United States
Department of
Agriculture

Natural
Resources
Conservation
Service

USDA Watershed Programs Facts and Figures

A Reservoir of Watershed Program Information

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Conservation
Engineering
Division

Historical Notes
Number 9
May 2020

The USDA Watershed Programs have had a huge impact on rural communities and natural resources over the past 75 years. They have resulted in one of the best collections of program and natural resource data of any federal program in the nation. However, locating the data and keeping it current has been a challenge, especially with the loss of institutional knowledge due to the retirements of so many of the generations of NRCS employees and project sponsors who were involved in the planning, implementation, and maintenance of the original watershed projects.

Larry Caldwell, an engineer who has worked with the Watershed Programs during his entire 51-year career with NRCS and the Oklahoma Conservation Commission, prepared this collection of information on the history, program implementation, and impacts of the watershed program from many different sources including engineering, program, and the National Inventory of Dams (NID) files.

The purpose of this document is to provide a comprehensive summary of watershed information in one place. It provides brief descriptions and some context for key legislative authorities, technology developments, inventories, and results that track the evolution of the watershed movement over the past seven decades. Hopefully, this document will be helpful for future generations of NRCS staffs, project sponsors, and other stakeholders interested in the watershed program.

This document describes where we have been, where we are today, and challenges for the future. Some of these data should be considered a “snapshot-in-time” look at the status of the Watershed Program since new dams will be built, more dams will be rehabilitated, and monetary benefits will increase due to inflation and land use changes. However, these data provide the basis for a description of the scope of the Watershed Program in each state. Some sections contain Caldwell’s personal interpretations based on his research, personal experiences, and more than 50 years of professional work history with the watershed program.

Cover photo: Reservoir of a watershed dam in Iowa with conservation practices in upland watershed. Source: NRCS photo gallery NRCSIA99433

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USDA Watershed Programs
Facts and Figures

A Reservoir of Watershed Program Information

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Cover page photo descriptions:

Top left: President Dwight D. Eisenhower and Assistant Secretary of Agriculture Earl Coke viewing a display of the Oklahoma Sandstone Creek project in a watershed exhibit at USDA headquarters in Washington, D.C., in 1953.

Top right: Cloud Creek, Dam No. 1, the first dam constructed under the authority of the Flood Control Act of 1944; Washita County, Okla.

Center left: Monument and dignitaries commemorating the end of the fifty-year service life of the first dam constructed under the authority of the Flood Control Act of 1944; Cordell, Okla.; July 3, 1998.This event initiated the watershed rehabilitation effort. Photo courtesy of Mark Harrison, Oklahoma Conservation Commission.

Center right: Sergeant Major Watershed Dam No. 1 at the dedication of the first watershed dam rehabilitated with USDA funds; Roger Mills County, Okla. April 14, 2000. Photo courtesy of Mark Harrison, Oklahoma Conservation Commission.

Lower Left: ARS Administrator Edward Knipling and NRCS Chief David White at monument in Oklahoma City, Okla. designating the USDA Watershed Program as a National Historic Engineering Landmark by ASABE, May 17, 2011. Photo courtesy of Mark Harrison, Oklahoma Conservation Commission.

Lower right: Watershed dam with soil and water conservation practices in upland areas. Source of photo unknown

About the author:

Larry Caldwell is a licensed professional engineer in Oklahoma. Prior to his retirement from the USDA Natural Resources Conservation Service in December 2009, he was the NRCS National Watershed Rehabilitation Program Leader in Washington DC. He worked with Congress to provide support for the watershed rehabilitation legislation that was signed into law in 2000. During his 41-year SCS/NRCS career, he served as the NRCS Oklahoma State Conservation Engineer for 15 years, the Missouri Assistant State Conservation Engineer for 5 years, and held several engineering positions with SCS in Iowa. After retirement from NRCS, he worked part-time for 10 years with the Oklahoma Conservation Commission working on watershed program issues in Oklahoma and the nation; retiring a second time in June 2019. He is currently a NRCS Earth Team volunteer working on watershed issues including preparation of this document and implementation of the DamWatch system. He has been involved with the USDA Watershed Programs during his entire 51-year career. His unofficial title has been “The Old Dam Man”. He received his degree in Agricultural Engineering from Iowa State University. He was born and raised on a farm in northwest Iowa. He currently lives in Stillwater, Oklahoma.

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USDA Watershed Program Facts and Figures
A Reservoir of Watershed Program Information

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May 2020

Preface:

The U.S. Department of Agriculture's (USDA) watershed programs have had a huge impact on rural communities and natural resources over the past 75 years. The USDA Watershed Program was designated as a National Historic Engineering Landmark by the American Society of Agricultural and Biosystems Engineering (ASABE). The Agricultural Research Service (ARS) Administrator Edward Knipling and Natural Resources Conservation Service (NRCS) Chief David White dedicated a granite monument on the Oklahoma state capitol grounds commemorating the event in Oklahoma City, Oklahoma, on May 11, 2011.

The watershed programs have resulted in one of the best collections of program and natural resource data of any federal program in the nation. However, locating and gathering the data and keeping it current has been a challenge, especially with the loss of institutional knowledge due to the retirements of so many of the generations of NRCS employees and project sponsors who were involved in the planning, implementation, and maintenance of the original watershed projects.

Throughout my 51-year career working with NRCS and the Oklahoma Conservation Commission, I have gathered a lot information on the history, program implementation, and impacts of the watershed program from several different sources over several years (my first draft of this document was completed in 2013). Data was continually gathered, updated, and compared between engineering, program, and the National Inventory of Dams (NID) files. Considerable efforts were made to identify the inconsistencies between the data and reconcile them as best as possible, many times by working directly with the state conservation engineers. I acknowledge that there are minor differences in some of the data due to differences in program and engineering data. A summary of the efforts to identify and correct the data is contained near the end of this document.

This document is intended to provide a comprehensive summary of watershed information in one place. It provides brief descriptions and some context for key legislative authorities, technology developments, inventories, and results that track the evolution of the watershed movement over the past seven decades. As a minimum, I hope that by publishing this document, it will be helpful for future generations of NRCS staffs, project sponsors, and other stakeholders interested in the watershed program.

This document is certainly not intended to "flow" as if the reader was reading an article or novel to be followed from beginning to end. But rather, each section is intended stand on its own. It is intended to be a reference document for Watershed Program data by state, project, hazard classification, age of dams, benefits, and rehabilitation, as well as a brief history of the various watershed programs and their congressional authorizations. An effort has been made to describe acronyms as much as possible.

This document describes where we have been, where we are today, and challenges for the future. Some of these data should be considered a “snapshot-in-time” look at the status of the Watershed Program since new dams will be built, more dams will be rehabilitated, and monetary benefits will increase due to inflation. However, these data provide the basis for a description of the scope of the Watershed Program in each state. Some sections contain my personal interpretations based on my research, understandings, personal experiences, and more than 50 years of professional work history with the watershed program.

The Watershed Program is different than many other federal conservation programs that provide funds for conservation practices. The Watershed Program is unique in that it brought people together who were dedicated to solving natural resource issues in their community. It is one of the best examples of a partnership of federal, state, local, and private entities coming together to plan and implement projects that have benefited their communities for more than two generations. They will continue providing these benefits for generations to come if current and future leaders address the maintenance and rehabilitation needs for these projects.

Personally, I continue to be struck by the foresight of those who came before us in conservation districts and the Soil Conservation Service, who planned, designed, and built the network of dams and conservation practices that have repeatedly worked the way they were supposed to under extreme conditions. This is especially commendable considering that by the year 2025, 6 out of 10 of the dams and associated conservation practices will have well exceeded their 50-year design life. While these dams were built with the best engineering and construction techniques available at the time, a lot has been learned since then about hydrology, earthquakes, auxiliary spillway erosion, etc. This should highlight the need for today’s leaders to continue the ARS research and to maintain the dams and their associated conservation practices to assure they will remain safe and function as designed to protect future generations. The USDA watershed programs have and will continue to change the lives of many people because of the benefits they provide to communities. Community leaders and elected officials need to be continually educated on the value of the watershed projects so that adequate funding can be provided for their maintenance.

This document was made possible by the countless number of people who maintained and updated the various records within SCS/NRCS over the years. The people included in the acknowledgement section of this document deserve a big “thank you” for their efforts to assist in making this project possible. I especially want to thank Noller Herbert, NRCS Director of Engineering, for his encouragement and support throughout the past years to complete this document.

This document is not intended to be all-inclusive nor a scholarly, refereed publication with foot notes. Although I believe the information provided is an accurate representation of the facts and sources of almost all of the information are identified, it is possible there may be some errors.

I alone assume responsibility for any errors or inaccuracies that may exist. All attempts were made to quality control the information in this document through numerous reviews and communications throughout the past two years.

I would be interested in receiving comments on corrections or additions to this information. I can be best contacted at larry.caldwell@usda.gov while I am still an Earth Team Volunteer.

Introduction:

The USDA Watershed Programs began with studies authorized in the Flood Control Act of 1936 (Public Law 78-534), The four Watershed Program authorizations are the Flood Control Act of 1944 (Public Law 78-534), the 1953 Pilot Watershed Program (Public Law 83-156), the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566), and the 1962 Resource Conservation and Development Act (Public Law 87-703). Since 1948, NRCS has assisted project sponsors to plan and implement over 2,100 watershed projects covering over 145 million acres in all 50 states and 3 territories. Of the 2,100 projects, 1,269 contain 11,841 dams built to date.

These watershed programs have resulted in a tremendous amount of natural resource data; however, it was located in many different locations and personal files. The author started gathering the data and organize it in one location more than 20 years ago. The need for this effort was increased when, in 2010, the NRCS in Oklahoma contracted with USEngineering Solutions Corporation of Hartford, Connecticut, to implement a pilot program to utilize their web-based application named DamWatch® that stores information on all dams in watershed projects. In 2012, NRCS expanded this effort to include all watershed projects in the nation that involved dams. In 2017, a team of watershed specialists in Oklahoma developed a national watershed benefits model to estimate monetary benefits for specific storms and geographies. During the process of gathering the information for the benefits model and the DamWatch system, we had to locate and reconcile differences in the data in the watershed records. This involved collecting program and engineering files and updating the National Inventory of Dams (NID) data. The effort also included working directly with state NRCS Watershed Program leaders and state conservation engineers to resolve data issues and prepare a listing of authorized watershed projects in each state and the dams located within them. This is now the most complete collection of watershed files and data available.

Watershed Program Quick Reference Data

This document has 288 pages and 90 charts, graphs, photos, and tables of data for all aspects of the Watershed Program. The following are quick reference summaries of the "primary big picture" information. Some of these data should be considered a "snapshot-in-time" look at the status of the Watershed Program since more projects will be authorized and more dams will be constructed, classified as high hazard, and rehabilitated. Also, appropriations will continue to be provided and the monetary benefits will continue to be updated. However, these data provide the basis for a description of the scope of the Watershed Program in each state.

Program	No. States/ Territories	No. of Watershed Projects			Total Project Area (ac.)
		Without Dams	With Dams	Total *	
PL-534	8	98	260	358	26,017,464
PL-566	53	724	886	1,610	115,834,650
Pilot	33	18	46	64	2,901,165
RC&D	32		77	77	410,000
Total	53	840	1,269	2,109	145,163,279

** Does not include181 deauthorized projects (25 Pl-534; 156 PL-566)*

Figure 1: Summary of number of projects by Watershed Program authorities

Year	No. of Dams Exceeding Service Life*
2019	5,716
2020	6,004
2021	6,241
2022	6,482
2023	6,722
2024	6,912
2025	7,087
2026	7,311
2027	7,439
2028	7,597
2029	7,716
2030	7,829

Figure 2: Number of watershed dams that will reach the end of their service life in each of the next 10 years (does not include dams with service life of 100 years or rehabilitated dams)

State	Watershed Program Authorities				State Totals
	PL-566	PL-534	Pilot	RC&D	
Alabama	100	0	0	7	107
Arizona	21	0	2	2	25
Arkansas	181	0	24	3	208
California	15	0	1	0	16
Colorado	87	0	55	3	145
Connecticut	29	0	0	1	30
Florida	10	0	0	0	10
Georgia	218	117	12	10	357
Hawaii	8	0	0	1	9
Idaho	3	0	0	0	3
Illinois	55	0	11	0	66
Indiana	132	0	0	2	134
Iowa	1,066	485	29	35	1,615
Kansas	799	0	14	17	830
Kentucky	182	0	17	1	200
Louisiana	35	0	0	0	35
Maine	16	0	0	0	16
Maryland	16	0	0	0	16
Massachusetts	30	0	0	1	31
Michigan	13	0	0	0	13
Minnesota	37	0	8	6	51
Mississippi	189	367	0	5	561
Missouri	1,148	0	30	25	1,203
Montana	16	0	0	3	19
Nebraska	619	0	106	13	738
Nevada	8	0	0	0	8
New Hampshire	24	0	0	0	24
New Jersey	19	0	0	1	20
New Mexico	75	0	2	2	79
New York	52	0	2	5	59
North Carolina	101	0	11	2	114
North Dakota	39	0	10	1	50
Ohio	48	0	16	0	64
Oklahoma	987	1,107	6	7	2,107
Oregon	6	0	0	0	6
Pennsylvania	82	0	0	9	91
Puerto Rico	2	0	0	0	2
South Carolina	97	0	7	1	105
South Dakota	33	0	2	21	56
Tennessee	133	0	9	1	143
Texas	697	1,242	60	4	2,003
Utah	40	0	3	2	45
Vermont	4	0	0	0	4
Virginia	118	29	3	0	150
Washington	3	0	0	0	3
West Virginia	77	81	7	4	169
Wisconsin	85	0	2	1	88
Wyoming	12	0	0	1	13
Totals	**7,767**	**3,428**	**449**	**197**	**11,841**

Figure 3: Number of project dams by state for each Watershed Program authority. (Source: NRCS GeoObserver NID export, March 2020)

State	Current Hazard			Totals
	High	Significant	Low	
Alabama	25	31	51	107
Arizona	24	1	0	25
Arkansas	47	49	112	208
California	14	2	0	16
Colorado	32	7	106	145
Connecticut	28	1	1	30
Florida	0	0	10	10
Georgia	192	130	35	357
Hawaii	8	1	0	9
Idaho	2	0	1	3
Illinois	17	21	28	66
Indiana	39	47	48	134
Iowa	26	34	1,555	1,615
Kansas	120	89	621	830
Kentucky	45	16	139	200
Louisiana	5	10	20	35
Maine	11	1	4	16
Maryland	12	4	0	16
Massachusetts	27	3	1	31
Michigan	6	5	2	13
Minnesota	17	5	29	51
Mississippi	77	38	446	561
Missouri	27	44	1,132	1,203
Montana	16	1	2	19
Nebraska	46	95	597	738
Nevada	7	0	1	8
New Hampshire	18	6	0	24
New Jersey	11	3	6	20
New Mexico	70	5	4	79
New York	54	2	3	59
North Carolina	42	31	41	114
North Dakota	9	28	13	50
Ohio	26	34	4	64
Oklahoma	260	201	1,646	2,107
Oregon	5	1	0	6
Pennsylvania	90	0	1	91
Puerto Rico	2	0	0	2
South Carolina	19	23	63	105
South Dakota	0	2	54	56
Tennessee	44	43	56	143
Texas	392	75	1,536	2,003
Utah	29	9	7	45
Vermont	4	0	0	4
Virginia	52	27	71	150
Washington	0	3	0	3
West Virginia	169	0	0	169
Wisconsin	27	3	58	88
Wyoming	3	3	7	13
Totals	**2,196**	**1,134**	**8,511**	**11,841**

Figure 4: Number of project dams with CURRENT hazard classification (Source: NRCS GeoObserver NID export, March 2020)

	PL-534	Pilot	PL-566	RC&D	All Programs
Total Number of Dams Built	3,428	449	7,767	197	11,841
Year First Dam was Built (Age of Oldest Dam in 2019)	1948 (71)	1953 (66)	1956 (63)	1966 (53)	1948 (71)
Latest Year Dam Built (Age of Newest Dam in 2019)	2006 (13)	1969 (50)	2015 (4)	1993 (26)	2015 (4)
Median Year of All Dams Built (Median Age of Dams in 2019)	1964 (55)	1957 (62)	1973 (46)	1977 (41)	1969 (50)
Year that most Dams were Built (No. of Dams)	1963 (260)	1956 (93)	1965 (363)	1980 (17)	1965 595)
No. of Dams that are more than 50 years old in 2019 (% of Total)	2,661 (78%)	449 (100%)	3,131 (40%)	20 (10%)	6,261 (53%)
No. of Dams that will be more than 50 years old in 2024 (% of Total)	3,070 (90%)	449 (100%)	4,231 (54%)	67 (34%)	7,817 (66%)
No. of Dams with <50-year Service Life (% of Total) *	16 (0%)	1 (0%)	79 (1%)	2 (0%)	98 (1%)
No. of Dams with 50-year Service Life (% of Total) *	3,106 (91%)	270 (60%)	3,649 (47%)	69 (35%)	7,094 (60%)
No. of Dams with 51 to 99-year Service Life (% of Total) *	0 (0%)	1 (0%)	1,014 (13%)	0 (0%)	1,015 (9%)
No. of Dams with 100-year Service Life (% of Total) *	184 (5%)	9 (2%)	1,686 (22%)	36 (18%)	1,915 (16%)
No. of Dams with no Service Life shown in NID (% of Total) *	123 (4%)	167 (37%)	1,338 (17%)	91 (46%)	1,719 (14%)
No. of Dams with Current High Hazard Classification (% of Total)	478 (14%)	65 (14%)	1,581 (20%)	33 (17%)	2,196 (19%)
Total Controlled Drainage Area of All Dams (sq. mi.)	9,276	1,404	36,665	917	48,262
Total Reservoir Surface Area of All Dams (ac.)	79,085	6,759	226,576	7,723	320,143
No. of Dams Rehabilitated	46 (1.3%)	22 (4.9%)	85 (1.1%)	7 (3.6%)	160 (1.4%)

* Includes rehabilitated dams

Figure 5: Summary of project dams by Watershed Program authorities
(Includes rehabilitated dams)
Source NID 2019

Status of Funded Rehab Projects 4-15-20					
State	No. of Dams Funded	In Planning	In Implementation	Rehab Completed	Assessments Completed
AL	1			1	26
AR	7	1	5	1	43
AZ	12	5	4	3	5
CA	1	1			13
CO	4	3		1	9
CT	4	4			28
GA	28	13	8	7	134
IA	4			4	1
ID					1
IL	1	1			2
IN					27
KS	8	1	4	3	106
KY	4		3	1	18
LA	3	3			9
MA	9	4	4	1	32
MD	1	1			5
ME					3
MN					20
MO	2			2	7
MS	27	6	4	17	92
NC	2	2			29
ND	8	7		1	14
NE	16	2	5	9	69
NH	5	5			20
NJ	1	1			12
NM	9	2	4	3	15
NV	1	1			4
NY	5	4	1		15
OH	10	2		8	13
OK	58	5	15	38	215
OR	3	3			6
PA	13	4	8	1	56
PR					2
SC					15
TN	7	3	2	2	46
TX	46	11	11	24	247
UT	24	7	7	10	28
VA	17	1	4	12	11
VT	4	4			4
WA					1
WI	11			11	
WV	9	6	2	1	160
WY	1		1		2
Totals	366	113	92	161	1,565
No. States	36	30	18	23	42

Figure 6: Status of rehabilitation projects (March 2020)
366 projects funded; 253 plans authorized (161 completed; 92 in implementation)
113 in planning
(Source: NRCS program files)

State	Flood Damage Reduction Benefits		Other Benefits		Total Average Annual Monetary Benefits
	Agriculture	Non-agriculture	Agriculture	Non-agriculture	
Alabama	$4,959,908	$1,246,159	$7,605,297	$5,019,182	$18,830,546
Alaska	$0	$1,671,276	$0	$729,223	$2,400,499
American Samoa	$0	$165,483	$0	$0	$165,483
Arizona	$3,372,555	$67,013,735	$3,474,133	$60,758	$73,921,181
Arkansas	$22,507,417	$4,251,673	$26,090,650	$42,554,712	$95,404,453
California	$12,087,141	$67,156,430	$11,023,939	$12,277,769	$102,545,279
Colorado	$2,450,321	$3,636,752	$5,665,146	$884,705	$12,636,924
Connecticut	$8,784	$7,841,670	$0	$437,348	$8,287,803
Delaware	$2,379,820	$2,285,247	$1,069,294	$1,537,654	$7,272,015
Florida	$3,133,493	$29,546	$14,118,972	$2,986,004	$20,268,015
Georgia	$4,723,728	$4,376,928	$6,128,866	$14,704,514	$29,934,036
Guam	$454,582	$0	$0	$0	$454,582
Hawaii	$807,687	$8,759,250	$11,629,774	$3,191,362	$24,388,072
Idaho	$921,001	$506,146	$11,968,568	$2,759,097	$16,154,812
Illinois	$2,187,774	$17,970,261	$999,367	$4,404,688	$25,562,089
Indiana	$4,899,095	$3,738,338	$4,062,613	$14,821,016	$27,521,061
Iowa	$11,503,645	$3,689,373	$8,307,670	$8,477,399	$31,978,087
Kansas	$23,259,243	$9,953,321	$13,638,524	$12,822,006	$59,673,094
Kentucky	$3,131,471	$2,516,959	$4,773,874	$3,816,804	$14,239,109
Louisiana	$25,300,944	$2,513,264	$12,627,310	$4,034,865	$44,476,383
Maine	$108,254	$922,669	$1,983,684	$1,953,467	$4,968,074
Mariana Islands	$233,258	$28,458	$291,135	$0	$552,851
Maryland	$1,542,150	$1,174,008	$2,801,564	$18,388,576	$23,906,297
Massachusetts	$24,623	$5,416,969	$0	$1,731,804	$7,173,396
Michigan	$7,657,068	$960,874	$9,881,212	$10,731,321	$29,230,475
Minnesota	$1,746,741	$4,657,517	$3,560,697	$1,416,479	$11,381,433
Mississippi	$55,404,993	$52,137,478	$55,605,411	$853,788	$164,001,669
Missouri	$5,062,437	$3,839,021	$4,498,749	$9,531,826	$22,932,033
Montana	$79,435	$3,135,310	$5,193,449	$1,646,904	$10,055,099
Nebraska	$16,024,897	$6,064,865	$34,868,604	$2,541,364	$59,499,731
Nevada	$38,936	$20,737	$1,294,902	$1,545,068	$2,899,643
New Hampshire	$163,573	$1,187,713	$19,564	$767,944	$2,138,795
New Jersey	$430,687	$5,392,239	$338,862	$3,804,846	$9,966,634
New Mexico	$3,722,808	$13,655,805	$27,154	$0	$17,405,767
New York	$3,329,966	$5,562,077	$69,956,857	$662,958,324	$741,807,224
North Carolina	$13,509,909	$9,414,248	$14,735,459	$8,872,599	$46,532,215
North Dakota	$7,671,669	$1,943,613	$1,399,686	$676,400	$11,691,368
Ohio	$2,594,375	$2,992,058	$2,844,122	$1,629,186	$10,059,741
Oklahoma	$23,544,160	$29,606,364	$6,168,320	$37,843,467	$97,162,311
Oregon	$443,864	$4,733,566	$9,505,264	$27,692,705	$42,375,399
Pennsylvania	$11,036,214	$8,682,435	$16,162,113	$14,910,393	$50,791,155
Puerto Rico	$658,672	$0	$2,544,461	$124,029	$3,327,162
Rhode Island	$0	$0	$120,449	$7,056	$127,506
South Carolina	$4,532,058	$3,167,247	$7,066,056	$5,853,260	$20,618,621
South Dakota	$2,251,925	$380,113	$3,397,190	$3,121,553	$9,150,781
Tennessee	$26,776,216	$17,633,922	$24,498,875	$12,818,573	$81,727,586
Texas	$56,058,424	$48,441,008	$24,418,857	$30,507,637	$159,425,925
Utah	$1,132,205	$2,815,184	$6,404,699	$3,928,752	$14,280,840
Vermont	$667	$731,740	$3,010,828	$1,438,204	$5,181,439
Virginia	$1,584,891	$5,620,584	$7,564,221	$6,186,642	$20,956,339
Washington	$2,174,578	$3,611,337	$7,213,402	$3,403,273	$16,402,591
West Virginia	$2,805,348	$43,658,146	$4,482,954	$20,641,953	$71,588,401
Wisconsin	$374,657	$2,501,867	$602,911	$2,505,730	$5,985,166
Wyoming	$686,971	$967,021	$2,183,912	$1,073,449	$4,911,354
National Totals	**$381,495,240**	**$500,378,004**	**$477,829,620**	**$1,036,625,680**	**$2,396,328,543**

Total Flood & Non-Flood Benefits	$881,873,243	$1,514,455,300	$2,396,328,543

7 NYC Projects	$0	$0	$68,179,547	$662,476,057	$730,655,605
Remaining 1,676 Projects	$381,495,240	$500,378,004	$409,650,073	$374,149,623	$1,665,672,939
	$881,873,243		$783,799,695		

Figure 7a: Average annual monetary benefits for all 1,683 projects with data in POINTS database (2019 dollars)

NAME		No. of Dams	Area Controlled by Dams (sq. mi.)	Average Annual Benefits Millions of Dollars (2019)			Average Annual Benefits S per sq. mi. of Control		
				Flood Benefits	Non-Flood Benefits	Total Benefits	Flood Benefits	Non-Flood Benefits	Total Benefits
NRCS NATIONAL TOTALS									
TOTAL FOR ALL DAMS NATIONWIDE		11,845	41,678	719.124	507.434	1,226.558	17,254	12,175	29,430
NRCS REGIONAL OFFICE									
NRCS REGION - WESTERN		372	4,651	151.855	50.658	202.512	32,652	10,893	43,545
NRCS REGION - CENTRAL		8,945	25,842	274.365	214.613	488.978	10,617	8,305	18,922
NRCS REGION - NORTHEAST		537	2,717	91.889	78.860	170.749	33,822	29,027	62,849
NRCS REGION - SOUTHEAST		1,991	8,469	201.015	163.303	364.318	23,736	19,283	43,020
NRCS PROGRAM AUTHORITY									
PL-566	PUBLIC LAW 566 (1954)	7,766	30,517	561.298	398.731	960.029	18,393	13,066	31,459
PL-534	PUBLIC LAW 534 (1944)	3,428	8,850	136.268	91.254	227.522	15,398	10,311	25,709
RC&D	Resource Conservation & Dev.	197	919	8.416	6.812	15.228	9,160	7,414	16,574
PILOT	PILOT Watershed Programs	449	1,245	11.757	9.516	21.273	9,441	7,641	17,082
OTHER	Projects With Special Funding	5	147	1.385	1.121	2.505	9,433	7,635	17,069
STATE OR TERRITORY									
AL	Alabama	107	621	5.107	4.918	10.025	8,230	7,925	16,155
AZ	Arizona	25	815	70.174	0.397	70.571	86,058	487	86,544
AR	Arkansas	208	988	20.563	40.883	61.446	20,814	41,382	62,196
CA	California	16	131	40.847	11.778	52.625	311,831	89,916	401,747
CO	Colorado	145	736	6.798	3.512	10.310	9,232	4,770	14,002
CT	Connecticut	30	66	7.702	0.426	8.128	116,082	6,423	122,504
FL	Florida	10	475	0.524	4.859	5.383	1,103	10,227	11,330
GA	Georgia	357	1,652	9.549	17.154	26.703	5,782	10,386	16,168
HI	Hawaii	9	16	2.677	8.917	11.594	166,276	553,866	720,142
ID	Idaho	3	41	0.603	1.804	2.408	14,896	44,555	59,451
IL	Illinois	66	614	6.693	3.799	10.492	10,892	6,183	17,075
IN	Indiana	134	547	6.096	14.088	20.184	11,141	25,744	36,885
IA	Iowa	1,615	920	15.091	12.832	27.923	16,397	13,943	30,339
KS	Kansas	831	3,094	33.457	25.136	58.592	10,815	8,125	18,940
KY	Kentucky	200	743	5.436	6.745	12.180	7,312	9,073	16,385
LA	Louisiana	35	343	0.607	1.676	2.283	1,771	4,894	6,664
ME	Maine	16	123	0.882	0.577	1.459	7,186	4,707	11,893
MD	Maryland	16	78	0.951	15.607	16.558	12,250	201,017	213,267
MA	Massachusetts	30	128	5.442	1.732	7.173	42,400	13,494	55,894
MI	Michigan	13	273	4.927	14.312	19.239	18,047	52,424	70,471
MN	Minnesota	51	1,400	12.210	7.218	19.428	8,723	5,157	13,880
MS	Mississippi	560	1,344	95.761	51.879	147.640	71,276	38,615	109,891
MO	Missouri	1,203	769	8.813	14.294	23.106	11,457	18,582	30,040
MT	Montana	19	364	3.208	2.840	6.048	8,819	7,807	16,625
NE	Nebraska	738	1,986	22.789	33.776	56.564	11,473	17,004	28,477
NV	Nevada	8	222	0.060	2.554	2.614	268	11,482	11,750
NH	New Hampshire	24	131	1.292	0.788	2.080	9,892	6,029	15,921
NJ	New Jersey	20	61	5.291	3.592	8.883	86,293	58,586	144,879
NM	New Mexico	79	1,383	18.306	1.957	20.263	13,238	1,415	14,653
NY	New York	59	230	5.098	0.066	5.164	22,183	286	22,469
NC	North Carolina	114	439	8.075	7.308	15.383	18,378	16,632	35,010
ND	North Dakota	50	1,033	8.401	2.724	11.125	8,135	2,637	10,772
OH	Ohio	64	207	2.261	2.690	4.950	10,911	12,982	23,894
OK	Oklahoma	2,107	5,959	51.135	39.582	90.718	8,581	6,642	15,223
OR	Oregon	6	62	1.886	3.606	5.491	30,212	57,778	87,990
PA	Pennsylvania	91	568	19.476	18.537	38.013	34,294	32,641	66,934
SC	South Carolina	105	579	4.417	7.170	11.588	7,636	12,394	20,029
SD	South Dakota	59	170	3.038	6.040	9.078	17,880	35,550	53,431
TN	Tennessee	143	347	43.398	13.200	56.598	125,225	38,088	163,312
TX	Texas	2,003	9,002	105.134	52.262	157.396	11,678	5,805	17,484
UT	Utah	45	505	5.549	11.831	17.380	10,993	23,436	34,429
VT	Vermont	4	7	0.500	0.150	0.650	72,616	21,763	94,379
VA	Virginia	150	938	7.378	7.204	14.582	7,862	7,677	15,538
WA	Washington	3	69	0.225	0.122	0.347	3,291	1,774	5,065
WV	West Virginia	170	845	38.069	20.384	58.453	45,048	24,122	69,170
WI	Wisconsin	88	346	1.509	2.863	4.372	4,358	8,269	12,627
WY	Wyoming	14	306	1.522	1.339	2.861	4,967	4,370	9,337
PR	Puerto Rico	2	1	0.200	0.308	0.508	179,854	277,815	457,668

Figure 7b: Average annual monetary benefits and benefits per square mile of area controlled for 1,271 watershed projects with dams (2019 dollars). See Appendix 4 for detailed benefits data for many geographies (state, congressional district, county, watershed project)

Talking Points When Speaking with a News Reporter

Many times, you might have an opportunity to be interviewed by a reporter on the importance of watershed projects, dams or the need for rehabilitation. Take advantage of every opportunity to talk to reporters. It is a “teachable moment” to talk to the public through a much larger megaphone, than any one person has individually. One good example of this is in 1976 when Gaylord Shaw, a Pulitzer Prize-winning journalist, wrote a series of stories exposing unsafe conditions at hundreds of dams across the United States highlighting the lack of a national inventory of dams. This helped prompt then President Jimmy Carter to order a nationwide dam safety inspection program and the enactment of the National Dam Safety Act.

When talking to a reporter, the following are some good tips to remember:

1. Speak in short sentences in common language.
2. Speak slowly.
3. If you don’t know, ask “how much time do I have?”
4. Focus on accuracy.
5. Get rid of jargon – use same language as in a cocktail party.
6. Always express numbers as “1”: need to think how to express expenses for budget, such as “one dollar for each American”.
7. Use general comparisons to describe scope (example: Olympic pool vs. a glass full of water).
8. Use percentages “6 out of 10”
9. Send documents with a note “what you are looking for is on page __”
10. Ask the reporter to read your quotes back to you to make sure you were understood correctly.
11. Use verbs and nouns – not adjectives.
12. Use graphs or photos.

It is always good to have basic facts and main points available for quick reference. The following are some talking points the author has used in several interviews:

- NRCS works with local conservation districts, municipalities, county governments, and other project sponsors to assist farmers and ranchers to apply many conservation practices across the nation. However, dams are one of the few practices that have the potential to put lives at risk if they are not properly designed and maintained. Dams built with the USDA Watershed Program have protected and served hundreds of communities for over 70 years. They protect lives and property from flooding, and many provide water supply and recreation for many communities. As the dams age, they need more attention to keep them safe. So, when you assist with the implementation of watershed projects, you are a part of a legacy that will protect communities and lives for generations to come.
- Number of watershed dams = 11,841 dams
- Number of states with watershed projects = 50 states plus two territories (Guam and Puerto Rico)
- Number of states with watershed projects that include dams = 47 states plus one territory (Puerto Rico). There are no watershed dams in Rhode Island, Delaware, or Alaska.

- Average annual monetary benefits = $2.4 billion each year (2019 dollars)
- The watershed structures represent a $24 billion public infrastructure (like roads, bridges, interstates, water systems, etc.)
- Number of watershed dams that will reach the end of their service life in each of the following years (does not include dams with service life of 100 years or rehabilitated dams):

2019: 5,716	2025: 7,087
2020: 6,004	2026: 7,311
2021: 6,241	2027: 7,439
2022: 6,482	2028: 7,597
2023: 6,722	2029: 7,716
2024: 6,912	2030: 7,829

- 2019 was a milestone year in the Watershed Program as over half of the watershed dams in the nation reached the end of their evaluated service life.
- Number of high-hazard watershed dams in the nation (March 2020) = 2,196
- Number of national rehabilitation projects funded (March 2020) = 359
- Number of national rehabilitation projects completed (March 2020) = 161

The following are some facts about the history of the Watershed Program and conditions impacting people during extreme events:

- Ironically, the concept of the watershed programs started with the dust bowl in the 1930's:
    - The extreme extended drought destroyed much of the vegetation across the southern plains. Even though there was an extended drought in progress, there were still isolated intense cells of thunderstorms. Since there was no vegetation to hold back the runoff, flash floods filled streams with sediment and caused massive flooding downstream.
    - One historic flood occurred around Hamon, Oklahoma, April 3-4, 1934, resulting in the deaths of 17 people. The Washita River flooded and washed a house off its foundation. Five members of one family perished as they rode their house down the river and crashed into a railroad bridge. Similar stories occurred across the southern plains during that time.
    - Congress enacted the Flood Control Act of 1936 which authorized many special studies of areas impacted by the devasting floods.
    - The Flood Control Act of 1944 (Public Law 78-534) authorized 11 projects to be implemented. (See the history section of this document for details of the watershed programs.)
- A total of almost 12,000 watershed dams were constructed between 1948 and 2019.
- Starting in the mid-1950's, an average of one dam was built every day for two decades.
- This required a tremendous effort to organize the farmers and ranchers to develop the watershed project, complete the planning of the project, survey, and design the structural measures, obtain the easements from private landowners, and construct the dams. This

was a massive effort not only considering the number of projects being formed and dams being constructed, but also considering the manual methods of survey and design at that time.

- But now as Paul Harvey used to say: “the rest of the story” …..since most of the dams were planned with a 50-year life, now, 60+ years later, an average of one dam per day will reach the end of their designed life for the next decade.
- It should not be implied that dams will be in eminent danger of collapse when the reach the end of their design life. But it does mean that as the dams get older, they will require more attention and increased maintenance to assure that they will continue to be safe and function as planned and designed.
- The challenge for today’s generation is to assure the watershed story continues to be told and obtain the funding and technical expertise to maintain and rehabilitate the aging dams so that they may continue to protect and serve communities for generations to come.
- The Watershed Program is one of the best examples of a partnership between federal, state, local, and private entities:
    - Federal: USDA NRCS technical assistance to plan, design, and implement the projects as well as financial assistance to construct and rehabilitate the dams.
    - State: technical and financial assistance to work with local project sponsors to maintain and rehabilitate the dams
    - Local government entities (project sponsors) to manage the projects, obtain easements to implement the projects, and maintain and rehabilitate the dams.
    - Private landowners: provide easements to allow the construction and maintenance of the structural measures and apply conservation practices in the drainage areas of the dams.
- The Watershed Program is one of the most versatile conservation programs available. While many of the projects address flood control and water supply, the Watershed Program also addresses many other natural resource issues such as water quality, irrigation water management, wetland and wildlife habitat, erosion control, and recreation.

Good quotes that the author has made or repeated from others during his career:

- Recent extreme rains across the nation have underscored the value of small watershed dams and the urgency of maintaining them.
- Watershed dams have been called “the silent sentinels” because they quietly protect communities.
- A lot of people don’t even realize these dams exist; let alone how they affect their daily lives.
- While the dams have been so important in the past 60 or 70 years, they’re going to be even more so for the next generation.
- I don’t know all the science behind all the projections on climate change, but it sure seems like when you look at the last decade, we’ve experienced much more extreme weather conditions. That goes for both prolonged droughts as well as devastating floods. If that continues — and a lot of people say it’s going to get worse before it gets better — we are

going to have the need for a reliable water supply during the drought periods and we're going to have to have the safe structures to function to provide flood control.

- The basic concept of watershed projects is to keep the raindrop as close to where it falls as possible. So instead of a large dam downstream, several small dams are built in the upper tributaries of the watershed. Each dam collects runoff from their drainage areas and slowly releases it through a pipe. Collectively, these dams greatly reduce the depth and extent of flooding downstream.
- The purpose of many of these watershed dams are for flood *control*, not flood *prevention*.
- Requests for funds for rehabilitation of aging dams far outstrip available funding. In 2015, there were funding requests for nearly 400 projects worth $502 million. Because of the limited funding, the focus has been on those dams that protect lives.
- I continue to be struck with the foresight that the community and Watershed Program leaders had back in the '40s and '50s to plan and design these projects. And now the dams are well past their planned life and they still continue to function. The challenge now is for today's generation is ensure they're maintained in safe condition.
- These watershed dams just continue to do their job!
- Extreme rainfall events bring severe flooding and property damage to many residents. Floodwaters cause traffic disruptions and closure of major highways. Despite the lowland flooding damage, it would have been much worse if it hadn't been for the flood control dams,
- The watershed flood control dams may easily go unnoticed across the landscape, but after a heavy rain event, they spring into action. They capture rushing flood water and hold the water back allowing it to be slowly released downstream. Slowing the water down and allowing it to be gradually released reduces damage to downstream roads, bridges, fences, cropland, and other property.
- The benefits of watershed dams are so important. Watershed projects protect areas from flooding losses that used to occur frequently before the dams were built. In addition to protecting crops, farmland, buildings, roads and bridges, some of the dams also protect lives. They impact so many vital aspects of our daily lives.
- The horrific flooding that has been experienced recently reminds us that our state has had a long and dark history of weather extremes. During the decades of the 1920s through the 1940s, much of the Midwest and southern plains experienced major floods inundating many flood plains almost every year. Much in the same way they battled the Dust Bowl, conservation districts and the NRCS planned and implemented watershed projects to alleviate flooding and address many other natural resource concerns.
- Although over half these dams have exceeded their planned life, they continue to provide flood protection along with sediment and nutrient capture and public water supply. It is our duty to maintain this flood protection system.

The "Perfect Storm" of Conditions That Exist with Aging Dams; People are at Risk

Larry Caldwell

February 2015 (Updated May 2020)

A "perfect storm" of conditions exist with aging watershed dams across the nation that could result in loss of life and significant property and environmental damage if actions are not taken soon. The following are the seven components of this storm. Any one condition is cause for concern. The presence of two or three would be cause for alarm, but all seven are occurring simultaneously which will eventually create a crisis for many communities.

1. **Number of dams: Watershed dams are everywhere; they have become an integral part of many communities across the nation.**
    a. 12,000 dams in 47 states (no dams in Alaska, Delaware, or Rhode Island).
    b. Most provide flood control; some provide sole source water supply for residents, industry, and irrigation, as well as recreation, wildlife habitat and wetlands, etc.
    c. These projects provide $2.4 billion average annual benefits, including damages that would have occurred had the dams not been in place.
    d. Media always concentrates on catastrophic damages; but we rarely hear about the damages that were avoided due to successful projects like these.

2. **Hazard: The landscape downstream from the dams has changed since they were constructed.**
    a. Most of the dams were constructed to protect agricultural areas.
    b. After the dams were built, people began to build houses, businesses, and roads downstream from the dams. Now the dams protect people's lives.
    c. Most of these dams do not meet current safety standards. Less than half of the 2,200 high hazard dams were originally designed to meet high hazard criteria.
    d. Dams are one of the few practices that NRCS designs that can kill someone if they should fail.

3. **Age: Watershed dams are approaching the end of their designed service life.**
    a. From the mid-1950s to the mid-1970s (two decades), an average of one watershed dam per day was constructed. The peak year was in 1963 when 605 dams were constructed.
    b. Most of the dams were designed with a 50-year service life.
    c. We are now nearing the end of the 20-year period when every day one watershed dam will come to the end of its service life.
    d. In 2020, over half of the 11,841 watershed dams have exceeded their service life.
    e. In 2020, the average age of the 11,841 watershed dams is 52 years.
    f. NRCS is the engineer of record for most of these dams.
    g. These dams are a victim of their own success. They have performed so well, most people do not know they even exist, let alone how they impact their daily lives.

4. **Climate change is resulting in more extreme weather conditions.**
    a. Climatological experts agree that impacts of climate change include:
        i. "Increased precipitation intensity and risk of flooding"
        ii. "Increased drought frequency and severity"
    b. Watershed dams help protect communities and people who are vulnerable to the impacts of climate change by providing safe flood control and dependable water supply for residents, industry, and irrigation.

5. **Limited funds: Project sponsors have a difficult time obtaining funds for the increasing maintenance needs with the aging dams. Federal funding for rehabilitation is variable.**
    a. Limited state budgets do not provide adequate maintenance funds needed to keep the aging dams safe or the local cost-share to rehabilitate their dams to meet current safety standards.
    b. Federal annual appropriations for rehabilitation of watershed dams have been variable, ranging from $10 to $40 million, except for a couple of "spikes" by ARRA & CCC funds.
    c. Variable funding levels do not allow for budget stability to maintain adequate staff to provide technical assistance to sponsors.

6. **Loss of institutional knowledge: Many of the engineers and technical specialists who originally planned and constructed the dams are no longer available; many of the sponsors who are currently responsible for maintaining the dams do not have experience with dams.**
    a. Many of the NRCS employees who were a part of the original generation who planned, designed, and constructed the watershed dams have retired as have the project sponsors who originally established and initiated the operation of the watershed projects.
    b. Many of today's sponsors do not have experience working with dams; most rely on NRCS technical specialists that are busy with delivering other conservation programs.

7. **Aging dams can, and have killed people:**
    a. Dams can fail quickly, leaving little time for warning and evacuation of people in harm's way. Example - Teton dam (June 5, 1976): seepage problem was first noticed at 7:00 am; warnings issued at 10:45 am; dam failed at 11:57 am.
    b. Contrary to popular belief, the failure of large dams don't kill the most people, smaller dams do. Wayne Graham, Bureau of Reclamation engineer, investigated all U.S. dam failures that resulted in one or more fatalities (1874 to 2006). He found that the majority of the fatalities resulted from dams the same size as most of the watershed dams in the nation.

So, the "perfect storm" is upon us. The conditions are stark and undeniable;

- Dams are critical infrastructure that communities depend upon for flood protection & water supply
- More people are at risk living downstream from the dams than ever before
- Dams are getting older and do not meet current safety standards
- Climate change will increase precipitation intensity, will produce larger and more frequent floods, will increase drought severity, will dangerously reduce critical water supplies, and more result in more frequent and widespread wildfires.
- Limited funds are available for maintenance and rehabilitation to keep the dams safe
- Fewer experienced people are available to address operation and maintenance issues and effectively respond to emergency conditions.

What are the responsible actions needed?:

- Better national recognition of the public safety issues related to aging dams.
- Stable funding to support core NRCS technical staff to assist local conservation districts with operation and maintenance of aging dams and upgrading them to meet current safety standards.
- Establishment of a system to monitor dams to provide timely warning when a natural or man-made disaster (earthquake, large storm, or wildfire) occurs so dams can be inspected and emergency assistance can be provided in a timely manner.
- Ability to make critical records readily available, such as emergency action plans, breach inundation maps, as-built construction drawings, inspection reports, photos, etc.
- Capture the remaining institutional knowledge about the watershed program (the little things that make a big difference) for future generations.

Local and national leaders hope that a dam failure or tragedy doesn't occur under their watch. Everyone needs to make a personal decision – what actions are <u>you</u> going to take to reduce the risk of dam failures? How will we work together to protect this critical infrastructure?

Watershed Program Authorities

Background:
The USDA Watershed Programs have made the NRCS, formerly called the Soil Conservation Service, one of the major federal participants in watershed protection and flood control in the United States. The programs are some of the best examples of federal, state, and local partnerships in the nation. The Watershed Programs originated with the following four authorities: The Flood Control Act of 1944 (Public Law 78-534), the 1953 Pilot Watershed Program (Public Law 83-156), the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566), and the 1962 Resource Conservation and Development Act (Public Law 87-703). These statutes authorized the NRCS to provide technical and financial assistance to local project sponsors for the planning and implementation of watershed projects.

The historical background of the Watershed Programs is summarized in several of the watershed history documents that are listed in the bibliography section at the end of this paper. This history provides a glimpse of the struggles involved with the development of federal water resources policies including a wide range of political, technical, public opinion, and conceptual issues in the early days of USDA becoming involved in flood control efforts. The following are good references that describe the political deliberations involved prior to the passage of the final legislation:

"The Complete Watershed Program in Flood Control" by Hugh Hammond Bennett; Soil Conservation Magazine, November 1951

"The Small Watershed Program, Law and Contemporary Problems" by Robert J. Morgan: Vol. 22, No. 3, 1957, pp 405 – 432, Duke University School of Law

"Legacy of the Control Act of 1936. The Flood Control Challenge: Past, Present, and Future"; Proceedings of the National Symposium of the Public Works Historical Society, New Orleans, Louisiana, Public Works Historical Society. September 26, 1986 (1988; pages 67-88).

"Protecting Nature's Reservoir" by Arthur Maass; reprinted from Public Policy 5 (1954)

"Big Dam Foolishness: The Problem of Modern Flood Control and Water Storage" by Elmer Peterson (1954).

"Watershed Management in Historical Perspective: The Soil Conservation Service's Experience" by Douglas Helms; Proceedings of the Watershed '93; A National Conference on Watershed Management, March 21-24, 1993, Alexandria, Virginia

"A History of Water Resource Activities of the United States Department of Agriculture" by Eugene C. Buie; September 1979

"Evolution of the Small Watershed Program"; Agricultural Economic Report No. 262; 1974

"Small Watersheds and the USDA: Legacy of the Flood Control Act of 1936" by Douglas Helms; 1988 Public Works Historical Society national symposium to commemorate the fiftieth anniversary of the 1936 Flood Control Act.

"Rehabilitation of Aging Watershed Dams": The 21st Century Challenge for Watershed Project Sponsors" by Larry Caldwell; 2004; Journal of Dam Safety. 2(2):4-9.

Ironically, the origins of the Watershed Programs began during the Dust Bowl days in the 1930's. During this time in the southern plains the vegetation was destroyed leaving the landscape unable to hold back runoff during isolated severe storms. Severe flooding occurred in many locations in the mid 1930's that devastated communities and caused millions of dollars of damages. The flooding resulted in loss of lives and damage to homes, businesses, roads, and bridges. It also resulted in severe erosion, damage to crops, loss of livestock and sediment deposition in streams and rivers. There were considerable discussions on how to solve this problem in many areas across the nation. Much of the discussion centered around the large dam concept promoted by the Army Corps of Engineers verses smaller dam concept promoted by the Soil Conservation Service (SCS). The SCS approach was to construct a series of smaller dams with land treatment in smaller watersheds in the upper tributaries that would trap water from storms and slowly release it over a period of days to reduce the flooding of streams and lands downstream. The SCS approach with the much-smaller foot-print on the landscape was eventually authorized in four separate legislative authorizations described below.

Watershed projects are federal-assisted projects, not federally owned. NRCS provides the interdisciplinary technical assistance to plan and design the measures in the project plans. Federally appropriated funds are used to fund a portion of the construction of the planned measures (100 percent for flood control measures). Project sponsors are responsible for implementing the projects including acquiring land rights, as well as operating and maintaining the installed measures. Local project sponsors are required to be local units of government such as conservation districts, special-use districts (such as conservancy districts, watershed districts, drainage districts, etc.), as well as counties, states, and municipalities. Conservation districts often take on this responsibility and sometimes partner with city and county governmental units for watershed projects.

To date, over 2,100 watershed projects have been authorized in 50 states, Puerto Rico, and the Pacific Basin. The installed measures in these projects represent a $24 billion (2020 dollars) investment in public infrastructure. This figure is based upon computing the current value of the annual federal appropriations for each year from 1948 to 2020 using the Consumer Price Index (CPI). This figure does not include the substantial contribution from the local sponsors for local cost-share of the measures, land-rights, and administration of the projects.

Congress authorized the Watershed Programs to address myriad natural resource issues including erosion and sediment control, flood damage reduction, agricultural water management, irrigation, drainage, fish and wildlife habitat development, groundwater recharge, water quality improvement, proper utilization of land, municipal and industrial water supply and public recreation area development.

Almost 12,000 dams in 47 states and three territories were constructed in 1,269 of these watershed projects (there are no dams in watershed projects in Delaware, Rhode Island, or Alaska). But the Watershed Programs involve more than just dams. An important component of the Watershed Programs has always been land treatment and land management with attention to both erosion control and agricultural and non-agricultural economics. Many of the projects included both structural and non-structural measures being installed.

The watershed projects were based on the conservation principal of holding the raindrop high in the watershed as close to where it strikes the ground as possible. This involved installation of a complete set of soil and water conservation practices on the landscape. Many projects included flood control dams to protect downstream areas. At least 50 percent of the upstream drainage areas of the dams had to be adequately treated with conservation practices before the dams were installed. This helped assure that excessive erosion would not reduce the effectiveness of the flood control measures during their evaluated life.

The primary purposes of many of the initial watershed projects included dams for flood damage reduction and erosion control. Later, dams were planned with the purpose of providing water supply for municipalities and irrigation as well as recreation.

NRCS has had a significant role on dam building in America. The 11,841 dams constructed in 1,269 watershed projects are almost one third of the 29,193 NRCS-assisted dams that are contained in the NRCS NID as of March 2020. NRCS has assisted with the design and construction of 32 percent of the 91,468 dams in the national inventory of dams. The inventory is maintained by the Corps of Engineers. It contains data on all dams that that are greater than 25 feet in height with more than 15 acre-feet of storage or more than 6 feet in height with more than 50 acre-feet of storage.

The Watershed Program has existed for more than 70 years and a tremendous amount of work has been completed with a great deal of success in solving complex natural resource issues. There are still natural resource issues that exist today that can be addressed by utilizing the program's authorities.

Watershed Dam Description

Typically, watershed dams are earthen embankments ranging from 20 to 90 feet in height with vegetated earthen auxiliary spillways and concrete or metal principal spillways. SCS/NRCS planned most watershed dams to provide flood control for agricultural land in rural areas. Some dams provide grade stabilization, water supply for municipalities, irrigation, and/or recreation. Figure 8 shows a schematic of a typical watershed dam. The reservoirs provide storage for the anticipated sediment accumulation during the evaluated life of the project (generally 50 to 100 years). The area above the principal spillway crest elevation, as illustrated in Figure 9a, provides temporary detention storage for runoff from large storms. The principal spillway conduit, as shown in Figure 9b, slowly releases the water temporarily stored in the reservoir. This controlled release reduces the rate of runoff from the watershed, thus reducing flood damages downstream. NRCS typically designed principal spillways to control runoff from a 25- to 100-year frequency storm (4 percent to 1 percent chance of occurrence event) depending on the structure's hazard classification. Designs typically include a vegetated earthen auxiliary spillway to safely pass excessive runoff generated by less frequent larger storm events around the earth embankment. Figure 10 provides photos of auxiliary spillways functioning. See Figure 11 for a summary of medians and maximums of features of watershed dams.

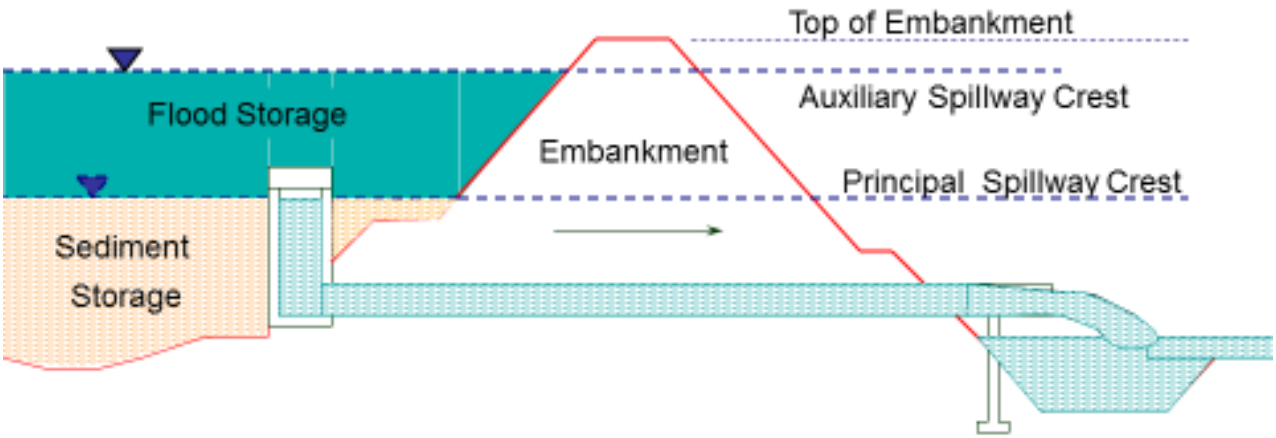


Figure 8: Section of Typical Watershed Dam

(a) (b)

Figure 9: (a) The detention pool (between reservoir and yellow line) temporarily stores runoff from large storms and (b) The principal spillway conduit slowly releases the runoff stored in the detention pool.

Figure 10: Auxiliary spillways are typically vegetated channels that safely convey runoff from large storms around the dam to avoid overtopping of the embankment

Feature	Median Value	Maximum		
		Value	Dam Name	State
Dam Height (ft)	32	145	Lower North River 81	VA
Dam Length (ft)	848	62,300	Harquahala FRS	AZ
Drainage Area (sq. miles) *	1.4	252	Running Water Draw 3	TX
Reservoir Surface Area (ac)	12	3,100	Cypress Black Bayou 1	LA
Volume of Earth Fill (cu. yds.)	50,211	4,430,000	Harquahala FRS	AZ
Spillway Width (ft)	68	1,750	Cottonwood-Walnut	NM
Sediment Storage (ac ft)	70	18,000	Millsite	UT
Flood Storage (ac ft)	270	59,880	Brady Lake	TX
Maximum Storage (ac. ft.)	530	90,310	Brady Lake	TX
Year that First Dam was Built (Age of Oldest Dam in 2019)		1948 (71)	Cloud Creek 1	OK
Latest Year Dam Built (Age of Newest Dam in 2019)		2015 (4)	Duck Creek Dam	NE

* 93% of the dams have a drainage area less than 10 sq. mi.

Figure 11: Median and maximum values of design features of watershed dams (Source: NRCS GeoObserver NID, July 21, 2019)

Watershed Program Authorities:
The following provides a brief history of each of the Watershed Programs and a summary of the projects and dams within them in each state. The primary sources of these data are legislative statutes, NRCS program files, the NRCS inventory of dams, and personal phone conversations to verify specific information between the author and NRCS state Watershed Program leaders.

The Flood Control Act of 1944 (Public Law 78-534):
The Flood Control Act of 1944 was signed by President Franklin D. Roosevelt on December 22, 1944 and became Public Law 78-534 (58 Stat. 905). This act authorized 11 watershed projects covering almost 32 million acres in 12 states (see Figures 14 and 15). See Appendix 7 for the text of PL 78-534.

The 1944 Act was the result of studies on many watersheds that were authorized by the Flood Control Act of 1936 (Public Law 74-738). What started as response to flooding that occurred in the mid-1930s emerged as debate of national policy on flood control. The 1936 Act provided for "the investigations of watersheds for run-off and water flow retardation and soil erosion prevention" in selected watersheds. Between 1937 and 1943, studies were initiated on 212 watersheds. By September 1944, 154 preliminary surveys had been completed including 124 that were recommended for detailed surveys. Twenty-five studies were completed and submitted to Congress. USDA recommended 11 of them be implemented. Section 13 of the Flood Control Act of 1944 provided funding for the "works of improvement for run-off and water flow retardation and soil erosion prevention for the following watersheds that are hereby adopted and authorized in the interest of national security and a view toward adequate reservoirs of useful and worthy public works…."

The studies of the Washita River in Oklahoma and the Trinity and Middle Colorado Watersheds in Texas highlighted intense debates between the Corps of Engineers and the Soil Conservation Service over the best approach to federal involvement in flood control and which agency should lead national flood control efforts. The issues involved whether the USDA projects should include flood control measures in addition to upstream land treatment. Each of the proposed Texas and Oklahoma projects included "small upstream floodwater retarding structures for temporary storage to regulate storm runoff and reduce peak discharges." By 1949, 25 of those structures had been constructed. An amendment to the 1950 appropriations act (PL-81-759) allowed funds for PL-534 projects to be spent on "gully control, floodwater detention, and floodway structures." Thus, without debate in Congress and without comment by the US Army Corps of Engineers, the Soil Conservation Service secured authority for building floodwater-retarding structures. This was a pivotal point in future USDA authorities and policies for water resources programs. The experiences from the planning and implementation of the 11 projects provided the model for future USDA flood control activities.

In 1947, when funding became available following the end of World War II, Congress began appropriating funds to USDA to begin work on the authorized projects. The first flood control dam authorized by the Flood Control Act of 1944 was Cloud Creek Watershed, Dam No. 1, near the town of Cordell in Washita County in southwest Oklahoma. See photo in Figure 12). On July 8, 1948, a national ceremony was held to dedicate the completed structure. Soil Conservation Service Chief Dr. Hugh Hammond Bennett, Oklahoma Governor Roy Turner, and Oklahoma Senator Robert Kerr were speakers at the ceremony that was reportedly attended by 10,000 people.

Figure 12: Photo of Cloud Creek Watershed, Dam No. 1,
the first dam constructed under the authority of the Flood Control Act of 1944; July 8, 1948.

On July 3, 1998, a ceremony commemorating the first watershed dam to have reached the end of its service life was held in Cordell, Oklahoma. NRCS Chief Pearlie Reed, Oklahoma Governor Frank Keating, and Oklahoma Representative Frank Lucas were speakers at this ceremony that was attended by 1,000 people. A granite monument designating the significance of this dam was dedicated at the Washita County courthouse (see photo in Figure13). Representative Lucas held a field hearing in conjunction with the event to highlight the future challenges with aging watershed infrastructure and discuss approaches to how to address them. This was the start of the national debate on possible federal involvement in the rehabilitation of aging watershed dams.

Figure 13: Photo of monument and dignitaries commemorating the end of the 50-year service life of the first dam constructed under the authority of the Flood Control Act of 1944; July 3, 1998. Photo courtesy of Mark Harrison, Oklahoma Conservation Commission.

Watershed	State(s)	Acres
Buffalo Creek	New York	279,680
Coosa River	Georgia, Tennessee	1,339,400
Little Sioux River	Iowa	1,740,800
Little Tallahatchip River	Mississippi	963,977
Los Angeles River	California	546,960
Middle Colorado	Texas	4,613,120
Potomac River	Virginia, West Virginia, Maryland, Pennsylvania	4,205,400
Santa Ynex River	California	675,000
Trinity River	Texas	8,424,260
Washita River	Oklahoma, Texas	5,095,040
Yazoo River	Mississippi	3,942,197
11 Watersheds	12 States	31,825,834 acres

Figure 14: The Eleven Watershed Projects Authorized by the Flood Control Act of 1944

Figure 15: Location of the 11 watershed projects authorized in 9 states by the Flood Control Act of 1944

The Sandstone Creek Watershed in Roger Mills County in western Oklahoma was the first watershed in the nation that had all of the planned dams constructed. Planning of the watershed was initiated in 1946. The construction contract for the first two dams was awarded in June 1950. Construction of the 24 dams in the watershed was completed by November 1952.

Figure 16: Photos of roadside signs identifying Sandstone Creek Watershed as the world's first Upstream Flood Prevention Project (also identified on the official Oklahoma state highway maps). Photo on right is the original 1953 sign with LL "Red" Males, chair of the Upper Washita Conservation District and early national leader and promoter of the Watershed Program.

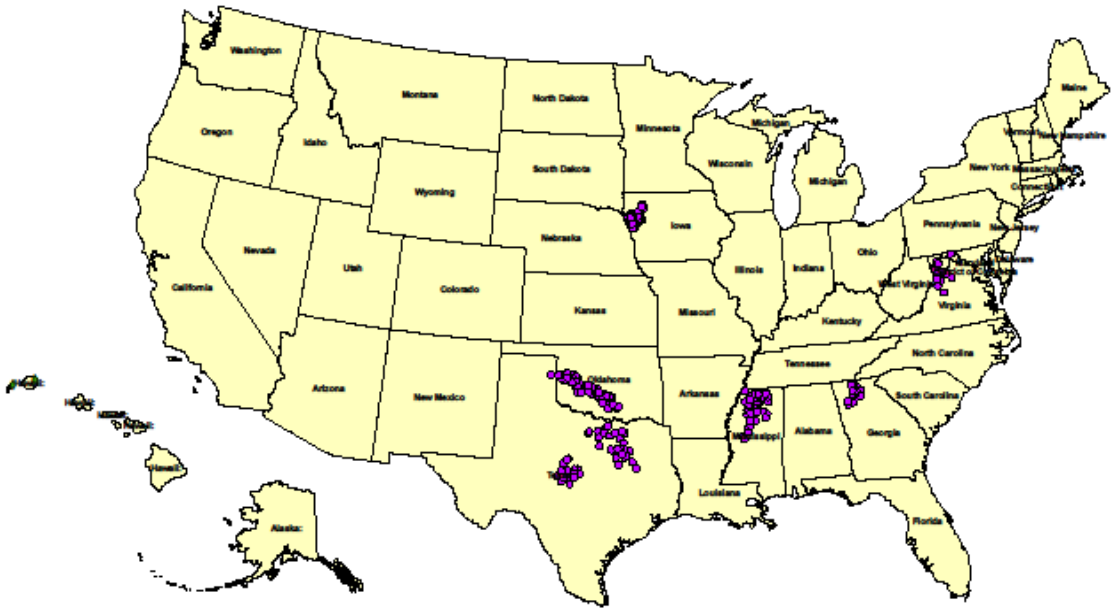


Figure 17: Locations of 260 PL-534 Watershed Projects with 3,428 dams in 7 states

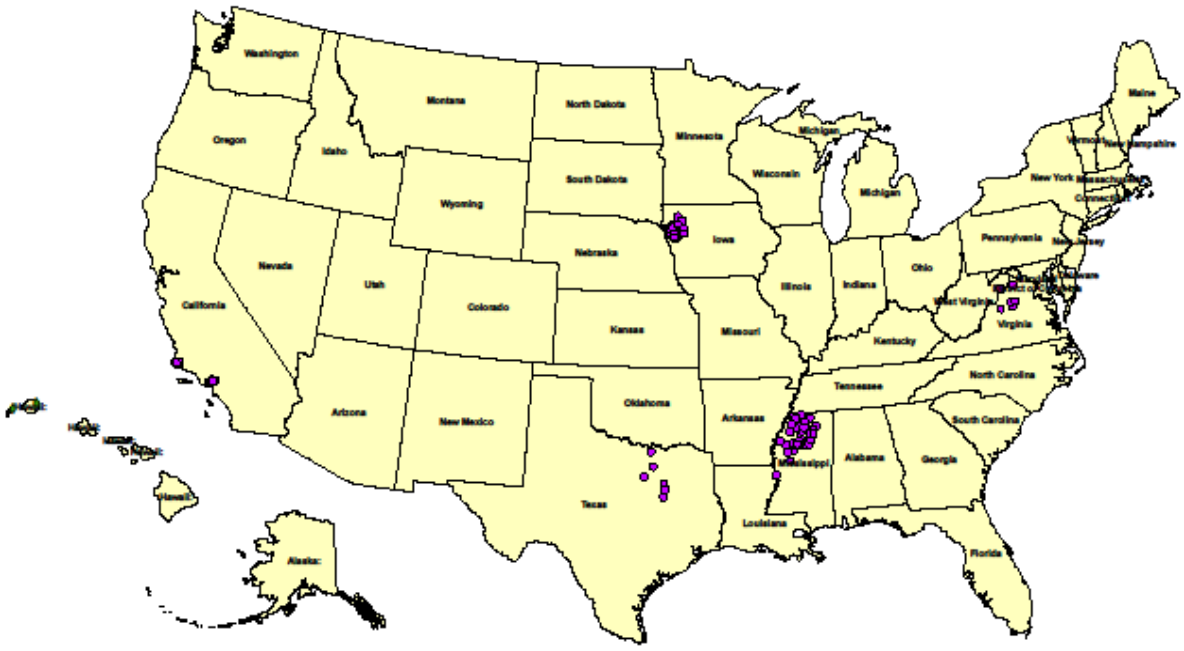


Figure 18: Locations of 98 PL-534 Watershed Projects without dams in 7 states

By 2019, 3,428 dams in 260 sub-watershed projects covering 26 million acres in 7 states were constructed under the authority of PL-78-534. Figure 19 provides a summary of the number of PL-534 dams constructed in each state. Note that no dams were constructed in the originally authorized Buffalo Creek Watershed in New York or the Los Angeles River and Santa Ynex River Watersheds in California.

STATE	No. of PL-534 Sub-watershed Projects	No. of PL-534 Dams
Georgia	15	117
Iowa	90	485
Mississippi	42	367
Oklahoma	55	1,107
Texas	45	1,242
Virginia	6	29
West Virginia	7	81
7 States	**260**	**3,428**

Figure 19: Number of PL-534 watershed projects and dams constructed in seven states (Source: July 21, 2019, NRCS GeoObserver NID)

Figure 20 shows the number of PL-534 dams built each year. Construction of the first PL-534 dam was completed in July 1948 (Cloud Creek 1 in Oklahoma). There were 8 other PL-534 dams built later in 1948. These dams were 72 years old in 2020. Most of the PL-534 dams were constructed from 1955 to 1975 with 260 dams constructed in 1963. Median year of all dams built was 1964 (55 years old in 2019). In 2006, the last 3 PL-534 dams were built (Bitter Creek 18-OK; Big Sandy 24C-TX; Elm Fork 19-TX). See Figure 37 for median values of design features of PL-534 dams.

The majority of the PL-534 dams (3,106; 91 percent) were planned with a 50-year evaluated service life, while 184 dams had a 100-year life. The remaining 123 did not have a service life indicated in the NID. By 2019, 2,661 (78 percent) of the PL-534 dams were more than 50 years old.

As of July 2019, 478 (14 percent) of the PL-534 dams had been classified as high hazard and 46 dams had been rehabilitated.

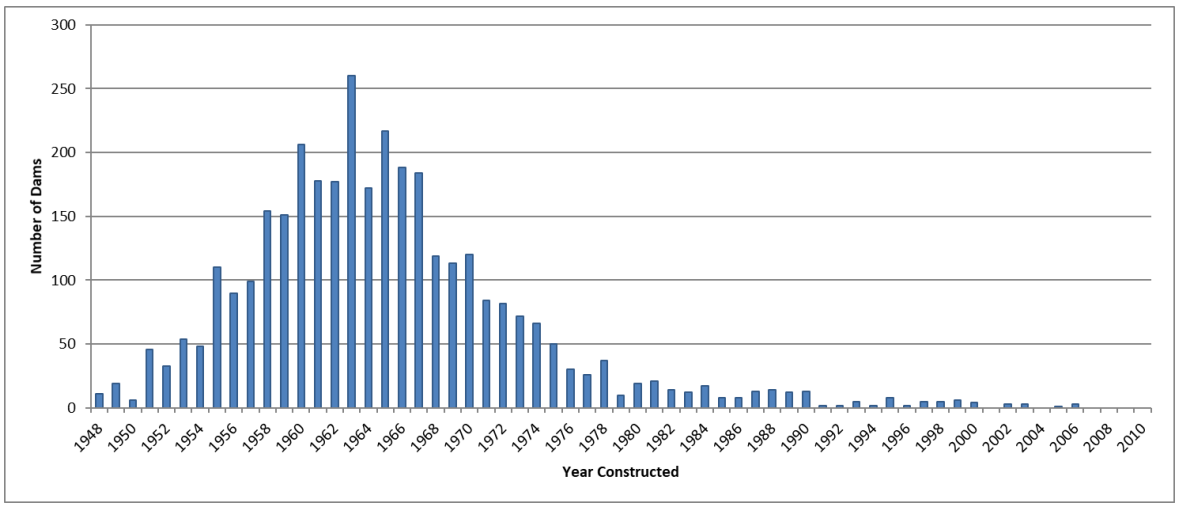


Figure 20: Number of PL-534 dams built each year

Pilot Watershed Program:

After stories of the success of the 11 PL-534 projects spread across the country, many communities wanted to implement similar projects. After years of contentious debates in Congress over authorization and funding of upstream watershed projects, Congress enacted the 1954 Department of Agriculture Appropriations Act (Public Law 83-156 (67Stat.214) on July 20, 1953. It included a provision under the heading “Flood Prevention” that provided $5,000,000 for a Pilot Watershed Program. The Secretary of Agriculture assigned responsibility for the Pilot Watershed Program to the Soil Conservation Service (SCS). Sixty-two watershed projects covering over 2.9 million acres in 33 states were selected between August 9 and December 8, 1953 (see Figures 21 and 22).

It was originally anticipated that the pilot projects would be completed in five years at a cost of $28,706,000; however, the actual installation time and costs were much more. The estimated costs ranged from $69,616 for the Switzler Watershed in Kansas to $6,012,545 for the Walnut Creek Watershed in California. Nineteen pilot projects were estimated to exceed $1,000,000 each. Pilot Watershed Program funds were not appropriated after 1974. The total actual federal obligations for the Pilot Watershed Program were $43,634,379. The official estimate for the local contribution to the total cost varied from 14 percent to 86 percent; however, USDA estimated the average local cost share was 50 percent.

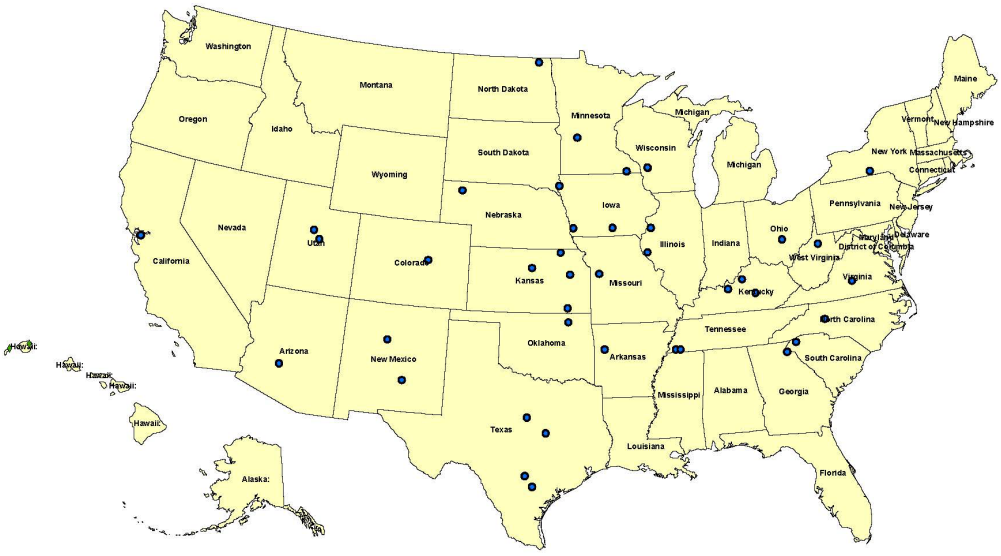


Figure 21: Location of 46 Pilot Watershed projects with 449 dams in 26 states

Works of improvement were installed in 54 of the original 62 projects. The following are the structural measures installed as a part of the Pilot Watershed Program:

384 floodwater retarding structures
475 grade stabilization structures
287 miles of channel
152 silt and debris basins
132 miles of floodways

According to the GeoObserver NID as of July 21, 2019, 449 dams were constructed in 46 projects in 26 states under the authority of the Pilot Watershed Program. See Figure 23 for the number of pilot dams built in each state. The number of dams in the inventory is less than the number of structures in the above summary because the inventory only includes dams that exceed 25 feet in height. Note that no dams were constructed in 18 of the authorized projects; however, several practices were installed that included structural measures other than dams of inventory size.

State	Watershed	Acres	State	Watershed	Acres
AR	Six Mile Creek	164,627	NE	Brownell Creek	15,360
				Dry Creek	31,360
AZ	White Tanks	59,136		Little Indian Creek	51,200
				Up. Salt & Swedeburg	114,516
CA	Adobe Creek	21,440			
	Calleguas Creek	215,000	NH	Baboosie Brook	30,528
	Walnut Creek	95,600			
			NJ	Pequest River	69,120
CO	Kiowa Creek	75,500			
			NM	Sandia Mt & Bernalillo	48,000
GA	N. Fork of Broad River	40,598		Upper Rio Hondo	192,000
IA	Honey Creek	9,120	NY	Ball Creek	5,888
	Mule Creek	8,013		Dean Creek	6,400
	Floyd River	8,700		Great Brook	16,640
	Floyd R. T. Nassau	5,480		Little Hoosick River	21,760
ID	Dry Creek	44,800	NC	Third Creek	66,240
IL	Hadley Creek	46,272	ND	Tongue River	419,200
	Money Creek	42,800			
	Old Tom Crook	11,520	OH	Rock Fork & Clear Fork	28,045
				Upper Hocking River	21,121
IN	Flat Creek	36,634			
			OK	Double Creek	30,250
KS	Aiken Creek & Bee Creek	6,726			
	Bill's Creek	16,000	PA	Cory Creek	15,424
	Little Delaware & Mission Creek	27,971	SC	Twelve Mile Creek	78,720
	Lost Creek	12,326			
	Snipe Creek	16,421	SD	Scott Creek	2,560
	Switzler Creek	19,910			
			TN	Mary's & Dand Creeks	14,900
KY	N. Fork of Rough River	24,960			
	Plum Creek	22,560	TX	Calaveras Creek	61,440
	Upper Green River	24,998		Cow Bayou	71,250
	Upper Red River	60,000		Escondido Creek	74,880
				Green Creek	67,200
MN	Chippewa River & Hawk Creek	60,800	UT	Pleasant Creek	10,880
	East Willow Creek	24,000		Santaquin Canyon	25,600
			VA	E. Fork of Falling River	41,997
MO	East Br. Of S. Fork Blackwater	12,613			
	Lost Creek	10,304	WA	Mission Creek	54,400
			WI	W. Fork of Kickapoo	17,945
MT	Muster Creek	32,000			
			WV	Salem Fork of Ten Mile Ck	5,760

Figure 22: 62 authorized Pilot Watershed Projects in 33 states (2,901,165 acres)

STATE	No. of Pilot Watershed Projects	No. of Pilot Watershed Dams
Arizona	1	2
Arkansas	1	24
California	1	1
Colorado	1	55
Georgia	1	12
Illinois	2	11
Iowa	2	29
Kansas	4	14
Kentucky	3	17
Minnesota	2	8
Missouri	2	30
Nebraska	5	106
New Mexico	2	2
New York	1	2
North Carolina	1	11
North Dakota	1	10
Ohio	1	16
Oklahoma	1	6
South Carolina	1	7
South Dakota	1	2
Tennessee	2	9
Texas	4	60
Utah	2	3
Virginia	1	3
West Virginia	1	7
Wisconsin	2	2
26 States	**46**	**449 dams**

Figure 23: Number of Pilot Watershed projects and dams in 26 states

Figure 24 shows the number of pilot dams built each year. Construction of the first Pilot dams were completed in 1953 (Mule Creek 1 and 2 in Iowa). These dams were 66 years old in 2019. Most of the pilot dams were constructed from 1954 to 1960, with 93 dams constructed in 1956. Median year of all dams built was 1957 (53 years old in 2020). The last pilot dam was built in 1969 (Upper Salt Creek 25-A; NE). See Figure 37 for median values of design features of Pilot dams.

The majority of the pilot dams (270; 60 percent) were planned with a 50-year evaluated service life while 167 dams did not have a service life indicated in the GeoObserver NID. All of the 449 pilot dams had exceeded their 50-year evaluated service life by 2019.

As of July 2019, 65 of the pilot dams had been classified as high hazard and 22 dams had been rehabilitated.

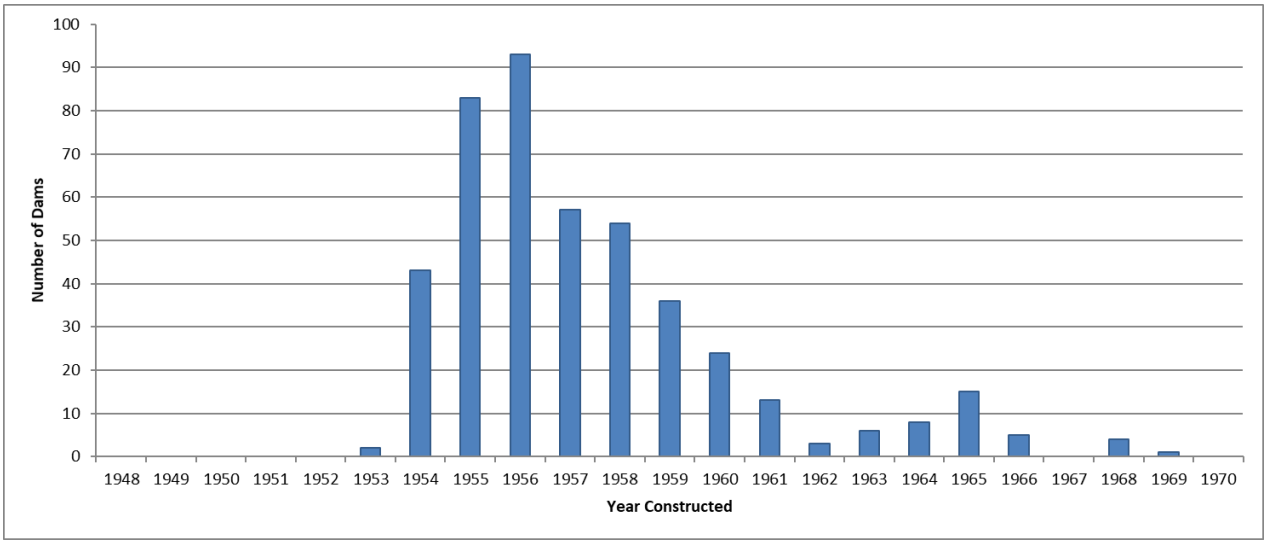


Figure 24: Number of Pilot Watershed dams built each year

The Watershed Protection and Flood Prevention Act of 1954:
During the early 1950's, debates raged in Congress and between federal agencies on the virtues of various technical approaches to flood control as well as differing political and public opinions on federal policy involving flood control. Hearings on proposals involved the controversial larger flood control approach by the U.S. Army Corps of Engineers for the Pick-Sloan Project, as well as similar proposals by the Bureau of Reclamation and the Tennessee Valley Authority (TVA). The Missouri Basin Commission held hearings in Kansas to gauge public sentiment concerning larger or smaller structure approaches. The flood control issue became an important issue in some campaigns of the 1952 political elections. Through these debates and hearings, it became evident that most rural communities supported the upstream flood control concept proposals.

The debates culminated when the Watershed Protection and Flood Prevention Act (Public Law 83-566; 16 U.S.C.1001 et. seq.) was signed by President Dwight D. Eisenhower on August 4, 1954. See Appendix 8 for the text of PL 83-566. This act was also called the Hope-Aiken Act which was named after Representative Clifford Hope (Kansas) who was chair of the House Agriculture Committee and Senator George Aiken (Vermont) who was chair of the Senate Agriculture Committee in the 83rd Congress. The Act established a permanent nationwide program that authorized the federal government to cooperate with states and their political subdivisions to "conserve, utilize, and dispose of water to protect land and water resources." It provided for technical and financial assistance to local watershed sponsors willing to assume responsibility for initiating, implementing, sharing in costs, and become legally responsible for operation and maintenance for structural measures in upstream watershed conservation and flood control. The Act authorized a comprehensive multipurpose program that included both structural and land treatment measures.

The basic authorities of this act were not new in the sense that they had existed in the Flood Control Act of 1944 and Pilot Watershed Program. However, those were restricted to specific watersheds. The PL-566 authorities were new in that they were extended nationwide and were permanent.

Unlike the PL-534 and Pilot Watershed Programs, the PL-566 act included size limitations on structural measures included in projects. Watersheds authorized by the Act cannot exceed 250,000 acres in area, nor may it include any structure that stores more than 5,000 acre-feet (ac.-ft.) of floodwater detention storage, nor more than 25,000 ac.-ft. of total capacity for all purposes (such as sediment, detention, and municipal water storage).

The PL-566 Act also defined responsibilities of local sponsoring organizations. They must acquire necessary land rights, provide the appropriate share of the non-flood prevention costs, provide for required water rights, agree to operate and maintain the works of improvement, and obtain agreements that the recommended farm conservation practices will be carried out by owners of not less than 50 percent of the areas situated above each retention reservoir included in the project.
An August 1956 amendment to the Act (Public Law 84-1018; 70 stat 1058) provided that the federal government shall bear the entire cost of constructing the works of improvement devoted to flood prevention. It also authorized projects to include municipal and industrial water supply at 100 percent local expense. The amendment also stipulated approval limits required by various congressional committees for projects that exceeded specified costs or structures that exceeded specified capacities. The Act was amended several times after 1956.

The photos in Figure 25 were taken in 1953 when the Pilot Projects were being authorized and a year before PL-566 was passed. Neither were certainties at the time this photo was taken.

By 2019, a total of 1,606 PL-566 watershed projects had been authorized covering over 116 million acres in 50 states and 3 territories. Of these, 886 projects include constructed dams and 724 projects do not include dams. See figure 27 for maps showing locations of PL-566 authorized projects.

A total of 7,766 dams in 886 sub-watershed projects in 47 states and 1 territory have been constructed under the authority of PL-83-566. See figure 26 for a summary of the number of PL-566 dams constructed in each state. Note that PL-566 dams have not been constructed in Alaska, Delaware, or Rhode Island.

President Dwight Eisenhower (center) and Asst. Sec. of Agriculture Earl Coke (left) view a display of Okla. Sandstone Creek project

Figure 25: Selected photos showing President Dwight D. Eisenhower viewing watershed exhibits in the USDA Whitten Building in Washington DC. Source: "President Eisenhower Visiting Watersheds Exhibit," 1953; Photographs of USDA Exhibits, 1900-1953, Record Group 16-EX, Box 5; National Archives; College Park, MD.

State	No. of PL-566 Dams	State	No. of PL-566 Dams
Alabama	100	Nevada	8
Arizona	21	New Hampshire	24
Arkansas	181	New Jersey	19
California	15	New Mexico	75
Colorado	87	New York	52
Connecticut	29	North Carolina	101
Florida	10	North Dakota	39
Georgia	218	Ohio	48
Hawaii	8	Oklahoma	987
Idaho	3	Oregon	6
Illinois	55	Pennsylvania	82
Indiana	132	Puerto Rico	2
Iowa	1,066	South Carolina	97
Kansas	800	South Dakota	33
Kentucky	182	Tennessee	133
Louisiana	35	Texas	687
Maine	16	Utah	40
Maryland	16	Vermont	4
Massachusetts	29	Virginia	118
Michigan	13	Washington	3
Minnesota	37	West Virginia	77
Mississippi	189	Wisconsin	85
Missouri	1,148	Wyoming	12
Montana	16		
Nebraska	619	Total	7,767

Figure 26: Number of PL-566 dams built in each state/territory

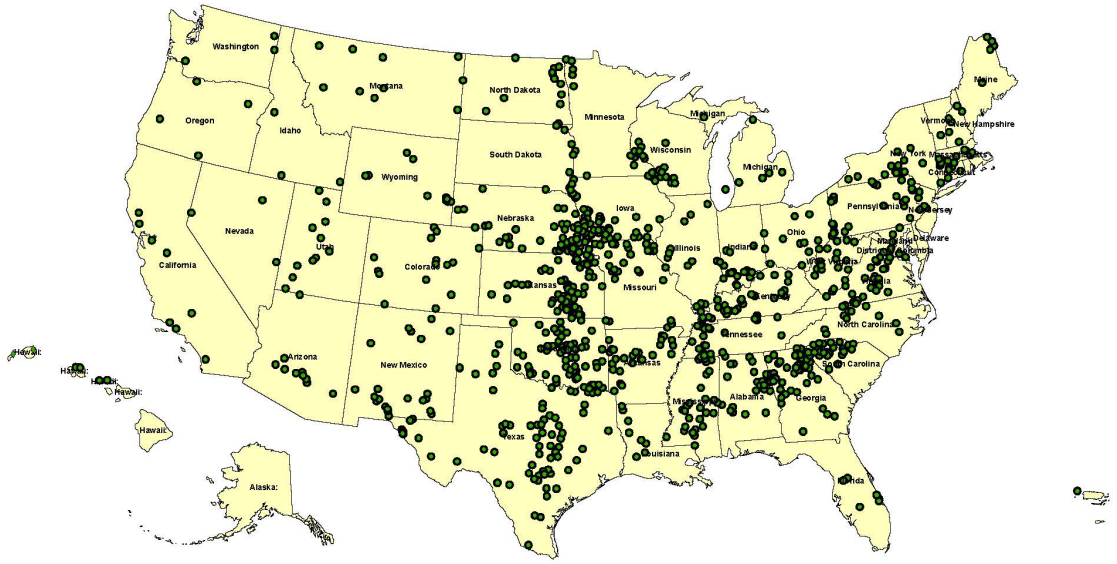


*Figure 27: Locations of 886 PL-566 Watershed Projects with 7,767 dams in 48 states/*territories *(Source: NRCS GeoObserver NID, July 21, 2019)*

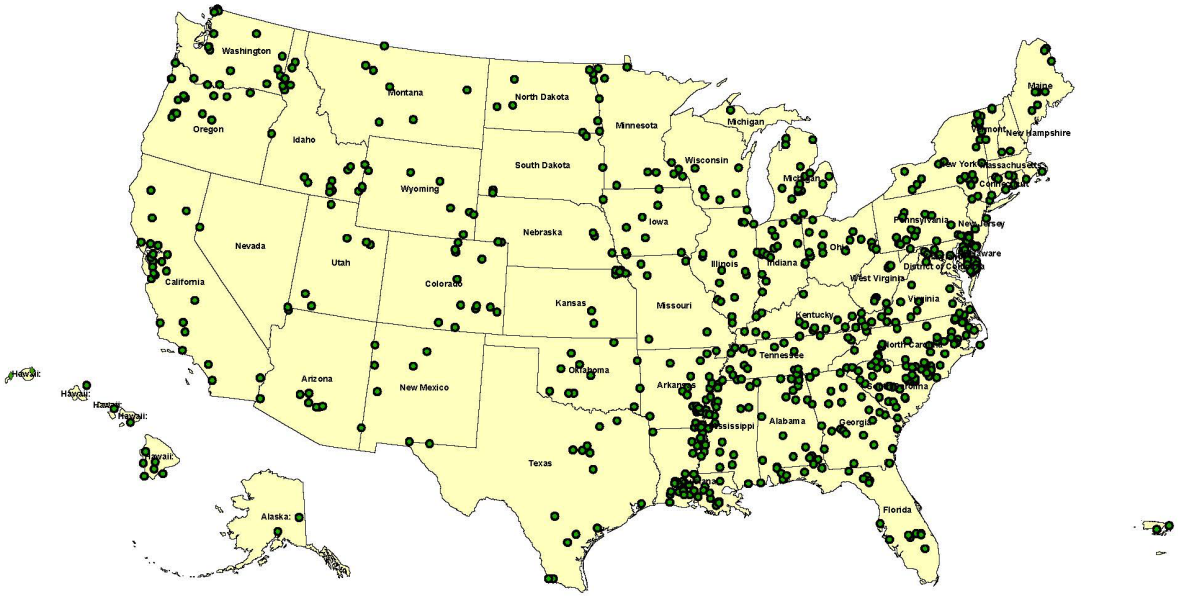


Figure 28: Locations of 724 PL-566 watershed projects in 53 states/territories without dams

According to the GeoObserver NID as of July 21, 2019, 7,767 dams were constructed in 886 projects in 47 states and 1 territory under the authority of the PL-566 Watershed Program. Figure 29 shows the number of PL-566 dams built each year. Construction of the first PL-534 dams were completed in 1956 (Glenwood Debris Basin in Utah). This dam was 64 years old in 2020. Most of the PL-566 dams were constructed from 1960 to 1980, with 365 dams constructed in 1965. Median year of all dams built was 1973 (47 years old in 2020). In 2015, the last PL-566 dam was built, Duck Creek Dam in Nebraska. See Figure 37 for median values of design features of PL-566 dams.

