		1	19		20
CA			10		10	NM	2	2	73		77
CO	32	1	77		110	NY		5	48		53
CT		1	30		31	NC	8	5	72		85
DE					0	ND	10		35		45
FL			9		9	OH	15		42		57
GA	12	10	218	117	357	OK	6	9	965	1114	2094
HI			6		6	OR			5		5
ID			3		3	PA		5	81		86
IL	11		53		64	PB					0
IN		2	118		120	PR			4		4
IA	28	33	659	426	1146	RI					0
KS	38	16	714		768	SC	7	2	77		86
KY	16	1	178		195	SD	2	21	32		55
LA			36		36	TN	5	1	124		130
ME			16		16	TX	60	43	695	1293	2091
MD			16		16	UT			28		28
MA		1	28		29	VT			4		4
MI			13		13	VA	3		102	28	133
MN	8	5	29		42	WA			6		6
MS	3	5	183	388	579	WV	7	4	74	78	163
MO	26	25	531		582	WI	1	1	83		86
MT		1	18		19	WY		2	11		13
						<b>TOTAL</b>	<b>420</b>	<b>231</b>	<b>6357</b>	<b>3444</b>	<b>10458</b>

\* Source: National Dams Inventory 1995

**Table 2. National Summary of  
Known Rehabilitation Needs**  
on Dams built by PL-566, PL-534, Pilot, and RC&D  
April 1999

State	Total No. of Project Dams	No. of Dams Needing Rehab.	Estimated Funds Needed
Alabama	108	71	\$23,937,000
Arkansas	201	77	\$20,427,000
Colorado	152	49	\$28,106,000
Georgia	357	129	\$85,099,000
Illinois	64	36	\$10,336,000
Indiana	127	41	\$14,040,000
Iowa	1187	284	\$20,124,000
Kansas	792	97	\$19,214,000
Kentucky	195	105	\$19,688,000
Mississippi	578	84	\$30,454,000
Missouri	659	244	\$21,148,000
Nebraska	900	294	\$3,600,000
New Mexico	71	17	\$22,360,000
New York	53	49	\$2,239,000
Ohio	77	46	\$7,124,000
Oklahoma	2094	190	\$52,728,000
Pennsylvania	91	14	\$817,000
Tennessee	137	43	\$12,143,700
Texas	1932	283	\$84,187,000
Virginia	144	16	\$9,775,000
West Virginia	167	34	\$53,346,000
Wisconsin	86	42	\$2,332,000
<b>Totals</b>	<b>10172</b>	<b>2245</b>	<b>\$543,226,000</b>

*Caution: These are preliminary estimates subject to change upon completion of detailed on-site assessment.*