Less than half of the PL-566 dams (3,649; 47 percent) were planned with a 50-year evaluated service life, while 1,686 dams (22 percent) had a 100-year life. Of the remaining, 1,014 dams had a 51 to 99-year service life and 1,338 did not have a service life indicated in the GeoObserver NID). By 2019, 3,131 (40 percent) of the PL-566 dams were more than 50 years old.

As of July 2019, 1,581 (20 percent) of the PL-566 dams had been classified as high hazard and 85 dams had been rehabilitated.

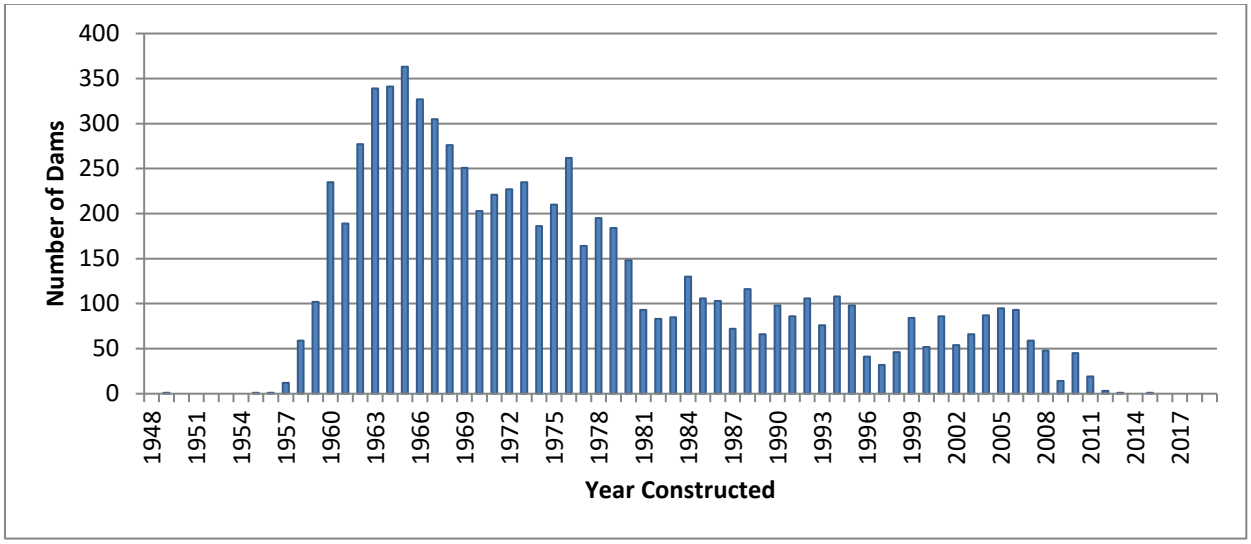


Figure 29: Number of PL-566 Watershed dams built each year

Resource Conservation and Development Program:
The Resource Conservation and Development (RC&D) Act was signed by President John Kennedy on September 27, 1962 under the authorities included in the Food and Agricultural Act of 1962; Public Law 87-703 (76 Stat. 605).

The purpose of the Act was to provide technical and financial assistance to RC&D Councils within multi-county areas authorized by the Secretary of Agriculture. NRCS assistance was authorized for the planning and installation of approved projects specified in RC&D area plans for land conservation, water quality, wildlife habitat, water management, recreation, community development, and environmental enhancement. When financial assistance was available, local or state agencies were required to provide land rights needed for the installation of all projects.

All federal funding for the RC&D Program was terminated in 2012.

According to GeoObserver NID as of July 21, 2019, 197 dams in 77 projects in 32 states had been constructed under the authority of the Resource Conservation and Development Program. These dams-controlled runoff from 384,000 acres. See Figures 30 and 31 for a summary of the number of RC&D dams constructed in each state.

State	No. of RC&D Dams	State	No. of RC&D Dams
Alabama	7	New Jersey	1
Arizona	2	New Mexico	2
Arkansas	3	New York	5
Colorado	3	North Carolina	2
Connecticut	1	North Dakota	1
Georgia	10	Oklahoma	7
Hawaii	1	Pennsylvania	9
Indiana	2	South Carolina	1
Iowa	35	South Dakota	21
Kansas	17	Tennessee	1
Kentucky	1	Texas	4
Massachusetts	1	Utah	2
Minnesota	6	West Virginia	4
Mississippi	5	Wisconsin	1
Missouri	25	Wyoming	1
Montana	3		
Nebraska	13	**Total**	**197**

Figure 30: Number of RC&D dams built in 32 states

Figure 31: Location of 77 RC&D projects with 197 dams in 32 states

According to the NRCS GeoObserver NID as of July 21, 2019, 197 dams were constructed in 77 projects in 32 states under the authority of RC&D. Figure 32 shows the number of RC&D dams built each year. Construction of the first RC&D dam was completed in 1966 (Lake Burlington 2 in North Carolina). This dam was 54 years old in 2020. Most of the RC&D dams were constructed from 1970 to 1985, with 17 dams constructed in 1980. Median year of all dams built was 1977 (43 years old in 2020). In 1993, the last RC&D dam was built, the McFee Road Structure in Nebraska. See Figure 37 for median values of design features of RC&D dams.

About one-third of the RC&D dams (69; 35 percent) were planned with a 50-year evaluated service life, while 36 dams (18 percent) had a 100-year life (of the remaining, 91 did not have a service life indicated in the GeoObserver NID). By 2019, 20 (10 percent) of the RC&D dams were more than 50 years old.

As of July 2019, 33 (17 percent) of the RC&D dams had been classified as high hazard and 7 dams had been rehabilitated.

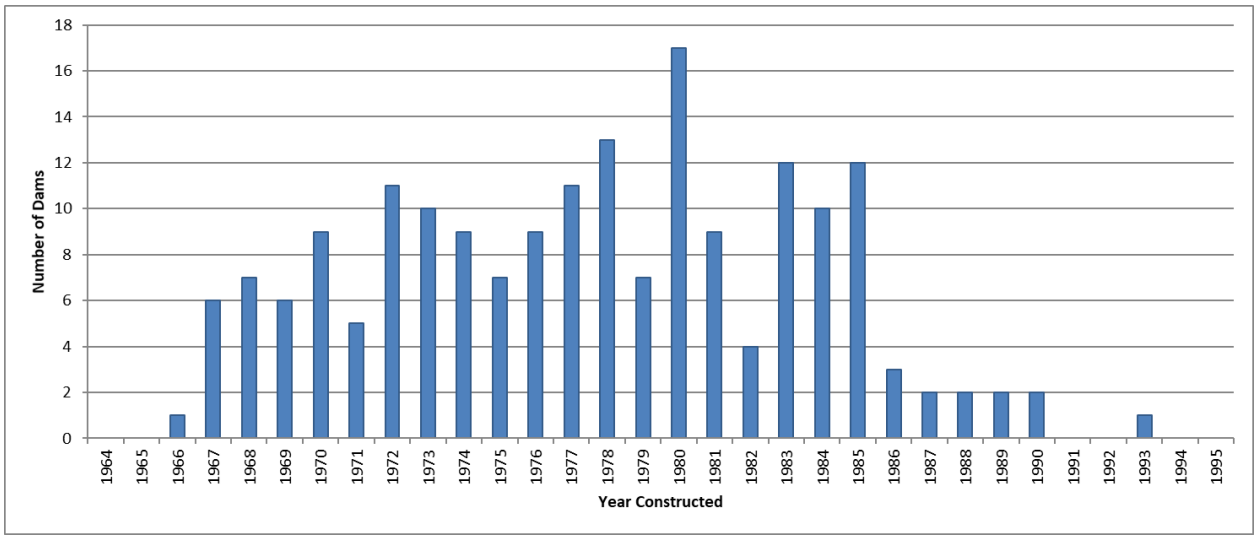


Figure 32: Number of RC&D dams built each year

All Watershed Programs:

A total of 2,109 watershed projects covering 145 million acres have been authorized under all four authorities of the Watershed Programs (PL-534, Pilot, RC&D, and PL-566). By 2019, 11,841 project dams have been constructed in 1,269 watershed projects in 47 states and one territory. Dams were not constructed in 840 watershed projects. These numbers do not include the 183 projects that were deauthorized. See Figures 39 and 40 for a summary of the number of projects and number of dams constructed in each program. Figure 41 provides a summary of the number of acres covered in each of the PL-534 and PL-566 watershed projects in each state.

The 840 authorized watershed projects that do not include dams are generally projects that involve land treatment, water quality protection, drainage, water management, or wildlife or wetland enhancements. Some of the projects that do not contain dams may have dams planned that are not yet constructed.

According to the GeoObserver NID as of July 21, 2019, 11,841 dams were constructed in 1,269 projects in 47 states and 1 territory under the authority of the four watershed programs. Figure 33 shows the number of all watershed dams built each year. Construction of the first watershed dam was completed in July 1948 (Cloud Creek 1 in Oklahoma). There were 8 other watershed dams built later in 1948. These dams were 72 years old in 2020. The majority of all watershed dams were constructed from 1955 to 1980, with 607 dams constructed in 1963. Median year of all dams built was 1969 (51 years old in 2020). In 2015, the last watershed dam was built, Duck Creek Dam in Nebraska. See Figure 37 for median values of design features of all watershed dams.

Almost two-thirds of all watershed dams (7,094; 60 percent) were planned with a 50-year evaluated service life, while 1,915 dams (16 percent) had a 100-year life. Of the remaining, 1,015 dams had a 51 to 99-year service life and 1,719 did not have a service life indicated in the GeoObserver NID). By 2019, 6,261 (53 percent) of the PL-566 dams were more than 50 years old. See figures 34 and 35 for the number of dams that will have exceeded their design lives for each of the next 10 years. Figure 36 shows how many dams will exceed 50 years old each year for the next ten years in each state.

As of July 2019, the current hazard classifications of the project dams include 2,196 high hazards (19 percent), 1,132 significant hazards (10 percent), and 8,513 low hazards (71 percent). Of the 2,196 project dams currently classified as high hazard, only 1,013 of them were originally designed as high hazard. See the “Hazard Classification” section of this report for more details on the evolution of NRCS hazard classification policies.

As of March 2020, 161 watershed dams had been rehabilitated.

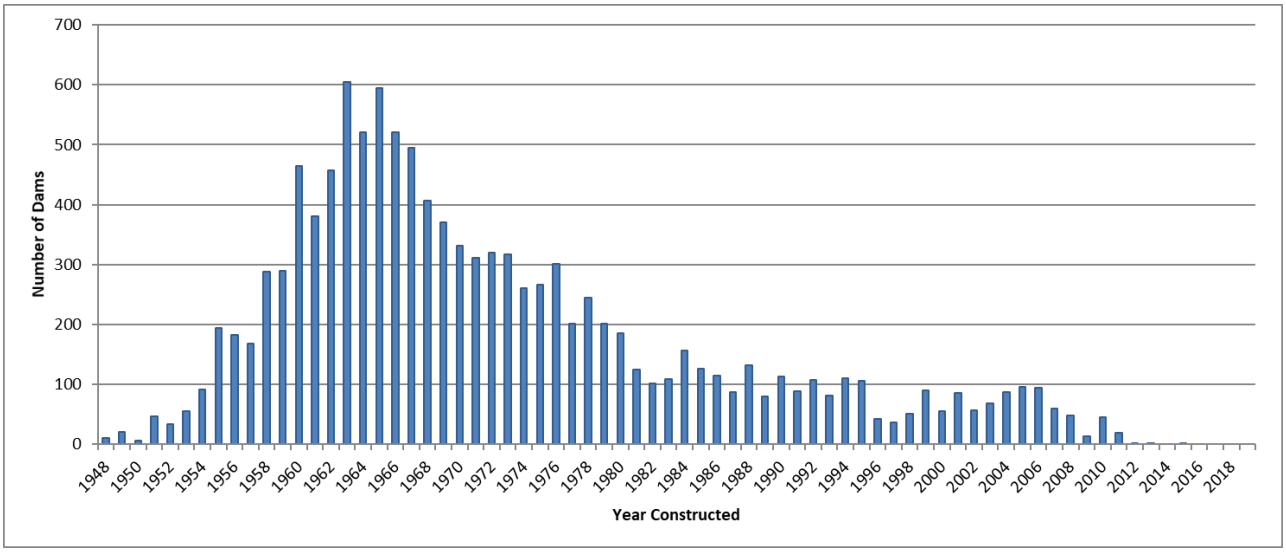


Figure 33: Number of watershed project dams built each year.

Year	No. of Dams Exceeding Service Life	% of 11,841 Project Dams
2019	5,716	48%
2020	6,004	51%
2021	6,241	53%
2022	6,482	55%
2023	6,722	57%
2024	6,912	58%
2025	7,087	60%
2026	7,311	62%
2027	7,439	63%
2028	7,597	64%
2029	7,716	65%
2030	7,829	66%

Figure 34: Number of watershed dams that will exceed their design service life each year (not including dams with 100-year service life or rehabilitated dams)

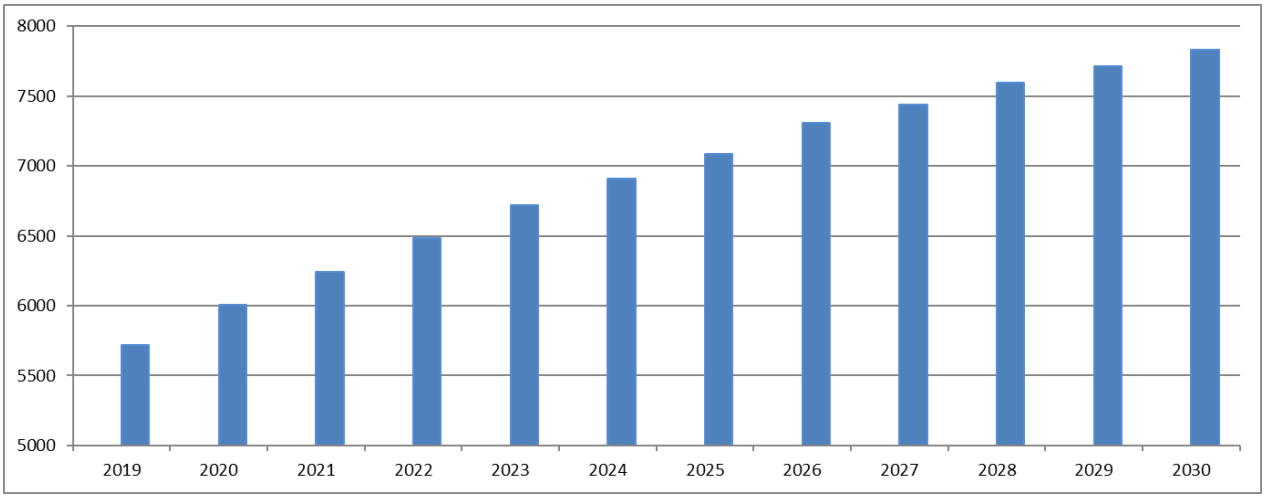


Figure 35: Bar chart of number of project dams that will exceed their 50-year design life each year

Number of Dams that Exceed 50 year Evaluated Service Life each year (not including dams with 100 year life or rehabilitated dams)

50 years old in...	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Year Built	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Alabama													3	3	5	2	6	4	4	2	7	2	1		1		1			1	1		
Arizona									1						2	1	1	1		2		1								2			
Arkansas							7	6	10	2		2	4		7	7	7	12	14	14	5	11	2	3	2	8	2	5	4	3	7	10	2
California									1					1	3	5							1					1			1		
Colorado							2	7	5	24	15	16	10	7	3	10	7	5							1								
Connecticut													3	1	2	1	4	1	2		4	1	1	2			2			2			
Florida												2			3						1	1	1						1				
Georgia						3	9	8	11	5	17	15	28	14	22	22	21	18	13	15	26	15	10	5	10	9	8	10	6	3	5	6	2
Hawaii																		1										1					
Idaho																			1					1									
Illinois							1	1	4		3	3	6	5	2		1		1	4	6	2	4	4	5	3	1	3	5	2	1		
Indiana												2	3	5	5	7	8	6	1	4	6	11	8	12	5	10	7	3	4	1	1		2
Iowa	3	6	1	11	9	17	15	38	21	11	27	17	30	36	32	56	39	48	52	65	45	32	35	42	44	41	41	22	48	11	42	41	30
Kansas							1	5	5	1	22	3	4	1	9	28	32	68	39	33	28	18	9	21	12	13	14	7	17	21	8	13	6
Kentucky								2	6	3	3	3	3	1	16	16	17	9	10	8	5	3	2	7	6			13	4	5	5	1	
Louisiana											3	11	3	2	2	3	2	1															
Maryland											1		1		3		3	2		1	2			1			1	1					
Massachusetts																															1		
Michigan														1	1	1	1	1	2	1							1						
Minnesota										1	6	1			1	3			1	6	2	1	1		1			1	1		1		
Mississippi									8	3	27	15	47	32	27	42	25	35	43	26	14	20	19	12	14	15	15	15	23				
Missouri							5		9	2	10	3	1	4	17	20	11	22	18	10	5	13	13	11	22	14	9	25	9	16	16	7	8
Montana															1	1			2				2				1		1	1			
Nebraska							8	14	20	12	10	21	11	8	9	25	20	39	44	18	33	32	29	18	28	29	23	5	38	12	29	14	26
Nevada													2	1	2																		
New Jersey												1	2	3	2		1					1			1								
New Mexico										4	4	6	7	5	15	4	3	3		1			1										
New York															1					1	2	1	2	1	1		1	2				1	
North Carolina							1	1	2	1	2		3	1	6	9	7	1	3	1	4	2	21		3	1			1				
North Dakota								2	1	4	1		1	3	3	1	2	2	3		2		2	2	1	4	3	1	1	1	1	2	1
Ohio								2	1				5	6		3	1		3	3	1	3	2	4	2	1	2	1	2	1		2	
Oklahoma	6	11	5	23	9	17	15	34	22	38	54	72	140	121	89	127	131	152	115	93	40	66	43	46	43	42	18	23	36	23	16	16	21
Oregon																				1		2	1					1					
Pennsylvania													5	1	1	1	1		1				6				2						
Puerto Rico																															1		
South Carolina							1	1	2	1			3	2	4	6	5	7	3	6	3	6	4	1	2	7	5	1	3	4	2	1	3
South Dakota								2					4	3	1	3			3	3	1	1	2	3	1	5		5	4		3		4
Tennessee											2	7	6	7	10	10	11	9	5	2	1	2			1		2						
Texas	1			10	14	18	20	57	42	43	57	69	119	81	106	137	113	77	81	64	64	34	53	38	26	31	28	25	14	11	14	3	7
Utah		2						3	1		3				1	2				2			4	1	3	2			6	1			
Virginia							1		1	4	3	4	3	1	7	3	2	9	4	8	1	1	2			2		1	1	1	1		1
Washington																								1	1					1			
West Virginia							2	4	4	2	8	5	6	4	7	8	5	10	7	10	8	5	7		5	3	2	3	1				
Wisconsin									2			4	3	7	9	11	5	5	2		3	2		1			1				1		
Wyoming											1	2			4		1		1		1	1										2	
Grand Total	10	19	6	44	32	55	88	187	179	161	279	284	466	367	439	575	493	548	478	400	314	290	288	237	241	240	190	175	224	128	158	119	113
Accumulative	**12**	**31**	**37**	**81**	**113**	**168**	**256**	**443**	**622**	**783**	**1,062**	**1,346**	**1,812**	**2,179**	**2,618**	**3,193**	**3,686**	**4,234**	**4,712**	**5,112**	**5,426**	**5,716**	**6,004**	**6,241**	**6,482**	**6,722**	**6,912**	**7,087**	**7,311**	**7,439**	**7,597**	**7,716**	**7,829**

Figure 36: Number of dams that will exceed their 50-year evaluated service life each year (does not include 1,150 dams with 100-year life built prior to 1980 and 161 rehabilitated dams)

The following is a summary of median values of various design features of all watershed dams that were constructed (Source: NRCS GeoObserver NID as of July 21, 2019):

Median Values of Dam Characteristics 11,841 Watershed Dams (source: GeoObserver NID July 21, 2019)					
	PL-534	Pilot	PL-566	RC&D	All Programs
Dam Height (ft)	33	29	32	30	32
Dam Length (ft)	1,000	680	790	560	848
Drainage Area (sq. miles)	1.4	1.0	1.5	0,9	1.4
Reservoir Surface Area (ac)	13	8	12	7	12
Volume of Earth Fill (cu. yds.)	57,422	30,050	47,869	28,908	50,211
Principal Spillway Conduit Diameter (ft)	2.0	2.0	2.0	2.0	2.0
No. of Dams with Corrugated Metal Pipe in Principal Spillway (% of Total)	603 (17%)	79 (18%)	1,472 (19%)	51 (26%)	2,205 (19%)
Spillway Width (ft)	86	80	60	50	68
Sediment Storage (ac ft)	78	43	69	35	70
Flood Storage (ac ft)	300	141	266	87	270
Maximum Storage (ac. ft.)	560	300	535	233	530

Figure 37: Median values of design features of watershed dams by program authority (Source: NRCS GeoObserver NID, July 21, 2019)

Definitions:

"Median" is the value of the data element where half of the dams are above that value and half are below.

"Dam Height" (ft.) is the height of the dam, defined as the vertical distance between the lowest point along the crest of the dam and the lowest point at the downstream toe which usually occurs in the natural bed of the stream or water course.

"Maximum Storage" (ac.-ft.) is the total storage space in a reservoir below the maximum attainable water surface elevation.

"Surface Area" (acres) is surface area of the impoundment at normal pool level to the crest of the lowest ungated outlet.

"Drainage Area" (square miles) is the area that drains toward the dam.

"Flood Storage (ac.-ft.) is the capacity of the reservoir between the elevation of the permanent pool and the crest of the auxiliary spillway.

	PL-534	Pilot	PL-566	RC&D	All Programs
Total Number of Dams Built	3,428	449	7,767	197	11,841
Year First Dam was Built (Age of Oldest Dam in 2019)	1948 (71)	1953 (66)	1956 (63)	1966 (53)	1948 (71)
Latest Year Dam Built (Age of Newest Dam in 2019)	2006 (13)	1969 (50)	2015 (4)	1993 (26)	2015 (4)
Median Year of All Dams Built (Median Age of Dams in 2019)	1964 (55)	1957 (62)	1973 (46)	1977 (41)	1969 (50)
Year that most Dams were Built (No. of Dams)	1963 (260)	1956 (93)	1965 (363)	1980 (17)	1965 595)
No. of Dams that are more than 50 years old in 2019 (% of Total)	2,661 (78%)	449 (100%)	3,131 (40%)	20 (10%)	6,261 (53%)
No. of Dams that will be more than 50 years old in 2024 (% of Total)	3,070 (90%)	449 (100%)	4,231 (54%)	67 (34%)	7,817 (66%)
No. of Dams with <50-year Service Life (% of Total) *	16 (0%)	1 (0%)	79 (1%)	2 (0%)	98 (1%)
No. of Dams with 50-year Service Life (% of Total) *	3,106 (91%)	270 (60%)	3,649 (47%)	69 (35%)	7,094 (60%)
No. of Dams with 51 to 99-year Service Life (% of Total) *	0 (0%)	1 (0%)	1,014 (13%)	0 (0%)	1,015 (9%)
No. of Dams with 100-year Service Life (% of Total) *	184 (5%)	9 (2%)	1,686 (22%)	36 (18%)	1,915 (16%)
No. of Dams with no Service Life shown in NID (% of Total) *	123 (4%)	167 (37%)	1,338 (17%)	91 (46%)	1,719 (14%)
No. of Dams with Current High Hazard Classification (% of Total)	478 (14%)	65 (14%)	1,581 (20%)	33 (17%)	2,196 (19%)
Total Controlled Drainage Area of All Dams (sq. mi.)	9,276	1,404	36,665	917	48,262
Total Reservoir Surface Area of All Dams (ac.)	79,085	6,759	226,576	7,723	320,143
No. of Dams Rehabilitated	46 (1.3%)	22 (4.9%)	85 (1.1%)	7 (3.6%)	160 (1.4%)

* Includes rehabilitated dams

Figure 38: Summaries of age, service life, high hazard, and rehabilitated dams (Source: GeoObserver NID, July 21, 2019)

State	Pilot Projects		RC&D Projects	PL-534 Projects			PL-566 Projects			All Projects (PL-534, PL-566, Pilot, RC&D)				
	Projects Orig. Auth.	Projects with Dams	Projects with Dams	Deauth. Projects	Projects without Dams	Projects with Dams	Deauth. Projects	Projects without Dams	Projects with Dams	Deauth. Projects	Projects without Dams	Projects with Dams	**No. of Auth. Projects**	**Projects Incl. Deauth.**
AK								4		0	4	0	4	4
AL			3				5	26	24	5	26	27	53	58
AR	1	1	3				11	31	27	11	31	31	62	73
AZ	1	1	2				2	11	11	2	11	14	25	27
CA	3	1			15		1	24	8	1	41	9	50	51
CO	1	1	3				1	10	16	1	10	20	30	31
CT			1					6	8	0	6	9	15	15
DE							1	9		1	9	0	9	10
FL							4	22	6	4	22	6	28	32
GA	1	1	2		1	14	7	24	43	7	25	60	85	92
GU								1		0	1	0	1	1
HI			1					10	4	0	10	5	15	15
IA	4	2	5		29	90		6	53	0	37	150	187	187
ID	1						1	18	3	1	19	3	22	23
IL	3	2					9	18	12	9	19	14	33	42
IN	1		2				7	18	17	7	19	19	38	45
KS	6	4	6				1	7	57	1	9	67	76	77
KY	4	3	1				3	15	29	3	16	33	49	52
LA							3	42	9	3	42	9	51	54
MA			1				3	3	10	3	3	11	14	17
MD								18	6	0	18	6	24	24
ME							4	11	6	4	11	6	17	21
MI							5	19	6	5	19	6	25	30
MN	2	2	6				1	11	12	1	11	20	31	32
MO	2	2	2					7	33	0	7	37	44	44
MP								1		0	1	0	1	1
MS			2	25	36	43	12	26	29	37	62	74	136	173
MT	1		2				5	8	10	5	9	12	21	26
NC	1	1	1				9	50	12	9	50	14	64	73
ND	1	1	1				2	9	12	2	9	14	23	25
NE	5	5	2				1	7	48	1	7	55	62	63
NH	1						1	1	6	1	2	6	8	9
NJ	1		1					11	4	0	12	5	17	17
NM	2	2	2				2	7	24	2	7	28	35	37
NV							2	2	3	2	2	3	5	7
NY	4	1	2		3			19	14	0	25	17	42	42
OH	2	1					4	16	10	4	17	11	28	32
OK	1	1	4			55	7	9	61	7	9	121	130	137
OR							5	15	4	5	15	4	19	24
PA	1		5				3	15	23	3	16	28	44	47
PR							1	2	1	1	2	1	3	4
RI								1		0	1	0	1	1
SC	1	1	1				3	32	26	3	32	28	60	63
SD	1	1	4				6	5	9	6	5	14	19	25
TN	2	2	1				2	23	24	2	23	27	50	52
TX	4	4	3		6	45	9	14	76	9	20	128	148	157
UT	2	2	2					6	11	0	6	15	21	21
VA	1	1			5	6	2	18	28	2	23	35	58	60
VT							1	10	1	1	10	1	11	12
WA	1						4	17	3	4	18	3	21	25
WI	1	2	1				3	7	19	3	6	22	28	31
WV	1	1	4		3	7	3	10	20	3	13	32	45	48
WY			1					12	8	0	12	9	21	21
Totals	64	46	77	25	98	260	156	724	886	181	840	1,269	2,109	2,290
No. States	33	26	32	1	8	7	40	53	48	53	53	53	53	53

Figure 39: Number of watershed projects (all authorities) in each state

Program	No. States/ Territories	No. of Watershed Projects			Total Project Area (ac.)
		Without Dams	With Dams	Total *	
PL-534	8	98	260	358	26,017,464
PL-566	53	724	886	1,610	115,834,650
Pilot	33	18	46	64	2,901,165
RC&D	32		77	77	410,000
Total	53	840	1,269	2,109	145,163,279

*Does not include 25 PL-534 projects or 158 PL-566 projects in 40 states that were deauthorized

Program	No. of Dams	Year 1st Dam was Built	Median Year Dams were Built	No. of Dams that were more than 50 years old in 2019
PL-534	3,428	1948	1964	2,661
PL-566	7,767	1956	1973	3,131
Pilot	449	1953	1957	449
RC&D	197	1966	1977	20
Total	11,841	1948	1969	6,261

Figure 40: Summary of all watershed authorities

State	PL-566	PL-534	Total
AK	117,010		117,010
AL	3,058,196		3,058,196
AR	3,477,549		3,477,549
AZ	1,633,227		1,633,227
CA	2,161,093	119,585	2,280,678
CO	1,665,416		1,665,416
CT	321,836		321,836
DE	873,920		873,920
FL	2,133,758		2,133,758
GA	4,969,214	1,174,650	6,143,864
HI	694,542		694,542
IA	2,191,613	1,033,578	3,225,191
ID	1,059,987		1,059,987
IL	1,690,594		1,690,594
IN	2,032,413		2,032,413
KS	6,250,803		6,250,803
KY	2,343,169		2,343,169
LA	5,981,142		5,981,142
MA	791,976		791,976
MD	680,925		680,925
ME	1,079,286		1,079,286
MI	1,730,601		1,730,601
MN	2,323,877		2,323,877
MO	2,884,163		2,884,163
MS	4,368,477	4,193,880	8,562,357
MT	3,353,731		3,353,731
NC	3,707,545		3,707,545
ND	2,445,641		2,445,641
NE	3,627,344		3,627,344
NH	502,430		502,430
NJ	389,347		389,347
NM	2,342,630		2,342,630
NV	220,804		220,804
NY	1,959,010	279,680	2,238,690
OH	2,913,860		2,913,860
OK	7,761,473	4,676,222	12,437,695
OR	767,456		767,456
PA	1,921,877		1,921,877
PB	4,295		4,295
PR	174,828		174,828
RI	24,100		24,100
SC	3,544,500		3,544,500
SD	1,376,634		1,376,634
TN	3,054,007		3,054,007
TX	9,357,367	11,162,830	20,520,197
UT	1,648,187		1,648,187
VA	2,774,245	603,272	3,377,517
VT	970,927		970,927
WA	811,130		811,130
WI	1,329,141		1,329,141
WV	1,382,304		1,382,304
WY	955,050	2,773,767	3,728,817
Totals	115,834,650	26,017,464	141,852,114

Figure 41: Area covered by PL-534 & PL-566 watershed projects by state and program

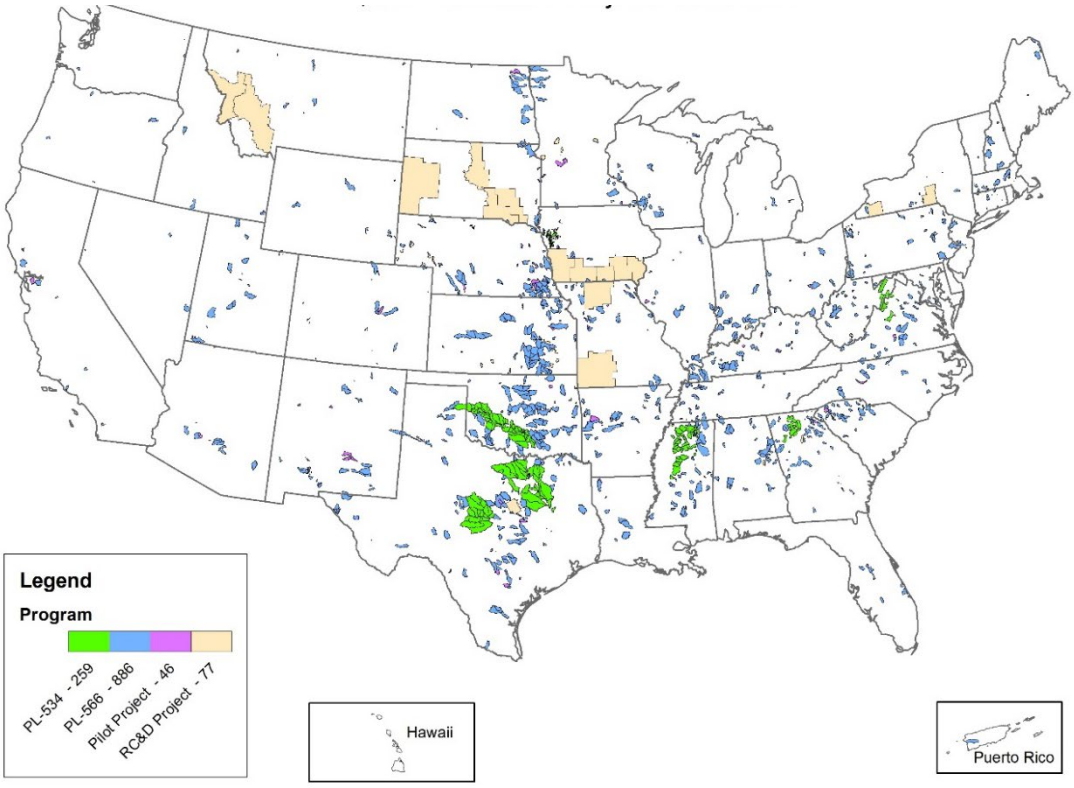


Figure 42: Map showing the locations of 1,269 watershed projects that contain 11,841 watershed dams in 47 states

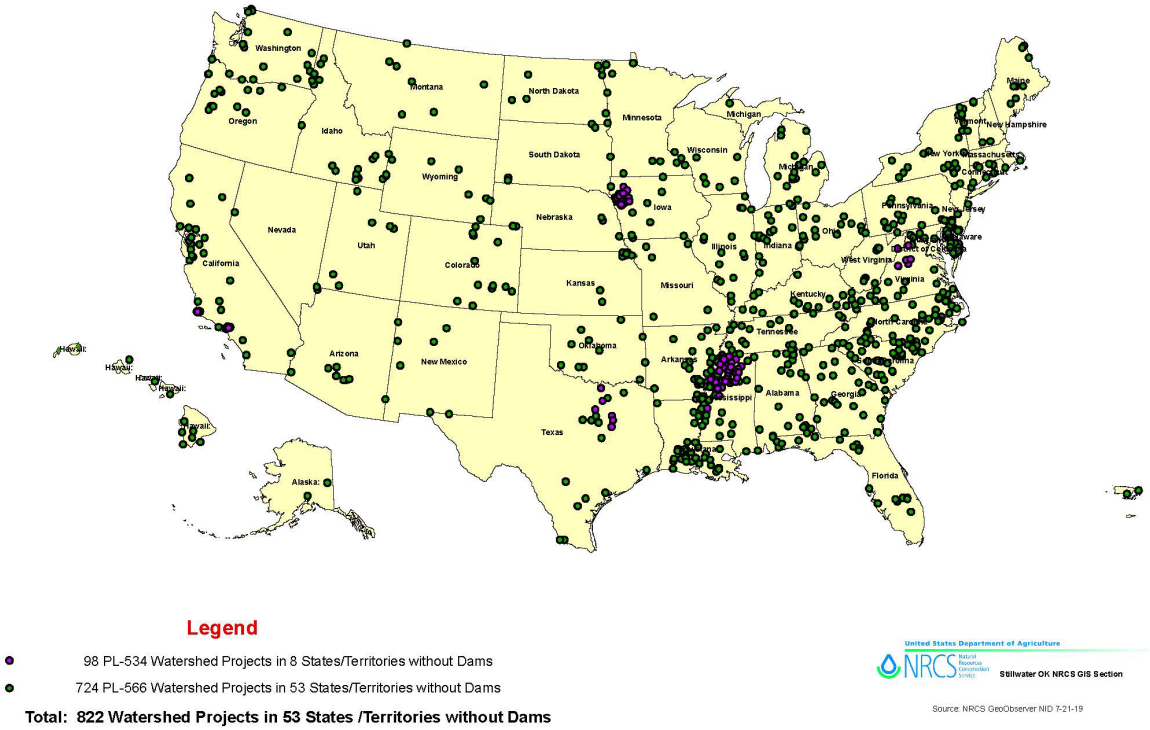


Figure 43: Location of 822 PL-534 and PL-566 watersheds in 53 states/territories without dams

A total of 2,109 watershed projects have been authorized by the following programs in 50 states and 3 territories:

- PL-534: 358 projects in 8 states
- PL-566: 1,610 projects in 50 states and 3 territories (does not include new watershed plans authorized since 2015)
- Pilot Program: 64 projects in 33 states
- RC&D: 77 projects in 32 states

Note: the above does not include 183 deauthorized projects (25 PL-534;158 PL-566). See Figure 44 for general locations of deauthorized watershed projects.

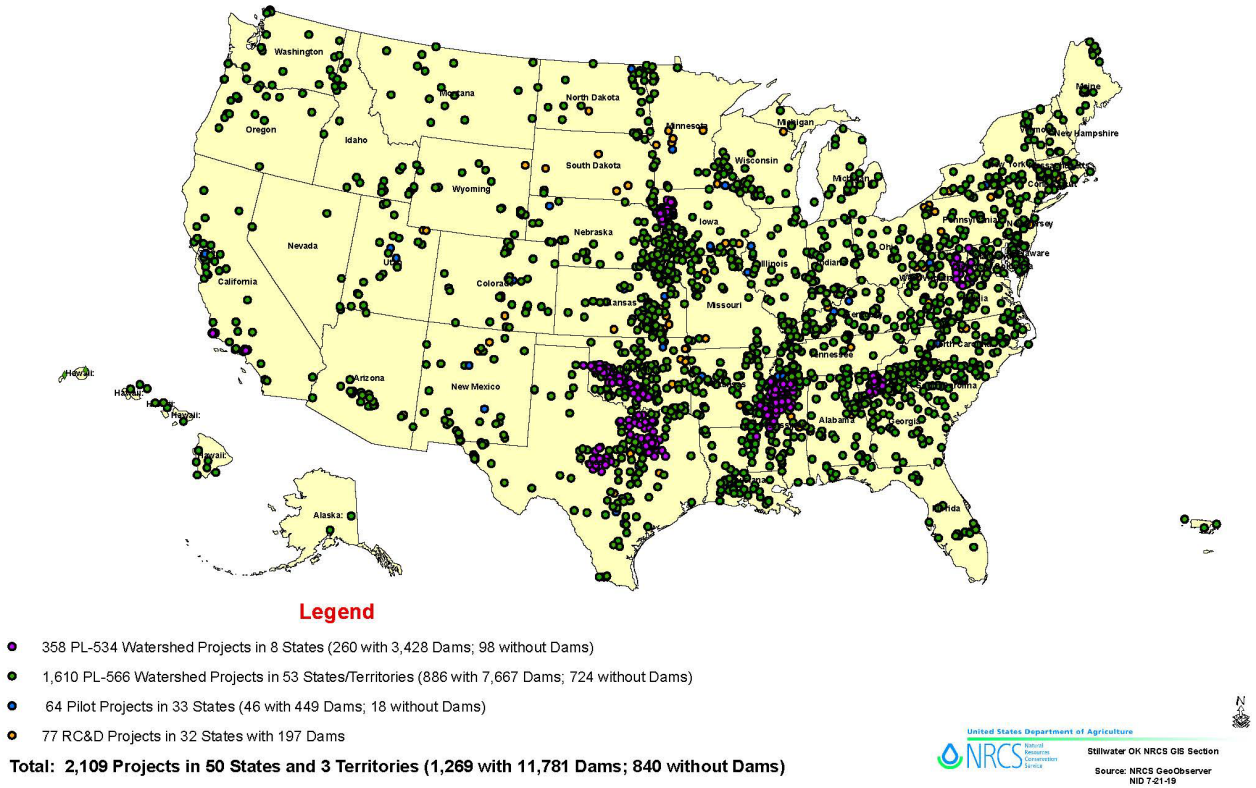


Figure 44: Location of 2,109 authorized watershed projects (with and without dams)

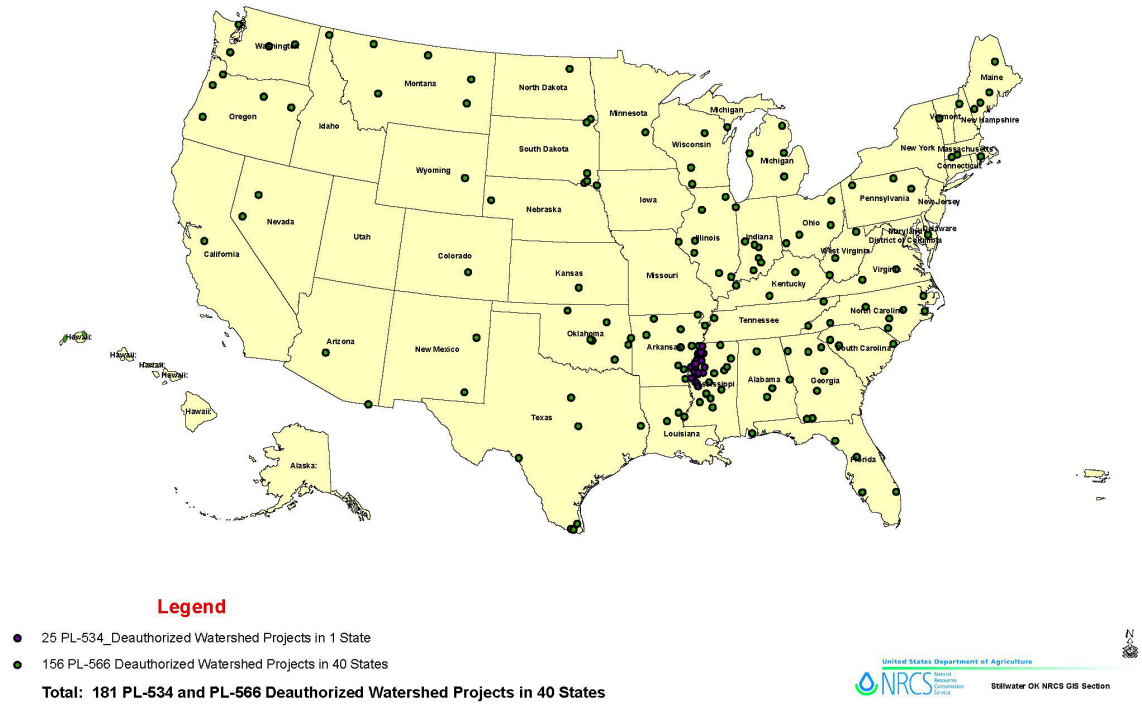


Figure 45: Location of 183 deauthorized PL-534 and PL-566 watershed projects

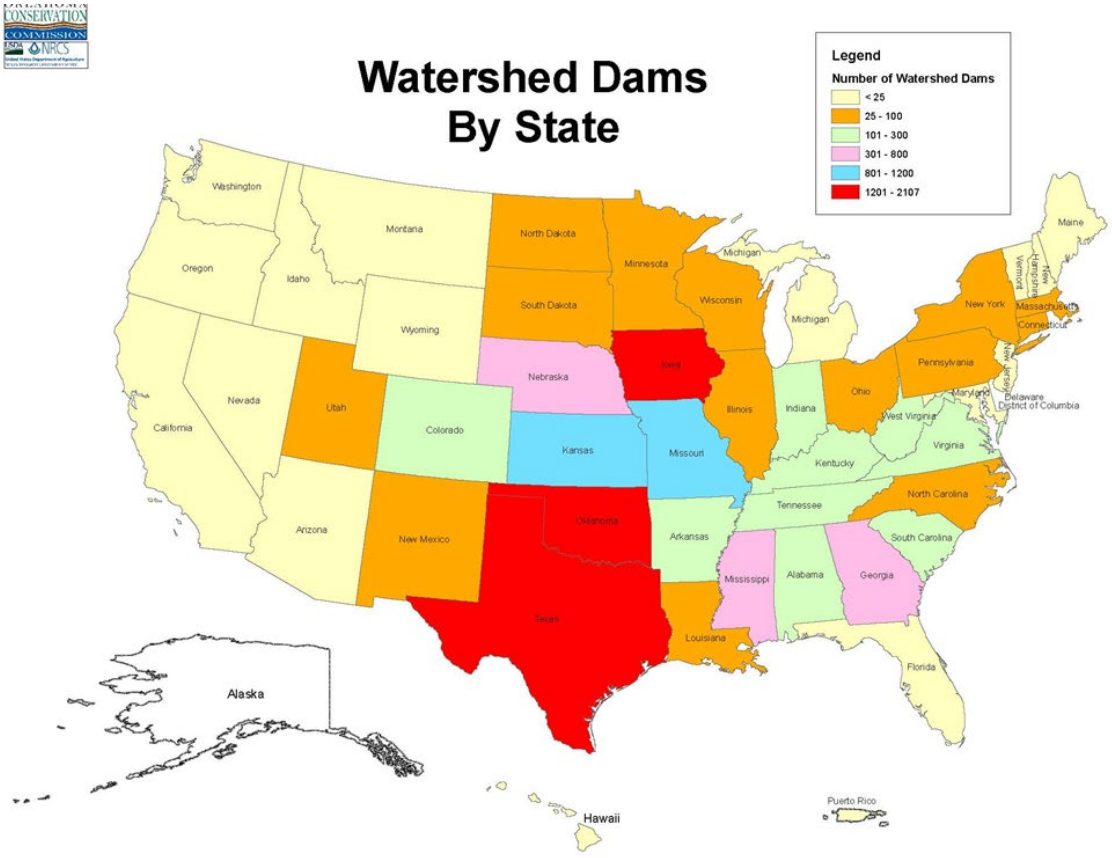


Figure 46: Number of watershed dams by state

State	Watershed Program Authorities				State Totals
	PL-566	PL-534	Pilot	RC&D	
Alabama	100	0	0	7	107
Arizona	21	0	2	2	25
Arkansas	181	0	24	3	208
California	15	0	1	0	16
Colorado	87	0	55	3	145
Connecticut	29	0	0	1	30
Florida	10	0	0	0	10
Georgia	218	117	12	10	357
Hawaii	8	0	0	1	9
Idaho	3	0	0	0	3
Illinois	55	0	11	0	66
Indiana	132	0	0	2	134
Iowa	1,066	485	29	35	1,615
Kansas	799	0	14	17	830
Kentucky	182	0	17	1	200
Louisiana	35	0	0	0	35
Maine	16	0	0	0	16
Maryland	16	0	0	0	16
Massachusetts	30	0	0	1	31
Michigan	13	0	0	0	13
Minnesota	37	0	8	6	51
Mississippi	189	367	0	5	561
Missouri	1,148	0	30	25	1,203
Montana	16	0	0	3	19
Nebraska	619	0	106	13	738
Nevada	8	0	0	0	8
New Hampshire	24	0	0	0	24
New Jersey	19	0	0	1	20
New Mexico	75	0	2	2	79
New York	52	0	2	5	59
North Carolina	101	0	11	2	114
North Dakota	39	0	10	1	50
Ohio	48	0	16	0	64
Oklahoma	987	1,107	6	7	2,107
Oregon	6	0	0	0	6
Pennsylvania	82	0	0	9	91
Puerto Rico	2	0	0	0	2
South Carolina	97	0	7	1	105
South Dakota	33	0	2	21	56
Tennessee	133	0	9	1	143
Texas	697	1,242	60	4	2,003
Utah	40	0	3	2	45
Vermont	4	0	0	0	4
Virginia	118	29	3	0	150
Washington	3	0	0	0	3
West Virginia	77	81	7	4	169
Wisconsin	85	0	2	1	88
Wyoming	12	0	0	1	13
Totals	**7,767**	**3,428**	**449**	**197**	**11,841**

Figure 47: Number of project dams by state for each Watershed Program authority. (Source: NRCS GeoObserver NID, export March 2020)

See Figure 48 for a map showing the location of watershed dams with respect to the 100-year frequency, 24-duration precipitation events. Note that the majority of the watershed dams are in the higher precipitation areas.

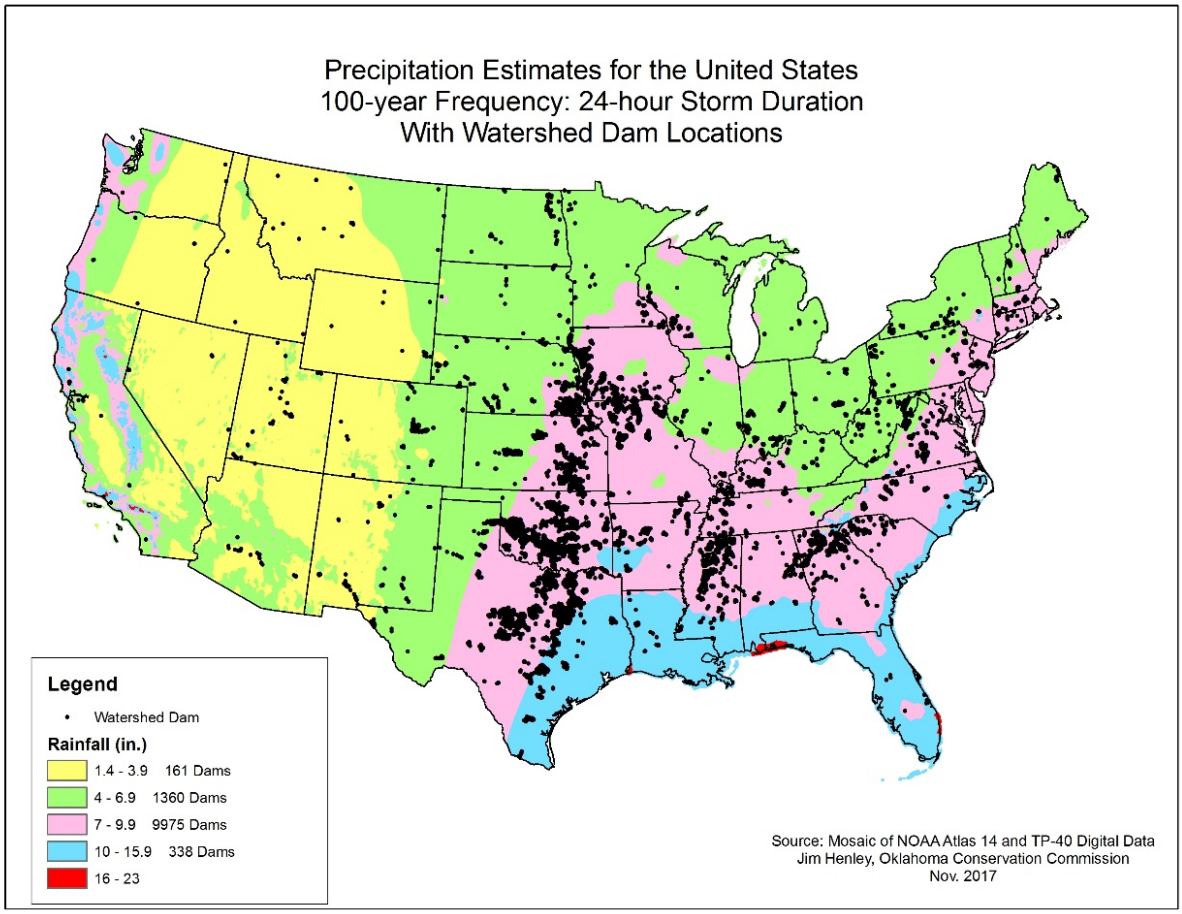


Figure 48: Location of watershed dams in relation to the average annual 100-year frequency 24-hour duration precipitation

Congressional Districts with Watershed Dams:
Watershed dams are in 2018 congressional districts. The majority of the dams are in the mid-west and southern plains. Half of the watershed dams are in 10 congressional districts in the following 6 states: IA (2), KS (1), MO (1), NE (1), OK (2), TX (2). Figure 48 provides a summary of the number of watershed dams in 25 congressional districts that have the most watershed dams. Figure 49 shows the numbers of watershed dams in congressional districts.

State Name	Cong Dist	No. of W'shed Dams	No. High Hazard Dams
Oklahoma	03	1041	96
Missouri	06	927	9
Iowa	04	798	17
Oklahoma	04	665	65
Iowa	03	513	7
Nebraska	03	462	18
Texas	13	386	21
Texas	11	359	26
Kansas	04	326	42
Oklahoma	02	317	54
Kansas	02	294	53
Iowa	02	279	2
Texas	04	267	46

State Name	Cong Dist	No. of W'shed Dams	No. High Hazard Dams
Nebraska	01	256	24
Mississippi	02	250	21
Mississippi	01	232	36
Kansas	01	210	29
North Dakota	00	192	9
Texas	06	182	20
Georgia	09	154	82
Texas	25	151	29
Kentucky	01	131	20
Texas	05	116	14
Missouri	05	105	0
Missouri	04	97	2

Figure 48: 25 congressional districts that have the most watershed dams. Three out of four watershed dams are located in these congressional districts. (Source: NRCS GeoObserver NID export, July 21, 2019)

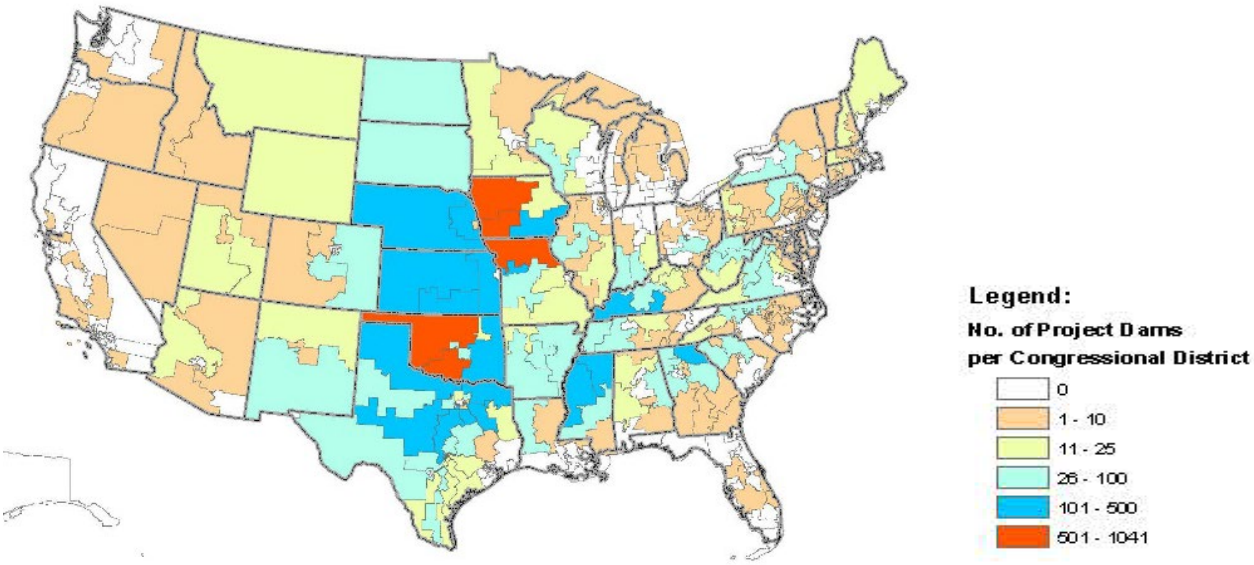


Figure 49: Number of watershed dams in 218 congressional districts (Source: NRCS GeoObserver NID export July 21, 2019)

Watershed Projects within the Mississippi River Basin:

There are 1,252,684 square miles in 31 states in the Mississippi River Basin. There are 1,160 watershed projects within the river basin; 805 of those projects include 8,484 dams (more than 70 percent of the national total). Figure 50 shows the location of the dams within the seven sub basins within the Mississippi River Basin.

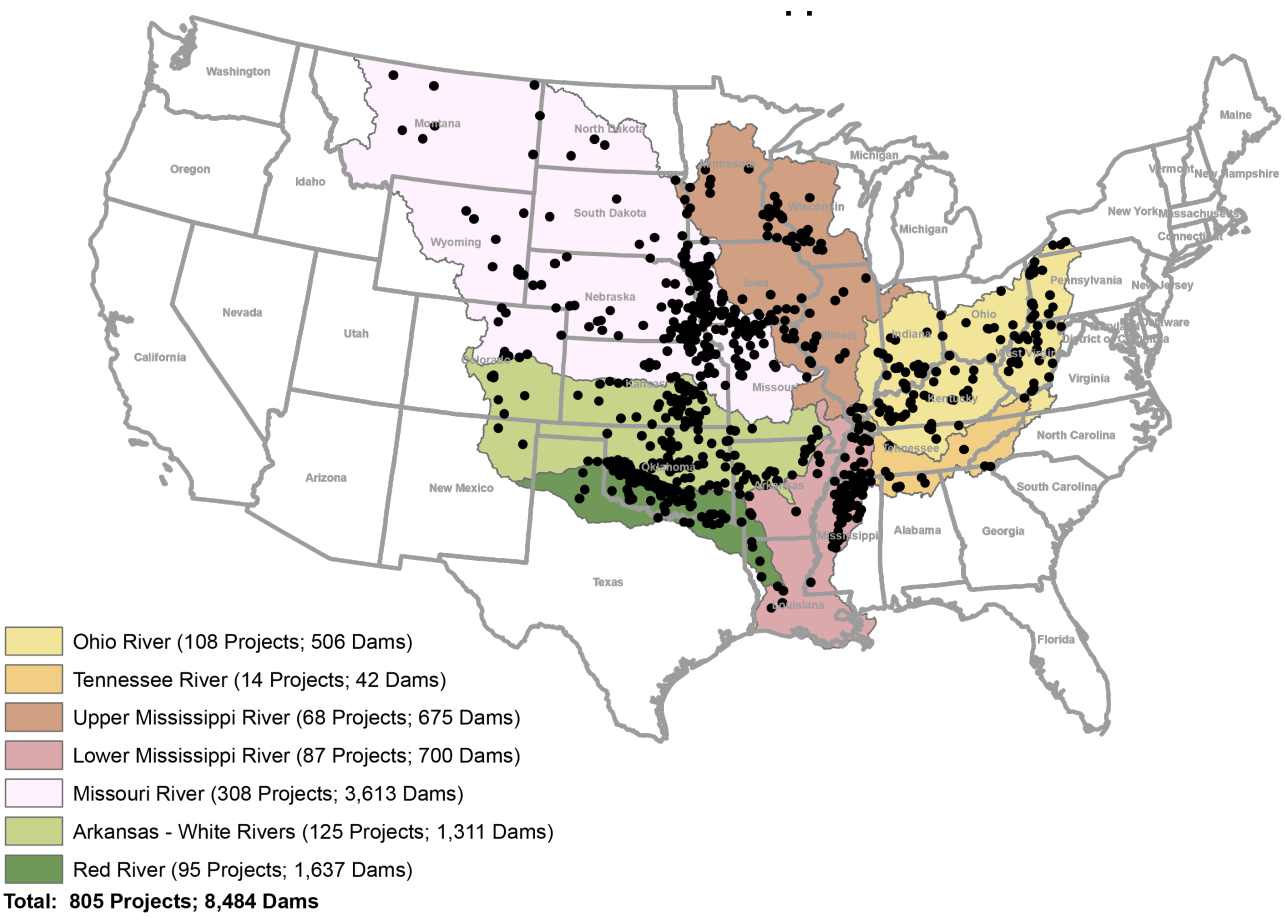


Figure 50: Watershed dams within the Mississippi River Basin

These watershed projects provide not only sediment and flood storage that has significant benefits to many communities in mid-America, but also provides many other benefits such as municipal and industrial water supply, recreation, wetland, and wildlife habitat, etc.

Figures 51 and 52 provide a summary of the watershed projects and dams within them by sub basin. The watershed dams store more than a million ac.-ft. of sediment and provide almost four million ac.-ft. of flood water retention. This has a significant impact on the areas downstream from the states and sub-basins where they are located. Almost half of the watershed dams were more than 50 years old in 2018.

Mississippi River Basin Totals

	River Basins							Mississippi River Basin Totals
	Ark - White	Lower Miss.	Missouri	Ohio	Red	Tennessee	Upper Miss	
River Basin Drainage Area (Sq. Mi.)	180,694	100,319	510,912	162,850	67,238	40,875	189,797	1,252,684
No of states	7	7	11	12	5	7	7	31
State Names	AR, CO, KS, MO NM OK, TX	AR, IL, KY, LA, MS, MO, TN	CO, IL, IA, KS, MN, MO, MT, NE, ND, SD, WY	IL, IN, KY, MD, MO, NY, NC, OH, PA, TN, VA, WV	AR, LA, NM,OK, TX	AL, GA, KY, MS, NC, TN, VA	IL, IN, IA, MN, MO, SD, WI	
No. of Watershed Projects	125	87	308	108	95	14	68	805
No of Projects without Dams	21	127	75	66	7	25	34	355
Total Number of Projects	146	214	383	174	102	39	102	1,160
No. of Watershed Dams	1,311	700	3,613	506	1,637	42	675	8,484
Year Oldest Dam Built	1954	1954	1948	1954	1948	1960	1954	1948
Median Age of Dams (Year Built)	1968	1966	1975	1969	1965	1968	1986	1969
No. of Dams > 50 years old in 2018	657	435	1,223	240	1,100	23	161	3,841
Total Controlled Drainage Area (Sq. Mi.)	7,249	1,762	5,887	2,422	5,090	144	1,982	24,536
Total Sediment Storage (Ac.-Ft.)	232,417	101,762	290,656	90,828	244,571	4,875	61,068	1,026,177
Total Normal Storage (Ac.-Ft.)	418,194	174,027	402,358	239,566	409,604	5,926	107,339	1,757,014
Total Flood Storage (Ac.-Ft.)	1,300,850	405,971	733,145	322,000	979,551	33,080	165,669	3,940,266
Total Reservoir Surface Area (Ac.)	45,764	28,030	45,427	17,670	44,401	576	13,152	195,020

Figure 52: Summary of characteristics of watershed dams in the Mississippi River Basin

Watershed Rehabilitation

During the 1990's, when many of the older watershed dams were approaching the end of their planned service life, many project sponsors were becoming concerned about future performance of the dams and their potential liability if the dams should fail. In 1992, Thomas Wehri, SCS Watershed Project Division, Washington, D.C., presented a technical paper at the annual conference of the American Society of Agricultural Engineers. The paper was a summary of the status of the condition of dams installed by the Watershed Programs and the needs of aging dams.

One of the first public discussions of this emerging issue was at a conference hosted by the National Watershed Coalition in Oklahoma City, Oklahoma, in 1996. The 300 people in attendance identified the need for assistance with rehabilitation of these aging dams as one of their highest priorities. On July 3, 1998, this issue gained national prominence during a public commemoration of the first watershed dam in the nation reaching the end of its 50-year service life. The dam was Cloud Creek Watershed dam no. 1 near Cordell, Oklahoma. Oklahoma Governor Frank Keating, NRCS Chief Pearlie Reed, and Oklahoma Congressman Frank Lucas, Oklahoma's 3rd Congressional District representative, participated in the event, which was attended by about 1,000 people. Congressman Lucas hosted a field hearing of the House Agricultural Subcommittee on the need for rehabilitation of the aging watershed dams.

During the fall of 1998, Congressman Wes Watkins, a long-time strong supporter of the USDA Watershed Program in Oklahoma's 5th District, worked with Congressman Frank Lucas to introduce HR 4409, which would authorize federal assistance to watershed project sponsors to rehabilitate their aging dams. Only one hearing was held before the end of the 105th Congress.

In 1999, Congressman Lucas prepared and introduced HR-728 in the new 106th Congress. A couple of months later, Senator Paul Coverdell of Georgia introduced the companion bill (S-1762) in the Senate. Senator Coverdell provided leadership in the Senate until his untimely death when Senators Richard Lugar of Indiana and Blanche Lincoln of Arkansas took over the leadership of this bill in the Senate. During the next two years, several congressional hearings and briefings were held. Several national organizations, including the National Watershed Coalition, the Association of State Dam Safety Officials (ASDSO), the Portland Cement Association, and the American Society of Civil Engineers, came together to support this proposed legislation that would become the first federal assistance for rehabilitation of non-federal dams. A closely coordinated effort resulted in obtaining 63 co-sponsors of the legislation in the House and 20 in the Senate. Pearlie Reed, Chief of the NRCS at the time, provided strong leadership for the agency during the deliberations of this legislation.

It became apparent through efforts to educate the elected officials that the situation needed to be personalized. Most elected officials were primarily concerned only with the issues involved in their particular state or district. In 1998, "Aging Watershed Projects: A Growing National Concern" was published in the Soil and Water Conservation Society's Conservation Voices magazine (Buckley, et al., 1998). The article described the nationwide dilemma concerning aging dams that was developing across the country. Reprints of this article were distributed to many partners and elected officials. During the next few years, several papers and presentations were prepared for partners interested in rehabilitating aging watershed dams (see papers by Larry Caldwell (1998, 2000, and 2004) as examples). Additionally, from 1998 to 2001, a team of NRCS and watershed partners

developed a series of case studies and fact sheets describing specific watershed projects, their benefits, and consequences if no action were taken in order to educate the public and legislative officials.

These fact sheets included the following:

- "Reinvesting in America's Watersheds" (USDA-NRCS, 1998): four-page national summary and 21 case studies of specific watersheds in 14 states.
- "Dams in Danger, People at Risk" (USDA-NRCS, 1999): fact sheets of 20 assessments of rehabilitation needs and a case study of a specific watershed project in each state.
- "Keeping Dams Safe" (USDA-NRCS, 2001): fact sheets of 11 case studies of specific watersheds in 5 states.
- Rapid survey of rehabilitation needs in 22 states concluded that 2,200 watershed dams had rehabilitation needs estimated at $543 million.

During the congressional deliberations, some organizations, such as American Rivers, expressed concerns for portions of the proposed program. One of the issues that emerged was in support of considering the removal of dams as a possible alternative. On October 24, 2000, late in the congressional deliberations, a colloquy occurred on the Senate floor between Senator Tom Harkin of Iowa and Senator Richard Lugar of Indiana to assure that decommissioning would be considered during the planning of all rehabilitation projects. Although rare, they may be viable reasons for removing a dam, especially if site features of a specific dam may prevent a safe structure from being assured.

While the congressional deliberations of the rehabilitation legislation were proceeding in 1999, special funding was provided by NRCS for the Oklahoma pilot rehabilitation project, Sergeant Major Creek Watershed which was completed with a public dedication ceremony on April 14, 2000.

In 2000 and 2001, a total of $16 million of Emergency Watershed Protection (EWP) funds was appropriated for pilot rehabilitation projects in Ohio, New Mexico, Wisconsin, and Missouri. Thirty-two dams in 20 watershed projects were rehabilitated in these four states between 2000 and 2004.

In October 2000, the watershed rehabilitation amendments were added to HR 4788 "the Grain Standards Act" section 313 as a vehicle to get them on the floor of Congress for debate. The amendments passed both the House and the Senate and on November 9, 2000, the legislation was signed by President Bill Clinton, making it Public Law 106-472. See Appendix 8 for the text of the Rehabilitation amendments 9Section 12) to PL-83-566.

The Legislation provided authorization to the USDA to assist watershed project sponsors with technical and financial assistance to plan, design, and rehabilitate aging watershed dams. The authorization provided federal assistance for rehabilitation of dams that were originally constructed with assistance from the PL-534, PL-566, Pilot, and RC&D programs.

The legislation required the Secretary of Agriculture to develop a priority ranking system to identify the projects with the greatest need for funding. The U.S. Bureau of Reclamation's (USBR) "Risked Based Profiling System" was selected as the basis for this ranking system. In August 2000, a special task force of NRCS national specialists was established to work with the USBR to adapt their process for the ranking of the NRCS-assisted dams. In May 2001, the resulting proposal from this effort was tested on 23 dams from the pilot rehabilitation projects. The final procedures were

included in the NRCS Rehabilitation policy that was issued in November 2001. The notice of availability was published in the Federal register in December 2001.

The rehabilitation amendment authorized federal funds for 65 percent of the total rehabilitation project cost (but not to exceed 100 percent of the actual construction cost). The total rehabilitation project cost includes land acquisition, easements, construction, and non-federal technical assistance and project administration. The cost of technical assistance provided by the NRCS is not considered as part of the total rehabilitation project cost. The sponsoring local organizations is responsible for the cost of all water, mineral, and other resource rights, and cost of permits that are not part of the total rehabilitation project cost.

The first funding for the newly authorized Watershed Rehabilitation program was included in the FY 2002 Appropriation Act. About half of the $10 million appropriated was allocated to 37 states for the primary purpose of conducting assessments of aging watershed dams to help identify high priority rehabilitation projects. The remainder was allocated to initiate planning, design, and construction of rehabilitation projects in Oklahoma, Texas, Tennessee, and Georgia.

Each appropriation act since 2002 directed that the funds be used for the dams that have the greatest need for protecting people's lives. Thus, funding has not been provided for rehabilitation of low-hazard dams unless they were in series with a downstream dam that acted as a hydrologic unit so that both needed to be rehabilitated at the same time.

NRCS policy directed that all rehabilitation plans be reviewed by the NRCS National Water Management Center (NWMC) in Little Rock, Arkansas. This staff provided the leadership to address the unique challenges with planning rehabilitation of dams that were originally planned and constructed prior to many of the environmental and other requirements that exist today. The rehabilitation planning process had to comply with many requirements such as:

- Public Law 91-190, the National Environmental Policy Act of 1969 (NEPA)
- Public Law 89-665, the National Historic Preservation Act of 1966
- Public Law 93-205, the Endangered Species Act of 1973
- Executive Order 11747, Economic and Environmental Principals and Guidelines for Water and Related Land Resources Implementation Studies of 1983 (U.S. Water Resources Council, 1983)

By April 2020, 366 rehabilitation projects in 36 states had been funded; 113 dams were in planning in 28 states; 92 dams in 18 states had plans authorized and were in design or construction; and 161 dams in 23 states had been rehabilitated. Figures 53 and 54 show the status of rehabilitation projects in each of 36 states. See Appendix 5 for a complete listing of funded rehabilitation projects and their status as of April 15, 2020.

In 2020, Doug McKalip, former NRCS Legislative Director, and Larry Caldwell, former NRCS Rehabilitation Program Leader, prepared a paper summarizing the history of the legislative efforts required to result in the enactment of the Watershed Rehabilitation Amendments of 2000. The paper entitled "A Watershed Effort – The 20th Anniversary of the Watershed Rehabilitation Act" was presented at the 2020 national conferences of ASDSO and ASABE.

Status of Funded Rehab Projects 4-15-20					
State	No. of Dams Funded	In Planning	In Implementation	Rehab Completed	Assessments Completed
AL	1			1	26
AR	7	1	5	1	43
AZ	12	5	4	3	5
CA	1	1			13
CO	4	3		1	9
CT	4	4			28
GA	28	13	8	7	134
IA	4			4	1
ID					1
IL	1	1			2
IN					27
KS	8	1	4	3	106
KY	4		3	1	18
LA	3	3			9
MA	9	4	4	1	32
MD	1	1			5
ME					3
MN					20
MO	2			2	7
MS	27	6	4	17	92
NC	2	2			29
ND	8	7		1	14
NE	16	2	5	9	69
NH	5	5			20
NJ	1	1			12
NM	9	2	4	3	15
NV	1	1			4
NY	5	4	1		15
OH	10	2		8	13
OK	58	5	15	38	215
OR	3	3			6
PA	13	4	8	1	56
PR					2
SC					15
TN	7	3	2	2	46
TX	46	11	11	24	247
UT	24	7	7	10	28
VA	17	1	4	12	11
VT	4	4			4
WA					1
WI	11			11	
WV	9	6	2	1	160
WY	1		1		2
Totals	366	113	92	161	1,565
No. States	36	30	18	23	42

Figure 53: Status of rehabilitation projects (April 2020)
366 projects funded; 253 plans authorized (161 completed; 92 in implementation)
113 projects in planning
(Source: NRCS program files)

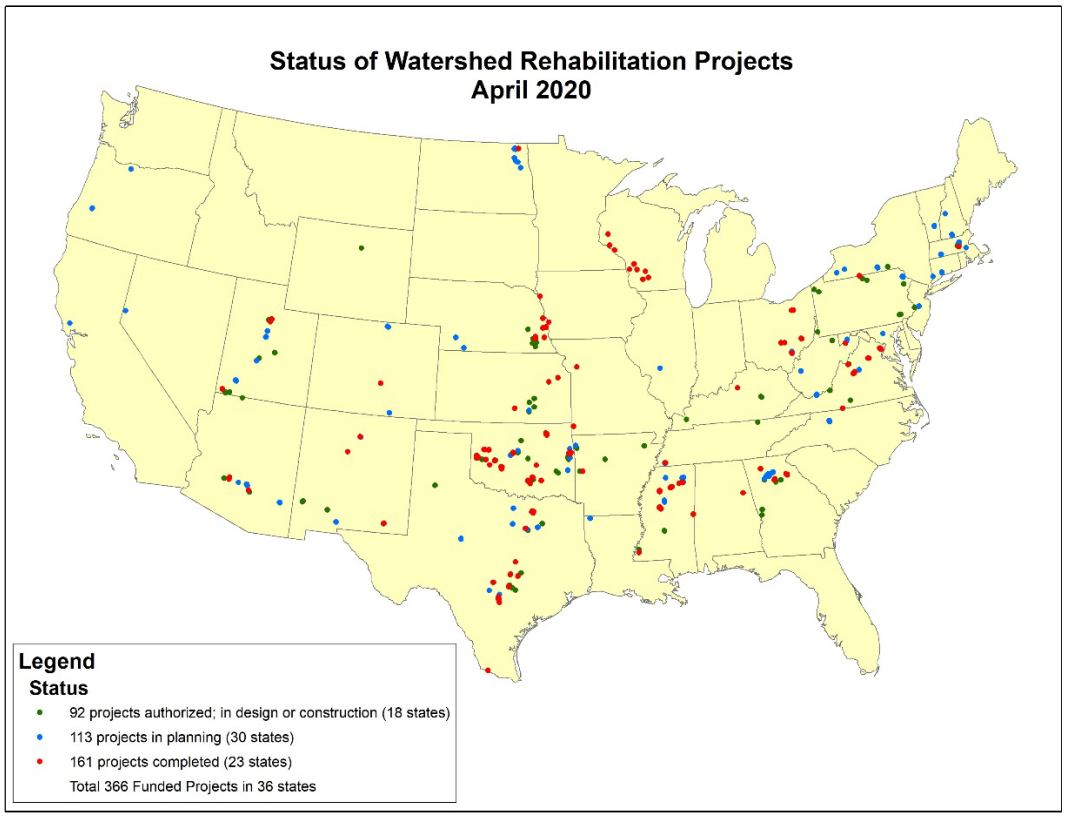


Figure 54: Locations of the funded rehabilitation projects April 2020

See Figure 55 for a bar chart showing the number of rehabilitation plans authorized each year and Figure 56 for the number of rehabilitation projects completed each year. The following are the author's conclusions after studying these figures. Assuming there is at least a two-year lag between appropriations and construction complete (probably much more than that):

- During the first 10 years of rehab appropriations (2000 to 2009), the total appropriations were $372 million (2020 equivalent dollars). Rehabilitation plans for 172 dams were authorized and 104 dams were rehabilitated by 2011. Therefore, appropriations averaged $37 million per year while an average of 14 plans were authorized and 9 dams were rehabilitated each year.
- During the next 9 years (2010 to 2018), the total appropriations were $521 million (2020 equivalent dollars). Rehabilitation plans were authorized for 82 dams and 57 dams were rehabilitated from 2012 to March 2020. Therefore, appropriations averaged $58 million per year during this period while an average of 9 plans were authorized and 6 dams were rehabilitated each year.

Therefore, during the last 9 years, the annual appropriations averaged 50% more than the the previous 10 years. However, the number of rehabilitation plans authorized and dams rehabilitated were only two-thirds of the performance of the previous 10 years, Additional rehabilitation projects will be planned and completed during the next few years; however, the above facts show that the rate of implementation is slowing down and dam rehabilitation projects are becoming more expensive.

The following are possible reasons why current projects are taking longer than the earlier projects:

1. The smaller and easiest (and less expensive) dams were rehabilitated first.
2. There were more experienced NRCS staff working on rehabilitation projects when the program started.
3. Most states have had to rely on architect-engineers (A&E) for planning and design in later years that resulted in three times the implementation costs as well as an additional 2 or 3 years for implementation.
4. There were 107 dams in planning in March 2020 with some plans that are just being started using funds that were recently allocated from 2020 appropriations.
5. It is getting more difficult for sponsors to obtain financing for their 35 percent of the more expensive projects.
6. For some dams, it is more difficult to obtain land rights, which takes longer to implement the project and is more expensive.

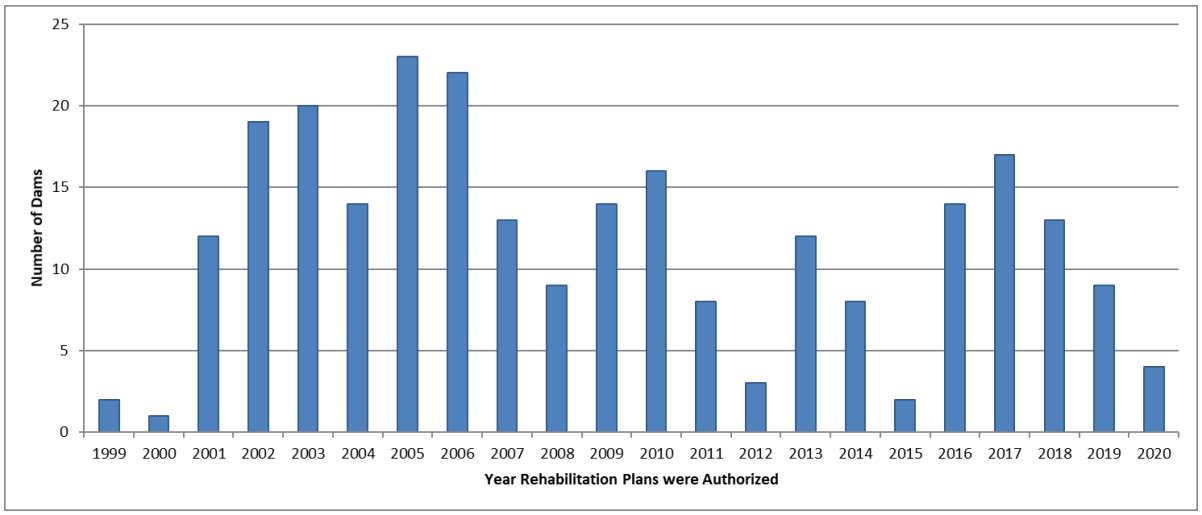


Figure 55: Number of dam rehabilitation plans authorized each year (Source: NRCS program files)

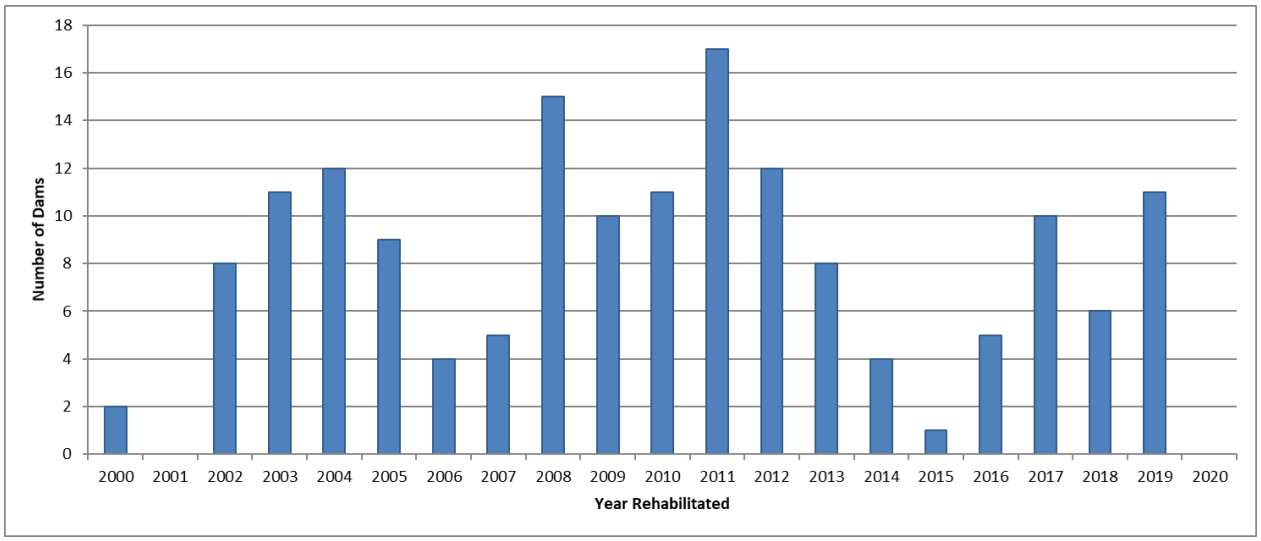


Figure 56: Number of dam rehabilitation projects completed each year (Source: NRCS program files)

Lessons Learned During Rehabilitation Efforts:
Most rehabilitation projects are more difficult to design and construct than a new dam. There are many unknowns and unique features that must be addressed in many rehabilitation projects. The following are lessons learned concerning the most common issues that are encountered:

Landowner Relations: Landowners need to be brought into the planning and implementation of the project early in the process, as it will impact their lives and the lives of their neighbors. Generally, the reservoirs must be drained during construction. This can be somewhat traumatic as the lakes are many times some of the best fishing locations in the areas. In fact, many state record fish have been caught in watershed lakes. Provisions need to be made for how to handle the removal of fish. Some sponsors failed to plan for the fish left behind when the reservoir was drained and then they had to deal with the dead fish and odor problems.

Sometimes land rights issues take time to resolve, so discussions should begin early in the process. Additional easements are generally needed for the enlarged reservoir for sediment and detention storage and for a larger embankment and spillway footprint. Access for operation, maintenance, and, sometimes, a temporary construction access needs to be identified. All easements need to be filed in the local courthouse for future reference.

Principal Spillway Conduits: The principal spillway conduits may be replaced during rehabilitation. Many times, the conduits must be enlarged for additional capacity. At other times the conduits are replaced to assure the materials will serve the additional 50 to 100 years of evaluated life of the project. Generally, the old principal spillway conduit is removed by excavating the embankment and a new conduit is installed. In some instances, it may be decided that excavation of a notch in tall embankments is not economical and a new conduit is installed by boring and jacking it through the dam.

Principal Spillway Inlets: Even when it is determined that the existing principal spillway conduit will function for the additional service life of the rehabilitation project, the existing inlet is generally replaced with a more hydraulically efficient inlet, like the standard Dx3D covered or open topped risers originally designed by the ARS.

Principal Spillway Outlets: Often the increased size of the principal spillway conduit requires enhanced protection for the outlet. This generally involves replacement or modification of an armored rock riprap plunge basin or a concrete impact basin.

Sediment Capacity: The rehabilitated dam must provide capacity for storage of the sediment that is anticipated to be delivered to the dam during the evaluated life of the project. Dr. Shawn Bennett of ARS found in several studies of reservoirs that the designed sediment capacity of the original structure was not fully used due to better than anticipated conservation practices in the upstream watershed, or conservative sediment delivery calculations used in the original design. In most cases, additional sediment capacity must be provided in the rehabilitated structure.

Embankment: Generally, the earth embankment must be modified to meet current design criteria for stability, seismic protection, and hydraulic capacity. This can involve raising the top elevation of the embankment, flattening the slopes, installing foundation drains, and adding wave protection to the front slope. If only a limited footprint area is available for the embankment, a concrete parapet wall can be designed to raise the embankment without widening the base.

Auxiliary spillways: Many times, the auxiliary spillways must be modified in order to meet hydraulic capacity, stability, and integrity requirements of current high-hazard design criteria to safely pass the probable maximum flood (PMF). Modification usually involves significant widening of the existing spillway and sometimes armoring the flow area of the spillway to protect it from erosion during design flows. If land rights are not available for an enlarged auxiliary spillway, a roller-compacted concrete (RCC) structure may be placed over the existing embankment or auxiliary spillway. RCC spillways provide increased spillway capacity while providing significant energy dissipation allowing for a smaller stilling basin footprint than traditional concrete spillways.

Relocation of at-risk properties: If only a few properties are at-risk downstream of the dam, sometimes it is more economical to relocate the at-risk properties and rehabilitate the dam to meet low-hazard criteria. If this is done, there must be controls on any future development within the area that would be inundated if the dam should fail. These controls generally involve easements, purchase of development rights, or purchase of the impacted land by fee title.

Decommissioning (As of March 2020, two project dams had been decommissioned): In limited cases, it is not practical to rehabilitate the existing dam. Many times, this is due to geologic features that make it difficult or expensive to construct a safe dam or environmental factors that must be addressed. Decommissioning permanently removes the flood detention capability of the dam. Decommissioning may involve the following:

- Removal of all or a portion of the existing embankment.
- Removal and disposal of the principal spillway conduit and inlet.
- Installation of a geomorphic rock drop structure to connect the downstream floodplain to the upstream valley to prevent accumulated sediment from moving downstream.
- Stabilization of the disturbed areas.

Assessments:
Assessments of dams have been completed almost every year since the beginning of the rehabilitation authorization. The purpose of an assessment is to provide local sponsors and NRCS with data regarding the condition of a dam, if the dam meets NRCS and State Dam Safety design, performance, and dam safety standards, risks to the public should the dam fail, rehabilitation alternatives, and estimated costs for rehabilitation alternatives.

The assessments allow the formation of a portfolio of dams that have the greatest need for rehabilitation for the protection of life and property. The need is identified using the risk index calculation. The risk index considers both the condition of the dam and the population at risk if the dam should fail. This process helps to identify and fund the dams that are in the greatest need for rehabilitation to assure the most effective use of limited appropriations.

Each assessment consisted of the following activities:

1. An on-site evaluation of the dam including completion of a dam inspection checklist including documentation of any deterioration or damage.
2. Review of the O&M agreement and determination if O&M is adequate.
3. Determination of the drainage area and hydrologic parameters used in the hydrologic analysis.
4. Completion of a hydrologic analysis to determine if the dam meets current NRCS and state design criteria.
5. Make a preliminary hazard classification evaluation including a reconnaissance to verify or locate potential hazards. This includes preparation of a map outlining the breach inundation limits.
6. Completion of the NRCS Failure Index and Risk Index using the NRCS “Evaluation of Potential Rehabilitation Projects” spreadsheet.
7. Completion of the Population at Risk (PAR) using the NRCS PAR Computation Worksheet.
8. Propose modification alternatives to assure the dam meets current NRCS and state standards including a cost analysis for each alternative.
9. Prepare a comprehensive assessment report with recommendations.

By March 2020, 1,565 assessments had been completed. Over half of the high-hazard dams (1,195) and 17% (189) of the significant hazard dams had been assessed. Figure 57 provides a summary of the number and location of assessments completed in each state since the beginning of the watershed rehabilitation program.

State	No. of Assessments Completed	State	No. of Assessments Completed
Alabama	26	Nevada	4
Arizona	5	New Hampshire	20
Arkansas	43	New Jersey	12
California	13	New Mexico	15
Colorado	9	New York	15
Connecticut	28	North Carolina	29
Florida	0	North Dakota	14
Georgia	134	Ohio	13
Hawaii	0	Oklahoma	215
Idaho	1	Oregon	6
Illinois	2	Pennsylvania	56
Indiana	27	Puerto Rico	2
Iowa	1	South Carolina	15
Kansas	106	South Dakota	0
Kentucky	18	Tennessee	46
Louisiana	9	Texas	247
Maine	3	Utah	28
Maryland	5	Vermont	4
Massachusetts	32	Virginia	11
Michigan	0	Washington	1
Minnesota	20	West Virginia	160
Mississippi	92	Wisconsin	0
Missouri	7	Wyoming	2
Montana	0	**Totals**	**1,565**
Nebraska	69		

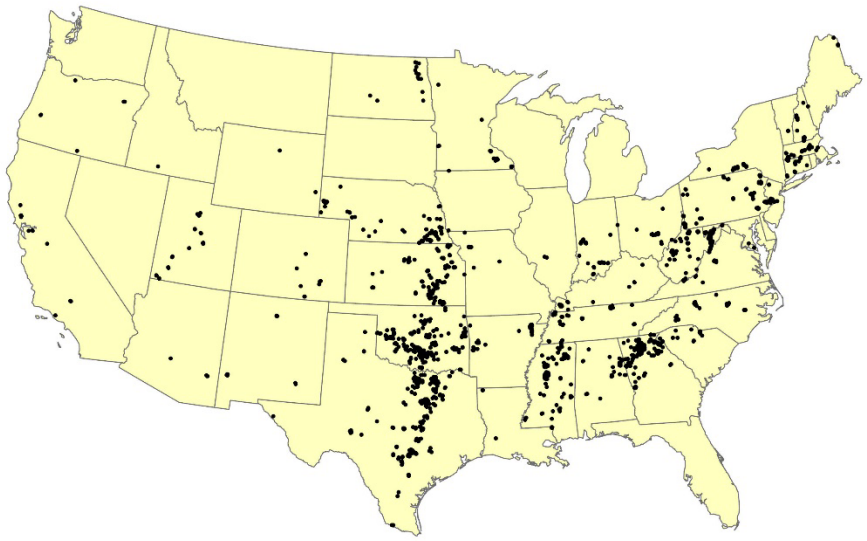


Figure 57: Number and location of assessments completed (March 2020) (Source: NRCS program files)

Dams with Corrugated Metal Pipe Principal Spillways:
Corrugated metal pipe (CMP) has been used for principal spillways, inlet structures, and appurtenances since the beginning of the Watershed Program. Some of the CMP deteriorated before the end of the project's designed service life. Many CMP principal spillways will have to be replaced in order to continue to function as designed beyond the designed service life. See Figure 58 for photos of examples of deterioration of corrugated metal pipes in dams.

Figure 58: Photos of examples of deterioration of CMPs in dams

Principal spillway material types shown in the GeoObserver NID (July 21, 2019) was analyzed to determine the locations and ages of CMPs in watershed dams. For this analysis the Oklahoma principal spillway type data in GeoObserver was replaced with data from a more detailed study conducted by Oklahoma NRCS staff. The Oklahoma study concluded that of the 333 dams with CMP principal spillways, 189 dams had CMP throughout the entire principal spillway while 143 had CMP tailpipes at the outlet end of concrete principal spillways. The Oklahoma dams did not include 99 dams that had CMP principal spillways that have been slip-lined with polyethylene pipe.

The analysis concluded that 2,276 watershed dams in 26 states have CMP principal spillways. The following states have the most CMP principal spillways:

Iowa	903	Texas	157
Nebraska	372	Kansas	99
Oklahoma	333	Mississippi	71
Missouri	185		

The seven states shown above have a total of 2,120 dams with CMP principal spillways which is 93 percent of all of the CMP principal spillways in watershed dams nationwide. The remaining 19 states with dams with CMP principal spillways have the other 156 dams. Over half (56%) of watershed dams in Iowa have CMP principal spillways.

See Figure 59 for a summary of the number of watershed dams with CMP principal spillways in the 26 states. It also shows the age of the dams with CMPs. Note that over half (57%) of the dams with CMPs (1,293 dams in 21 states) are more than 50 years old. The oldest dams with CMP principal spillways are 72 years old in 2020. There have been 12 dams built with CMP principal spillways in Iowa and Minnesota since 2010.

No. of Watershed Dams with CMP Principal Spillways									
Year Built	1948 to 1949	1950 to 1959	1960 to 1969	1970 to 1979	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	1948 to 2019
Age in 2019	70 to71 years	60 to 69 years	50 to 59 years	40 to 49 years	30 to 39 years	20 to 29 years	10 to 19 years	0 to 9 years	Totals 0 to 71 years
AR			8						8
AZ		1							1
CO		12	11						23
GA		1	5	1	4				11
IA		14	314	311	120	88	46	10	903
IL				8					8
IN			16	6	5				27
KS		14	49	36					99
KY		1	6	4					11
LA			1						1
MN			7	1			2	2	12
MO		1	93	87	1		3		185
MS		9	43	19					71
NC				1					1
ND			3						3
NE		29	199	71	62	11			372
NM			8						8
OH		1	9						10
OK	12	165	122	34					333
SD			2	14	6	1			23
TX		17	112	28					157
VA			4	2					6
WV			2						2
WY			1						1
Totals	12	265	1015	623	198	100	51	12	2,276
No. of States	1	12	21	15	6	3	3	2	26
>50 yrs old	1,293 dams in 22 states								

Figure 59: Summary of number and ages of watershed dams with CMP principal spillways

There are 58 watershed dams in 15 states that have been reclassified to high hazard since they were built. Almost 80% (46 dams in 14 states) are more than 51 years old in 2020. The oldest high hazard dam with a CMP principal spillway was built in Georgia in 1953 (67 years old in 2020); while the youngest high hazard dam was built in 1988 in Nebraska (32 years old in 2020). See Figure 60 for a summary of the high-hazard watershed dams that have CMP principal spillways.

No. of Dams with CMP Principal Spillways that have Current High Hazard Classification					
Year Built	1950 to 1959	1960 to 1969	1970 to 1979	1980 to 1989	1950 to 1989
Age in 2019	60 to 69 years	50 to 59 years	40 to 49 years	30 to 39 years	Totals 30 to 69 years
AR		4			4
AZ	1				1
CO	1				1
GA	1			1	2
IA		2			2
IL			2		2
IN		1	2		3
MO		2	1		3
MS		1			1
NE		4	3	3	10
NM		5			5
OH		1			1
OK	6	5			11
TX	1	9			10
WV		2			2
Totals	10	36	8	4	58
No. of States	5	11	4	2	15
> 50 years old	46 dams in 14 states				

Figure 60: Summary of high-hazard watershed dams that have CMP principal spillways

Watershed Benefits

Watershed projects have improved the quality of life and the environment in communities by protecting people's lives and property; conserving soil and water resources; reducing flooding; providing economic development, recreation, and water supplies; enhancing water quality; and improving wetlands and wildlife habitat.

The PL-566 statute requires data be maintained on the benefits resulting from the installed measures. The watershed benefits database is the most complete benefit database of any USDA program. The benefits for the PL-534 and PL-566 projects are computed during the planning of the projects and documented in the project work plans. The benefits include average annual monetary benefits as well as many social and environmental benefits. The benefits are stored in the NRCS database called the Program Operations Information Tracking System (POINTS).

Monetary Benefits:

Note: This section includes excerpts from a paper entitled "What was the Value of Flood Control During Last Week's Storm? Use the New NRCS Watershed Benefits Model to Find Out" that was presented at the 2018 ASDSO conference in Seattle Washington. Authors of the paper were Larry Caldwell, Gary Utley, and Jim Henley. The benefits numbers were updated to include the most current benefits values (2019 dollars).

The 2020 total average annual monetary benefits for all PL-534 and PL-566 projects is approximately $2.4 billion (2019 dollars). The monetary benefits are updated with the Implicit Price Deflator (IPD) index (second quarter) each year to assure they are presented in consistent current dollars. Monetary benefits for the Pilot Watershed and RC&D projects are not included in the databases. The current year benefit values are expressed in the dollars of the previous year since that is the latest inflation figures that are available.

The following is a description of how monetary benefits for watershed projects were originally computed. When evaluating the original watershed projects, planners computed average annual benefits for without-project conditions and for with-project conditions assuming all planned measures were installed. The difference between these two conditions is considered the planned benefits of the project. Benefits were categorized by flood damage reduction and non-flood conditions for both agricultural and non-agricultural land uses.

Flood damage reduction benefits were generally computed by comparing the without-project and with-project damages resulting from various storm frequencies (typically 1-year, 2-year, 5-year, 10-year, 25 year, 50-year, and 100-year return intervals) for agriculture and non-agriculture conditions and then computing the statistical average annual benefits over the evaluated life of the project.

Examples of flood damage reduction benefits to agriculture include crop and pasture damage (yield reduction); damage to fences, farm buildings, and equipment; livestock loss; gully erosion, flood plain scour, and sedimentation/debris removal from flood plains and channels, etc. Examples of flood damage reduction to non-agriculture included damage reduction to urban properties (residential and commercial), utilities, roads, railroads, and bridges.

Examples of non-flood benefits to agriculture include water management, and water supply for irrigation and livestock. Non-flood benefits to non-agriculture include municipal and industrial water supply, recreation, fish and wildlife, increased property values, and reduced water treatment costs.

The total average annual benefits in the POINTS database (2019 dollars) is $2,396,328.543. However, there are seven watersheds that protect the New York City water supply skew the total monetary benefits in POINTS. These seven watersheds involve benefits of $730,655,605 (almost one-third (30.4 percent) of the total monetary benefits for all projects in POINTS.

The flood damage reduction monetary benefits are 37 percent of total monetary benefits for the 1,683 projects in POINTS ($881,873,243 for flood reduction benefits vs. $1,514,455,300 for non-flood reduction benefits). However, the seven New York City watersheds provide $730,655,605 of non-flood reduction benefits. Therefore, not counting the New York City watershed benefits, the flood and non-flood damage reduction benefits are about equal ($881,873,243 vs. $783,799,695).

The agricultural monetary benefits are 36 percent of total monetary benefits for the 1,683 projects in POINTS ($859,324,860 for agricultural related benefits vs. $1,537,003,684 for non-agricultural benefits). However, the seven New York City watersheds provide $662,476,057 of non-agriculture benefits. Therefore, not counting the New York City watershed benefits, agriculture and non-agriculture related benefits are about equal ($791,145,313 vs. $874,527,627).

The 1,070 PL-534 and PL-566 projects that have dams in them have approximately the same amount of total monetary benefits as the 613 PL-534 and PL-566 projects that do not have dams in them $1,168,528,417 vs. $1,227,800,126). However, the seven New York City watersheds provide $730,655,605 of total monetary benefits, which is almost 60 percent of the total monetary benefits for the projects without dams. Therefore, not counting the New York City watershed benefits, the total monetary benefits of the 1,070 projects with dams are almost 2.5 times greater than the benefits from the 606 projects without dams ($1,168,528,417 vs. $497,144,521).

The following is a summary of the average annual benefits for the four categories in POINTS (2019 dollars):

Category	Benefits for all 1,683 Projects	Benefits for 1,070 Projects with Dams
Ag flood benefits	$ 381,495,240	$ 287,284,657
Non-ag flood benefits	$ 500,378,044	$ 399,746,904
Total flood damage reduction benefits	$ 881,873,243	$ 687,031,561
Ag non-flood benefits	$ 477,829,620	$ 209,882,011
Non-ag non-flood benefits	$1,036,625,680	$ 271,614,845
Total non-flood benefits	$1,514,455,300	$ 481,496,856
Total benefits	$2,396,328,543	$1,168,528,417

There are 201 watershed projects with dams that do not have benefits data entered in the POINTS database. These are 28 PL-534, 47 PL-566, 46 pilot, 3 other, and 77 RC&D projects. Based on the national median benefits per square mile-controlled data from POINTS, these projects produce approximately $58 million of additional average annual benefits.

The average annual benefits data in the POINTS database is updated annually to current dollars. The POINTS benefits data is considered the weakest link of all data needed to compute daily

benefits today. It should be noted that different people using varying criteria, base prices, and methods over 40 years of watershed planning completed the economic analysis for watershed planning. Thus, the average annual benefits per square mile of control can vary greatly from watershed to watershed depending on what was in the downstream floodplain and how the benefits were originally analyzed.

While far from perfect, the POINTS benefits database is the most up-to-date and complete source of the average annual benefits available for each watershed that NRCS planned and constructed. However, during the review of the national watershed benefits model, the model developers and reviewers from five states with remaining institutional knowledge of the Watershed Program, universally agreed that the current POINTS benefit data needs attention. A significant effort is needed to review and update the data to be more accurate and consistent with actual current conditions. This group recommends that a comprehensive evaluation of the current Watershed Program benefits (similar to the benefits portion of the 1987 study) be conducted in order to be able to report more accurate benefits of the Watershed Program. In 2020, a significant effort to update the POINTS benefits data was proposed, but not yet initiated.

The POINTS flood benefits per square mile vary from $ 0/sq. mi. to $ 4.7 million /sq. mi. However, there are 610 dams controlling 1,752 sq. mi. with more than $50,000 benefits/sq. mi. and 415 dams controlling 3,350 sq. mi. with less than $1,000 benefits/sq. mi. Therefore, 91 percent of the dams controlling 88 percent of the total drainage area have flood benefits between $1,000 and $50,000 per square mile.

Based on 2019 data, the national weighted-average flood benefits are $17,254 per sq. mi. controlled and the mean is $9,661 per sq. mi. controlled. The lower benefits per square mile are generally in the Midwest where most of the dams are located. The higher benefit values are generally in projects in states on the east and west coasts. The national weighted-average total benefits (flood and non-flood) is $27,556/sq. mi. controlled and the mean is $17,918/sq. mi. controlled.

Figures 61, 62, and 63 provide tables of the average annual monetary benefits for PL-534 and PL-566 projects, summarized by state and program.

Figure 64 shows the index (based on the IPD index) and national monetary benefits for the 1,265 watershed projects that contain dams from 2006 to 2019. Appendix 4 provides a summary of 2019 average annual benefits and benefits per square mile controlled for the following geographies: national, watershed program, state, congressional district, county, and watershed project.

State	Flood Damage Reduction Benefits		Other Benefits		Total Average Annual Monetary Benefits
	Agriculture	Non-agriculture	Agriculture	Non-agriculture	
Alabama	$4,959,908	$1,246,159	$7,605,297	$5,019,182	$18,830,546
Alaska	$0	$1,671,276	$0	$729,223	$2,400,499
American Samoa	$0	$165,483	$0	$0	$165,483
Arizona	$3,372,555	$67,013,735	$3,474,133	$60,758	$73,921,181
Arkansas	$22,507,417	$4,251,673	$26,090,650	$42,554,712	$95,404,453
California	$12,087,141	$67,156,430	$11,023,939	$12,277,769	$102,545,279
Colorado	$2,450,321	$3,636,752	$5,665,146	$884,705	$12,636,924
Connecticut	$8,784	$7,841,670	$0	$437,348	$8,287,803
Delaware	$2,379,820	$2,285,247	$1,069,294	$1,537,654	$7,272,015
Florida	$3,133,493	$29,546	$14,118,972	$2,986,004	$20,268,015
Georgia	$4,723,728	$4,376,928	$6,128,866	$14,704,514	$29,934,036
Guam	$454,582	$0	$0	$0	$454,582
Hawaii	$807,687	$8,759,250	$11,629,774	$3,191,362	$24,388,072
Idaho	$921,001	$506,146	$11,968,568	$2,759,097	$16,154,812
Illinois	$2,187,774	$17,970,261	$999,367	$4,404,688	$25,562,089
Indiana	$4,899,095	$3,738,338	$4,062,613	$14,821,016	$27,521,061
Iowa	$11,503,645	$3,689,373	$8,307,670	$8,477,399	$31,978,087
Kansas	$23,259,243	$9,953,321	$13,638,524	$12,822,006	$59,673,094
Kentucky	$3,131,471	$2,516,959	$4,773,874	$3,816,804	$14,239,109
Louisiana	$25,300,944	$2,513,264	$12,627,310	$4,034,865	$44,476,383
Maine	$108,254	$922,669	$1,983,684	$1,953,467	$4,968,074
Mariana Islands	$233,258	$28,458	$291,135	$0	$552,851
Maryland	$1,542,150	$1,174,008	$2,801,564	$18,388,576	$23,906,297
Massachusetts	$24,623	$5,416,969	$0	$1,731,804	$7,173,396
Michigan	$7,657,068	$960,874	$9,881,212	$10,731,321	$29,230,475
Minnesota	$1,746,741	$4,657,517	$3,560,697	$1,416,479	$11,381,433
Mississippi	$55,404,993	$52,137,478	$55,605,411	$853,788	$164,001,669
Missouri	$5,062,437	$3,839,021	$4,498,749	$9,531,826	$22,932,033
Montana	$79,435	$3,135,310	$5,193,449	$1,646,904	$10,055,099
Nebraska	$16,024,897	$6,064,865	$34,868,604	$2,541,364	$59,499,731
Nevada	$38,936	$20,737	$1,294,902	$1,545,068	$2,899,643
New Hampshire	$163,573	$1,187,713	$19,564	$767,944	$2,138,795
New Jersey	$430,687	$5,392,239	$338,862	$3,804,846	$9,966,634
New Mexico	$3,722,808	$13,655,805	$27,154	$0	$17,405,767
New York	$3,329,966	$5,562,077	$69,956,857	$662,958,324	$741,807,224
North Carolina	$13,509,909	$9,414,248	$14,735,459	$8,872,599	$46,532,215
North Dakota	$7,671,669	$1,943,613	$1,399,686	$676,400	$11,691,368
Ohio	$2,594,375	$2,992,058	$2,844,122	$1,629,186	$10,059,741
Oklahoma	$23,544,160	$29,606,364	$6,168,320	$37,843,467	$97,162,311
Oregon	$443,864	$4,733,566	$9,505,264	$27,692,705	$42,375,399
Pennsylvania	$11,036,214	$8,682,435	$16,162,113	$14,910,393	$50,791,155
Puerto Rico	$658,672	$0	$2,544,461	$124,029	$3,327,162
Rhode Island	$0	$0	$120,449	$7,056	$127,506
South Carolina	$4,532,058	$3,167,247	$7,066,056	$5,853,260	$20,618,621
South Dakota	$2,251,925	$380,113	$3,397,190	$3,121,553	$9,150,781
Tennessee	$26,776,216	$17,633,922	$24,498,875	$12,818,573	$81,727,586
Texas	$56,058,424	$48,441,008	$24,418,857	$30,507,637	$159,425,925
Utah	$1,132,205	$2,815,184	$6,404,699	$3,928,752	$14,280,840
Vermont	$667	$731,740	$3,010,828	$1,438,204	$5,181,439
Virginia	$1,584,891	$5,620,584	$7,564,221	$6,186,642	$20,956,339
Washington	$2,174,578	$3,611,337	$7,213,402	$3,403,273	$16,402,591
West Virginia	$2,805,348	$43,658,146	$4,482,954	$20,641,953	$71,588,401
Wisconsin	$374,657	$2,501,867	$602,911	$2,505,730	$5,985,166
Wyoming	$686,971	$967,021	$2,183,912	$1,073,449	$4,911,354
National Totals	**$381,495,240**	**$500,378,004**	**$477,829,620**	**$1,036,625,680**	**$2,396,328,543**

Total Flood & Non-Flood Benefits	$881,873,243	$1,514,455,300	$2,396,328,543

7 NYC Projects	$0	$0	$68,179,547	$662,476,057	$730,655,605
Remaining 1,676 Projects	$381,495,240	$500,378,004	$409,650,073	$374,149,623	$1,665,672,939
	$881,873,243		$783,799,695		

Figure 61: Average annual monetary benefits for 1,683 PL-534 and PL-566 projects in POINTS (2019 dollars)

NAME		No. of Dams	Area Controlled by Dams (sq. mi.)	Average Annual Benefits Millions of Dollars (2019)			Average Annual Benefits S per sq. mi. of Control		
				Flood Benefits	Non-Flood Benefits	Total Benefits	Flood Benefits	Non-Flood Benefits	Total Benefits
NRCS NATIONAL TOTALS									
TOTAL FOR ALL DAMS NATIONWIDE		11,845	41,678	719.124	507.434	1,226.558	17,254	12,175	29,430
NRCS REGIONAL OFFICE									
NRCS REGION - WESTERN		372	4,651	151.855	50.658	202.512	32,652	10,893	43,545
NRCS REGION - CENTRAL		8,945	25,842	274.365	214.613	488.978	10,617	8,305	18,922
NRCS REGION - NORTHEAST		537	2,717	91.889	78.860	170.749	33,822	29,027	62,849
NRCS REGION - SOUTHEAST		1,991	8,469	201.015	163.303	364.318	23,736	19,283	43,020
NRCS PROGRAM AUTHORITY									
PL-566	PUBLIC LAW 566 (1954)	7,766	30,517	561.298	398.731	960.029	18,393	13,066	31,459
PL-534	PUBLIC LAW 534 (1944)	3,428	8,850	136.268	91.254	227.522	15,398	10,311	25,709
RC&D	Resource Conservation & Dev.	197	919	8.416	6.812	15.228	9,160	7,414	16,574
PILOT	PILOT Watershed Programs	449	1,245	11.757	9.516	21.273	9,441	7,641	17,082
OTHER	Projects With Special Funding	5	147	1.385	1.121	2.505	9,433	7,635	17,069
STATE OR TERRITORY									
AL	Alabama	107	621	5.107	4.918	10.025	8,230	7,925	16,155
AZ	Arizona	25	815	70.174	0.397	70.571	86,058	487	86,544
AR	Arkansas	208	988	20.563	40.883	61.446	20,814	41,382	62,196
CA	California	16	131	40.847	11.778	52.625	311,831	89,916	401,747
CO	Colorado	145	736	6.798	3.512	10.310	9,232	4,770	14,002
CT	Connecticut	30	66	7.702	0.426	8.128	116,082	6,423	122,504
FL	Florida	10	475	0.524	4.859	5.383	1,103	10,227	11,330
GA	Georgia	357	1,652	9.549	17.154	26.703	5,782	10,386	16,168
HI	Hawaii	9	16	2.677	8.917	11.594	166,276	553,866	720,142
ID	Idaho	3	41	0.603	1.804	2.408	14,896	44,555	59,451
IL	Illinois	66	614	6.693	3.799	10.492	10,892	6,183	17,075
IN	Indiana	134	547	6.096	14.088	20.184	11,141	25,744	36,885
IA	Iowa	1,615	920	15.091	12.832	27.923	16,397	13,943	30,339
KS	Kansas	831	3,094	33.457	25.136	58.592	10,815	8,125	18,940
KY	Kentucky	200	743	5.436	6.745	12.180	7,312	9,073	16,385
LA	Louisiana	35	343	0.607	1.676	2.283	1,771	4,894	6,664
ME	Maine	16	123	0.882	0.577	1.459	7,186	4,707	11,893
MD	Maryland	16	78	0.951	15.607	16.558	12,250	201,017	213,267
MA	Massachusetts	30	128	5.442	1.732	7.173	42,400	13,494	55,894
MI	Michigan	13	273	4.927	14.312	19.239	18,047	52,424	70,471
MN	Minnesota	51	1,400	12.210	7.218	19.428	8,723	5,157	13,880
MS	Mississippi	560	1,344	95.761	51.879	147.640	71,276	38,615	109,891
MO	Missouri	1,203	769	8.813	14.294	23.106	11,457	18,582	30,040
MT	Montana	19	364	3.208	2.840	6.048	8,819	7,807	16,625
NE	Nebraska	738	1,986	22.789	33.776	56.564	11,473	17,004	28,477
NV	Nevada	8	222	0.060	2.554	2.614	268	11,482	11,750
NH	New Hampshire	24	131	1.292	0.788	2.080	9,892	6,029	15,921
NJ	New Jersey	20	61	5.291	3.592	8.883	86,293	58,586	144,879
NM	New Mexico	79	1,383	18.306	1.957	20.263	13,238	1,415	14,653
NY	New York	59	230	5.098	0.066	5.164	22,183	286	22,469
NC	North Carolina	114	439	8.075	7.308	15.383	18,378	16,632	35,010
ND	North Dakota	50	1,033	8.401	2.724	11.125	8,135	2,637	10,772
OH	Ohio	64	207	2.261	2.690	4.950	10,911	12,982	23,894
OK	Oklahoma	2,107	5,959	51.135	39.582	90.718	8,581	6,642	15,223
OR	Oregon	6	62	1.886	3.606	5.491	30,212	57,778	87,990
PA	Pennsylvania	91	568	19.476	18.537	38.013	34,294	32,641	66,934
SC	South Carolina	105	579	4.417	7.170	11.588	7,636	12,394	20,029
SD	South Dakota	59	170	3.038	6.040	9.078	17,880	35,550	53,431
TN	Tennessee	143	347	43.398	13.200	56.598	125,225	38,088	163,312
TX	Texas	2,003	9,002	105.134	52.262	157.396	11,678	5,805	17,484
UT	Utah	45	505	5.549	11.831	17.380	10,993	23,436	34,429
VT	Vermont	4	7	0.500	0.150	0.650	72,616	21,763	94,379
VA	Virginia	150	938	7.378	7.204	14.582	7,862	7,677	15,538
WA	Washington	3	69	0.225	0.122	0.347	3,291	1,774	5,065
WV	West Virginia	170	845	38.069	20.384	58.453	45,048	24,122	69,170
WI	Wisconsin	88	346	1.509	2.863	4.372	4,358	8,269	12,627
WY	Wyoming	14	306	1.522	1.339	2.861	4,967	4,370	9,337
PR	Puerto Rico	2	1	0.200	0.308	0.508	179,854	277,815	457,668

Figure 62: Average annual monetary benefits and benefits per square mile of area controlled for 1,270 watershed projects with dams (2019 dollars). See Appendix 4 for detailed benefits data for many geographies (state, congressional district, county, watershed project)

Benefits		PL-534 Projects			PL-566 Projects			PL-534 & PL-566 Projects		
		With Dams	Without Dams	Total	With Dams	Without Dams	Total	With Dams	Without Dams	Total
Flood damage reduction	Agriculture	$85.3	$13.8	$99.1	$202.0	$80.4	$282.3	$287.2	$94.2	$381.4
	Non-Agriculture	$50.1	$22.5	$72.9	$349.7	$77.7	$427.4	$399.7	$100.6	$500.4
Other Benefits	Agriculture	$58.3	$9.8	$68.3	$151.6	$258.0	$409.6	$209.9	$268.0	$477.9
	Non-Agriculture	$32.3	$0.6	$32.9	$239.4	$764.4	$1,003.8	$271.7	$765.0	$1,036.7
Total average annual monetary annual benefits		$226	$47	$273	$943	$1,181	$2,123	$1,169	$1,228	$2,396

Figure 63: Average annual monetary benefits ($ millions) of installed measures in 1,683 PL-534 and PL-566 projects Source: POINTS database updated to 2019 dollars

Year*	Index**	NRCS POINTS Data		
		Average-Annual Benefits (millions $)		
		Non-flood	Flood	Total
2005	1.00000	394.1	558.4	952.5
2006	1.03321	407.2	577.0	984.1
2007	1.06190	418.5	593.0	1,011.5
2008	1.08074	425.9	603.5	1,029.4
2009	1.09108	430.0	609.3	1,039.3
2010	1.10303	434.7	616.0	1,050.6
2011	1.12694	444.1	629.3	1,073.4
2012	1.14616	451.7	640.0	1,091.7
2013	1.16445	458.9	650.3	1,109.2
2014	1.18983	468.9	664.4	1,133.3
2015	1.20126	473.4	670.8	1,144.2
2016	1.21589	479.2	679.0	1,158.1
2017	1.23534	486.8	689.8	1,176.7
2018	1.02497	499.0	707.1	1,206.0
2019	1.01743	507.4	719.1	1,226.6

*YEAR = "current dollars" for year shown. Note that the value for year shown is used for the following year until inflation rate is known for that year (example: current value in 2020 is in 2019 dollars)

** Index is the factor to multiple previous year's values by to obtain current dollars for years shown. The Index is based on the Implicit Price Deflator (IPD) Index (second quarter) each year to assure they are presented in consistent current dollars

Figure 64: Average-annual benefits from 2006 to 2019 for watershed projects with dams

POINTS Benefits Data is Generally Conservative:
Most users of the POINTS data believe that the average annual benefits in POINTS today are very conservative and do not capture the present-day benefits of the watershed projects. The benefits data in POINTS is the original benefits data computed at the time the projects were planned and authorized with the dollars updated to current value. However, land uses, infrastructure, and other changes have occurred within the project since they were originally planned. In 2020, a significant effort to update the POINTS benefits data was proposed, but not yet initiated.

The following are some of the reasons why POINTS benefits are conservative:

- Changes in land use in the project benefited area including increased downstream development. Sometimes land that was in agricultural crops have been converted to subdivisions with many homes, businesses, roads, etc., so the projects that were planned to protect agricultural crops now protect lives as well as millions of dollars of property.
- The original planned benefits did not capture all of the benefits at the time they were planned. Discussions with many of the original watershed project planners in several states revealed that once enough benefits were identified and documented to justify the project with a benefit cost ratio greater than one, the planning was considered complete, the work plan was authorized, and they moved on to the next project.
- Property values around reservoirs have increased greatly due to the demand for lake front property.
- Many secondary benefits resulted from the increased flood protection and businesses associated with increased water-based recreation and wildlife habitat improvement created by the projects.
- The benefits of the watershed projects are continuing well past the original economic evaluation period. Most of the projects were evaluated for a 50-year period. More than half of the dams have been functioning for more than 50 years, some as long as 70 years. It is anticipated that most of the projects will continue to provide planned benefits for several more generations assuming the measures are properly maintained.
- The dams are protecting higher valued crops than when the plans were evaluated. Today's crop yields are much greater than anticipated when the projects were planned due to improvements in plant genetics, intensive use of fertilizers and pesticides, and irrigation. For example, Figure 65 displays USDA-NASS yield data that shows that since 1955, corn grain yields in the U.S. have increased at a fairly constant rate of 1.9 bushels per acre per year, increasing from a national average of approximately 40 bushels per acre in 1955 to 170 bushels per acre in 2016.

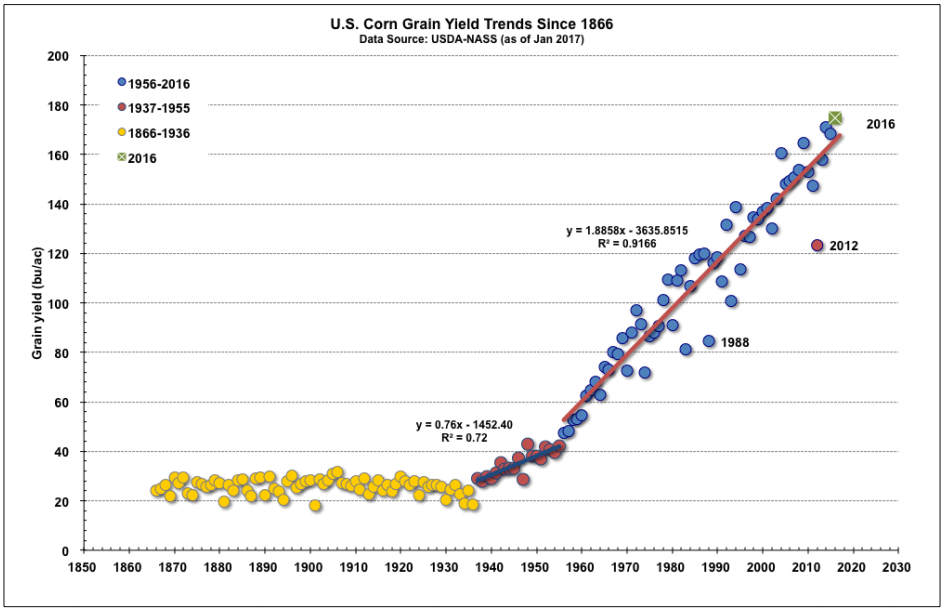


Figure 65: U.S. Corn Yield Trends since 1866
https://www.agry.purdue.edu/ext/corn/news/timeless/yieldtrends.html

- The dams are protecting higher valued land than when the plans were evaluated. Today's cropland values are much greater than anticipated when the projects were planned. For example, Figure 66 displays land value data that show that since 1969, land values in several Midwestern and Western states have increased from 6 to 15 times during the past 48 years, increasing from approximately $500 to $1,000/acre in 1969 to $3,000 to 11,000 per acre in 2017. These data are taken from a study completed by the Department of Agricultural and Consumer Economics University of Illinois.

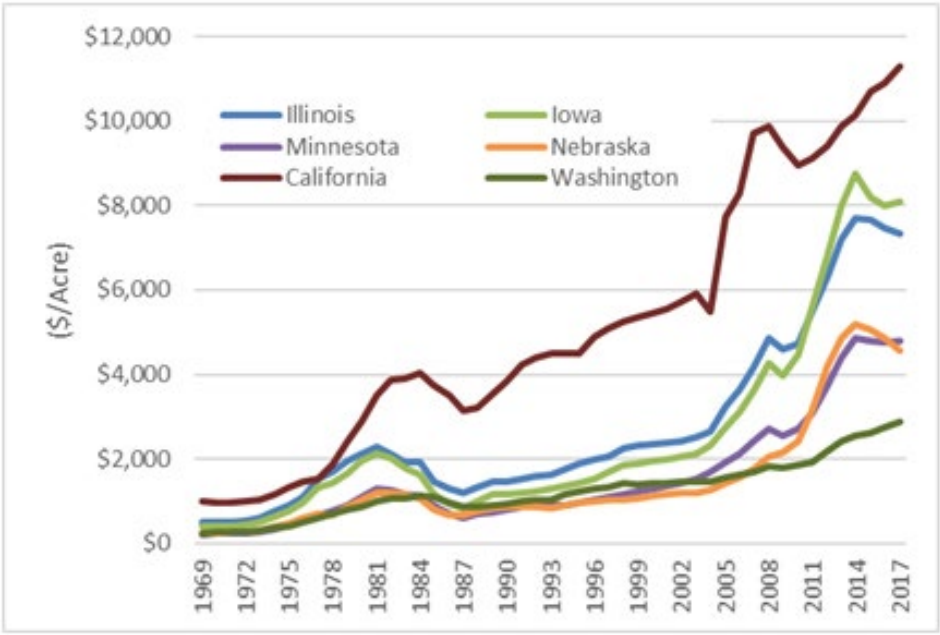


Figure 66: Cropland values since 1969 in selected states
http://farmdocdaily.illinois.edu/2017/08/updated-farmland-values-indexing-tools-2017.html

There are also many social benefits that were not captured in the original economic benefit analysis. In addition to providing significant water-based recreation and wildlife habitat improvements, watershed projects reduced the following risks that increased the quality of life within the watershed projects:

- Threat to loss of life
- Inconvenience associated with damage to roads and bridges
- Disruption of life safety services such as police, fire protection, and emergency equipment.
- Interruption of utilities
- Pollution of drinking water supplies

There are some projects where the benefits may be less than originally planned due to the following:

- Some of the planned projects assumed that landuse would change in the with-project condition to more intense cropland with higher values. Sometimes this intensification was not realized.
- Downstream landuse changed from cropland to less intensive use like range or pastureland.
- Large reservoirs were constructed downstream on areas where flood reduction benefits were originally assumed.

However, most people knowledgeable of the Watershed Program's history believe that re-evaluations of benefits using today's techniques and conditions would yield much greater average annual benefits than originally planned.

Non-monetary Benefits:
The following are the total non-monetary benefits for all PL-534 and PL-566 watershed projects (note that this data has not been updated in more than a decade).

Number of people benefited:	48,319,180
Number of farms and ranches benefited:	181,551
Number of bridges benefited:	61,702
Number of public facilities benefited:	3,663
Number of businesses benefited:	46,586
Number of homes benefited:	611,093
Number of domestic water supplies benefited:	27,874
Acres of nutrient management:	674,283
Tons of animal waste properly disposed:	4,801,640
Tons of soil saved from erosion:	90,198,341
Tons of reduction of annual sedimentation:	59,803,699
Streams and corridors enhanced or protected:	47,513
Lakes and reservoirs enhanced or protected:	2,518,613
Acre-feet of water conserved:	1,846,147
Acre-feet of groundwater recharge:	261,738
Acres of wetlands enhanced or restored:	279,375

Acres of upland or riparian wildlife habitat created, enhanced, or restored: 9,150,271

Figure 67: Mon-monetary benefits for PL-534 and PL-566 watershed projects
(Source: 2012 NRCS POINTS database)

1987 Evaluation of the Watershed Program:
The Soil Conservation Service (SCS, now NRCS) conducted a comprehensive study of the PL-566 Watershed Program from October 1983 to October 1985. In July 1987, SCS published the findings in a report entitled “Evaluation of the Watershed Protection and Flood Prevention Program”. The study collected an extensive set of physical and economic data for 60 projects randomly selected at the beginning of the evaluation in October 1983. The evaluation team selected these projects from the 486 projects that had been completed for at least 5 years (i.e., completed by October 1978). The evaluation team judged that 5 years was an adequate period for identifying economic benefits and other impacts of a project. The study estimated economic benefits accruing to the 486 projects from the sample data with 80 percent statistical reliability. The evaluation team did not have the resources to measure directly the impacts of land treatment installed in the watershed projects. Instead, they used data from the National Resources Inventory to estimate those impacts.

The evaluation concluded “the ratio of economic benefits to costs in fiscal year 1984 was greater than expected. Although the Federal dollars spent on these projects exceeded the planned cost by an average of 22 percent, the economic benefits accruing in 1984 exceeded by 34 percent the benefits anticipated in the project plans.” It also concluded that “it is likely that the measured agricultural benefits in 1984 are conservative”. The planned estimate of benefit-cost ratio for all 486 completed projects averaged about 2 to 1. The actual ratio of benefit to cost in the 1984 study, based on the sampled projects, was about 2.2 to 1.

National Watershed Benefits Model:
The national watershed benefits model is based on the Oklahoma benefits model that has been in use since 2007. In 2016, work began to expand the model to compute the monetary benefits generated by all the watershed dams across the nation each day. The model summarizes monetary benefits data for many geographical units such as watershed project, county, congressional district, state, NRCS region, program authorization, or nation. It accumulates the benefits for various time intervals (daily to year-to-date) as well as a user-defined period back to 2005.

The model computes daily monetary benefits for 11,779 watershed dams located in 1,265 projects in 45 states. Nineteen watershed projects cross state lines (the model considers the area in each state as a separate project). Even though the model contains all of the data needed to compute daily monetary benefits for 11,845 dams in 1,271 watershed projects, rainfall data for five projects in Hawaii (9 dams) and one project in Puerto Rico (2 dams) is not readily available. Therefore, the model computes only non-flood benefits for those six projects and 11 dams. The model does not compute any benefits for 66 dams located in 13 watersheds that are inactive in DamWatch. There are no other project dams in six of those watersheds.

The model archives the rainfall amounts, storm recurrence frequencies, and benefits computed for each geographical area for future use. It also archives the daily rainfall recorded for each watershed dam and reports the benefits for any geographical area for any archived past time period. It uses the National Weather Service (NWS) daily rainfall data for the drainage area for each dam, NWS precipitation depth-duration-frequency data, and the NRCS NID data.

The monetary benefits include flood benefits (damage reduction to crops, pastures, fences, farm buildings, equipment, livestock loss, residential/ commercial properties, utilities, roads, railroads, and bridges) and non-flood benefits (water management (irrigation), livestock water, municipal water supply, recreation, and improved fish and wildlife habitat).

Basic Data Required for Model Development and Analysis:

1. NWS daily rainfall accumulation product called the Quantitative Precipitation Estimate (QPE) in 4km by 4km grids obtained for a 24-hour period ending at 1200z (about 6:00am CST). This precipitation data is available 8 hours after 1200z or about 2:00pm CST) from all states except Hawaii. NWS River Forecast Centers in the western U.S. may not always have up-to-date data by 2:00pm CST.
2. NWS NOAA Atlas 14 rainfall Depth-Duration-Frequency (DDF) data.
3. Average annual benefits data updated to current year values. The monetary benefits represent the reduction in flood damages and non-flood benefits that NRCS computed during the original planning process. These data are part of the NRCS benefits database named POINTS. The average annual benefits for each watershed reported in the POINTS database (updated to 2019 dollars) was initially utilized in the national benefits model. If significant changes are made to the POINTS database in the future, the average annual benefits for the affected watersheds can be updated in the national benefits model. The national benefits model will include the capability to update the base average annual benefits to the current year's dollars.
4. NID data for the dams, including dam ID, location (latitude and longitude), and drainage area.
5. GIS shape-files of the drainage areas of each dam developed for the updated DamWatch system. The centroid of each drainage area was determined using GIS analysis.
6. Economic damage factor curve (EDF): percent of total average annual benefits for each storm frequency. The authors developed a default for each watershed project in the nation based on an analysis of economic planning data from several watershed projects in Kansas, Nebraska, and Oklahoma.

The model requires a significant amount of data gathered from various sources or computed using various assumptions. Default data is used if the required data was not readily available. States can replace default data if better data become available in the future.

Process used by the model to compute watershed benefits:

1. Downloads the NWS nationwide QPE rainfall grid data at 5:00pm CST each day. The model accesses the NWS daily rainfall accumulation for the continental United States (CONUS). The model downloads the daily rainfall values in the NWS rainfall grid for each 4km x 4km cell within the drainage area of each dam. The daily rainfall value for each dam is determined by computing the weighted average of all NWS cells in the rainfall grid within the drainage area of the dam.
2. Interpolates the rainfall return frequency from Depth-Duration-Frequency Curve for that project
3. Interpolates the economic damage factor (EDF) for the computed return frequency from the economic damage curves
4. Calculates the percent of the total planned control of each dam by dividing the drainage area for each dam by the total drainage area in the watershed project controlled by the dams.
5. Computes the daily storm flood benefits for each dam by multiplying the EDF by the percent control by the average annual flood benefits in the POINTS database.
6. Computes the daily non-flood benefits by dividing the total non-flood benefits in the POINTS database for that project by 365 days per year.
7. Accumulates and summarizes the computed benefits for standard geographical areas.
8. Archives the daily rainfall and benefits data at the end of each day for future use so economic benefits reports can be generated for any time period.

The Economic Damage Factor (EDF) is the percent of average annual benefits for a watershed project for a specific storm frequency. The EDF curve shows the percent of average annual benefits for a series of frequency storms. The default EDF curve in the model was developed using analyses of projects in Nebraska, Kansas, and Oklahoma. These analyses resulted in an EDF curve that is used as the default curve for all watersheds nationwide for the model (see Figure 68).

Storm Frequency (years)	0.1	0.25	0.5	1	2	5	10	25	50	100	200	500	1000
% of Average-Annual Benefits	0	5.0	12.0	26.0	55.0	90.0	125.0	150.0	170.0	180.0	188.0	195.0	200.0

Figure 68: Default economic damage curve values used in the benefits model

State staffs can replace this default EDF with an EDF curve for specific watershed projects if better representative damage factor curves can be developed. However, the developers concluded that information needed for representative EDF curves is difficult to obtain for many projects because of the following factors:

a. Much of the original planning data is not available in many states.
b. Available data is not well organized making it difficult to understand.
c. Some data is for hydraulic reaches only without a composite for the entire project.
d. Much of the early watershed planning analysis was completed before computers were used so documentation is difficult to interpret.
e. Various versions of the NRCS ECONII computer program were used to compute damages in the economic analysis making it difficult to interpret results.
f. Many projects were planned prior to the availability of the ECONII computer program so flood damage data needed to prepare a damage curve was not summarized for the earlier planned projects.
g. ECONII calculated with and without project flood damages for agriculture only. All other damages were calculated by other means. A complete economic damage curve was not a common product and was typically not included in the project documentation.

Download of Daily NWS Precipitation Data:

NWS accumulates and reports the precipitation grid data for a 24-hour period each day from 1200z to 1200z (6:00am to 6:00am CST). The complete dataset covering the CONUS is first available by 11:30am CST. NWS updates the data several times each day as they improve the accuracy through ground-truthing, etc. In Oklahoma, reported precipitation amounts generally increase as NWS updates the data. The model uses the data version that is available at approximately 5:00pm CST and the model produces the standard reports that are usually available by 6:00pm CST. The archived precipitation data uses the latest corrected data around 9:30pm CST. Therefore, there may be a minor variation in the initial reported benefits and the archived values.

One inherent problem with the NWS precipitation data is the way it is recorded. Higher frequency storms are sometimes missed if a storm starts one day and ends the next day or the day after. The NWS QPE product records the precipitation falling each 24-hour period, starting at 6:00am CST and ending at 6:00am CST the next day. The model assumes each day's precipitation is a separate storm. For example, using a watershed project near Stillwater, Oklahoma, if a storm produces 3

inches from midnight to 6:00am one day and 3 inches from 6:00am to noon the next day, the benefits computed by the model for the two smaller storms each day are only one-third of the benefits computed for the higher frequency storm for the six-inch 24-hour event. This issue is inherent to the reporting of the rainfall.

Standard Reports from the National Benefits Model

The model computes the benefits for various geographical areas and saves a standard report that consists of 39 pages. The standard model daily reports include a cover page with a brief national summary of the number and frequency of storms that occurred, definitions of abbreviations used in the reports, and an index of the reports of the various geographical areas. The report also includes a one-page summary of the maximum rainfall and benefits ranked for each geographical category. The remainder of the pages in the standard daily report include a listing of the geographical areas with their benefits for that day. A similar report is prepared as an annual summary at the end of each year. Each report includes the following for each geographical area:

1. The number of dams and controlled drainage area within that geographical area.
2. Precipitation (weighted rainfall and maximum rainfall) within that geographical area.
3. Monetary benefits data (flood, non-flood, and total) for that geographical area.
4. Weighted rainfall and total benefits for the previous 2 days, 3 days, 5 days, 7 days, and year-to-date.

The model displays the results of the daily benefits computation in a standard daily report. The model archives the weighted rainfall amounts, storm frequency, and benefits computed for each geographical area for future use. It also archives the rainfall recorded for each watershed dam daily. The model automatically accumulates the watershed benefits for year-to-date and the following time daily intervals: 2, 3, 4, 5, 7, 10, 14, 20, 30, 45, and 60 days. The model can also compute the benefits for any user defined period back to January 2, 2005 (example: 21 days starting April 4, 2016 and ending April 25, 2016).

Accessing the Model Reports:

The daily benefits reports are automatically uploaded to a SharePoint folder in the NRCS network. NRCS staffs can access the reports at any time for the most recent day to any of the archived daily reports back to January 2005. In 2019, NRCS approved a modification to the NRCS DamWatch system that will allow DamWatch users to access the calculated benefits data for any day or group of days for any period back to 2006. This new DamWatch feature will be released in early 2020.

The DamWatch benefits model results displays the flood and non-flood benefits for not only the selected period, but also the actual benefits for each year from the present back to 2006. The average annual benefits are also shown for each geography selected. It also displays the number of dams and the area controlled by the dams within any selected geographical area. This is the first time this type of data has been available.

The information from the model is helpful for educating residents and decision makers about the value of these projects, the benefits they provide to their community, and the need to maintain this important public infrastructure so it can continue to serve generations to come. The model reports the benefits immediately after a storm occurs so that news stories can report on the damage that did not occur due to the watershed projects, during the news cycle while the rest of the media is focusing on the devastation caused by the storm.

Watershed Program Appropriations

Appropriations are made by Congress to provide funds to NRCS for technical and financial assistance to implement watershed programs. At various times throughout the years, funds were provided through four accounts: watershed operations, watershed planning and surveys, river basin surveys, and later, watershed rehabilitation. In addition to annual appropriations, funds were also made through special appropriations such as the 1983 Jobs Bill, the 2009 American Reinvestment and Recovery Act (ARRA) stimulus bill, and funding through the Commodity Credit Corporation (CCC). The 2014 and 2018 Farm Bills authorized use of funds from the Regional Conservation Partnership Program for planning and implementation of watershed projects.

The following is a summary of the appropriations for watershed operations and watershed rehabilitation for each year from 1947 to 2020. The actual appropriation was also converted to current value (2020 dollars) using the Consumer Price Index (CPI).

Appropriations for Watershed Operations:
The first appropriation for the Watershed Program was in 1947, three years after the Flood Control Act of 1944 was enacted. Appropriations were delayed until funds were available following World War II.

Figures 69 and 70 provide a summary of the annual appropriations for the PL-534 and PL-566 Watershed Programs from 1947 to 2020, as well as the equivalent current value (2020 dollars). The total current value (2020 dollars) of the appropriations for watershed operations from 1947 to 2020 is almost $24 billion.

Note that the following special appropriations were in addition to the annual PL-534 and PL-566 appropriations. These special appropriations are included in Figures 69 and 70.

- 1976 includes transition quarter (change of fiscal years from calendar year to Oct.-Sept.)
- 1983 includes $100 million jobs bill
- 1995 deficit reduction (downsizing)
- 2009 includes $145 mil economic stimulus funding through the American Reinvestment and Recovery Act (ARRA)
- 2019 and 2020 includes a total of over $36 million CCC funds. Congress appropriated $50 million each year that could be used for Watershed Operations and Watershed Rehabilitation with allocations to be distributed at USDA's discretion.

The following are additional actual allocations made with the Regional Conservation Partnership Program (RCPP) for planning and implementation of PL-566 watershed projects. Note: these RCPP appropriations are not included in Figures 69 and 70:

FY	Number of Projects	States	Allocation Amount
2015	5	AR, CO, ND, MN, MN, SD, WA	$23,076,782
2016	2	AR, OR	$ 6,300,000
2017	9	AR, AZ, CA, CO, MI, NE, TX, UT	$46,422,118
2018	4	CA, NE, OR	$17,486,360
Total	20	14	$93,285,260

Fiscal Year	Total Appropriations	Equivalent 2020 Dollars
1947	$2,100,000	$24,541,561
1948	$3,000,000	$32,440,830
1949	$6,000,000	$65,699,496
1950	$9,500,000	$102,729,295
1951	$10,315,000	$103,391,212
1952	$6,559,600	$64,508,839
1953	$7,750,000	$75,644,644
1954	$12,000,000	$116,256,357
1955	$14,732,000	$143,256,607
1956	$22,000,000	$210,785,882
1957	$29,500,000	$273,592,028
1958	$38,720,000	$349,160,615
1959	$43,500,000	$389,568,660
1960	$40,750,000	$358,776,216
1961	$56,370,000	$491,320,166
1962	$78,787,000	$679,884,851
1963	$86,702,200	$738,408,070
1964	$89,072,000	$748,802,444
1965	$97,602,000	$807,487,683
1966	$91,973,000	$739,780,851
1967	$95,826,100	$747,696,056
1968	$96,156,000	$720,086,863
1969	$82,132,000	$583,222,241
1970	$90,770,000	$609,674,953
1971	$100,334,000	$645,625,755
1972	$132,099,000	$823,589,861
1973	$115,675,500	$678,963,079
1974	$121,674,000	$643,189,002
1975	$109,641,600	$531,105,541
1976	$167,076,000	$765,225,698
1977	$129,649,000	$557,550,604
1978	$143,280,000	$572,698,071
1979	$148,107,000	$531,651,089
1980	$152,244,000	$481,504,907
1981	$177,024,000	$507,523,329
1982	$176,611,000	$476,955,850
1983	$181,295,000	$474,366,741

Fiscal Year	Actual Appropriations	Equivalent 2020 Dollars
1984	$175,000,000	$438,945,140
1985	$175,325,850	$424,640,512
1986	$176,691,000	$420,137,665
1987	$161,182,000	$369,765,129
1988	$161,679,000	$356,169,407
1989	$161,797,400	$340,045,942
1990	$161,855,000	$322,729,211
1991	$163,163,000	$312,199,582
1992	$173,885,000	$322,992,317
1993	$187,162,000	$337,549,581
1994	$199,236,000	$350,354,221
1995	$70,000,000	$119,701,837
1996	$100,000,000	$166,098,152
1997	$101,036,000	$164,054,766
1998	$101,036,000	$161,538,588
1999	$91,643,000	$143,354,736
2000	$99,443,000	$150,497,336
2001	$99,224,000	$146,035,851
2002	$106,590,000	$154,426,322
2003	$109,285,000	$154,819,229
2004	$86,487,000	$119,318,179
2005	$74,971,000	$100,041,180
2006	$75,000,000	$96,952,381
2007	$0	$0
2008	$30,000,000	$36,312,731
2009	$169,289,000	$205,643,165
2010	$30,000,000	$35,670,571
2011	$0	$0
2012	$0	$0
2013	$0	$0
2014	$0	$0
2015	$0	$0
2016	$0	$0
2017	$150,000,000	$166,970,784
2018	$150,000,000	$155,675,469
2019	$176,287,480	$179,360,465
2020	$204,987,208	$204,987,208
Totals	**$6,888,781,938**	**$23,523,653,602**

Figure 69: Annual appropriations for PL-534 and PL-566 programs
1947 to 2020
(actual appropriations and equivalent 2020 dollars)

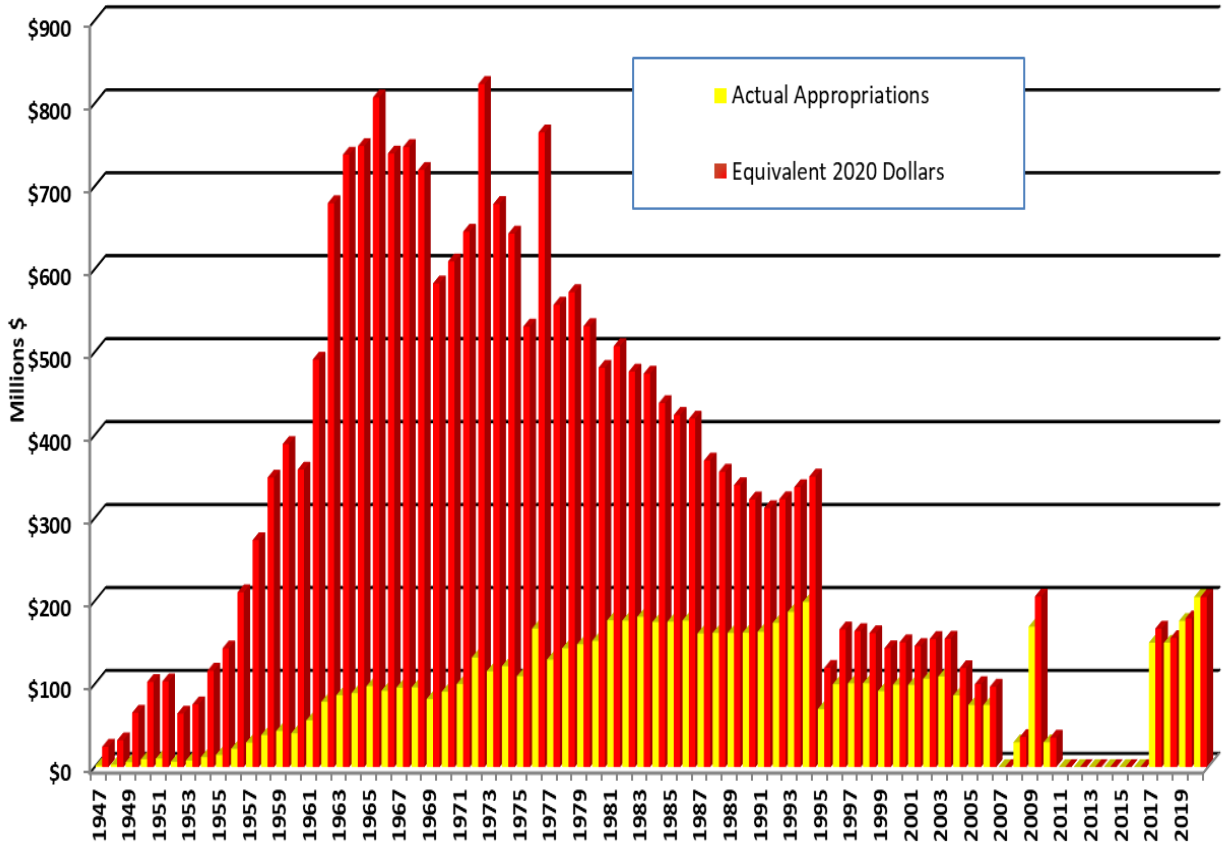


Figure 70: Bar chart of annual appropriations for PL-534 and PL-566 programs 1947 to 2020
(actual appropriations and equivalent 2020 dollars)

Watershed Rehabilitation Appropriations:
The following is a summary of the appropriations provided for watershed rehabilitation from FY2000 to FY2020 (See Figures 71 and 72). The FY2000 and FY2001 appropriations were funds from the Emergency Watershed Protection (EWP) program for pilot rehabilitation projects in Ohio, New Mexico, Wisconsin, and Mississippi. In addition to the following, NRCS provided Oklahoma $750,000 of watershed operations funds for the Sergeant Major pilot rehabilitation project.

Note that the following special appropriations are in addition to the annual appropriations:

- 2009 includes $50 mil economic stimulus funding through the American Reinvestment and Recovery Act (ARRA)
- CCC funds in 2014, 2015, 2019, and 2020. In FY 2019 and 2020, Congress appropriated $50 million each year that could be used for Watershed Operations and Watershed Rehabilitation with allocations to be distributed at USDA's discretion.

The total current value (2020 dollars) of the appropriations for watershed rehabilitation from 2000 to 2020 is almost $1 billion.

Fiscal Year	Actual Appropriations			Equivalent 2020 Dollars
	ARRA or CCC *	Discretionary	Total Appropriation	
2000		$8,000,000	$8,000,000	$12,107,224
2001		$8,000,000	$8,000,000	$11,774,236
2002		$10,000,000	$10,000,000	$14,487,881
2003		$29,848,000	$29,848,000	$42,284,342
2004		$30,273,800	$30,273,800	$41,765,984
2005		$27,280,000	$27,280,000	$36,402,387
2006		$31,561,000	$31,561,000	$40,798,855
2007		$31,245,000	$31,245,000	$39,272,195
2008		$19,860,000	$19,860,000	$24,039,028
2009	$50,000,000	$40,000,000	$90,000,000	$109,327,156
2010		$40,000,000	$40,000,000	$47,560,761
2011		$17,964,000	$17,964,000	$20,744,984
2012		$15,000,000	$15,000,000	$17,025,710
2013		$13,547,338	$13,547,338	$15,167,329
2014	$250,000,000	$12,000,000	$262,000,000	$288,419,573
2015	$73,000,000	$12,000,000	$85,000,000	$93,460,300
2016		$12,000,000	$12,000,000	$13,029,966
2017		$12,000,000	$12,000,000	$13,357,606
2018		$10,000,000	$10,000,000	$10,378,365
2019	$23,712,520	$10,000,000	$33,712,520	$34,300,185
2020	$20,012,792	$10,000,000	$30,012,792	$30,012,792
Total	**$416,725,312**	**$400,579,138**	**$817,304,450**	**$955,716,859**

Notes:

1. FY1998: $750,000 from Watershed Operations funds provided for Oklahoma Pilot Rehab Project
2. FY 2000 & 2001: $8 million from EWP funds for Pilot Rehab Projects in OH, MS, NM, & WI
3. FY 2009: Includes $50 million from the American Reinvestment and Recovery Act (ARRA)
4. FY 2014, 2015, 2019 & 2020: Includes funds from Commodity Credit Corporation (CCC). In FY 2019 and 2020, Congress appropriated $50 million each year that could be used for Watershed Operations and Watershed Rehabilitation with allocations to be distributed at USDA's discretion.

Figure 71: Annual appropriations for Watershed Rehabilitation (actual appropriations and equivalent 2020 dollars)

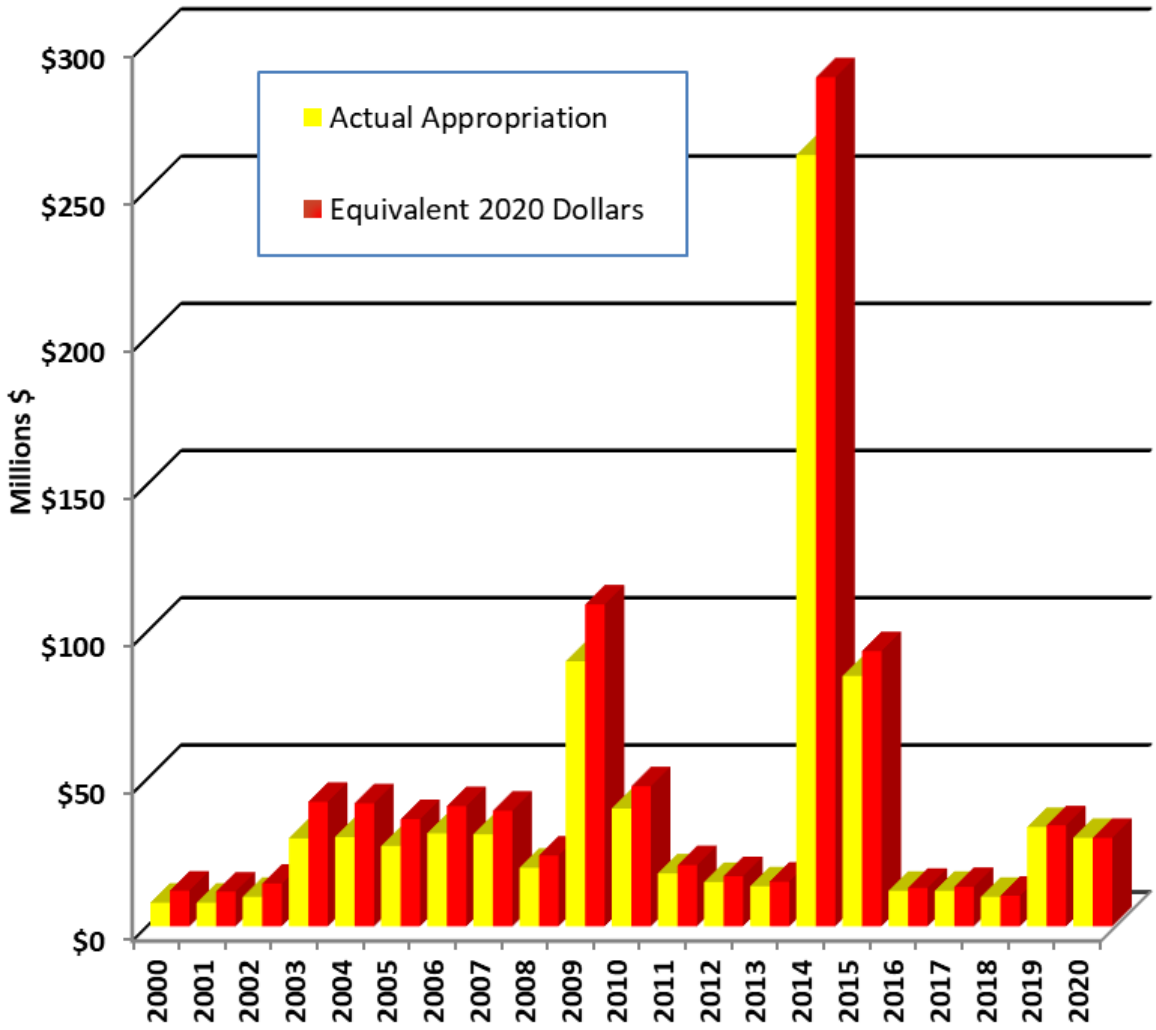


Figure 72: Bar chart of annual appropriations for Watershed Rehabilitation (actual appropriations and equivalent 2020 dollars)

Total Annual Appropriations for Watershed Operations and Rehabilitation Programs:
The following is a summary of the appropriations provided for all Watershed Programs including watershed rehabilitation from 1947 to 2020 (See Figures 73, 74 and 75). This provides a view of total funds that SCS/NRCS had available to deliver the Watershed Programs. Several observations can made while reviewing the bar chart in Figure 75:

1. The *actual* total annual appropriations for 2017 to 2020 are very similar to the actual appropriations for the period 1981 to 1994 when the watershed appropriations were at their highest ($165 to $200 million per year), however the “buying power” of those earlier years was two to three times the current amounts.
2. The *actual* total appropriations for watershed operations and rehabilitation 1947 to 2020 was $7,706,086,388.

3. The *total appropriations in 2020 dollars* for watershed operations and rehabilitation 1947 to 2020 was $24,479,370,518 (more than $24 billion!). This is essentially the total current value of the infrastructure on the land today, not counting the significant value of land rights and local cost share provided by the project sponsors.

4. The *largest actual* annual appropriations for watershed operations was $199,236,000 in 1994 and $204,987,208 in 2020.

5. The *smallest actual* annual appropriation for watershed operations was $0 in 2007 and 2011-2016.

6. The *largest annual appropriation in 2020 dollars* for watershed operations was $823,589,861 in 1972.

7. The *largest actual* annual appropriation for watershed operations and rehabilitation was $262,000,000 in 2014 (all rehabilitation).

8. The *smallest actual* annual appropriation for watershed operations and rehabilitation was $2,100,000 in 1947 (all watershed operations).

9. There were rather consistent funding levels from year to year during the period 1977 to 1994 with annual appropriations ranging from $130 million to $199 million each year. The period from 1995 to 2006 had reduced funding, but still rather consistent funding levels from year to year with annual appropriations generally ranging from $90 to $110 million with one year at $139 million. The steady funding levels allowed for consistent staffing levels for support for the program.

10. Erratic funding levels from 2007 to 2016 with total annual appropriations of operations and rehabilitation ranging from $12 million to $262 million per year made it difficult to maintain and manage staffs for implementation of the program. Watershed operations had zero appropriations in 7 of these 10 years while rehabilitation appropriations varied from $12 million to $262 million during this decade.

11. From 2017 to 2020, the annual appropriation for watershed operations ballooned to $150 million to $204 million while the appropriations for rehabilitation were reduced to $10 million to $33 million.

12. From 2010 to the present, many states had drastic reductions in technical staffs, so much of the planning and design work was contracted out to consulting firms. This increased technical assistance costs approximately 3 times what it cost when NRCS provided the technical services with NRCS staffs.

Fiscal Year	Actual Appropriations			Equivalent 2020 Dollars	CPI
	Watershed Operations	Watershed Rehabilitation	Total WS and Rehab		
1947	$2,100,000		$2,100,000	$24,541,561	22.30
1948	$3,000,000		$3,000,000	$32,440,830	24.10
1949	$6,000,000		$6,000,000	$65,699,496	23.80
1950	$9,500,000		$9,500,000	$102,729,295	24.10
1951	$10,315,000		$10,315,000	$103,391,212	26.00
1952	$6,559,600		$6,559,600	$64,508,839	26.50
1953	$7,750,000		$7,750,000	$75,644,644	26.70
1954	$12,000,000		$12,000,000	$116,256,357	26.90
1955	$14,732,000		$14,732,000	$143,256,607	26.80
1956	$22,000,000		$22,000,000	$210,785,882	27.20
1957	$29,500,000		$29,500,000	$273,592,028	28.10
1958	$38,720,000		$38,720,000	$349,160,615	28.90
1959	$43,500,000		$43,500,000	$389,568,660	29.10
1960	$40,750,000		$40,750,000	$358,776,216	29.60
1961	$56,370,000		$56,370,000	$491,320,166	29.90
1962	$78,787,000		$78,787,000	$679,884,851	30.20
1963	$86,702,200		$86,702,200	$738,408,070	30.60
1964	$89,072,000		$89,072,000	$748,802,444	31.00
1965	$97,602,000		$97,602,000	$807,487,683	31.50
1966	$91,973,000		$91,973,000	$739,780,851	32.40
1967	$95,826,100		$95,826,100	$747,696,056	33.40
1968	$96,156,000		$96,156,000	$720,086,863	34.80
1969	$82,132,000		$82,132,000	$583,222,241	36.70
1970	$90,770,000		$90,770,000	$609,674,953	38.80
1971	$100,334,000		$100,334,000	$645,625,755	40.50
1972	$132,099,000		$132,099,000	$823,589,861	41.80
1973	$115,675,500		$115,675,500	$678,963,079	44.40
1974	$121,674,000		$121,674,000	$643,189,002	49.30
1975	$109,641,600		$109,641,600	$531,105,541	53.80
1976	$167,076,000		$167,076,000	$765,225,698	56.90
1977	$129,649,000		$129,649,000	$557,550,604	60.60
1978	$143,280,000		$143,280,000	$572,698,071	65.20
1979	$148,107,000		$148,107,000	$531,651,089	72.60
1980	$152,244,000		$152,244,000	$481,504,907	82.40
1981	$177,024,000		$177,024,000	$507,523,329	90.90
1982	$176,611,000		$176,611,000	$476,955,850	96.50
1983	$181,295,000		$181,295,000	$474,366,741	99.60

Figure 73: Annual appropriations for PL-534, PL-566, and watershed rehabilitation programs 1947 - 1983
(actual appropriations and equivalent 2020 dollars)

Fiscal Year	Actual Appropriations			Equivalent 2020 Dollars	CPI
	Watershed Operations	Watershed Rehabilitation	Total WS and Rehab		
1984	$175,000,000		$175,000,000	$438,945,140	103.90
1985	$175,325,850		$175,325,850	$424,640,512	107.60
1986	$176,691,000		$176,691,000	$420,137,665	109.60
1987	$161,182,000		$161,182,000	$369,765,129	113.60
1988	$161,679,000		$161,679,000	$356,169,407	118.30
1989	$161,797,400		$161,797,400	$340,045,942	124.00
1990	$161,855,000		$161,855,000	$322,729,211	130.70
1991	$163,163,000		$163,163,000	$312,199,582	136.20
1992	$173,885,000		$173,885,000	$322,992,317	140.30
1993	$187,162,000		$187,162,000	$337,549,581	144.50
1994	$199,236,000		$199,236,000	$350,354,221	148.20
1995	$70,000,000		$70,000,000	$119,701,837	152.40
1996	$100,000,000		$100,000,000	$166,098,152	156.90
1997	$101,036,000		$101,036,000	$164,054,766	160.50
1998	$101,036,000		$101,036,000	$161,538,588	163.00
1999	$91,643,000		$91,643,000	$143,354,736	166.60
2000	$99,443,000	$8,000,000	$107,443,000	$162,604,561	172.20
2001	$99,224,000	$8,000,000	$107,224,000	$157,810,087	177.07
2002	$106,590,000	$10,000,000	$116,590,000	$168,914,202	179.88
2003	$109,285,000	$29,848,000	$139,133,000	$197,103,571	183.96
2004	$86,487,000	$30,273,800	$116,760,800	$161,084,164	188.90
2005	$74,971,000	$27,280,000	$102,251,000	$136,443,567	195.30
2006	$75,000,000	$31,561,000	$106,561,000	$137,751,236	201.60
2007	$0	$31,245,000	$31,245,000	$39,272,195	207.34
2008	$30,000,000	$19,860,000	$49,860,000	$60,351,760	215.303
2009	$169,289,000	$90,000,000	$259,289,000	$314,970,321	214.537
2010	$30,000,000	$40,000,000	$70,000,000	$83,231,331	219.179
2011	$0	$17,964,000	$17,964,000	$20,744,984	225.672
2012	$0	$15,000,000	$15,000,000	$17,025,710	229.601
2013	$0	$13,547,338	$13,547,338	$15,167,329	232.773
2014	$0	$262,000,000	$262,000,000	$288,419,573	236.736
2015	$0	$85,000,000	$85,000,000	$93,460,300	237.017
2016	$0	$12,000,000	$12,000,000	$13,029,966	240.008
2017	$150,000,000	$12,000,000	$162,000,000	$180,328,447	234.12
2018	$150,000,000	$10,000,000	$160,000,000	$166,053,834	251.107
2019	$175,000,000	$35,000,000	$210,000,000	$213,660,650	256.143
2020	$200,000,000	$35,000,000	$235,000,000	$235,000,000	260.608
Total	**$6,871,407,250**	**$823,579,138**	**$7,694,986,388**	**$24,356,688,632**	

Figure 74: Annual appropriations for PL-534, PL-566, and watershed rehabilitation programs 1984 - 2020
(actual appropriations and equivalent 2020 dollars)

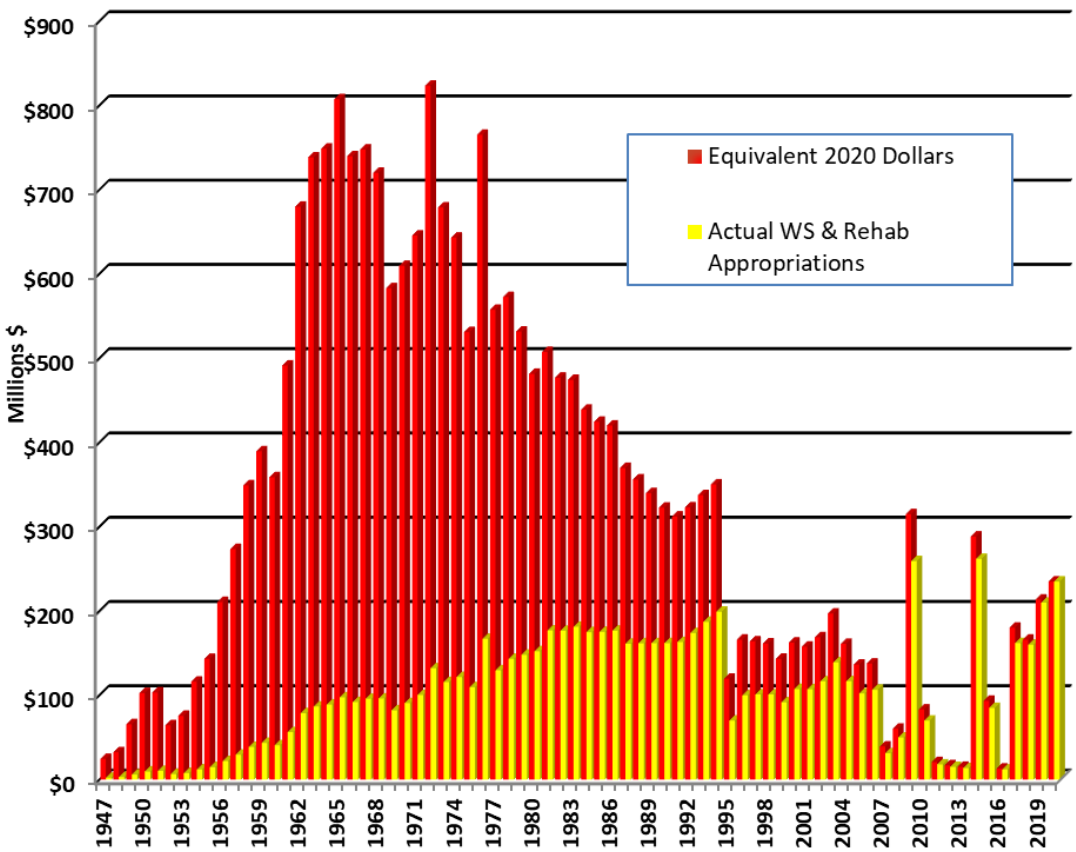


Figure 75: Bar chart of annual appropriations for PL-534, PL-566, and Watershed Rehabilitation programs 1947 - 2020 (actual appropriations and equivalent 2020 dollars)

Hazard Classification Potential:

Hazard classification potential is used throughout the dam safety community to classify the possible adverse consequences that result from the release of water or stored contents due to failure of the dam or mis-operation of the dam or appurtenances. It categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests.

One of the primary purposes of a hazard classification system is to select the appropriate design criteria. Generally, design criteria becomes more conservative as the potential for loss of life and/or property damage increases.

The hazard classification of a dam is based on the downstream damage that would result if the dam were to fail. The hazard classification has no relationship to the condition of the dam, its structural integrity, operational status, or flood storage capability.

Determining the hazard classification of a dam generally includes completing a hydraulic analysis to determine the extent of flooding that will result from a failure of the dam. This includes the assumptions used in the dam break/inundation analysis (height of water in the reservoir, in-flow during failure, mode of failure, etc.), as well as the detail of topographic data used to define the downstream area. After the hydraulic analysis is completed, interpretations of that data is necessary. This includes a determination of the depth and velocity of water at houses, commercial buildings, roads, bridges, railroads, camp sites, recreational areas, utilities, etc. that will result in potential loss of life or economic impacts.

ACER Technical Memorandum No. 11, U.S Department of Interior, Bureau of Reclamation (1988) is an excellent reference for guidance on hazard classification.

While various state and federal agencies have somewhat different definitions for hazard classes, the concept between the classifications are quite similar. The following is the current NRCS definition for hazard classes as shown in the NRCS National Engineering Manual, 4th Edition, June 2017. It is interesting to note that these definitions are the same as the definitions that were first issued in 1958 except that the current definitions use the word "dams" instead of "structures".

- **Low Hazard Potential:** Dams in rural or agricultural areas where failure may damage farm buildings, agricultural land, or township and country roads.
- **Significant Hazard Potential:** Dams in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, or minor railroads, or interrupt service of relatively important public utilities.
- **High Hazard Potential:** Dams where failure may cause loss of life or serious damage to homes, industrial or commercial buildings, important public utilities, main highways, or railroads.

History of the Evolution of SCS use of Hazard Classification in Dam Design:
The design of flood control dams evolved in the 1950’s as SCS and other agencies were planning, designing, and constructing an increasing number of dams. In the early years of the Watershed Program, SCS used a conservative application of existing farm pond criteria for dam design. SCS

issued Washington Engineering Memo 3 on October 7, 1954. It contained the first SCS national criteria for design of flood retarding dams. It was the first document to include the concept of hazard potential in the design of the dam and required greater capacities for a dam that might cause loss of life if it should fail.

In July 1956, SCS revised Washington Engineering Memo 3. It provided definitions of three hazard potential levels (low, moderate, and high) and provided criteria for auxiliary spillway design and freeboard capacities based on the hazard potential. It set detention storage requirements for determining the auxiliary spillway elevation based on the following design storms depending on the hazard classification:

- Low hazard: 25 yr.-6 hr. storm
- Moderate hazard: 25 to 50 yr.-6 hr. storm
- High hazard: 100 yr.-6 hr. storm

SCS issued Washington Engineering Memo 27 on March 14, 1958 which was completely replaced by a revision dated March 19, 1965. Although Memo 27 included hazard classification, it did not include a procedure for predicting a breach discharge and measuring its downstream impact.

In July 1967, SCS issued an amendment to Memo 27. It contained guidance to use cost as a criteria to subdivide the (a) structure class into (a) and (a+b/2). Class (a) (now low-hazard dams) required a minimum volume of detention storage from a routed 25-year, 10-day storm with a minimum auxiliary spillway freeboard design. Class (b) (now significant-hazard dams) required a minimum volume of detention storage from a routed 50-year, 10-day storm and an increased auxiliary spillway design. In effect, the a+b/2 criteria averaged the precipitation requirements giving a 37.5 year, 10-day storm.

Memo 27 provided dam design guidance during the period when most of the watershed dams were planned, designed, and constructed. It was used for the design of all watershed dams until SCS Technical Release 60 was issued in 1976. The author estimates that less than 20 percent of watershed dams were designed with TR-60 criteria.

Changes in Classification of Dams due to Downstream Land Use Changes:

Most watershed dams were originally designed to reduce flood damages to agricultural areas. However, after the dams were built, development began to take place within the protected areas downstream from the dams. When a house or business was built within the breach inundation area of the dam, the hazard classification of that dam changed to high hazard since the dam now protected human life. In many states the number of dams with a higher hazard classification has increased significantly. Most states do not have authority to control downstream development, therefore the number of high-hazard dams will continue to increase. This is commonly referred to as “hazard creep”.

The following summaries demonstrate the changes in hazard classification from the times the dams were built to the present. All data are from the NRCS GeoObserver NID as of June 14, 2019.

- Figure 78: Number of project dams by current high-hazard classification
- Figure 79: Number of project dams by original design high-hazard classification
- Figure 80: Changes in number of project dams classified as high-hazard 2006 to 2019

There are currently 2,196 watershed dams in 44 states that are classified high hazard. See figures 76 and 77 for locations of these dams. Over half of these dams were originally designed as low or significant hazard (1,182 vs. 2,196). The 1,014 dams shown as designed as high hazard includes about 150 of the dams that have been rehabilitated to meet NRCS current criteria and a few others have been modified to meet current state criteria. Therefore 1,182 dams in 38 states currently classified as high hazard that do not meet current NRCS safety criteria.

The number of dams being reclassified to high hazard is increasing each year. Note that in the past 13 years (2006 to 2019), 493 dams were reclassified to high hazard in 30 states. That is an average of 38 dams each year that have been reclassified to high hazard. Some of the increases are due to improved breach inundation methodologies and interpretation of hazard to life such as critical depths of inundation of roads, houses, etc. However, the vast majority of hazard classification increases are due to new development within the downstream areas that would be inundated if the dam should fail.

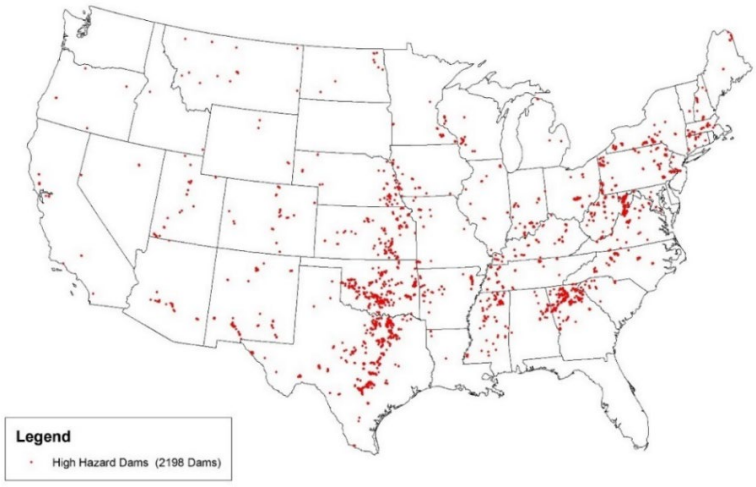


Figure 76: Location of 2,196 high-hazard watershed dams
Source: NRCS GeoObserver NID export, March 2020)

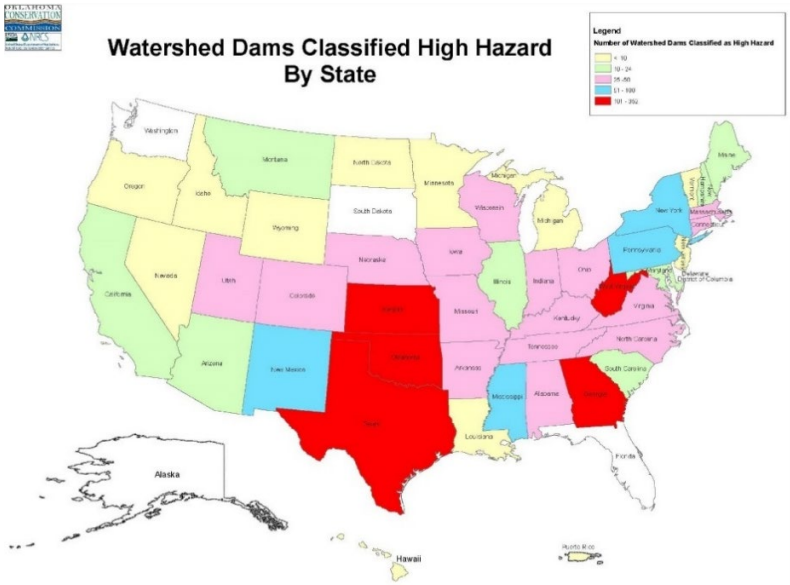


Figure 77: Number of high-hazard watershed dams by state

State	Current Hazard			Totals
	High	Significant	Low	
Alabama	25	31	51	107
Arizona	24	1	0	25
Arkansas	47	49	112	208
California	14	2	0	16
Colorado	32	7	106	145
Connecticut	28	1	1	30
Florida	0	0	10	10
Georgia	192	130	35	357
Hawaii	8	1	0	9
Idaho	2	0	1	3
Illinois	17	21	28	66
Indiana	39	47	48	134
Iowa	26	34	1,555	1,615
Kansas	120	89	621	830
Kentucky	45	16	139	200
Louisiana	5	10	20	35
Maine	11	1	4	16
Maryland	12	4	0	16
Massachusetts	27	3	1	31
Michigan	6	5	2	13
Minnesota	17	5	29	51
Mississippi	77	38	446	561
Missouri	27	44	1,132	1,203
Montana	16	1	2	19
Nebraska	46	95	597	738
Nevada	7	0	1	8
New Hampshire	18	6	0	24
New Jersey	11	3	6	20
New Mexico	70	5	4	79
New York	54	2	3	59
North Carolina	42	31	41	114
North Dakota	9	28	13	50
Ohio	26	34	4	64
Oklahoma	260	201	1,646	2,107
Oregon	5	1	0	6
Pennsylvania	90	0	1	91
Puerto Rico	2	0	0	2
South Carolina	19	23	63	105
South Dakota	0	2	54	56
Tennessee	44	43	56	143
Texas	392	75	1,536	2,003
Utah	29	9	7	45
Vermont	4	0	0	4
Virginia	52	27	71	150
Washington	0	3	0	3
West Virginia	169	0	0	169
Wisconsin	27	3	58	88
Wyoming	3	3	7	13
Totals	**2,196**	**1,134**	**8,511**	**11,841**

Figure 78: Number of project dams with CURRENT hazard classification (Source: NRCS GeoObserver NID export, March 2020)

State	Design Hazard				Totals
	High	Significant	Low	Unknown	
Alabama	8	26	73	0	107
Arizona	16	8	1	0	25
Arkansas	23	27	133	25	208
California	14	2	0	0	16
Colorado	20	13	112	0	145
Connecticut	28	1	1	0	30
Florida	0	0	10	0	10
Georgia	26	84	246	1	357
Hawaii	6	3	0	0	9
Idaho	2	0	1	0	3
Illinois	15	15	36	0	66
Indiana	17	59	58	0	134
Iowa	21	33	1,561	0	1,615
Kansas	55	141	634	0	830
Kentucky	24	21	155	0	200
Louisiana	4	8	23	0	35
Maine	11	1	4	0	16
Maryland	12	4	0	0	16
Massachusetts	27	2	2	0	31
Michigan	4	4	2	3	13
Minnesota	10	10	31	0	51
Mississippi	20	45	495	1	561
Missouri	18	48	1,136	1	1,203
Montana	14	2	2	1	19
Nebraska	25	66	644	3	738
Nevada	7	0	1	0	8
New Hampshire	16	8	0	0	24
New Jersey	7	6	7	0	20
New Mexico	23	13	39	4	79
New York	45	12	2	0	59
North Carolina	5	20	70	19	114
North Dakota	3	44	3	0	50
Ohio	13	34	17	0	64
Oklahoma	57	130	1,920	0	2,107
Oregon	5	1	0	0	6
Pennsylvania	72	18	1	0	91
Puerto Rico	2	0	0	0	2
South Carolina	2	30	73	0	105
South Dakota	0	2	54	0	56
Tennessee	22	32	89	0	143
Texas	114	98	1,789	2	2,003
Utah	17	18	7	3	45
Vermont	4	0	0	0	4
Virginia	43	32	75	0	150
Washington	0	3	0	0	3
West Virginia	133	34	2	0	169
Wisconsin	3	13	72	0	88
Wyoming	0	3	10	0	13
Totals	**1,013**	**1,174**	**9,591**	**63**	**11,841**

Figure 79: Number of project dams with ORIGINAL DESIGN high-hazard classification (Source: NRCS GeoObserver NID export, March 2020)
Note: "design high-hazard" includes dams rehabilitated

State	Design	2006	Current		Difference Design vs. Current	Difference 2006 vs. 2019
Alabama	8	25	25		17	0
Arizona	16	24	24		8	0
Arkansas	23	42	47		24	5
California	14	14	14		0	0
Colorado	20	20	32		12	12
Connecticut	28	28	28		0	0
Florida	0	0	0		0	0
Georgia	26	185	192		166	7
Hawaii	6	6	8		2	2
Idaho	2	2	2		0	0
Illinois	15	15	17		2	2
Indiana	17	34	39		22	5
Iowa	21	23	26		5	3
Kansas	55	111	120		65	9
Kentucky	24	34	45		21	11
Louisiana	4	4	5		1	1
Maine	11	11	11		0	0
Maryland	12	12	12		0	0
Massachusetts	27	26	27		0	1
Michigan	4	6	6		2	0
Minnesota	10	10	17		7	7
Mississippi	20	76	77		57	1
Missouri	18	27	27		9	0
Montana	14	14	16		2	2
Nebraska	25	36	46		21	10
Nevada	7	7	7		0	0
New Hampshire	16	17	18		2	1
New Jersey	7	7	11		4	4
New Mexico	23	32	70		47	38
New York	45	51	54		9	3
North Carolina	5	33	42		37	9
North Dakota	3	9	9		6	0
Ohio	13	20	26		13	6
Oklahoma	57	165	260		203	95
Oregon	5	4	5		0	1
Pennsylvania	72	73	90		18	17
Puerto Rico	2	2	2		0	0
South Carolina	2	3	19		17	16
South Dakota	0	0	0		0	0
Tennessee	22	38	44		22	6
Texas	114	213	392		278	179
Utah	17	25	29		12	4
Vermont	4	4	4		0	0
Virginia	43	48	52		9	4
Washington	0	0	0		0	0
West Virginia	133	138	169		36	31
Wisconsin	3	26	27		24	1
Wyoming	0	3	3		3	0
Totals	**1,013**	**1,703**	**2,196**		**1,183**	**493**

Figure 80 Comparison of number of project dams with high-hazard classification since being built (Source: NRCS GeoObserver NID exports 2006 and July 21, 2019)
Note: "design hazard" includes rehabilitated dams

Evolution of SCS/NRCS Dam Design Criteria 1948 to 2019

(This section includes excerpts from a paper entitled “How Many Times did 2,100 Watershed Dams in Oklahoma Experience Auxiliary Spillway Flows in 67 Years?” presented at the 2016 ASDSO conference in Philadelphia, PA. Authors of the paper were Larry Caldwell, Ray Riley, and Jim Henley):

SCS revised design criteria for detention storage and principal spillway release rates several times during the 1950s, 60s, and 70s when most of the watershed dams were planned, designed, and constructed. The design criteria changes were due to results of hydrology studies, research data, and lessons learned after reviewing the performance of dams and auxiliary spillways following storm events. During the first 25 years of the Watershed Program, SCS went from an agency that assisted farmers and ranchers with the planning, design, and installation of conservation practices to one of the primary flood control dam building agencies in the country. The performance of these dams during the past 70 years has demonstrated that SCS adopted and quickly implemented the results of hydrologic and hydraulic studies and techniques to constantly improve design criteria through this period. A listing of selected historic SCS criteria documents are shown in Figure 81. Figure 82 are photos showing some of the technology tools used to implement projects in the early days of the watershed program.

The following is a brief history of the evolution of SCS design criteria (note that most of the following concerns national policy, however, Oklahoma’s criteria is discussed since it was many times involved in revision of national policies and procedures):

By 1948, SCS had assisted farmers and ranchers with building thousands of farm ponds since the agency's creation in 1935. SCS designed almost of these small dams with little or no detention storage. Many SCS field employees were experienced in the dam construction techniques of the time. However, the agency was still gaining knowledge and experience in the principals of hydrology and hydraulics and their impacts on detention storage or auxiliary spillway design.

During the 1950’s and 60s, SCS engineers gained considerable experience through the planning, design, and construction of hundreds of watershed dams across the nation. Additionally, research by USDA-ARS assisted with the development of engineering design criteria and understanding of hydrology, climate, and other related topics that affected the development of design criteria and policy within SCS. The culmination of first-hand field experience and research resulted in many improvements in engineering criteria that influenced the design of dams for years to come.

In the early years of the Watershed Program, SCS used a conservative application of existing farm pond criteria for dam design. One of the problems with early hydrology was the lack of good rainfall probability data. Rainfall data published by Yarnell in 1935 was the only source of rainfall frequency data. It was recognized early in the planning process that Yarnell's data was generally too low. SCS designers continually increased the Yarnell values by arbitrary amounts called “p” factors. However, in some instances, SCS designers used the actual Yarnell values as a minimum. An evaluation of auxiliary spillway flows in Oklahoma through 1978 showed that 17 of 19 dams designed with Yarnell minimum storage values had flowed at least twice. This gave strong credibility to the later detention storage criteria which increased Yarnell values by roughly 25 percent.

Watershed projects planned in many states prior to 1957 used various versions of a method of manual watershed modeling called “concordant flow”. The concordant flow method was based on a 20-year period of rainfall that was deemed representative of the watershed. Normally a two-day rainfall amount (deemed 24-hour rainfall) using three or more 24-hour reporting precipitation stations was determined by using a weighted Theissen Polygon method. All stations were second order stations which measured daily precipitation at a specific time each day. This procedure also required a survey of high-water marks from the flood of record that was used to establish the rainfall-runoff relationship for all storms for flood damage estimates in the watershed. Planners also used the rainfall-runoff relationship developed by this procedure as one part of the detention storage determination for planning and designing the dams in the watershed. The maximum rainfall event was checked against the 1935 Yarnell 25-year, 24-hour precipitation. If it did not exceed the Yarnell 25-year, 24-hour value, planners used the Yarnell 25-year, 24-hour value as the minimum. Further, planners used the Yarnell 25-year, 24-hour storm if the largest event in the 20-year rainfall series was determined to be excessively high (a subjective outlier).

In the early 1950’s, the design of the detention storage of many dams did not to involve flood routing. Many dams in the same watershed evaluated by Ray Riley and Larry Caldwell had the same amount of watershed inches of flood storage regardless of drainage area size or principal spillway release rate. Many of the auxiliary spillways of Oklahoma watershed dams designed during this period flowed three to six times.

SCS Washington Engineering Memo 3 was issued October 7, 1954. It contained the first SCS national criteria for design of flood retarding dams. It included criteria to determine minimum capacities and elevations for auxiliary spillways. It was the first document to include the concept of hazard potential in the design of the dam. It required greater capacities for a dam that might cause loss of life if it should fail.

In July 1956, a revision to Memo 3 was issued. It provided definitions of three hazard potential levels (low, moderate, and high) and provided criteria for auxiliary spillway design and freeboard capacities based on the hazard potential. It also provided more detailed national hydrologic, hydraulic, and embankment criteria for the design of dams. The 1956 document set the detention storage requirements for determining the auxiliary spillway elevation based on the following design storms depending on the hazard classification:

- Low hazard: 25 yr.-6 hr. storm
- Moderate hazard: 25 to 50 yr.-6 hr. storm
- High hazard: 100 yr.-6 hr. storm

This document was the predecessor of SCS Washington Engineering Memo 27 that was issued March 14, 1958 and was completely replaced by a revision dated March 19, 1965. This document provided dam design guidance during the period when most of the watershed dams were planned, designed, and constructed.

Principal spillway release rates in the early structures were very low. As an example, many watershed dams designed in the 1950’s in Oklahoma had principal spillway release rates that varied from 2 to 3 cubic feet per second per square mile (csm). The assumption was made that the

dams should store all the flood volume and release it slowly over a long time period. The use of lower csm rates contributed to a large number of auxiliary spillway flows since detention pools were not always completely evacuated between flood-producing events. There were also many complaints from landowners whose crops and grassland within the detention pools were drowned out. The floods of 1957 in the Midwest caused SCS to re-evaluate the slow release rate philosophy.

Numerous changes in watershed planning occurred between 1958 and 1964. The first was the introduction of runoff curve numbers as a method to define rainfall-runoff relationships in the 1956 revision of the 1954 SCS National Engineering Handbook. Curve numbers were based on soils and land use data. The curve number approach also recognized initial abstractions from rainfall and accounted for antecedent moisture conditions. SCS engineer Victor Mockus and others led the pioneering effort to develop the concept of curve numbers, with the intended usage on small ungaged watersheds. His team collected extensive rainfall – runoff research data in small plots. It took some time to train field personnel and planners on the use of the procedure. In Oklahoma, the first use of curve numbers appeared in a 1958 watershed plan. In the1964 revision of the National Engineering Handbook, Section 4 Hydrology, Victor Mockus authored Chapter 10, “Estimation of direct runoff from storm rainfall.”

A game-changer for watershed planning occurred in May 1961 with the release of Technical Paper No. 40 - Rainfall Frequency Atlas for the United States by the Weather Bureau (later National Weather Service) of the U.S. Department of Commerce. David M. Hershfield prepared TP-40 under contract with the Engineering Division of the Soil Conservation Service. Many more stations were available for Hershfield's study as compared to Yarnell's study. Yarnell’s data was based only on limited rainfall records from a few recording gaging stations across the nation and were supplemented with data from dedicated observers. After Yarnell’s data was published, a network of recording gages was installed that increased the amount of data by a factor of 20. The analysis of this expanded data was the basis for Weather Bureau’s studies starting with Technical Papers 24, 25, 28, 29, and eventually 40. The precipitation data in these technical papers were generally larger than Yarnell’s values; in some instances, as much as three times larger (See TP-40 introduction, 1961).

TP-40 was a very important occurrence in SCS hydrology history. It replaced the outdated and somewhat unreliable Yarnell data as a source of rainfall-frequency data. It quickly became the national standard for rainfall frequencies. At times, some have questioned its reliability, but it has never been replaced. In 1970-72, John Miller from the National Weather Service, Arlin Nix from the Agricultural Research Service, and Ray Riley, SCS, served on a national committee to determine the adequacy of TP-40. They concluded that it was statistically reliable and that it was still the best rainfall frequency source available.

TP-40 generally gave higher values for the 25-year, 24-hour rainfall than previous procedures. TP-40, plus new curve number procedures, provided the basis for converting from concordant flow methods to statistically more reliable flood-frequency analysis for determining detention storage requirements and watershed flooding and damages. Converting from concordant flow methods to computerized modeling of watersheds took time and training to achieve a total conversion. Concordant Flow analysis still appeared in a 1964 Oklahoma watershed plan. SCS began implementing digital reservoir routing (PESIN and RESIN) and water surface profiles computation programs between 1960 and 1964.

Changes in the methods of computing detention storage requirements occurred in a relatively short period of time. In 1957, major floods occurred throughout the Midwest from mid-April through mid-June; some areas received more than 35 inches of rain. Besides major flooding, two significant changes in dam design resulted from those floods. In late early 1959, the SCS EWP unit at Fort Worth, Texas, released a storm report for the 1957 flood. The water level in the reservoirs of some dams remained near the auxiliary spillway elevation for periods of up to 60 days. Most of the vegetation died in the detention pool area of many dams. This report recommended that dams be designed with a drawdown period of approximately 10 days. Several years later SCS added the concept of 10-day drawdown to address repetitive storms in dam design criteria. The report also recommended increasing the principal spillway release rates of two to five csm to a more reasonable value of "say 10 csm". For the next 10 years, and for some planners the next 15 years, almost every dam in Oklahoma was planned with a restricted release rate of exactly 10 csm even though it might be 90 percent or more of full pipe flow.

In March 1958, SCS issued Engineering Memo 27 (the entire document was revised and reissued on March 19, 1965). It contained design criteria for earthen dams that was used for the design of all watershed dams until SCS Technical Release 60 was issued in 1976. Although Engineering Memo 27 included hazard classification, it did not include a procedure for predicting a breach discharge and measuring its downstream impact. The 1958 definitions for hazard classification are exactly the same as the current TR-60 definitions except that TR-60 uses the word "dams" where Engineering Memo 27 used the word "structures".

In September 1958, SCS in Oklahoma issued Engineering Memo 28. This document contained a breach procedure and guidelines for evaluating the breach impacts. The breach defined in Oklahoma Engineering Memo 28 is the same rectangular breach that is still a part of the current TR-60. These Oklahoma procedures were used as the basis for SCS EWP Technical Guide 24 dated December 8, 1969. The example used in EWP Technical Guide 24 was an actual breach analysis of a proposed Washita River dam upstream from the town of Colony, Oklahoma that Ray Riley had completed in the spring of 1969. Oklahoma SCS was certainly a leader, if not the actual creator, of breach analysis procedures for dam hazard classification.

In May 1959, SCS Oklahoma issued Engineering Memos 33 and 35. They included design storm inflow hydrograph development and requirements for estimating storage requirements for dams. These two documents served as the basic procedure for determining detention storage requirements in Oklahoma until the "Washington Minimum" procedures were adopted in 1976.

In 1960, SCS developed the first watershed workplans with 100-year sediment life. Provisions for 100-year evaluations were contained in Public Law 566. The author is not aware of any PL-534 or PL-566 workplans prepared prior to 1960 that were planned with a 100-year sediment life.

During this period, several major actions influenced watershed planning for many years. In 1964, the Hydrology Branch of SCS in cooperation with the Hydrology Laboratory of the ARS developed the original FORTRAN computer program for watershed scale modeling through a contract with C-E-I-R, Inc. This later became the "TR-20 Computer Program for Project Formulation – Hydrology." The program began wide-scale usage in 1965 and is still used today in an MS Windows version. The program was very versatile; it accurately reproduced historical storms and allowed flexibility in

evaluating numerous alternatives. In 1965, the TR-20 program was only available on the IBM 1620 mainframe computer in Beltsville, Maryland. Users mailed batch input data to Beltsville and Beltsville mailed boxes of output data back to users in about six weeks. The program with flexibility for more dams and cross-sections easily runs on a personal computer today.

SCS issued a complete revision to SCS Engineering Memo 27 on March 19, 1965. This revision included comprehensive additions to criteria for dams. In July 1967, SCS issued an amendment to SCS Engineering Memo 27. It contained guidance to use cost as a criteria to subdivide the (a) structure class into (a) and (a+b/2). Class (a) (now low-hazard dams) required a minimum volume of detention storage from a routed 25-year, 10-day storm with a minimum auxiliary spillway freeboard design. Class (b) (now significant-hazard dams) required a minimum volume of detention storage from a routed 50-year, 10-day storm and an increased auxiliary spillway design. In effect, the a+b/2 criteria averaged the precipitation requirements giving a 37.5 year, 10-day storm.

Initially, SCS used (a) criteria for dams costing less than $75,000 and (a+b/2) criteria for higher cost dams. SCS Engineering Memo 27, supplement 6 in September 1974 increased the dollar value to $110,000. In 1976, TR-60 eliminated the dollar criteria and replaced it with "storage x height product of 30,000” criteria.

SCS Engineering Memo 27 also required the use of 30-inch diameter conduits on class (a) structures where a joint extension safety margin of at least 1.5 could not be achieved with smaller diameter conduits. The impact of this requirement was that most class (a) dams required a 30- inch diameter conduit unless it could be located on a non-yielding foundation. At the time, manufacturers did not produce a product that would meet these requirements for diameters less than 30 inches. As a result, SCS designed many smaller class (a) dams with restricted flow inlets because a 30-inch diameter full-pipe-flow conduit has discharges greater than 100 cfs. SCS often did not have the option to downstream channel improvement during this period, so the designers used 30-inch diameter conduits with restricted flow inlets or two-stage inlets. Two-stage inlets cost significantly more than restricted-flow inlets and two-stage inlets usually produced overbank flow at the higher stages. Many states chose to use restricted flow inlets rather than the two-stage inlets.

The National Environmental Policy Act (NEPA) of 1969 (effective on January 1, 1970) significantly impacted watershed planning. The act significantly increased planning time by requiring more input from the public and review by all potentially affected federal and state agencies. SCS had to prepare and publish an individual Environmental Assessment (EA) of Environmental Impact Statement (EIS) in the Federal Register for each project. After a comment period, SCS staff addressed all of the comments received during the comment period.

Almost concurrently with NEPA, SCS decided to no longer economically justify watershed dams as a group. Instead, SCS required incremental economic analysis for each dam (later small groups of similar dams) until no additional dams could be justified with a benefit-cost (B:C) ratio greater than 1.0. Prior to incremental analysis, most watersheds contained 50 to 60 percent control with 60 to 70 percent flood damage reductions. After the advent of incremental analysis, watersheds consisted of larger dams with only 20 to 30 percent watershed control with 25 to 35 percent damage reductions. Several watershed sponsors rescinded applications as a direct result of NEPA and the incremental analysis decision.

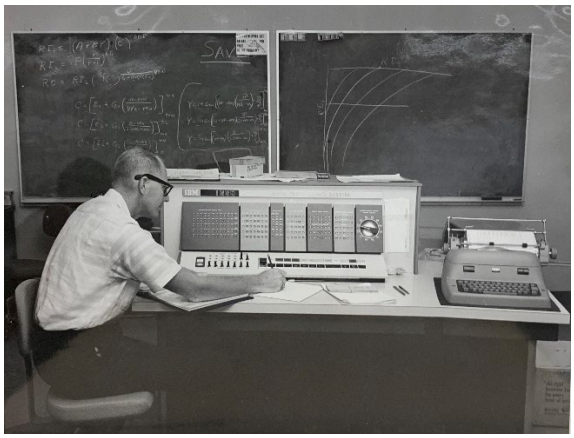
After 1972, Oklahoma SCS and project sponsors concentrated on getting previously planned dams constructed. No new watershed plans were approved in Oklahoma from 1971 to 1975 and only seven watershed plans containing dams have been authorized since 1975. The majority of the 508 dams built in Oklahoma since 1972 were in watersheds planned before 1972. Only 45 dams have been built in watersheds planned after 1972.

In February 1973, SCS issued Technical Release 52 as a guide for the design of earth auxiliary spillways for earth dams. This was one of SCS engineer Mel Culp's many contributions to dam design guidance in SCS. It significantly changed the layout and design of earthen auxiliary spillways. Most auxiliary spillways designed in Oklahoma prior to TR-52 used the hydraulic efficient case 8 auxiliary spillway profile (a critical exit slope, a 50-foot-wide level crest section, and a two-foot drop just upstream from the crest into the forebay section). The bulk length requirements in TR-52 virtually eliminated the use of case 8 spillways even though about 1,700 dams had been built by the time TR-52 was issued. Oklahoma SCS staffs believed that the resultant bulk length requirements in TR-52 were too conservative and that the location of the required bulk length measurement (two feet below the crest) greatly reduced the volume below the auxiliary spillway crest) was not realistic. To meet the requirements of TR-52, Oklahoma SCS developed the case 4(a) auxiliary spillway with a normally critical exit section, a level 50-foot crest section and a forebay slope of -0.004. Case 4 (a) has been the dominant auxiliary spillway profile since the mid 1970's. The arrival of the new technology in the new SCS SITES program greatly improved the design capability and expanded the choices for auxiliary spillway profiles. The case 8 and case 4 (a) profiles became the case 14 and case 27 under SITES technology.

In June 1976, SCS issued Technical Release 60. This document brought together all criteria for dams with a height times storage product greater than 3,000. TR-60 was another iteration to improve the criteria used during the first 25 years of dam building. TR-60 was updated with revisions in 1982, 1985, 2005 and 2019. The latest revision (March 2019) included significant changes in the following chapters: "Hydrology", "Geologic and Geotechnical Considerations", "Earth Embankments and Foundations", "Principal Spillways", and "Auxiliary Spillways."

SCS Engineering Memorandums				
No.	**Original Issue Date**	**Revisions / Supplements**		**Subject**
1	2/19/1954			Policy - Engineering Drafting Involved in Preparing Construction Plans
2	3/12/1954			Measurement of the Hydrologic Effects of Applied Programs on the 65 Watershd Protection Projects
3	10/7/1954	7/16/1956		Limiting Criteria for the Design of Earth Fill Dams
6	7/20/1954	6/18/1964 7/19/1972	12/8/1977 2/6/1979	Review and Approval of Engineering Plans Establishment of Technical Standards Governing Engineering Work
10	11/8/1954			Geologic Investigations
16	10/31/1955			Allocation of Sediment Storage for Design of Floodwater Retarding Structures
17	4/2/1956	9/19/1961		"As Built" Plans
19	11/7/1956			Input data required for computing certain parameters used in water surface profile computations for natural channels and output of Univac
23	12/9/1957			Approval and Review of High Hazard Dams
27	10/7/1954	7/16/1956 1/7/1957 3/14/1958 3/19/1965 3/4/1966 5/18/1967	3/15/1968 5/21/1969 6/4/1971 2/4/1972 6/1/1976	Limiting Criteria for the Design of Earth Fill Dams
28	8/23/1957	4/1/1958		Water Surface Profiles - Use of Electronic Computing Machines
31	4/2/1959			Emergency Spillway Design
33	2/8/1960			Dam Site Investigations
34	7/12/1957	4/11/1966	10/12/1971	Engineering Handbooks - Section 4, Hydrology, Supplement A
35	7/31/1958	7/23/1964 10/10/1966	7/19/1968 2/24/1969	Specifications for Construction Contracts for FP, WP, or RC&D Projects
38	11/25/1958			SCS Approval of Engineering Services Under Public Law 566
40	8/20/1959			Multiple Purpose Flood Control and Storage Dams
41	9/24/1959	10/28/1965		Criteria - Dams Built in National Forests
42	2/20/1961			Reinforced Concrete Pipe Drop Inlet Barrels
43	1/17/1961			Design Criteria for Water Storage & Water Retarding Structures in Series
45	9/11/1961			Field Study of Movements of Inlet and Barrel Sections of Principal Spillways Under Earth Dams on Compressible Foundations
47	11/22/1961	7/15/1966		Standards for Clearing Reservoirs Above Floodwater-Retarding and Multiple-Purpose Dams
50	5/16/1963	11/23/1965 9/12/1966 10/5/1966 9/12/1966	10/5/1966 6/2/1967 4/3/1968	National Standard Detail Drawings of Standard Covered Risers for Pipe Drop Inlet Spillways
52	7/24/1963	6/4/1965 10/6/1966	6/12/1967	Inspection of Construction Work
54	5/18/1964			Use of Non-Federal Engineers - Industrial and Municipal Water Supply
74	7/29/1970			Field Study of Emergency Spillway Performance
Other Criteria Documents				
Technical Releases				
20	1982	1986, 1990, 2015		Computer Program for Project Formulation Hydrolgy
33		1978		Simplified Method for Determining Floodwater Storage
35	1967			Method of Reservoir Flood Routing
48		2005		SITES Water Resource Site Analysis Computer Program
52	Feb. 1973			Design and Layout of Earth Emergency Spillways
60	June 1976	1982, 1985, 1990, 2005, 2019		Earth Dams and Reservoirs
National Engineering Handbook				
4	1956	1964, 1965, 1971, 1972, 1985, 1993		Chapter 10 - "Hydrology". Includes background and description of the Runoff Curve Number (RCN) developed by Mockus (1949), Sherman (1949), Andrews (1954), and Agrosky (1956)
Other Documents				
	1935			D.L. Yarnell, "Rainfall Intensity - Frequency Data"; Misc. Publication No. 204, USDA, Washington DC
TP-40	5/1/1961	US Weather Bureau		Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Figure 81: Historic SCS Engineering Policy/Criteria Documents



*"Mr. Ivie of Fort Worth using an IBM-1620 electronic computer
in the solution of a hydraulic problem of a watershed, SCS photo; no date; TX-49.380"*

"James S. Broussard, engineering aid with the watershed construction party in New Iberia, Louisiana; No date; SCS photo: LA-62671"

"Final embankment check being made by the Stephenville Soil Conservation Service Construction Unit on site 10 of the Upper Bosque River Watershed. James Moore, supervisory surveying technician, is assisting Anthony Paterson and Mike Wood, summer aids, in taking readings on top of the embankment while Walton Gregory, surveying technician, takes and records readings; Bosque SWCD; Erath County; no date; TX-51,200"

"Training WUC Polston in the use of a self-leveler used on watershed construction project. Upper Josiphine-Jackson Creek, Highlands County. SCS photo by Don Schuhart; Feb. 1965; Florida D13-11"

Figure 82: Photos showing technology tools used during the early days of the watershed program. Source: Photographs of Soil and Natural Resources Conservation Activities and Personnel, 1936-1988, Record Group 114-H, Box 81; National Archives at College Park, MD.

History of the Original SCS Dams Inventory Database

Provided by Bill Irwin, former NRCS National Design Engineer

Bill Irwin, former NRCS National Design Engineer, sent Larry Caldwell the following note on February 28, 2018 after Larry was asking questions on the history of SCS Inventory of Dams:

"Here is my summary of the SCS/NRCS Dams-Inventory effort through 2005. I hardly remember writing it, but it has the best account of various generations. I inherited the Dams Inventory in 1992 when John Bevard just could not handle it anymore as he was prime player in the Emergency Spillway data group at the time. So, Jerry Seinwell looked north to NENTC and I got it. SCS was married to UNIX databases at the time, but I could not do anything in UNIX so I quickly figured out that I could import delimited ASCII files out of UNIX and directly into Excel so I did most of the early compilation and updating in Excel. I kind of remember having Sarah at ASDSO try to do some work with those original delimited ASCII files later on but she could not work with them. When I discovered that forgotten Disk last week, I was surprised to see Mike Grounds apparently digested them." (Note: that "forgotten disk" contained the complete 1992 and 2005 SCS NIDs.)

Various offices of SCS began keeping computerized records of SCS assisted dams in the early 1970's. An Executive Order instructed all Federal Agencies including SCS to implement the Federal Guidelines for Dam Safety dated 1979 which requires each Federal agency involved with dams maintain an inventory of those dams. SCS began an effort in the early 1980's to centralize all dam records into a single national dataset. An SCS dams inventory database was developed and established under System 2000 on a mainframe computer located in Fort Collins. SCS States were able to access the database by remote batch to view and update their data with via Harris computer equipment. A UNIX based system replaced the old Harris system in 1990 and the database was moved to the Kansas City Computer Center in 1992. An Adobe Acrobat copy of the distribution Bulletin for the UNIX program and an Appendix detailing the dam data dictionary is included on this disk.

In 1988 funds were appropriated to the Corps of Engineers under PL99-662 to expand and update the national inventory of dams in the United States. The Corps executed a Memorandum of Agreement (MOA) with FEMA whereby FEMA assumed responsibility for development of the National Inventory of Dams (NID). In the early 1990's, FEMA hired a software contractor, Venture Computing, and worked with all dam safety agencies via the Association of State Dam Safety Officials and the Interagency Committee on Dam Safety to compile the NID. SCS subsequently established a MOA with FEMA to support development of the NID and provide funding for collective dam safety activities. Venture Computing developed PC-based software titled NATDAM to enable all participants to enter their data, and to compile an updated, PC-based NID. The first PC-based NID was compiled in 1992 and released on CD.

SCS also contracted with Venture Computing to download the existing SCS dataset from the Kansas City Computer Center mainframe into ASCII text, develop a new SCS dams inventory database paralleling the NID, and convert this dataset for inclusion in the NID. SCS also contracted with Venture Computing to develop PC-based software (SCSNAT) to enter, review, and correct data in the SCS dams inventory database. All of the dam inventory software developed by Venture Computing was based on an early DOS version of Borland PARADOX database software. SCS dams inventory data was added to the revised NID in 1994."

Emergency Action Plans

Emergency action plans (EAPs) are important documents to have in the event of an emergency involving the potential failure of a high-hazard dam. The EAP document that identifies incidents that can lead to potential emergency conditions at a dam identifies the areas and people that can be affected and specifies pre-planned actions to be followed to minimize property damage and potential loss of life because of failure or mis-operation of a dam. It is critical that the information contained in the EAP is accurate and current to effectively warn and evacuate people at risk and other citizens downstream from the dam.

Many dam owners may not know where to start in developing EAPs or what to include in them. In 2004, the NRCS and the ASDSO launched a joint effort to develop a sample EAP for earthen high-hazard dams. Through this effort, NRCS in 2006 revised agency policy relating to content and format of EAPs and prepared a final sample EAP. NRCS also developed an electronic "fillable form" template, instructions, and helpful hints to prepare site specific EAPs. Many states have adapted this sample as a basis for their EAPs.

The main elements of the NRCS sample EAP are:

- EAP Overview
- Roles/Responsibilities
- Steps 1 & 2: Emergency Level Determination
- Step 3: Notification and Communication
- Step 4: Expected Actions
- Step 5: Termination and Follow-up
- Maintenance/Exercising
- Appendices

In July 2013, FEMA issued revised federal guidelines for EAPs (FEMA P-64). In 2019, NRCS revised the original sample EAP and "fillable form" template to assure they were consistent with the updated FEMA document. Some of the major revisions included the following:

- Changed description of emergency levels from "1, 2, 3" to descriptive titles
- Added "High Flow" emergency level for situations when auxiliary spillway flows could inundate homes, business, roads, or other infrastructure
- Changed reference from "Evacuation Map" to "Inundation Map"
- Included reference to DamWatch alerts and documentation in tickets
- Adapted the template to *MS Word 2019*
- Made several miscellaneous edits

Users may edit the electronic "fillable form" template as necessary to adapt the format and content as necessary to meet State or local requirements and site-specific situations. These documents are available to the public on the NRCS website. See figure 83 for an example of an EAP prepared using the NRCS template.

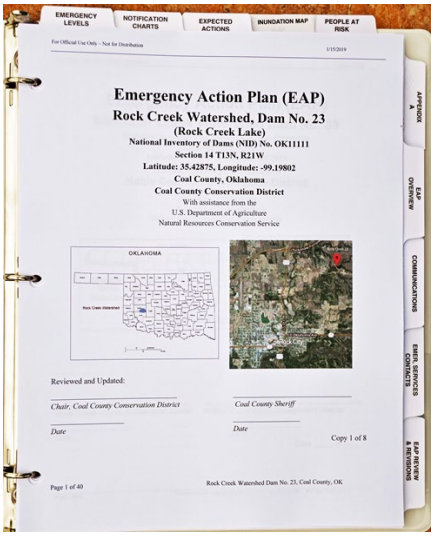


Figure 83: An example of an EAP prepared using the NRCS sample EAP fillable form template

The NRCS Sample EAP Documents may be obtained by going to the NRCS eDirectives (electronic directive system) on the NRCS website by typing in: http://directives.sc.egov.usda.gov; Click on "Manuals", then on "Title 180". Then click on "National O&M Manual," then on "Subpart F-Emergency Action Plan." This section shows the NRCS policy concerning EAPs. Scroll down to "Section 500.52B" for the sample EAP, the EAP fillable form template, and helpful hints.

The following tips will make site-specific EAPs easier to use:

a. Place the EAP in a three-ring binder for field use.
b. Use top "hot buttons" divider tabs to quickly access important sections during an emergency.
c. Use side divider tabs for major sections for use during training, annual reviews, and updating (see instructions on how to obtain preprinted divider tabs)
d. Use headers and footers to identify each sheet with dam name in case sheets get separated.
e. Number each copy of the final EAP and maintain a record of the person who received each copy to help assure all official holders receive future updates and revisions.

Preprinted Sets of Divider Tabs may be ordered by following these steps:

a. Access the following url: https://nrcspad.sc.egov.usda.gov/DistributionCenter/
b. Type 210–020 or "High-hazard Dams Emergency Action Plans" in the input box and click "*Search"*
c. A screen with the description of the divider tabs will come up; click on *"Add to Basket"*
d. Enter the quantity you wish to order (15 maximum for non-NRCS orders).
e. Select "Update Basket" button each time you add an item to your basket or adjust the quantity.
f. Click on *"Checkout," then* enter your shipping address information.
g. Click on "*Next" if* you have successfully placed your order, you will get a confirmation that reads*, "Your order has been received."*
h. Orders are shipped within 3 to 5 business days. NRCS provides the divider tabs at no charge.

Responding to Extreme Events and Potential Dam Failure Incidents

Extreme rainfall and seismic events associated with dams seem to be increasing in recent years. It is good to listen and understand the reports of people who were involved in the stressful situations that required life-saving decisions to be made quickly with little information. Most said they never thought it would ever happen to them. Hearing about the details of the disasters and how people died helps to better understand what could have occurred to reduce the number of fatalities. However, many dam failures are not caused by extreme precipitation events; many incidents involving aging dams have resulted from 25-year frequency storms or less.

Listening to personal accounts of those involved with response to recent extreme events such as Hurricanes Harvey and Irma, the Oroville Dam emergency, and the dam failures during the past several years should make one think about how they would respond in similar situations. This is especially important for NRCS and watershed project sponsors to be prepared for how they will respond when a watershed dam fails and loss of life results. Many sponsors and NRCS employees are not prepared for responding to such an unthinkable event. Recent national incidents should serve as a wake-up call for the need for training in emergency response.

Project sponsors and NRCS employees should hear the personal accounts described above so they can personally get that uncomfortable feeling in their stomach so they may be called to action. Hopefully, they will make a personal priority to take the actions necessary to be better prepared to respond if needed during their watch. Most do not have the training or awareness of what needs to be done. What can and should be done to be better prepared? The following is a summary to identify questions that everyone should ask and actions that can be taken now to provide a plan for a more effective and quicker response to a dam failure.

Background:
Dam failure, or even a near failure, is fortunately not a common occurrence. To date, there has been no loss of life or significant property damage resulting from the failure of a watershed dam. However, as many of the watershed dams reach the end of their planned designed life span, the potential for such events increases. And, as more development occurs downstream from dams, the population at risk and the potential for loss of life and property damage increases.

Watershed sponsors, state dam safety agency officials, NRCS staff and others who will be involved in dealing with a dam failure or a major problem with a dam must be better prepared for such an event. State and local officials will need critical information to help with emergency response in a safe, organized, and timely manner. Emergency situations will usually involve interaction with the media and social media.

Dam owners and emergency managers must work closely together quickly to protect people in the areas threatened by damaging floodwaters to avoid loss of life and injuries. Case studies clearly show extreme losses can occur with limited or no warnings of population at risk in the flood impact zone. The case studies also show the importance of warning time and rapid public response during dam failures.

In November 2019, FEMA released a new publication entitled “Emergency Operations Planning: Dam Incident Guide”. It is intended to help local emergency managers to create a plan to respond

to dam incidents and failures that take place in or affect their communities. The guide includes a general template for a dam incident response plan that can be adapted to meet specific community needs. The publication can be accessed at https://fema.gov/technical-manuals-and-guides

Questions to answer to be better prepared to respond to a dam safety incident:

1. Who should be contacted immediately during or after a dam failure incident?
2. Who has the authority for implementing evacuations?
3. Are public affairs staffs prepared to assist with response to public inquires?
4. What media should be contacted for spreading critical information?
5. How will you respond to inaccurate "facts" that are being spread by social media?
6. What is NRCS' policy on responding to a call that a dam is failing and fatalities may have occurred? (State Conservationists, NHQ, USDA?)
7. Where are critical documents needed for making decisions for specific dams?
    a. Emergency action plans
    b. Breach inundation maps
    c. As-built drawings
    d. Inspection reports
8. Do you understand the basic concepts and terminology used by emergency management personnel using the Incident Command System (ICS)?
9. Do emergency response personnel understand actions that may be needed during or immediately following a dam failure?
10. If conditions warrant, who are the technical experts that may help to quickly evaluate and recommend actions that may reduce the impacts of a complete failure?
11. What are the state or local emergency contracting procedures available in your state and how can they be implemented?

Actions to take to be better prepared to respond to dam failure incidents

1. Assure that all high-hazard dams have current emergency action plans (EAP).
2. Learn how to conduct periodic tabletop exercises of EAPs (resources are available from ASDSO and your state dam safety agencies).
3. Conduct periodic tabletop exercises of EAPs for high-hazard dams.
4. Work with state and local staffs to develop a good working relationship with emergency management officials (police, sheriff, firemen, emergency managers, etc.) so that everyone is on a first-name basis and understands the potential dangers involved and what may need to be done in the event of an emergency.
5. Provide ICS training to those who may be involved in response so that they understand the concepts and terminology of ICS used by emergency managers.
6. Know where critical information is located for dams.
7. Identify and train public affairs staff to assist with working with media staffs and social media during an emergency following a dam incident. See "Break Glass in Case of Dam Failure" document in Appendix 6 to assist in working with the media.
8. Provide training on basics of EAP preparation, ICS, and tabletop exercises.
9. Become an authorized user and become proficient on use of DamWatch.
10. Assemble a team of technical experts and public affairs specialists to be available to assist sponsors and NRCS during emergency situations.
11. In the event of a dam failure, refer to the ASDSO document entitled Dam Failure Investigation Guidelines that is available at the following website: https://damsafety.org/sites/default/files/DFIC_Investigation_Guide_12-10-11_0.pdf

Potential for Loss of Life due to a Dam Failure

The following information is taken from work completed by Wayne Graham P.E., a hydraulic engineer with the Technical Service Center, Bureau of Reclamation (BOR), in Denver, Colorado. Mr. Graham worked most of his 30+ year career to investigate all dam failures that resulted in one or more fatalities. He has prepared numerous reports on the consequences of dam failures. In 2010, BOR released a document entitled " Estimating Loss of Life for Dam Failure Scenarios." The report, that was a culmination of Mr. Graham's work, contains a 12-step process for evaluating the loss of life that would occur from flash floods and floods caused by dam failure.

Much of Mr. Graham's work is based on his detailed study of all dam failures in US that resulted in 1 or more fatalities (1874 to 2008). He concentrated his study on 400 dam failures that occurred from 1985 to 1998 and 317 fatalities from dam failures that occurred from 1960 to 2008.

To provide context of Mr. Graham's work, it is important to understand the median sizes of watershed dams so that they can be compared to his conclusions. Summary of July 2019 NID data for 11,841 watershed dams:

Height: maximum 145 ft.; median 32 ft.
Drainage area: maximum 252 sq. mi.; median 1.4 sq. mi.;
90% of the dams have drainage areas less than 10 sq. mi.
Total storage: maximum 90,310 ac. ft.; median 530 ac. ft.)

Mr. Grahams work concluded the following data of dam failures that resulted in fatalities (the numbers in parenthesizes are the median data for watershed data):

1. 88% of the fatalities were from dams between 20 and 49 feet in height (32 ft.)
2. 47% of the fatalities were from dams with drainage areas with < 2 sq. mi. (1.4 sq. mi.)
3. 75% of the fatalities were from dams with drainage areas with < 10 sq. mi. (93% < 2 sq. mi)
4. 87% of the fatalities resulted from dams with < 1,000 ac. ft. of storage (530 ac. ft.)
5. 7 dams had < 300 ac-ft of water released during the failure (530 ac. ft.)
6. The fatalities resulting from failure of smaller dams occurred within the first 3 miles downstream. For larger dams, the fatalities extended more than 15 miles downstream.

The above summaries demonstrate that the median sizes of characteristics of watershed dams are the sizes that Mr. Graham found were the most likely to result in fatalities if the dams failed.

Mr. Graham determined that the following are the greatest factors that influence loss of life from dam failures:

Number of people at risk
Flood depths and velocity
Time of day during the dam failure
Ease of evacuation of at-risk people
Timeliness of warnings so that at-risk people can evacuate and protect themselves

Of the above factors, the only factor that can be prepared for is timeliness of warnings. Being prepared with current emergency action plans, training in how to respond quickly, and monitoring conditions are critical for issuing timely warnings and thus, reducing fatalities. One of the many lessons learned from Hurricane Katrina was that "we need to think of the unthinkable and plan accordingly".

Dams can fail quickly:
Mr. Graham's study included case studies that showed dams can fail quickly, leaving little time for warning and evacuation of people in harm's way downstream. For example, on June 5, 1976, Teton Dam in Idaho failed in less than five hours after a problem was initially identified.

1. Seepage on the downstream slope was first noticed at 7:00
2. At 9:30 am, the project engineer thought dam could be saved and dispatched two D-9 dozers to fill the eroded areas (both dozers were lost into the quickly growing erosion area)
3. Public warnings were issued at 10:45 am
4. The dam failed at 11:57 am

But this failure case study also demonstrates the benefit of a quick response to a potential dam failure situation with timely warnings. Teton Dam was the largest earth-fill dam in the United States. It was 305 feet tall and had a reservoir volume of 250,000 ac.-ft. The dam failed on a Saturday morning at 11:57 a.m. The public were warned prior to the failure. Only 11 fatalities resulted (6 drown, 3 heart failures, 1 accidental gun shot, and 1 suicide). Some of the fatalities were due to at-risk people who had evacuated but returned to their property.

The resulting downstream flood covered more than 150 sq. mi. including flood depths greater than 15 feet deep in Sugar City, and 8 ft. in Rexburg. More than 700 houses were destroyed and additional 3,000 houses were damaged. There were no fatalities in these cities!

Cities of Rexburg and Sugar City inundated by flood waters after failure of Teton Dam

Most fatalities resulted from smaller dams:
Contrary to popular belief, the failure of large dams don't kill the most people; the failure of smaller dams do. The failure of Teton Dam (the largest earth dam in the United States) resulted in only 11 fatalities. However, the following case studies demonstrate the potential for greater loss of life as a result of the failure of much smaller dams that are near the size of typical watershed dams. Note that all of the following dams are the typical size of watershed dams.

<u>Laurel Run Dam (Pennsylvania):</u>
Dam height: 42 feet
Age: 63 years old
Reservoir volume: 310 acre-feet
Dam failed at 2:35 a.m. on July 20, 1977
No warnings were issued
30 houses suffered major damage
40 fatalities resulted

<u>Kelly Barnes Dam (Georgia):</u>
Dam height: 40 feet
Reservoir volume: 630 acre-feet
Dam failed: 1:20 a.m.,
Sunday, Nov. 6, 1977
No warnings were issued
9 houses, 18 mobile homes,
& 2 college dorms were destroyed
39 fatalities resulted within 2 miles of the dam in Taccoa, GA
(20 were children)

<u>Timberlake Dam (Virginia):</u>
Dam height: 33 feet
Reservoir volume: 1,449 acre-feet
Dam failed: 11 p.m. on June 22, 1995
No warnings were issued
2 fatalities: a woman drowned after her car was swept off a road downstream from the dam breach; a first responder drowned while trying to save her

Big Bay Dam (Mississippi):
Dam height: 57 ft.
Storage: 22,100 ac-ft
Failed at 12:20 p.m.
Friday, March 12, 2004
Emptied in 2.5 hours
No fatalities: officials credited the EAP
Significant property damage
121 homes were damaged; 52 homes were destroyed, including several that were 17 miles downstream from the dam

The residents in the above communities and others that experienced dam failures would have never expected to see the following headlines in their local papers. No community expects these tragedies to occur:

The Salt Lake Tribune

Georgia Dam Bursts, 37 Kil

Laconia:

Belmont:

The Citizen

VOL. 70 NO. 64 LACONIA, N.H.

Shock, Disbelief

Dam Not Up For Review Until 1997

Local woman drives in rain, fails to return

By Dave Curley
Staff writer

JUN. 2 4 1995

Doris spent Thursday with her grown children in Richmond. Just before she got in her car to return home, she called her husband in Forest to tell him that she loved him and that she would be home soon.

More than 24 hours later, she had not arrived and her friends and family had heard nothing from her.

Stanley

"She's just disappeared, car and all," family friend Vicki Bailey said Friday night. "We're at

Reservoir Dam Bursts in Hawaii; One Is Killed and 7 Are Missing

By JANIS L. MAGIN
New York Times

HONOLULU, March 14 — One person was killed and as many as seven were

Dam Breaks; Town Inundate

The Estes Park TRAIL-GAZETTE $1

4 Feared Lost in Flash Flood

Many dams fail during their "first filling":

Mr. Graham also found that many dams failed when their reservoirs first filled to maximum capacity when the maximum stresses were placed on the dam's foundation, abutments, and components of the dam. The majority of watershed dams have never flowed through the auxiliary spillway since they were constructed (based on Oklahoma study; see page 135). Therefore, most watershed dams have not had a "first filling" even though they may be 50 years old!

Watershed Dams Can and Have Failed:

Several watershed dams have failed during the past few decades; however, no fatalities or significant property damage has resulted to date. As the dams get older and more development occurs downstream from the dams, this record will be difficult to maintain.

The following are examples of watershed dams that have failed. The most recent dam failures occurred in Wisconsin (five dams failed in August 2018) and in Mississippi (one dam failed in February 2019).

Obion Watershed (OH)

Sugar Creek Watershed; L-44 (OK) 2007

Black Creek Watershed (MS)

Upper Red Rock Watershed; Dam 20 (OK)

Askalmore Watershed (MS) Feb. 2001

Coon Creek Watershed; Dam 2 (WI)

DamWatch

(This section includes excerpts from a paper entitled “NRCS -DamWatch® - Lessons Learned and Looking Ahead” presented at the 2018 ASDSO conference in Seattle Washington. Authors of the paper were Steve Durgin, Larry Caldwell, and Joseph Scannell)**:**

The Need for a Reliable Dam Monitoring System:
NRCS recognized many safety issues with aging watershed dams that could potentially result in loss of life or significant property and environmental damage. Monitoring of these dams was critical to identify potential disastrous events in a timely manner so preventive actions or evacuations can take place before lives are lost. NRCS deployed DamWatch to provide an effective dam monitoring system helps to address many issues as follows:

- Dams are critical infrastructure that communities depend upon for flood protection and water supply. Most residents are not aware of the risks associated with these aging dams. NRCS uses DamWatch to provide basic data that sponsors can use to prepare information stories to inform communities about the dams that protect and serve them.
- An increasing number of people living downstream from the dams are at risk. NRCS and project sponsors originally constructed most of the dams to protect agricultural areas. However, in many cases, people began to build houses and businesses downstream from the dams following construction. Now the dams protect people’s lives. NRCS and sponsors use DamWatch to monitor high-hazard dams to enable a quick warning to downstream people at risk if extreme events occur.
- Dams are aging and need additional attention. NRCS designed most of the dams with a 50-year service life. In 2020, the oldest watershed dam will be 72 years old and the median age of all 11,800 dams is 50 years. NRCS and sponsors use DamWatch to store critical historical records about dams.
- Extreme weather events are increasing causing a greater variability in precipitation intensity, frequency, and quantity resulting in larger and more frequent floods, and increased drought severity. Watershed dams help protect communities by providing safe flood control and dependable water supply for residents, industry, and irrigation.
- Limited funds are available for maintenance and rehabilitation to keep the dams safe. NRCS and sponsors use DamWatch to provide data that assist with prioritizing needs for O&M and rehabilitation.
- Fewer experienced people are available to address operation and maintenance (O&M) issues and effective response to emergency conditions. NRCS and sponsors use DamWatch to provide real-time climate and background information to assist new employees and inexperienced staff.

In short, NRCS needed a reliable dam monitoring system to provide timely warning when disasters such as earthquakes, large rainstorms, or wildfires occur. A monitoring system also makes critical records readily available, as well as capture institutional knowledge about the Watershed Program (the little things that make a big difference) for future generations. DamWatch provided a solution.

NRCS DamWatch Background:
In 2010, the NRCS and Oklahoma Conservation Commission partnered with USEngineering Solutions (USES) Corporation of Hartford, Connecticut, to implement *DamWatch*® to monitor and store data for 2,107 watershed dams in Oklahoma. NRCS funded this project as a national pilot for a web-based watershed information system. USES provided the pilot web application to the NRCS using a Software-as-a-Service (SaaS) delivery model.

In 2012, NRCS awarded a contract to USES to expand the DamWatch system to cover the 11,800 dams in 47 states. USES provided the system as a Customizable-off-the-Shelf (COTS) application. NRCS deployed the system in the Federal server farm located in Kansas City, Missouri. The NRCS National DamWatch allowed watershed sponsors and NRCS personnel to monitor, in real-time, and respond to potentially destructive flood events. In 2017, NRCS and USES extended the contract to provide NRCS and project sponsors continued service for another five years.

In 2018, after the first five years of implementation, training, and field experience, a summary presentation was made at the 2018 ASDSO national conference. The presentation included a summary of the efforts to enhance the NRCS DamWatch application as well as lessons learned during its deployment. Deployment included a massive nationwide call for data that resulted in over 85,000 digitized dam safety related files including emergency action plans, as-built drawings, inspection reports, operation and maintenance agreements, pictures and other dam related files. Throughout the implementation phase the NRCS Project Team integrated numerous data sources to the National DamWatch system to enhance environmental hazard awareness including precipitation (forecast and actual), earthquake, hurricane, snow melt, and site deployed devices to name a few. During a five-year period, NRCS trained more than 1,000 users. Events such as Hurricanes Joaquin, Harvey, and Irma, as well as many local extreme rainfall events, successfully tested the application. NRCS learned many lessons that assisted in making the system more efficient and useable.

DamWatch Description:
DamWatch is a web-based dam-monitoring software system that empowers NRCS, project sponsors, and emergency managers to leverage electronically stored dam-safety data with real-time data monitoring. The system uses real-time precipitation and stream flow data from the NWS and the U.S. Geological Survey (USGS) to alert identified staff and emergency personnel of predetermined site-specific thresholds. Upon receipt of alerts, personnel can use the system interface to determine the need for preventative actions or emergency response during potentially life-threatening situations, especially those involving high-hazard dams. See the following link for additional information on the DamWatch application: http://www.usengineeringsolutions.com/

DamWatch utilizes GIS to display the dam location and drainage area and allows the dam owner and dam safety personnel to monitor dams proactively, in real time, so they can better respond to potentially hazardous and life-threatening storm events. The system collects and processes the real-time data at regular intervals and is compared against predetermined thresholds to alert essential personnel when the dams are experiencing a critical event.

DamWatch enables 24/7 real-time access to information via the web by multiple entities and mobile users as opposed to having access restricted only to those with the ability to get to an office and file cabinet drawers.

Rainfall amounts at specific locations can vary significantly when a precipitation event moves through an area with numerous watershed dams. Using NWS radar data, *DamWatch* can determine which dams have received the heaviest rainfall within their drainage basin and, therefore, have the highest probability of spillway flow. This allows project sponsors and NRCS to prioritize field inspections of the most critical dams first. *DamWatch* can save time and money by helping to initiate preventative actions or emergency responses.

The NRCS National DamWatch system gathers and archives numerous real-time environmental conditions from public data sources such as the National Oceanic and Atmospheric Administration (NOAA), the NWS, the USGS as well as numerous field-deployed devices. DamWatch uses these data sources to assist dam owners and operators to increase the situational awareness of natural hazards. The following are the data sources currently employed in the NRCS DamWatch application:

- NWS NEXRAD Level 3 Digital and Non-Digital Accumulated Precipitation
- NOAA (NCEP) Qualitative Precipitation Forecast (QPF)
- NOAA (AWPS) Qualitative Precipitation Estimate (QPE)
- NOAA (NHC) Hurricane P-Surge 2.0
- USGS Real-time River Gage Network
- USGS Shake Cast Seismic products
- NSIDC SNODAS Snowpack and melt-rate models

NRCS users establish a default threshold value for each alert level. Typically, DamWatch triggers a rainfall alert when runoff from rainfall over 75 percent of the watershed area of a dam would theoretically raise the reservoir level from the principal spillway crest up to the crest of the auxiliary spillway. A Spillway Flow Alert is issued when an additional 2-inches of rainfall is received that would theoretically result in flow in the auxiliary spillway.

The NRCS National DamWatch system employs an automatic messaging system that alerts users via cellular phone text messages or e-mails. Users can monitor these messages during critical flood events. Accordingly, NRCS and sponsors can dispatch appropriate staff to those dams for alerts issued during a storm event. NRCS personnel and sponsors can remotely access DamWatch using any web-enabled mobile devices. NRCS provided tablet computers to selected users for accessing DamWatch in the field. The tablets enable personnel to interact remotely with the system to document activities, upload pictures, and view online files. Each tablet has the capability to receive alerts, take pictures and videos, and even video chat with other deployed field personnel.

The system stores site-specific data such as as-built drawings, inspection reports, operation and maintenance agreements, emergency action plans, photos, videos, and watershed benefits data. Users can access this data via remote means to allow interaction between on-site personnel and specialists in various offices. Figure 84 provides a summary of the 84,555 files that had been loaded into the DamWatch system as of July 27, 2018.

Summary of the Number of Files Loaded in DamWatch as of July 27, 2018										
State	Region	No. of Dams	Documents	Drawings	EAP	Inspections	Pictures	Videos	Total No. of Files	Ave. No. Files/Dam
AL	SE	107	464	159			4		627	5.9
AR	SE	208	251	264	51		204		770	3.7
AZ	West	25	227	36	11	158	3		435	17.4
CA	West	16	64	20	4				88	5.5
CO	West	145	25	132					157	1.1
CT	NE	30	97	28					125	4.2
FL	SE	10		10					10	1.0
GA	SE	357	1,428	690	64	32			2,214	6.2
HI	West	9	26	14					40	4.4
IA	Central	1,615	65	1,093			18		1,176	0.7
ID	West	3	8	2					10	3.3
IL	Central	66	66	66	4	40	5		181	2.7
IN	Central	134	533	19		2	201		755	5.6
KS	Central	831	59	1,422			12	2	1,495	1.8
KY	SE	200	16	6		27	87		136	0.7
LA	SE	35	616	52			1,484		2,152	61.5
MA	NE	30	92	30					122	4.1
ME	NE	16	24	32					56	3.5
MD	NE	16	59	16	3	7			85	5.3
MI	NE	13	97	13					110	8.5
MN	Central	51	334	39		54	2		429	8.4
MO	Central	1,203	2,820	987		21	64		3,892	3.2
MS	SE	560	639	458			205		1,302	2.3
MT	West	19	64	22	25	68			179	9.4
NC	SE	114	29	80			22		131	1.1
ND	Central	50	176	2	31		1		210	4.2
NE	Central	738	2,162	726		1	32		2,921	4.0
NH	NE	24	289	87					376	15.7
NJ	NE	20	152	25	2	33	50		262	13.1
NM	West	79	254	151					405	5.1
NY	NE	59	408	80	28	113	253		882	14.9
NV	West	8	1	7		4			12	1.5
OH	NE	64	150	79	44	521	173		967	15.1
OK	Central	2,107	3,729	25,524	1,204	2,269	532	1	33,259	15.8
OR	West	6							0	0.0
PA	NE	91	1,607	116	1		160		1,884	20.7
PR	SE	2	102				34		136	68.0
SC	SE	105	127	93			6		226	2.2
SD	Central	59	274	56		1	20		351	5.9
TN	SE	143		199					199	1.4
TX	Central	2,003	77	19,694	1	24	203		19,999	10.0
UT	West	45	184	15	5		8	4	216	4.8
VA	NE	150	482	161					643	4.3
VT	NE	4	16	5			8		29	7.3
WA	West	3	28	4		3	23	6	64	21.3
WI	Central	88	241	119	5	143	604		1,112	12.6
WV	NE	170	871	401	339	389	1,710	5	3,715	21.9
WY	West	14		10					10	0.7
Totals		11,845	19,433	53,244	1,822	3,910	6,128	18	84,555	7.1

Figure 84: Number of files stored in the National NRCS DamWatch as of July 27, 2018

Number of DamWatch Users:
The number of users continued to grow since NRCS established DamWatch as a part of normal operations. In 2018, there were 1,204 authorized users in the national NRCS DamWatch system. The following is a summary of the types of users in the system:

NRCS Field Offices: 378
NRCS Area Offices: 161
NRCS State Offices: 196
NRCS National Office: 35
Administrators: 109
System Administrators: 19
Project Sponsors: 162
State Conservation Agencies: 48
State Dam Safety Agencies: 38
Emergency Managers: 20
Other: 34
USES: 4

Conclusions:
DamWatch supports NRCS project sponsors and other stakeholders by providing:

- Remote real-time access to critical technical data for dams (Critical for field personnel investigating a potential emergency who need basic site-specific data.)
- Interactive capability to share on-site technical information in real-time (photos, videos, notes, etc.) to specialists in NRCS (state office and technical centers), state dam safety officials, and state conservation agencies.
- Alerts to local and state officials of seismic events and high rainfalls on the drainage areas of individual dams and identify those that spillway flows are or could soon be occurring so dam safety personnel can prioritize their resources and concentrate their efforts on the most critical needs (i.e. those that have the potential for loss of life).
- Access to current emergency action plans with current contact information on people at-risk so emergency management personnel can prepare for possible warnings and evacuations in a timely manner.
- Empowering NRCS dam safety engineers to predict, identify, prepare for, and record potentially destructive flood and seismic events. NRCS, watershed project sponsors and dam safety officials have the capability to efficiently dispatch emergency personnel, dam safety inspectors, and maintenance workers before, during, and after a flood or seismic event affects their inventory of structures. It is especially important to provide this support for project sponsors and NRCS staffs that have dwindling institutional knowledge and experience with aging dams. The tool can identify the occurrence of potential hazards, and serves as a repository for relevant structure information, several sources of real-time meteorological data, hydrologic data, seismic data, and any monitoring device data available.
- Facilitating communication and coordination by automatically contacting key personnel and informing them of potentially destructive events linked to individual thresholds and user-defined emergency action plan (EAP) protocols.
- Allowing real-time access of, through a graphical display of geographic data, an inventory of monitored structures and the list of structures experiencing a respective critical event. DamWatch creates a watch list of structures that identifies a priority list requiring action according to user-defined parameters. DamWatch also provides users with pertinent

structure information, real-time meteorological data, hydrologic data, and seismologic mapping data. Beyond timely effectuation of individual action plans, users can document off-site and on-site responses electronically.

- DamWatch facilitates efficiency in annual operation and maintenance inspections. It allows local field or area offices, in conjunction with the local sponsors and state dam safety officials, to identify minor concerns before they escalate into major concerns. It allows all engineers, inspectors, and other personnel associated with a dam to share previous actions and inspections.

In summary, DamWatch provides:

- Alerts to forecast and real-time events on 11,800 NRCS-assisted dams.
- Access to current dam data and EAPs.
- Interactive transfer of data from the field to specialists in local, state, and national offices.
- Fast and consistent data access to dam safety information.
- Relevant dam safety information tailored to each specific dam site.
- Capability for rapid response of critical data to emergency managers and first responders to identify people to evacuate in a short time as well as technical support services available to assist.

Loss of Institutional Knowledge

Douglas Helms, SCS Historian, highlighted the influence of the Watershed Programs on the USDA, and on the Soil Conservation Service in particular, in many of his articles. In his article, “Legacy of the Flood Control Act of 1936” (1988), he concluded with the following;

> “The inclusion of a strong water resources program in SCS certainly broadened the base of disciplines. Hugh H. Bennett and Walter Lowdermilk viewed soil conservation as an interdisciplinary undertaking and included the many disciplines in the formative years. The water resources activity brought more hydrologists, engineers, geologists, and economists into the combined soil and water program than might have been expected. In response to the controversies arising from complying with the National Environmental Policy Act, more biologists were added. Furthermore, the methods of planning and implementation under the flood control acts provide a basis, if not to ensure that each discipline participate in the joint soil and water conservation effort, encourage such participation.”

Figure 75 shows the appropriations for the Watershed Program steadily decreased from the mid 1990’s with a six-year period of no appropriations other than for rehabilitation. During this time the generation of technical staffs and sponsors who planned, obtained easements, designed, and constructed the watershed dams and other structural measures were retiring. Since funding decreased significantly, many remaining technical staffs were disbanded, and positions vacated by retirements were not filled. As a result, there has been an increasing loss of institutional knowledge.

Figure 85 provides a summary of when the last new damwas constructed or rehabilitated in each state With the reducing institutional knowledge remaining, most states are relying on consultants to plan and design new and rehabilitated dams.

The following is a “big picture” look at the critical issue of loss of institutional knowledge of constructing watershed dams.

- 22 states have **not** had a new project dam constructed within the past 25 years.
- 18 states have constructed new project dams within the past 10 to 25 years.
- Only 8 states have constructed new project dams within the past 10 years.
- 22 states have completed rehabilitation of dams within the past 12 years.
- 25 states have had new or rehabilitated dam construction within the past 10 years.
- 17 states have **not** had new or rehabilitated dam construction within the past 25 years

State	Year Project Dams Built		Last Rehab
	First	Last	
Alabama	1960	2001	2008
Arizona	1956	1988	2017
Arkansas	1954	2008	2011
California	1956	1991	
Colorado	1954	1996	2019
Connecticut	1960	1994	
Florida	1959	1981	
Georgia	1953	1993	2011
Hawaii	1965	1998	
Idaho	1966	1989	
Illinois	1954	2003	
Indiana	1959	2003	
Iowa	1948	2012	2011
Kansas	1954	2010	2015
Kentucky	1955	2010	2007
Louisiana	1958	1975	
Maine	1964	1975	
Maryland	1958	1975	
Massachusetts	1960	1990	2012
Michigan	1961	1993	
Minnesota	1957	2010	
Mississippi	1956	2003	2016
Missouri	1954	2010	2010
Montana	1962	1977	
Nebraska	1954	2015	2013
Nevada	1960	1970	
New Hampshire	1962	1983	
New Jersey	1959	1986	
New Mexico	1955	1995	2007
New York	1955	2001	
North Carolina	1954	2012	
North Dakota	1955	2007	2014
Ohio	1955	2000	2010
Oklahoma	1948	2011	2019
Oregon	1967	1984	
Pennsylvania	1960	1994	2010
Puerto Rico	1978	1984	
South Carolina	1954	1990	
South Dakota	1955	1998	
Tennessee	1954	2002	2010
Texas	1948	2009	2019
Utah	1955	1989	2019
Vermont	1968	1973	
Virginia	1954	2001	2019
Washington	1971	1977	
West Virginia	1954	2009	2013
Wisconsin	1956	1987	2012
Wyoming	1958	1984	

Figure 85: Years that project dams were built or rehabilitated in each state/territory

Special Studies of Oklahoma Watershed Dams

The following special studies of watershed dams in Oklahoma may be of interest and have some applicability to dams in other states:

Dams in Series (Oklahoma only):
During the process of updating the DamWatch threshold rainfall amounts, the issue of dams in series was investigated. The NID definition for drainage area (DA) includes the entire area upstream from a dam including the drainage areas of all upstream dams. In reviewing Oklahoma's NID, it was found that there was not a lot of consistency in how the drainage areas for dams in series were entered; some were total drainage areas while some were just the uncontrolled area below the upper dam or dams. It is suspected that the same issue exists in other states.

The calculated areas of the drainage area shape files used in DamWatch and the benefits model were compared with the drainage areas shown in the NID. Discrepancies were resolved. The project maps for the 120 watershed projects with dams were reviewed to identify dams in series. We identified 167 dams in series with 111 of these dams upstream from 56 lower dams. The total and uncontrolled drainage areas were checked to see how/if they compared to the existing NID DA values. In the end, we determined there were 118 dams in the Oklahoma NID that required the drainage areas to be corrected.

Number of Residents Close to Watershed Dams (Oklahoma)
Oklahoma has a lot of watershed dams scattered across the state. We completed an analysis to determine how many Oklahoma residents were within different distances from a watershed dam. It was determined that 9 out of 10 Oklahomans (92.9 percent) live within 20 miles of a watershed dam. Figure 86 demonstrates that watershed dams are close to all Oklahomans and that residents live, work, and play under their protection every day.

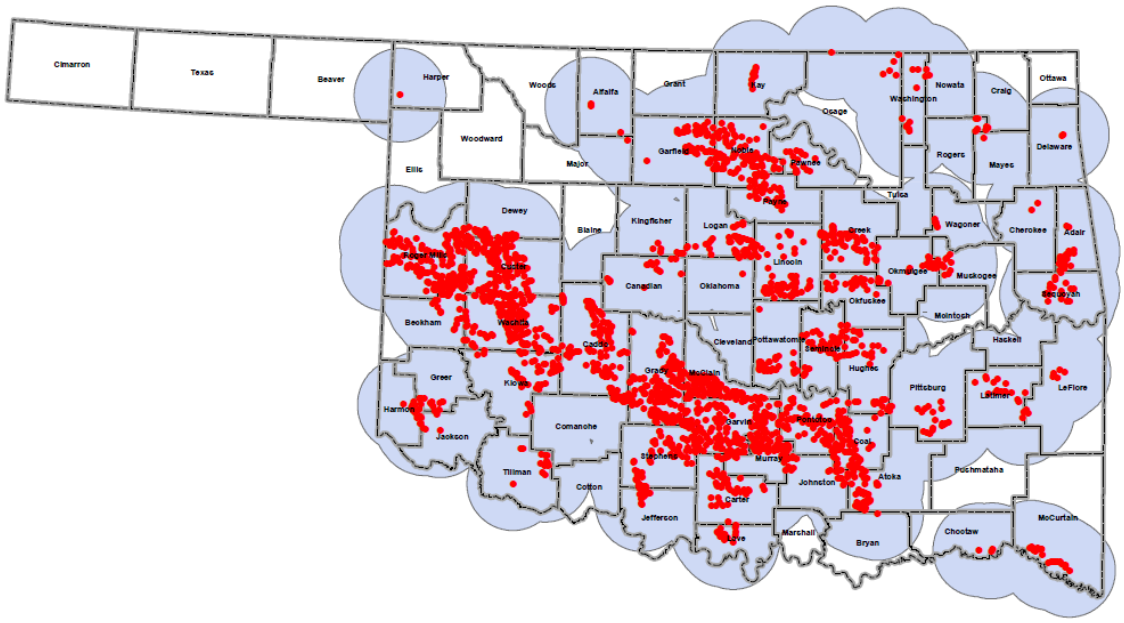


Figure 86: Map showing area that is within a 20 miles radius of each dam in Oklahoma. 93 percent of the Oklahoma population lives within the area shown.

Summary of Potential Damage Locations (Oklahoma):
The Oklahoma special watershed team completed breach inundation studies during their work on 202 dam assessments. NRCS retired GIS Specialist Jim Henley prepared a registry of the potential damage locations (PDLs) as the breach inundation maps were completed. PDLs are infrastructure such as houses, business, churches, campgrounds, roads, and bridges that could be inundated if the dam should fail. Jim quickly determined that a specific PDL impacted by one dam could also be impacted by another dam on the same tributary. Jim maintained the registry as additional assessments were completed. Each PDL was given a unique ID. The registry included a description of the structure, latitude and longitude location, elevations of the ground and maximum water surface, maximum water depth, and photo ID number.

The registry provided consistent information for the PDL in case it was determined that it could also be impacted by the breach of another dam.

The following is a summary of the 4,535 PDLs Inundated by the Breach of 202 Watershed Dams Assessed as of December 5, 2015:

PDL Totals

All PDL's impacted by 1 dam:		3,744
All PDL's impacted by 2 dams		478
All PDL's impacted by 3 dams		189
All PDL's impacted by 4 dams		108
All PDL's impacted by 5 dams		10
All PDL's impacted by 6 dams		6
	Total	4,535

PDL breakdown:

Occupied houses, mobile homes, double-wide, apartments, cabins, and camper trailers:

2897 impacted by 1 dam
366 impacted by 2 dams
146 impacted by 3 dams
89 impacted by 4 dams
5 impacted by 5 dams
1 impacted by 6 dams
3504 total

Commercial buildings, schools, and churches:

389 impacted by 1 dam
48 impacted by 2 dams
28 impacted by 3 dams
6 impacted by 4 dams
3 impacted by 5 dams
5 impacted by 6 dams
479 total

Highways 2-lane, 4-lane:

123 impacted by 1 dam
10 impacted by 2 dams
3 impacted by 3 dams
1 impacted by 4 dams
137 total

Local Roads:

244 impacted by 1 dam
38 impacted by 2 dams
11 impacted by 3 dams
11 impacted by 4 dams
1 impacted by 5 dams
305 total

Railroads:

24 impacted by 1 dam
8 impacted by 2 dams
32 total

Unoccupied structures and out-buildings:

66 impacted by 1 dam
9 impacted by 2 dams
1 impacted by 3 dams
1 impacted by 4 dams
1 impacted by 5 dams
78 total

Totals:

Occupied structures (houses, mobile homes, etc.):	3,504
Commercial buildings, churches, schools:	479
Highways 2-lane, 4-lane:	137
Local Roads:	305
Railroads:	32
Unoccupied structures:	78
Total:	4,535

Impact of Oklahoma Watershed Dams on COE & Bureau of Reclamation Dams

Oklahoma has 2,107 watershed dams and 11 major United States Army Corps of Engineers (COE) and Bureau of Reclamation (BOR) dams. Most of the COE and BOR dams have several watershed dams within their drainage areas that have significant impact on sediment and flood detention storage of their dams.

An analysis determined that there are 1,910 watershed dams in 117 watershed projects that are within the drainage area of the 11 COE and BOR dams. This number does not include 91 dams in 5 watershed projects in Texas or 456 dams in 35 watershed projects in Kansas that are also within the drainage areas of some of the COE and BOR dams. Therefore, there are a total of 2,457 watershed dams within the drainage areas of the 11 major COE and BOR dams in Oklahoma. A summary of the number and impact of the watershed dams on COE and BOR dams in Oklahoma is shown in Figure 87.

Watershed Dams Upstream from COE & BOR Reservoirs				
Reservoir	Operator	Drainage Area (sq. mi.)	W'shed Dams within Drainage Areas	
			No. of W'shed Projects	No. of W'shed, Dams
Altus	BOR	2,515	1	7
Arbuckle	BOR	126	1	17
Canton	COE	7,600	1	1
Eufaula	COE	47,522	16	297
Foss	BOR	1,496	12	203
Ft Cobb	BOR	314	1	12
Ft Gibson	COE	12,494	2	10
Kerr	COE	147,756	5	77
Keystone	COE	74,506	11	231
Texoma	COE	39,719	65	1,041
Wister	COE	993	1	14
Oklahoma Dams			116	1,910
Kansas Dams			5	91
Texas Dams			35	456
Grand Total			156	2,457

Figure 87: Summary of the number of the watershed dams within drainage areas of 11 COE and BOR dams in Oklahoma

The following is a more-detailed summary of the watershed dams within the drainage area of the COE Denison Dam (Lake Texoma):

Drainage area (two major forks of Lake Texoma):

Red River	25,838 square miles
Washita River	7,945 square miles
Total	33,783 square miles

Washita River Basin (PL-534)

1,140 flood control dams constructed 1948 to 1998 (including 37 in Texas)
Cumulative drainage area of 1,140 dams in the Washita River Basin: 2,906 square miles (36 percent of the drainage area is controlled)

Sediment Storage

Sediment accumulated in Lake Texoma (1944-1995) according to COE sediment surveys: 850,000 ac.-ft.
Remaining sediment storage in Lake Texoma (below elevation 590) 1,010,000 ac.-ft.
Cumulative sediment storage in 1,140 watershed dams in Washita River Basin: 241,115 ac.-ft.
Median age of PL-534 Washita River Basin dams: 57 years

Flood Storage

Conservation storage - Lake Texoma (elevation 590-617) 1,600,000 ac.-ft.
Flood storage (elevation 617-649) 2,600,000 ac.-ft.
Cumulative total flood storage in PL-534 dams: 580,756 ac.-ft.

Conclusion: The 1,140 small upland flood control dams in the Washita River Basin (PL-534) have not only provided flood control benefits for the ag land and small communities in the 5- million-acre Washita River Basin, but also had considerable benefit on flood storage and sediment reduction into Lake Texoma at the mouth of the Washita River.

The PL-534 dams have held back approximately 1/4 million ac.-ft. of sediment that otherwise would have eventually reached Lake Texoma where there are many concerns about the rate at which some of the tributaries are filling with sediment and adversely impacting marinas, fishing, etc.

The PL-534 dams have also provided 580,000 ac.-ft. of flood storage that has held flood waters from entering Lake Texoma when the peak inflows occur.

Auxiliary Spillway Flow Data (Oklahoma):
(This section includes excerpts from a paper entitled “How Many Times did 2,100 Watershed Dams in Oklahoma Experience Auxiliary Spillway Flows in 67 Years?” presented at the 2016 ASDSO conference in Philadelphia, PA. Authors of the paper were Larry Caldwell, Ray Riley, and Jim Henley):

An analysis of auxiliary spillway flows in Oklahoma was conducted in 2016. These data were updated to include auxiliary spillway flows in 2019. The authors analyzed the 1,096 dams that have experienced 2,051 auxiliary spillway flows since 1948. The flow records were analyzed by the location of the dams and the storms, depths of flows, and the resulting damages. In addition, the evolution of design criteria was reviewed to determine how changes to the criteria played a role in the frequency and location of auxiliary spillway flows. Climatic effects and land use changes were also examined. The reasons why some spillways flowed, while others did not are also discussed with respect to the changes in design criteria at the various times the dams were planned and designed. This analysis revealed the actual recurrence frequencies of auxiliary spillway flows and compares them to current design criteria. The results of this analysis should be applicable to thousands of similar age dams in the Midwest.

SCS/NRCS and project sponsor staffs in Oklahoma have kept detailed records of auxiliary spillway flows on watershed dams since 1950 when the first auxiliary spillway that flowed on a watershed dam. They recognized the importance of monitoring extreme weather events and the impacts on the performance of watershed dams and the reduction of flooding that resulted. When large storms occurred over watershed projects, considerable staff time was devoted to conducting site-specific studies to determine high water levels and crop and road damages in downstream areas. They also conducted field reviews to verify spillway flows and depths following storm events. SCS prepared special storm reports including performance of the dams and auxiliary spillway flows following many of the major storms. SCS and local sponsors used the studies to document the success of the watershed projects, the performance of the dams, and the benefits the dams provided.

In 1970, Ray Riley, a new hydrologist on the state staff at that time, gathered and summarized data on auxiliary spillway flows of dams constructed up until that time. These data were used to help evaluate the design criteria and propose changes if needed. All field office staffs reported known spillway flows up to that date to Riley. He also reviewed all storm reports in the files and summarized the data. Riley sent the resulting data to all field offices for review and comment. The value of this performance data was recognized by Oklahoma SCS leadership, so a state policy was developed in 1972 that required all field office staffs in Oklahoma to document rainfall and structure data for every dam that experienced auxiliary spillway flow. This policy continues in effect to date and is contained in an Oklahoma supplement to the National Engineering Manual, section 504.12. Due to this long-term policy, Oklahoma has one of the most comprehensive state data sets of auxiliary spillway flows and performance of dams in the nation.

In the 1980s, Oklahoma SCS developed a form to provide a consistent record to document the field investigations of auxiliary spillway flow events. Field office staffs completed this form for every dam that experienced an auxiliary spillway flow. After each major storm event, the data from the data sheets were transferred to the master auxiliary spillway summary file was updated every year there were storms that resulted in auxiliary spillway flows.

In the mid 1970's, SCS national staff initiated a study to improve the integrity and stability designs of auxiliary spillways. Technical staffs from the ARSand NRCS collaborated to study both principal and auxiliary spillway performance. In 1983, following a major flood in Arkansas, a national Emergency Spillway Flow Study Task Group was formally established, and national policy was issued that directed all state conservation engineers to report all auxiliary spillway flows with over one-foot flow depth to the national office. This policy is contained in NRCS National Engineering Manual section 504.12. NRCS later revised the policy to three-foot flow depth, which remains the policy to date. There were several site-specific studies completed by this task group during the 1970's and 1980's. This task group continued to gather data into the early 1990's when the Design and Analysis of Earth Spillways team was formed to analyze the data and develop new design criteria and procedures.

Auxiliary Spillway Flow Summaries: Since the beginning of the Oklahoma Watershed Program in 1948, there have been numerous storms that have resulted in many auxiliary spillway flows. The first auxiliary spillway flows were reported in southwestern Oklahoma for four dams on May 1, 1950. At that time, only 25 watershed dams had been constructed in the state. As more dams were constructed, the number of reported auxiliary spillway flows increased with each extreme rainfall event. For instance, 23 auxiliary spillways flowed in May and June of 1957 when a wide spread storm occurred in north central Oklahoma; by that time 194 watershed dams in Oklahoma had been constructed.

From 1948 to 1997, SCS in Oklahoma planned and authorized 120 watershed projects that included dams. SCS/NRCS built 2,107 dams in these watersheds. From 1948 to 2019, 1,096 dams in 88 watersheds experienced 2,051 auxiliary spillway flows, while 1,011 dams have never experienced auxiliary spillway flows.

About half of the auxiliary spillways (550) flowed only once. The remaining half (546) flowed from two to eight times as shown below:

290 auxiliary spillways flowed twice
152 auxiliary spillways flowed 3 times
73 auxiliary spillways flowed 4 times
17 auxiliary spillways flowed 5 times
11 auxiliary spillways flowed 6 times
2 auxiliary spillways flowed 7 times
1 auxiliary spillway flowed 8 times

1,011 auxiliary spillways have never flowed

From 1948 to 2019, there were 68 storms that resulted in one or more auxiliary spillway flows. Auxiliary spillway flows were reported during 39 of the 71-year period. There were no spillway flows during the other 32 years. About three-fourths of the auxiliary spillway flows occurred as a result of 10 storm events as summarized in Figure 88. Several of these storms exceeded 500-year return frequencies.

Rainfall Event		No of Dams w AS Flows
Start Date	End Date	
4/26/1990	5/4/1990	352
5/27/1987	5/29/1987	206
5/5/2015	5/28/2015	204
6/13/2015	6/19/2015	190
9/28/1986	10/4/1986	178
5/20/2019	5/26/2019	109
10/19/1983	10/20/1983	101
6/9/1995	6/10/1995	90
10/12/1981	10/18/1981	75
10/7/1970	10/8/1970	59
6/26/2007	7/10/2007	59

Figure 88: Summary of 11 storm events that resulted in 1,564 auxiliary spillway flows (76% of the total) in Oklahoma from 1948 to 2019

Almost half of the 2,051 auxiliary spillway flows had flow depths less than 1-foot deep and 90 percent were less than 2.5 feet deep as summarized in Figure 89. The maximum reported flow depth was 5.3 feet. Reports indicated that approximately 10 embankments overtopped either partially or along the entire length of the dam with minimal or no damage to the embankment.

Summary of AS Flows by Flow Depth Updated 6-20-19			
AS Flow Depth (ft)	No. of AS Flows	% of Total	Accum %
0.1 to 0.4	363	17.7%	18%
0.5 to 0.9	616	30.0%	48%
1.0 to 1.4	497	24.2%	72%
1.5 to 1.9	209	10.2%	82%
2.0 to 2.4	165	8.0%	90%
2.5 to 2.9	59	2.9%	93%
3.0 to 3.4	32	1.6%	95%
3.5 to 3.9	9	0.4%	95%
4.0 to 4.4	6	0.3%	95%
4.5 to 4.9	1	0.0%	95%
5 to 5.2	3	0.1%	96%
?	92	4.5%	100%
Total	2051	100%	

Figure 89: Range of auxiliary spillway flow depths

Damages resulting from auxiliary spillway flows

Following spillway flow events, field inspectors reported damages using ratings of "severe", "moderate", or "slight or none". The ratings for the damages were somewhat subjective, but they provided an indication of the spillway's performance and the need for repairs. Many of the reported "severe" and "moderate" damaged auxiliary spillways required special designs and formal contracting for the repairs.

Of the 2,051 auxiliary spillway flows reported during the past 71 years, only 329 were reported with ratings of "severe" or "moderate" damage. About one-third of the auxiliary spillways with flow depths from 2.0 feet to greater than 3.0 feet were damaged, while 20 percent of those with flow depths between 1.0 and 1.9 feet were damaged. Less than 10 percent of those with flow depths less than 1.0 feet were damaged. Figure 90 summarizes the damages resulting from auxiliary spillway flows.

Number of Auxiliary Spillways Severely or Moderately Damaged at Various Flow Depths				
AS Flow Depth (ft.)	Severe Damage	Moderate Damage	Total No. of AS Flows	% Damaged
>3.0	7	10	51	33%
2.0 - 2.9	39	39	224	35%
1.0 - 1.9	70	74	706	20%
<1.0	34	56	979	9%
Unknown	0	0	92	0%
Totals	150	179	2,051	16%

Figure 90: Summary of auxiliary spillway flow depths that resulted in severe or moderate damage ratings

Analysis of variables that impact auxiliary spillway flows:

The following variables were analyzed to try to determine the reasons why some dams experienced auxiliary spillway flows and others did not:

a. Changes in design criteria for detention storage and principal spillway discharge: The design of dams has evolved over the years as SCS and ARS gained more experience, conducted more research, and addressed issues that developed. Thus, dams designed in the 1950's had different detention storage volumes and principal spillway discharges than similar dams designed using the design criteria in the 1970's or later. However, the analysis concluded that approximately 50 percent of the dams planned and designed during each of four time periods studied experienced auxiliary spillway flows. The number of dams experiencing multiple auxiliary spillway flows was also quite similar between time periods. The evolution of design and planning criteria during the 1950's to 1970's when thousands of dams were being planned, designed, and constructed is provided in the section entitled "Evolution of SCS/NRCS Dam Design Criteria 1948 to 2019".

b. The location and number of high rainfall events: Theoretically, the frequency of auxiliary spillway flows should be similar regardless of the average annual rainfall amounts across the state, since design storms also vary across the state. This variable was considered by analyzing the auxiliary spillway flows by four average annual rainfall zones in the state. Less than 10 percent of the dams in the dryer western area of Oklahoma have ever experienced auxiliary spillway flow, while almost two-thirds of the dams in the wetter areas of central and eastern Oklahoma have experienced auxiliary spillway flows, many of them multiple times.

c. Age of the dams: Older dams have more opportunities to experience more extreme rainfall events. This variable was considered by determining the "structure-years" for specific dams or groups of dams. A "structure-year" for a specific dam is the age of the dam. The "structure-years" for a group of dams is the summation of the ages of all the dams in that group. The dataset includes almost 120,000 structure years of data.

The analysis concluded that SCS design criteria did not fully considered the impacts of the drier climate in the western part of the state. It appears that the extreme dry conditions that occur frequently in the western part of the state have a larger impact on reduced runoff from larger storms than is reflected in the design criteria that considers more normal runoff considerations (soils, land use, etc.).

The impacts of climate on the actual auxiliary spillway flows over the 71-year period is demonstrated by a comparison of the two extreme rainfall areas in the state, the western drier area and the higher rainfall area in the southeast. Approximately the same number of dams were built in each zone (245 and 218). However, only 22 auxiliary spillway flows on 20 dams occurred in western area, while 245 flows occurred on 132 dams in the southeast. The flows in the state's southeast were deeper and many dams experienced three or more flows, while only two dams had multiple flows in the west.

Even though spillway flow frequencies should be similar across the state, the analysis concluded that the frequency of auxiliary spillway flows varied from one flow every 608 years in the drier western area of the state, to every 86 years in the west central, 45 years in the east central, and 39 years in the southeast portion of the state. The statewide weighted average of actual auxiliary spillway use was once every 58 years. This is much less than today's design criteria would indicate.

In addition to the three critical variables analyzed above, the following were also determined to be reasons contributing to why some dams experienced auxiliary spillway flows while others did not:

a. "Luck of the draw" as to the location of heavy thunderstorms and high rainfall events.

b. Some dams were designed with more detention storage because they were required to meet a higher performance standard. High- and significant-hazard dams are required to be designed with more detention storage, which in turn affected the frequency of auxiliary spillway flows for these dams.

c. Drought conditions proceeding extreme rainfall events affected the occurrence of auxiliary spillways flows because some dams had more than designed detention

storage at the time of high rainfall events due to previous drought conditions that lowered the permanent reservoir.

d. Wetter than normal conditions proceeding extreme rainfall events affected occurrence of auxiliary spillway flows. Some of the dams had less than designed detention storage at the time of high rainfall events either due to accumulated sediment in the detention pool or a higher than normal reservoir due to runoff from prior storms that had not yet drained down.

e. Land use change, drought conditions, heavy growth, and/or dense vegetation in the watershed affected infiltration rates that resulted in different runoff conditions than assumed in the original design.

f. The principal spillways could not function as designed due to being plugged with debris or man-made modifications to the principal spillway inlet.

Efforts to Compare Databases, Identify Inconsistencies, and Correct Errors:

During 2012, the NRCS contracted with USEngineering Solutions Corporation of Hartford Connecticut to implement “DamWatch®”. This is a web-based application that stores information on the watershed dams, makes it available for retrieval via the internet as well as provides for alerts to specified people when high rainfalls have occurred over the drainage areas of each dam. During the process of gathering the information to load in the DamWatch system, many watershed records had to be located. This involved identifying the specific watershed projects and dams that are in each state and gathering program and engineering files and NID data. GIS shape files of the drainage areas of each of the 11,845 watershed dams were compared to the shape files of the 2,100+ watershed project shape files to determine the number of projects that include dams. Personal phone calls were made to NRCS state Watershed Programs leaders and state conservation engineers to resolve issues identified on specific projects and dams. While watershed information has been available in the past, this effort helped to “clean up” many of the records and resulted in a complete listing of authorized watershed projects in each state as well as those which contain dams.

In April 2017, Larry Caldwell, Jim Henley, and Lil Holkum made a comprehensive comparison of the GeoObserver NID data and the Project Master List that was had prepared for the DamWatch data update in February 2017. If there were differences between the NID data set and the project master list, the project master list data was used (with a few exceptions) and corrections were made to entries in the NID data. The corrections were discussed with the NRCS state conservation engineers (SCEs) before they were made.

After the GeoObserver NID was updated for the 11,845 project dams, that data set was merged with the NID Data for the 17,336 non-project dams from the original GeoObserver NID. Global changes for all the 29,181 dams were then made for FIPS codes and congressional districts for each dam based on the dam’s latitude and longitude (there were a few exceptions for FIPS codes as explained below).

The following is a summary of the NID comparisons made, the results of the comparisons, and the actions taken for the 11,845 project dams:

1. Three project dams were added to the original NID data as per the master list.
2. 132 project dams were corrected to be consistent with dam names in the project list.
3. NID ID numbers were corrected for 7 dams except for 4 dams in South Carolina that had duplicate NIDID numbers. These numbers were not changed in the NID and need to be investigated further.
4. The county name and FIP county codes were corrected for 51 dams where the county shown in the NID was not consistent with the county where the latitude and longitude indicated. Corrections were made to the county entries for 35 dams. There were 16 dams with their embankment centerlines that were located directly on the county boundary line. The county shown in the original NID were used for these 16 dams.

5. Current hazard class was corrected for 41 dams. The master list hazards were used for all but 10 dams where the NID was evidently updated after the master list was prepared. SCE's were contacted to confirm the current hazard for specific dams.

6. The authority for 9 dams were corrected. The master list entries were used in the NID for all dams with differences since these were confirmed with the SCEs during development of the master list.

7. The watershed numbers of 3,014 dams were corrected. The master list entries were used in the NID for all dams with differences.

8. The watershed names for 1,047 dams were corrected. The master list entries were used in the NID for all dams with differences to be consistent with the master list watershed numbers.

9. The rehab years for 161 dams that have been rehabilitated with NRCS assistance were checked (listing was provided by NRCS' national rehabilitation program leader). Note that if there was a year shown in the "Year Modified" column in the NID for the rehabbed dams, the year modified was deleted. All entries that were "0" or "NA" in the "Year Modified" column were deleted. All rehabilitated dams included a "Y" in the "Rehab" column.

10. The county names and FIPs county codes for 251 non-project dams were corrected for dams that were not consistent. If the latitude and longitude did not fall within the county shown, the counties shown in the NID were considered correct. The FIPS codes are now consistent with the county in the NID.

Updating the NID for Rehabilitated Project Dams:

As dams are rehabilitated, the NID data needs to be updated to reflect the data for the rehabilitated dam. This requires gathering the rehab design and planning data and updating the following 24 fields in the original NID data. See the t NID Data Dictionary for details on entries for specific fields.

Dam Length: defined as length along top of dam, including auxiliary spillway

Dam Height: Height of the dam to nearest foot, defined as the vertical distance between the lowest point along the crest of the top of the dam and the lowest point at the downstream toe that usually occurs in the natural bed of the stream or water course.

Hydraulic Height: same as dam height

Max Discharge: discharge from auxiliary spillway and principal spillway

Max Storage: sum of storages for sediment, flood, surcharge, and other

Normal Storage: storage at normal reservoir level (principal spillway elevation)

Surface Area: area of reservoir at normal level (lowest ungated outlet of principal spillway)

Drainage Area: square miles to nearest hundredth

Current Hazard

Spillway Width (feet)

Volume of Dam: earth embankment volume (cubic yards)

Planned Service Life: evaluated life of the dam as per the work plan supplement

Population At Risk (PAR)

PAR Accuracy: “A” for Analyzed with breach inundation map or “E” for estimated visually

Year PAR: Year PAR was estimated

Design Hazard: for rehabilitated dam

Sediment Storage: submerged and aerated (ac.-ft.)

Flood Storage: storage between principal spillway and auxiliary spillway elevations minus other storage and the aerated sediment storage

Surcharge Storage: storage between auxiliary spillway and top-of-dam elevations

Other Storage: storage below auxiliary spillway elevation other than sediment or flood storage

Principal Spillway Type

Conduit Height

Rehabilitated: “Y” or “N”

Year Rehabilitated: year construction of the rehabilitated dam was completed

This is also a good time to check the accuracy of the data in the following 8 original fields since some of these fields may have changed since the original dam was built:

Owner Name

Longitude: decimal (remember, this is always negative)

Latitude: decimal

Dam Designer: “USDA NRCS” if NRCS did the design; enter the A&E firm’s name, if A&E did the design.

Purposes: were additional purposes added?

Year Completed: keep the year completed for the original dam

Year Modified: do not populate this field for rehab

Program Authorization: keep the authorization program for the original dam

A Salute to the Past and Challenges for the Future

The success of the USDA Watershed Program has been recognized as one of the outstanding agricultural engineering achievements of the 20th century by the American Society of Agricultural and Biological Engineers (ASABE) (Cuello and Huggins, 2000). In 2011, ASABE recognized the USDA Watershed Program as a national landmark of Agricultural Engineering.

Watershed projects have improved the quality of life and the environment in communities by protecting people's lives and property; conserving soil and water resources; reducing flooding; providing economic development, recreation, and water supplies; enhancing water quality; and improving wetlands and wildlife habitat.

The original leaders of the Watershed Programs had the vision to convince decision makers to establish a federal/state partnership to address natural resource issues that had never been done before. Their initial vision evolved into the enactment of legislative authorities. Then policies and procedures were developed to implement the national Watershed Program. The following paragraph is from SCS Historian Douglas Helms' article entitled "Small Watersheds and the USDA: Legacy of the Flood Control Act of 1936":

> "The contemporary challenge is to recognize that development of policy is a learning process that builds on the knowledge obtained by past errors. Politics and policies do change. One of the lessons of the past half century is that intelligent and accurate criticism will make a difference."

This statement has consistently held true for the past 75 years and applies to both administrative policies as well as technical criteria and procedures.

Our generation's challenge will be to ensure the existing watershed projects continue to function as designed so they can continue to provide these benefits for future generations. NRCS must ensure that technical capacity of specialize technical disciplines are maintained so that mew watershed projects can continue to be planned and implemented to address natural resource issues in more communities across the nation.

The following are some of the future challenges for the Watershed Programs to remain functional:

1. Viable sponsors: As existing sponsors retire or resign from their governing positions in the local sponsoring organizations, NRCS should commit to working with local sponsors to educate their replacements on the operation and maintenance of watershed project measures.
2. NRCS technical capacity: Many of the generation of NRCS employees who planned, designed, and installed the project measures are retiring and the remaining number of technical specialists are quickly dwindling. A plan to utilize remaining technical specialists and those recently retired is needed to train new employees to transfer the institutional knowledge of Watershed Program and technical issues. Consultants can be used to help with peak workloads but should not be relied upon for program implementation.

3. Funding: Federal funding for planning, design, and installation of projects (rehabilitation of existing dams as well as planning and implementation of new projects) is a growing challenge with growing deficits. Local funding for operation and maintenance, local cost share for rehabilitation of their aging dams, and implementation of new projects are also huge challenges. NRCS and local projects sponsors must continue to educate elected officials and community leaders to help ensure adequate funding to operate and maintain their structural measures.
4. Permitting: Obtaining permits for projects is challenging in some areas. Local project sponsors must continue to be engaged to understand permitting policies and procedures and how to work with regulatory agencies.
5. Obtaining easements: Easements for installations of the early watershed projects were generally donated by landowners as their part in providing benefits for their community. But that is generally not the case as much today and easements must be negotiated and purchased. This requires additional funding and the ability to work with landowners.
6. Telling the story: Educating local community leaders and elected officials is a constant need to assure the public is aware of the benefits of the watershed projects that protect their communities.
7. Training: New sponsors and NRCS employees need training on O&M techniques and responsibilities as well as planning and implementation of watershed projects.
8. Continue research: We do not know all of the answers involved with planning and design of complex structures that protect lives as well as addressing technical and social challenges with addressing new natural resource issues.

The USDA Watershed Programs have developed a valuable infrastructure of flood control dams that are rapidly aging beyond their design life. As we look back at the past 75 years of implementing the Watershed Programs, we marvel at the strong cooperative effort put forth by local sponsors, organizations, and state and federal agencies. We celebrate the successful planning, design, and construction projects that have extended the life of numerous structures, and we look forward to the challenges that lie ahead. Hopefully, the lessons learned and the experienced gained can be used to improve and expand this work in the future.

Watershed Program Trivia

In the process of gathering the data for this paper, several interesting trivia facts were identified:

1. First dam to be built under any of the Watershed Program authorities:
   Cloud Creek, Dam No. 1 (Oklahoma) built in 1948; age = 72 years (2020)

2. States with most watershed dams built under all watershed authorities:

2,107 OK	1,203 MO
2,003 TX	831 KS
1,615 IA	738 NE

3. States with most watershed dams classified as high hazard:

392 TX	169 WV
260 OK	120 KS
192 GA	

4. Number of fatalities resulting from the failure of a watershed dam in the United States: 0

5. States with most watershed projects (all authorities):

187 IA	136 MS
148 TX	129 OK

6. Tallest watershed dam: 145 feet (Lower North River 81: VA)

7. Largest drainage area of a project dam: 252 sq. mi. (Running Water Draw #3; TX)

8. Longest watershed dam embankment: 62,300 ft. (Harquahala Dam: AZ)

9. Largest reservoir surface area: 3,100 ac. (Cypress Black Bayou 1; LA)

10. Largest storage at top of dam: 90,310 ac.-ft. (Brady Lake: TX)

11. States with largest geographical area covered by PL-534 & PL-566 watershed projects:

20,520,197 ac. TX	8,562,357 ac. MS
12,437,695 ac. OK	6,143,864 ac. GA

12. Most common watershed project names:

Mud/Muddy Creek (18)	Bear Creek (11)
Mill Creek (17)	Big Creek (10)
Indian Creek (15)	Rock Creek (9)
Spring Creek (13)	Beaver Creek (7)

Acknowledgements

The collection of the data contained in this paper was a culmination of efforts over several years from 2013 to 2020 that involved several people who contributed in various ways. The following people are acknowledged for their special efforts, as well as their incredible patience to respond to my constant questions and requests for information. It is hoped that our collective efforts will help future generations by having this up-to-date reference of watershed history and data.

Carolyn Caldwell, my wife, who not only was a huge help in reviewing this document, but also had to listen to mind-numbing data as this was being prepared over several years!

Lillian Holkum, Oklahoma Conservation Commission, Stillwater, Okla., who spent considerable time gathering, sorting, and processing tons of watershed data. Her patience and hard work in preparing so many summaries were critical to making this document possible. She is one of the hardest working, most dedicated employees I have worked with in my entire career.

Noller Herbert, NRCS Director of the Conservation Engineering Division, Washington, D.C., who provided the overall leadership and support for making the DamWatch implementation and collection of watershed data possible as well as arranging for publication of this document

Ken Worster, design engineer, NRCS National Design, Construction, and Soil Mechanics Center, Ft. Worth, TX, who led the initial coordination of the DamWatch implementation effort.

Steve Durgin, NRCS National Design Engineer, Washington, D.C., who helped provide summaries of the NRCS inventory of dams data base and provided national leadership for DamWatch.

Shelby Callaway, NTCS Historian who reviewed and provided excellent suggested edits on the final draft of this document and assisted with arrangements to get it published.

NRCS Watershed Program staff (Kevin Farmer and Jesse Wilson) who made several Watershed Program files available for this effort, as well review of the final document..

Doug McKalip, former NRCS Legislative Director, who assisted with the paper summarizing the history of the passage of the Watershed Rehabilitation Amendments. His excellent story telling talents and research on the legislative efforts made this an excellent reference that is and interesting read.

George Townsley, NRCS National Water Management Center, Little Rock, Ark., who provided considerable help with summarizing and updating the benefits and appropriations data.

Darrel Dominick, Oklahoma's State Conservationist, who allowed me to return to the Oklahoma NRCS staff after I was given a directed reassignment to move my headquarters to Washington DC after being head quartered in Stillwater, Oklahoma for several years.

Mike Thralls and Robert Toole, Oklahoma Conservation Commission, for their support and hiring me following my NRCS retirement so I could pursue special watershed projects.

Gary O'Neill, Oklahoma's State Conservationist, who provided considerable encouragement, support, and office space allow me to continue to serve as an Earth Team Volunteer to complete this document.

Jim Henley, NRCS GIS Specialist (retired), who prepared many maps and spreadsheet summaries based on GIS analysis of data as well as provided support for the national watershed benefits model.

Ray Riley, NRCS Hydrologist (retired), who shared considerable historic information on design criteria and auxiliary spillway flows.

Gary Utley, NRCS Hydrologist (retired), who was the primary developer of the national watershed benefits model.

Brad Fischer, FPAC Public Affairs Specialist who reviewed and provide excellent edits to the draft document.

USEngineering Solutions staff (Joe Scannell, Gregory Vernon, Stephen Hand, & Joel Mirkin) for their extra efforts to process GIS shape files to identify discrepancies in data and to organize DamWatch files.

Ken Becker, cartographer, NRCS National Geospatial Center of Excellence (NGCE), Ft. Worth, Tex., who developed the GIS shape files for the drainage area boundaries for almost 8,000 project dams. He also provided valuable assistance in updating the NID database.

Dwain Phillips, Oklahoma Conservation Commission for his help in formatting, preparing summaries, providing photos, and preparing numerous fact sheets including the "Break Glass in Case of Dam Failure" document.

Mark Harrison, Oklahoma Conservation Commission for his help in providing photos.

Shirley Roberts, Cartographer, NRCS GIS, Stillwater, Okla., who processed the geospacial data and produced the national maps.

Doug Helms, NRCS National Historian who provided many of the valuable Watershed Program historical documents. (*Doug passed away in September 2018 and continues to be greatly missed by everyone in the Watershed Program.*)

John Peterson, SCS (retired), who provided excellent comments and edits to initial drafts based on his extensive experience as an SCS watershed engineer and various SCS leader positions.

Chuck Easterling, New Mexico Watershed Coalition, who encouraged me to proceed with this endeavor and provided excellent comments and edits of initial draft.

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Appendix 1

Listing of 1,269 Watershed Projects with 11,841 Dams

1,269 Watershed Projects with 11,841 Dams

260 PL-534; 886 PL-566; 77 RC&D; 46 Pilot

(Includes 19 projects "double counted" since they cross statelines)

7-26-19

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
AL	AL2016	Big Nance Creek	PL-566	1	197.0	x
AL	AL2009	Big Prairie and French Creeks	PL-566	2	256.0	x
AL	AL2021	Blue Eye Creek	PL-566	2	29.4	x
AL	AL2005	Bristow's Creek	PL-566	1	25.6	x
AL	AL2024	Cahulga Creek	PL-566	1	25.0	x
AL	AL2015	Cheaha Creek	PL-566	5	114.0	x
AL	AL2020	Choccolocco Creek	PL-566	10	397.2	x
AL	AL2019	Crooked Creek	PL-566	5	98.3	x
AL	AL2032	Cypress Creek	PL-566	1	157.5	x
AL	AL2043	Dry Creek	PL-566	6	40.1	x
AL	AL2033	Dynne Creek	PL-566	2	25.5	x
AL	AL2034	Factory Creek	PL-566	2	86.2	x
AL	AL9000	Fox Creek	RC&D	1	37.5	
AL	AL2003	High Pine Creek	PL-566	9	78.7	x
AL	AL2013	Hurricane Creek	PL-566	1	73.2	x
AL	AL2018	Ketchepedrakee Creek	PL-566	5	54.2	x
AL	AL9001	Lake Livingston University Dam - Factory Crk	RC&D	1	1.1	
AL	AL9002	Little Hillabee Creek	RC&D	5	71.7	
AL	AL2002	Little New River	PL-566	3	51.5	x
AL	AL2007	Little Paint Creek	PL-566	1	56.6	x
AL	AL2012	Lost Creek	PL-566	4	25.6	x
AL	AL2029	Mush Creek	PL-566	2	59.3	x
AL	AL2025	Old Town Creek	PL-566	6	161.4	x
AL	AL2010	Powell Creek	PL-566	9	67.8	x
AL	AL2028	Tallaseehatchie Creek	PL-566	7	200.8	x
AL	AL2008	Terrapin Creek	PL-566	10	284.2	x
AL	AL2014	Town Creek	PL-566	5	246.3	x
AR	AR9005	Bailey Branch	RC&D	1	2.6	
AR	AR2013	Big Creek	PL-566	21	130.3	x
AR	AR9006	Cane Creek	RC&D	1	23.0	
AR	AR2001	Caney Creek	PL-566	7	67.7	x
AR	AR2039	Cedar-Piney Creeks	PL-566	3	37.2	x
AR	AR2030	Cooper Creek	PL-566	6	52.8	x
AR	AR2043	Des Arc Bayou	PL-566	5	113.7	x
AR	AR2008	East Fork Point Remove Creek	PL-566	11	157.8	x
AR	AR2005	Flat Creek	PL-566	6	50.1	x
AR	AR2052	Flat Rock Creek	PL-566	1	30.3	x
AR	AR2036	Fourche Creek	PL-566	7	205.8	x
AR	AR2047	Galla Creek	PL-566	1	45.6	x
AR	AR2029	Haney Creek	PL-566	1	31.1	x
AR	AR2031	Little Clear Creek	PL-566	1	64.5	x
AR	AR2046	Little Mulberry Creek	PL-566	1	85.9	x
AR	AR2019	Mud Creek	PL-566	1	32.8	x
AR	AR2011	Muddy Fork of Illinois River	PL-566	4	73.3	x
AR	AR2034	North Fork of Ozan Creek	PL-566	6	72.6	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
AR	AR9007	Old Davidsonville State Park	RC&D	1	0.1	
AR	AR2003	Ouachita Creek	PL-566	3	25.2	x
AR	AR2053	Ozan Creeks	PL-566	10	98.5	x
AR	AR2042	Poinsett	PL-566	33	81.6	x
AR	AR2017	Poteau River	PL-566	16	263.1	x
AR	AR8001	Six Mile Creek	PILOT	24	274.3	
AR	AR2054	South Fork	PL-566	2	46.3	x
AR	AR2038	South Fourche	PL-566	7	431.4	x
AR	AR2018	Tupelo Bayou	PL-566	2	42.8	x
AR	AR2051	Upper Ouachita River	PL-566	1	134.3	x
AR	AR2050	Upper Petit Jean	PL-566	3	335.1	x
AR	AR2045	Upper Tri-County	PL-566	3	22.8	x
AR	AR2007	West Fork Point Remove Creek	PL-566	19	306.0	x
AZ	AZ2006	Apache Junction-Gilbert	PL-566	2	141.3	x
AZ	AZ2008	Buckeye	PL-566	3	177.8	x
AZ	AZ2005	Buckhorn-Mesa	PL-566	2	57.3	x
AZ	AZ2004	Florence	PL-566	1	79.1	x
AZ	AZ9003	Foote Wash Dam	RC&D	1	8.8	
AZ	AZ2011	Fredonia	PL-566	1	10.5	x
AZ	AZ2002	Frye Creek-Stockton Wash	PL-566	4	222.6	x
AZ	AZ2012	Guadalupe	PL-566	1	4.5	x
AZ	AZ2010	Harquahala Valley	PL-566	2	196.2	x
AZ	AZ2003	Magma	PL-566	1	107.6	x
AZ	AZ9004	No Name Wash Frs	RC&D	1	1.0	
AZ	AZ8000	White Tanks	PILOT	2	90.5	
AZ	AZ2014	Wickenburg	PL-566	2	2.4	x
AZ	AZ2007	Williams-Chandler	PL-566	2	209.4	x
CA	CA2005	Adobe Creek	PL-566	2	29.0	x
CA	CA2014	Beardsley	PL-566	1	63.0	x
CA	CA2021	Carpinteria Valley	PL-566	1	25.4	x
CA	CA2006	Central Sonoma	PL-566	4	254.3	x
CA	CA2011	Escondido Creek	PL-566	1	44.1	x
CA	CA2008	Marsh-Kellogg Creek	PL-566	3	187.7	x
CA	CA2018	Mustang Creek	PL-566	1	22.3	x
CA	CA8002	Pine Creek (Walnut Creek)	PILOT	1	144.4	
CA	CA2026	Tehachapi	PL-566	2	51.0	x
CO	CO2002	Big Sandy Creek	PL-566	14	310.7	x
CO	CO2017	Boxelder Creek	PL-566	5	289.8	x
CO	CO2015	Canon	PL-566	2	9.3	x
CO	CO2004	Coalbank Creek	PL-566	1	35.2	x
CO	CO2016	Crooked Arroyo	PL-566	4	111.4	x
CO	CO9009	Dry Creek	RC&D	1	1.1	
CO	CO2007	Fishers Peak-Carbon Arroyos	PL-566	2	2.2	x
CO	CO2005	Franktown-Parker Tributaries of Cherry Creek	PL-566	22	261.2	x
CO	CO2012	Home Supply	PL-566	2	1.8	x
CO	CO2011	Indian Wash	PL-566	1	6.3	x
CO	CO8003	Kiowa Creek	PILOT	55	122.1	
CO	CO2009	Limon	PL-566	3	16.4	x
CO	CO9008	Mud Gulch	RC&D	1	3.7	
CO	CO9010	North Walsenburg	RC&D	1	0.5	
CO	CO2013	Pine River	PL-566	2	2.1	x

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CO	CO2010	Roatcap Wash	PL-566	1	13.7	x
CO	CO2019	Sedgwick-Sand Draws	PL-566	9	109.2	x
CO	CO2021	Shavano Valley	PL-566	2	5.5	x
CO	CO2003	West Cherry Creek	PL-566	11	49.1	x
CO	CO2001	Wray	PL-566	6	3.2	x
CT	CT2009	Avery Brook	PL-566	2	2.6	x
CT	CT2003	Blackberry River	PL-566	4	35.6	x
CT	CT2007	Farm Brook	PL-566	3	4.3	x
CT	CT2002	Furnace Brook-Middle River	PL-566	6	53.0	x
CT	CT9011	Mansfield Rec Pond	RC&D	1	0.8	
CT	CT2004	North Branch Park River	PL-566	5	27.6	x
CT	CT2008	Norwalk River	PL-566	2	31.9	x
CT	CT2005	South Branch Park River	PL-566	5	46.0	x
CT	CT2006	Spaulding Pond Brook	PL-566	2	1.4	x
FL	FL2002	Fisheating Creek	PL-566	1	81.8	x
FL	FL2015	Fort Pierce Farms	PL-566	2	45.7	x
FL	FL2003	North St. Lucie River Drainage District	PL-566	2	102.8	x
FL	FL2016	Palatlakaha River	PL-566	2	40.8	x
FL	FL2005	Sebastian River Drainage District	PL-566	2	53.3	x
FL	FL2009	South Sumter	PL-566	1	90.1	x
GA	GA1001.04	Amicalola Creek-Coosa	PL-534	4	82.9	x
GA	GA2006	Barber Creek	PL-566	4	14.8	x
GA	GA2033	Beaverdam Creek	PL-566	7	73.9	x
GA	GA2044	Big Cedar Creek	PL-566	5	50.3	x
GA	GA2021	Bishop Creek	PL-566	3	31.4	x
GA	GA2039	Bridge Creek-Ochlocknee River	PL-566	3	62.5	x
GA	GA2017	Bull Creek	PL-566	11	74.1	x
GA	GA2028	Cane Creek	PL-566	4	103.9	x
GA	GA1001.05	Cartecay River-Coosa	PL-534	7	95.6	x
GA	GA2060	Cedar Creek	PL-566	1	12.8	x
GA	GA1001.16	Ellijay River-Coosa	PL-534	8	77.6	x
GA	GA1001.07	Etowah River Reach-Coosa	PL-534	12	179.7	x
GA	GA2040	Euharlee Creek	PL-566	4	14.3	x
GA	GA2037	Grove River	PL-566	8	70.8	x
GA	GA9012	Gwinnett RC&D	RC&D	8	113.1	
GA	GA2020	Haynes Creek-Brushy Fork Creek	PL-566	4	36.1	x
GA	GA2015	Hazel Creek	PL-566	4	24.3	x
GA	GA2058	Head of Chattooga River	PL-566	4	184.5	x
GA	GA2011	Head of Little Tennessee River	PL-566	1	1.4	
GA	GA2009	Hightower Creek	PL-566	4	19.2	x
GA	GA2049	Hudson River	PL-566	1	3.7	x
GA	GA2056	Little Creek	PL-566	2	12.2	x
GA	GA1001.03	Little River - Coosa	PL-534	17	82.3	x
GA	GA2045	Little River II	PL-566	3	19.8	x
GA	GA2043	Little Sandy Creek & Trail Creek	PL-566	6	45.0	x
GA	GA2019	Little Satilla Creek	PL-566	2	47.6	x
GA	GA2007	Little Tallapoosa River	PL-566	14	101.3	x
GA	GA1001.06	Long Swamp Creek-Coosa	PL-534	4	43.7	x
GA	GA2035	Lower Little Tallapoosa River	PL-566	14	187.3	x
GA	GA2022	Marbury Creek	PL-566	3	20.1	x
GA	GA2023	Middle Fork Broad River	PL-566	6	56.9	x

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GA	GA2026	Middle Oconee-Walnut Creek	PL-566	11	112.8	
GA	GA2008	Mill Creek	PL-566	5	43.9	x
GA	GA1001.08	Mill-Canton Creeks-Coosa	PL-534	7	208.9	x
GA	GA1001.15	Mountaintown Creek-Coosa	PL-534	4	96.9	x
GA	GA1001.14	Noonday Creek-Coosa	PL-534	5	29.2	x
GA	GA2014	North Broad River	PL-566	8	70.9	x
GA	GA8004	North Fork of The Broad River	PILOT	12	56.7	
GA	GA2012	Palmetto Creek	PL-566	3	21.6	x
GA	GA2041	Pine Log Tributary	PL-566	4	117.3	
GA	GA2013	Potato Creek	PL-566	9	192.7	x
GA	GA1001.13	Pumpkinville Creek-Coosa	PL-534	12	123.5	x
GA	GA1001.12	Raccoon Creek-Coosa	PL-534	2	19.1	x
GA	GA2024	Rocky Comfort Creek	PL-566	4	46.3	x
GA	GA2004	Rooty Creek	PL-566	5	41.9	x
GA	GA2042	Sallacoa Creek	PL-566	10	95.1	
GA	GA2016	Sandy Creek	PL-566	6	32.8	x
GA	GA2005	Sautee Creek	PL-566	5	31.3	x
GA	GA1001.11	Settingdown Creek-Coosa	PL-534	15	51.4	x
GA	GA1001.10	Sharp Mountain Creek-Coosa	PL-534	12	62.6	x
GA	GA2057	Soque Creek	PL-566	6	46.8	
GA	GA2034	South Fork Little River	PL-566	3	43.3	x
GA	GA2036	South Fork of Broad River	PL-566	5	96.7	x
GA	GA2018	South River	PL-566	8	90.1	x
GA	GA1001.09	Stamp-Shoal Creeks-Coosa	PL-534	2	28.9	x
GA	GA1001.01	Talking Rock Creek-Coosa	PL-534	6	106.8	x
GA	GA2051	Tesnatee Creek	PL-566	1	2.9	x
GA	GA2010	Tobosofkee Creek	PL-566	3	181.0	x
GA	GA9013	Tri-County	RC&D	2	0.3	
GA	GA2062	Upper Mulberry River	PL-566	3	53.8	x
GA	GA2052	Yellowjacket Creek	PL-566	1	6.2	x
HI	HI9014	Happy Valley	RC&D	1	1.5	
HI	HI2007	Honolua	PL-566	5	39.2	x
HI	HI2013	Lower Hamakua Ditch	PL-566	1	60.9	x
HI	HI2003	Puukapu	PL-566	1	15.4	x
HI	HI2009	Waimanalo	PL-566	1	9.4	x
IA	IA2053	A&T Longbranch	PL-566	3	21.4	x
IA	IA7601.01	AFMSCS-Little Sioux	PL-534	2	13.5	x
IA	IA7601.02	Anthon-Little Sioux	PL-534	3	1.2	
IA	IA7601.126	Arcola-Little Sioux	PL-534	5	8.6	x
IA	IA7601.03	Arlington-Little Sioux	PL-534	6	9.0	x
IA	IA7601.04	Arnold-Armstrong-Little Sioux	PL-534	15	12.3	x
IA	IA2044	Bacon Creek	PL-566	32	24.9	x
IA	IA2010	Badger Creek	PL-566	28	52.5	x
IA	IA7601.07	Baker-Little Sioux	PL-534	3	2.5	x
IA	IA7601.08	Barber Hollow-Little Sioux	PL-534	2	4.4	x
IA	IA2058	Bear Creek	PL-566	10	36.4	x
IA	IA2018	Bee Jay	PL-566	3	25.1	x
IA	IA7601.09	Big Coon Creek-Little Sioux	PL-534	8	59.6	x
IA	IA2008	Big Park	PL-566	15	15.3	x
IA	IA7601.11	Big Whiskey One-Little Sioux	PL-534	4	6.0	x
IA	IA2020	Big Wyacondah	PL-566	36	56.4	x

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IA	IA7601.12	Bitter Creek-Little Sioux	PL-534	5	17.1	x
IA	IA2027	Blockton	PL-566	23	30.5	x
IA	IA7601.19	Bruene-Spahn-Little Sioux	PL-534	1	1.5	x
IA	IA7601.14	Camp Creek-Little Sioux	PL-534	8	7.9	x
IA	IA9020	Chariton Valley	RC&D	9	1912.4	
IA	IA7601.15	Clark-Little Sioux	PL-534	2	1.4	
IA	IA7601.17	College Corner-Little Sioux	PL-534	4	6.2	x
IA	IA7601.18	Cord-Little Sioux	PL-534	3	1.1	x
IA	IA7601.21	Cottonwood-Green Valley-Little Sioux	PL-534	4	6.2	x
IA	IA7601.22	Crawford Creek-Little Sioux	PL-534	12	13.1	x
IA	IA2007	Crooked Creek	PL-566	4	34.6	x
IA	IA7601.23	Croy-Little Sioux	PL-534	15	7.5	
IA	IA2034	Dane Ridge	PL-566	31	28.0	x
IA	IA2016	Davids Creek	PL-566	14	61.0	x
IA	IA2019	Davis-Battle Creek	PL-566	15	7.2	x
IA	IA7601.24	Davis-Little Sioux	PL-534	11	6.5	x
IA	IA2026	Diamond Lake	PL-566	4	7.4	x
IA	IA7601.26	Dickman-Little Sioux	PL-534	3	3.1	x
IA	IA7601.28	Dutch Hollow-Little Sioux	PL-534	12	9.3	x
IA	IA7601.29	East Aldrich Creek-Little Sioux	PL-534	3	3.2	
IA	IA2801	East Fork of Big Creek	PL-566	21	18.1	x
IA	IA2804	East Fork of the Grand River	PL-566	91	166.8	x
IA	IA7601.31	East Waterman Creek-Little Sioux	PL-534	1	2.6	x
IA	IA7601.34	Elkhorn No. 2-Little Sioux	PL-534	3	3.2	x
IA	IA2024	English Bench	PL-566	7	7.4	x
IA	IA7601.36	Fee-Little Sioux	PL-534	2	1.4	
IA	IA7601.37	Gallup-Little Sioux	PL-534	2	2.2	
IA	IA2033	Gant Creek	PL-566	14	14.9	x
IA	IA7601.40	Garton-Little Sioux	PL-534	1	0.6	
IA	IA9021	Geode	RC&D	2	2392.8	
IA	IA7601.41	Glen Ellen-Little Sioux	PL-534	3	4.5	x
IA	IA9019	Golden Hills	RC&D	4	4733.3	
IA	IA7601.42	Gothier No.2-Little Sioux	PL-534	2	1.1	x
IA	IA7601.43	Grand Meadow-Little Sioux	PL-534	3	4.4	x
IA	IA2011	Hamburg	PL-566	1	4.0	x
IA	IA2004	Harmony Creek	PL-566	5	4.7	x
IA	IA7601.45	Heisler Creek-Little Sioux	PL-534	6	4.5	x
IA	IA2023	Held	PL-566	13	11.5	x
IA	IA8007	Honey Creek	PILOT	13	13.6	
IA	IA2017	Hound Dog Creek	PL-566	11	7.8	x
IA	IA7601.47	Huff-Little Sioux	PL-534	5	4.4	x
IA	IA2013	Indian Creek	PL-566	9	7.0	x
IA	IA2050	Indian Creek-Van Buren	PL-566	7	74.6	x
IA	IA7601.48	Innes-Jalas-Little Sioux	PL-534	1	1.8	x
IA	IA7601.49	Jett-Little Sioux	PL-534	7	2.9	x
IA	IA7601.50	Kirkholm-Little Sioux	PL-534	3	1.3	
IA	IA7601.52	Lawson-Little Sioux	PL-534	4	5.0	x
IA	IA2041	Ledgewood Creek	PL-566	9	11.6	x
IA	IA7601.53	Leech Hollow-Little Sioux	PL-534	7	12.2	x
IA	IA2037	Leutzinger-Lowe Run	PL-566	1	6.5	x
IA	IA7601.54	Little Beaver-Little Sioux	PL-534	6	5.2	x

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IA	IA7601.55	Little Egypt-Little Sioux	PL-534	8	4.7	x
IA	IA2057	Little Paint Creek	PL-566	2	14.1	x
IA	IA2048	Little River	PL-566	7	108.2	x
IA	IA7601.56	Little Whiskey-Little Sioux	PL-534	3	22.0	x
IA	IA7601.57	Lower Beaver-Little Sioux	PL-534	2	6.9	
IA	IA7601.58	Lum Hollow-Little Sioux	PL-534	16	9.9	x
IA	IA7601.62	McCall-Little Sioux	PL-534	11	12.9	x
IA	IA7601.63	McDonald-Little Sioux	PL-534	3	2.8	x
IA	IA7601.65	McLarty-Edwards-Little Sioux	PL-534	8	3.8	x
IA	IA7601.66	McMaster-Little Sioux	PL-534	4	2.7	x
IA	IA7601.67	Mike Mikkelson-Little Sioux	PL-534	10	9.4	x
IA	IA7601.68	Miller-Little Sioux	PL-534	3	1.2	x
IA	IA2009	Mill-Picayune Creek	PL-566	85	98.5	x
IA	IA7601.70	Moore-Little Sioux	PL-534	2	0.7	x
IA	IA7601.72	Mortensen-Little Sioux	PL-534	1	1.9	
IA	IA2031	Mosquito of Harrison	PL-566	18	36.9	x
IA	IA2012	Moulton	PL-566	8	11.4	x
IA	IA7601.74	Muckey Creek-Little Sioux	PL-534	8	5.1	x
IA	IA7601.75	Mud Creek-Little Sioux	PL-534	8	12.2	x
IA	IA8008	Mule Creek	PILOT	16	11.1	
IA	IA7601.76	Nepper-Little Sioux	PL-534	2	0.7	
IA	IA7601.77	Neustrom-Little Sioux	PL-534	12	7.4	x
IA	IA2039	North Pigeon	PL-566	15	6.7	x
IA	IA7601.78	Nutt Hollow-Little Sioux	PL-534	6	3.8	x
IA	IA7601.127	Parnell-Little Sioux	PL-534	15	9.2	x
IA	IA9018	Pathfinders	RC&D	6	3021.8	
IA	IA7601.80	Perion-Little Sioux	PL-534	3	3.1	
IA	IA7601.81	Phillips-Little Sioux	PL-534	6	3.9	
IA	IA2021	Pierce Creek No. 1	PL-566	5	5.7	x
IA	IA2047	Pierce Creek No. 2	PL-566	8	12.9	x
IA	IA7601.83	Pilot Rock-Little Sioux	PL-534	3	3.6	x
IA	IA2042	Pioneer	PL-566	1	8.3	x
IA	IA7601.84	Pleasant Valley-Little Sioux	PL-534	9	5.9	x
IA	IA2014	Pony Creek	PL-566	17	29.6	x
IA	IA7601.85	Quad Valley-Little Sioux	PL-534	3	7.3	x
IA	IA7601.87	Ralston-Little Sioux	PL-534	4	4.0	x
IA	IA7601.88	Reed-Little Sioux	PL-534	10	8.7	x
IA	IA7601.90	Robeson-Little Sioux	PL-534	3	3.6	x
IA	IA2005	Rocky Branch Creek	PL-566	8	13.5	x
IA	IA7601.92	Rodney-Little Sioux	PL-534	5	5.9	x
IA	IA2015	Ryan-Henschal	PL-566	6	15.1	x
IA	IA2043	Simon Run	PL-566	4	6.3	x
IA	IA7601.93	Simonsen-Little Sioux	PL-534	4	1.7	
IA	IA2006	Simpson Creek	PL-566	3	6.3	x
IA	IA7601.94	Smokey Hollow-Little Sioux	PL-534	4	3.4	x
IA	IA2055	Soap Creek	PL-566	132	254.7	x
IA	IA2025	South Hungerford No. 2	PL-566	5	4.5	x
IA	IA9017	Southern Iowa	RC&D	14	3460.1	
IA	IA2022	Stennett-Red Oak Creek	PL-566	11	14.8	x
IA	IA7601.96	Sunrise-Little Sioux	PL-534	3	4.5	x
IA	IA7601.97	Theobald-Little Sioux	PL-534	1	1.3	

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IA	IA2036	Three Mile Creek	PL-566	28	56.4	x
IA	IA7601.98	Tom King-Little Sioux	PL-534	1	2.3	
IA	IA2045	Troublesome Creek	PL-566	66	127.4	x
IA	IA2030	Turkey Creek	PL-566	54	127.9	x
IA	IA2046	Twelve Mile Creek	PL-566	30	75.9	x
IA	IA2051	Twin Ponies	PL-566	2	27.7	x
IA	IA7601.99	U.B.-Little Sioux	PL-534	2	1.4	x
IA	IA7601.101	Upper Beaver-Little Sioux	PL-534	8	5.6	x
IA	IA2803	Upper Locust Creek	PL-566	15	48.8	x
IA	IA7601.102	Walling-Little Sioux	PL-534	15	4.0	
IA	IA2029	Walters Creek	PL-566	31	46.2	x
IA	IA7601.103	Washburn-Little Sioux	PL-534	2	4.3	x
IA	IA7601.104	Waterman Spring-Little Sioux	PL-534	3	4.1	x
IA	IA2040	Waubonsie Creek	PL-566	27	43.4	x
IA	IA7601.106	Weber Creek - Little Sioux	PL-534	10	3.7	
IA	IA7601.105	Weber-Little Sioux	PL-534	6	2.6	
IA	IA7601.107	Wenger-Little Sioux	PL-534	6	2.8	x
IA	IA7601.108	West Aldrich-Little Sioux	PL-534	2	11.3	x
IA	IA7601.109	West Beaver-Little Sioux	PL-534	5	2.1	x
IA	IA2032	West Douglas	PL-566	10	10.5	x
IA	IA7601.111	West Fork No.1-Little Sioux	PL-534	4	2.7	x
IA	IA7601.112	West Fork No.3-Little Sioux	PL-534	6	4.8	x
IA	IA2802	West Fork of Big Creek	PL-566	51	62.8	x
IA	IA2038	West Sunnyside	PL-566	10	8.6	x
IA	IA7601.115	West Wolf Creek-Little Sioux	PL-534	9	41.6	x
IA	IA7601.116	Westside-Little Sioux	PL-534	4	23.1	x
IA	IA7601.117	Willow Creek-Little Sioux	PL-534	6	5.4	x
IA	IA7601.119	Windy Hill-Little Sioux	PL-534	9	9.6	x
IA	IA7601.121	Wolf Creek-Little Sioux	PL-534	9	9.9	x
IA	IA7601.123	Woods Hollow-Little Sioux	PL-534	3	2.3	x
IA	IA7601.124	Woodward Glen-Little Sioux	PL-534	1	3.2	x
IA	IA7601.125	Zellmer-Little Sioux	PL-534	7	3.1	x
ID	ID2013	Brundage Creek	PL-566	1	129.7	x
ID	ID2004	Cedar Creek	PL-566	1	209.5	x
ID	ID2005	Montpelier Creek	PL-566	1	80.4	x
IL	IL2016	Bay Creek	PL-566	3	224.9	x
IL	IL2004	Big Blue	PL-566	2	39.7	x
IL	IL2015	Coal & Crane Creek	PL-566	12	61.8	x
IL	IL8005	Hadley Creek	PILOT	5	72.4	
IL	IL2003	Hambaugh-Martin	PL-566	8	13.3	x
IL	IL2035	Lake Taylorville	PL-566	2	130.0	x
IL	IL2011	Little Cache Creek	PL-566	5	70.1	x
IL	IL2012	Little Creek	PL-566	1	18.3	x
IL	IL2022	Mendota	PL-566	1	7.5	x
IL	IL2017	Mill Creek	PL-566	8	126.0	x
IL	IL8006	Old Tom Creek	PILOT	6	15.8	
IL	IL2005	Shoal Creek	PL-566	5	287.9	x
IL	IL2002	Tiskilwa	PL-566	4	4.3	x
IL	IL2023	Upper Salt Creek	PL-566	4	115.5	x
IN	IN2036	Anderson River	PL-566	4	151.9	x
IN	IN2004	Boggs Creek	PL-566	2	76.0	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
IN	IN9015	Buffalo Trace Lake Dam	RC&D	1	126.1	
IN	IN2003	Busseron Creek	PL-566	22	255.5	x
IN	IN9016	Deer Creek	RC&D	1	50.5	
IN	IN2025	Delaney Creek	PL-566	12	143.0	x
IN	IN2001	Elk Creek	PL-566	7	27.1	x
IN	IN2006	French Lick Creek	PL-566	4	204.0	x
IN	IN2018	Little Raccoon Creek	PL-566	16	154.0	x
IN	IN2027	Little Walnut Creek	PL-566	3	64.3	x
IN	IN2007	Middle Fork of Anderson River	PL-566	8	105.4	x
IN	IN2017	Muddy Fork of Silver Creek	PL-566	5	66.5	x
IN	IN2002	Prairie Creek (Daviess)	PL-566	11	152.2	x
IN	IN2014	Prairie Creek (Vigo)	PL-566	3	123.9	x
IN	IN2022	Prides Creek	PL-566	1	231.6	x
IN	IN2010	Stucker Fork	PL-566	20	162.2	x
IN	IN2016	Twin-Rush Creek	PL-566	3	83.7	x
IN	IN2020	Upper Big Blue River	PL-566	10	196.5	x
IN	IN2023	West Boggs Creek	PL-566	1	13.2	x
KS	KS8009	Aiken-Bee Creek (Upper Bee Creek)	PILOT	1	10.6	
KS	KS2015	Andale	PL-566	1	26.2	x
KS	KS2017	Bee Creek	PL-566	7	62.6	x
KS	KS2023	Big Caney	PL-566	31	340.7	x
KS	KS2048	Big Creek	PL-566	6	132.3	x
KS	KS9022	Cedar Creek	RC&D	2	50.1	
KS	KS2007	Cimarron	PL-566	4	11.3	x
KS	KS2036	Cross Creek	PL-566	15	177.4	x
KS	KS2059	Diamond Creek	PL-566	2	152.0	x
KS	KS2056	Dry Creek	PL-566	2	26.1	x
KS	KS9023	Eagle Creek	RC&D	2	78.5	
KS	KS2045	East Sector Whitewater River	PL-566	6	161.5	x
KS	KS2061	Elk Creek	PL-566	18	139.9	x
KS	KS2013	Fall River	PL-566	27	318.4	x
KS	KS2014	Frog Creek	PL-566	8	35.1	x
KS	KS2022	Grant-Shanghai Creeks	PL-566	7	39.4	x
KS	KS2058	Grasshopper-Coal Creek	PL-566	22	99.9	x
KS	KS2043	Hargis Creek	PL-566	1	10.6	x
KS	KS2030	Irish Creek	PL-566	15	46.9	x
KS	KS9025	Jacobs-Phenis Creek	RC&D	4	55.7	
KS	KS2026	Lakin	PL-566	4	16.5	x
KS	KS2028	Little Delaware-Mission Creeks & Tributa	PL-566	38	95.4	x
KS	KS2021	Little Walnut-Hickory	PL-566	40	271.6	x
KS	KS8011	Lost Creek	PILOT	3	20.0	
KS	KS2038	Lower Elk River	PL-566	20	198.9	x
KS	KS2040	Lower Salt Creek	PL-566	5	148.6	x
KS	KS2034	Lower Wakarusa	PL-566	7	164.3	x
KS	KS2041	Lyons Creek	PL-566	15	280.3	x
KS	KS2018	Middle Caney	PL-566	15	156.5	x
KS	KS2060	Middle Creek	PL-566	7	115.7	x
KS	KS2055	Middle Creek (Linn & Miami)	PL-566	1	73.9	x
KS	KS2050	Middle Walnut	PL-566	8	293.5	x
KS	KS2801	Mission Creek	PL-566	4	16.4	
KS	KS2024	Muddy Creek	PL-566	2	47.4	x

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KS	KS2016	Nebo Creek	PL-566	3	14.2	x
KS	KS2031	North Black Vermillion	PL-566	30	155.2	x
KS	KS2047	North Sector Upper Walnut	PL-566	23	347.7	x
KS	KS2057	Peyton Creek	PL-566	3	34.2	x
KS	KS2025	Rock Creek	PL-566	22	134.3	x
KS	KS2049	Sand Creek	PL-566	3	96.3	x
KS	KS9024	See-Kan	RC&D	2	69.9	
KS	KS2020	Silver Creek	PL-566	6	18.5	x
KS	KS8012	Snipe Creek	PILOT	6	26.0	
KS	KS2062	South Fork	PL-566	8	291.2	x
KS	KS2065	South Fork Wolf River	PL-566	3	97.9	x
KS	KS2035	Spillman Creek	PL-566	18	188.9	x
KS	KS2010	Spring Creek	PL-566	4	41.7	x
KS	KS9026	Sunflower	RC&D	3	144.1	
KS	KS8013	Switzler Creek	PILOT	4	40.9	
KS	KS2008	Thompsonville	PL-566	3	7.3	x
KS	KS2027	Timber Creek	PL-566	33	160.5	x
KS	KS2029	Turkey Creek	PL-566	15	165.0	x
KS	KS2019	Twin Caney	PL-566	15	152.2	x
KS	KS2032	Upper Black Vermillion	PL-566	28	85.0	x
KS	KS9028	Upper Duck Creek	RC&D	4	66.2	
KS	KS2037	Upper Elk River	PL-566	27	219.5	x
KS	KS2039	Upper Salt Creek	PL-566	39	322.6	x
KS	KS2012	Upper Verdigris	PL-566	38	327.1	x
KS	KS2033	Upper Wakarusa	PL-566	17	531.1	x
KS	KS2046	Upper Walnut South Sector	PL-566	2	104.5	x
KS	KS2009	Walnut Creek	PL-566	44	124.3	x
KS	KS2044	West Sector Whitewater River	PL-566	9	356.5	x
KS	KS2051	Wet Walnut No. 1	PL-566	9	201.0	x
KS	KS2052	Wet Walnut No. 2	PL-566	23	379.8	x
KS	KS2053	Wet Walnut No. 3	PL-566	9	341.6	x
KS	KS2054	Wet Walnut No. 5	PL-566	3	355.3	x
KS	KS2011	White Clay-Brewery-Whiskey Creeks	PL-566	25	22.6	x
KY	KY2036	Banklick Creek	PL-566	1	58.2	x
KY	KY2023	Big Muddy Creek	PL-566	4	102.0	x
KY	KY2020	Big Reedy Creek	PL-566	2	41.4	x
KY	KY2026	Buck Creek	PL-566	2	37.5	x
KY	KY2018	Caney Creek	PL-566	10	152.5	x
KY	KY2038	Chamberlain Branch	PL-566	1	12.6	x
KY	KY2006	Cypress Creek	PL-566	3	63.7	x
KY	KY2010	Donaldson Creek	PL-566	7	73.3	x
KY	KY2012	East Fork of Clarks River	PL-566	5	304.0	x
KY	KY2021	East Fork of Pond River	PL-566	17	218.5	x
KY	KY2030	Fox Creek	PL-566	5	69.6	x
KY	KY2019	Humphrey-Clanton Creek	PL-566	3	105.4	x
KY	KY2022	Little Kentucky River	PL-566	5	65.3	x
KY	KY2031	Mill Creek	PL-566	1	32.4	x
KY	KY2008	Mud River	PL-566	23	374.7	x
KY	KY2015	North Fork of Little River	PL-566	4	58.5	x
KY	KY2037	North Fork of Nolin River	PL-566	2	51.7	x
KY	KY8014	North Fork of Rough River	PILOT	1	39.0	

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KY	KY2009	Obion Creek	PL-566	11	321.7	x
KY	KY9030	Owens Creek	RC&D	1	9.5	
KY	KY2041	Pigeon Roost Creek	PL-566	3	7.6	x
KY	KY8015	Plum Creek	PILOT	11	35.3	
KY	KY2035	Red Lick Creek	PL-566	4	69.9	x
KY	KY2033	Salt Lick Creek	PL-566	4	56.1	x
KY	KY2027	Short Creek	PL-566	2	38.5	x
KY	KY2039	Stewart Creek	PL-566	2	19.4	x
KY	KY2005	Twin Creek	PL-566	1	26.3	x
KY	KY8016	Upper Green River	PILOT	5	44.7	
KY	KY2029	Upper Tradewater River	PL-566	7	94.0	x
KY	KY2028	Valley Creek	PL-566	4	92.5	x
KY	KY2016	West Fork of Clarks River	PL-566	10	222.7	x
KY	KY2032	West Fork of Mayfield Creek	PL-566	33	71.5	x
KY	KY2024	West Fork of Pond River	PL-566	6	82.9	x
LA	LA2014	Bayou Boeuf	PL-566	2	328.6	x
LA	LA2001	Bayou Dupont	PL-566	15	90.6	x
LA	LA2008	Bayou Rapides	PL-566	1	175.2	x
LA	LA2004	Bear Creek	PL-566	3	33.5	x
LA	LA2019	Cypress-Black Bayou	PL-566	2	255.6	x
LA	LA2012	Lower Toulon Bayou	PL-566	1	13.6	x
LA	LA2006	Pleasant Valley/Big Ditch & Scarboroug Creeks	PL-566	5	19.0	x
LA	LA2002	Upper Bayou Nezpique	PL-566	3	329.0	x
LA	LA2003	Upper West Fork of Cypress Bayou	PL-566	3	8.7	x
MA	MA2001	Baiting Brook	PL-566	1	32.6	x
MA	MA2802	Blackberry River	PL-566	1	13.3	x
MA	MA2008	Bradley Brook	PL-566	1	46.1	x
MA	MA2010	Clam River	PL-566	5	31.4	x
MA	MA2014	Diamond Brook	PL-566	1	1.3	x
MA	MA2011	Pine Tree Brook	PL-566	1	4.5	x
MA	MA2006	Powdermill Brook	PL-566	2	42.5	x
MA	MA2004	Su-As-Co River	PL-566	9	237.8	x
MA	MA2007	Upper Quaboag River	PL-566	5	167.0	x
MA	MA2012	Washington Mountain Brook	PL-566	3	36.3	x
MA	MA9031	Wild Acres Dam	RC&D	1	0.6	
MD	MD2004	Gilbert Run	PL-566	3	45.6	x
MD	MD2001	Little Deer Creek	PL-566	3	14.1	x
MD	MD2002	Little Youghiogheny River	PL-566	6	40.8	x
MD	MD2015	Piney Run	PL-566	1	18.4	x
MD	MD2016	St. Mary's River	PL-566	1	32.5	x
MD	MD2008	Upper Rock Creek	PL-566	2	76.5	x
ME	ME2004	Cold River-Old Course Saco	PL-566	2	31.0	x
ME	ME2005	Dunham-Davee Brook	PL-566	3	8.5	x
ME	ME2001	Libby Brook	PL-566	2	37.3	x
ME	ME2003	Limestone Stream	PL-566	3	48.4	x
ME	ME2002	Presque Isle Stream	PL-566	5	197.9	x
ME	ME2008	Violette Stream	PL-566	1	64.6	x
MI	MI2022	Black Creek	PL-566	2	6.3	x
MI	MI2014	East Branch Sturgeon River	PL-566	2	98.3	x
MI	MI2017	East Upper Maple River	PL-566	1	13.0	x
MI	MI2001	Little Black River	PL-566	4	28.4	x

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MI	MI2004	Misteguay Creek	PL-566	3	166.4	x
MI	MI2006	North Branch of Mill Creek	PL-566	1	28.0	x
MN	MN2802	Bear Creek	PL-566	4	16.5	
MN	MN2006	Bear Valley	PL-566	3	45.9	x
MN	MN2016	Belle Creek	PL-566	6	78.4	x
MN	MN2020	Burnham Creek	PL-566	1	158.4	x
MN	MN2018	Canby Creek	PL-566	3	45.4	x
MN	MN9032	Chippewa River Fish Barrier	RC&D	1	145.5	
MN	MN2010	Crooked Creek	PL-566	6	69.8	x
MN	MN8017	East Willow Creek	PILOT	6	35.8	
MN	MN2009	Joe River	PL-566	1	96.2	x
MN	MN9033	Knife Lake	RC&D	1	91.2	
MN	MN9034	Lake Linka	RC&D	1	0.9	
MN	MN2013	Lakes Okabena & Ocheda	PL-566	1	109.1	x
MN	MN9035	Long Tom Lake	RC&D	1	115.7	
MN	MN9036	Marlu Mill Pond	RC&D	1	61.9	
MN	MN2007	North Branch of Two Rivers	PL-566	1	379.9	x
MN	MN9037	Pine Lawn Park	RC&D	1	29.0	
MN	MN8018	Shakopee Creek Pilot Watershed	PILOT	2	323.1	
MN	MN2023	Snake River	PL-566	2	253.7	x
MN	MN2019	South Fork Zumbro River	PL-566	7	353.5	x
MN	MN2014	Upper Tamarac River	PL-566	2	364.3	x
MO	MO2003	102 River Tributaries	PL-566	11	28.9	x
MO	MO2009	Bear Creek	PL-566	14	51.7	x
MO	MO2027	Big Creek-Hurricane Creek	PL-566	124	279.5	x
MO	MO2016	Buck and Doe Run Creeks	PL-566	19	48.4	x
MO	MO2008	Callahan Creek	PL-566	7	34.4	x
MO	MO2017	Clarence Cannon Memorial	PL-566	9	87.8	x
MO	MO2013	Durgens Creek	PL-566	16	70.0	x
MO	MO8019	East Branch of South Fork of Blackwater	PILOT	20	25.3	
MO	MO2002	East Fork of Big Creek	PL-566	80	77.8	x
MO	MO2036	East Fork of The Grand River	PL-566	22	102.5	x
MO	MO2029	East Locust Creek	PL-566	81	124.3	x
MO	MO2032	East Yellow Creek	PL-566	61	192.9	x
MO	MO2801	Fourche Creek	PL-566	9	123.0	
MO	MO2026	Grassy Creek	PL-566	40	55.9	x
MO	MO9041	Green Hills RC&D	RC&D	23	4964.8	
MO	MO2011	Grindstone-Lost-Muddy Creek	PL-566	52	327.4	x
MO	MO2035	Hickory Creek	PL-566	5	38.0	x
MO	MO2006	Hoover-Frankum	PL-566	10	30.0	x
MO	MO2015	Little Sni-A-Bar	PL-566	18	39.2	x
MO	MO7113	Lost Creek - Pilot	PILOT	10	16.4	
MO	MO2018	Lost Creek (PL-566)	PL-566	8	60.3	x
MO	MO2020	Lower Little Black River	PL-566	1	148.1	x
MO	MO2034	Marthasville Town Branch	PL-566	1	3.0	x
MO	MO2033	Moniteau Creek	PL-566	56	148.5	x
MO	MO2021	Mozingo Creek	PL-566	4	51.5	x
MO	MO2005	Panther Creek	PL-566	12	31.1	x
MO	MO2001	Platte River Tributaries	PL-566	8	24.5	x
MO	MO2007	South Fork of Blackwater River	PL-566	18	99.6	x
MO	MO9044	Southwest Missouri RC&D	RC&D	2	9033.2	

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MO	MO2004	Tabo Creek	PL-566	58	132.3	x
MO	MO2025	Troublesome Creek	PL-566	127	139.5	x
MO	MO2019	Upper Little Black River	PL-566	12	179.1	x
MO	MO2030	Upper Locust Creek	PL-566	89	323.8	x
MO	MO2010	Wellington-Napoleon	PL-566	17	57.2	
MO	MO2028	West Fork of Big Creek	PL-566	143	230.3	x
MO	MO2014	Williams Creek	PL-566	3	23.8	x
MO	MO2012	Willow-Cravens	PL-566	13	53.4	x
MS	MS3302.01	Abiaca Creek-Yazoo	PL-534	22	155.1	x
MS	MS3302.02	Ascalmore Creek-Yazoo	PL-534	18	116.6	x
MS	MS3301.17	Ayers Creek-Ltl. Talla	PL-534	1	41.6	x
MS	MS2050	Bahala Creek	PL-566	5	49.6	
MS	MS2012	Bentonia Creek	PL-566	9	70.7	
MS	MS2037	Big Creek	PL-566	7	126.2	
MS	MS3302.06	Big Sand Creek-Yazoo	PL-534	25	149.1	x
MS	MS3301.19	Big Springs Creek	PL-534	2	90.3	
MS	MS3302.07	Black Creek-Yazoo	PL-534	19	384.7	x
MS	MS3302.85	Bogue Creek - Yazoo	PL-534	25	214.9	
MS	MS3302.12	Buntyn Creek-Yazoo	PL-534	4	104.1	x
MS	MS2008	Chiwapa Creek	PL-566	10	149.6	
MS	MS2040	Chunky River	PL-566	6	363.6	
MS	MS2020	Chuquatonchee Creek	PL-566	14	616.7	
MS	MS2046	Copiah Creek	PL-566	1	127.4	
MS	MS3301.02	Cypress & Puss Cuss Creeks -Ltl Talla	PL-534	11	135.3	x
MS	MS3302.18	Cypress Creek - Yazoo	PL-534	8	40.8	x
MS	MS2028	Dry Creek	PL-566	4	20.7	
MS	MS3301.18	East & West Goose Creeks-Ltl. Talla	PL-534	2	51.3	
MS	MS3302.20	Eden Creek-Yazoo	PL-534	2	11.3	x
MS	MS2002	Ellison Creek	PL-566	4	17.1	
MS	MS2006	Grays Creek	PL-566	13	35.3	
MS	MS3301.04	Greasy Creek-Ltl. Talla	PL-534	14	58.8	x
MS	MS3301.05	Hell Creek-Ltl. Talla	PL-534	5	38.2	x
MS	MS3302.24	Hickahala Creek-Yazoo	PL-534	10	215.6	x
MS	MS2029	Holiday Creek	PL-566	2	96.6	
MS	MS3302.27	Hotophia Creek-Yazoo	PL-534	5	36.0	x
MS	MS3302.31	Indian Creek - Bobo Bayou-Yazoo	PL-534	9	57.1	x
MS	MS3302.32	Johnson and Fair-Yazoo	PL-534	3	40.8	x
MS	MS9038	Kemper County Lake	RC&D	1	12.9	
MS	MS3301.06	Locks Creek-Ltl. Talla	PL-534	2	32.0	x
MS	MS2026	Long Creek	PL-566	5	63.5	
MS	MS3302.73	Long Creek-Yazoo	PL-534	3	85.0	x
MS	MS3301.20	Lower Tallahatchie River	PL-534	3	143.7	
MS	MS3301.09	Mill Creek-Ltl. Talla	PL-534	4	26.2	x
MS	MS2003	Muddy Creek	PL-566	19	101.4	x
MS	MS3302.62	Murray Creek-Yazoo	PL-534	4	48.5	
MS	MS3302.69	North Fork Tillatoha-Hunter Creek-Yazoo	PL-534	13	70.5	x
MS	MS3301.12	North Tippah Creek-Ltl. Talla	PL-534	3	9.1	x
MS	MS3301.13	Oaklimeter Creek-Ltl. Talla	PL-534	14	62.9	x
MS	MS3301.14	Okonatie Creek-Ltl. Talla	PL-534	2	31.0	x
MS	MS3302.76	Otoucalofa Creek-Yazoo	PL-534	5	113.0	x
MS	MS3302.77	Pelucia Creek-Yazoo	PL-534	20	65.4	x

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MS	MS3302.78	Perry Creek-Yazoo	PL-534	3	32.6	x
MS	MS2011	Persimmon & Burnt Corn Creeks	PL-566	4	45.2	
MS	MS3302.79	Persimmon Creek-Yazoo	PL-534	12	67.8	x
MS	MS3302.81	Pigeon Roost Creek-Yazoo	PL-534	4	223.7	x
MS	MS3302.83	Piney Creek-Yazoo	PL-534	5	77.3	x
MS	MS2802	Porters Creek	PL-566	2	13.4	
MS	MS3302.84	Potacocowa Creek-Yazoo	PL-534	20	64.8	x
MS	MS2041	Richland Creek	PL-566	3	146.3	
MS	MS2007	Second Creek	PL-566	10	124.2	
MS	MS3302.40	Senatobia Creek-Yazoo	PL-534	9	90.6	
MS	MS2013	Shammack Creek	PL-566	5	35.1	
MS	MS2055	Shuqualak Creek	PL-566	1	37.7	
MS	MS3302.44	Skuna River-Yazoo	PL-534	2	140.1	x
MS	MS2051	Sowashee Creek	PL-566	4	84.3	x
MS	MS2024	Standing Pine Creek	PL-566	4	59.3	
MS	MS2001	Tackett Creek	PL-566	4	53.0	
MS	MS2032	Tallahaga Creek	PL-566	8	126.3	x
MS	MS3302.51	Tillatoba Creek-Yazoo	PL-534	12	99.8	
MS	MS3301.07	Tippah - Ltl. Talla	PL-534	16	226.0	x
MS	MS3302.52	Toposhaw Creek-Yazoo	PL-534	3	42.2	
MS	MS2021	Town Creek	PL-566	22	388.8	x
MS	MS3302.53	Turkey Creek-Yazoo	PL-534	10	174.5	
MS	MS2025	Tuscumbia River	PL-566	10	323.1	x
MS	MS2045	Upper Leaf River	PL-566	3	210.5	
MS	MS3301.16	Upper Tallahatchie River-Ltl. Talla	PL-534	8	66.9	x
MS	MS3301.15	Upper Tippah River-Ltl. Talla	PL-534	5	58.7	x
MS	MS9039	Upper Yockanookany	RC&D	4	1.4	
MS	MS2005	West Hatchie Creek	PL-566	6	74.0	
MS	MS2038	White Sands-Green Creek	PL-566	2	190.8	
MS	MS2060	Whites Creek	PL-566	1	45.0	
MT	MT2011	Baker Lake	PL-566	1	6.3	x
MT	MT2007	Beaver Creek	PL-566	1	129.4	x
MT	MT2008	Big Spring Creek	PL-566	4	150.5	x
MT	MT9200	Bitter Root	RC&D	2	6262.0	
MT	MT2002	Box Elder Creek	PL-566	1	24.0	x
MT	MT2005	Cedar Creek	PL-566	1	24.6	x
MT	MT9201	Headwaters	RC&D	1	10773.8	
MT	MT2003	Jawbone Creek	PL-566	2	4.7	x
MT	MT2001	Lower Willow Creek	PL-566	1	106.4	x
MT	MT2009	Newlan Creek	PL-566	1	82.1	
MT	MT2004	Shelby	PL-566	2	5.1	x
MT	MT2006	Sidney Water Users Association	PL-566	2	5.3	x
NC	NC2004	Bear Creek	PL-566	7	63.3	x
NC	NC2801	Cane Creek	PL-566	1	25.2	x
NC	NC2046	County Line Creek	PL-566	1	94.2	x
NC	NC2025	Crabtree Creek	PL-566	10	145.0	x
NC	NC2003	Deep Creek	PL-566	15	124.6	x
NC	NC2035	Dutchman Creek	PL-566	9	129.5	x
NC	NC9076	Lake Burlington	RC&D	2	1.6	
NC	NC2047	Limestone Creek	PL-566	1	60.8	x
NC	NC2037	Little Yadkin River	PL-566	18	61.3	x

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NC	NC2009	Muddy Creek	PL-566	9	98.5	x
NC	NC2045	Second Broad River	PL-566	19	221.3	x
NC	NC2028	Stewarts Creek-Lovills Creek	PL-566	1	74.6	x
NC	NC8029	Third Creek	PILOT	11	100.5	
NC	NC2013	Town Fork Creek	PL-566	10	135.1	x
ND	ND2013	Boundary Creek	PL-566	2	52.0	x
ND	ND2004	Elm River	PL-566	3	363.6	x
ND	ND2020	English Coulee	PL-566	1	64.2	x
ND	ND9077	Mcdowell Dam	RC&D	1	6.7	
ND	ND2014	Middle Branch-Park River	PL-566	5	241.9	x
ND	ND2008	Middle-South Branch Forest River	PL-566	3	326.1	x
ND	ND2015	Mott Dam	PL-566	1	4.4	x
ND	ND2006	North Branch Forest River	PL-566	4	159.1	x
ND	ND2017	Square Butte Creek	PL-566	4	307.5	x
ND	ND2002	Swan-Buffalo Creek	PL-566	3	337.2	x
ND	ND2005	Tewaukon	PL-566	3	146.8	x
ND	ND8030	Tongue River	PILOT	10	170.4	
ND	ND2019	Upper Turtle River	PL-566	8	268.8	x
ND	ND2011	Willow Creek-Park River	PL-566	2	189.8	x
NE	NE2008	Antelope Creek	PL-566	3	101.9	x
NE	NE2040	Aowa Creek	PL-566	33	101.2	x
NE	NE2018	Bear-Pierce-Cedar Creek	PL-566	30	110.2	x
NE	NE2019	Bellwood	PL-566	13	123.0	x
NE	NE2017	Big Indian Creek	PL-566	35	208.8	x
NE	NE2047	Blackwood Creek	PL-566	11	350.7	x
NE	NE2010	Bowman-Spring Branch	PL-566	7	59.2	x
NE	NE8021	Brownell Creek	PILOT	20	22.6	
NE	NE2029	Brule	PL-566	1	20.3	x
NE	NE2057	Buck and Duck Creeks	PL-566	2	29.4	
NE	NE2014	Buckley Creek	PL-566	6	29.6	x
NE	NE2037	Clatonia Creek	PL-566	8	39.4	x
NE	NE2041	Clear Creek	PL-566	2	58.4	x
NE	NE2035	Corporation Gulch	PL-566	1	47.3	x
NE	NE2028	Cottonwood Creek	PL-566	12	54.6	x
NE	NE2027	Cub Creek	PL-566	21	140.9	x
NE	NE2013	Cure Creek	PL-566	1	54.4	x
NE	NE2023	Dorchester	PL-566	4	24.5	x
NE	NE8022	Dry Creek	PILOT	10	79.6	
NE	NE2021	Dry Creek South	PL-566	6	33.5	x
NE	NE2016	Gering Valley	PL-566	10	83.5	x
NE	NE8023	Indian Creek	PILOT	31	75.7	
NE	NE2022	Jones Creek	PL-566	2	18.8	x
NE	NE2046	Long Branch	PL-566	23	62.2	x
NE	NE2039	Lower Medicine Creek	PL-566	2	241.8	x
NE	NE2056	Middle Big Nemaha	PL-566	8	239.4	x
NE	NE2033	Mission Creek	PL-566	7	39.8	x
NE	NE2009	Mud Creek	PL-566	15	57.0	x
NE	NE9063	North Central RC&D	RC&D	3	79.9	
NE	NE2006	Oak Creek	PL-566	28	179.3	x
NE	NE9140	Panhandle RC&D	RC&D	10	416.7	
NE	NE2036	Papillion Creek	PL-566	13	401.0	x

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NE	NE2020	Pilger Creek	PL-566	1	20.2	x
NE	NE2005	Plattsmouth	PL-566	5	30.6	x
NE	NE2015	Plum Creek	PL-566	32	69.4	x
NE	NE2025	Rock Creek (Pawnee)	PL-566	11	59.3	x
NE	NE2051	South Branch Little Nemaha	PL-566	19	176.4	x
NE	NE2045	South Fork	PL-566	11	81.9	x
NE	NE2034	Spring Creek (Dawson)	PL-566	6	168.4	x
NE	NE2026	Spring Creek (Johnson)	PL-566	21	52.2	x
NE	NE2024	Stamford	PL-566	2	61.0	x
NE	NE2053	Swan Creek	PL-566	21	283.3	x
NE	NE2043	Tekamah-Mud Creek	PL-566	9	33.7	x
NE	NE2032	Thirty-Two Mile Creek	PL-566	6	102.8	x
NE	NE2012	Turtle Creek	PL-566	1	16.6	x
NE	NE2030	Upper Big Nemaha	PL-566	70	182.7	x
NE	NE2038	Upper Medicine Creek	PL-566	4	396.7	x
NE	NE8024	Upper Salt Creek	PILOT	40	166.9	
NE	NE8025	Upper Salt Swedeburg	PILOT	5	40.8	
NE	NE2058	Wilbur Watershed	PL-566	1	33.6	
NE	NE2007	Wildhorse Creek	PL-566	3	40.2	x
NE	NE2011	Wilson Creek	PL-566	67	121.6	x
NE	NE2042	Winnebago-Bean Creek	PL-566	10	41.0	x
NE	NE2054	Wolf-Wildcat Creek	PL-566	7	88.0	x
NE	NE2031	Ziegler Creek	PL-566	8	73.4	x
NH	NH2005	Baker River	PL-566	7	213.3	x
NH	NH2801	Cold River-Old Course Saco	PL-566	1	47.4	x
NH	NH2006	Dead River	PL-566	1	16.2	x
NH	NH2002	Oliverian Brook	PL-566	1	40.6	x
NH	NH2003	Souhegan River	PL-566	13	220.2	x
NH	NH2007	Sugar River	PL-566	1	275.6	x
NJ	NJ2010	Assunpink Creek	PL-566	8	91.5	x
NJ	NJ2013	Furnace Brook	PL-566	1	7.6	x
NJ	NJ2004	Paulins Kill	PL-566	3	177.1	x
NJ	NJ2002	Stony Brook	PL-566	7	46.7	x
NJ	NJ9070	Toms River - Turnmill Pond	RC&D	1	3.2	
NM	NM2020	Anthony Arroyo	PL-566	1	7.7	x
NM	NM2017	Apache-Brazito-Mesquite Arroyos	PL-566	4	61.7	x
NM	NM2007	Caballo Arroyos	PL-566	5	12.3	x
NM	NM2019	Cass Draw	PL-566	2	61.4	x
NM	NM2028	Cottonwood-Walnut Creek	PL-566	2	382.3	x
NM	NM2021	Crow, Broad, and Placitas Arroyos	PL-566	2	191.1	x
NM	NM2004	Dona Ana Arroyo	PL-566	2	10.5	x
NM	NM2027	Eagle-Tumbleweed Draw	PL-566	1	272.0	x
NM	NM2014	Fillmore Arroyos	PL-566	3	25.3	x
NM	NM2016	Hackberry Draw	PL-566	2	23.9	x
NM	NM2003	Hatch Valley Arroyos	PL-566	6	20.1	x
NM	NM9071	La Mesilla	RC&D	1	0.7	
NM	NM9072	Las Cruces Arroyo	RC&D	1	1.7	
NM	NM2011	Pecos Arroyo	PL-566	1	75.6	x
NM	NM2009	Prop Canyon & Tributaries	PL-566	2	31.7	x
NM	NM2802	Running Water Draw	PL-566	1	230.6	
NM	NM2010	Saltpeter Creek	PL-566	1	49.3	x

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NM	NM8026	Sandia Mountain Tributaries	PILOT	1	38.7	
NM	NM2012	Santa Cruz River	PL-566	7	182.5	x
NM	NM2023	Sebastian Martin-Black Mesa	PL-566	7	171.5	x
NM	NM2022	Sibley, Green, Jaralosa, and Candler Arroyos	PL-566	3	157.5	x
NM	NM2026	T or C Williamsburg Arroyos	PL-566	1	30.5	x
NM	NM2015	Tortugas Arroyo	PL-566	2	29.6	x
NM	NM2008	Tramperos Creek	PL-566	2	214.4	x
NM	NM2013	Upper Gila Valley Arroyos	PL-566	12	41.5	x
NM	NM8027	Upper Rio Hondo	PILOT	1	403.5	
NM	NM2005	Upper Rio Penasco	PL-566	3	218.4	x
NM	NM2006	Zuber Draw	PL-566	3	184.9	x
NV	NV2004	Elko	PL-566	3	46.8	x
NV	NV2001	Peavine Mountain	PL-566	4	6.0	x
NV	NV2002	Upper Meadow Valley	PL-566	1	195.5	x
NY	NY2012	Batavia Kill	PL-566	3	73.1	x
NY	NY2027	Beaver Brook	PL-566	1	2.0	x
NY	NY2021	Brandywine Creek	PL-566	1	0.8	x
NY	NY9074	Central New York	RC&D	4	1614.2	
NY	NY2002	Conewango Creek	PL-566	9	298.3	x
NY	NY8028	Dean Creek	PILOT	2	8.9	
NY	NY2020	Deposit Creek	PL-566	1	76.4	x
NY	NY2007	Genegantslet Creek	PL-566	2	104.2	x
NY	NY2016	Higinbotham Brook	PL-566	1	1.6	x
NY	NY2003	Ischua Creek	PL-566	7	116.6	x
NY	NY2010	Little Choconut, Finch Hollow and Trout Brook	PL-566	8	19.8	x
NY	NY2019	Mill Brook	PL-566	2	4.7	x
NY	NY2009	Nanticoke Creek	PL-566	9	113.5	x
NY	NY2014	Newtown-Hoffman Creeks	PL-566	5	87.3	x
NY	NY2011	Patterson-Brixius and Grey Creek	PL-566	2	15.2	x
NY	NY9073	Seneca Trail	RC&D	1	1322.8	
NY	NY2025	Virgil Creek	PL-566	1	17.9	x
OH	OH2005	Chippewa Creek	PL-566	8	187.8	x
OH	OH2007	East Fork of Buck Creek	PL-566	4	9.8	x
OH	OH2027	Four Mile Creek	PL-566	4	99.1	x
OH	OH2012	Margaret Creek	PL-566	5	60.0	x
OH	OH2004	Marsh Run	PL-566	1	31.4	x
OH	OH2019	North Hocking River	PL-566	1	51.6	x
OH	OH2016	Pine Creek	PL-566	1	184.2	x
OH	OH2009	Rush Creek	PL-566	19	235.0	x
OH	OH8031	Upper Hocking	PILOT	16	50.0	
OH	OH2003	Upper Wabash	PL-566	3	124.4	x
OH	OH2010	West Fork Duck Creek	PL-566	2	106.5	x
OK	OK3101.03	Barnitz Creek-Washita	PL-534	76	283.7	x
OK	OK3101.21	Bear Creek-Washita	PL-534	10	84.0	x
OK	OK3101.05	Bear Hybarger - Criner Creek-Washita	PL-534	11	102.7	x
OK	OK2007	Bear-Fall Coon Creek	PL-566	31	188.3	x
OK	OK3101.24	Beaver Creek-Washita	PL-534	15	85.5	x
OK	OK3101.20	Beaver Dam Creek-Washita	PL-534	6	44.0	x
OK	OK2801	Big Caney Creek	PL-566	1	15.9	x
OK	OK3101.18	Big Kiowa Creek-Washita	PL-534	6	38.2	x
OK	OK2002	Big Wewoka Creek	PL-566	41	273.7	x

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OK	OK3101.16	Bitter Creek-Washita	PL-534	19	105.0	x
OK	OK3101.15	Boggy Creek-Washita	PL-534	36	121.6	x
OK	OK9078	Boiling Springs	RC&D	1	8.1	
OK	OK3101.14	Broken Leg Creek-Washita	PL-534	3	17.9	x
OK	OK2056	Brushy-Peaceable Creek	PL-566	18	341.1	x
OK	OK3101.13	Buttler Laterals-Washita	PL-534	9	71.5	x
OK	OK3101.01	Caddo Creek-Washita	PL-534	28	427.2	x
OK	OK2020	Cane Creek	PL-566	21	165.4	x
OK	OK2026	Caney Creek	PL-566	14	64.5	x
OK	OK2011	Caney-Coon Creek	PL-566	3	36.6	x
OK	OK2046	Canyon View Creek	PL-566	4	23.0	x
OK	OK2068	Carney Creek	PL-566	1	27.2	x
OK	OK2045	Caston-Mountain Creek	PL-566	5	74.6	x
OK	OK3101.11	Cavalry Creek-Washita	PL-534	30	104.4	x
OK	OK3101.10	Cherokee Sandy Creek-Washita	PL-534	19	70.9	x
OK	OK3101.09	Chigley Sandy Creek-Washita	PL-534	14	46.1	x
OK	OK3101.08	Cobb Creek-Washita - Fast Runner	PL-534	12	338.7	x
OK	OK3101.07	Colbert Creek-Washita	PL-534	3	22.2	x
OK	OK2047	Cotton-Coon-Mission Creek	PL-566	11	318.4	x
OK	OK2023	Cottonwood Creek	PL-566	16	380.4	x
OK	OK2061	Cow Creek	PL-566	29	194.4	x
OK	OK3101.06	Cowden Laterals-Washita	PL-534	13	127.1	x
OK	OK3101.05	Criner Creek-Washita (w/ Bear-Hybarger)	PL-534	22		x
OK	OK3101.12	Dead Indian-Wildhorse Creek-Washita	PL-534	12	98.0	x
OK	OK2059	Deep Red Run-Coffin Creek	PL-566	2	89.0	x
OK	OK2024	Delaware Creek	PL-566	13	80.1	x
OK	OK3101.04	Delaware Creek-Washita	PL-534	2	55.4	x
OK	OK8032	Double Creek	PILOT	6	59.7	
OK	OK2073	Dry Creek	PL-566	8	242.9	x
OK	OK3101.22	Finn Creek-Washita	PL-534	35	94.1	x
OK	OK2049	Fitzgerald-Soldier Creek	PL-566	5	30.6	x
OK	OK3101.42	Fort Cobb Laterals-Washita	PL-534	9	118.6	x
OK	OK2037	Four Mile Creek	PL-566	1	53.7	x
OK	OK2013	Fourche Maline Creek	PL-566	14	307.1	x
OK	OK9079	Fourteen Mile Creek	RC&D	2	25.5	
OK	OK2042	Frogville Creek	PL-566	2	25.5	x
OK	OK3101.60	Gyp Creek-Washita	PL-534	1	111.1	x
OK	OK3101.48	Ionine Creek-Washita	PL-534	3	85.2	x
OK	OK2051	Jack Creek	PL-566	10	71.3	x
OK	OK2060	Kadashan Bottom	PL-566	5	15.8	x
OK	OK2065	Kickapoo Nations Creek	PL-566	5	281.6	x
OK	OK3101.49	Kickapoo Sandy Creek-Washita	PL-534	20	67.9	x
OK	OK2043	Lambert Creek	PL-566	2	12.3	x
OK	OK2012	Leader-Middle Clear Boggy Creek	PL-566	33	169.0	x
OK	OK2006	Little Deep Fork Creek	PL-566	56	262.7	x
OK	OK3101.54	Little Washita River-Washita	PL-534	45	241.6	x
OK	OK2003	Little Wewoka Creek-Graves Creek	PL-566	16	196.6	x
OK	OK2004	Long Branch Creek	PL-566	11	44.7	x
OK	OK2058	Lost-Duck Creeks	PL-566	9	92.6	x
OK	OK2034	Lower Bayou Creek	PL-566	15	151.2	x
OK	OK2052	Lower Black Bear Creek	PL-566	19	246.4	x

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OK	OK2030	Lower Clear Boggy Creek	PL-566	23	349.6	x
OK	OK2053	Lower Red Rock Creek	PL-566	7	206.7	x
OK	OK3101.56	Maysville Laterals-Washita	PL-534	21	82.2	x
OK	OK2078	Middle Deep Red Run Creek	PL-566	1	287.7	x
OK	OK3101.53	Mill Creek-Washita	PL-534	18	157.7	x
OK	OK3101.51	Nine Mile Creek-Washita	PL-534	18	82.8	x
OK	OK2074	North Deer Creek	PL-566	1	46.5	x
OK	OK3101.52	Oak Creek-Washita	PL-534	14	70.5	x
OK	OK2054	Okfuskee Tributaries	PL-566	29	355.2	x
OK	OK2032	Okmulgee Creek	PL-566	2	25.3	x
OK	OK2044	Otter Creek	PL-566	4	282.5	x
OK	OK3101.55	Owl Creek-Washita	PL-534	15	33.6	x
OK	OK2057	Paint Creek	PL-566	1	31.3	x
OK	OK3101.57	Panther Creek-Washita	PL-534	6	85.0	x
OK	OK3101.58	Peavine Creek-Washita	PL-534	10	59.8	x
OK	OK3101.59	Pennington Creek-Washita	PL-534	3	101.8	x
OK	OK2055	Pryor Creek	PL-566	8	277.4	x
OK	OK2039	Quapaw Creek	PL-566	38	157.3	x
OK	OK3101.43	Quartermaster Creek-Washita	PL-534	36	188.1	x
OK	OK3101.61	Rainy Mountain Creek-Washita	PL-534	29	314.4	x
OK	OK3101.23	Roaring Creek-Washita	PL-534	40	110.0	x
OK	OK2066	Robinson Creek	PL-566	5	58.3	x
OK	OK2041	Rock Creek	PL-566	4	62.8	x
OK	OK3101.47	Rock Creek-Washita	PL-534	17	163.4	x
OK	OK3101.33	Round Creek-Washita	PL-534	9	70.1	x
OK	OK3101.26	Rush Creek-Washita	PL-534	54	288.2	x
OK	OK3101.27	Saddle Mountain Creek-Washita	PL-534	12	114.4	x
OK	OK2019	Sallisaw Creek	PL-566	34	300.9	x
OK	OK2009	Salt Creek	PL-566	35	247.2	x
OK	OK2031	Salt-Camp Creek	PL-566	5	117.3	x
OK	OK3101.29	Sandstone Creek-Washita	PL-534	42	103.7	x
OK	OK2005	Sandy Creek	PL-566	29	227.1	x
OK	OK9080	Scraper Hollow Creek	RC&D	2	9.1	
OK	OK3101.30	Sergeant Major Creek-Washita	PL-534	6	30.9	x
OK	OK3101.31	Soldier Creek-Washita	PL-534	12	60.3	x
OK	OK3101.32	South Clinton Laterals-Washita	PL-534	16	75.5	x
OK	OK3101.44	Spring Creek-Washita	PL-534	4	83.3	x
OK	OK2029	Stillwater Creek	PL-566	34	275.6	x
OK	OK3101.34	Sugar Creek-Washita	PL-534	51	289.8	x
OK	OK2015	Timber Creek	PL-566	7	62.5	x
OK	OK3101.25	Tonkawa Creek-Washita	PL-534	13	47.6	x
OK	OK2028	Tri-County Turkey Creek	PL-566	31	317.0	x
OK	OK2070	Turkey Creek	PL-566	3	440.0	x
OK	OK3101.36	Turkey Creek-Washita	PL-534	12	71.8	x
OK	OK2038	Uncle John Creek	PL-566	12	154.5	x
OK	OK2033	Upper Bayou Creek	PL-566	8	193.2	x
OK	OK2014	Upper Black Bear Creek	PL-566	72	376.1	x
OK	OK2022	Upper Blue River	PL-566	2	317.9	x
OK	OK2010	Upper Clear Boggy Creek	PL-566	49	252.9	x
OK	OK2040	Upper Elk Creek	PL-566	35	388.3	x
OK	OK2063	Upper Muddy Boggy Creek	PL-566	24	320.8	x

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OK	OK2018	Upper Red Rock Creek	PL-566	43	308.1	x
OK	OK3101.37	Upper Washita Creek-Washita	PL-534	35	268.6	x
OK	OK3101.39	Washington Creek-Washita	PL-534	3	23.6	x
OK	OK2027	Waterfall-Gilford Creek	PL-566	11	88.4	x
OK	OK3101.35	Wayne Creek-Washita	PL-534	2	27.9	x
OK	OK2008	Whitegrass-Waterhole Creek	PL-566	9	42.4	x
OK	OK3101.40	Whiteshields Creek-Washita	PL-534	19	31.8	x
OK	OK9081	Whitewater Creek	RC&D	2	28.7	
OK	OK3101.46	Wildhorse Creek-Washita	PL-534	107	673.9	x
OK	OK3101.41	Winter Creek-Washita	PL-534	24	94.6	x
OR	OR2022	Deadman-Bullard	PL-566	1	10.6	x
OR	OR2006	Middle Fork of Hood River	PL-566	1	61.2	x
OR	OR2007	Sutherlin Creek	PL-566	2	43.9	x
OR	OR2009	Wolf Creek	PL-566	2	167.3	x
PA	PA2012	Brandywine Creek	PL-566	5	313.0	x
PA	PA2015	Briar Creek	PL-566	2	32.9	x
PA	PA2009	Brodhead Creek	PL-566	2	41.6	x
PA	PA9084	Conneautville	RC&D	1	6.2	
PA	PA2023	Cross Creek	PL-566	2	63.0	x
PA	PA2008	Dunlap Creek	PL-566	2	17.2	x
PA	PA2004	Greene-Dreher	PL-566	7	74.6	x
PA	PA2801	Harmon Creek	PL-566	8	21.7	x
PA	PA2021	Jacobs Creek	PL-566	3	94.8	x
PA	PA2011	Kaercher Creek	PL-566	3	5.5	x
PA	PA2001	Lackawaxen Tributaries	PL-566	7	43.6	x
PA	PA2002	Little Schuylkill River	PL-566	5	159.8	x
PA	PA2014	Little Shenango River	PL-566	6	139.6	x
PA	PA2016	Marsh Creek	PL-566	3	81.1	x
PA	PA2010	Martin Creek	PL-566	2	51.6	x
PA	PA2019	Mauch Chunk Creek	PL-566	1	9.0	x
PA	PA2017	Middle Creek	PL-566	3	128.7	x
PA	PA2006	Mill Creek (Tioga)	PL-566	3	13.0	x
PA	PA2007	Mill Run	PL-566	3	58.3	x
PA	PA2020	Neshaminy Creek	PL-566	8	232.0	x
PA	PA2003	North Fork Cowanesque River	PL-566	1	21.6	x
PA	PA9087	Northmoreland	RC&D	1	18.0	
PA	PA9082	Penn Gameland Water Fowl, French Creek	RC&D	5	41.3	
PA	PA2013	Sandy Creek	PL-566	2	64.8	x
PA	PA2005	Saul-Mathay Run	PL-566	2	7.1	x
PA	PA9086	Springville	RC&D	1	3.2	
PA	PA9085	Two Mile Run	RC&D	1	14.2	
PA	PA2802	Wheeling Creek	PL-566	2	187.3	x
PR	PR2001	Anasco River	PL-566	2	201.2	x
SC	SC2013	Beaverdam Creek (Edgefield)	PL-566	2	43.8	x
SC	SC2024	Beaverdam Creek (Oconee)	PL-566	4	37.8	x
SC	SC2030	Beaverdam-Warrior Creeks	PL-566	5	55.1	x
SC	SC2012	Big Creek	PL-566	2	19.6	x
SC	SC2006	Broadmouth Creek	PL-566	4	30.1	x
SC	SC2025	Brown's Creek	PL-566	1	43.2	x
SC	SC2003	Brushy Creek	PL-566	4	37.0	x
SC	SC2026	Cane Creek	PL-566	4	138.5	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
SC	SC2002	Coneross Creek	PL-566	4	74.9	x
SC	SC2008	Duncan Creek	PL-566	6	82.3	x
SC	SC2016	Fishing Creek	PL-566	4	49.7	x
SC	SC2020	Georges Creek	PL-566	1	33.0	x
SC	SC2007	Hills Creek	PL-566	1	23.4	x
SC	SC2033	Hollow Creek	PL-566	1	22.2	x
SC	SC2005	Huff Creek	PL-566	5	35.7	x
SC	SC2027	Jackson-Mill Creek	PL-566	4	58.6	x
SC	SC2028	Little Lynches Creek	PL-566	1	135.9	x
SC	SC2040	Little River	PL-566	14	123.9	x
SC	SC2029	North Tyger River	PL-566	1	35.0	x
SC	SC2035	Oolenoy River	PL-566	3	49.2	x
SC	SC2038	Rabon Creek	PL-566	3	87.8	x
SC	SC2031	Rocky Creek	PL-566	4	199.9	x
SC	SC2022	South Tyger River	PL-566	4	54.7	x
SC	SC2009	Thicketty Creek	PL-566	7	130.8	x
SC	SC2015	Three & Twenty Creek	PL-566	4	92.2	x
SC	SC9089	Tinkers Creek	RC&D	1	26.5	
SC	SC8033	Twelve Mile Creek	PILOT	7	106.1	
SC	SC2004	Wateree Creek	PL-566	4	58.5	x
SD	SD9091	Black Hills	RC&D	1	12643.8	
SD	SD2006	Brule Creek	PL-566	8	210.9	x
SD	SD9092	Lower James	RC&D	1	4034.7	
SD	SD2017	Lower Little Minnesota River-Big Stone Lake	PL-566	1	497.4	x
SD	SD2014	Mud Creek	PL-566	1	26.8	x
SD	SD9090	North Central	RC&D	6	5151.1	
SD	SD2003	Pattee Creek	PL-566	4	40.9	x
SD	SD9093	Randall	RC&D	13	4552.9	
SD	SD8034	Scott Creek	PILOT	2	4.5	
SD	SD2001	Silver Creek	PL-566	6	31.7	x
SD	SD2012	Spring-Bull Creek	PL-566	3	41.4	x
SD	SD2015	Union Creek	PL-566	5	47.1	x
SD	SD2011	Upper Deer Creek-Lake Hendricks	PL-566	1	49.2	x
SD	SD2004	Wild Rice Creek	PL-566	4	103.5	x
TN	TN2011	Bear Creek	PL-566	2	52.1	x
TN	TN2015	Cane Creek	PL-566	7	90.6	x
TN	TN9094	Cane Creek Putnam	RC&D	1	24.0	
TN	TN2016	Cub Creek	PL-566	3	17.0	x
TN	TN2012	Cypress Creek	PL-566	12	43.2	x
TN	TN2014	Houser Creek	PL-566	2	34.1	x
TN	TN2036	Hurricane Creek	PL-566	3	81.1	x
TN	TN2005	Indian Creek	PL-566	4	36.6	x
TN	TN2008	Jennings Creek	PL-566	10	74.4	x
TN	TN2002	Johnson Creek	PL-566	5	36.2	x
TN	TN2019	Line Creek	PL-566	1	68.9	x
TN	TN8035	Mary's Creek	PILOT	7	16.0	
TN	TN2038	McNairy-Cypress Creek	PL-566	9	180.2	x
TN	TN2006	Meridian Creek	PL-566	3	19.9	x
TN	TN2022	Middle Fork-Obion River	PL-566	9	120.2	x
TN	TN2031	Mud Creek	PL-566	5	74.8	x
TN	TN2801	Muddy Creek	PL-566	1	18.1	

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
TN	TN2039	North Fork-Forked Deer River	PL-566	19	136.1	x
TN	TN2017	Pine Creek	PL-566	2	14.2	x
TN	TN2010	Porter's Creek	PL-566	10	55.3	x
TN	TN2035	Red Boiling Springs	PL-566	3	15.1	x
TN	TN2013	Reelfoot-Indian Creek	PL-566	11	127.5	x
TN	TN8036	Sand Creek	PILOT	2	6.4	
TN	TN2034	Sweetwater Creek	PL-566	4	63.0	x
TN	TN2003	Thompson Creek	PL-566	5	29.7	x
TN	TN2804	Three Cypress Creek	PL-566	1	56.9	x
TN	TN2023	Weatherford-Bear Creek	PL-566	2	50.4	x
TX	TX2013	Alamo Arroyo	PL-566	2	123.7	x
TX	TX2066	Aquilla-Hackberry Creek	PL-566	16	296.9	x
TX	TX2048	Attoyac Bayou	PL-566	13	340.1	x
TX	TX2016	Auds Creek	PL-566	13	48.7	x
TX	TX2061	Bennett Creek	PL-566	4	164.7	x
TX	TX2047	Big Creek	PL-566	2	41.3	x
TX	TX3501.53	Big Sandy Creek-Trinity	PL-534	38	494.2	x
TX	TX3601.17	Blanket Creek-Middle Colorado	PL-534	19	197.0	x
TX	TX9099	Bosque Bottomlands	RC&D	2	1002.2	
TX	TX3601.16	Brady Creek-Middle Colorado	PL-534	42	803.7	x
TX	TX3601.15	Brown-Mullin-Middle Colorado	PL-534	7	132.4	x
TX	TX3601.14	Brownwood Laterals-Middle Colorado	PL-534	22	310.8	x
TX	TX8037	Calaveras Creek	PILOT	7	94.2	
TX	TX2034	Camp Rice Arroyo	PL-566	1	50.8	x
TX	TX2023	Caney Creek	PL-566	12	73.3	x
TX	TX2049	Castleman Creek	PL-566	6	47.3	x
TX	TX3501.29	Cedar Creek-Trinity	PL-534	91	1033.6	x
TX	TX3501.30	Chambers Creek-Trinity	PL-534	137	1072.7	x
TX	TX2019	Chiltipin-San Fernando Creek	PL-566	8	312.2	x
TX	TX2055	Choctaw Creek	PL-566	23	259.9	x
TX	TX3601.13	Clear Creek-Middle Colorado	PL-534	8	150.4	x
TX	TX3501.31	Clear Creek-Trinity	PL-534	62	355.8	x
TX	TX3501.32	Clear Fork of Trinity River-Trinity	PL-534	34	429.3	x
TX	TX2069	Comal River	PL-566	5	130.1	x
TX	TX2078	Cornudas, North and Culp Draws	PL-566	1	54.3	x
TX	TX8038	Cow Bayou	PILOT	29	115.3	
TX	TX2005	Cummins Creek	PL-566	20	313.0	x
TX	TX3601.12	Deep Creek-Middle Colorado	PL-534	6	73.1	x
TX	TX3501.33	Denton Creek-Trinity	PL-534	97	694.6	x
TX	TX2079	Deport Creek	PL-566	1	9.7	x
TX	TX2014	Diablo Arroyo	PL-566	2	56.1	x
TX	TX2050	Donahoe Creek	PL-566	6	152.9	x
TX	TX2018	Dry Devils River and Lowrey Draw	PL-566	13	243.7	x
TX	TX2051	Duck Creek	PL-566	17	221.5	x
TX	TX3501.36	East Fork Above Lavon-Trinity	PL-534	64	345.9	x
TX	TX2028	East Keechi Creek	PL-566	10	101.6	x
TX	TX3501.38	East Laterals of the Trinity-Trinity	PL-534	4	176.5	x
TX	TX2074	Ecleto Creek	PL-566	5	265.7	x
TX	TX2094	Elm Creek (1250)	PL-566	3	373.0	x
TX	TX2087	Elm Creek (Cen-Tex)	PL-566	34	324.9	x
TX	TX3501.52	Elm Fork-Trinity	PL-534	35	401.0	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
TX	TX8047	Escondido Creek - Pilot	PILOT	11	114.9	
TX	TX2053	Escondido Creek (PL-566)	PL-566	2	114.9	x
TX	TX2060	Farmers Creek	PL-566	23	102.3	x
TX	TX3501.43	Gray's Creek-Trinity	PL-534	14	91.4	x
TX	TX8040	Green Creek	PILOT	13	101.6	
TX	TX2092	Hamilton Creek	PL-566	3	83.6	x
TX	TX3501.45	Hickory Creek-Trinity	PL-534	9	258.3	x
TX	TX2077	Hitson, C&L and Washburn Draws	PL-566	3	299.4	x
TX	TX2072	Hog Creek	PL-566	2	90.4	x
TX	TX3601.01	Home Creek-Middle Colorado	PL-534	21	268.9	x
TX	TX2046	Hondo Creek	PL-566	3	46.1	x
TX	TX3601.11	Jim Ned Creek-Middle Colorado	PL-534	37	785.0	x
TX	TX2009	Johnsons Draw	PL-566	7	166.0	x
TX	TX2038	Kent Creek	PL-566	6	46.1	x
TX	TX2030	Kickapoo Creek	PL-566	6	61.9	x
TX	TX3501.49	Lake Creek-Trinity	PL-534	3	81.5	x
TX	TX2068	Lakeview	PL-566	24	232.8	x
TX	TX2015	Langford Creek	PL-566	11	38.8	x
TX	TX2082	Leona River	PL-566	3	169.1	x
TX	TX3501.50	Little Elm and Laterals-Trinity	PL-534	17	312.8	x
TX	TX2042	Logan Slough Creek	PL-566	3	11.4	x
TX	TX2006	Lower Brushy Creek	PL-566	17	207.5	x
TX	TX3501.51	Lower East Fork Laterals-Trinity	PL-534	13	78.7	x
TX	TX2035	Lower Plum Creek	PL-566	10	237.7	x
TX	TX2070	Lower Running Water Draw	PL-566	4	238.6	x
TX	TX3601.18	Lower San Saba River-Middle Colorado	PL-534	16	966.2	x
TX	TX2031	Macho Arroyo	PL-566	1	19.7	x
TX	TX2032	Madden Arroyo	PL-566	1	30.1	x
TX	TX2022	Martinez Creek	PL-566	6	88.1	x
TX	TX2083	McClellan Creek	PL-566	13	338.1	x
TX	TX2063	Mill Creek	PL-566	1	131.0	x
TX	TX2027	Mimms Draw	PL-566	1	6.5	x
TX	TX3501.05	Mountain Creek-Trinity	PL-534	3	305.7	x
TX	TX3601.10	Mukewater Creek-Middle Colorado	PL-534	10	132.4	x
TX	TX3601.09	Mustang Creek-Middle Colorado	PL-534	11	153.7	x
TX	TX2043	Nolan Creek	PL-566	13	113.9	x
TX	TX3501.06	North Creek-Trinity	PL-534	17	98.9	x
TX	TX2057	North Cuero	PL-566	2	19.5	x
TX	TX3501.04	North Trinity Laterals-Trinity	PL-534	4	111.6	x
TX	TX3601.08	Northeast Laterals-Middle Colorado	PL-534	6	123.1	x
TX	TX2037	Northeast Tributaries of the Leon River	PL-566	26	316.8	x
TX	TX3601.07	Northwest Laterals-Middle Colorado	PL-534	17	335.0	x
TX	TX2025	Olmitos and Garcias Creeks	PL-566	7	152.1	x
TX	TX2084	Paluxy River	PL-566	19	394.3	x
TX	TX2059	Pecan Creek	PL-566	4	29.8	x
TX	TX3501.07	Pilot Grove Creek-Trinity	PL-534	52	298.6	x
TX	TX2044	Pine Creek	PL-566	13	188.0	x
TX	TX2029	Plum Creek	PL-566	18	151.3	x
TX	TX2088	Pollard Creek	PL-566	2	12.2	x
TX	TX2085	Red Deer Creek	PL-566	4	337.5	x
TX	TX3501.09	Richland Creek-Trinity	PL-534	125	886.2	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
TX	TX3501.10	Rosser Trinidad Laterals-Trinity	PL-534	2	171.1	x
TX	TX3501.11	Rowlett Creek-Trinity	PL-534	6	226.2	x
TX	TX2058	Ruckers Creek	PL-566	1	23.8	x
TX	TX2071	Running Water Draw	PL-566	2	156.3	x
TX	TX2056	Rush Creek	PL-566	11	290.0	x
TX	TX2040	Salado Creek	PL-566	14	221.0	x
TX	TX3501.13	Salt Creek and Laterals-Trinity	PL-534	17	183.8	x
TX	TX2020	San Diego-Rosita Creeks	PL-566	10	344.4	x
TX	TX2076	Sanderson Canyon	PL-566	11	220.6	x
TX	TX3501.27	Sister Grove Creek-Trinity	PL-534	37	123.9	x
TX	TX3601.06	Southeast Laterals-Middle Colorado	PL-534	10	171.6	x
TX	TX3601.05	Southwest Laterals-Middle Colorado	PL-534	7	417.8	x
TX	TX2010	Sulphur Creek	PL-566	9	132.0	x
TX	TX2024	Tehuacana Creek	PL-566	28	299.2	x
TX	TX3501.17	Ten Mile Creek-Trinity	PL-534	2	136.1	x
TX	TX2090	Three-Mile and Sulfur Draw	PL-566	2	138.3	x
TX	TX2036	Town Branch	PL-566	2	3.4	x
TX	TX9123	Town Creek	RC&D	1	0.6	
TX	TX3601.04	Turkey Creek-Middle Colorado	PL-534	13	92.3	x
TX	TX2045	Upper Bosque River	PL-566	27	370.8	x
TX	TX2007	Upper Brushy Creek	PL-566	29	301.6	x
TX	TX9125	Upper Caney Creek	RC&D	1	1.4	
TX	TX2073	Upper Cibolo Creek	PL-566	4	76.7	x
TX	TX3501.19	Upper East Fork Laterals-Trinity	PL-534	28	144.7	x
TX	TX2017	Upper Lake Fork Creek	PL-566	23	218.7	x
TX	TX2033	Upper Las Moras Creek	PL-566	2	27.1	x
TX	TX3601.02	Upper Pecan Bayou-Middle Colorado	PL-534	25	689.1	x
TX	TX2091	Upper San Marcos River	PL-566	5	95.2	x
TX	TX3101	Upper Washita River	PL-534	38	444.8	x
TX	TX2041	Valley Creek	PL-566	19	230.7	x
TX	TX3501.21	Village & Walker Creeks-Trinity	PL-534	8	120.1	x
TX	TX3501.25	West Fork above Bridgeport-Trinity	PL-534	8	997.1	x
TX	TX2093	West Fork of Buffalo Creek	PL-566	1	12.1	x
TX	TX2054	Williams Creek	PL-566	4	30.1	x
TX	TX2086	Willow Creek	PL-566	2	46.6	x
TX	TX2011	York Creek	PL-566	16	141.4	x
UT	UT2006	American Fork-Dry Creek	PL-566	5	184.9	
UT	UT9126	Beaver Meadows	RC&D	1	30.1	
UT	UT2008	Blue Creek-Howell	PL-566	1	192.8	x
UT	UT9132	Dinasaur Land	RC&D	1	1.9	
UT	UT2010	Ferron	PL-566	10	295.1	
UT	UT2003	Glenwood	PL-566	1	113.4	x
UT	UT2004	Greens Lake	PL-566	3	11.5	
UT	UT2007	Miller-Biglow	PL-566	2	12.8	
UT	UT2009	Minersville	PL-566	2	414.5	x
UT	UT2011	Monroe-Annabella	PL-566	3	177.2	x
UT	UT8041	Mt. Pleasant Creek	PILOT	2	17.1	
UT	UT2005	North Fork of Ogden River	PL-566	1	67.0	
UT	UT8042	Santaquin	PILOT	1	3.9	
UT	UT2012	Vernon	PL-566	1	206.6	
UT	UT2013	Warner Draw	PL-566	11	297.4	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
VA	VA2042	Ararat River	PL-566	7	40.0	x
VA	VA2011	Beautiful Run	PL-566	8	30.4	x
VA	VA2006	Beaver Creek	PL-566	1	9.5	x
VA	VA2005	Buffalo Creek	PL-566	9	115.9	x
VA	VA2027	Buffalo River	PL-566	3	94.9	x
VA	VA2029	Bush River	PL-566	7	155.5	x
VA	VA2030	Cedar Run	PL-566	2	92.0	x
VA	VA2018	Cherrystone Creek	PL-566	2	45.5	x
VA	VA701.12	Dry Run-Potomac	PL-534	2	15.0	x
VA	VA8043	East Fork Falling River	PILOT	3	52.2	
VA	VA2031	Great Creek	PL-566	1	38.1	x
VA	VA2014	Horse Pasture Creek	PL-566	2	11.9	x
VA	VA2013	Johns Creek	PL-566	4	105.1	x
VA	VA2008	Leatherwood Creek	PL-566	5	73.1	x
VA	VA2015	Little Falling River	PL-566	3	43.9	x
VA	VA2010	Little River	PL-566	2	47.6	x
VA	VA701.10	Lower North River-Potomac	PL-534	6	135.5	x
VA	VA2004	Marrowbone Creek	PL-566	1	30.0	x
VA	VA2002	Mountain Run	PL-566	5	49.4	x
VA	VA2007	Muddy Creek	PL-566	2	11.8	x
VA	VA2025	Ni River	PL-566	1	52.2	x
VA	VA2023	Pohick Creek	PL-566	6	30.6	x
VA	VA2019	Potomac Creek	PL-566	2	66.8	x
VA	VA2003	Roanoke Creek	PL-566	14	218.8	x
VA	VA701.02	Shoemaker River-Potomac	PL-534	3	36.7	x
VA	VA2022	Slate River	PL-566	5	154.7	x
VA	VA2016	South Anna River	PL-566	9	364.2	x
VA	VA701.01	South River-Potomac	PL-534	13	233.6	x
VA	VA2801	Stewarts Creek-Lovills Creek	PL-566	1	116.4	
VA	VA701.08	Stoney Creek-Potomac	PL-534	2	113.3	x
VA	VA2024	Upper Blackwater River	PL-566	2	115.1	x
VA	VA2021	Upper Clinch Valley	PL-566	2	69.6	x
VA	VA701.04	Upper North River-Potomac	PL-534	3	65.0	x
VA	VA2012	White Oak Run	PL-566	1	21.1	x
VA	VA2017	Willis River	PL-566	11	278.4	x
VT	VT2002	Jewell Brook	PL-566	4	7.1	x
WA	WA2008	Locke	PL-566	1	3.6	x
WA	WA2013	Newman Lake	PL-566	1	39.8	x
WA	WA2009	Silver Lake	PL-566	1	43.6	x
WI	WI2005	Alma-Mill Creek	PL-566	6	12.2	x
WI	WI2007	Bad Axe	PL-566	8	204.5	x
WI	WI2008	Bay City	PL-566	1	8.6	x
WI	WI2020	Blackhawk-Kickapoo	PL-566	1	109.5	x
WI	WI2006	Bogus Creek	PL-566	2	10.9	x
WI	WI2004	Coon Creek	PL-566	14	107.4	x
WI	WI2013	Garden Valley (Rose Valley)	PL-566	1	24.9	x
WI	WI2014	Glen Hills	PL-566	10	57.3	x
WI	WI9137	Halls Creek Wildlife Flowage	RC&D	1	5.7	
WI	WI8045	Klinkner	PILOT	1	2.6	
WI	WI2015	Knight's Creek	PL-566	3	37.7	x
WI	WI2002	Lost Creek	PL-566	3	7.3	x

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
WI	WI2003	Mill Creek	PL-566	8	61.7	x
WI	WI8046	MLSNA	PILOT	1	1.5	
WI	WI2018	Otter Creek	PL-566	2	212.6	x
WI	WI2017	Plain-Honey Creek	PL-566	3	69.8	x
WI	WI2016	Plum Creek	PL-566	4	98.1	x
WI	WI2023	Poplar River	PL-566	1	155.0	x
WI	WI2009	South Nelson	PL-566	1	14.6	x
WI	WI2019	Tri-Creek	PL-566	1	49.7	x
WI	WI2011	Twin Parks	PL-566	9	114.1	x
WI	WI2012	West Fork Kickapoo	PL-566	7	94.1	x
WV	WV2011	Big Ditch Run	PL-566	1	56.6	x
WV	WV2014	Blakes Creek-Armour Creek	PL-566	1	32.0	x
WV	WV2005	Bonds Creek	PL-566	1	43.6	x
WV	WV2006	Brush Creek	PL-566	10	33.1	x
WV	WV9133	Charles Fork	RC&D	1	39.4	
WV	WV2003	Dave's Fork-Christian's Fork	PL-566	3	40.8	x
WV	WV2017	Elk Twomile Creek	PL-566	3	33.5	x
WV	WV2034	Elkwater Fork (Upper Tygart)	PL-566	1	42.6	x
WV	WV2013	Harmon Creek	PL-566	6	16.6	
WV	WV2032	Howard Creek	PL-566	1	22.8	x
WV	WV9140	Jumping Branch	RC&D	1	61.9	
WV	WV701.03	Lost River-Potomac	PL-534	3	127.5	x
WV	WV701.01	Lunice Creek-Potomac	PL-534	3	53.6	x
WV	WV2004	Marlin Run	PL-566	1	31.9	x
WV	WV2021	Mill Creek	PL-566	6	125.9	x
WV	WV701.08	New Creek-Whites Run-Potomac	PL-534	9	94.8	x
WV	WV701.09	North and South Mill Creek-Potomac	PL-534	4	104.3	x
WV	WV701.04	Patterson Creek-Potomac	PL-534	31	258.3	x
WV	WV2024	Pocatalico River	PL-566	2	356.2	x
WV	WV2007	Polk Creek	PL-566	8	33.2	x
WV	WV2020	Pond Run	PL-566	1	40.3	x
WV	WV9135	Pullman	RC&D	1	25.8	
WV	WV8044	Salem Fork	PILOT	7	16.4	
WV	WV2008	Saltlick Creek	PL-566	5	49.2	x
WV	WV701.10	South Fork River-Potomac	PL-534	23	255.2	x
WV	WV2015	Upper Buffalo Creek	PL-566	7	71.4	x
WV	WV2010	Upper Deckers Creek	PL-566	7	30.0	x
WV	WV2002	Upper Grave Creek	PL-566	7	45.4	x
WV	WV2026	Upper Mud River	PL-566	1	96.7	x
WV	WV9136	Walker Creek	RC&D	1	31.5	
WV	WV701.06	Warm Springs Run-Potomac	PL-534	8	15.0	x
WV	WV2016	Wheeling Creek	PL-566	5	88.1	x
WY	WY2003	Angell Draw	PL-566	1	12.0	x
WY	WY2005	Arnold Drain	PL-566	1	7.3	x
WY	WY2004	Boulder Lake	PL-566	1	155.9	x
WY	WY2002	London Flats-Bovee	PL-566	4	30.7	x
WY	WY2006	North Fork Powder River	PL-566	1	292.3	x
WY	WY2001	Pine Ridge-Case Bier	PL-566	2	42.0	x
WY	WY9139	Spring Branch- Ore	RC&D	1	7.1	
WY	WY2012	Spring Canyon	PL-566	1	8.7	x
WY	WY2013	Upper North Lavure River	PL-566	1	51.2	

State	Project ID	Project Name	Program	No. of Dams in Wshed	Project Area (sq mi)	POINTS Benefits Data?
1269				11,840	207,206	1,071

Appendix 2

Listing of 840 Watershed Projects without Dams

840 Watershed Projects without Dams

724 PL-566; 98 PL-534; 18 Pilot

7-26-19

State	Project Number	Project Name	Program	Latitude	Longitude
AK	2001	Delta Clearwater	PL-566	63.92	-145.33
AK	1000	Matanuska River	PL-566	61.75	-149
AK	1001	Tanana Floodplain Acquisition	PL-566		
AK	1002	Tanana Rikas Roadhouse	PL-566		
AL	2037	Bear Creek-Southeast Choctawhatchee Rive	PL-566	31.19932	-85.51682
AL	2040	Bear-Caine Creeks	PL-566	32.3889	87.0445
AL	2023	Big Coon Creek	PL-566	34.82384	86.00347
AL	2004	Brackin's Mill Creek	PL-566	31.30247	85.80538
AL	2035	Buck Creek	PL-566	31.43286	86.61303
AL	2042	Camp Branch	PL-566	31.3	85.6
AL	2044	Chandler Mountain	PL-566	33.9	86.2
AL	2001	Clear Creek	PL-566	34.82096	86.3229
AL	2052	Cochgalechee Creek	PL-566	32.63	85
AL	2801	Crow Creek	PL-566	34.9875	85.88307
AL	2041	Harrison Mill-Panther Creeks	PL-566	31.2	85.6
AL	2039	Kelly-Preston Mill Creek	PL-566	31.3805	85.6607
AL	2047	Memphis-Noxubee	PL-566	33.2924	88.0764
AL	2031	Mud Creek	PL-566	34.05141	86.69165
AL	2051	Northeast Yellow River	PL-566	31.4	88.2
AL	2045	Pates Creek	PL-566	31.2017	85.368
AL	2006	Pine Barren Creek	PL-566	31.05	-87.5
AL	2806	Pine Barren Creek	PL-566	31.00803	87.51891
AL	2048	Short-Scarham Creeks	PL-566	34.5	86
AL	2050	South Sauty Creek	PL-566	34.7481	85.9292
AL	2802	Spring Creek	PL-566	30.8057	85.227
AL	2027	Swan Creek	PL-566	34.87907	86.89606
AL	2049	Town Creek-Dekalb	PL-566	34.3169	86.2958
AL	2030	Upper Brushy Creek	PL-566	31.0439	87.51298
AL	2046	Whitewater Creek	PL-566	31.7874	85.9231
AL	2036	Wilkerson Creek	PL-566	31.30247	85.80538
AR	2010	Arkansas City	PL-566	33.71064	91.27628
AR	2025	Ark-La	PL-566	33.00542	91.33934
AR	2037	Big Running Water Ditch	PL-566	35.90913	91.15656
AR	2027	Big Slough	PL-566	36.3	-90.25
AR	2055	Bois D'arc Bayou	PL-566	33.56867	93.96888
AR	2065	Buffalo River Tributaries	PL-566	35.85	-92.8
AR	2002	Camp Bayou	PL-566	33.01353	91.63495
AR	2021	Canal 18	PL-566	33.7759	91.51617
AR	2033	Caney Bayou	PL-566	33.12874	91.36475

State	Project Number	Project Name	Program	Latitude	Longitude
AR	2040	Chicot	PL-566	33.11368	91.20745
AR	2014	Chicot; Desha; & Drew	PL-566	33.68546	91.47702
AR	2016	Crooked Bayou	PL-566	33.13813	91.42757
AR	2057	Crow Creek	PL-566	35.2	90.7
AR	2066	Departee Creek	PL-566		
AR	2059	Duck Creek	PL-566	34.7806	91.9183
AR	2058	Dunn Creek	PL-566	34.7806	91.9183
AR	2032	Fleschman's Bayou	PL-566	33.21217	91.55707
AR	2009	Fourche Bayou	PL-566	34.6301	92.1917
AR	2064	Gould Portion Of Grady-Gould	PL-566	33.7	-91.33
AR	2012	Grady-Gould	PL-566	33.93753	91.67261
AR	2015	Kelso-Rohwer	PL-566	33.71164	91.27629
AR	1000	Kuhn Bayou	PL-566		
AR	2023	Lee-Phillips	PL-566	34.69606	90.72716
AR	2063	Little Red River	PL-566	35.2583	-91.7185
AR	1001	Little Red River Irrigation Project	PL-566		
AR	2801	Lower Little Black	PL-566	36.2	-90.77953
AR	2056	Plum Bayou(Flat Bayou Portion)	PL-566	34.45684	91.95009
AR	2004	Randolph-Walnut Lake	PL-566	33.94778	91.48093
AR	2022	Wells Bayou	PL-566	33.84978	91.37595
AR	2035	White River Backwater	PL-566	34.19855	90.94336
AR	2062	Yocona-Spybuck	PL-566	34.9	90.6
AZ	2032	Asaayi Lake (New Mexico #)	PL-566	35.982	-108.9297
AZ	2003	Aua	PL-566	14.27	170.67
AZ	2017	Eloy	PL-566	32.9497	111.4021
AZ	2019	Hohokam	PL-566	32.92	111.55
AZ	2021	Maricopa-Stanfield	PL-566	33.06	112
AZ	2018	New Magma	PL-566	33.4824	112.0535
AZ	2022	San Carlos Watershed	PL-566	33.0139	-111.2308
AZ	2009	Vanar Wash	PL-566	32.33115	109.06905
AZ	2801	Virgin Valley	PL-566	36.88	-113.93
AZ	2020	West Maricopa	PL-566	33.36	112.5
AZ	2016	Yuma Mesa	PL-566	32.8639	114.5318
CA	1001	Alameda Creek Watershed	PL-566	37.6	-121.88
CA	2004	Arroyo Grande Creek	PL-566	35.1	120.6
CA	2007	Buena Vista Creek	PL-566	33.2	117.2
CA	2015	Buttonwillow Water Managment Project	PL-566	35.36	119.42
CA	2029	Cull Creek	PL-566	37.73	122.05
CA	2032	Elkhorn Slough	PL-566	36.84	121.72
CA	2033	Hayfork Creek	PL-566	40.54	123.1
CA	2031	Indian Creek	PL-566	40.1	120.8
CA	4501.05	Los Angeles - Aliso Creek	PL-534	34.27	118.53
CA	4501.07	Los Angeles - Arroyo Calabasas Creek	PL-534	34.18	118.62

State	Project Number	Project Name	Program	Latitude	Longitude
CA	4501.06	Los Angeles - Bell Creek	PL-534	34.2	118.7
CA	4501.01	Los Angeles - Browns Creek	PL-534	34.3	118.59
CA	4501.04	Los Angeles - Bull Creek	PL-534	34.25	118.48
CA	4501.08	Los Angeles - Limekiln Creek	PL-534	34.25	118.56
CA	4501.09	Los Angeles - Lower E. Canyon	PL-534	34.28	118.46
CA	4501.10	Los Angeles - Santa Susana Creek	PL-534	34.25	118.61
CA	4501.03	Los Angeles - Upper E. Canyon	PL-534	34.32	118.46
CA	4501.02	Los Angeles - Wilbur Creek	PL-534	34.25	118.54
CA	2016	Lower Llagas Creek	PL-566	37.04	121.55
CA	2022	Lower Pine Creek	PL-566	37.9	122
CA	2028	Lower Silver Creek	PL-566	37.36	121.82
CA	2017	Main Street Canyon	PL-566	33.84	117.57
CA	2034	Mccoy Wash	PL-566	33.75	114.75
CA	2012	Mosher Creek	PL-566	38.06	121.2
CA	2010	Napa River	PL-566	38.31	122.29
CA	2019	New Jerusalem	PL-566	37.7	121.39
CA	2025	Newman	PL-566	37.35	121
CA	2013	Revolon	PL-566	34.17	119.1
CA	4502.03	Santa Ynez - Cemetery Canyon	PL-534	34.62	120.45
CA	4502.05	Santa Ynez - Hoag-Santa Rita	PL-534	34.68	120.35
CA	4502.04	Santa Ynez - Purisima-Cebada	PL-534	34.68	120.4
CA	4502.02	Santa Ynez - Rodeo-San Pasqual	PL-534	34.64	120.52
CA	4502.01	Santa Ynez - San Miguelito	PL-534	34.63	120.47
CA	2035	Stemple Creek	PL-566	38.26	-122.83
CA	2023	Stone Corral	PL-566	34.98	119.19
CA	2009	Ulatis Creek	PL-566	38.33	121.85
CA	2020	Upper Llagas Creek	PL-566	37.1	121.65
CA	2030	Upper Stony Creek	PL-566	39.4	-122.6
CA	2027	Woodlake-Antelope Valley	PL-566	36.42	119.1
CA		Adobe Creek	Pilot		
CA		Calleguas Creek	Pilot		
CO	2029	Beaver Creek	PL-566	40.2	-103.5
CO	2025	Highline Breaks	PL-566	38.033589	-103.62831
CO	2026	Holbrook Lake Ditch	PL-566	38.166168	-103.57395
CO	2024	Limestone-Graveyard Creeks	PL-566	38.151824	-102.80637
CO	2014	Louden	PL-566	40.40616	105.0356
CO	2027	Six Mile-St. Charles Watershed	PL-566	38.133438	-104.46977
CO	2022	Spring Creek	PL-566	39.239443	-104.82094
CO	2018	Trinchera (Costilla)	PL-566	37.30244	105.63468
CO	2023	Trinidad Lake North	PL-566	37.157978	-104.67689
CO	2020	Wolf Creek-Highlands	PL-566	37.96343	-102.4195
CT	2801	Blind Brook	PL-566	41.04375	73.67312
CT	1000	Farmington River Restoration Project	PL-566	41.963574	-73.017084

State	Project Number	Project Name	Program	Latitude	Longitude
CT	2011	Mill-Horse Brook	PL-566	41.8049	-71.9933
CT	2010	Neck River	PL-566	41.34007	-72.62175
CT	2001	Roaring Brook-Walnut Street Brook	PL-566	41.86655	-72.89951
CT	2012	Yantic River	PL-566	41.4392	-72.0853
DE	2001	Bear Hole	PL-566	38.4652	75.20199
DE	2801	Brandywine Creek	PL-566	39.89892	75.91327
DE	2006	Indian River Bay	PL-566	38.6	75.2
DE	2005	Love Creek	PL-566	38.665	75.4026
DE	2003	Marshyhope Creek	PL-566	39.00485	75.65144
DE	2803	Red-White Clay Creek	PL-566	39.8	75.72
DE	2802	Upper Chester River	PL-566	39.32777	75.7717
DE	2004	Upper Choptank River	PL-566	39.17976	75.69496
DE	2002	Upper Nanticoke River	PL-566	38.72934	75.67757
FL	2025	Aucilla River	PL-566	30.508	83.8767
FL	2023	Canoe Creek	PL-566	30.4732	87.2574
FL	2021	East Pittman Creek	PL-566	31.01278	85.63131
FL	2010	Istokpoga Marsh	PL-566	27.23673	81.29655
FL	2001	Lake Placid East Chain Of Lakes	PL-566	27.23673	81.29655
FL	2031	Lower Kissimmee River	PL-566	27.38809	-80.99503
FL	2013	Mills Creek	PL-566	30.61845	81.77779
FL	2027	North East Middle Suwannee River	PL-566	30.2	83
FL	2029	North West Middle Suwannee River	PL-566	30.1	83.2
FL	2004	Pine Barren Creek	PL-566	31.00803	87.51891
FL	2017	Pond Creek	PL-566	30.7412	87.31443
FL	2008	Sarasota West Coast	PL-566	27.29338	82.33974
FL	2030	South East Middle Suwannee River	PL-566	30	82.9
FL	2020	South Florida Conservancy District	PL-566	26.65378	80.68422
FL	2028	South West Middle Suwannee River	PL-566	29.9	82.95
FL	2026	Spring Creek	PL-566	30.8057	85.227
FL	2006	Taylor Creek	PL-566	27.3559	80.75443
FL	2032	Taylor Creek-Nubbin Slough	PL-566	27.28806	-80.76257
FL	2007	Upper Josephine-Jackson Creek	PL-566	27.37541	81.38672
FL	2024	Upper Shoal River	PL-566	30.7081	86.138
FL	2012	Upper Tampa Bay	PL-566	28.063	82.669
FL	2022	West Fork Coldwater Creek	PL-566	30.6373	87.0741
GA	2803	Aucilla River	PL-566	30.508	83.8767
GA	2002	Bear Creek	PL-566	33.5515	83.81811
GA	2064	Beaver Creek	PL-566	32.39427	84.03116
GA	2055	Big Creek	PL-566	34.09468	84.28699

State	Project Number	Project Name	Program	Latitude	Longitude
GA	2066	Cason Branch-Duhart Creek	PL-566	33.0437	82.4133
GA	1001.02	Coosa - Allatoona Creek	PL-534		
GA	2072	Days Crossroads Community	PL-566	31.6208	84.9903
GA	2047	Ebenezer Creek	PL-566	32.7359	81.6296
GA	2046	Eli Whitney	PL-566	32.0456	81.1063
GA	2073	Five Points Area	PL-566	32.3	83.9
GA	2038	Fort Lawton-Little Buckhead Creek	PL-566	32.87018	81.88415
GA	2029	Hiawassee River	PL-566	34.83155	83.67157
GA	2067	Horse Creek	PL-566	31.9931	82.899
GA	2802	Lost Creek	PL-566	33.6244	85.33414
GA	2059	North Oconee River	PL-566	34.17988	83.60993
GA	2071	Piscola Creek	PL-566	30.8341	83.5781
GA	1000	Richland Creek Reservoir	PL-566	33.549	-84.4952
GA	2003	Rocky Creek	PL-566	33.66229	82.70473
GA	2065	Shoal Creek	PL-566	32.353	84.5005
GA	2074	South Chickamauga Creek	PL-566	34.82	85.3
GA	2048	Ten Mile-Briar Creek	PL-566	31.52319	82.41441
GA	2801	Terrapin Creek	PL-566	33.83702	85.58942
GA	2070	Turkey Creek	PL-566	32.1634	83.7907
GA	2031	Turtle River	PL-566	31.23271	81.49361
GA	2069	Upper Fifteen-Mile Creek	PL-566	32.5862	82.3032
GU	2001	Talofofo Village	PL-566	13.4	144.8
HI	2006	Kahaluu	PL-566	21.42	157.83
HI	2005	Kona	PL-566	19.63	155.97
HI	2011	Lahaina	PL-566	20.86	156.67
HI	1000	Manoa	PL-566	21.3	-157.85
HI	2004	Naalehu	PL-566	19.08	155.58
HI	2012	Upcountry Maui	PL-566	20.8	156.28
HI	2002	Waianae Iki	PL-566	21.45	158.2
HI	2001	Waianae Nui	PL-566	21.42	158.17
HI	2008	Wailuku-Alenaio	PL-566	19.72	155.13
HI	2010	Waimea-Paauilo	PL-566	20.05	155.61
IA	2028	Beaver	PL-566	42.24611	94.16245
IA	2035	Deer Creek	PL-566	43.44621	93.12513
IA		Floyd R T Nassau	Pilot		
IA		Floyd River	Pilot		
IA	2054	Long Branch	PL-566	41.792057	-95.119516
IA	7601.05	Ltl. Sioux - Arrowhead	PL-534	42.302793	-96.097885
IA	7601.06	Ltl. Sioux - Badger Creek	PL-534	42.313089	-95.486213
IA	7601.11	Ltl. Sioux - Big Whiskey No. 1	PL-534	42.500917	-96.241842
IA	7601.13	Ltl. Sioux - Black Slough	PL-534	43.006438	-95.687645
IA	7601.16	Ltl. Sioux - Climbing Hill	PL-534	42.314819	-96.044861
IA	7601.20	Ltl. Sioux - Corwin-Logan	PL-534	42.404263	-95.49118
IA	7601.25	Ltl. Sioux - Deer And Rathburn	PL-534	42.681161	-95.949302

State	Project Number	Project Name	Program	Latitude	Longitude
IA	7601.27	Ltl. Sioux - Dutch Creek	PL-534	42.235985	-95.805631
IA	7601.30	Ltl. Sioux - East Mapleton	PL-534	42.187627	-95.760871
IA	7601.32	Ltl. Sioux - Elk Creek	PL-534	42.383085	-95.353535
IA	7601.35	Ltl. Sioux - Elliott Creek	PL-534	42.494261	-96.159767
IA	7601.38	Ltl. Sioux - Galva-Shaller	PL-534	42.494495	-95.361137
IA	7601.39	Ltl. Sioux - Garfield	PL-534	42.228395	-95.644944
IA	7601.44	Ltl. Sioux - Habinck	PL-534	42.204155	-95.883725
IA	7601.51	Ltl. Sioux - Last Chance	PL-534	42.374385	-95.898988
IA	7601.59	Ltl. Sioux - Maple	PL-534	42.224681	-95.765272
IA	7601.60	Ltl. Sioux - Martin	PL-534	42.848856	-95.453742
IA	7601.61	Ltl. Sioux - Masters	PL-534	42.116558	-95.838127
IA	7601.64	Ltl. Sioux - Mc Elhaney	PL-534	42.525399	-95.991662
IA	7601.69	Ltl. Sioux - Miller Creek	PL-534	42.303657	-95.83767
IA	7601.71	Ltl. Sioux - Moorhead Creek	PL-534	42.351573	-95.690785
IA	7601.73	Ltl. Sioux - Moville	PL-534	42.464616	-96.084648
IA	7601.79	Ltl. Sioux - Odebolt	PL-534	42.32441	-95.308633
IA	7601.82	Ltl. Sioux - Pierson	PL-534	42.528689	-95.811848
IA	7601.89	Ltl. Sioux - Reynolds	PL-534	42.254138	-95.736468
IA	7601.91	Ltl. Sioux - Rock Creek	PL-534	42.455364	-95.854787
IA	7601.95	Ltl. Sioux - South Garfiled	PL-534	42.571179	-95.93725
IA	7601.114	Ltl. Sioux - West Mapleton	PL-534	42.181881	-95.840396
IA	7601.118	Ltl. Sioux - Willow Rock	PL-534	42.693433	-95.709286
IA	1000	Madison Co. Water Supply	PL-566	41.332	-94.016
IA	2056	Mill Creek	PL-566	40.623274	-95.11667
IA	2052	Morlee	PL-566	42.7495	93.2412
ID	2021	Bedrock Creek	PL-566	46.5	116.5
ID		Dry Creek	Pilot		
ID	2002	Fourth Of July Creek	PL-566	47.55008	116.52042
ID	2007	Georgetown Creek	PL-566	42.51163	111.17519
ID	2009	Hazelton Butte	PL-566	42.49536	114.231
ID	2017	Lower Sand Creek	PL-566	43.33	112
ID	2020	Mission-Lapwai Creek	PL-566	46.2441	116.8
ID	2015	Rock Creek-Big Canyon/East Fork	PL-566	42.7523	112.836
ID	2016	Rock Creek-Houtz/Outlet	PL-566	42.7523	112.836
ID	2011	Rock Creek-Roy East	PL-566	42.36	112.7
ID	2008	Rock Creek-Sublett	PL-566	42.5	112.9
ID	2010	Rock Creek-Summit	PL-566	42.26	112.86
ID	2022	Scott's Pond	PL-566	42.7	114.5167
ID	2023	Southern Washington County WQP	PL-566	44.2512	-116.9684
ID	2019	Tammany Creek	PL-566	46.398	116.9532
ID	2018	Tensed/Lolo	PL-566	47.2789	116.6308
ID	2014	Thorn Creek	PL-566	46.7484	117
ID	2006	Trail Creek	PL-566	43.68461	111.05499
ID	2012	Upper Sand Creek	PL-566	43.5	111.86

State	Project Number	Project Name	Program	Latitude	Longitude
IL	2034	Argyle Lake	PL-566	40.43	-90.71
IL	2024	Ash-Loop	PL-566	38.522	-90.01042
IL	2013	Flat Branch	PL-566	39.64825	-88.31196
IL	2007	Hog River-Pig Creek	PL-566	38.4269	-89.81603
IL	1000	Indian Creek	PL-566	41.8	-88.26
IL	2027	Kinkaid Lake	PL-566	37.7437	-89.2826
IL	2033	Lake Bloomington	PL-566	40.494	-88.9465
IL	2036	Lake Carlinville	PL-566	39.242	-89.842
IL	2030	Lake Mattoon	PL-566	39.4854	-88.2644
IL	2029	Lick Creek	PL-566	39.7802	-89.646
IL	2025	Little Calumet River	PL-566	41.67273	-87.60601
IL	2031	Lower Des Plaines Tributaries	PL-566	42.3109	-87.9231
IL	1004	McDowell Grove	PL-566	41.795125	-88.187242
IL	2028	Raccoon Lake	PL-566	38.5639	-89.0318
IL	2010	Scattering Fork	PL-566	39.64825	-88.31196
IL	2026	Spring Lake	PL-566	40.55804	-90.66309
IL	1002	Steeple run	PL-566	41.77	-88.14
IL	2032	Upper Crab Orchard Creek	PL-566	37.466	-89.2437
IL		Money Creek	Pilot		
IN	2013	Bachelor Run	PL-566	40.54072	-86.54082
IN	2034	Bailey-Cox-Newtson	PL-566	41.32025	-86.55652
IN	2037	Bruce Lake	PL-566	41.5817	-85.88102
IN	2031	East Fork Of Whitewater River	PL-566	39.77529	-84.8239
IN	2030	Fall Creek	PL-566	40.32487	-87.284
IN		Flat Creek	Pilot		
IN	2801	Four Mile Creek	PL-566	39.7242	-84.8648
IN	2040	Honey Creek	PL-566	39.4666	-87.3913
IN	2033	Jordan Creek	PL-566	40.46009	-87.5257
IN	2012	Kickapoo Creek	PL-566	40.43347	-87.22712
IN	2009	Lattas Creek	PL-566	39.15247	-87.18815
IN	2008	Little Wea Creek	PL-566	40.28339	-86.98492
IN	2802	Lower Stillwater River	PL-566	40.04	-84.5
IN	2032	Lye Creek Drain	PL-566	40.15731	-86.7849
IN	2038	Mariah Creek	PL-566	38.6962	-87.451
IN	2015	Mill Creek-Fulton	PL-566	41.05331	-86.41142
IN	2039	Pigeon Creek	PL-566	41.6421	-85.0055
IN	2028	Rock Creek (Cass)	PL-566	40.62127	-86.31793
IN	2024	Rock Creek (Wells)	PL-566	40.6618	-85.16257
KS		Bill's Creek	Pilot		
KS	2802	Cotton-Coon-Mission Creek	PL-566	36.8	95.87
KS	2068	Doyle Creek	PL-566	38.17	97.12
KS		Little Delaware-Mission Creeks	Pilot		
KS	2064	North-Middle Forks Wolf	PL-566	39.8	95.55
KS	2067	Pony Creek	PL-566	39.95	95.75
KS	2063	Roy's Creek	PL-566	39.95	95.45

State	Project Number	Project Name	Program	Latitude	Longitude
KS	2066	Squaw Creek Lower Wolf	PL-566	39.8	95.2
KS	2069	Upper Delaware And Tributaries	PL-566	39.75	95.77
KY	2048	Bacon Creek	PL-566	36.8019	-84.1244
KY	2803	Bear Creek (Scott)	PL-566	36.55	84.5
KY	2049	Boone Fork	PL-566	37.2	-82.6
KY	2045	Brashear's Creek	PL-566	38.4249	-85.1529
KY	2046	Cane Valley	PL-566	37.1022	-85.2794
KY	2007	Canoe Creek	PL-566	37.8057	-87.594
KY	2043	East And Middle Forks Of Massac Creek	PL-566	37.0548	-88.6348
KY	2044	Fall Creek	PL-566	36.8176	-84.8466
KY	2042	Highland Creek	PL-566	37.6619	-87.9257
KY	2801	Line Creek	PL-566	36.626	-85.65752
KY	2040	Little And Middle Pitman Creek	PL-566	37.2648	-85.5427
KY	2011	Meadow Creek	PL-566	36.91065	-84.74758
KY	2802	Reelfoot-Indian Creek	PL-566	36.37	89.21
KY	2050	Rockhouse Creek	PL-566	37.127578	-83.434059
KY	2047	South Fork Of Little River	PL-566	36.816	-87.4844
KY		Upper Red River	Pilot		
LA	2801	Ark-La	PL-566	33.00542	91.33934
LA	2029	Avoyelles-St. Landry	PL-566	31.00245	92.21494
LA	2005	Baker Canal	PL-566	29.8724	90.9818
LA	2010	Bayou Blue	PL-566	30.67635	92.69925
LA	2032	Bayou Bonne Idee	PL-566	33.00888	91.43107
LA	2050	Bayou Bourbeux	PL-566	30.5	92.05
LA	2051	Bayou Duralde-Lower Nezpique	PL-566	30.26	92.35
LA	2009	Bayou Folse	PL-566	29.72218	90.57104
LA	2037	Bayou Grosse Tete	PL-566	30.7521	91.63882
LA	2041	Bayou Mallet	PL-566	30.4	92.4
LA	2045	Bayou Penchant-Lake Penchant	PL-566	29.5585	90.7254
LA	2035	Bayou Plaquemine Brule	PL-566	30.21002	92.57915
LA	2039	Bell City	PL-566	30.12997	93.03075
LA	2043	Bundick Creek	PL-566	30.6983	92.7491
LA	2023	Cameron-Creole	PL-566	29.7771	93.07142
LA	2024	Central Madison	PL-566	32.20924	91.53348
LA	2049	Central Richland	PL-566	32.4	91.8
LA	2038	Choctaw Bayou	PL-566	30.40678	91.25555
LA	2018	Cocodrie-Grand Louis	PL-566	30.6791	92.3477
LA	2017	Duralde-Des Cannes	PL-566	30.57059	92.57929
LA	2040	East Carroll	PL-566	32.7616	91.2101
LA	2033	East Franklin	PL-566	31.89198	91.78236
LA	2021	English Bayou	PL-566	30.25007	92.99256
LA	2042	Fifth Ward	PL-566	30.2648	92.3522
LA	2036	Johnson Bayou	PL-566	30.96567	91.79436
LA	2034	Kinder	PL-566	30.61329	92.77955

State	Project Number	Project Name	Program	Latitude	Longitude
LA	2031	Lake Verret	PL-566	30.24771	91.33081
LA	2015	Lower Bayou Teche	PL-566	30.08043	92.03171
LA	2048	Middle Tangipahoa	PL-566	30.5967	90.4658
LA	2007	North Tensas	PL-566	31.93923	91.1884
LA	2013	Panama Canal-Conway Bayou	PL-566	30.11825	91.0244
LA	2052	Red Bayou	PL-566	32.884	-93.836
LA	2011	Seventh Ward Canal	PL-566	30.08184	92.32279
LA	2016	South Tensas	PL-566	31.74915	91.36185
LA	2022	Upper Bayou Teche	PL-566	29.96755	91.61214
LA	2046	Upper Vermilion Bayou	PL-566	30.25	91.8
LA	2027	Walnut-Roundaway	PL-566	32.22588	91.11335
LA	2030	West Carroll	PL-566	33.00351	91.28371
LA	2044	West Fork Bayou L'ours	PL-566	29.6571	90.5867
LA	2025	West Fork Of Bayou Lacassine	PL-566	30.25007	92.99256
LA	2020	West Madison	PL-566	32.54836	91.35352
MA	2016	Cape Cod Water Resources Restoration Project	PL-566	41.684	-70.282
MA	2801	Furnace Brook-Middle River	PL-566	41.90632	72.23568
MA	2803	Souhegan River	PL-566	42.91648	71.78356
MD	2006	Aydelotte	PL-566	38.3697	75.6027
MD	2010	Coonfoot Branch	PL-566	38.25389	75.2951
MD	2017	Dividing Creek	PL-566	38.15115	75.59552
MD	2022	Dry Run	PL-566	39.69	-78.75
MD	2009	Franklin Branch	PL-566	38.37943	75.24914
MD	2013	Goldsboro	PL-566	39.0107	75.78258
MD	2021	Linganore Creek	PL-566	39.4606	-77.4174
MD	2005	Long Marsh	PL-566	39.12233	75.86479
MD	2802	Marshyhope Creek	PL-566	38.527403	-75.757642
MD	2007	Ninepin Branch	PL-566	38.31331	75.34775
MD	2012	Passerdyke	PL-566	38.27868	75.60369
MD	2018	Seneca Creek	PL-566	39.20921	77.1499
MD	2014	Shingle Landing	PL-566	38.44647	75.26829
MD	2003	Timmonstown Branch	PL-566	38.31331	75.34775
MD	2019	Upper Chester River	PL-566	39.32777	75.7717
MD	2801	Upper Choptank River	PL-566	39.17976	75.69496
MD	2011	Upper Manokin	PL-566	38.25581	75.65862
MD	2020	West And Rhode Rivers	PL-566	39.0795	76.5958
ME	2014	Dickey Brook	PL-566	46.7521	68.0758
ME	2018	Kenduskeag Stream	PL-566	44.9915	68.7668
ME	2019	Long-Cross Lakes	PL-566	46.7521	68.0758
ME	2011	Lovejoy Pond	PL-566	44.53446	69.44466
ME	2020	Meduxnekeag River	PL-566	46.2	67.85
ME	2012	Parkhurst Siding-Caribou	PL-566	46.80394	67.93658
ME	2016	Pattee Brook	PL-566	46.7521	68.0758
ME	2017	Perley Brook	PL-566	46.7521	68.0758

State	Project Number	Project Name	Program	Latitude	Longitude
ME	2013	Sebasticook Lake	PL-566	45.06642	69.20174
ME	2021	Upper Piscataquis River	PL-566	45.1	69.4
ME	2015	Webber Pond	PL-566	44.3631	69.8584
MI	2026	Baraga Village	PL-566	46.7398	88.4362
MI	2021	Bean Creek	PL-566	41.9049	84.6112
MI	2023	Bear River	PL-566	45.2449	85.1237
MI	2013	Catlin-Waters; Reynolds-Session	PL-566	42.9117	84.5614
MI	2024	Elk River	PL-566	44.9886	85.2098
MI	2012	Farm Creek-Lee Drain	PL-566	43.9578	84.4441
MI	2019	Indian Creek	PL-566	43.0712	83.2507
MI	2011	Jo Drain	PL-566	43.52256	84.24353
MI	2009	Middle Branch Of Cass River	PL-566	43.3843	82.8016
MI	2027	Mud Creek	PL-566	42.6	85.2
MI	2002	Muskrat Creek	PL-566	42.89213	84.78091
MI	2020	Rogue River	PL-566	43.1024	85.68559
MI	2003	Sanborn	PL-566	45.0563	83.4933
MI	2025	South Branch Kawkawlin River	PL-566	43.6233	83.9197
MI	2005	South Branch Of Cass River	PL-566	43.0712	83.2507
MI	2029	Stony Creek	PL-566	43	84.75
MI	2028	Swan Creek	PL-566	41.75	85.14
MI	2801	Upper Tiffin	PL-566	41.5805	84.1071
MI	2018	West Upper Maple River	PL-566	43.19298	84.60806
MN	2012	Cooks Valley	PL-566	44.28616	91.87766
MN	2011	Crane Creek	PL-566	44.17869	93.28347
MN	2015	Janesville Village	PL-566	44.20185	93.77139
MN	2021	Kanaranzi-Little Rock	PL-566	43.6422	95.6906
MN	2005	Middle Fork Of Two Rivers	PL-566	48.77213	96.88434
MN	2017	Norman-Polk	PL-566	47.42754	96.77528
MN	2003	Rush-Pine Creek	PL-566	43.96865	91.66754
MN	2024	Spring Brook	PL-566	48.3337	-96.445
MN	2801	Upper Deer Creek-Lake Hendricks	PL-566	44.41409	96.54095
MN	2022	Whitewater River	PL-566	44.09	92.18
MN	2008	Zippel	PL-566	48.83995	94.97291
MO	2802	Indian Creek-Van Buren	PL-566	40.66	91.9482
MO	2038	Kelly Creek	PL-566	36.929	-93.928
MO	1000	Little Otter Creek	PL-566	39.7	-93.95
MO	2023	Little Wyaconda-Sugar Creek	PL-566	40.27	-91.71
MO	2037	McKenzie Creek	PL-566	37.15	-90.7
MO	2803	Mill Creek	PL-566	40.757	95.1924
MO	2031	Town Branch	PL-566	40.201	-94.29
MP	2002	Kagman	PL-566	15.17	145.75
MS	2056	Bayou Pierre	PL-566	31.8956	90.3875
MS	2058	Beartown	PL-566	31.2117	90.4382
MS	2027	Beaver Dam Bayou	PL-566	33.52963	90.73248
MS	2042	Browns Creeks	PL-566	34.65264	88.56766

State	Project Number	Project Name	Program	Latitude	Longitude
MS	2018	Buck Island Bayou	PL-566	34.83044	90.27319
MS	2017	Central Bogue Phalia	PL-566	33.75545	90.98381
MS	2065	Choctaw	PL-566	33.55	90.8
MS	2020	Chuquatonchee Creek	PL-566	33.7341	88.73058
MS	2053	Deer Creek	PL-566	33.58059	90.98997
MS	2062	Dry Creek(Columbia)	PL-566	31.3	89.8
MS	2057	Fourteen Mile-Bakers Creek	PL-566	32.3108	90.2387
MS	2063	Hambrick	PL-566	34.7	90.3
MS	2033	Harris Bayou	PL-566	34.31806	90.70343
MS	2030	Home Cypress Bayou	PL-566	34.00716	90.48478
MS	1000	Hurricane Katrina Watershed Restoration Project	PL-566	30.4	-88.4
MS	2023	Indian Bayou	PL-566	32.92682	90.9099
MS	2064	Indian Creek	PL-566	34.8	88.2
MS	2801	Indian Creek	PL-566	35.00279	89.21881
MS	2047	Line Creek	PL-566	33.70052	89.13736
MS	2061	Long Beach	PL-566	30.4072	89.0303
MS	3301.01	Ltl. Talla - Cane Creek	PL-534	34.4276	88.9688
MS	3301.03	Ltl. Talla - Duncan-Cane Creeks	PL-534	34.2947	89.1875
MS	3301.07	Ltl. Talla - Lower Tippah River	PL-534	34.7632	89.2406
MS	3301.08	Ltl. Talla - Ltl. Spring-Ochewalla Creeks	PL-534	34.625	89.5094
MS	3301.10	Ltl. Talla - Mud Creek	PL-534	34.2934	89.1219
MS	3301.11	Ltl. Talla - Nelson Creek	PL-534	34.4829	89.7813
MS	2048	Moorhead Bayou	PL-566	33.47419	90.53472
MS	2054	Okatoma Creek	PL-566	31.72212	89.67282
MS	2059	South Delta	PL-566	33.145	90.5308
MS	2039	Tri-County Hopson Bayou	PL-566	34.10136	90.34152
MS	2016	Upper Bogue Phalia	PL-566	33.54323	90.82637
MS	2019	Upper Quiver River & Blue Lake	PL-566	33.84749	90.42968
MS	3302.86	Yazoo - Arkabutla Creek	PL-534	34.6039	90.0547
MS	3302.03	Yazoo - Batupan Bogue	PL-534	33.6579	89.6813
MS	3302.08	Yazoo - Black Creek (Delta)	PL-534	33.1026	90.3188
MS	3302.11	Yazoo - Brunswick Levee	PL-534	32.549	-91.0334
MS	3302.13	Yazoo - Burney Branch	PL-534	34.3289	89.5344
MS	3302.14	Yazoo - Bynum Creek	PL-534	34.25	89.743
MS	3302.15	Yazoo - Cane-Mussacuna Cks.	PL-534	34.7697	90.0313
MS	3302.16	Yazoo - Coldwater River	PL-534	34.9184	89.625
MS	3302.18	Yazoo - Cypress Creek	PL-534	33.9895	89.7563
MS	3302.19	Yazoo - Davis Splinter Creek	PL-534	34.2816	89.675
MS	3302.21	Yazoo - Fighting Bayou	PL-534	33.7447	90.4625
MS	3302.25	Yazoo - Hoffa Creek	PL-534	33.7876	90.0938
MS	3302.26	Yazoo - Horse Pen Creek	PL-534	33.7001	-89.4851
MS	3302.29	Yazoo - Hurricane-Wolf Creek	PL-534	34.8711	90.0406
MS	3302.65	Yazoo - Mc Ivor Creek	PL-534	34.4145	90

State	Project Number	Project Name	Program	Latitude	Longitude
MS	3302.70	Yazoo - North Yalobusha River	PL-534	33.8316	89.9375
MS	3302.61	Yazoo - Northern Drainage District	PL-534	33.9	90.7438
MS	3302.47	Yazoo - Pumpkin Creek	PL-534	34.3105	89.4219
MS	3302.37	Yazoo - Riverdale Creek	PL-534	33.8711	89.825
MS	3302.39	Yazoo - Sabougla Creek	PL-534	33.7105	89.3688
MS	3302.43	Yazoo - Short Fork Creek	PL-534	34.7974	89.9438
MS	3302.87	Yazoo - Skuna Rv. Tributaries	PL-534	34.1053	89.2813
MS	3302.49	Yazoo - Sledge Bayou	PL-534	34.2789	90.2469
MS	3302.46	Yazoo - South Yalobusha (Skelton)	PL-534	33.75	-89.9194
MS	3302.48	Yazoo - Strayhorn Creek	PL-534	34.5789	90.1563
MS	3302.88	Yazoo - Toby Tubby Creek	PL-534	34.4132	89.5719
MS	3302.55	Yazoo - Upper Skuna River	PL-534	34.1316	89.1344
MS	3302.58	Yazoo - Will Neil	PL-534	33.4737	90.1563
MS	3302.57	Yazoo - Willis Creek	PL-534	33.4474	90.3938
MS	3302.59	Yazoo - Yalobusha River	PL-534	33.8684	-89.2619
MT	2012	Alkali Creek	PL-566	45.95724	108.49933
MT	2022	Buffalo Rapids	PL-566	47.5	105.3
MT	2016	Lower Birch Creek	PL-566	48	112
MT	2019	Mill Creek	PL-566	45.6393	110.5846
MT	2018	Muddy Creek(Northeast Unit)	PL-566	47.83201	111.46181
MT		Muster Creek	Pilot		
MT	2017	Sage Creek	PL-566	48.9794	111.01505
MT	1001	Upper Clarks Fork Watershed	PL-566		
MT	2015	Wolf Creek	PL-566	47.23857	110.26422
NC	2015	Ahoskie Creek	PL-566	36.29683	77.05444
NC	2807	Ararat River	PL-566	36.6552	80.2821
NC	2029	Back Swamp	PL-566	34.60579	79.10056
NC	2044	Bear Swamp (Chowan Co)	PL-566	36.09328	76.5656
NC	2060	Big And Double Creeks	PL-566	36.3687	80.2501
NC	2063	Black Creek	PL-566	35.4	78.7
NC	2019	Broad Creek	PL-566	35.53622	76.61562
NC	2042	Bryant Swamp	PL-566	34.52186	78.82789
NC	2050	Buffalo-Muddy Fork Creek	PL-566	35.38678	81.51772
NC	2011	Burnt Mill Creek	PL-566	36.09328	76.5656
NC	2027	Caw Caw Swamp	PL-566	33.97849	78.6205
NC	2034	Chicod Creek	PL-566	35.43265	77.10847
NC	2808	Clarks Fork-Bullocks Creek	PL-566	34.96704	81.40093
NC	2021	Conetoe Creek	PL-566	35.80806	77.36668
NC	2051	Creswell	PL-566	35.85775	76.40436
NC	2014	Cutawhiskie Creek	PL-566	36.33753	77.04151
NC	2023	Dunn Swamp & Cedar Branch Tributaries	PL-566	34.34632	78.8246
NC	2052	Fishing Creek	PL-566	36.2683	78.6489
NC	2032	Flea Hill	PL-566	35.10884	78.71295

State	Project Number	Project Name	Program	Latitude	Longitude
NC	2006	Folley Ditch	PL-566	36.41508	76.49503
NC	2010	Grindle Creek	PL-566	35.80806	77.36668
NC	2017	Gum Neck	PL-566	35.68122	76.15262
NC	2804	Head Of Little Tennessee River	PL-566	35.00302	83.29226
NC	2038	Hobbsville-Sunbury	PL-566	36.54193	76.72607
NC	2008	Horse Swamp-Flat Swamp	PL-566	36.33753	77.04151
NC	2057	Indian, Howards And Beaver Dam Creeks	PL-566	35.6999	81.2569
NC	2031	Jacob Swamp	PL-566	34.61605	79.06233
NC	2020	Johnson's Milltail	PL-566	35.29285	77.23508
NC	2055	Lanes Creek	PL-566	34.979	80.0951
NC	2036	Little Contentnea Creek	PL-566	35.5756	77.44801
NC	2061	Lower Little & South Yadkin	PL-566	35.8	81.2
NC	2024	Lyon Swamp-White Oak Swamp	PL-566	34.46027	78.30156
NC	2033	Meadow Branch	PL-566	34.61605	79.06233
NC	2018	Moccasin Creek	PL-566	35.52432	78.23877
NC	2022	Mosley Creek-Tracey Swamp	PL-566	35.24731	77.36102
NC	2049	Moss Neck	PL-566	34.71626	79.13648
NC	2048	Muddy Creek (Duplin)	PL-566	34.923	77.9542
NC	2065	Nahunta Swamp	PL-566	35.47	77.87
NC	2066	Newfound and Sandymush Creek	PL-566	35.72	-82.73
NC	2802	Northwest Cherokee	PL-566	35.1	81.7
NC	2016	Pollock Swamp	PL-566	36.1212	76.68346
NC	2054	Ramseur Reservoir	PL-566	35.7637	79.814
NC	2056	Richardson Creek	PL-566	34.979	80.0951
NC	2059	Sandy Run Creek	PL-566	35.2982	81.518
NC	2030	Swan Quarter	PL-566	35	76
NC	2039	Swift Creek	PL-566	35.5756	77.44801
NC	2803	Thompson-Westfield Creek	PL-566	34.6871	80.116
NC	2058	Upper Contentnea Creek	PL-566	35.7	78.2
NC	2064	Upper French Broad River	PL-566	35	83
NC	2805	Wallace	PL-566	34.6	79.8
ND	2023	Belfield	PL-566	46.9	-103.3
ND	2024	Colfax	PL-566	46.46	-96.88
ND	2009	Lower Forest River	PL-566	48.26192	-97.12975
ND	2016	Midland-Drayton	PL-566	48.55106	-97.1929
ND	2021	Muskrat Lake Basin	PL-566	48.1554	-102.3116
ND	2012	St. Thomas-Lodema	PL-566	48.7083	-97.4583
ND	2022	Taylor	PL-566	47	-102.3
ND	2007	West Trib. Bois-De-Sioux River	PL-566	46.00474	-96.7417
ND	2801	Wild Rice Creek	PL-566	45.9583	-97.791
NE	2052	Balls Branch	PL-566	41.01094	102.41273
NE	2049	Bone Creek	PL-566	41.42501	96.98065
NE	2055	East-West-Dry Maple Creeks	PL-566	41.5613	97.0792

State	Project Number	Project Name	Program	Latitude	Longitude
NE	2802	Pony Creek	PL-566	39.95	95.75
NE	2801	Sedgwick-Sand Draws	PL-566	41.00611	102.64627
NE	2050	Stevens-Callahan(Camp Creek)	PL-566	40.70221	95.95012
NE	2803	Walnut Creek	PL-566	39.87623	95.53472
NH	2001	Ash Swamp;Tannery;White & Black Brooks	PL-566	42.95258	72.30447
NH		Baboosic Brook	Pilot		
NJ	2014	Clove Brook	PL-566	41.27868	74.66618
NJ	2009	Middle Neck	PL-566	39.6333	75.402
NJ	2016	Navesink	PL-566	40.3019	74.1135
NJ	2011	Parkers Creek	PL-566	39.97123	74.88814
NJ		Pequest River	Pilot		
NJ	2007	Pine Mount-Mill Creek	PL-566	39.40427	75.30425
NJ	2008	Repaupo Creek	PL-566	39.75343	75.32053
NJ	2012	Riggins Ditch	PL-566	39.24164	74.98746
NJ	2003	Silver Lake-Locust Island	PL-566	39.50556	75.41257
NJ	2005	Town Bank	PL-566	39.54538	75.46515
NJ	2006	Tributaries Of Maurice River Cove	PL-566	39.19892	75.08368
NJ	2015	Upper Salem River	PL-566	39.66518	75.33253
NM	2032	Asaayi Lake	PL-566	35.98	108.94
NM	2803	Cornudas; North And Culp Draws	PL-566	32.00423	105.43039
NM	2025	Corrales	PL-566	35.28457	106.73442
NM	2030	Espanola-Rio Chama	PL-566	35.97588	106.09189
NM	2031	Largo-Agua Fria	PL-566	34	108.5
NM	2801	Vanar Wash	PL-566	32.33115	109.06905
NM	2029	Zuni Pueblo	PL-566	35.1	108.8
NV	2007	Evans Creek	PL-566	39.5596	119.8359
NV	2003	Virgin Valley	PL-566	37	114
NY		Ball Creek	Pilot		
NY	2022	Blind Brook	PL-566	41.04375	73.67312
NY	1901.03	Buffalo - Buffalo	PL-534		
NY	1901.01	Buffalo - Cayuga	PL-534		
NY	1901.02	Buffalo - Cazenovia	PL-534		
NY	2001	Cowaselon Creek	PL-566	43.12921	75.81384
NY	2015	Cromline Creek	PL-566	41.3484	74.30336
NY	2024	Dyke Creek	PL-566	42.2212	78.0116
NY	2018	Flint Creek	PL-566	42.59948	77.32409
NY		Great Brook	Pilot		
NY	1000	Lake George Watershed Protection Initiative	PL-566	43.423	-73.716
NY	1001	Lake Oscawana Water Quality Project	PL-566	41.2308	-73.5055
NY		Little Hoosick River	Pilot		
NY	2013	Marsh Ditch	PL-566	42.38809	77.67454
NY	2028	Nyc Ws (Ashokan)	PL-566	42.08333	74.3

State	Project Number	Project Name	Program	Latitude	Longitude
NY	2030	Nyc Ws (Lower Cannonsville)	PL-566	42.207	75.08916
NY	2032	Nyc Ws (Neversink)	PL-566	41.93833	74.53833
NY	2031	Nyc Ws (Pepacton)	PL-566	42.185	74.64316
NY	2033	Nyc Ws (Rondout)	PL-566	41.87016	74.518
NY	2034	Nyc Ws (Schoharie)	PL-566	42.30166	74.3235
NY	2029	Nyc Ws (Upper Cannonsville)	PL-566	42.3075	74.77283
NY	2017	Oak Orchard Creek	PL-566	43.04682	78.26154
NY	2023	Otisco Lake	PL-566	43.0581	76.1636
NY	2026	Tomhannock Reservoir	PL-566	42.7067	73.6387
NY	2006	Upper Five Mile Creek	PL-566	42.59948	77.32409
OH	2022	East Branch Of Sugar Creek	PL-566	40.467	81.4562
OH	2801	East Fork Of Whitewater River	PL-566	39.77529	84.81397
OH	2024	Kings Creek	PL-566	40.1005	83.7694
OH	2013	Little Auglaize River	PL-566	41.05303	84.41963
OH	2029	Lower Stillwater River	PL-566	40.04	84.5
OH	2014	Middle Branch Of The Little Auglaize R	PL-566	41.05303	84.41963
OH	1000	Muskingam River	PL-566	40.5	-82.1
OH	2015	Prairie-Hoaglin Br. Of Little Auglaize R	PL-566	41.05303	84.41963
OH	2017	Short Creek	PL-566	40.25	80.9
OH	2020	South Fork Licking River	PL-566	40.0666	82.4652
OH	2028	Upper Blanchard River	PL-566	40.9	83.6
OH	2021	Upper Killbuck Creek	PL-566	40.8389	81.8653
OH	2025	Upper Mad River	PL-566	40.3913	83.7822
OH	2030	Upper Stillwater River	PL-566	40.2	84.55
OH	2026	Upper Tiffin	PL-566	41.5805	84.1071
OH	2023	Wills Creek	PL-566	40.047	80.8593
OH		Rock Fork & Clear Fork	Pilot		
OK	2071	Campbell Creek	PL-566	35.82225	-97.7415
OK	2072	Deer Creek	PL-566	35.6299	-98.75
OK	2069	Hoyle Creek	PL-566	36.302	-98.1997
OK	2076	Little Beaver Creek	PL-566	34.5715	-98.0135
OK	2075	Lugert-Altus	PL-566	34.6465	-99.3075
OK	2064	Mckinney Buzzard	PL-566	33.9979	94.805
OK	2067	Paw Paw Bottoms	PL-566	35.98531	-94.587
OK	2025	Squaw Creek	PL-566	34.565	-98.2806
OK	2077	Wild Horse Creek	PL-566	35.3662	-97.13506
OR	2005	Beaver Creek	PL-566	44.83855	122.65435
OR	2023	Buck Hollow	PL-566	45.25	121
OR	2019	Dry Creek	PL-566	45.3678	120.2108
OR	2011	Grand Prairie	PL-566	44.65745	123.07168
OR	2016	Juniper Canyon	PL-566	44.21059	120.7455
OR	2002	Little Pudding River	PL-566	44.89837	122.82611
OR	2008	Lower Amazon & Flat Creek	PL-566	44.05091	123.08898

State	Project Number	Project Name	Program	Latitude	Longitude
OR	2024	Lower Tillamook Bay	PL-566	45.456	-123.844
OR	2001	Lynx Hollow Creek	PL-566	43.85383	123.13763
OR	2025	McKenzie Canyon Irrigation Project	PL-566	44.371	-121.375
OR	2018	Mt. Hood Irrigation District	PL-566	45.6452	121.56
OR	2020	North Side Big Nestucca	PL-566	45.4703	123.812
OR	2004	Skipanon River	PL-566	46.18428	123.89124
OR	2021	Upper Stage Gulch	PL-566	45.7641	118.8402
OR	2003	Willakenzie Area	PL-566	44.07056	122.93048
PA	2026	Buffalo Creek	PL-566	40.94	77.18
PA	2027	Cedar Run	PL-566	41.04	77.55
PA	2024	Clover Creek	PL-566	40.4	78.21
PA		Cory Creek	Pilot		
PA	2035	Glenwhite Run	PL-566	40.51	78.51
PA	2039	Indian Creek	PL-566	40.02	79.378
PA	2029	Laurel Hill Creek	PL-566	39.96	79.26
PA	2037	Little Toby Creek	PL-566	41.28	78.73
PA	2033	Monastery Run	PL-566	40.29	79.43
PA	2032	Oven Run	PL-566	40.104	78.898
PA	1000	Pidcock-Mill Watershed	PL-566		
PA	2031	Pitchpine Run	PL-566	41.1	78.87
PA	2034	Red-White Clay Creeks	PL-566	39.81	75.76
PA	2025	Rock Creek	PL-566	39.82	77.19
PA	2036	Tulpehocken Creek	PL-566	40.37	76.19
PA	2030	Yellow Creek	PL-566	40.19	78.38
PR	2003	Guayanes River	PL-566	18.13	65.88
PR	2004	Toa Vaca Lake	PL-566	18.2	66.5
RI	2001	Aquidneck Island	PL-566	41.5369	71.283
SC	2010	Back Swamp	PL-566	34.07768	80.13636
SC	2047	Bush River-Beaverdam Creek	PL-566	34.4892	81.978
SC	2060	Cabin Branch	PL-566	33.9	81
SC	2023	Carters Branch-Muddy Creek	PL-566	34.596	79.60508
SC	2042	Cartwheel Community	PL-566	34.09759	79.0045
SC	2036	Clarks Fork-Bullocks Creek	PL-566	34.96704	81.40093
SC	2037	Fairforest Creek	PL-566	34.8257	81.67421
SC	2058	Frazier Park	PL-566	34.6952	81.133
SC	2061	Holly Hill	PL-566	33.33	80.42
SC	2021	Horse Range Swamp	PL-566	33.36776	80.44943
SC	2053	Little Saluda River	PL-566	33.9847	81.713
SC	2011	Lynches Lake-Camp Branch	PL-566	33.97246	79.78543
SC	2018	Maple Swamp	PL-566	34.42996	79.33831
SC	2059	Nichols	PL-566	34.25	79.1
SC	2054	North Fork Edisto	PL-566	33.9585	81.1835
SC	2041	Northeast Calhoun	PL-566	33.76189	80.64822
SC	2050	Northwest Cherokee	PL-566	35.1	81.7

State	Project Number	Project Name	Program	Latitude	Longitude
SC	2045	Pacolet River	PL-566	34.9572	81.9763
SC	2055	Pickens-Anderson	PL-566	34.81	82.6986
SC	2046	Rafting Creek	PL-566	34.1724	80.2457
SC	2048	Salem Community	PL-566	34.0837	79.7495
SC	2044	Salkehatchie River	PL-566	33.3072	81.3456
SC	2062	South Darlington	PL-566	34.273319	-79.88222
SC	2057	South Edisto	PL-566	33.2557	81.0887
SC	2052	Thompson-Westfield Creek	PL-566	34.6871	-80.116
SC	2039	Upper New River	PL-566	32.51868	81.00456
SC	2043	Upper Savannah	PL-566	34.2271	82.427
SC	2049	Wallace	PL-566	34.6	79.8
SC	2051	West Orangeburg	PL-566	33.5321	81.7845
SC	2014	Willow Swamp	PL-566	32.99284	81.00319
SC	2019	Wilson Creek (Anderson)	PL-566	34.41357	82.66011
SC	2056	Woodrow	PL-566	34.1724	80.2457
SD	2018	Fall River-North Unit	PL-566	43.25	103.167
SD	2019	Fall River-South Unit	PL-566	43.125	103.167
SD	2008	Green Creek	PL-566	43.02753	96.50636
SD	2801	Tewaukon	PL-566	45.79706	97.56595
SD	2802	West Trib. Bois-De-Sioux River	PL-566	46.00474	96.7417
TN	2044	Beans Creek	PL-566	35.1906	86.0923
TN	2051	Bear Creek (Scott)	PL-566	36.55	84.5
TN	2046	Beaver Creek	PL-566	35.45	89.6
TN	2045	Big Creek	PL-566	35	-90
TN	2049	Big Limestone Creek	PL-566	36.1741	82.8332
TN	2037	Bogota	PL-566	36.14603	89.45432
TN	2029	Crow Creek	PL-566	35	86
TN	2802	East Fork Of Clarks River	PL-566	37	-88
TN	2053	East Prong Little Pigeon River	PL-566	35	83
TN	2052	Hickory Creek	PL-566	36	86
TN	2050	Lick Creek (1995)	PL-566	36.3	83
TN	2041	Madison-Cypress Creek	PL-566	35.5855	88.7994
TN	2027	Martin Creek	PL-566	36.11831	88.31489
TN	2047	North Fork Wolf River	PL-566	35.1991	89.4257
TN	2040	Portland	PL-566	36.408	86.5205
TN	2018	Proctor Creek	PL-566	36.62912	85.59402
TN	2025	Roark's Cove	PL-566	35.20804	85.91327
TN	2024	Shady Valley	PL-566	36.48352	81.94227
TN	2805	South Chickamauga Creek	PL-566	35	85
TN	2043	Spring Creek	PL-566	36.2874	88.7675
TN	2048	Sulphur Fork Creek	PL-566	36.2673	87.0669
TN	2803	Tuscumbia River	PL-566	35	89
TN	2042	White Oak Creek	PL-566	35.4364	88.6155
TX	2021	Agua Dulce Creek	PL-566	28.0341	-98.18366
TX	2801	Anthony Arroyo	PL-566	32	-106.5

State	Project Number	Project Name	Program	Latitude	Longitude
TX	2103	Bexar-Medina-Atascosa Counties Water Conservation	PL-566	29.18	-98.85
TX	2097	Big Creek(Delta Co.)	PL-566	33.3841	-95.7026
TX	2098	Big Creek(Tri-County)	PL-566	31.2605	-96.9372
TX	2096	Caddo Creek	PL-566	33.1234	-96.6235
TX	2052	Chocolate;Little Chocolate;Lynn Bayou	PL-566	28.67694	-96.699
TX	2039	East Bay Bayou	PL-566	29.74758	-94.4841
TX	2095	Los Olmos Creek	PL-566	26.4249	-98.8375
TX	2099	Lower Aquilla-Hackberry Creek	PL-566	31.9969	-97.1192
TX	2102	Nolan River	PL-566	32.1	-97.5
TX	2026	Ramirez Creek	PL-566	26.40893	-99.05259
TX	2100	Sulphur Creek(Wp)	PL-566	28.408	-97.7515
TX	3501.40	Trinity - Elm Fork & E. Laterals	PL-534	33	-96.9
TX	3501.46	Trinity - Isle Du Bois Creek	PL-534	33.6	97
TX	3501.01	Trinity - Red Oak Creek	PL-534	32.3	-96.37
TX	3501.12	Trinity - Rush Creek	PL-534	32.1	-96.3
TX	3501.15	Trinity - Sycamore Creek	PL-534	32.6	97.3
TX	3501.03	Trinity - Tehuacana Creek	PL-534	31.8	96.4
TX	2101	Upper North Bosque River	PL-566	32.1	-98
UT	1000	Coal Creek	PL-566	37.7	-113.2
UT	2015	Dry Gulch-Martin Lateral	PL-566	40.28788	110.00776
UT	2014	Hansel Valley	PL-566	41.74146	112.62812
UT	2017	Muddy Creek-Orderville	PL-566	37.25	112.75
UT	2016	Sand Wash	PL-566	40.3629	110.2437
UT	2018	Tri-Valley	PL-566	40.4	111.4
VA	2001	Back Creek	PL-566	37.20436	-80.58409
VA	2045	Buena Vista	PL-566	37	-79
VA	2043	Chestnut Creek	PL-566	37	81
VA	2033	Copper Creek	PL-566	36.7	-82.5
VA	2035	Cripple Creek	PL-566	36.8364	-81.578
VA	2036	Hays Creek	PL-566	38.1337	-79.0412
VA	2802	Hobbsville-Sunbury	PL-566	37	-77
VA	2026	Indian Creek	PL-566	36.59308	76.1356
VA	2041	Lick Creek	PL-566	36.9503	-82.113
VA	2044	Little Reed Island Creek	PL-566	36.75	-80.75
VA	2034	Looney-Mill Creek	PL-566	37.4861	-79.8283
VA	2046	North Fork Powell River	PL-566	36.7917	-83.083
VA	2803	Opequon Creek	PL-566	39	-78
VA	2038	Pamunkey River	PL-566	37.6542	-76.988
VA	0701.11	Potomac - Gap Run	PL-534	38.15	78.45
VA	0701.09	Potomac - Linville Creek	PL-534	38.34	-78.52
VA	0701.14	Potomac - Mill Creek	PL-534	38.35	-78.26
VA	0701.15	Potomac - Moffett Creek	PL-534	38.15	-79.07
VA	0701.07	Potomac - Tumbling Run	PL-534	39	-78.22

State	Project Number	Project Name	Program	Latitude	Longitude
VA	2040	Sandy Creek	PL-566	36.7662	-79.4002
VA	2039	Three Creek	PL-566	36.7071	-81.9775
VA	2032	Upper Appomattox River	PL-566	37.3622	-78.8284
VA	2037	Watkins Branch	PL-566	37.266	82.0632
VT	2010	Barton And Clyde Rivers	PL-566	44.8709	72.2231
VT	2007	Black River	PL-566	44.90761	72.21479
VT	2005	Laplatte River	PL-566	44.38091	73.21184
VT	2008	Lemon Fair River	PL-566	44.055	73.1714
VT	2011	Lower Lake Champlain	PL-566	43.7	73.4
VT	2012	Lower Lamoille River	PL-566	44.7	73
VT	2006	Lower Otter And Dead Creeks	PL-566	44.46289	73.40276
VT	2009	Lower Winooski River	PL-566	44.4832	73.1669
VT	2003	Stevens-Rugg	PL-566	44.80792	73.17044
VT	2004	Upper Castleton River	PL-566	43.64248	73.07005
WA	2010	East Side Green River	PL-566	47.28	122.1
WA	2006	French Creek	PL-566	47.89266	122.04788
WA	2015	Johnson Creek	PL-566	48.97747	122.25858
WA	2003	Lacamas Creek Tributaries	PL-566	45.74127	122.49251
WA	2005	Marshland	PL-566	47.89266	122.04788
WA		Mission Creek	Pilot		
WA	2023	Moxee	PL-566	46.5	120.4
WA	2018	Newaukum	PL-566	47.15	122
WA	2020	North Pine-Spring Valley Creek	PL-566	47.6701	117.3908
WA	2024	Omak Creek	PL-566	48.37	119.37
WA	2016	Pleasant Valley Creek	PL-566	47.07344	117.49499
WA	2019	Rebel Flat Creek	PL-566	46.8219	117.2514
WA	2002	Saar Creek	PL-566	48.90156	122.17719
WA	2022	Tenmile Creek	PL-566	48.8	122.4
WA	2801	Thorn Creek	PL-566	46.7484	116.9211
WA	2021	Tucannon River	PL-566	46.3256	117.9845
WA	2007	Twin Buttes	PL-566	45.7851	120.82915
WA	2011	West Side Green River	PL-566	47.28324	122.15579
WI	2024	Brillion	PL-566	44.16917	88.19342
WI	2031	Maiden Rock Coulee	PL-566	44.57658	92.29398
WI	2033	Mosher-Anderson Creek	PL-566	43.08	88.5
WI	2026	Pine River	PL-566	43.3512	90.48449
WI	2010	Trout Run	PL-566	44.28641	90.89606
WI	2030	Upper Sugar River	PL-566	42.85171	89.4937
WI	2032	Upper West Branch Of The Pecatonica	PL-566	43.04284	90.36767
WV	2019	Dunloup Creek	PL-566	37.84464	81.12533
WV	2030	Headwaters Of Indian Creek	PL-566	37.5423	80.6153
WV	2028	Little Whitestick-Cranberry Creeks	PL-566	37.7742	81.223
WV	2027	Middle Grave Creek	PL-566	39.9352	80.706
WV	2029	Opequon	PL-566	39.4517	77.9783

State	Project Number	Project Name	Program	Latitude	Longitude
WV	2009	Pecks Run	PL-566	39.05532	80.18093
WV	2025	Piney Creek-Soak Creek	PL-566	37.70877	81.25181
WV	0701.02	Potomac - Cacapon River	PL-534		
WV	0701.07	Potomac - Potomac Headwaters	PL-534	38.957717	-78.904092
WV	0701.05	Potomac - So. Branch Upstream	PL-534		
WV	2012	Shooks Run	PL-566	39.1389	80.07639
WV	2031	Teter Creek	PL-566	39.1193	80.0072
WV	2033	Tributary Of Evitts Run	PL-566	39.3211	77.8441
WY	2014	Allison Draw	PL-566	41.2	-104.7
WY	2801	Boxelder Creek	PL-566	40.84302	104.9457
WY	2007	Cache Creek	PL-566	43.45167	-110.77
WY	2011	Candy Jack	PL-566	43.64073	-108.216
WY	2010	Cottonwood Creek	PL-566	42.67836	-110.973
WY	2017	Kaycee Flood Protection Project	PL-566	43.42	-106.38
WY	2016	Lingle Fort Laramie	PL-566	42.193	-104.456
WY	2015	North Platte River	PL-566	42.1	-104.2
WY	2802	Spring Creek	PL-566	40.5229	105.1076
WY	2008	Star Valley-Dry Creek	PL-566	42.72724	-110.981
WY	2803	Trail Creek	PL-566	43.68461	111.05499
WY	2009	Upper North Laramie River	PL-566	42.29464	-105.593

Appendix 3

Listing of 183
Deauthorized Watershed Projects

183 Deauthorized Watershed Projects

158 PL-566; 25 PL-534

7-26-19

State	Project Number	Project Name	Program	Latitude	Longitude
AL	2022	Bon Secour-Magnolia River	PL-566	30.44283	87.7287
AL	2011	Crowdabout Creek	PL-566	34.40178	87.03135
AL	2017	Mill Creek	PL-566	32.53585	86.33908
AL	2038	Moores Creek	PL-566	32.8646	85.2677
AL	2026	Upper Big Swamp Creek	PL-566	32.15799	86.68433
AR	2060	Boydsville	PL-566	36.369	90.3886
AR	2024	Crooked Lake Bayou	PL-566	35.8275	89.9921
AR	2048	Fish Bayou	PL-566	34.88118	90.40913
AR	2026	Garrett Bridge	PL-566	33.9805	91.7171
AR	2041	Larkin Creek	PL-566	34.89746	90.87347
AR	2061	Lower Caney Bayou	PL-566	33.3085	91.3275
AR	2044	Lower Tri-County	PL-566	35.72285	91.48792
AR	2020	Redfork	PL-566	33.7778	91.3921
AR	2049	Spadra Creek	PL-566	35.51616	93.56914
AR	2028	Upper Crooked Creek	PL-566	36.2707	93.0882
AR	2006	Upper Culotches Bay	PL-566	34.8528	91.5289
AZ	2013	Perilla Mountain	PL-566	31.34851	109.61291
AZ	2015	White Tank Mountains	PL-566	33.5	112.5
CA	2024	Patterson	PL-566	37.5	121.1
CO	2006	Vineland Area Tributary To Arkansas Rive	PL-566	38.2572	104.6112
DE	2007	Broad Creek	PL-566	38.7	75.6
FL	2014	Big Slough	PL-566	26.9543	82.0358
FL	2018	California Lake	PL-566	29.6428	83.1339
FL	2011	Jumper Creek	PL-566	28.71483	82.05673
FL	2019	Loxahatchee Sub-Drainage District	PL-566	26.71101	80.2272
GA	2053	Big Slough	PL-566	30.8794	84.2269
GA	2027	Dry Creek	PL-566	30.8793	84.5614
GA	2025	Fishing Creek	PL-566	33.0695	83.2354
GA	2054	John's Creek	PL-566	34.2549	85.1865
GA	2061	Middle River	PL-566	34.24113	83.18322
GA	2032	Pennahatchee Creek	PL-566	32.1634	83.7907
GA	2050	Suwanee Creek	PL-566	34.10508	83.99443
ID	2003	Cow Creek-Dobson Creek	PL-566	48.64237	116.24511
IL	2018	Clear Creek	PL-566	39.95509	-90.29543
IL	1001	Hickory Creek	PL-566	41.42	-89.74
IL	2020	Lower Mckee Creek (North Fork)	PL-566	39.9468	-91.3358
IL	2021	Nutwood	PL-566	39.372	-90.3805
IL	2006	Seven Mile Creek (Jefferson)	PL-566	38.3108	-88.9085
IL	2014	Seven Mile Creek (White)	PL-566	38.0995	-88.1826

State	Project Number	Project Name	Program	Latitude	Longitude
IL	2019	Upper Mckee Creek (North Fork)	PL-566	39.9468	-91.3358
IL	1003	West Branch DuPage River	PL-566	41.96	-88.11
IL	2801	West Creek	PL-566	41.40414	87.51696
IN	2026	Big Raccoon Creek	PL-566	39.73555	-87.10339
IN	2011	Dewitt Creek	PL-566	38.874	-86.34463
IN	2035	Hall-Flat Creek	PL-566	38.29229	-86.74133
IN	2021	Indian Creek	PL-566	39.39219	-86.28066
IN	2029	Lost River	PL-566	38.63602	-86.22288
IN	2019	Mill Creek (Hendricks)	PL-566	39.53098	-86.52378
IN	2005	West Creek	PL-566	41.40414	-87.51696
KS	2042	Mt. Hope	PL-566	37.80241	97.67464
KY	2014	Beaver Creek	PL-566	36.9986	-85.9223
KY	2013	Crab Orchard Creek	PL-566	37.6619	-87.9257
KY	2034	Upper Howard Creek	PL-566	37.9837	-84.1732
LA	2026	Chatlin Lake Canal	PL-566	31.30655	92.49787
LA	2028	North Concordia	PL-566	31.48512	91.50109
LA	2047	Sicily Island	PL-566	31.6921	91.8087
MA	2009	Broad Brook	PL-566	42.1296	72.5758
MA	2015	Cobb Brook	PL-566	41.7669	71.1
MA	2013	West Branch Westfield River	PL-566	42.08901	72.97999
ME	2009	Fish Stream	PL-566	46.00111	68.44187
ME	2006	Nezinscot River	PL-566	44.28363	70.19622
ME	2007	Stevens Brook	PL-566	44.0657	70.7011
ME	2010	Twenty-Five Mile Stream	PL-566	44.63646	69.41078
MI	2010	Black Creek (Mason)	PL-566	43.95082	86.23634
MI	2008	Fowlerville Drain	PL-566	42.65292	84.11216
MI	2007	Little River	PL-566	45.3203	87.5873
MI	2015	Tebo-Erickson	PL-566	43.77335	83.95426
MI	2016	Truax Creek	PL-566	45.09561	83.82255
MN	2004	Coon Creek	PL-566	45.30148	93.25793
MS	2022	Bear-Tilda Bogue	PL-566	32.53547	90.16869
MS	2014	Beasha Creek	PL-566	32.68446	89.26795
MS	2043	Box Creek	PL-566	33.07874	89.94741
MS	2035	Eutacutaches Creek	PL-566	32.29612	89.92432
MS	2034	Five Creeks	PL-566	33.61357	89.03371
MS	2031	Houlka Creek	PL-566	33.76651	88.84072
MS	2052	Mantachie; Bogue Fala And Bogue Eucuba C	PL-566	34.15878	88.58395
MS	2009	Mulberry Creek	PL-566	33.49321	89.63625
MS	2049	Panther Creek	PL-566	32.54745	90.18153
MS	2044	Roberson Creek	PL-566	34.854	89.14226
MS	2036	Silver Creek	PL-566	31.85713	89.86211
MS	2015	Tallahalla Creek	PL-566	32.15524	90.56264
MS	3302.09	Yazoo - Bolivar Creek	PL-534	33.8158	-90.875

State	Project Number	Project Name	Program	Latitude	Longitude
MS	3302.10	Yazoo - Broad Slough	PL-534	33.3297	-90.9952
MS	3302.17	Yazoo - Crenshaw	PL-534	34.4997	-90.1954
MS	3302.22	Yazoo - Gum Pond	PL-534	33.8684	-90.9687
MS	3302.23	Yazoo - Hampton Lake	PL-534	34.5011	-90.501
MS	3302.30	Yazoo - Hushpuckena Creek	PL-534	34.0099	-90.7544
MS	3302.33	Yazoo - Jones Bayou	PL-534	33.7478	-90.7236
MS	3302.34	Yazoo - Lake Cormorant	PL-534	34.8605	90.2469
MS	3302.35	Yazoo - Lake Henry	PL-534	33.5553	-90.2952
MS	3302.45	Yazoo - Leflore	PL-534	33.5	-90.6
MS	3302.82	Yazoo - Little Mound Bayou	PL-534	33.8905	-90.722
MS	3302.85	Yazoo - Long Lake	PL-534	34.1991	-90.5711
MS	3302.68	Yazoo - Lower Tippo Bayou	PL-534	33.8226	-90.1597
MS	3302.64	Yazoo - Moon Lake-Phillips Bayou	PL-534	34.5208	-90.4938
MS	3302.63	Yazoo - Murphy Bayou	PL-534	33.1251	-90.7623
MS	3302.66	Yazoo - New Africa	PL-534	34.084	-90.6118
MS	3302.67	Yazoo - New Porters Bayou	PL-534	33.6132	90.7188
MS	3302.74	Yazoo - Oldham Lake	PL-534	34.1579	-90.6172
MS	3302.75	Yazoo - Opossum Bayou	PL-534	34.1579	90.3281
MS	3302.41	Yazoo - Sevier Lake-Fish Bayou	PL-534	34.0188	-90.6858
MS	3302.42	Yazoo - Shaw	PL-534	33.6036	-90.7738
MS	3302.72	Yazoo - Southwest Delta Sunflower	PL-534	32.9228	-90.6306
MS	3302.36	Yazoo - Sunflower	PL-534	33.5719	-90.553
MS	3302.54	Yazoo - Turn Bayou	PL-534	34.0267	-90.7031
MS	3302.56	Yazoo - White Oak-Ark Bayou	PL-534	34.5526	90.3438
MT	2014	Boulder River	PL-566	46.26912	112.02811
MT	2010	Carbon Hill	PL-566	46.3988	105.7766
MT	2013	City Of Browning	PL-566	48.63233	112.95355
MT	2020	Pasture Creek	PL-566	47.5688	105.6313
MT	2021	Thirtymile Creek	PL-566	48.5157	108.9284
NC	2002	Abbotts Creek	PL-566	35.8431	80.1939
NC	2007	Deep Creek (Washington)	PL-566	35.8564	76.6432
NC	2026	Juniper Swamp	PL-566	34.6482	79.0975
NC	2012	Lowland	PL-566	35.1209	76.7547
NC	2005	Mud Creek	PL-566	35.3336	82.466
NC	2053	Sandy Creek	PL-566	35.0856	78.9315
NC	2043	Stoney Creek	PL-566	35.3666	77.9953
NC	2041	Tallulah Creek (Long Creek Portion)	PL-566	35.3293	83.8045
NC	2040	Upper Bay River	PL-566	35.1209	76.7547
ND	2018	Starkweather	PL-566	48.3983	-98.62511
ND	2010	Wild Rice 'B'	PL-566	45.96823	-97.0436
NE	2044	Winters Creek	PL-566	41.81041	103.53252
NH	2008	Indian Brook	PL-566	44.49887	71.59462
NM	2018	Avalon-Alacran	PL-566	32.45077	104.19917

State	Project Number	Project Name	Program	Latitude	Longitude
NM	2024	Tucumcari Draw	PL-566	35.16036	103.76508
NV	2006	East Walker	PL-566	39.1021	119.2032
NV	2005	Lovelock Valley	PL-566	40.29088	118.53332
OH	2008	Black Brook	PL-566	41.17	81.2715
OH	2011	Buffalo Creek	PL-566	40.0148	81.5433
OH	2006	Dick's Creek-Little Muddy Creek	PL-566	39.4389	84.5156
OH	2018	Rattlesnake Creek	PL-566	39.76838	83.60478
OK	2035	Bixby Conservancy District No. 25	PL-566	36.1411	95.9453
OK	2016	Cache Creek Bottom	PL-566	35.0603	94.6506
OK	2048	Dumpling-Beaver Creek	PL-566	34.3469	95.4692
OK	2050	Garrison Creek	PL-566	35.38839	94.48558
OK	2017	Haikey Creek	PL-566	36.1411	95.9453
OK	2062	Pott-Sem-Turkey	PL-566	35.25394	96.80317
OK	2036	Squirrel Creek	PL-566	35.3126	96.9283
OK	2021	Wagon Creek	PL-566	36.6888	98.3341
OR	2017	Calapooya Creek	PL-566	43.2495	123.3905
OR	2014	Little Luckiamute River	PL-566	44.85303	123.3509
OR	2013	Mckay-Rock Creek	PL-566	45.493	122.8738
OR	2012	Pine Valley	PL-566	44.7758	117.7431
OR	2015	Rock Creek	PL-566	44.98022	119.76627
PA	2022	Nescopeck Creek	PL-566	41.04	76.02
PA	2018	Oil Creek	PL-566	41.73	79.75
PA	2028	Upper Tioga River	PL-566	41.71	77.03
PR	2002	Bajura	PL-566	18.2	66.5
SC	2034	Eighteen Mile Creek	PL-566	34.5282	82.6128
SC	2017	Mitchell Swamp-Pleasant Meadow Branch	PL-566	33.8537	78.9571
SC	2032	Wilson Creek (Greenwood)	PL-566	34.2014	82.1477
SD	2013	Hurley Creek	PL-566	43.34673	97.26282
SD	2007	Marne Creek	PL-566	42.87098	97.43481
SD	2016	Mission Hill	PL-566	42.96011	97.24414
SD	2002	Richland Creek	PL-566	42.75742	96.59486
SD	2010	Turkey Ridge Creek	PL-566	43.34673	97.26282
SD	2009	Upper Little Minnesota River	PL-566	45.81168	97.32768
TN	2030	Lewis-Hunsacker Creek	PL-566	36.15897	89.41338
TN	2007	Lick Creek	PL-566	36.41824	82.68127
TX	2065	Arroyo Colorado	PL-566	26.33712	97.5267
TX	2067	Darrs Creek	PL-566	31.0986	-97.5651
TX	2080	Kickapoo Creek (Lipan)	PL-566	32.47826	-98.02341
TX	2012	Knob Creek	PL-566	31.0986	-97.5651
TX	2064	Los Fresnos Resaca	PL-566	26.06637	97.87338
TX	2075	Pond Creek	PL-566	31.0986	97.5651
TX	2062	Rancho Viejo	PL-566	26.03406	97.72807
TX	2081	San Felipe	PL-566	29.45476	100.8569
TX	2089	Sandy Creek	PL-566	31.10424	94.0202

State	Project Number	Project Name	Program	Latitude	Longitude
VA	2028	Nibbs Creek	PL-566	37.35868	-77.95222
VA	2020	South Fork Roanoke River	PL-566	37.16111	-80.12189
VT	2001	Neshobe River	PL-566	44.055	73.1714
WA	2004	Chimacum Creek	PL-566	48.04271	122.77679
WA	2017	East Wenatchee	PL-566	47.42023	120.30746
WA	2014	Goose Creek	PL-566	47.81852	118.52229
WA	2012	Lake Creek	PL-566	46.6247	122.8132
WI	2025	First Capitol	PL-566	42.7036	90.25529
WI	2022	Spring Brook	PL-566	45.11675	89.18622
WI	2021	Willow Creek	PL-566	43.49144	90.25684
WV	2018	Kanawha Twomile Creek	PL-566	38.4026	81.59597
WV	2022	Mate Creek	PL-566	37.64271	82.08069
WV	2023	Prickett Creek	PL-566	39.50168	80.02048
WY	2013	Douglas	PL-566	42.77158	-105.384

Appendix 4

Summary of 2020 Average Annual Benefits

(2019 equivalent dollars)

including number of dams and controlled drainage areas
by the following geography areas:

National

Watershed Program

Region

State

Congressional District

County

Watershed Project

P-01	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
ACCUMULATION ID		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
NRCS NATIONAL TOTALS (01)									
TOTAL FOR ALL FWRS NATIONWIDE		11,845	41,678	719.124	507.434	1,226.558	17,254	12,175	29,430
NRCS REGIONAL OFFICE (04)									
01	NRCS REGION - WESTERN	372	4,651	151.855	50.658	202.512	32,652	10,893	43,545
02	NRCS REGION - CENTRAL	8,945	25,842	274.365	214.613	488.978	10,617	8,305	18,922
03	NRCS REGION - NORTHEAST	537	2,717	91.889	78.860	170.749	33,822	29,027	62,849
04	NRCS REGION - SOUTHEAST	1,991	8,469	201.015	163.303	364.318	23,736	19,283	43,020
NRCS PROGRAM AUTHORITY (05)									
PL-566	PUBLIC LAW 566 (1954)	7,766	30,517	561.298	398.731	960.029	18,393	13,066	31,459
PL-534	PUBLIC LAW 534 (1944)	3,428	8,850	136.268	91.254	227.522	15,398	10,311	25,709
RC&D	Resource Conservation & Dev.	197	919	8.416	6.812	15.228	9,160	7,414	16,574
PILOT	PILOT Watershed Programs	449	1,245	11.757	9.516	21.273	9,441	7,641	17,082
OTHER	Projects With Special Funding	5	147	1.385	1.121	2.505	9,433	7,635	17,069
NWS - RIVER FORECAST CENTER (13)									
APRFC	Alaska-Pacific	9	16	2.677	8.917	11.594	166,276	553,866	720,142
ABRFC	Arkansas-Red Basin	2,857	10,023	89.165	68.758	157.923	8,896	6,860	15,756
CNRFC	California-Nevada	24	154	41.149	14.228	55.377	266,786	92,248	359,034
CBRFC	Colorado Basin	91	1,735	77.775	13.248	91.023	44,824	7,635	52,459
LMRFC	Lower Mississippi	910	2,487	104.050	98.775	202.825	41,834	39,713	81,547
MARFC	Middle Atlantic	310	1,500	33.123	43.522	76.645	22,078	29,010	51,088
MBRFC	Missouri Basin	3,619	5,267	64.857	73.514	138.371	12,313	13,957	26,270
NCRFC	North Central	737	3,749	34.627	37.094	71.721	9,236	9,894	19,130
NERFC	Northeast	111	497	17.628	3.675	21.303	35,493	7,400	42,893
NWRFC	Northwest	14	230	1.968	5.411	7.378	8,545	23,495	32,040
OHRFC	Ohio	510	2,456	60.386	46.825	107.211	24,589	19,067	43,656
SERFC	Southeast	775	4,147	74.918	42.525	117.443	18,064	10,253	28,317
WGRFC	West Gulf	1,878	9,415	116.803	50.940	167.742	12,406	5,411	17,817
STATE OR TERRITORY (48)									
AL	01 Alabama	107	621	5.107	4.918	10.025	8,230	7,925	16,155
AZ	04 Arizona	25	815	70.174	0.397	70.571	86,058	487	86,544
AR	05 Arkansas	208	988	20.563	40.883	61.446	20,814	41,382	62,196
CA	06 California	16	131	40.847	11.778	52.625	311,831	89,916	401,747
CO	08 Colorado	145	736	6.798	3.512	10.310	9,232	4,770	14,002
CT	09 Connecticut	30	66	7.702	0.426	8.128	116,082	6,423	122,504
FL	12 Florida	10	475	0.524	4.859	5.383	1,103	10,227	11,330
GA	13 Georgia	357	1,652	9.549	17.154	26.703	5,782	10,386	16,168
HI	15 Hawaii	9	16	2.677	8.917	11.594	166,276	553,866	720,142
ID	16 Idaho	3	41	0.603	1.804	2.408	14,896	44,555	59,451
IL	17 Illinois	66	614	6.693	3.799	10.492	10,892	6,183	17,075
IN	18 Indiana	134	547	6.096	14.088	20.184	11,141	25,744	36,885
IA	19 Iowa	1,615	920	15.091	12.832	27.923	16,397	13,943	30,339
KS	20 Kansas	831	3,094	33.457	25.136	58.592	10,815	8,125	18,940
KY	21 Kentucky	200	743	5.436	6.745	12.180	7,312	9,073	16,385
LA	22 Louisiana	35	343	0.607	1.676	2.283	1,771	4,894	6,664
ME	23 Maine	16	123	0.882	0.577	1.459	7,186	4,707	11,893
MD	24 Maryland	16	78	0.951	15.607	16.558	12,250	201,017	213,267
MA	25 Massachusetts	30	128	5.442	1.732	7.173	42,400	13,494	55,894
MI	26 Michigan	13	273	4.927	14.312	19.239	18,047	52,424	70,471
MN	27 Minnesota	51	1,400	12.210	7.218	19.428	8,723	5,157	13,880
MS	28 Mississippi	560	1,344	95.761	51.879	147.640	71,276	38,615	109,891
MO	29 Missouri	1,203	769	8.813	14.294	23.106	11,457	18,582	30,040
MT	30 Montana	19	364	3.208	2.840	6.048	8,819	7,807	16,625
NE	31 Nebraska	738	1,986	22.789	33.776	56.564	11,473	17,004	28,477
NV	32 Nevada	8	222	0.060	2.554	2.614	268	11,482	11,750
NH	33 New Hampshire	24	131	1.292	0.788	2.080	9,892	6,029	15,921
NJ	34 New Jersey	20	61	5.291	3.592	8.883	86,293	58,586	144,879
NM	35 New Mexico	79	1,383	18.306	1.957	20.263	13,238	1,415	14,653
NY	36 New York	59	230	5.098	0.066	5.164	22,183	286	22,469
NC	37 North Carolina	114	439	8.075	7.308	15.383	18,378	16,632	35,010
ND	38 North Dakota	50	1,033	8.401	2.724	11.125	8,135	2,637	10,772
OH	39 Ohio	64	207	2.261	2.690	4.950	10,911	12,982	23,894
OK	40 Oklahoma	2,107	5,959	51.135	39.582	90.718	8,581	6,642	15,223
OR	41 Oregon	6	62	1.886	3.606	5.491	30,212	57,778	87,990
PA	42 Pennsylvania	91	568	19.476	18.537	38.013	34,294	32,641	66,934
SC	45 South Carolina	105	579	4.417	7.170	11.588	7,636	12,394	20,029
SD	46 South Dakota	59	170	3.038	6.040	9.078	17,880	35,550	53,431
TN	47 Tennessee	143	347	43.398	13.200	56.598	125,225	38,088	163,312
TX	48 Texas	2,003	9,002	105.134	52.262	157.396	11,678	5,805	17,484
UT	49 Utah	45	505	5.549	11.831	17.380	10,993	23,436	34,429
VT	50 Vermont	4	7	0.500	0.150	0.650	72,616	21,763	94,379
VA	51 Virginia	150	938	7.378	7.204	14.582	7,862	7,677	15,538
WA	53 Washington	3	69	0.225	0.122	0.347	3,291	1,774	5,065
WV	54 West Virginia	170	845	38.069	20.384	58.453	45,048	24,122	69,170
WI	55 Wisconsin	88	346	1.509	2.863	4.372	4,358	8,269	12,627
WY	56 Wyoming	14	306	1.522	1.339	2.861	4,967	4,370	9,337
PR	72 Puerto Rico	2	1	0.200	0.308	0.508	179,854	277,815	457,668

P-02	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
CONGRESSIONAL DISTRICTS (217)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
AL-02	CD-02 - ALABAMA	6	35	0.451	0.312	0.763	13,003	8,992	21,994
AL-03	CD-03 - ALABAMA	66	458	2.497	3.055	5.551	5,454	6,672	12,126
AL-04	CD-04 - ALABAMA	11	49	0.552	0.543	1.094	11,171	10,993	22,164
AL-05	CD-05 - ALABAMA	2	3	0.118	0.137	0.256	42,472	49,296	91,767
AL-07	CD-07 - ALABAMA	22	76	1.489	0.871	2.360	19,635	11,480	31,114
AR-01	CD-01 - ARKANSAS	86	203	10.502	9.411	19.913	51,721	46,347	98,068
AR-02	CD-02 - ARKANSAS	39	331	1.725	1.107	2.832	5,209	3,342	8,551
AR-03	CD-03 - ARKANSAS	14	108	2.139	0.916	3.056	19,746	8,458	28,204
AR-04	CD-04 - ARKANSAS	69	345	6.197	29.449	35.646	17,941	85,264	103,205
AZ-01	CD-01 - ARIZONA	7	224	3.106	0.086	3.192	13,894	383	14,278
AZ-03	CD-03 - ARIZONA	2	50	0.391	0.155	0.546	7,848	3,102	10,950
AZ-04	CD-04 - ARIZONA	13	514	45.519	0.156	45.676	88,569	304	88,873
AZ-05	CD-05 - ARIZONA	2	26	20.414	0.000	20.414	779,442	0	779,442
AZ-07	CD-07 - ARIZONA	1	2	0.743	0.000	0.743	397,569	0	397,569
CA-05	CD-05 - CALIFORNIA	6	37	2.691	0.000	2.691	71,844	0	71,844
CA-09	CD-09 - CALIFORNIA	1	3	1.037	0.246	1.283	384,221	91,093	475,314
CA-11	CD-11 - CALIFORNIA	3	61	22.069	5.249	27.318	364,710	86,748	451,459
CA-16	CD-16 - CALIFORNIA	1	12	0.422	0.000	0.422	34,855	0	34,855
CA-23	CD-23 - CALIFORNIA	2	10	1.584	0.061	1.645	153,048	5,875	158,923
CA-24	CD-24 - CALIFORNIA	1	4	5.414	0.316	5.730	1,424,755	83,104	1,507,859
CA-26	CD-26 - CALIFORNIA	1	1	2.951	1.553	4.505	4,918,640	2,589,047	7,507,687
CA-50	CD-50 - CALIFORNIA	1	3	4.679	4.353	9.032	1,344,557	1,250,870	2,595,427
CO-02	CD-02 - COLORADO	7	184	1.980	1.342	3.322	10,732	7,274	18,006
CO-03	CD-03 - COLORADO	7	26	1.307	0.285	1.593	49,863	10,883	60,746
CO-04	CD-04 - COLORADO	92	380	2.401	1.572	3.973	6,317	4,136	10,452
CO-05	CD-05 - COLORADO	39	145	1.109	0.313	1.422	7,624	2,151	9,774
CT-01	CD-01 - CONNECTICUT	11	19	4.650	0.081	4.731	240,545	4,193	244,738
CT-02	CD-02 - CONNECTICUT	9	20	0.528	0.307	0.835	26,772	15,576	42,348
CT-03	CD-03 - CONNECTICUT	3	5	0.891	0.007	0.898	195,436	1,547	196,983
CT-04	CD-04 - CONNECTICUT	2	4	0.237	0.000	0.237	63,068	0	63,068
CT-05	CD-05 - CONNECTICUT	5	19	1.397	0.031	1.428	73,547	1,626	75,173
FL-08	CD-08 - FLORIDA	2	15	0.161	2.371	2.531	10,649	157,221	167,870
FL-10	CD-10 - FLORIDA	2	222	0.072	0.139	0.212	327	629	956
FL-11	CD-11 - FLORIDA	1	19	0.125	0.082	0.206	6,407	4,209	10,616
FL-17	CD-17 - FLORIDA	1	70	0.049	0.544	0.594	703	7,777	8,480
FL-18	CD-18 - FLORIDA	4	149	0.117	1.722	1.839	786	11,553	12,339
GA-01	CD-01 - GEORGIA	2	31	0.012	0.547	0.559	388	17,926	18,314
GA-02	CD-02 - GEORGIA	9	212	0.825	6.925	7.749	3,889	32,652	36,541
GA-03	CD-03 - GEORGIA	48	248	1.436	2.143	3.579	5,789	8,643	14,431
GA-04	CD-04 - GEORGIA	2	6	0.091	0.048	0.139	15,958	8,423	24,381
GA-06	CD-06 - GEORGIA	11	28	0.136	0.044	0.180	4,827	1,545	6,373
GA-07	CD-07 - GEORGIA	8	24	0.350	0.199	0.549	14,500	8,247	22,748
GA-08	CD-08 - GEORGIA	4	10	0.008	0.339	0.347	837	35,588	36,425
GA-09	CD-09 - GEORGIA	154	570	2.991	4.342	7.334	5,244	7,612	12,856
GA-10	CD-10 - GEORGIA	27	111	0.683	1.400	2.083	6,174	12,642	18,816
GA-11	CD-11 - GEORGIA	31	74	0.610	0.242	0.852	8,202	3,248	11,450
GA-12	CD-12 - GEORGIA	7	11	0.209	0.128	0.336	19,702	12,057	31,759
GA-14	CD-14 - GEORGIA	54	327	2.198	0.798	2.996	6,718	2,438	9,156
HI-02	CD-02 - HAWAII	9	16	2.677	8.917	11.594	166,276	553,866	720,142
IA-01	CD-01 - IOWA	23	13	0.213	0.243	0.457	16,883	19,264	36,147
IA-02	CD-02 - IOWA	280	191	2.569	2.311	4.880	13,430	12,086	25,516
IA-03	CD-03 - IOWA	514	344	4.772	6.932	11.704	13,867	20,144	34,011
IA-04	CD-04 - IOWA	798	372	7.537	3.346	10.883	20,242	8,985	29,226
ID-01	CD-01 - IDAHO	1	6	0.000	0.932	0.932	0	169,366	169,366
ID-02	CD-02 - IDAHO	2	35	0.603	0.873	1.476	17,237	24,942	42,179
IL-06	CD-06 - ILLINOIS	1	2	0.101	0.093	0.194	52,152	47,770	99,922
IL-08	CD-08 - ILLINOIS	3	59	3.055	2.798	5.853	52,152	47,770	99,922
IL-12	CD-12 - ILLINOIS	1	4	0.407	0.000	0.407	114,572	0	114,572
IL-13	CD-13 - ILLINOIS	7	366	0.158	0.276	0.433	430	752	1,182
IL-15	CD-15 - ILLINOIS	16	131	1.776	0.565	2.341	13,513	4,300	17,813
IL-16	CD-16 - ILLINOIS	5	6	0.537	0.000	0.537	83,873	0	83,873
IL-17	CD-17 - ILLINOIS	6	4	0.037	0.030	0.066	9,433	7,635	17,069
IL-18	CD-18 - ILLINOIS	27	42	0.623	0.038	0.660	14,757	890	15,647
IN-04	CD-04 - INDIANA	4	42	0.329	0.712	1.041	7,839	16,992	24,831
IN-06	CD-06 - INDIANA	23	103	1.906	1.969	3.875	18,594	19,205	37,798
IN-08	CD-08 - INDIANA	68	310	2.744	9.117	11.861	8,840	29,374	38,213
IN-09	CD-09 - INDIANA	39	92	1.118	2.290	3.408	12,100	24,779	36,879
KS-01	CD-01 - KANSAS	210	1,146	10.938	5.317	16.255	9,546	4,640	14,186
KS-02	CD-02 - KANSAS	295	496	8.982	7.399	16.381	18,122	14,928	33,049
KS-04	CD-04 - KANSAS	326	1,452	13.537	12.420	25.957	9,322	8,553	17,875
KY-01	CD-01 - KENTUCKY	130	479	2.685	3.062	5.747	5,611	6,398	12,009
KY-02	CD-02 - KENTUCKY	29	150	1.252	1.438	2.689	8,326	9,563	17,889
KY-04	CD-04 - KENTUCKY	17	44	0.925	0.416	1.342	20,984	9,433	30,417
KY-05	CD-05 - KENTUCKY	10	21	0.250	0.925	1.175	11,869	43,938	55,807
KY-06	CD-06 - KENTUCKY	14	49	0.324	0.904	1.228	6,555	18,313	24,868
LA-04	CD-04 - LOUISIANA	27	239	0.441	0.691	1.132	1,847	2,890	4,737
LA-05	CD-05 - LOUISIANA	8	104	0.165	0.986	1.151	1,595	9,518	11,113
MA-01	CD-01 - MASSACHUSETTS	13	40	2.024	1.266	3.290	50,968	31,862	82,831
MA-02	CD-02 - MASSACHUSETTS	9	34	0.867	0.261	1.128	25,184	7,593	32,776
MA-03	CD-03 - MASSACHUSETTS	5	47	1.343	0.156	1.499	28,827	3,346	32,173
MA-05	CD-05 - MASSACHUSETTS	1	2	0.376	0.000	0.376	202,277	0	202,277
MA-07	CD-07 - MASSACHUSETTS	1	4	0.451	0.038	0.489	101,132	8,415	109,547
MA-08	CD-08 - MASSACHUSETTS	1	1	0.381	0.012	0.392	290,467	8,840	299,308
MD-01	CD-01 - MARYLAND	3	4	0.000	0.107	0.107	0	28,229	28,229
MD-05	CD-05 - MARYLAND	4	24	0.346	1.165	1.511	14,429	48,529	62,958
MD-06	CD-06 - MARYLAND	8	39	0.449	12.584	13.032	11,372	319,061	330,433
MD-08	CD-08 - MARYLAND	1	10	0.156	1.751	1.907	15,024	168,388	183,412
ME-02	CD-02 - MAINE	16	123	0.882	0.577	1.459	7,186	4,707	11,893
MI-01	CD-01 - MICHIGAN	6	114	0.065	0.781	0.845	566	6,830	7,396
MI-02	CD-02 - MICHIGAN	2	4	0.118	0.151	0.270	31,503	40,175	71,679
MI-04	CD-04 - MICHIGAN	4	132	3.226	12.550	15.776	24,432	95,032	119,464
MI-10	CD-10 - MICHIGAN	1	23	1.517	0.830	2.347	66,256	36,255	102,510
MN-01	CD-01 - MINNESOTA	25	129	4.014	1.378	5.392	31,053	10,659	41,712
MN-02	CD-02 - MINNESOTA	9	33	0.255	0.068	0.324	7,637	2,046	9,684
MN-07	CD-07 - MINNESOTA	16	1,152	7.143	5.126	12.269	6,198	4,448	10,646
MN-08	CD-08 - MINNESOTA	1	85	0.797	0.645	1.442	9,433	7,635	17,069
MO-03	CD-03 - MISSOURI	20	21	0.156	0.087	0.244	7,562	4,226	11,788
MO-04	CD-04 - MISSOURI	101	62	0.506	0.544	1.050	8,218	8,841	17,059
MO-05	CD-05 - MISSOURI	106	66	0.851	0.747	1.599	12,851	11,275	24,125
MO-06	CD-06 - MISSOURI	939	488	3.881	10.677	14.558	7,950	21,870	29,820

P-03	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
CONGRESSIONAL DISTRICTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
MO-07	CD-07 - MISSOURI	15	19	2.604	0.152	2.756	136,518	7,987	144,506
MO-08	CD-08 - MISSOURI	22	113	0.814	2.085	2.899	7,175	18,387	25,562
MS-01	CD-01 - MISSISSIPPI	248	580	60.327	33.681	94.008	103,945	58,033	161,978
MS-02	CD-02 - MISSISSIPPI	256	573	32.955	15.935	48.890	57,537	27,821	85,358
MS-03	CD-03 - MISSISSIPPI	52	175	2.333	2.145	4.478	13,341	12,267	25,607
MS-04	CD-04 - MISSISSIPPI	4	16	0.146	0.118	0.265	9,433	7,635	17,069
MT-AL	CD-AL - MONTANA	19	364	3.208	2.840	6.048	8,819	7,807	16,625
NC-01	CD-01 - NORTH CAROLINA	6	19	0.538	0.266	0.804	27,668	13,704	41,371
NC-02	CD-02 - NORTH CAROLINA	4	30	1.190	1.214	2.404	39,771	40,578	80,349
NC-04	CD-04 - NORTH CAROLINA	6	40	1.571	1.603	3.175	39,771	40,578	80,349
NC-05	CD-05 - NORTH CAROLINA	33	133	1.134	0.656	1.790	8,549	4,946	13,495
NC-06	CD-06 - NORTH CAROLINA	28	114	1.455	1.175	2.631	12,722	10,275	22,997
NC-07	CD-07 - NORTH CAROLINA	1	2	0.529	0.825	1.354	228,888	357,110	585,998
NC-09	CD-09 - NORTH CAROLINA	7	35	0.618	0.562	1.180	17,482	15,879	33,362
NC-10	CD-10 - NORTH CAROLINA	10	23	0.531	0.628	1.159	23,144	27,354	50,498
NC-11	CD-11 - NORTH CAROLINA	18	41	0.457	0.353	0.810	11,149	8,604	19,753
NC-13	CD-13 - NORTH CAROLINA	1	2	0.051	0.025	0.077	27,668	13,704	41,371
ND-AL	CD-AL - NORTH DAKOTA	50	1,033	8.401	2.724	11.125	8,135	2,637	10,772
NE-01	CD-01 - NEBRASKA	258	369	5.459	7.709	13.167	14,812	20,917	35,729
NE-02	CD-02 - NEBRASKA	8	11	0.002	0.368	0.370	204	33,957	34,161
NE-03	CD-03 - NEBRASKA	472	1,607	17.328	25.699	43.027	10,783	15,992	26,776
NH-01	CD-01 - NEW HAMPSHIRE	1	3	0.290	0.018	0.308	96,624	5,989	102,614
NH-02	CD-02 - NEW HAMPSHIRE	23	128	1.002	0.770	1.772	7,853	6,030	13,883
NJ-04	CD-04 - NEW JERSEY	8	36	3.710	2.415	6.125	104,474	68,020	172,494
NJ-05	CD-05 - NEW JERSEY	4	4	0.225	0.227	0.451	54,994	55,385	110,379
NJ-07	CD-07 - NEW JERSEY	1	1	0.014	0.015	0.028	14,701	15,712	30,413
NJ-12	CD-12 - NEW JERSEY	7	21	1.342	0.935	2.278	64,589	45,014	109,603
NM-01	CD-01 - NEW MEXICO	1	4	0.039	0.031	0.070	9,433	7,635	17,069
NM-02	CD-02 - NEW MEXICO	57	1,095	16.023	0.932	16.955	14,635	851	15,486
NM-03	CD-03 - NEW MEXICO	21	284	2.244	0.994	3.238	7,904	3,502	11,406
NV-02	CD-02 - NEVADA	7	19	0.023	2.450	2.473	1,159	125,971	127,131
NV-04	CD-04 - NEVADA	1	203	0.037	0.104	0.141	183	513	696
NY-19	CD-19 - NEW YORK	4	21	1.183	0.000	1.183	57,411	0	57,411
NY-21	CD-21 - NEW YORK	1	2	0.226	0.000	0.226	111,464	0	111,464
NY-22	CD-22 - NEW YORK	28	70	1.435	0.054	1.489	20,396	767	21,163
NY-23	CD-23 - NEW YORK	26	137	2.254	0.012	2.266	16,474	86	16,560
OH-04	CD-04 - OHIO	5	3	0.290	0.400	0.691	100,430	138,621	239,051
OH-06	CD-06 - OHIO	3	12	0.159	0.278	0.437	12,765	22,246	35,011
OH-07	CD-07 - OHIO	1	3	0.038	0.020	0.058	13,018	6,613	19,631
OH-08	CD-08 - OHIO	7	22	0.328	0.385	0.714	14,600	17,146	31,746
OH-15	CD-15 - OHIO	41	133	1.006	1.384	2.390	7,583	10,428	18,011
OH-16	CD-16 - OHIO	7	34	0.438	0.223	0.661	13,018	6,613	19,631
OK-01	CD-01 - OKLAHOMA	15	44	0.470	0.345	0.815	10,640	7,808	18,448
OK-02	CD-02 - OKLAHOMA	317	1,080	8.627	8.367	16.994	7,989	7,748	15,737
OK-03	CD-03 - OKLAHOMA	1,040	3,093	22.538	13.765	36.302	7,288	4,451	11,738
OK-04	CD-04 - OKLAHOMA	665	1,552	17.639	13.810	31.449	11,366	8,898	20,265
OK-05	CD-05 - OKLAHOMA	70	191	1.862	3.296	5.158	9,757	17,271	27,027
OR-02	CD-02 - OREGON	4	49	0.280	3.450	3.730	5,711	70,392	76,103
OR-04	CD-04 - OREGON	2	13	1.606	0.156	1.762	119,823	11,641	131,464
PA-03	CD-03 - PENNSYLVANIA	16	159	0.761	0.508	1.270	4,802	3,206	8,008
PA-05	CD-05 - PENNSYLVANIA	4	16	0.389	0.137	0.526	25,012	8,788	33,800
PA-06	CD-06 - PENNSYLVANIA	2	23	0.954	2.404	3.358	41,311	104,074	145,384
PA-07	CD-07 - PENNSYLVANIA	3	19	0.799	2.013	2.812	41,311	104,074	145,384
PA-08	CD-08 - PENNSYLVANIA	8	51	3.825	10.023	13.848	75,221	197,108	272,329
PA-09	CD-09 - PENNSYLVANIA	3	11	0.611	0.161	0.772	56,706	14,972	71,677
PA-10	CD-10 - PENNSYLVANIA	29	103	3.598	0.696	4.294	34,841	6,739	41,580
PA-11	CD-11 - PENNSYLVANIA	2	8	0.063	0.038	0.102	7,854	4,778	12,632
PA-12	CD-12 - PENNSYLVANIA	1	2	0.015	0.012	0.027	9,433	7,635	17,069
PA-15	CD-15 - PENNSYLVANIA	3	3	0.181	0.036	0.217	58,015	11,432	69,447
PA-17	CD-17 - PENNSYLVANIA	6	41	1.112	0.170	1.282	27,135	4,151	31,285
PA-18	CD-18 - PENNSYLVANIA	14	133	7.168	2.339	9.506	53,985	17,616	71,601
PR-AL	CD-AL - PUERTO RICO	2	1	0.200	0.308	0.508	179,854	277,815	457,668
SC-02	CD-02 - SOUTH CAROLINA	1	6	0.063	0.094	0.158	11,079	16,471	27,550
SC-03	CD-03 - SOUTH CAROLINA	68	324	2.713	4.098	6.811	8,381	12,662	21,043
SC-04	CD-04 - SOUTH CAROLINA	5	57	0.226	1.194	1.420	3,994	21,071	25,064
SC-05	CD-05 - SOUTH CAROLINA	30	184	1.312	1.674	2.987	7,128	9,094	16,222
SC-07	CD-07 - SOUTH CAROLINA	1	8	0.103	0.109	0.212	12,294	13,097	25,391
SD-AL	CD-AL - SOUTH DAKOTA	59	170	3.038	6.040	9.078	17,880	35,550	53,431
TN-03	CD-03 - TENNESSEE	6	13	8.313	2.460	10.773	664,538	196,649	861,187
TN-06	CD-06 - TENNESSEE	15	34	0.919	0.799	1.718	27,048	23,505	50,553
TN-07	CD-07 - TENNESSEE	33	91	10.444	3.616	14.060	114,162	39,531	153,693
TN-08	CD-08 - TENNESSEE	89	209	23.722	6.324	30.046	113,729	30,321	144,050
TX-01	CD-01 - TEXAS	13	72	0.778	1.282	2.059	10,768	17,746	28,515
TX-03	CD-03 - TEXAS	29	66	1.372	0.813	2.186	20,878	12,376	33,254
TX-04	CD-04 - TEXAS	269	495	8.725	4.469	13.194	17,635	9,032	26,667
TX-05	CD-05 - TEXAS	116	319	3.707	7.939	11.646	11,630	24,910	36,540
TX-06	CD-06 - TEXAS	183	432	4.632	6.238	10.870	10,714	14,429	25,143
TX-08	CD-08 - TEXAS	3	3	0.153	0.201	0.353	57,507	75,498	133,005
TX-10	CD-10 - TEXAS	20	72	1.643	0.097	1.740	22,799	1,349	24,149
TX-11	CD-11 - TEXAS	362	2,381	25.775	7.925	33.699	10,823	3,328	14,151
TX-12	CD-12 - TEXAS	40	108	1.599	0.210	1.810	14,765	1,942	16,708
TX-13	CD-13 - TEXAS	389	1,385	12.831	5.294	18.124	9,262	3,822	13,084
TX-15	CD-15 - TEXAS	42	327	1.983	1.118	3.102	6,066	3,421	9,487
TX-17	CD-17 - TEXAS	94	262	4.087	1.279	5.365	15,622	4,888	20,509
TX-19	CD-19 - TEXAS	31	391	1.636	1.401	3.037	4,182	3,581	7,764
TX-21	CD-21 - TEXAS	31	288	6.246	4.277	10.523	21,697	14,855	36,552
TX-23	CD-23 - TEXAS	54	1,072	13.430	3.316	16.745	12,532	3,094	15,626
TX-25	CD-25 - TEXAS	151	535	7.945	3.254	11.199	14,841	6,078	20,919
TX-26	CD-26 - TEXAS	22	67	0.843	0.082	0.925	12,633	1,233	13,866
TX-27	CD-27 - TEXAS	11	53	0.822	0.149	0.971	15,493	2,802	18,295
TX-28	CD-28 - TEXAS	20	189	0.878	0.589	1.467	4,640	3,116	7,756
TX-30	CD-30 - TEXAS	1	2	0.030	0.121	0.151	12,596	51,197	63,794
TX-31	CD-31 - TEXAS	86	253	3.912	1.666	5.578	15,491	6,597	22,089
TX-32	CD-32 - TEXAS	6	30	0.434	0.027	0.460	14,365	889	15,254
TX-34	CD-34 - TEXAS	11	119	0.895	0.218	1.113	7,530	1,839	9,368
TX-35	CD-35 - TEXAS	19	82	0.779	0.298	1.077	9,550	3,650	13,199
UT-01	CD-01 - UTAH	4	117	0.482	0.153	0.634	4,110	1,303	5,412
UT-02	CD-02 - UTAH	23	104	2.381	9.504	11.884	22,950	91,610	114,560
UT-03	CD-03 - UTAH	14	262	2.475	2.003	4.478	9,433	7,635	17,069
UT-04	CD-04 - UTAH	4	21	0.212	0.171	0.383	9,854	7,976	17,830

P-04	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
CONGRESSIONAL DISTRICTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
VA-01	CD-01 - VIRGINIA	2	33	0.082	0.316	0.398	2,495	9,621	12,117
VA-05	CD-05 - VIRGINIA	74	497	2.968	4.205	7.173	5,968	8,457	14,425
VA-06	CD-06 - VIRGINIA	32	191	2.657	1.040	3.696	13,902	5,440	19,341
VA-07	CD-07 - VIRGINIA	17	109	0.501	0.829	1.330	4,584	7,582	12,166
VA-09	CD-09 - VIRGINIA	19	93	0.887	0.523	1.410	9,554	5,627	15,182
VA-10	CD-10 - VIRGINIA	2	9	0.161	0.166	0.326	18,869	19,451	38,319
VA-11	CD-11 - VIRGINIA	4	6	0.122	0.126	0.248	18,869	19,451	38,319
VT-AL	CD-AL - VERMONT	4	7	0.500	0.150	0.650	72,616	21,763	94,379
WA-03	CD-03 - WASHINGTON	1	39	0.006	0.117	0.123	159	2,967	3,126
WA-05	CD-05 - WASHINGTON	2	29	0.219	0.005	0.224	7,505	169	7,674
WI-02	CD-02 - WISCONSIN	14	89	0.176	1.175	1.351	1,990	13,245	15,235
WI-03	CD-03 - WISCONSIN	62	214	0.864	1.344	2.207	4,031	6,269	10,300
WI-07	CD-07 - WISCONSIN	12	43	0.469	0.345	0.814	10,833	7,976	18,808
WV-01	CD-01 - WEST VIRGINIA	91	445	27.234	4.473	31.707	61,140	10,042	71,182
WV-02	CD-02 - WEST VIRGINIA	61	310	7.465	12.027	19.492	24,063	38,770	62,833
WV-03	CD-03 - WEST VIRGINIA	18	89	3.370	3.884	7.253	37,690	43,444	81,135
WY-AL	CD-AL - WYOMING	14	306	1.522	1.339	2.861	4,967	4,370	9,337

P-05	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
6D HYD-UNITS (HUCS) (223)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
010100	St. John	11	105	0.456	0.549	1.005	4,327	5,212	9,539
010200	Penobscot	3	7	0.137	0.010	0.147	20,661	1,574	22,235
010400	Androscoggin	1	6	0.089	0.458	0.547	13,803	70,616	84,419
010600	Saco	3	14	0.579	0.036	0.615	42,135	2,626	44,760
010700	Merrimack	30	171	3.032	0.393	3.426	17,690	2,295	19,985
010801	Upper Connecticut	6	23	0.616	0.284	0.900	26,820	12,378	39,198
010802	Lower Connecticut	25	66	6.175	0.647	6.823	93,199	9,772	102,971
010900	Massachusetts-Rhode Island Coa	2	6	0.832	0.049	0.881	144,118	8,512	152,630
011000	Connecticut Coastal	23	56	3.902	1.246	5.147	69,277	22,117	91,394
020200	Upper Hudson	4	23	1.099	0.000	1.099	48,811	0	48,811
020301	Lower Hudson	7	11	0.165	0.176	0.340	14,701	15,712	30,413
020401	Upper Delaware	30	85	7.727	3.832	11.559	90,974	45,116	136,090
020402	Lower Delaware	21	131	6.807	14.633	21.440	51,765	111,288	163,053
020403	Mid Atlantic Coastal	1	3	0.028	0.023	0.051	9,433	7,635	17,069
020501	Upper Susquehanna	47	125	2.736	0.224	2.961	21,970	1,801	23,772
020502	West Branch Susquehanna	3	13	0.507	0.104	0.612	38,907	7,992	46,899
020503	Lower Susquehanna	6	58	0.647	0.223	0.869	11,066	3,808	14,874
020600	Upper Chesapeake	1	10	0.156	1.751	1.907	15,024	168,388	183,412
020700	Potomac	126	613	11.786	18.431	30.217	19,238	30,084	49,321
020801	Lower Chesapeake	26	125	0.639	0.883	1.522	5,105	7,049	12,154
020802	James	42	325	1.924	3.242	5.166	5,914	9,966	15,880
030101	Roanoke	43	279	1.976	1.345	3.322	7,079	4,819	11,898
030102	Albemarle-Chowan	1	41	0.211	0.344	0.555	5,181	8,432	13,613
030202	Neuse	17	91	3.350	3.109	6.459	36,932	34,274	71,205
030300	Cape Fear	3	4	0.544	0.837	1.382	137,773	212,012	349,784
030401	Upper Pee Dee	62	191	2.094	1.206	3.301	10,966	6,317	17,283
030402	Lower Pee Dee	2	12	0.168	0.173	0.342	14,601	15,076	29,676
030501	Santee	111	553	4.657	7.253	11.910	8,419	13,111	21,530
030601	Savannah	79	326	2.125	3.464	5.589	6,529	10,642	17,171
030602	Ogeechee	4	27	0.022	0.880	0.902	805	32,482	33,288
030701	Altamaha	57	372	1.570	8.456	10.026	4,215	22,711	26,926
030702	St. Marys-Satilla	5	39	0.217	0.625	0.842	5,561	15,977	21,538
030801	St. Johns	2	222	0.072	0.139	0.212	327	629	956
030802	East Florida Coastal	4	66	0.255	3.936	4.191	3,866	59,746	63,612
030901	Kissimmee	1	70	0.049	0.544	0.594	703	7,777	8,480
030902	Southern Florida	2	98	0.023	0.157	0.180	235	1,596	1,831
031002	Tampa Bay	1	19	0.125	0.082	0.206	6,407	4,209	10,616
031200	Ochlockonee	3	2	0.000	0.073	0.073	0	42,998	42,998
031300	Apalachicola	45	180	1.679	1.591	3.270	9,350	8,856	18,206
031501	Coosa-Tallapoosa	252	1,284	7.790	6.522	14.312	6,069	5,081	11,150
031502	Alabama	2	16	0.138	0.084	0.222	8,588	5,234	13,823
031601	Black Warrior-Tombigbee	60	219	47.171	1.103	48.274	215,237	5,034	220,271
031602	Mobile Bay-Tombigbee	17	37	0.480	0.293	0.773	13,048	7,957	21,004
031700	Pascagoula	24	57	1.223	1.247	2.471	21,364	21,776	43,141
031800	Pearl	34	107	0.889	7.598	8.487	8,305	71,006	79,311
040301	Northwestern Lake Michigan	3	96	0.065	0.800	0.866	683	8,349	9,032
040500	Southeastern Lake Michigan	3	15	1.860	11.100	12.960	125,166	746,948	872,113
040700	Northwestern Lake Huron	4	23	0.046	0.018	0.064	1,966	769	2,735
040802	Saginaw	3	121	1.485	1.601	3.086	12,276	13,239	25,515
040900	St. Clair-Detroit	1	23	1.517	0.830	2.347	66,256	36,255	102,510
041000	Western Lake Erie	1	0	0.246	0.389	0.635	2,239,594	3,535,403	5,774,997
041201	Eastern Lake Erie	2	1	0.006	0.005	0.011	9,433	7,635	17,069
041402	Oswego	2	19	0.708	0.000	0.708	37,378	0	37,378
050100	Allegheny	25	165	1.273	0.153	1.426	7,732	928	8,660
050200	Monongahela	41	105	4.269	5.192	9.460	40,526	49,290	89,815
050301	Upper Ohio-Beaver	38	327	25.740	2.755	28.494	78,621	8,414	87,035
050302	Upper Ohio-Little Kanawha	60	362	5.140	7.474	12.614	14,199	20,647	34,847
050400	Muskingum	8	37	0.477	0.242	0.719	13,018	6,613	19,631
050500	Kanawha	23	61	3.868	5.582	9.450	63,520	91,680	155,200
050701	Guyandotte	1	51	0.385	1.286	1.672	7,514	25,080	32,594
050800	Great Miami	8	6	0.237	0.236	0.473	39,624	39,357	78,981
050901	Middle Ohio-Raccoon	1	2	0.012	0.016	0.028	5,839	7,407	13,245
051001	Licking	11	47	0.897	0.665	1.562	19,297	14,295	33,592
051002	Kentucky	5	13	0.145	0.370	0.514	10,807	27,656	38,463
051100	Green	81	420	2.029	4.367	6.395	4,835	10,405	15,240
051201	Wabash	52	243	2.266	4.449	6.714	9,341	18,339	27,679
051202	Patoka-White	74	313	3.600	6.244	9.844	11,516	19,976	31,492
051301	Upper Cumberland	18	48	6.724	2.408	9.132	141,208	50,561	191,769
051302	Lower Cumberland	4	27	0.244	0.125	0.369	9,158	4,702	13,860
051401	Lower Ohio-Salt	22	50	0.474	0.756	1.230	9,532	15,207	24,739
051402	Lower Ohio	44	221	2.742	4.299	7.041	12,429	19,486	31,915
060102	Upper Tennessee	7	15	2.858	1.197	4.055	193,212	80,956	274,168
060200	Middle Tennessee-Hiwassee	4	6	0.085	0.028	0.113	13,500	4,485	17,985
060300	Middle Tennessee-Elk	10	38	0.618	0.502	1.120	16,284	13,235	29,519
060400	Lower Tennessee	20	83	1.032	0.504	1.536	12,428	6,067	18,495
070200	Minnesota	12	611	5.791	7.907	13.698	9,478	12,941	22,419
070300	St. Croix	1	85	0.797	0.645	1.442	9,433	7,635	17,069
070400	Upper Mississippi-Black-Root	38	163	4.596	1.207	5.802	28,129	7,386	35,515
070500	Chippewa	17	57	0.183	0.616	0.799	3,207	10,799	14,007
070600	Upper Mississippi-Maquoketa-Plu	51	138	0.566	1.023	1.589	4,093	7,394	11,487
070700	Wisconsin	33	144	0.472	1.358	1.830	3,271	9,418	12,689
070801	Upper Mississippi-Skunk-Wapsip	23	16	0.220	0.083	0.303	13,626	5,153	18,779
071000	Des Moines	180	139	1.492	2.292	3.784	10,708	16,455	27,163
071100	Upper Mississippi-Salt	276	144	1.039	1.127	2.166	7,192	7,801	14,993
071200	Upper Illinois	4	61	3.156	2.891	6.047	52,152	47,770	99,922
071300	Lower Illinois	29	160	1.126	0.269	1.395	7,017	1,675	8,692
071401	Upper Mississippi-Meramec	1	4	0.407	0.000	0.407	114,572	0	114,572
071402	Kaskaskia	5	251	0.158	0.017	0.175	628	68	696
080102	Hatchie-Obion	210	463	34.923	10.073	44.996	75,479	21,771	97,250
080202	St. Francis	40	26	2.783	0.894	3.677	107,850	34,660	142,510
080203	Lower White	26	89	0.744	2.600	3.344	8,359	29,226	37,585
080302	Yazoo	366	751	45.652	41.270	86.922	60,797	54,961	115,758
080401	Upper Ouachita	19	73	1.991	21.499	23.490	27,155	293,260	320,415
080402	Lower Ouachita	1	21	0.198	0.160	0.358	9,433	7,635	17,069
080602	Big Black-Homochitto	38	104	0.983	0.796	1.779	9,433	7,635	17,069
080801	Atchafalaya-Vermillion	2	59	0.144	0.458	0.602	2,443	7,775	10,218
080802	Calcasieu-Mermentau	6	23	0.255	0.365	0.619	11,032	15,793	26,826
090100	Souris	2	38	0.424	0.222	0.646	11,057	5,776	16,833
090201	Upper Red	10	169	0.794	0.794	1.588	4,690	4,691	9,381
090202	Devils Lake-Sheyenne	3	94	0.859	0.076	0.935	9,088	810	9,898

P-06	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
6D HYD-UNITS (HUCS) (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
090203	Lower Red	40	1,216	8.108	2.500	10.608	6,671	2,057	8,727
100200	Missouri Headwaters	1	19	0.000	0.000	0.000	0	0	0
100301	Upper Missouri	1	43	0.409	0.331	0.741	9,433	7,635	17,069
100302	Marias	2	4	0.623	0.088	0.711	139,383	19,716	159,099
100401	Fort Peck Lake	4	98	1.356	0.703	2.060	13,794	7,152	20,946
100402	Musselshell	2	3	0.029	0.002	0.031	8,889	601	9,491
100500	Milk	1	79	0.107	0.798	0.905	1,355	10,099	11,454
100600	Missouri-Poplar	1	20	0.395	0.000	0.395	19,753	0	19,753
100902	Powder	2	59	0.314	0.540	0.854	5,306	9,126	14,432
101000	Lower Yellowstone	3	6	0.151	0.692	0.843	26,498	121,316	147,814
101202	Belle Fourche	2	6	0.053	0.043	0.097	9,433	7,635	17,069
101301	Lake Oahe	10	116	0.142	0.487	0.629	1,222	4,197	5,418
101302	Cannonball-Heart-Knife	1	3	0.083	0.000	0.083	25,886	0	25,886
101401	Fort Randall Reservoir	2	1	0.014	0.011	0.025	9,433	7,635	17,069
101402	White	1	1	0.009	0.008	0.017	9,433	7,635	17,069
101500	Niobrara	8	94	0.535	0.271	0.805	5,682	2,873	8,555
101701	Lewis and Clark Lake	49	89	1.135	0.680	1.814	12,813	7,678	20,491
101702	Big Sioux	53	85	2.207	2.127	4.334	26,106	25,158	51,264
101800	North Platte	28	195	2.786	11.597	14.383	14,277	59,435	73,711
101900	South Platte	109	487	4.240	3.045	7.284	8,700	6,247	14,947
102001	Middle Platte	13	129	1.827	0.304	2.131	14,201	2,365	16,567
102002	Lower Platte	96	173	2.405	1.605	4.010	13,937	9,304	23,241
102200	Elkhorn	2	6	0.257	0.746	1.003	43,760	127,130	170,890
102300	Missouri-Little Sioux	763	388	7.802	3.403	11.206	20,126	8,779	28,905
102400	Missouri-Nishnabotna	706	678	10.388	20.141	30.529	15,313	29,691	45,004
102500	Republican	43	432	1.413	0.871	2.284	3,268	2,016	5,284
102600	Smoky Hill	95	384	4.197	1.751	5.948	10,920	4,556	15,476
102701	Kansas	123	245	3.858	3.446	7.304	15,719	14,041	29,760
102702	Big Blue	314	715	10.332	7.366	17.698	14,444	10,298	24,742
102801	Grand	936	509	5.697	8.048	13.745	11,204	15,826	27,030
102802	Chariton	22	11	0.118	0.076	0.193	10,610	6,829	17,439
102901	Osage	13	34	0.445	0.829	1.274	13,093	24,360	37,453
103001	Lower Missouri-Blackwater	211	136	1.403	3.181	4.584	10,315	23,384	33,699
103002	Lower Missouri	1	1	0.000	0.040	0.041	457	37,912	38,369
110100	Upper White	47	232	7.970	8.499	16.470	34,407	36,690	71,097
110200	Upper Arkansas	28	237	1.290	0.202	1.492	5,437	851	6,288
110300	Middle Arkansas	206	1,032	8.809	8.608	17.417	8,536	8,341	16,877
110400	Upper Cimarron	1	43	0.409	0.331	0.740	9,433	7,635	17,069
110500	Lower Cimarron	70	240	2.467	1.865	4.333	10,271	7,766	18,038
110600	Arkansas-Keystone	165	501	2.968	2.333	5.301	5,926	4,657	10,583
110701	Verdigris	212	1,062	9.597	6.679	16.276	9,037	6,289	15,326
110702	Neosho	66	202	4.892	1.312	6.203	24,211	6,491	30,703
110800	Upper Canadian	1	18	0.029	0.000	0.029	1,647	0	1,647
110901	Middle Canadian	6	106	0.226	0.041	0.267	2,131	390	2,521
110902	Lower Canadian	87	207	2.590	0.566	3.156	12,515	2,734	15,249
111002	Lower Beaver	1	5	0.165	0.041	0.207	30,579	7,657	38,236
111003	Lower North Canadian	238	731	7.352	9.250	16.602	10,058	12,656	22,715
111101	Robert S. Kerr Reservoir	101	511	4.128	9.545	13.673	8,078	18,678	26,756
111102	Lower Arkansas-Fourche La Fav	77	538	6.124	3.354	9.479	11,389	6,238	17,627
111201	Prairie Dog Town Fork Red	24	94	1.628	0.018	1.646	17,386	191	17,577
111202	Salt Fork Red	31	90	0.605	0.119	0.723	6,756	1,325	8,080
111203	North Fork Red	59	414	1.940	0.849	2.789	4,688	2,052	6,740
111301	Red-Pease	6	7	0.113	0.107	0.220	16,191	15,390	31,581
111302	Red-Lake Texoma	88	277	3.305	4.801	8.106	11,923	17,324	29,246
111303	Washita	1,145	3,084	23.943	13.510	37.453	7,764	4,381	12,145
111401	Red-Little	240	619	6.502	5.227	11.729	10,512	8,450	18,962
111402	Red-Saline	22	257	0.187	0.851	1.038	727	3,316	4,044
111403	Big Cypress-Sulphur	25	40	0.725	0.049	0.774	18,139	1,230	19,368
120100	Sabine	24	77	0.768	0.672	1.439	9,917	8,676	18,593
120200	Neches	13	72	0.778	1.282	2.059	10,768	17,746	28,515
120301	Upper Trinity	924	2,047	28.049	22.989	51.038	13,703	11,230	24,933
120302	Lower Trinity	6	15	0.194	0.260	0.454	13,137	17,581	30,718
120500	Brazos Headwaters	24	503	3.385	2.044	5.429	6,731	4,064	10,795
120602	Middle Brazos-Bosque	127	618	9.099	2.293	11.392	14,718	3,709	18,427
120701	Lower Brazos	31	54	0.547	0.422	0.970	10,085	7,784	17,870
120702	Little	153	630	7.139	2.332	9.471	11,341	3,705	15,046
120800	Upper Colorado	6	35	0.411	0.000	0.411	11,652	0	11,652
120901	Middle Colorado-Concho	301	2,047	22.687	7.606	30.293	11,082	3,716	14,798
120902	Middle Colorado-Llano	7	20	0.387	0.048	0.435	19,596	2,435	22,032
120903	Lower Colorado	20	72	1.643	0.097	1.740	22,799	1,349	24,149
121002	Guadalupe	57	347	7.635	1.116	8.752	22,003	3,217	25,220
121003	San Antonio	52	295	3.100	6.366	9.465	10,497	21,556	32,053
121101	Nueces	3	48	1.354	0.329	1.683	27,996	6,791	34,787
121102	Southwestern Texas Coastal	18	299	0.802	0.539	1.341	2,688	1,804	4,492
130201	Upper Rio Grande	16	27	0.870	0.015	0.885	32,201	559	32,760
130202	Rio Grande-Elephant Butte	3	32	0.095	0.031	0.126	2,948	973	3,921
130301	Rio Grande-Caballo	29	459	7.749	0.000	7.749	16,896	0	16,896
130401	Rio Grande-Fort Quitman	7	220	0.798	0.006	0.803	3,620	25	3,645
130402	Rio Grande-Amistad	12	155	3.982	0.293	4.275	25,732	1,892	27,624
130403	Devils	20	253	3.381	0.040	3.422	13,381	159	13,540
130500	Rio Grande Closed Basins	6	355	3.416	1.144	4.560	9,614	3,221	12,835
130600	Upper Pecos	15	599	8.156	0.932	9.087	13,617	1,555	15,173
130800	Rio Grande-Falcon	2	9	0.210	0.000	0.210	24,286	0	24,286
130900	Lower Rio Grande	7	132	0.248	0.085	0.333	1,873	641	2,514
140100	Colorado Headwaters	1	6	0.314	0.015	0.329	49,465	2,327	51,791
140200	Gunnison	3	17	0.916	0.122	1.037	53,090	7,052	60,142
140401	Upper Green	3	140	0.093	0.364	0.458	669	2,611	3,280
140600	Lower Green	10	172	1.627	1.317	2.944	9,433	7,635	17,069
140801	Upper San Juan	2	2	0.072	0.144	0.216	35,825	72,101	107,925
150100	Lower Colorado-Lake Mead	13	239	1.593	7.854	9.447	6,669	32,871	39,541
150400	Upper Gila	18	244	2.643	0.086	2.729	10,849	352	11,200
150501	Middle Gila	6	303	46.795	0.000	46.795	154,613	0	154,613
150601	Salt	3	26	17.762	0.000	17.762	693,816	0	693,816
150701	Lower Gila-Agua Fria	9	264	2.510	0.311	2.822	9,524	1,180	10,704
160102	Lower Bear	1	28	0.603	0.347	0.950	21,547	12,392	33,939
160201	Weber	1	10	0.095	0.077	0.172	9,433	7,635	17,069
160202	Jordan	8	99	0.931	0.754	1.685	9,433	7,635	17,069
160203	Great Salt Lake	2	123	0.538	0.199	0.737	4,369	1,611	5,980
160300	Escalante Desert-Sevier Lake	11	63	1.280	1.660	2.940	20,332	26,352	46,683
160401	Humboldt	3	14	0.023	0.918	0.941	1,670	67,999	69,669

P-07	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
6D HYD-UNITS (HUCS) (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
160501	Truckee	4	6	0.000	1.532	1.532	0	257,506	257,506
170102	Pend Oreille	5	92	0.187	0.231	0.417	2,038	2,519	4,557
170103	Spokane	1	28	0.169	0.000	0.169	5,982	0	5,982
170402	Upper Snake	1	7	0.000	0.526	0.526	0	75,140	75,140
170502	Middle Snake-Powder	2	36	0.000	0.743	0.743	0	20,391	20,391
170602	Salmon	1	6	0.000	0.932	0.932	0	169,366	169,366
170701	Middle Columbia	1	9	0.000	2.706	2.706	0	309,307	309,307
170800	Lower Columbia	1	39	0.006	0.117	0.123	159	2,967	3,126
171003	Southern Oregon Coastal	2	13	1.606	0.156	1.762	119,823	11,641	131,464
180101	Northern California Coastal	4	15	2.172	0.000	2.172	141,066	0	141,066
180200	Upper Sacramento	1	4	0.280	0.000	0.280	73,656	0	73,656
180201	Lower Sacramento	2	22	0.518	0.000	0.518	23,498	0	23,498
180300	Tulare-Buena Vista Lakes	1	4	0.666	0.026	0.691	153,048	5,875	158,923
180400	San Joaquin	4	72	23.498	5.471	28.969	325,638	75,818	401,456
180500	San Francisco Bay	1	3	0.030	0.024	0.054	9,433	7,635	17,069
180600	Central California Coastal	1	4	5.414	0.316	5.730	1,424,755	83,104	1,507,859
180701	Ventura-San Gabriel Coastal	1	1	2.951	1.553	4.505	4,918,640	2,589,047	7,507,687
180703	Laguna-San Diego Coastal	1	3	4.679	4.353	9.032	1,344,557	1,250,870	2,595,427
180902	Northern Mojave	1	6	0.918	0.035	0.954	153,048	5,875	158,923
200100	Hawaii	2	3	0.304	3.345	3.648	97,697	1,075,444	1,173,140
200200	Maui	6	13	2.373	0.410	2.783	182,836	31,580	214,416
200600	Oahu	1	0	0.000	5.163	5.163	0	##########	##########
210100	Puerto Rico	2	1	0.200	0.308	0.508	179,854	277,815	457,668

P-08	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (877)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
01011	AL - BULLOCK	6	35	0.451	0.312	0.763	13,003	8,992	21,994
01015	AL - CALHOUN	6	55	0.278	1.280	1.559	5,024	23,100	28,124
01017	AL - CHAMBERS	2	5	0.034	0.002	0.037	6,622	468	7,090
01019	AL - CHEROKEE	3	30	0.118	0.022	0.140	3,892	715	4,608
01027	AL - CLAY	16	77	0.336	0.398	0.734	4,385	5,187	9,573
01029	AL - CLEBURNE	15	142	0.630	0.933	1.563	4,428	6,554	10,982
01047	AL - DALLAS	1	0	0.001	0.001	0.001	8,588	5,234	13,823
01055	AL - ETOWAH	1	4	0.102	0.156	0.257	27,334	41,860	69,194
01059	AL - FRANKLIN	1	1	0.007	0.005	0.012	7,389	5,790	13,179
01077	AL - LAUDERDALE	1	1	0.018	0.032	0.050	12,472	22,710	35,183
01079	AL - LAWRENCE	5	29	0.175	0.333	0.508	6,129	11,633	17,762
01085	AL - LOWNDES	1	16	0.137	0.084	0.221	8,588	5,234	13,823
01089	AL - MADISON	1	1	0.101	0.105	0.206	74,039	77,270	151,308
01091	AL - MARENGO	15	23	0.346	0.184	0.531	15,322	8,159	23,480
01093	AL - MARION	3	12	0.103	0.030	0.133	8,596	2,467	11,063
01095	AL - MARSHALL	1	4	0.164	0.019	0.184	40,090	4,674	44,764
01105	AL - PERRY	2	24	0.949	0.424	1.374	39,894	17,833	57,727
01111	AL - RANDOLPH	7	23	0.154	0.011	0.165	6,622	468	7,090
01119	AL - SUMTER	3	13	0.056	0.178	0.233	4,151	13,286	17,437
01121	AL - TALLADEGA	17	125	0.945	0.409	1.354	7,589	3,280	10,869
04005	AZ - COCONINO	1	9	0.573	0.000	0.573	67,391	0	67,391
04009	AZ - GRAHAM	6	215	2.534	0.086	2.619	11,780	399	12,179
04013	AZ - MARICOPA	12	292	23.667	0.311	23.979	81,150	1,067	82,217
04021	AZ - PINAL	6	300	43.400	0.000	43.400	144,570	0	144,570
05029	AR - CONWAY	17	103	0.358	0.122	0.479	3,472	1,181	4,653
05031	AR - CRAIGHEAD	20	22	0.244	1.134	1.378	10,857	50,516	61,373
05033	AR - CRAWFORD	3	37	1.939	0.993	2.932	51,925	26,606	78,531
05037	AR - CROSS	7	12	0.970	0.804	1.773	83,587	69,275	152,862
05045	AR - FAULKNER	2	13	0.282	0.033	0.315	22,500	2,638	25,138
05047	AR - FRANKLIN	13	35	0.326	0.263	0.589	9,433	7,635	17,069
05055	AR - GREENE	4	16	0.152	0.810	0.963	9,595	50,993	60,588
05057	AR - HEMPSTEAD	13	21	1.052	0.202	1.254	50,402	9,696	60,097
05061	AR - HOWARD	1	2	0.093	0.006	0.100	46,749	3,226	49,976
05063	AR - INDEPENDENCE	1	5	0.446	0.592	1.038	89,119	118,428	207,546
05075	AR - LAWRENCE	13	60	1.223	3.817	5.040	20,363	63,561	83,923
05079	AR - LINCOLN	1	21	0.198	0.160	0.358	9,433	7,635	17,069
05081	AR - LITTLE RIVER	1	3	0.200	0.086	0.287	66,816	28,815	95,631
05083	AR - LOGAN	12	74	1.436	0.729	2.165	19,424	9,858	29,281
05097	AR - MONTGOMERY	2	12	0.299	0.112	0.411	24,893	9,323	34,216
05105	AR - PERRY	10	97	0.343	0.254	0.597	3,542	2,627	6,169
05109	AR - PIKE	2	4	0.208	0.014	0.222	46,749	3,226	49,976
05111	AR - POINSETT	30	14	1.782	0.089	1.871	127,670	6,383	134,054
05113	AR - POLK	1	34	0.339	21.164	21.503	9,973	622,468	632,440
05115	AR - POPE	9	79	0.686	0.401	1.087	8,683	5,074	13,756
05121	AR - RANDOLPH	8	46	5.079	1.597	6.675	110,188	34,645	144,833
05127	AR - SCOTT	18	102	1.409	5.989	7.398	13,815	58,715	72,530
05135	AR - SHARP	2	7	0.409	0.407	0.816	58,377	58,130	116,507
05141	AR - VAN BUREN	5	68	0.364	0.041	0.405	5,356	600	5,956
05143	AR - WASHINGTON	4	29	0.324	0.029	0.353	11,182	999	12,181
05145	AR - WHITE	5	51	0.378	0.657	1.035	7,434	12,920	20,354
05149	AR - YELL	4	22	0.025	0.375	0.400	1,143	17,368	18,511
06013	CA - CONTRA COSTA	4	63	23.106	5.495	28.601	365,544	86,934	452,478
06029	CA - KERN	2	10	1.584	0.061	1.645	153,048	5,875	158,923
06033	CA - LAKE	2	22	0.518	0.000	0.518	23,498	0	23,498
06047	CA - MERCED	1	12	0.422	0.000	0.422	34,855	0	34,855
06073	CA - SAN DIEGO	1	3	4.679	4.353	9.032	1,344,557	1,250,870	2,595,427
06083	CA - SANTA BARBARA	1	4	5.414	0.316	5.730	1,424,755	83,104	1,507,859
06097	CA - SONOMA	4	15	2.172	0.000	2.172	141,066	0	141,066
06111	CA - VENTURA	1	1	2.951	1.553	4.505	4,918,640	2,589,047	7,507,687
08035	CO - DOUGLAS	21	98	0.675	0.195	0.870	6,864	1,983	8,847
08039	CO - ELBERT	46	77	0.532	0.426	0.959	6,955	5,567	12,522
08041	CO - EL PASO	35	138	0.458	0.292	0.750	3,309	2,107	5,416
08043	CO - FREMONT	4	7	0.651	0.021	0.672	92,712	3,013	95,725
08055	CO - HUERFANO	1	1	0.006	0.005	0.011	9,433	7,635	17,069
08067	CO - LA PLATA	2	2	0.072	0.144	0.216	35,825	72,101	107,925
08069	CO - LARIMER	7	184	1.980	1.342	3.322	10,732	7,274	18,006
08071	CO - LAS ANIMAS	2	1	0.069	0.003	0.072	48,042	2,123	50,165
08073	CO - LINCOLN	3	13	0.085	0.020	0.105	6,360	1,498	7,859
08077	CO - MESA	1	6	0.314	0.015	0.329	49,465	2,327	51,791
08085	CO - MONTROSE	3	17	0.916	0.122	1.037	53,090	7,052	60,142
08089	CO - OTERO	4	102	0.386	0.046	0.432	3,787	449	4,237
08115	CO - SEDGWICK	9	58	0.223	0.768	0.991	3,832	13,203	17,035
08123	CO - WELD	1	27	0.305	0.077	0.383	11,308	2,859	14,167
08125	CO - YUMA	6	3	0.125	0.037	0.161	38,694	11,367	50,061
09001	CT - FAIRFIELD	2	4	0.237	0.000	0.237	63,068	0	63,068
09003	CT - HARTFORD	12	21	5.058	0.081	5.139	245,160	3,929	249,089
09005	CT - LITCHFIELD	4	18	0.989	0.031	1.020	55,893	1,746	57,638
09009	CT - NEW HAVEN	3	5	0.891	0.007	0.898	195,436	1,547	196,983
09011	CT - NEW LONDON	2	0	0.290	0.289	0.579	604,463	601,136	1,205,598
09013	CT - TOLLAND	7	19	0.238	0.019	0.256	12,360	968	13,327
12055	FL - HIGHLANDS	1	70	0.049	0.544	0.594	703	7,777	8,480
12061	FL - INDIAN RIVER	2	15	0.161	2.371	2.531	10,649	157,221	167,870
12069	FL - LAKE	2	222	0.072	0.139	0.212	327	629	956
12111	FL - ST. LUCIE	4	149	0.117	1.722	1.839	786	11,553	12,339
12119	FL - SUMTER	1	19	0.125	0.082	0.206	6,407	4,209	10,616
13001	GA - APPLING	3	9	0.206	0.078	0.284	23,882	9,074	32,956
13011	GA - BANKS	14	56	0.243	1.602	1.845	4,351	28,685	33,035
13013	GA - BARROW	6	23	0.182	0.159	0.341	7,827	6,842	14,669
13015	GA - BARTOW	7	15	0.092	0.085	0.177	6,329	5,824	12,153
13021	GA - BIBB	1	181	0.184	6.135	6.319	1,017	33,991	35,008
13045	GA - CARROLL	26	126	0.706	1.182	1.888	5,619	9,403	15,022
13055	GA - CHATTOOGA	3	171	0.156	0.120	0.276	914	698	1,612
13057	GA - CHEROKEE	21	56	0.507	0.180	0.688	9,108	3,238	12,345
13059	GA - CLARKE	3	29	0.109	0.515	0.624	3,715	17,588	21,302
13067	GA - COBB	5	8	0.024	0.003	0.027	3,060	408	3,467
13071	GA - COLQUITT	3	2	0.000	0.073	0.073	0	42,998	42,998
13077	GA - COWETA	1	13	0.079	0.022	0.101	5,877	1,665	7,542
13085	GA - DAWSON	11	31	0.095	0.095	0.190	3,049	3,042	6,091
13105	GA - ELBERT	1	15	0.098	0.011	0.109	6,423	708	7,131
13117	GA - FORSYTH	17	34	0.110	0.470	0.580	3,277	14,006	17,283

P-09	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
13119	GA - FRANKLIN	7	18	0.133	0.086	0.219	7,487	4,854	12,341
13121	GA - FULTON	10	27	0.133	0.043	0.176	4,906	1,596	6,502
13123	GA - GILMER	20	121	0.452	0.173	0.625	3,721	1,428	5,149
13129	GA - GORDON	8	27	0.258	0.209	0.466	9,433	7,635	17,069
13133	GA - GREENE	3	12	0.046	0.008	0.054	3,855	682	4,537
13135	GA - GWINNETT	14	49	0.591	0.398	0.988	11,989	8,072	20,061
13137	GA - HABERSHAM	13	50	0.280	0.368	0.648	5,623	7,386	13,009
13139	GA - HALL	5	16	0.141	0.123	0.265	8,807	7,678	16,485
13143	GA - HARALSON	5	11	0.032	0.049	0.082	2,855	4,400	7,256
13145	GA - HARRIS	3	10	0.030	0.054	0.084	3,055	5,464	8,518
13147	GA - HART	6	14	0.091	0.010	0.101	6,423	708	7,131
13157	GA - JACKSON	13	29	0.168	0.125	0.293	5,876	4,363	10,239
13171	GA - LAMAR	4	40	0.194	0.557	0.751	4,865	13,952	18,817
13187	GA - LUMPKIN	3	20	0.033	0.094	0.127	1,609	4,608	6,217
13195	GA - MADISON	12	64	0.122	0.265	0.386	1,904	4,135	6,039
13199	GA - MERIWETHER	4	20	0.108	0.200	0.308	5,329	9,913	15,241
13207	GA - MONROE	1	8	0.008	0.266	0.274	1,017	33,991	35,008
13209	GA - MONTGOMERY	2	0	0.003	0.002	0.005	9,433	7,635	17,069
13215	GA - MUSCOGEE	11	36	0.731	0.900	1.632	20,309	25,000	45,309
13219	GA - OCONEE	1	2	0.025	0.006	0.031	12,193	3,084	15,277
13221	GA - OGLETHORPE	4	16	0.139	0.173	0.313	8,812	10,951	19,763
13223	GA - PAULDING	10	24	0.092	0.252	0.344	3,820	10,524	14,345
13227	GA - PICKENS	19	66	0.917	0.095	1.013	13,994	1,456	15,450
13231	GA - PIKE	5	24	0.183	0.012	0.194	7,453	475	7,928
13233	GA - POLK	9	20	1.134	0.080	1.214	55,928	3,944	59,872
13237	GA - PUTNAM	5	11	0.119	0.022	0.141	10,722	1,953	12,674
13241	GA - RABUN	1	1	0.013	0.010	0.023	9,433	7,635	17,069
13257	GA - STEPHENS	13	26	0.238	0.190	0.428	9,285	7,424	16,709
13281	GA - TOWNS	4	6	0.085	0.028	0.113	13,500	4,485	17,985
13285	GA - TROUP	1	6	0.018	0.004	0.022	2,875	681	3,556
13293	GA - UPSON	1	4	0.028	0.002	0.030	7,453	475	7,928
13295	GA - WALKER	1	11	0.010	0.008	0.018	914	698	1,612
13301	GA - WARREN	4	27	0.022	0.880	0.902	805	32,482	33,288
13305	GA - WAYNE	2	31	0.012	0.547	0.559	388	17,926	18,314
13309	GA - WHEELER	2	2	0.000	0.047	0.047	0	28,383	28,383
13311	GA - WHITE	4	11	0.081	0.119	0.200	7,287	10,754	18,041
13313	GA - WHITFIELD	5	23	0.091	0.017	0.107	3,976	722	4,698
15001	HI - HAWAII	2	3	0.304	3.345	3.648	97,697	1,075,444	1,173,140
15003	HI - HONOLULU	1	0	0.000	5.163	5.163	0	##########	##########
15009	HI - MAUI	6	13	2.373	0.410	2.783	182,836	31,580	214,416
16003	ID - ADAMS	1	6	0.000	0.932	0.932	0	169,366	169,366
16007	ID - BEAR LAKE	1	28	0.603	0.347	0.950	21,547	12,392	33,939
16083	ID - TWIN FALLS	1	7	0.000	0.526	0.526	0	75,140	75,140
17001	IL - ADAMS	4	3	0.033	0.026	0.059	9,433	7,635	17,069
17009	IL - BROWN	8	5	0.014	0.010	0.024	2,963	2,222	5,185
17011	IL - BUREAU	4	4	0.025	0.000	0.025	6,031	0	6,031
17021	IL - CHRISTIAN	2	115	0.000	0.258	0.258	0	2,239	2,239
17023	IL - CLARK	8	65	0.812	0.565	1.377	12,539	8,727	21,266
17031	IL - COOK	4	61	3.156	2.891	6.047	52,152	47,770	99,922
17071	IL - HENDERSON	5	3	0.027	0.022	0.049	9,433	7,635	17,069
17087	IL - JOHNSON	6	30	0.337	0.000	0.337	11,396	0	11,396
17099	IL - LASALLE	1	2	0.512	0.000	0.512	231,621	0	231,621
17135	IL - MONTGOMERY	5	251	0.158	0.017	0.175	628	68	696
17149	IL - PIKE	3	15	0.030	0.001	0.031	1,969	54	2,023
17151	IL - POPE	2	37	0.627	0.000	0.627	16,899	0	16,899
17169	IL - SCHUYLER	12	19	0.546	0.000	0.546	29,329	0	29,329
17181	IL - UNION	1	4	0.407	0.000	0.407	114,572	0	114,572
17187	IL - WARREN	1	1	0.009	0.008	0.017	9,433	7,635	17,069
18019	IN - CLARK	5	14	0.247	0.455	0.702	17,605	32,381	49,986
18025	IN - CRAWFORD	1	1	0.277	1.324	1.602	213,284	1,018,717	1,232,001
18027	IN - DAVIESS	11	39	0.273	0.439	0.712	7,025	11,305	18,329
18037	IN - DUBOIS	3	1	0.230	1.100	1.331	213,284	1,018,717	1,232,001
18055	IN - GREENE	3	5	0.067	0.262	0.329	12,445	48,346	60,791
18061	IN - HARRISON	1	1	0.010	0.008	0.017	9,433	7,635	17,069
18065	IN - HENRY	8	42	1.024	1.180	2.204	24,574	28,337	52,911
18077	IN - JEFFERSON	1	2	0.024	0.016	0.040	10,801	7,304	18,105
18101	IN - MARTIN	3	62	0.163	0.876	1.039	2,617	14,025	16,643
18107	IN - MONTGOMERY	1	11	0.055	0.090	0.145	4,868	7,982	12,850
18117	IN - ORANGE	4	12	0.132	0.054	0.186	11,054	4,567	15,621
18121	IN - PARKE	15	70	0.339	0.556	0.895	4,868	7,982	12,850
18123	IN - PERRY	9	59	0.413	1.234	1.647	7,042	21,052	28,094
18125	IN - PIKE	1	1	0.122	0.511	0.634	154,997	646,931	801,928
18133	IN - PUTNAM	3	31	0.274	0.622	0.896	8,929	20,298	29,227
18139	IN - RUSH	2	16	0.402	0.463	0.865	24,574	28,337	52,911
18143	IN - SCOTT	19	61	0.659	0.445	1.104	10,801	7,304	18,105
18153	IN - SULLIVAN	17	52	0.649	2.523	3.172	12,445	48,346	60,791
18167	IN - VIGO	5	20	0.209	0.292	0.500	10,407	14,567	24,974
18175	IN - WASHINGTON	22	47	0.528	1.637	2.164	11,291	35,005	46,296
19001	IA - ADAIR	4	1	0.011	0.025	0.036	11,469	25,672	37,142
19003	IA - ADAMS	44	37	0.263	1.672	1.935	7,125	45,378	52,503
19005	IA - ALLAMAKEE	9	6	0.063	0.122	0.185	10,689	20,706	31,395
19007	IA - APPANOOSE	52	24	0.347	0.048	0.394	14,305	1,963	16,268
19009	IA - AUDUBON	69	31	0.613	0.657	1.269	19,990	21,431	41,420
19021	IA - BUENA VISTA	1	1	0.006	0.005	0.011	9,433	7,635	17,069
19029	IA - CASS	68	30	0.396	0.466	0.863	13,131	15,457	28,589
19035	IA - CHEROKEE	25	14	0.224	0.095	0.320	15,899	6,772	22,671
19039	IA - CLARKE	1	1	0.005	0.004	0.009	9,433	7,635	17,069
19047	IA - CRAWFORD	57	31	0.517	0.002	0.519	16,608	53	16,661
19051	IA - DAVIS	62	29	0.465	0.016	0.481	16,057	535	16,592
19053	IA - DECATUR	43	47	0.733	1.144	1.877	15,647	24,415	40,061
19071	IA - FREMONT	32	16	0.252	0.099	0.351	15,644	6,143	21,787
19077	IA - GUTHRIE	1	0	0.005	0.004	0.009	23,422	18,364	41,786
19085	IA - HARRISON	51	29	0.589	0.009	0.598	19,992	290	20,282
19093	IA - IDA	43	17	0.356	0.330	0.686	21,520	19,922	41,442
19101	IA - JEFFERSON	9	3	0.036	0.036	0.072	11,992	11,957	23,950
19115	IA - LOUISA	2	1	0.013	0.010	0.023	9,433	7,635	17,069
19117	IA - LUCAS	19	7	0.066	0.054	0.120	9,433	7,635	17,069
19119	IA - LYON	1	6	0.019	0.511	0.530	3,059	83,884	86,942
19121	IA - MADISON	27	34	0.235	1.318	1.552	6,924	38,835	45,759
19123	IA - MAHASKA	2	1	0.012	0.010	0.022	9,433	7,635	17,069

P-10	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
19129	IA - MILLS	56	51	0.630	0.081	0.711	12,353	1,598	13,951
19133	IA - MONONA	163	70	1.195	0.449	1.643	17,011	6,388	23,399
19135	IA - MONROE	45	19	0.276	0.025	0.301	14,590	1,323	15,914
19137	IA - MONTGOMERY	11	6	0.052	0.020	0.072	8,450	3,282	11,732
19139	IA - MUSCATINE	1	5	0.069	0.000	0.069	13,277	0	13,277
19141	IA - O'BRIEN	3	2	0.026	0.001	0.026	10,825	387	11,211
19145	IA - PAGE	13	8	0.118	0.000	0.118	14,914	0	14,914
19149	IA - PLYMOUTH	51	20	0.485	0.045	0.530	24,379	2,266	26,645
19155	IA - POTTAWATTAMIE	40	22	0.777	0.061	0.838	34,916	2,735	37,652
19157	IA - POWESHIEK	4	2	0.056	0.000	0.056	32,260	0	32,260
19159	IA - RINGGOLD	120	37	0.914	1.073	1.987	24,877	29,176	54,053
19165	IA - SHELBY	46	27	0.401	0.006	0.407	14,784	220	15,004
19173	IA - TAYLOR	26	14	0.222	0.208	0.429	15,647	14,688	30,335
19175	IA - UNION	71	87	0.892	1.880	2.772	10,259	21,613	31,873
19177	IA - VAN BUREN	9	35	0.206	0.893	1.099	5,883	25,506	31,390
19179	IA - WAPELLO	20	15	0.236	0.000	0.236	15,671	0	15,671
19181	IA - WARREN	1	1	0.005	0.025	0.030	6,924	38,835	45,759
19185	IA - WAYNE	15	4	0.106	0.073	0.179	26,977	18,727	45,704
19191	IA - WINNESHIEK	10	5	0.094	0.121	0.215	18,822	24,316	43,139
19193	IA - WOODBURY	288	124	3.108	1.237	4.345	25,028	9,963	34,992
20005	KS - ATCHISON	57	35	2.645	0.107	2.751	76,650	3,089	79,739
20007	KS - BARBER	1	16	0.147	0.119	0.267	9,433	7,635	17,069
20013	KS - BROWN	75	93	0.789	0.946	1.735	8,479	10,174	18,653
20015	KS - BUTLER	99	337	2.878	2.234	5.112	8,536	6,626	15,162
20017	KS - CHASE	23	127	1.595	0.794	2.388	12,606	6,273	18,879
20019	KS - CHAUTAUQUA	49	267	2.844	1.489	4.333	10,671	5,584	16,255
20031	KS - COFFEY	12	35	0.312	0.178	0.490	8,873	5,069	13,942
20033	KS - COMANCHE	1	43	0.409	0.331	0.740	9,433	7,635	17,069
20035	KS - COWLEY	50	190	1.847	4.196	6.042	9,729	22,101	31,829
20041	KS - DICKINSON	23	102	1.103	0.785	1.888	10,827	7,704	18,531
20045	KS - DOUGLAS	7	20	0.429	0.137	0.566	21,502	6,862	28,365
20049	KS - ELK	59	266	2.318	2.520	4.839	8,708	9,467	18,176
20069	KS - GRAY	4	6	0.037	0.022	0.059	6,153	3,765	9,918
20073	KS - GREENWOOD	49	230	1.938	0.803	2.741	8,414	3,485	11,900
20077	KS - HARPER	1	11	0.102	0.083	0.185	9,433	7,635	17,069
20079	KS - HARVEY	10	73	0.734	0.571	1.305	10,037	7,798	17,835
20085	KS - JACKSON	24	78	1.441	1.755	3.196	18,416	22,425	40,841
20087	KS - JEFFERSON	3	2	0.069	0.000	0.069	29,088	0	29,088
20093	KS - KEARNY	4	12	0.409	0.052	0.461	34,398	4,402	38,801
20101	KS - LANE	1	96	0.198	0.141	0.339	2,072	1,474	3,546
20105	KS - LINCOLN	39	130	1.233	0.517	1.750	9,463	3,966	13,429
20111	KS - LYON	15	61	0.459	0.372	0.831	7,519	6,099	13,618
20115	KS - MARION	10	32	0.520	0.252	0.772	16,305	7,886	24,190
20117	KS - MARSHALL	63	76	0.904	1.521	2.425	11,948	20,102	32,050
20121	KS - MIAMI	1	7	0.198	0.726	0.924	26,787	97,967	124,754
20123	KS - MITCHELL	21	110	1.004	0.141	1.145	9,170	1,287	10,456
20125	KS - MONTGOMERY	3	18	0.386	0.065	0.451	21,646	3,635	25,281
20127	KS - MORRIS	7	19	0.212	0.135	0.347	11,206	7,145	18,351
20131	KS - NEMAHA	23	29	0.717	0.844	1.561	24,936	29,356	54,292
20135	KS - NESS	15	193	0.932	0.630	1.562	4,823	3,263	8,086
20139	KS - OSAGE	11	41	0.444	0.450	0.894	10,723	10,856	21,579
20141	KS - OSBORNE	1	3	0.024	0.018	0.042	6,982	5,430	12,411
20143	KS - OTTAWA	4	20	0.622	0.143	0.765	31,281	7,179	38,460
20149	KS - POTTAWATOMIE	9	29	0.383	0.130	0.513	13,284	4,531	17,815
20165	KS - RUSH	28	193	2.052	1.124	3.176	10,646	5,830	16,476
20173	KS - SEDGWICK	6	11	0.230	0.047	0.277	20,889	4,318	25,207
20177	KS - SHAWNEE	12	35	0.395	0.466	0.862	11,443	13,493	24,937
20191	KS - SUMNER	1	8	0.088	0.027	0.115	11,011	3,444	14,454
20201	KS - WASHINGTON	2	7	0.092	0.008	0.100	12,395	1,100	13,495
20205	KS - WILSON	6	16	0.152	0.123	0.275	9,433	7,635	17,069
20207	KS - WOODSON	2	17	0.165	0.133	0.298	9,433	7,635	17,069
21007	KY - BALLARD	3	14	0.110	0.184	0.294	7,727	12,878	20,605
21011	KY - BATH	3	8	0.059	0.180	0.239	7,698	23,501	31,199
21027	KY - BRECKINRIDGE	1	3	0.026	0.021	0.048	9,433	7,635	17,069
21031	KY - BUTLER	7	30	0.195	0.252	0.447	6,455	8,332	14,787
21033	KY - CALDWELL	7	33	0.255	0.180	0.435	7,788	5,487	13,274
21035	KY - CALLOWAY	8	27	0.304	0.000	0.304	11,194	0	11,194
21039	KY - CARLISLE	20	9	0.135	0.048	0.183	14,647	5,202	19,850
21047	KY - CHRISTIAN	22	136	0.475	0.777	1.253	3,485	5,699	9,184
21061	KY - EDMONSON	1	7	0.071	0.164	0.236	10,478	24,122	34,600
21065	KY - ESTILL	1	0	0.058	0.013	0.071	150,926	34,274	185,200
21069	KY - FLEMING	5	25	0.094	0.274	0.368	3,767	11,002	14,770
21083	KY - GRAVES	25	37	0.338	0.048	0.386	9,036	1,296	10,332
21085	KY - GRAYSON	13	76	0.321	0.760	1.082	4,210	9,961	14,171
21093	KY - HARDIN	4	20	0.385	0.231	0.616	19,680	11,830	31,509
21097	KY - HARRISON	1	1	0.018	0.000	0.018	29,454	0	29,454
21103	KY - HENRY	5	25	0.128	0.222	0.350	5,081	8,790	13,870
21105	KY - HICKMAN	2	2	0.009	0.000	0.009	3,776	0	3,776
21107	KY - HOPKINS	2	1	0.308	0.000	0.308	335,759	0	335,759
21109	KY - JACKSON	3	2	0.195	0.800	0.995	82,878	340,512	423,390
21117	KY - KENTON	1	10	0.700	0.130	0.831	70,816	13,174	83,990
21123	KY - LARUE	2	14	0.242	0.000	0.242	17,913	0	17,913
21137	KY - LINCOLN	7	19	0.055	0.125	0.180	2,944	6,663	9,607
21141	KY - LOGAN	14	72	0.146	0.528	0.674	2,031	7,329	9,359
21151	KY - MADISON	4	13	0.087	0.357	0.443	6,660	27,460	34,120
21157	KY - MARSHALL	4	23	0.216	0.000	0.216	9,189	0	9,189
21165	KY - MENIFEE	1	3	0.026	0.080	0.107	7,698	23,501	31,199
21171	KY - MONROE	1	9	0.019	0.335	0.354	2,019	35,326	37,345
21177	KY - MUHLENBERG	8	51	0.104	0.387	0.491	2,032	7,537	9,570
21211	KY - SHELBY	6	6	0.053	0.043	0.095	9,433	7,635	17,069
21215	KY - SPENCER	5	4	0.036	0.030	0.066	9,433	7,635	17,069
21219	KY - TODD	10	59	0.135	0.452	0.588	2,314	7,728	10,042
21225	KY - UNION	3	3	0.127	0.120	0.247	43,076	40,688	83,764
21233	KY - WEBSTER	1	0	0.003	0.002	0.005	9,433	7,635	17,069
22003	LA - ALLEN	3	6	0.022	0.022	0.044	3,952	3,928	7,880
22013	LA - BIENVILLE	1	4	0.005	0.008	0.013	1,197	2,218	3,415
22015	LA - BOSSIER	5	185	0.077	0.318	0.395	417	1,717	2,134
22039	LA - EVANGELINE	3	18	0.233	0.343	0.575	13,294	19,583	32,878
22069	LA - NATCHITOCHES	9	12	0.049	0.000	0.049	3,888	0	3,888
22079	LA - RAPIDES	3	100	0.144	0.983	1.127	1,444	9,865	11,308

P-11	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
22085	LA - SABINE	6	15	0.056	0.000	0.056	3,888	0	3,888
22117	LA - WASHINGTON	5	4	0.021	0.003	0.024	5,460	648	6,108
23003	ME - AROOSTOOK	11	105	0.456	0.549	1.005	4,327	5,212	9,539
23017	ME - OXFORD	2	11	0.289	0.018	0.307	26,914	1,686	28,600
23021	ME - PISCATAQUIS	3	7	0.137	0.010	0.147	20,661	1,574	22,235
24013	MD - CARROLL	1	10	0.156	1.751	1.907	15,024	168,388	183,412
24017	MD - CHARLES	3	15	0.193	1.158	1.351	12,679	76,178	88,857
24023	MD - GARRETT	6	14	0.449	0.938	1.386	31,061	64,924	95,985
24025	MD - HARFORD	3	4	0.000	0.107	0.107	0	28,229	28,229
24031	MD - MONTGOMERY	2	25	0.000	11.646	11.646	0	465,850	465,850
24037	MD - ST. MARY'S	1	9	0.154	0.007	0.160	17,453	771	18,225
25003	MA - BERKSHIRE	10	29	1.689	1.201	2.889	58,315	41,458	99,773
25013	MA - HAMPDEN	3	11	0.336	0.065	0.401	31,195	6,036	37,231
25017	MA - MIDDLESEX	4	38	1.426	0.122	1.547	37,259	3,183	40,442
25021	MA - NORFOLK	2	6	0.832	0.049	0.881	144,118	8,512	152,630
25027	MA - WORCESTER	11	45	1.160	0.295	1.455	26,015	6,623	32,638
26031	MI - CHEBOYGAN	4	23	0.046	0.018	0.064	1,966	769	2,735
26037	MI - CLINTON	1	11	1.742	10.949	12.690	156,893	986,359	1,143,252
26043	MI - DICKINSON	2	91	0.019	0.763	0.781	206	8,388	8,594
26087	MI - LAPEER	1	23	1.517	0.830	2.347	66,256	36,255	102,510
26139	MI - OTTAWA	2	4	0.118	0.151	0.270	31,503	40,175	71,679
26145	MI - SAGINAW	2	68	0.829	0.894	1.724	12,276	13,239	25,515
26155	MI - SHIAWASSEE	1	53	0.656	0.707	1.362	12,276	13,239	25,515
27011	MN - BIG STONE	1	115	1.083	0.876	1.959	9,433	7,635	17,069
27023	MN - CHIPPEWA	1	100	0.939	0.760	1.699	9,433	7,635	17,069
27041	MN - DOUGLAS	1	168	1.585	1.283	2.868	9,433	7,635	17,069
27045	MN - FILLMORE	6	15	0.144	0.117	0.260	9,433	7,635	17,069
27049	MN - GOODHUE	6	29	0.251	0.041	0.292	8,632	1,415	10,047
27055	MN - HOUSTON	10	30	0.166	0.065	0.231	5,594	2,201	7,795
27065	MN - KANABEC	1	85	0.797	0.645	1.442	9,433	7,635	17,069
27067	MN - KANDIYOHI	1	102	0.966	0.782	1.748	9,433	7,635	17,069
27069	MN - KITTSON	2	32	0.137	0.310	0.448	4,323	9,763	14,086
27089	MN - MARSHALL	4	527	0.960	0.263	1.223	1,821	499	2,320
27099	MN - MOWER	1	29	0.271	0.219	0.490	9,433	7,635	17,069
27105	MN - NOBLES	1	12	0.072	0.311	0.384	6,066	26,106	32,173
27109	MN - OLMSTED	7	44	3.362	0.666	4.027	76,822	15,217	92,039
27119	MN - POLK	1	9	0.444	0.032	0.476	48,637	3,473	52,110
27121	MN - POPE	2	56	0.525	0.425	0.950	9,433	7,635	17,069
27157	MN - WABASHA	3	4	0.004	0.027	0.032	1,017	6,247	7,264
27173	MN - YELLOW MEDICINE	3	44	0.504	0.395	0.898	11,475	9,001	20,476
28001	MS - ADAMS	10	59	0.554	0.448	1.003	9,433	7,635	17,069
28003	MS - ALCORN	6	64	0.149	0.123	0.271	2,333	1,930	4,263
28007	MS - ATTALA	5	6	0.061	0.050	0.111	9,433	7,635	17,069
28009	MS - BENTON	47	102	2.223	10.965	13.188	21,843	107,737	129,580
28013	MS - CALHOUN	18	18	1.063	1.473	2.536	59,132	81,916	141,048
28015	MS - CARROLL	86	232	14.130	9.282	23.411	60,932	40,026	100,958
28017	MS - CHICKASAW	15	3	0.162	0.097	0.258	62,771	37,635	100,406
28019	MS - CHOCTAW	4	1	0.014	0.011	0.025	9,433	7,635	17,069
28029	MS - COPIAH	1	4	0.040	0.033	0.073	9,433	7,635	17,069
28031	MS - COVINGTON	4	4	0.041	0.034	0.075	9,433	7,635	17,069
28033	MS - DE SOTO	2	1	0.166	0.096	0.262	159,865	92,247	252,112
28043	MS - GRENADA	6	4	0.036	0.029	0.065	9,433	7,635	17,069
28051	MS - HOLMES	23	80	11.428	0.044	11.471	142,706	544	143,251
28061	MS - JASPER	4	8	0.076	0.062	0.138	9,433	7,635	17,069
28065	MS - JEFFERSON DAVIS	2	3	0.025	0.021	0.046	9,433	7,635	17,069
28067	MS - JONES	2	5	0.048	0.039	0.087	9,433	7,635	17,069
28069	MS - KEMPER	6	19	0.175	0.142	0.317	9,433	7,635	17,069
28071	MS - LAFAYETTE	24	47	0.257	0.292	0.548	5,408	6,149	11,557
28075	MS - LAUDERDALE	4	9	0.773	0.882	1.655	81,582	93,147	174,729
28079	MS - LEAKE	4	16	0.154	0.125	0.279	9,433	7,635	17,069
28081	MS - LEE	12	64	23.471	0.000	23.471	364,909	0	364,909
28085	MS - LINCOLN	5	21	0.196	0.159	0.355	9,433	7,635	17,069
28089	MS - MADISON	4	9	0.084	0.068	0.152	9,433	7,635	17,069
28091	MS - MARION	2	10	0.099	0.080	0.178	9,433	7,635	17,069
28093	MS - MARSHALL	10	35	0.037	6.564	6.602	1,069	188,161	189,230
28095	MS - MONROE	1	0	0.000	0.000	0.000	0	0	0
28097	MS - MONTGOMERY	13	22	0.248	0.224	0.472	11,372	10,301	21,673
28101	MS - NEWTON	6	17	0.157	0.127	0.284	9,433	7,635	17,069
28103	MS - NOXUBEE	1	4	0.037	0.030	0.067	9,433	7,635	17,069
28107	MS - PANOLA	30	50	1.302	0.890	2.192	25,984	17,773	43,757
28115	MS - PONTOTOC	15	61	10.369	0.458	10.827	169,299	7,482	176,781
28117	MS - PRENTISS	5	30	2.746	0.044	2.789	91,723	1,454	93,178
28121	MS - RANKIN	3	11	0.107	0.086	0.193	9,433	7,635	17,069
28129	MS - SMITH	4	14	0.128	0.104	0.232	9,433	7,635	17,069
28135	MS - TALLAHATCHIE	37	88	2.599	1.439	4.039	29,696	16,442	46,139
28137	MS - TATE	15	6	0.004	0.754	0.758	681	131,948	132,629
28139	MS - TIPPAH	42	61	2.542	4.628	7.170	41,522	75,608	117,130
28145	MS - UNION	14	40	16.785	1.007	17.793	420,916	25,262	446,178
28155	MS - WEBSTER	10	12	0.109	0.088	0.196	9,433	7,635	17,069
28159	MS - WINSTON	8	36	0.232	7.081	7.314	6,493	197,866	204,360
28161	MS - YALOBUSHA	30	43	2.764	2.282	5.046	64,918	53,610	118,529
28163	MS - YAZOO	20	26	0.171	1.519	1.691	6,716	59,516	66,232
29019	MO - BOONE	7	14	0.073	0.080	0.153	5,412	5,880	11,291
29023	MO - BUTLER	2	3	0.008	0.082	0.090	2,790	27,791	30,581
29025	MO - CALDWELL	1	0	0.000	0.000	0.000	0	0	0
29033	MO - CARROLL	109	37	0.337	0.457	0.794	9,239	12,505	21,744
29041	MO - CHARITON	2	1	0.007	0.009	0.016	10,450	14,237	24,688
29045	MO - CLARK	7	12	0.071	0.115	0.186	5,922	9,682	15,604
29047	MO - CLAY	3	8	0.043	1.886	1.930	5,446	237,415	242,862
29061	MO - DAVIESS	6	2	0.014	0.028	0.042	7,500	14,917	22,417
29063	MO - DEKALB	42	90	0.549	0.625	1.174	6,132	6,982	13,115
29075	MO - GENTRY	7	2	0.014	0.016	0.029	6,132	6,982	13,115
29079	MO - GRUNDY	3	0	0.000	0.000	0.000	0	0	0
29081	MO - HARRISON	243	109	0.864	1.451	2.315	7,919	13,301	21,220
29089	MO - HOWARD	43	16	0.194	0.288	0.482	12,340	18,278	30,617
29101	MO - JOHNSON	38	28	0.184	0.097	0.282	6,615	3,484	10,098
29103	MO - KNOX	61	22	0.140	0.200	0.339	6,416	9,174	15,590
29107	MO - LAFAYETTE	93	57	0.135	0.626	0.762	2,384	11,030	13,415
29111	MO - LEWIS	112	49	0.299	0.546	0.845	6,075	11,103	17,178
29113	MO - LINCOLN	19	20	0.156	0.047	0.203	7,946	2,406	10,352

P-12	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
29115	MO - LINN	42	15	0.156	0.213	0.369	10,450	14,237	24,688
29117	MO - LIVINGSTON	17	5	0.050	0.062	0.112	9,272	11,667	20,939
29119	MO - MCDONALD	1	0	0.000	0.000	0.000	0	0	0
29127	MO - MARION	26	9	0.059	0.085	0.144	6,699	9,712	16,411
29129	MO - MERCER	6	0	0.000	0.000	0.000	0	0	0
29145	MO - NEWTON	13	19	2.603	0.152	2.755	140,602	8,192	148,793
29147	MO - NODAWAY	25	36	0.169	3.889	4.058	4,690	108,232	112,923
29171	MO - PUTNAM	64	24	0.285	0.380	0.665	11,658	15,540	27,198
29175	MO - RANDOLPH	13	4	0.054	0.079	0.133	12,340	18,278	30,617
29177	MO - RAY	13	9	0.716	0.121	0.837	75,637	12,741	88,378
29181	MO - RIPLEY	20	110	0.806	2.004	2.809	7,292	18,137	25,429
29199	MO - SCOTLAND	10	15	0.049	0.091	0.139	3,141	5,856	8,997
29209	MO - STONE	1	0	0.001	0.001	0.002	9,433	7,635	17,069
29211	MO - SULLIVAN	129	41	0.640	0.485	1.125	15,488	11,738	27,226
29219	MO - WARREN	1	1	0.000	0.040	0.041	457	37,912	38,369
29227	MO - WORTH	24	11	0.137	0.139	0.276	12,190	12,324	24,514
30025	MT - FALLON	1	5	0.120	0.019	0.139	25,550	4,062	29,611
30027	MT - FERGUS	4	98	1.356	0.703	2.060	13,794	7,152	20,946
30029	MT - FLATHEAD	1	13	0.133	0.062	0.195	10,441	4,914	15,355
30039	MT - GRANITE	1	72	0.004	0.163	0.167	57	2,276	2,333
30041	MT - HILL	1	79	0.107	0.798	0.905	1,355	10,099	11,454
30043	MT - JEFFERSON	1	19	0.000	0.000	0.000	0	0	0
30059	MT - MEAGHER	1	43	0.409	0.331	0.741	9,433	7,635	17,069
30081	MT - RAVALLI	2	6	0.000	0.000	0.000	0	0	0
30083	MT - RICHLAND	2	1	0.031	0.672	0.704	30,901	665,795	696,696
30091	MT - SHERIDAN	1	20	0.395	0.000	0.395	19,753	0	19,753
30101	MT - TOOLE	2	4	0.623	0.088	0.711	139,383	19,716	159,099
30107	MT - WHEATLAND	2	3	0.029	0.002	0.031	8,889	601	9,491
31001	NE - ADAMS	6	58	0.404	0.135	0.539	6,947	2,313	9,260
31007	NE - BANNER	1	14	0.128	0.103	0.231	9,433	7,635	17,069
31017	NE - BROWN	1	7	0.068	0.055	0.123	9,433	7,635	17,069
31021	NE - BURT	9	20	0.337	0.503	0.840	16,446	24,579	41,025
31023	NE - BUTLER	25	46	1.100	0.512	1.612	24,085	11,206	35,292
31025	NE - CASS	8	11	0.134	0.153	0.287	12,395	14,187	26,582
31031	NE - CHERRY	2	10	0.099	0.080	0.179	9,433	7,635	17,069
31041	NE - CUSTER	1	13	0.150	0.019	0.170	11,209	1,436	12,644
31045	NE - DAWES	1	15	0.138	0.111	0.249	9,433	7,635	17,069
31047	NE - DAWSON	5	96	1.081	0.138	1.220	11,209	1,436	12,644
31049	NE - DEUEL	1	2	0.021	0.017	0.038	9,433	7,635	17,069
31051	NE - DIXON	33	52	0.743	0.404	1.147	14,341	7,803	22,144
31055	NE - DOUGLAS	5	7	0.000	0.285	0.285	0	38,767	38,767
31063	NE - FRONTIER	11	193	0.526	0.380	0.906	2,725	1,971	4,695
31067	NE - GAGE	150	284	4.110	6.253	10.363	14,477	22,026	36,503
31069	NE - GARDEN	3	7	0.066	0.053	0.120	9,433	7,635	17,069
31083	NE - HARLAN	2	2	0.121	0.017	0.138	59,043	8,109	67,152
31085	NE - HAYES	7	168	0.205	0.268	0.473	1,219	1,593	2,812
31087	NE - HITCHCOCK	1	8	0.009	0.012	0.021	1,219	1,593	2,812
31095	NE - JEFFERSON	37	140	1.973	0.714	2.686	14,134	5,112	19,247
31097	NE - JOHNSON	57	102	1.450	2.101	3.551	14,227	20,616	34,843
31101	NE - KEITH	2	12	0.110	0.012	0.122	9,173	995	10,168
31105	NE - KIMBALL	1	3	0.028	0.023	0.050	9,433	7,635	17,069
31109	NE - LANCASTER	65	81	1.194	2.981	4.175	14,731	36,785	51,516
31119	NE - MADISON	1	2	0.160	0.737	0.897	70,922	327,691	398,613
31123	NE - MORRILL	4	36	0.323	0.092	0.415	9,022	2,568	11,590
31127	NE - NEMAHA	10	22	0.247	0.404	0.650	11,000	18,007	29,008
31131	NE - OTOE	107	110	1.066	1.984	3.050	9,671	18,005	27,677
31133	NE - PAWNEE	60	88	1.571	1.993	3.564	17,844	22,647	40,491
31143	NE - POLK	2	2	0.095	0.017	0.113	40,988	7,524	48,512
31145	NE - RED WILLOW	14	51	0.335	0.150	0.485	6,572	2,942	9,514
31147	NE - RICHARDSON	18	23	0.209	0.858	1.067	9,018	36,986	46,004
31151	NE - SALINE	22	94	1.781	0.370	2.151	18,904	3,925	22,830
31153	NE - SARPY	5	4	0.002	0.108	0.110	536	26,124	26,661
31155	NE - SAUNDERS	24	68	0.930	0.401	1.331	13,600	5,862	19,462
31157	NE - SCOTTS BLUFF	10	27	1.113	10.881	11.994	41,602	406,753	448,354
31159	NE - SEWARD	10	22	0.346	0.345	0.692	15,683	15,637	31,320
31161	NE - SHERIDAN	5	63	0.240	0.032	0.272	3,816	506	4,322
31167	NE - STANTON	1	4	0.097	0.009	0.106	26,879	2,483	29,362
31169	NE - THAYER	7	17	0.080	0.024	0.104	4,742	1,438	6,180
31177	NE - WASHINGTON	4	1	0.000	0.041	0.041	0	38,767	38,767
32007	NV - ELKO	3	14	0.023	0.918	0.941	1,670	67,999	69,669
32017	NV - LINCOLN	1	203	0.037	0.104	0.141	183	513	696
32031	NV - WASHOE	4	6	0.000	1.532	1.532	0	257,506	257,506
33003	NH - CARROLL	1	3	0.290	0.018	0.308	96,624	5,989	102,614
33007	NH - COOS	1	6	0.089	0.458	0.547	13,803	70,616	84,419
33009	NH - GRAFTON	8	59	0.388	0.170	0.558	6,531	2,857	9,388
33011	NH - HILLSBOROUGH	13	56	0.480	0.081	0.561	8,538	1,432	9,971
33019	NH - SULLIVAN	1	5	0.044	0.062	0.106	8,126	11,265	19,391
34019	NJ - HUNTERDON	1	1	0.014	0.015	0.028	14,701	15,712	30,413
34021	NJ - MERCER	10	43	3.872	2.579	6.451	89,797	59,820	149,617
34025	NJ - MONMOUTH	4	10	1.152	0.748	1.900	113,244	73,592	186,837
34029	NJ - OCEAN	1	3	0.028	0.023	0.051	9,433	7,635	17,069
34037	NJ - SUSSEX	3	1	0.052	0.009	0.061	42,764	6,983	49,747
34041	NJ - WARREN	1	3	0.173	0.218	0.391	60,194	75,960	136,153
35005	NM - CHAVES	3	106	0.137	0.000	0.137	1,292	0	1,292
35006	NM - CIBOLA	2	28	0.056	0.000	0.056	2,001	0	2,001
35007	NM - COLFAX	1	18	0.029	0.000	0.029	1,647	0	1,647
35009	NM - CURRY	1	128	1.210	0.979	2.189	9,433	7,635	17,069
35013	NM - DONA ANA	24	315	4.170	0.000	4.170	13,259	0	13,259
35015	NM - EDDY	7	336	6.725	0.000	6.725	20,018	0	20,018
35017	NM - GRANT	12	29	0.110	0.000	0.110	3,841	0	3,841
35027	NM - LINCOLN	1	122	1.151	0.932	2.082	9,433	7,635	17,069
35035	NM - OTERO	3	15	0.095	0.000	0.095	6,142	0	6,142
35039	NM - RIO ARRIBA	14	22	0.786	0.002	0.788	35,384	106	35,490
35043	NM - SANDOVAL	1	4	0.039	0.031	0.070	9,433	7,635	17,069
35047	NM - SAN MIGUEL	1	19	0.048	0.000	0.048	2,464	0	2,464
35049	NM - SANTA FE	1	3	0.068	0.000	0.068	21,776	0	21,776
35051	NM - SIERRA	5	144	3.579	0.000	3.579	24,835	0	24,835
35055	NM - TAOS	1	2	0.016	0.013	0.028	9,433	7,635	17,069
35059	NM - UNION	2	91	0.087	0.000	0.087	953	0	953
36007	NY - BROOME	23	61	1.364	0.041	1.405	22,289	675	22,964

P-13	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
36009	NY - CATTARAUGUS	13	71	0.689	0.002	0.692	9,763	32	9,796
36013	NY - CHAUTAUQUA	4	12	0.117	0.000	0.117	9,687	0	9,687
36015	NY - CHEMUNG	5	31	0.800	0.000	0.800	25,695	0	25,695
36017	NY - CHENANGO	6	12	0.309	0.013	0.321	25,504	1,047	26,551
36039	NY - GREENE	3	20	0.873	0.000	0.873	42,604	0	42,604
36043	NY - HERKIMER	1	2	0.226	0.000	0.226	111,464	0	111,464
36053	NY - MADISON	1	1	0.092	0.000	0.092	106,165	0	106,165
36107	NY - TIOGA	2	1	0.012	0.009	0.021	9,433	7,635	17,069
36109	NY - TOMPKINS	1	18	0.616	0.000	0.616	34,068	0	34,068
37001	NC - ALAMANCE	2	2	0.015	0.013	0.028	9,433	7,635	17,069
37003	NC - ALEXANDER	1	5	0.046	0.037	0.083	9,433	7,635	17,069
37033	NC - CASWELL	1	48	0.115	0.852	0.966	2,384	17,714	20,098
37059	NC - DAVIE	9	48	0.413	0.439	0.852	8,550	9,092	17,642
37061	NC - DUPLIN	1	2	0.529	0.825	1.354	228,888	357,110	585,998
37067	NC - FORSYTH	4	14	0.218	0.038	0.256	16,002	2,788	18,790
37079	NC - GREENE	2	5	0.125	0.062	0.187	27,668	13,704	41,371
37097	NC - IREDELL	10	31	0.293	0.237	0.530	9,433	7,635	17,069
37111	NC - MCDOWELL	18	41	0.457	0.353	0.810	11,149	8,604	19,753
37161	NC - RUTHERFORD	10	23	0.531	0.628	1.159	23,144	27,354	50,498
37169	NC - STOKES	24	49	0.770	0.172	0.942	15,665	3,504	19,169
37171	NC - SURRY	1	16	0.555	0.139	0.694	35,754	8,963	44,717
37179	NC - UNION	1	15	0.423	0.404	0.827	28,800	27,471	56,271
37183	NC - WAKE	10	69	2.761	2.817	5.579	39,771	40,578	80,349
37191	NC - WAYNE	5	17	0.464	0.230	0.694	27,668	13,704	41,371
37197	NC - YADKIN	15	56	0.359	0.063	0.422	6,476	1,132	7,608
38009	ND - BOTTINEAU	2	38	0.424	0.222	0.646	11,057	5,776	16,833
38015	ND - BURLEIGH	1	6	0.058	0.047	0.105	9,433	7,635	17,069
38017	ND - CASS	4	100	0.867	0.077	0.945	8,713	776	9,489
38019	ND - CAVALIER	6	84	0.835	0.480	1.315	9,907	5,705	15,612
38035	ND - GRAND FORKS	10	223	2.510	0.445	2.955	11,239	1,994	13,232
38041	ND - HETTINGER	1	3	0.083	0.000	0.083	25,886	0	25,886
38059	ND - MORTON	1	37	0.014	0.144	0.157	362	3,837	4,198
38063	ND - NELSON	1	52	0.233	0.066	0.299	4,514	1,281	5,795
38065	ND - OLIVER	3	68	0.024	0.259	0.284	362	3,837	4,198
38067	ND - PEMBINA	7	110	1.344	0.762	2.107	12,189	6,914	19,103
38081	ND - SARGENT	3	17	0.162	0.063	0.224	9,552	3,714	13,265
38091	ND - STEELE	1	42	0.073	0.006	0.079	1,742	151	1,893
38097	ND - TRAILL	1	75	0.130	0.011	0.141	1,742	151	1,893
38099	ND - WALSH	9	178	1.645	0.140	1.785	9,247	788	10,036
39009	OH - ATHENS	5	17	0.097	0.546	0.643	5,569	31,361	36,929
39021	OH - CHAMPAIGN	4	3	0.044	0.012	0.055	15,757	4,167	19,924
39033	OH - CRAWFORD	1	0	0.246	0.389	0.635	2,239,594	3,535,403	5,774,997
39037	OH - DARKE	1	13	0.091	0.109	0.201	6,990	8,371	15,361
39045	OH - FAIRFIELD	27	84	0.690	0.611	1.301	8,214	7,282	15,497
39087	OH - LAWRENCE	1	2	0.012	0.016	0.028	5,839	7,407	13,245
39103	OH - MEDINA	5	16	0.212	0.108	0.320	13,018	6,613	19,631
39107	OH - MERCER	2	6	0.043	0.052	0.095	6,990	8,371	15,361
39121	OH - NOBLE	2	10	0.147	0.262	0.409	14,183	25,282	39,465
39127	OH - PERRY	9	31	0.220	0.227	0.447	7,008	7,236	14,245
39135	OH - PREBLE	4	3	0.194	0.224	0.418	60,286	69,822	130,108
39169	OH - WAYNE	3	20	0.264	0.134	0.398	13,018	6,613	19,631
40001	OK - ADAIR	18	71	0.486	0.972	1.458	6,802	13,600	20,403
40003	OK - ALFALFA	3	6	0.083	0.158	0.241	14,244	27,038	41,282
40005	OK - ATOKA	34	76	0.434	0.347	0.781	5,696	4,557	10,253
40009	OK - BECKHAM	42	131	0.827	0.148	0.976	6,323	1,134	7,457
40013	OK - BRYAN	1	2	0.010	0.006	0.015	6,207	3,563	9,770
40015	OK - CADDO	104	338	4.112	0.603	4.714	12,164	1,784	13,947
40017	OK - CANADIAN	16	98	1.267	0.426	1.693	12,911	4,339	17,251
40019	OK - CARTER	39	186	1.093	1.966	3.059	5,860	10,545	16,405
40021	OK - CHEROKEE	2	5	0.043	0.035	0.078	9,433	7,635	17,069
40023	OK - CHOCTAW	3	9	0.256	0.338	0.595	28,781	37,946	66,727
40029	OK - COAL	53	139	1.094	0.613	1.707	7,880	4,413	12,293
40031	OK - COMANCHE	10	25	0.201	0.130	0.330	8,144	5,262	13,406
40035	OK - CRAIG	1	1	0.003	0.001	0.004	3,840	1,860	5,701
40037	OK - CREEK	56	137	1.210	1.048	2.258	8,847	7,663	16,510
40039	OK - CUSTER	121	253	1.285	0.462	1.747	5,083	1,828	6,912
40041	OK - DELAWARE	2	7	0.068	0.055	0.123	9,433	7,635	17,069
40043	OK - DEWEY	22	48	0.205	0.055	0.260	4,311	1,155	5,466
40047	OK - GARFIELD	48	165	0.737	0.120	0.857	4,474	728	5,202
40049	OK - GARVIN	145	255	2.791	2.427	5.218	10,949	9,520	20,469
40051	OK - GRADY	154	291	4.157	1.338	5.495	14,262	4,592	18,854
40055	OK - GREER	13	28	0.192	0.038	0.230	6,756	1,325	8,080
40057	OK - HARMON	14	55	0.373	0.073	0.446	6,756	1,325	8,080
40059	OK - HARPER	1	5	0.165	0.041	0.207	30,579	7,657	38,236
40063	OK - HUGHES	37	146	0.800	0.358	1.158	5,470	2,445	7,915
40065	OK - JACKSON	4	6	0.040	0.008	0.048	6,756	1,325	8,080
40067	OK - JEFFERSON	10	19	0.310	0.042	0.352	16,250	2,209	18,460
40069	OK - JOHNSTON	22	65	0.330	0.482	0.812	5,105	7,447	12,552
40071	OK - KAY	9	21	0.423	0.070	0.492	19,758	3,250	23,008
40073	OK - KINGFISHER	8	46	0.309	0.061	0.370	6,707	1,329	8,036
40075	OK - KIOWA	47	232	1.198	0.633	1.831	5,167	2,729	7,896
40077	OK - LATIMER	17	131	0.806	1.189	1.995	6,150	9,079	15,229
40079	OK - LE FLORE	7	57	0.382	0.793	1.174	6,711	13,948	20,659
40081	OK - LINCOLN	64	159	1.953	3.347	5.299	12,283	21,052	33,334
40083	OK - LOGAN	39	106	1.033	0.423	1.456	9,790	4,008	13,798
40085	OK - LOVE	15	38	0.831	0.391	1.221	21,954	10,327	32,280
40087	OK - MCCLAIN	87	127	2.344	0.928	3.272	18,417	7,294	25,711
40089	OK - MCCURTAIN	20	36	0.831	0.819	1.650	23,177	22,828	46,005
40093	OK - MAJOR	1	3	0.026	0.015	0.041	9,513	5,565	15,078
40097	OK - MAYES	1	1	0.003	0.002	0.005	3,840	1,860	5,701
40099	OK - MURRAY	58	87	0.711	0.286	0.997	8,145	3,277	11,421
40101	OK - MUSKOGEE	10	31	0.226	0.001	0.227	7,231	33	7,265
40103	OK - NOBLE	89	242	1.466	0.808	2.274	6,059	3,339	9,398
40105	OK - NOWATA	2	5	0.026	0.033	0.059	5,719	7,324	13,042
40107	OK - OKFUSKEE	25	55	0.543	0.560	1.103	9,897	10,199	20,096
40109	OK - OKLAHOMA	2	5	0.038	0.182	0.220	7,775	37,627	45,402
40111	OK - OKMULGEE	19	102	1.057	0.519	1.576	10,327	5,066	15,393
40113	OK - OSAGE	6	39	0.223	0.280	0.502	5,771	7,249	13,020
40117	OK - PAWNEE	16	65	0.485	1.460	1.945	7,476	22,498	29,974
40119	OK - PAYNE	34	54	0.873	0.837	1.710	16,245	15,586	31,831

P-14	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
40121	OK - PITTSBURG	19	56	0.680	0.149	0.830	12,122	2,664	14,785
40123	OK - PONTOTOC	71	199	1.724	0.438	2.162	8,651	2,198	10,849
40125	OK - POTTAWATOMIE	31	88	1.017	2.839	3.856	11,550	32,246	43,795
40129	OK - ROGER MILLS	143	478	1.610	1.061	2.671	3,366	2,219	5,585
40131	OK - ROGERS	6	8	0.031	0.015	0.046	3,840	1,860	5,701
40133	OK - SEMINOLE	37	98	0.807	0.274	1.081	8,243	2,798	11,041
40135	OK - SEQUOYAH	18	78	0.517	1.081	1.599	6,661	13,921	20,582
40137	OK - STEPHENS	63	203	2.481	1.985	4.466	12,231	9,789	22,019
40141	OK - TILLMAN	13	121	0.998	3.879	4.877	8,257	32,072	40,329
40145	OK - WAGONER	5	7	0.155	0.061	0.216	23,310	9,274	32,584
40147	OK - WASHINGTON	10	38	0.315	0.283	0.599	8,402	7,549	15,951
40149	OK - WASHITA	140	379	2.444	1.590	4.034	6,448	4,195	10,643
41019	OR - DOUGLAS	2	13	1.606	0.156	1.762	119,823	11,641	131,464
41027	OR - HOOD RIVER	1	9	0.000	2.706	2.706	0	309,307	309,307
41037	OR - LAKE	1	4	0.280	0.000	0.280	73,656	0	73,656
41061	OR - UNION	2	36	0.000	0.743	0.743	0	20,391	20,391
42011	PA - BERKS	3	3	0.181	0.036	0.217	58,015	11,432	69,447
42015	PA - BRADFORD	3	1	0.014	0.011	0.025	9,433	7,635	17,068
42017	PA - BUCKS	8	51	3.825	10.023	13.848	75,221	197,108	272,329
42025	PA - CARBON	1	6	0.065	0.012	0.077	10,941	2,098	13,039
42029	PA - CHESTER	5	42	1.753	4.417	6.170	41,311	104,074	145,384
42037	PA - COLUMBIA	2	8	0.063	0.038	0.102	7,854	4,778	12,632
42039	PA - CRAWFORD	8	65	0.348	0.287	0.634	5,346	4,407	9,753
42051	PA - FAYETTE	3	11	0.611	0.161	0.772	56,706	14,972	71,677
42085	PA - MERCER	8	94	0.414	0.222	0.635	4,423	2,371	6,795
42089	PA - MONROE	2	14	0.704	0.097	0.801	51,959	7,185	59,145
42103	PA - PIKE	3	11	1.204	0.254	1.458	111,470	23,559	135,029
42105	PA - POTTER	1	3	0.026	0.016	0.042	7,640	4,584	12,225
42107	PA - SCHUYLKILL	5	35	1.047	0.158	1.205	29,859	4,496	34,354
42109	PA - SNYDER	3	55	0.647	0.115	0.762	11,836	2,109	13,945
42115	PA - SUSQUEHANNA	3	2	0.129	0.029	0.159	76,409	17,405	93,814
42117	PA - TIOGA	6	17	0.836	0.170	1.007	48,129	9,794	57,923
42121	PA - VENANGO	1	8	0.079	0.064	0.143	9,433	7,635	17,069
42125	PA - WASHINGTON	12	98	5.963	2.114	8.077	60,539	21,465	82,005
42127	PA - WAYNE	11	7	0.348	0.075	0.423	46,566	10,018	56,584
42129	PA - WESTMORELAND	3	36	1.220	0.237	1.456	34,034	6,602	40,636
45007	SC - ANDERSON	14	39	0.607	0.637	1.244	15,486	16,263	31,749
45021	SC - CHEROKEE	7	42	0.212	0.097	0.310	5,077	2,329	7,406
45023	SC - CHESTER	5	31	0.383	0.503	0.886	12,530	16,442	28,972
45025	SC - CHESTERFIELD	1	8	0.103	0.109	0.212	12,294	13,097	25,391
45037	SC - EDGEFIELD	2	6	0.083	0.166	0.249	14,443	28,951	43,394
45039	SC - FAIRFIELD	8	47	0.132	0.311	0.443	2,832	6,647	9,480
45045	SC - GREENVILLE	10	85	0.182	1.093	1.275	2,136	12,837	14,973
45057	SC - LANCASTER	5	39	0.393	0.553	0.947	10,045	14,144	24,189
45059	SC - LAURENS	27	155	0.970	1.362	2.332	6,253	8,784	15,036
45063	SC - LEXINGTON	1	6	0.063	0.094	0.158	11,079	16,471	27,550
45073	SC - OCONEE	8	41	0.434	0.519	0.953	10,706	12,819	23,524
45077	SC - PICKENS	11	45	0.532	1.068	1.601	11,748	23,582	35,330
45083	SC - SPARTANBURG	1	9	0.131	0.445	0.576	14,134	47,824	61,958
45087	SC - UNION	1	6	0.053	0.093	0.146	8,555	14,989	23,544
45091	SC - YORK	4	20	0.138	0.117	0.255	7,050	5,967	13,016
46009	SD - BON HOMME	12	11	0.105	0.085	0.190	9,433	7,635	17,069
46011	SD - BROOKINGS	1	17	0.126	0.282	0.409	7,526	16,811	24,337
46021	SD - CAMPBELL	1	1	0.007	0.006	0.013	9,433	7,635	17,069
46023	SD - CHARLES MIX	3	25	0.280	0.185	0.464	11,248	7,436	18,684
46051	SD - GRANT	1	6	0.063	0.091	0.155	10,643	15,393	26,037
46053	SD - GREGORY	1	1	0.005	0.004	0.010	9,433	7,635	17,069
46065	SD - HUGHES	1	1	0.009	0.007	0.016	9,433	7,635	17,069
46079	SD - LAKE	3	23	0.215	0.174	0.390	9,433	7,635	17,069
46081	SD - LAWRENCE	1	0	0.002	0.001	0.003	9,433	7,635	17,069
46083	SD - LINCOLN	7	23	0.690	0.803	1.493	30,155	35,075	65,230
46091	SD - MARSHALL	4	31	0.421	0.713	1.134	13,562	22,961	36,523
46099	SD - MINNEHAHA	6	12	0.278	0.424	0.702	24,072	36,667	60,739
46107	SD - POTTER	1	1	0.012	0.009	0.021	9,433	7,635	17,069
46109	SD - ROBERTS	1	4	0.000	3.012	3.012	0	754,924	754,924
46119	SD - SULLY	1	1	0.008	0.007	0.015	9,433	7,635	17,069
46127	SD - UNION	12	12	0.791	0.216	1.006	67,935	18,520	86,455
46129	SD - WALWORTH	2	2	0.019	0.015	0.034	9,433	7,635	17,069
46135	SD - YANKTON	1	1	0.007	0.006	0.013	9,433	7,635	17,069
47027	TN - CLAY	2	7	0.090	0.090	0.180	12,694	12,785	25,480
47047	TN - FAYETTE	5	5	0.152	0.045	0.197	28,199	8,279	36,478
47053	TN - GIBSON	19	4	0.140	0.140	0.279	33,432	33,432	66,864
47069	TN - HARDEMAN	18	46	9.340	2.631	11.972	203,628	57,366	260,994
47079	TN - HENRY	9	39	4.179	0.721	4.900	106,610	18,398	125,008
47085	TN - HUMPHREYS	3	6	0.064	0.279	0.343	11,153	48,277	59,431
47087	TN - JACKSON	7	15	0.456	0.047	0.502	29,559	3,032	32,592
47097	TN - LAUDERDALE	7	22	3.235	1.250	4.485	144,166	55,693	199,860
47107	TN - MCMINN	3	7	2.104	0.856	2.960	286,226	116,501	402,727
47109	TN - MCNAIRY	9	22	0.574	0.474	1.048	25,620	21,152	46,772
47111	TN - MACON	5	9	0.355	0.646	1.001	37,561	68,432	105,993
47113	TN - MADISON	8	24	4.703	0.462	5.165	193,061	18,959	212,019
47123	TN - MONROE	1	2	0.449	0.183	0.632	286,226	116,501	402,727
47131	TN - OBION	13	80	5.172	3.042	8.214	64,631	38,009	102,639
47141	TN - PUTNAM	1	2	0.020	0.016	0.035	9,433	7,635	17,069
47151	TN - SCOTT	2	4	5.760	1.421	7.181	1,604,522	395,792	2,000,314
47157	TN - SHELBY	6	3	0.024	0.020	0.044	9,433	7,635	17,069
47181	TN - WAYNE	3	17	0.465	0.233	0.697	26,657	13,332	39,989
47183	TN - WEAKLEY	22	30	6.116	0.646	6.762	201,246	21,245	222,491
48001	TX - ANDERSON	3	12	0.041	0.059	0.101	3,412	4,887	8,299
48027	TX - BELL	41	111	1.585	0.579	2.164	14,273	5,214	19,486
48029	TX - BEXAR	27	157	1.547	5.298	6.845	9,866	33,793	43,659
48031	TX - BLANCO	1	1	0.006	0.005	0.010	9,433	7,635	17,069
48035	TX - BOSQUE	4	46	0.239	0.103	0.341	5,165	2,219	7,384
48041	TX - BRAZOS	2	1	0.045	0.016	0.060	45,190	15,817	61,008
48043	TX - BREWSTER	1	20	0.500	0.038	0.538	25,538	1,945	27,483
48045	TX - BRISCOE	6	7	0.113	0.107	0.220	16,191	15,390	31,581
48049	TX - BROWN	57	215	9.948	2.672	12.621	46,276	12,431	58,708
48053	TX - BURNET	4	21	0.534	0.015	0.549	25,875	740	26,615
48055	TX - CALDWELL	17	85	1.075	0.268	1.343	12,691	3,158	15,848
48059	TX - CALLAHAN	22	187	1.097	0.453	1.550	5,857	2,418	8,275

P-15	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
48065	TX - CARSON	1	24	0.045	0.060	0.105	1,891	2,554	4,445
48069	TX - CASTRO	1	38	0.232	0.037	0.269	6,092	964	7,056
48077	TX - CLAY	5	12	0.196	0.111	0.307	16,092	9,087	25,179
48081	TX - COKE	6	35	0.411	0.000	0.411	11,652	0	11,652
48083	TX - COLEMAN	81	549	3.381	1.292	4.673	6,163	2,355	8,518
48085	TX - COLLIN	99	187	3.702	1.849	5.552	19,790	9,885	29,676
48091	TX - COMAL	8	97	1.315	0.284	1.599	13,611	2,935	16,546
48093	TX - COMANCHE	19	141	0.722	0.226	0.947	5,135	1,604	6,740
48095	TX - CONCHO	38	287	2.225	0.673	2.898	7,748	2,343	10,091
48097	TX - COOKE	49	141	2.394	0.000	2.394	17,037	0	17,037
48105	TX - CROCKETT	7	96	1.018	0.022	1.040	10,572	232	10,804
48109	TX - CULBERSON	2	36	0.475	0.166	0.641	13,162	4,614	17,776
48113	TX - DALLAS	8	12	0.440	0.199	0.639	37,882	17,094	54,976
48121	TX - DENTON	23	69	0.862	0.083	0.945	12,525	1,210	13,735
48123	TX - DEWITT	4	13	0.287	0.110	0.398	21,813	8,377	30,189
48125	TX - DICKENS	17	107	1.300	0.238	1.538	12,179	2,231	14,410
48129	TX - DONLEY	2	7	0.116	0.001	0.117	17,386	191	17,577
48131	TX - DUVAL	11	193	0.195	0.430	0.625	1,011	2,232	3,243
48139	TX - ELLIS	84	242	2.135	4.974	7.109	8,810	20,529	29,339
48143	TX - ERATH	76	373	3.690	1.145	4.835	9,883	3,068	12,950
48145	TX - FALLS	6	23	0.219	0.170	0.389	9,482	7,352	16,834
48147	TX - FANNIN	18	47	0.765	0.096	0.861	16,116	2,024	18,141
48149	TX - FAYETTE	18	61	1.381	0.082	1.463	22,799	1,349	24,149
48171	TX - GILLESPIE	4	16	0.106	0.048	0.154	6,791	3,074	9,865
48179	TX - GRAY	12	182	0.344	0.465	0.809	1,891	2,554	4,445
48181	TX - GRAYSON	80	132	2.822	1.945	4.768	21,374	14,732	36,106
48187	TX - GUADALUPE	12	41	0.696	0.129	0.825	17,025	3,146	20,171
48189	TX - HALE	3	96	0.587	0.093	0.680	6,092	964	7,056
48191	TX - HALL	22	87	1.512	0.017	1.529	17,386	191	17,577
48193	TX - HAMILTON	5	9	0.277	0.050	0.328	31,624	5,717	37,341
48209	TX - HAYS	17	122	4.310	0.410	4.720	35,258	3,351	38,609
48211	TX - HEMPHILL	31	263	0.610	0.456	1.066	2,320	1,737	4,058
48213	TX - HENDERSON	5	42	0.232	0.607	0.840	5,521	14,439	19,959
48217	TX - HILL	80	150	2.287	0.966	3.253	15,256	6,447	21,702
48221	TX - HOOD	2	11	0.097	0.035	0.132	8,717	3,144	11,862
48223	TX - HOPKINS	13	42	0.433	0.052	0.485	10,348	1,254	11,602
48229	TX - HUDSPETH	11	540	3.739	0.983	4.722	6,929	1,822	8,751
48231	TX - HUNT	19	33	0.542	0.087	0.629	16,511	2,647	19,158
48237	TX - JACK	33	118	0.834	1.573	2.407	7,051	13,294	20,345
48249	TX - JIM WELLS	7	106	0.607	0.108	0.715	5,748	1,023	6,771
48251	TX - JOHNSON	26	77	1.924	1.424	3.348	25,126	18,590	43,716
48255	TX - KARNES	18	87	1.062	0.511	1.573	12,204	5,872	18,075
48257	TX - KAUFMAN	75	184	2.244	4.367	6.611	12,218	23,773	35,991
48259	TX - KENDALL	4	34	0.406	0.420	0.826	11,920	12,346	24,266
48271	TX - KINNEY	2	9	0.210	0.000	0.210	24,286	0	24,286
48277	TX - LAMAR	30	76	1.094	0.522	1.616	14,411	6,874	21,285
48281	TX - LAMPASAS	8	58	0.896	0.054	0.950	15,333	924	16,256
48287	TX - LEE	2	11	0.261	0.015	0.277	22,799	1,349	24,149
48289	TX - LEON	1	1	0.013	0.011	0.024	9,433	7,635	17,069
48293	TX - LIMESTONE	22	31	0.480	0.045	0.525	15,662	1,472	17,134
48307	TX - MCCULLOCH	28	356	3.130	1.092	4.222	8,784	3,065	11,849
48309	TX - MCLENNAN	52	178	3.015	0.878	3.893	16,936	4,931	21,867
48313	TX - MADISON	2	1	0.140	0.190	0.330	109,955	149,538	259,494
48327	TX - MENARD	1	9	0.080	0.017	0.098	8,727	1,852	10,578
48331	TX - MILAM	12	29	0.328	0.170	0.498	11,366	5,905	17,271
48333	TX - MILLS	16	125	0.467	0.309	0.776	3,722	2,464	6,186
48337	TX - MONTAGUE	123	207	3.052	1.024	4.076	14,753	4,947	19,700
48347	TX - NACOGDOCHES	4	39	0.424	0.699	1.124	10,768	17,746	28,515
48349	TX - NAVARRO	99	190	2.497	1.264	3.761	13,142	6,651	19,792
48353	TX - NOLAN	5	52	0.340	0.313	0.653	6,526	5,998	12,524
48363	TX - PALO PINTO	4	14	0.396	0.005	0.401	28,141	345	28,486
48367	TX - PARKER	34	82	1.233	0.025	1.257	15,008	299	15,308
48369	TX - PARMER	2	134	0.057	0.697	0.754	427	5,220	5,647
48371	TX - PECOS	2	61	1.562	0.119	1.681	25,538	1,945	27,483
48377	TX - PRESIDIO	1	4	0.139	0.000	0.139	32,602	0	32,602
48379	TX - RAINS	2	6	0.061	0.007	0.068	10,348	1,254	11,602
48387	TX - RED RIVER	11	17	0.277	0.023	0.301	16,754	1,419	18,172
48393	TX - ROBERTS	4	14	0.139	0.041	0.180	9,568	2,855	12,423
48397	TX - ROCKWALL	27	40	0.650	0.640	1.289	16,255	16,009	32,264
48399	TX - RUNNELS	7	110	0.889	0.272	1.161	8,068	2,470	10,538
48401	TX - RUSK	2	8	0.086	0.142	0.229	10,768	17,746	28,515
48411	TX - SAN SABA	25	110	0.676	0.261	0.937	6,137	2,366	8,504
48413	TX - SCHLEICHER	2	46	0.701	0.005	0.706	15,110	114	15,224
48419	TX - SHELBY	6	19	0.206	0.339	0.544	10,768	17,746	28,515
48425	TX - SOMERVELL	2	16	0.224	0.064	0.288	13,922	3,961	17,883
48427	TX - STARR	7	132	0.248	0.085	0.333	1,873	641	2,514
48435	TX - SUTTON	11	110	1.663	0.013	1.675	15,110	114	15,224
48441	TX - TAYLOR	20	71	0.420	0.261	0.681	5,911	3,679	9,590
48443	TX - TERRELL	8	70	1.781	0.136	1.917	25,538	1,945	27,483
48451	TX - TOM GREEN	2	17	0.131	0.051	0.182	7,919	3,113	11,032
48459	TX - UPSHUR	1	6	0.061	0.101	0.163	10,768	17,746	28,515
48463	TX - UVALDE	3	48	1.354	0.329	1.683	27,996	6,791	34,787
48467	TX - VAN ZANDT	29	78	0.875	2.834	3.709	11,172	36,194	47,366
48483	TX - WHEELER	7	42	0.098	0.073	0.171	2,320	1,737	4,058
48491	TX - WILLIAMSON	45	141	2.327	1.087	3.414	16,449	7,683	24,132
48493	TX - WILSON	1	6	0.030	0.048	0.079	4,879	7,807	12,686
48497	TX - WISE	84	203	2.514	1.392	3.907	12,355	6,842	19,197
49001	UT - BEAVER	2	23	0.623	1.503	2.126	26,839	64,796	91,635
49003	UT - BOX ELDER	1	97	0.293	0.000	0.293	3,014	0	3,014
49009	UT - DAGGETT	1	2	0.019	0.015	0.034	9,433	7,635	17,069
49015	UT - EMERY	8	169	1.590	1.287	2.876	9,433	7,635	17,069
49021	UT - IRON	3	3	0.027	0.022	0.049	9,433	7,635	17,069
49023	UT - JUAB	2	5	0.046	0.037	0.082	9,433	7,635	17,069
49039	UT - SANPETE	4	21	0.204	0.165	0.368	9,872	7,990	17,861
49041	UT - SEVIER	4	20	0.465	0.000	0.465	22,934	0	22,934
49043	UT - SUMMIT	1	8	0.075	0.060	0.135	9,433	7,635	17,069
49045	UT - TOOELE	1	26	0.245	0.199	0.444	9,433	7,635	17,069
49049	UT - UTAH	6	94	0.886	0.717	1.602	9,433	7,635	17,069
49053	UT - WASHINGTON	11	27	0.984	7.750	8.733	35,868	282,622	318,490
49057	UT - WEBER	1	10	0.095	0.077	0.172	9,433	7,635	17,069

P-16	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
STATE & COUNTY FIPS CODE (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
50027	VT - WINDSOR	4	7	0.500	0.150	0.650	72,616	21,763	94,379
51003	VA - ALBEMARLE	1	9	0.084	0.034	0.118	8,875	3,562	12,437
51009	VA - AMHERST	3	20	0.279	0.806	1.085	13,981	40,400	54,381
51011	VA - APPOMATTOX	3	10	0.097	0.079	0.176	9,433	7,635	17,069
51015	VA - AUGUSTA	16	84	1.310	0.000	1.310	15,604	0	15,604
51025	VA - BRUNSWICK	1	41	0.211	0.344	0.555	5,181	8,432	13,613
51029	VA - BUCKINGHAM	17	108	0.271	0.172	0.443	2,506	1,589	4,095
51031	VA - CAMPBELL	3	20	0.043	0.044	0.087	2,114	2,194	4,307
51035	VA - CARROLL	1	21	0.197	0.160	0.357	9,433	7,635	17,069
51037	VA - CHARLOTTE	14	77	0.493	0.050	0.542	6,366	642	7,008
51045	VA - CRAIG	4	31	0.144	0.089	0.233	4,624	2,859	7,483
51047	VA - CULPEPER	5	28	0.250	0.139	0.389	8,960	4,990	13,950
51049	VA - CUMBERLAND	1	12	0.027	0.015	0.041	2,134	1,170	3,304
51059	VA - FAIRFAX	6	15	0.282	0.291	0.574	18,869	19,451	38,319
51061	VA - FAUQUIER	2	20	0.268	1.172	1.440	13,715	60,010	73,725
51067	VA - FRANKLIN	2	4	0.158	0.039	0.197	35,608	8,774	44,382
51085	VA - HANOVER	1	5	0.012	0.019	0.031	2,514	3,804	6,318
51089	VA - HENRY	8	48	0.245	0.100	0.345	5,091	2,080	7,171
51109	VA - LOUISA	10	52	0.189	0.235	0.424	3,661	4,565	8,226
51113	VA - MADISON	9	16	0.138	0.054	0.192	8,687	3,385	12,072
51139	VA - PAGE	2	5	0.184	0.002	0.186	39,168	463	39,631
51141	VA - PATRICK	7	2	0.048	0.062	0.109	20,065	25,935	46,001
51143	VA - PITTSYLVANIA	2	20	0.021	0.042	0.063	1,038	2,064	3,102
51147	VA - PRINCE EDWARD	16	144	1.120	2.127	3.246	7,761	14,743	22,504
51165	VA - ROCKINGHAM	9	71	0.639	0.174	0.814	9,055	2,471	11,526
51171	VA - SHENANDOAH	2	12	0.245	0.057	0.301	20,527	4,742	25,269
51177	VA - SPOTSYLVANIA	1	25	0.050	0.436	0.487	2,015	17,416	19,431
51179	VA - STAFFORD	2	33	0.082	0.316	0.398	2,495	9,621	12,117
51185	VA - TAZEWELL	2	5	0.292	0.148	0.440	64,544	32,708	97,251
53015	WA - COWLITZ	1	39	0.006	0.117	0.123	159	2,967	3,126
53051	WA - PEND OREILLE	1	1	0.050	0.005	0.055	55,075	5,433	60,507
53063	WA - SPOKANE	1	28	0.169	0.000	0.169	5,982	0	5,982
54007	WV - BRAXTON	5	20	0.310	0.058	0.368	15,680	2,926	18,606
54009	WV - BROOKE	6	7	0.064	0.052	0.117	9,433	7,635	17,069
54023	WV - GRANT	18	94	2.335	1.268	3.603	24,737	13,434	38,171
54025	WV - GREENBRIER	1	14	1.862	0.242	2.104	137,620	17,881	155,501
54031	WV - HARDY	7	65	1.596	1.699	3.295	24,628	26,208	50,836
54033	WV - HARRISON	7	2	0.022	0.018	0.040	9,433	7,635	17,069
54035	WV - JACKSON	7	112	1.300	7.095	8.395	11,642	63,516	75,159
54039	WV - KANAWHA	4	4	0.591	0.277	0.868	148,147	69,406	217,553
54041	WV - LEWIS	8	7	0.324	0.059	0.382	49,209	8,912	58,121
54043	WV - LINCOLN	1	51	0.385	1.286	1.672	7,514	25,080	32,594
54049	WV - MARION	7	12	1.236	1.384	2.620	101,341	113,438	214,779
54051	WV - MARSHALL	11	107	15.327	0.131	15.458	142,897	1,223	144,120
54055	WV - MERCER	13	19	0.717	1.697	2.414	37,116	87,838	124,954
54057	WV - MINERAL	29	78	1.242	0.359	1.602	15,903	4,599	20,501
54065	WV - MORGAN	8	2	0.249	0.281	0.530	147,131	166,525	313,656
54069	WV - OHIO	1	29	4.003	0.028	4.031	138,608	970	139,578
54071	WV - PENDLETON	19	86	3.007	0.000	3.007	34,917	0	34,917
54075	WV - POCAHONTAS	1	1	0.165	0.000	0.165	131,715	0	131,715
54077	WV - PRESTON	7	16	0.422	0.345	0.767	25,911	21,211	47,122
54083	WV - RANDOLPH	1	8	0.000	2.062	2.062	0	244,927	244,927
54085	WV - RITCHIE	3	91	1.010	0.706	1.715	11,040	7,717	18,756
54087	WV - ROANE	2	7	0.087	0.497	0.584	12,223	69,742	81,965
54089	WV - SUMMERS	1	3	0.027	0.022	0.048	9,433	7,635	17,069
54101	WV - WEBSTER	1	1	0.214	0.637	0.851	182,595	544,368	726,963
54107	WV - WOOD	2	8	1.572	0.181	1.753	205,495	23,690	229,185
55011	WI - BUFFALO	8	18	0.076	0.000	0.076	4,262	0	4,262
55019	WI - CLARK	1	12	0.345	0.132	0.477	28,629	10,990	39,619
55023	WI - CRAWFORD	1	2	0.018	0.001	0.018	7,975	241	8,215
55033	WI - DUNN	3	7	0.060	0.004	0.064	8,355	536	8,891
55037	WI - FLORENCE	1	5	0.047	0.038	0.084	9,433	7,635	17,069
55049	WI - IOWA	11	73	0.120	1.049	1.169	1,641	14,341	15,982
55063	WI - LA CROSSE	2	3	0.009	0.011	0.020	2,843	3,457	6,299
55081	WI - MONROE	8	16	0.054	0.042	0.095	3,380	2,637	6,018
55091	WI - PEPIN	6	10	0.064	0.040	0.103	6,150	3,825	9,975
55093	WI - PIERCE	4	26	0.125	0.402	0.528	4,892	15,706	20,598
55103	WI - RICHLAND	8	14	0.072	0.035	0.107	5,093	2,509	7,602
55109	WI - ST. CROIX	10	26	0.077	0.175	0.252	2,933	6,657	9,591
55111	WI - SAUK	3	16	0.056	0.126	0.182	3,631	8,085	11,716
55123	WI - VERNON	22	118	0.387	0.809	1.196	3,278	6,857	10,135
56001	WY - ALBANY	1	46	0.434	0.351	0.785	9,433	7,635	17,069
56011	WY - CROOK	1	6	0.052	0.042	0.094	9,433	7,635	17,069
56015	WY - GOSHEN	9	66	0.722	0.117	0.839	10,936	1,767	12,703
56019	WY - JOHNSON	2	59	0.314	0.540	0.854	5,306	9,126	14,432
56035	WY - SUBLETTE	1	130	0.000	0.289	0.289	0	2,227	2,227
72011	PR - ANASCO	2	1	0.200	0.308	0.508	179,854	277,815	457,668

P-17	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (1271)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
AL-2002.000	240	3	12	0.103	0.030	0.133	8,596	2,467	11,063
AL-2003.000	High Pine Creek	9	28	0.188	0.013	0.202	6,622	468	7,090
AL-2005.000	Bristow's Creek	1	4	0.102	0.156	0.257	27,334	41,860	69,194
AL-2007.000	Little Paint Creek	1	4	0.164	0.019	0.184	40,090	4,674	44,764
AL-2008.000	Terrapin Creek	10	122	0.476	0.088	0.564	3,892	715	4,608
AL-2009.000	Big Prairie and French Creeks	2	24	0.949	0.424	1.374	39,894	17,833	57,727
AL-2010.000	Powell Creek	9	17	0.286	0.106	0.392	16,416	6,099	22,515
AL-2012.000	Lost Creek	4	14	0.055	0.107	0.162	4,055	7,847	11,902
AL-2013.000	Hurricane Creek	1	1	0.101	0.105	0.206	74,039	77,270	151,308
AL-2014.000	Town Creek	5	16	0.122	0.095	0.217	7,389	5,790	13,179
AL-2015.000	Cheaha Creek	5	51	0.256	0.132	0.388	5,053	2,616	7,669
AL-2016.000	Big Nance Creek	1	13	0.060	0.243	0.303	4,623	18,615	23,238
AL-2018.000	Ketchepedrakee Creek	5	29	0.149	0.142	0.291	5,109	4,863	9,972
AL-2019.000	Crooked Creek	5	33	0.052	0.146	0.198	1,557	4,412	5,969
AL-2020.000	Choccolocco Creek	10	84	0.428	2.029	2.457	5,073	24,069	29,142
AL-2021.000	Blue Eye Creek	2	9	0.081	0.016	0.097	9,465	1,921	11,386
AL-2024.000	Cahulga Creek	1	7	0.081	0.103	0.184	12,451	15,865	28,315
AL-2025.000	Old Town Creek	6	35	0.451	0.312	0.763	13,003	8,992	21,994
AL-2028.000	Tallaseehatchie Creek	7	61	0.587	0.153	0.740	9,611	2,507	12,119
AL-2029.000	Mush Creek	2	16	0.138	0.084	0.222	8,588	5,234	13,823
AL-2032.000	Cypress Creek	1	1	0.018	0.032	0.050	12,472	22,710	35,183
AL-2033.000	Dynne Creek	2	6	0.009	0.015	0.024	1,574	2,570	4,143
AL-2034.000	Factory Creek	2	12	0.046	0.170	0.215	3,695	13,774	17,469
AL-2043.000	Dry Creek	6	5	0.060	0.078	0.138	11,641	15,085	26,727
AL-9000.000	Fox Creek	1	1	0.013	0.010	0.023	9,433	7,635	17,069
AL-9001.000	Lake Livingston University Dam -	1	1	0.010	0.008	0.018	9,433	7,635	17,069
AL-9002.000	Little Hillabee Creek	5	13	0.123	0.099	0.222	9,433	7,635	17,069
AZ-2002.000	Frye Creek-Stockton Wash	4	204	2.428	0.000	2.428	11,909	0	11,909
AZ-2003.000	Magma	1	74	0.645	0.000	0.645	8,677	0	8,677
AZ-2004.000	Florence	1	61	2.468	0.000	2.468	40,389	0	40,389
AZ-2005.000	Buckhorn-Mesa	2	26	20.414	0.000	20.414	779,442	0	779,442
AZ-2006.000	Apache Junction-Gilbert	2	56	29.222	0.000	29.222	524,628	0	524,628
AZ-2007.000	Williams-Chandler	2	109	11.066	0.000	11.066	101,426	0	101,426
AZ-2008.000	Buckeye	3	89	1.037	0.000	1.037	11,646	0	11,646
AZ-2010.000	Harquahala Valley	2	132	0.892	0.000	0.892	6,764	0	6,764
AZ-2011.000	Fredonia	1	9	0.573	0.000	0.573	67,391	0	67,391
AZ-2012.000	Guadalupe	1	2	0.743	0.000	0.743	397,569	0	397,569
AZ-2014.000	Wickenburg	2	2	0.198	0.000	0.198	101,286	0	101,286
AZ-8000.000	White Tanks	2	41	0.384	0.311	0.695	9,433	7,635	17,069
AZ-9003.000	Foote Wash Dam	1	10	0.096	0.078	0.174	9,433	7,635	17,069
AZ-9004.000	No Name Wash Frs	1	1	0.010	0.008	0.017	9,433	7,635	17,069
AR-2001.000	Caney Creek	7	12	0.970	0.804	1.773	83,587	69,275	152,862
AR-2003.000	Ouachita Creek	3	3	0.077	0.062	0.138	27,958	22,390	50,349
AR-2005.000	Flat Creek	6	25	0.471	3.653	4.124	18,592	144,100	162,692
AR-2007.000	West Fork Point Remove Creek	19	151	1.089	0.004	1.093	7,212	27	7,240
AR-2008.000	East Fork Point Remove Creek	11	77	0.044	0.160	0.204	570	2,076	2,646
AR-2011.000	Muddy Fork of Illinois River	4	29	0.324	0.029	0.353	11,182	999	12,181
AR-2013.000	Big Creek	21	38	0.366	1.943	2.308	9,595	50,993	60,588
AR-2017.000	Poteau River	16	91	1.043	5.847	6.890	11,464	64,249	75,712
AR-2018.000	Tupelo Bayou	2	13	0.282	0.033	0.315	22,500	2,638	25,138
AR-2019.000	Mud Creek	1	5	0.446	0.592	1.038	89,119	118,428	207,546
AR-2029.000	Haney Creek	1	3	0.200	0.086	0.287	66,816	28,815	95,631
AR-2030.000	Cooper Creek	6	33	0.669	0.082	0.751	20,089	2,462	22,552
AR-2031.000	Little Clear Creek	1	15	0.357	0.116	0.473	23,797	7,730	31,527
AR-2034.000	North Fork of Ozan Creek	6	18	0.862	0.059	0.922	46,749	3,226	49,976
AR-2036.000	Fourche Creek	7	46	5.078	1.596	6.674	110,385	34,698	145,083
AR-2038.000	South Fourche	7	94	0.266	0.193	0.458	2,828	2,049	4,877
AR-2039.000	Cedar-Piney Creeks	3	19	0.000	0.355	0.355	0	18,710	18,710
AR-2042.000	Poinsett	33	14	1.813	0.091	1.904	127,670	6,383	134,054
AR-2043.000	Des Arc Bayou	5	51	0.378	0.657	1.035	7,434	12,920	20,354
AR-2045.000	Upper Tri-County	3	8	0.492	0.489	0.981	58,377	58,130	116,507
AR-2046.000	Little Mulberry Creek	1	22	0.453	0.391	0.844	20,586	17,772	38,357
AR-2047.000	Galla Creek	1	22	0.275	0.399	0.674	12,492	18,148	30,640
AR-2050.000	Upper Petit Jean	3	42	1.397	0.543	1.940	33,265	12,936	46,201
AR-2051.000	Upper Ouachita River	1	34	0.339	21.164	21.503	9,973	622,468	632,440
AR-2052.000	Flat Rock Creek	1	0	1.129	0.487	1.616	3,320,738	1,430,962	4,751,700
AR-2053.000	Ozan Creeks	10	9	0.491	0.164	0.655	55,343	18,448	73,791
AR-2054.000	South Fork	2	12	0.299	0.112	0.411	24,893	9,323	34,216
AR-8001.000	Six Mile Creek	24	77	0.731	0.591	1.322	9,433	7,635	17,069
AR-9005.000	Bailey Branch	1	3	0.025	0.020	0.045	9,433	7,635	17,069
AR-9006.000	Cane Creek	1	21	0.198	0.160	0.358	9,433	7,635	17,069
AR-9007.000	Old Davidsonville State Park	1	0	0.001	0.001	0.002	9,433	7,635	17,069
CA-2005.000	Adobe Creek	2	22	0.518	0.000	0.518	23,498	0	23,498
CA-2006.000	Central Sonoma	4	15	2.172	0.000	2.172	141,066	0	141,066
CA-2008.000	Marsh-Kellogg Creek	3	60	23.076	5.471	28.547	384,221	91,093	475,314
CA-2011.000	Escondido Creek	1	3	4.679	4.353	9.032	1,344,557	1,250,870	2,595,427
CA-2014.000	Beardsley	1	1	2.951	1.553	4.505	4,918,640	2,589,047	7,507,687
CA-2018.000	Mustang Creek	1	12	0.422	0.000	0.422	34,855	0	34,855
CA-2021.000	Carpinteria Valley	1	4	5.414	0.316	5.730	1,424,755	83,104	1,507,859
CA-2026.000	Tehachapi	2	10	1.584	0.061	1.645	153,048	5,875	158,923
CA-8002.000	Pine Creek (Walnut Creek)	1	3	0.030	0.024	0.054	9,433	7,635	17,069
CO-2001.000	Wray	6	3	0.125	0.037	0.161	38,694	11,367	50,061
CO-2002.000	Big Sandy Creek	14	113	0.093	0.107	0.200	824	948	1,772
CO-2003.000	West Cherry Creek	11	33	0.097	0.045	0.142	2,971	1,384	4,355
CO-2004.000	Coalbank Creek	1	27	0.305	0.077	0.383	11,308	2,859	14,167
CO-2005.000	Franktown-Parker Tributaries of (	22	96	0.797	0.212	1.009	8,309	2,205	10,514
CO-2007.000	Fishers Peak-Carbon Arroyos	2	1	0.069	0.003	0.072	48,042	2,123	50,165
CO-2009.000	Limon	3	13	0.085	0.020	0.105	6,360	1,498	7,859
CO-2010.000	Roatcap Wash	1	12	0.084	0.015	0.100	7,263	1,331	8,594
CO-2011.000	Indian Wash	1	6	0.314	0.015	0.329	49,465	2,327	51,791
CO-2012.000	Home Supply	2	2	0.000	0.952	0.952	0	532,165	532,165
CO-2013.000	Pine River	2	2	0.072	0.144	0.216	35,825	72,101	107,925
CO-2015.000	Canon	2	4	0.625	0.000	0.625	146,997	0	146,997
CO-2016.000	Crooked Arroyo	4	102	0.386	0.046	0.432	3,787	449	4,237
CO-2017.000	Boxelder Creek	5	183	1.980	0.390	2.370	10,837	2,132	12,969
CO-2019.000	Sedgwick-Sand Draws	9	58	0.223	0.768	0.991	3,832	13,203	17,035
CO-2021.000	Shavano Valley	2	6	0.832	0.106	0.938	147,179	18,798	165,977
CO-8003.000	Kiowa Creek	55	72	0.679	0.549	1.228	9,433	7,635	17,069
CO-9008.000	Mud Gulch	1	2	0.021	0.017	0.039	9,433	7,635	17,069
CO-9009.000	Dry Creek	1	1	0.005	0.004	0.009	9,433	7,635	17,069

P-18	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
CO-9010.000	North Walsenburg	1	1	0.006	0.005	0.011	9,433	7,635	17,069
CT-2002.000	Furnace Brook-Middle River	6	19	0.231	0.013	0.244	12,475	705	13,180
CT-2003.000	Blackberry River	4	18	0.989	0.031	1.020	55,893	1,746	57,638
CT-2004.000	North Branch Park River	5	11	2.214	0.081	2.295	209,299	7,661	216,961
CT-2005.000	South Branch Park River	5	8	2.626	0.000	2.626	313,777	0	313,777
CT-2006.000	Spaulding Pond Brook	2	0	0.290	0.289	0.579	604,463	601,136	1,205,598
CT-2007.000	Farm Brook	3	5	0.891	0.007	0.898	195,436	1,547	196,983
CT-2008.000	Norwalk River	2	4	0.237	0.000	0.237	63,068	0	63,068
CT-2009.000	Avery Brook	2	2	0.217	0.000	0.217	129,132	0	129,132
CT-9011.000	Mansfield Rec Pond	1	1	0.007	0.006	0.012	9,433	7,635	17,069
FL-2002.000	Fisheating Creek	1	70	0.049	0.544	0.594	703	7,777	8,480
FL-2003.000	North St. Lucie River Drainage D	2	98	0.023	0.157	0.180	235	1,596	1,831
FL-2005.000	Sebastian River Drainage Distric	2	15	0.161	2.371	2.531	10,649	157,221	167,870
FL-2009.000	South Sumter	1	19	0.125	0.082	0.206	6,407	4,209	10,616
FL-2015.000	Fort Pierce Farms	2	51	0.094	1.565	1.659	1,852	30,810	32,663
FL-2016.000	Palatlakaha River	2	222	0.072	0.139	0.212	327	629	956
GA-2004.000	Rooty Creek	5	11	0.119	0.022	0.141	10,722	1,953	12,674
GA-2005.000	Sautee Creek	5	11	0.095	0.055	0.150	8,526	4,974	13,500
GA-2006.000	Barber Creek	4	11	0.135	0.034	0.169	12,193	3,084	15,277
GA-2007.000	Little Tallapoosa River	14	63	0.560	0.376	0.936	8,836	5,946	14,782
GA-2008.000	Mill Creek	5	23	0.091	0.017	0.107	3,976	722	4,698
GA-2009.000	Hightower Creek	4	6	0.085	0.028	0.113	13,500	4,485	17,985
GA-2010.000	Tobosofkee Creek	3	204	0.208	6.947	7.155	1,017	33,991	35,008
GA-2011.000	Head of Little Tennessee River	1	1	0.013	0.010	0.023	9,433	7,635	17,069
GA-2012.000	Palmetto Creek	3	10	0.030	0.054	0.084	3,055	5,464	8,518
GA-2013.000	Potato Creek	9	52	0.388	0.025	0.413	7,453	475	7,928
GA-2014.000	North Broad River	8	20	0.147	0.095	0.243	7,487	4,854	12,341
GA-2015.000	Hazel Creek	4	8	0.034	0.102	0.136	4,233	12,617	16,850
GA-2016.000	Sandy Creek	6	16	0.051	0.030	0.081	3,159	1,863	5,022
GA-2017.000	Bull Creek	11	36	0.731	0.900	1.632	20,309	25,000	45,309
GA-2018.000	South River	8	55	0.078	0.127	0.205	1,403	2,299	3,702
GA-2019.000	Little Satilla Creek	2	31	0.012	0.547	0.559	388	17,926	18,314
GA-2020.000	Haynes Creek-Brushy Fork Cree	4	7	0.225	0.072	0.297	32,493	10,420	42,913
GA-2021.000	Bishop Creek	3	9	0.206	0.078	0.284	23,882	9,074	32,956
GA-2022.000	Marbury Creek	3	14	0.072	0.131	0.203	5,054	9,229	14,283
GA-2023.000	Middle Fork Broad River	6	30	0.057	0.162	0.219	1,866	5,340	7,207
GA-2024.000	Rocky Comfort Creek	4	27	0.022	0.880	0.902	805	32,482	33,288
GA-2026.000	Middle Oconee-Walnut Creek	11	26	0.242	0.196	0.438	9,433	7,635	17,069
GA-2028.000	Cane Creek	4	20	0.108	0.200	0.308	5,329	9,913	15,241
GA-2033.000	Beaverdam Creek	7	29	0.188	0.021	0.209	6,423	708	7,131
GA-2034.000	South Fork Little River	3	12	0.046	0.008	0.054	3,855	682	4,537
GA-2035.000	Lower Little Tallapoosa River	14	66	0.162	0.844	1.006	2,460	12,797	15,257
GA-2036.000	South Fork of Broad River	5	18	0.160	0.199	0.359	8,812	10,951	19,763
GA-2037.000	Grove River	8	41	0.222	0.342	0.564	5,429	8,355	13,785
GA-2039.000	Bridge Creek-Ochlocknee River	3	2	0.000	0.073	0.073	0	42,998	42,998
GA-2040.000	Euharlee Creek	4	9	0.197	0.059	0.256	22,507	6,761	29,267
GA-2041.000	Pine Log Tributary	4	8	0.080	0.064	0.144	9,433	7,635	17,069
GA-2042.000	Sallacoa Creek	10	30	0.280	0.226	0.506	9,433	7,635	17,069
GA-2043.000	Little Sandy Creek & Trail Creek	6	36	0.132	0.627	0.759	3,715	17,588	21,302
GA-2044.000	Big Cedar Creek	5	12	0.938	0.021	0.958	81,239	1,811	83,050
GA-2045.000	Little River II	3	8	0.017	0.011	0.027	2,157	1,409	3,567
GA-2049.000	Hudson River	1	4	0.000	1.200	1.200	0	322,677	322,677
GA-2051.000	Tesnatee Creek	1	3	0.014	0.080	0.094	4,300	24,695	28,994
GA-2052.000	Yellowjacket Creek	1	6	0.018	0.004	0.022	2,875	681	3,556
GA-2056.000	Little Creek	2	2	0.000	0.047	0.047	0	28,383	28,383
GA-2057.000	Soque Creek	6	19	0.182	0.147	0.330	9,433	7,635	17,069
GA-2058.000	Head of Chattooga River	4	183	0.167	0.128	0.294	914	698	1,612
GA-2060.000	Cedar Creek	1	13	0.079	0.022	0.101	5,877	1,665	7,542
GA-2062.000	Upper Mulberry River	3	12	0.070	0.094	0.164	5,806	7,881	13,687
GA-1001.001	Talking Rock Creek-Coosa	6	26	0.099	0.000	0.099	3,865	0	3,865
GA-1001.003	Little River - Coosa	17	43	0.209	0.068	0.277	4,906	1,596	6,502
GA-1001.004	Amicalola Creek-Coosa	4	16	0.071	0.025	0.095	4,420	1,551	5,971
GA-1001.005	Cartecay River-Coosa	7	49	0.245	0.055	0.301	4,988	1,126	6,113
GA-1001.006	Long Swamp Creek-Coosa	4	15	0.107	0.036	0.143	7,069	2,406	9,475
GA-1001.007	Etowah River Reach-Coosa	12	44	0.071	0.203	0.274	1,609	4,608	6,217
GA-1001.008	Mill-Canton Creeks-Coosa	7	19	0.239	0.130	0.369	12,437	6,748	19,185
GA-1001.009	Stamp-Shoal Creeks-Coosa	2	15	0.068	0.000	0.068	4,590	0	4,590
GA-1001.010	Sharp Mountain Creek-Coosa	12	28	0.794	0.044	0.838	28,363	1,564	29,927
GA-1001.011	Settingdown Creek-Coosa	15	25	0.096	0.431	0.527	3,841	17,188	21,029
GA-1001.012	Raccoon Creek-Coosa	2	5	0.026	0.000	0.026	5,107	0	5,107
GA-1001.013	Pumpkinville Creek-Coosa	12	28	0.108	0.296	0.404	3,820	10,524	14,345
GA-1001.014	Noonday Creek-Coosa	5	8	0.024	0.003	0.027	3,060	408	3,467
GA-1001.015	Mountaintown Creek-Coosa	4	25	0.066	0.076	0.142	2,601	3,005	5,606
GA-1001.016	Ellijay River-Coosa	8	44	0.131	0.042	0.172	2,948	943	3,890
GA-8004.000	North Fork of The Broad River	12	24	0.223	0.181	0.404	9,433	7,635	17,069
GA-9012.000	Gwinnett RC&D	8	33	0.313	0.253	0.565	9,433	7,635	17,069
GA-9013.000	Tri-County	2	0	0.003	0.002	0.005	9,433	7,635	17,069
HI-2003.000	Puukapu	1	3	0.304	0.205	0.509	99,619	67,181	166,800
HI-2007.000	Honolua	5	13	2.373	0.410	2.782	183,506	31,672	215,179
HI-2009.000	Waimanalo	1	0	0.000	5.163	5.163	0	##########	##########
HI-2013.000	Lower Hamakua Ditch	1	0	0.000	3.140	3.140	0	52,328,771	52,328,771
HI-9014.000	Happy Valley	1	0	0.000	0.000	0.001	9,433	7,635	17,069
ID-2004.000	Cedar Creek	1	7	0.000	0.526	0.526	0	75,140	75,140
ID-2005.000	Montpelier Creek	1	28	0.603	0.347	0.950	21,547	12,392	33,939
ID-2013.000	Brundage Creek	1	6	0.000	0.932	0.932	0	169,366	169,366
IL-2002.000	Tiskilwa	4	4	0.025	0.000	0.025	6,031	0	6,031
IL-2003.000	Hambaugh-Martin	8	5	0.014	0.010	0.024	2,963	2,222	5,185
IL-2004.000	Big Blue	2	15	0.029	0.000	0.029	1,916	0	1,916
IL-2005.000	Shoal Creek	5	251	0.158	0.017	0.175	628	68	696
IL-2011.000	Little Cache Creek	5	26	0.275	0.000	0.275	10,617	0	10,617
IL-2012.000	Little Creek	1	4	0.407	0.000	0.407	114,572	0	114,572
IL-2015.000	Coal & Crane Creek	12	19	0.546	0.000	0.546	29,329	0	29,329
IL-2016.000	Bay Creek	3	41	0.689	0.000	0.689	16,899	0	16,899
IL-2017.000	Mill Creek	8	65	0.812	0.565	1.377	12,539	8,727	21,266
IL-2022.000	Mendota	1	2	0.512	0.000	0.512	231,621	0	231,621
IL-2023.000	Upper Salt Creek	4	61	3.156	2.891	6.047	52,152	47,770	99,922
IL-2035.000	Lake Taylorville	2	115	0.000	0.258	0.258	0	2,239	2,239
IL-8005.000	Hadley Creek	5	4	0.034	0.027	0.061	9,433	7,635	17,069
IL-8006.000	Old Tom Creek	6	4	0.037	0.030	0.066	9,433	7,635	17,069
IN-2001.000	Elk Creek	7	8	0.055	0.057	0.113	7,353	7,600	14,953

P-19	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
IN-2002.000	Prairie Creek (Daviess)	11	39	0.273	0.439	0.712	7,025	11,305	18,329
IN-2003.000	Busseron Creek	22	63	0.778	3.023	3.801	12,445	48,346	60,791
IN-2004.000	Boggs Creek	2	49	0.042	0.033	0.075	853	669	1,521
IN-2006.000	French Lick Creek	4	12	0.132	0.054	0.186	11,054	4,567	15,621
IN-2007.000	Middle Fork of Anderson River	8	53	0.358	1.190	1.548	6,779	22,525	29,304
IN-2010.000	Stucker Fork	20	63	0.682	0.462	1.144	10,801	7,304	18,105
IN-2014.000	Prairie Creek (Vigo)	3	15	0.147	0.053	0.200	9,740	3,517	13,256
IN-2016.000	Twin-Rush Creek	3	22	0.258	0.791	1.049	11,578	35,503	47,081
IN-2017.000	Muddy Fork of Silver Creek	5	14	0.247	0.455	0.702	17,605	32,381	49,986
IN-2018.000	Little Raccoon Creek	16	81	0.394	0.646	1.040	4,868	7,982	12,850
IN-2020.000	Upper Big Blue River	10	58	1.425	1.644	3.069	24,574	28,337	52,911
IN-2022.000	Prides Creek	1	1	0.122	0.511	0.634	154,997	646,931	801,928
IN-2023.000	West Boggs Creek	1	13	0.122	0.843	0.964	9,157	63,517	72,674
IN-2025.000	Delaney Creek	12	17	0.214	0.788	1.002	12,665	46,539	59,204
IN-2027.000	Little Walnut Creek	3	31	0.274	0.622	0.896	8,929	20,298	29,227
IN-2036.000	Anderson River	4	2	0.508	2.425	2.932	213,284	1,018,717	1,232,001
IN-9015.000	Buffalo Trace Lake Dam	1	1	0.010	0.008	0.017	9,433	7,635	17,069
IN-9016.000	Deer Creek	1	6	0.055	0.044	0.099	9,433	7,635	17,069
IA-2004.000	Harmony Creek	5	5	0.042	0.005	0.047	9,052	1,192	10,244
IA-2005.000	Rocky Branch Creek	8	3	0.033	0.033	0.066	12,329	12,525	24,854
IA-2006.000	Simpson Creek	3	2	0.038	0.001	0.039	18,681	572	19,253
IA-2007.000	Crooked Creek	4	2	0.131	0.084	0.216	82,958	53,385	136,343
IA-2008.000	Big Park	15	7	0.128	0.000	0.128	17,225	0	17,225
IA-2009.000	Mill-Picayune Creek	85	48	0.717	0.011	0.727	14,784	220	15,004
IA-2010.000	Badger Creek	28	35	0.239	1.343	1.582	6,924	38,835	45,759
IA-2011.000	Hamburg	1	1	0.036	0.000	0.036	40,427	0	40,427
IA-2012.000	Moulton	8	7	0.083	0.048	0.130	11,197	6,426	17,623
IA-2013.000	Indian Creek	9	4	0.183	0.000	0.183	46,997	0	46,997
IA-2014.000	Pony Creek	17	18	0.264	0.000	0.264	14,320	0	14,320
IA-2015.000	Ryan-Henschal	6	4	0.107	0.006	0.113	28,213	1,647	29,860
IA-2016.000	Davids Creek	14	8	0.032	0.213	0.244	3,762	25,402	29,164
IA-2017.000	Hound Dog Creek	11	4	0.049	0.045	0.094	13,895	12,675	26,570
IA-2018.000	Bee Jay	3	3	0.074	0.054	0.128	22,152	15,944	38,097
IA-2019.000	Davis-Battle Creek	15	4	0.124	0.001	0.125	31,780	234	32,014
IA-2020.000	Big Wyacondah	36	14	0.233	0.016	0.249	16,461	1,095	17,556
IA-2021.000	Pierce Creek No. 1	5	5	0.057	0.000	0.057	11,656	0	11,656
IA-2022.000	Stennett-Red Oak Creek	11	6	0.052	0.020	0.072	8,450	3,282	11,732
IA-2023.000	Held	13	5	0.110	0.000	0.110	20,790	0	20,790
IA-2024.000	English Bench	7	3	0.034	0.016	0.050	11,466	5,578	17,045
IA-2025.000	South Hungerford No. 2	5	2	0.057	0.000	0.057	36,505	0	36,505
IA-2026.000	Diamond Lake	4	2	0.056	0.000	0.056	32,260	0	32,260
IA-2027.000	Blockton	23	14	0.219	0.000	0.219	16,096	0	16,096
IA-2029.000	Walters Creek	31	34	0.181	1.352	1.532	5,346	40,028	45,374
IA-2030.000	Turkey Creek	54	25	0.232	0.344	0.576	9,416	13,979	23,395
IA-2031.000	Mosquito of Harrison	18	11	0.342	0.000	0.342	31,163	0	31,163
IA-2032.000	West Douglas	10	2	0.078	0.000	0.078	34,604	0	34,604
IA-2033.000	Gant Creek	14	6	0.130	0.000	0.130	23,152	0	23,152
IA-2034.000	Dane Ridge	31	16	0.278	0.000	0.278	17,164	0	17,164
IA-2036.000	Three Mile Creek	28	37	0.462	1.253	1.714	12,354	33,511	45,865
IA-2037.000	Leutzinger-Lowe Run	1	5	0.069	0.000	0.069	13,277	0	13,277
IA-2038.000	West Sunnyside	10	4	0.084	0.000	0.084	21,383	0	21,383
IA-2039.000	North Pigeon	15	7	0.146	0.000	0.146	21,646	0	21,646
IA-2040.000	Waubonsie Creek	27	27	0.320	0.029	0.349	11,743	1,062	12,805
IA-2041.000	Ledgewood Creek	9	7	0.097	0.043	0.140	14,459	6,415	20,875
IA-2042.000	Pioneer	1	6	0.019	0.511	0.530	3,059	83,884	86,942
IA-2043.000	Simon Run	4	1	0.104	0.000	0.104	167,128	0	167,128
IA-2044.000	Bacon Creek	32	14	0.704	0.757	1.462	51,717	55,590	107,306
IA-2045.000	Troublesome Creek	66	26	0.619	0.485	1.104	23,422	18,364	41,786
IA-2046.000	Twelve Mile Creek	30	46	0.334	0.537	0.871	7,309	11,773	19,082
IA-2047.000	Pierce Creek No. 2	8	3	0.062	0.000	0.062	20,030	0	20,030
IA-2048.000	Little River	7	37	0.500	1.033	1.533	13,525	27,961	41,486
IA-2050.000	Indian Creek-Van Buren	7	34	0.200	0.888	1.089	5,822	25,816	31,638
IA-2051.000	Twin Ponies	2	4	0.162	0.000	0.162	43,575	0	43,575
IA-2053.000	A&T Longbranch	3	1	0.000	0.523	0.523	0	769,366	769,366
IA-2055.000	Soap Creek	132	62	0.976	0.000	0.976	15,671	0	15,671
IA-2057.000	Little Paint Creek	2	3	0.029	0.106	0.135	9,916	35,754	45,670
IA-2058.000	Bear Creek	10	5	0.094	0.121	0.215	18,822	24,316	43,139
IA-2801.000	East Fork of Big Creek	21	6	0.155	0.000	0.155	27,070	0	27,070
IA-2802.000	West Fork of Big Creek	51	15	0.286	0.407	0.693	18,913	26,920	45,833
IA-2803.000	Upper Locust Creek	15	4	0.106	0.073	0.179	26,977	18,727	45,704
IA-2804.000	East Fork of the Grand River	91	28	0.787	0.869	1.656	28,302	31,232	59,534
IA-7601.001	AFMSCS-Little Sioux	2	0	0.048	0.000	0.048	123,398	0	123,398
IA-7601.002	Anthon-Little Sioux	3	0	0.004	0.003	0.007	9,433	7,635	17,069
IA-7601.003	Arlington-Little Sioux	6	3	0.040	0.000	0.040	14,659	0	14,659
IA-7601.004	Arnold-Armstrong-Little Sioux	15	8	0.025	0.140	0.165	3,103	17,414	20,517
IA-7601.007	Baker-Little Sioux	3	1	0.002	0.024	0.026	1,878	24,663	26,541
IA-7601.008	Barber Hollow-Little Sioux	2	0	0.001	0.017	0.017	1,581	50,575	52,156
IA-7601.009	Big Coon Creek-Little Sioux	8	8	0.248	0.000	0.248	32,183	0	32,183
IA-7601.011	Big Whiskey One-Little Sioux	4	1	0.035	0.000	0.035	28,241	0	28,241
IA-7601.012	Bitter Creek-Little Sioux	5	2	0.035	0.000	0.035	21,609	0	21,609
IA-7601.014	Camp Creek-Little Sioux	8	5	0.109	0.222	0.331	23,699	48,248	71,947
IA-7601.015	Clark-Little Sioux	2	1	0.012	0.009	0.021	9,433	7,635	17,069
IA-7601.017	College Corner-Little Sioux	4	2	0.072	0.000	0.072	30,264	0	30,264
IA-7601.018	Cord-Little Sioux	3	1	0.015	0.000	0.015	15,751	0	15,751
IA-7601.019	Bruene-Spahn-Little Sioux	1	0	0.009	0.000	0.009	35,161	0	35,161
IA-7601.021	Cottonwood-Green Valley-Little S	4	2	0.102	0.019	0.121	60,101	11,327	71,428
IA-7601.022	Crawford Creek-Little Sioux	12	6	0.135	0.300	0.435	22,242	49,289	71,531
IA-7601.023	Croy-Little Sioux	15	3	0.028	0.023	0.052	9,433	7,635	17,069
IA-7601.024	Davis-Little Sioux	11	4	0.003	0.064	0.067	721	15,333	16,054
IA-7601.026	Dickman-Little Sioux	3	1	0.042	0.000	0.042	51,463	0	51,463
IA-7601.028	Dutch Hollow-Little Sioux	12	7	0.189	0.000	0.189	25,422	0	25,422
IA-7601.029	East Aldrich Creek-Little Sioux	3	1	0.009	0.008	0.017	9,433	7,635	17,069
IA-7601.031	East Waterman Creek-Little Siou	1	1	0.012	0.000	0.012	15,159	0	15,159
IA-7601.034	Elkhorn No. 2-Little Sioux	3	1	0.022	0.000	0.022	38,392	0	38,392
IA-7601.036	Fee-Little Sioux	2	1	0.012	0.010	0.022	9,433	7,635	17,069
IA-7601.037	Gallup-Little Sioux	2	0	0.005	0.004	0.009	9,433	7,635	17,069
IA-7601.040	Garton-Little Sioux	1	1	0.006	0.005	0.011	9,433	7,635	17,069
IA-7601.041	Glen Ellen-Little Sioux	3	1	0.024	0.000	0.024	23,628	0	23,628
IA-7601.042	Gothier No.2-Little Sioux	2	0	0.011	0.004	0.015	23,580	7,584	31,164
IA-7601.043	Grand Meadow-Little Sioux	3	3	0.022	0.005	0.027	8,148	1,854	10,002

P-20	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
IA-7601.045	Heisler Creek-Little Sioux	6	3	0.037	0.001	0.038	14,664	414	15,078
IA-7601.047	Huff-Little Sioux	5	2	0.036	0.012	0.048	18,607	6,113	24,720
IA-7601.048	Innes-Jalas-Little Sioux	1	0	0.003	0.001	0.004	13,673	4,563	18,236
IA-7601.049	Jett-Little Sioux	7	3	0.058	0.006	0.064	21,917	2,369	24,286
IA-7601.050	Kirkholm-Little Sioux	3	0	0.004	0.003	0.007	9,433	7,635	17,069
IA-7601.052	Lawson-Little Sioux	4	2	0.038	0.016	0.054	17,470	7,277	24,747
IA-7601.053	Leech Hollow-Little Sioux	7	8	0.106	0.000	0.106	12,657	0	12,657
IA-7601.054	Little Beaver-Little Sioux	6	3	0.019	0.041	0.060	6,579	13,912	20,491
IA-7601.055	Little Egypt-Little Sioux	8	4	0.003	0.036	0.039	918	10,166	11,083
IA-7601.056	Little Whiskey-Little Sioux	3	2	0.084	0.000	0.084	38,118	0	38,118
IA-7601.057	Lower Beaver-Little Sioux	2	1	0.007	0.006	0.013	9,433	7,635	17,069
IA-7601.058	Lum Hollow-Little Sioux	16	9	0.086	0.005	0.091	9,143	482	9,625
IA-7601.062	McCall-Little Sioux	11	5	0.130	0.039	0.169	23,751	7,109	30,860
IA-7601.063	McDonald-Little Sioux	3	1	0.018	0.000	0.018	19,012	415	19,426
IA-7601.065	McLarty-Edwards-Little Sioux	8	3	0.050	0.007	0.058	17,981	2,648	20,629
IA-7601.066	McMaster-Little Sioux	4	1	0.004	0.000	0.004	2,715	0	2,715
IA-7601.067	Mike Mikkelson-Little Sioux	10	6	0.108	0.000	0.108	17,610	0	17,610
IA-7601.068	Miller-Little Sioux	3	1	0.009	0.000	0.009	13,650	0	13,650
IA-7601.070	Moore-Little Sioux	2	1	0.019	0.018	0.036	26,613	25,309	51,922
IA-7601.072	Mortensen-Little Sioux	1	1	0.013	0.011	0.024	9,433	7,635	17,069
IA-7601.074	Muckey Creek-Little Sioux	8	3	0.001	0.018	0.019	184	6,434	6,618
IA-7601.075	Mud Creek-Little Sioux	8	3	0.057	0.000	0.057	21,310	0	21,310
IA-7601.076	Nepper-Little Sioux	2	0	0.002	0.002	0.004	9,433	7,635	17,069
IA-7601.077	Neustrom-Little Sioux	12	5	0.145	0.000	0.145	30,932	0	30,932
IA-7601.078	Nutt Hollow-Little Sioux	6	3	0.029	0.006	0.035	11,350	2,494	13,844
IA-7601.080	Perion-Little Sioux	3	1	0.010	0.008	0.018	9,433	7,635	17,069
IA-7601.081	Phillips-Little Sioux	6	3	0.027	0.022	0.048	9,433	7,635	17,069
IA-7601.083	Pilot Rock-Little Sioux	3	2	0.036	0.009	0.045	21,225	5,365	26,590
IA-7601.084	Pleasant Valley-Little Sioux	9	3	0.040	0.003	0.043	11,624	906	12,530
IA-7601.085	Quad Valley-Little Sioux	3	1	0.048	0.008	0.057	51,467	8,739	60,205
IA-7601.087	Ralston-Little Sioux	4	2	0.042	0.000	0.042	22,245	0	22,245
IA-7601.088	Reed-Little Sioux	10	4	0.142	0.000	0.142	33,739	0	33,739
IA-7601.090	Robeson-Little Sioux	3	1	0.024	0.040	0.064	22,029	37,608	59,637
IA-7601.092	Rodney-Little Sioux	5	2	0.074	0.000	0.074	37,343	0	37,343
IA-7601.093	Simonsen-Little Sioux	4	2	0.014	0.012	0.026	9,433	7,635	17,069
IA-7601.094	Smokey Hollow-Little Sioux	4	2	0.176	0.003	0.179	78,222	1,447	79,668
IA-7601.096	Sunrise-Little Sioux	3	1	0.035	0.000	0.035	25,843	0	25,843
IA-7601.097	Theobald-Little Sioux	1	0	0.005	0.004	0.008	9,433	7,635	17,069
IA-7601.098	Tom King-Little Sioux	1	1	0.011	0.009	0.020	9,433	7,635	17,069
IA-7601.099	U.B.-Little Sioux	2	1	0.023	0.003	0.026	37,565	5,210	42,775
IA-7601.101	Upper Beaver-Little Sioux	8	3	0.084	0.008	0.092	32,270	3,206	35,476
IA-7601.102	Walling-Little Sioux	15	2	0.020	0.016	0.035	9,433	7,635	17,069
IA-7601.103	Washburn-Little Sioux	2	1	0.020	0.000	0.020	13,733	0	13,733
IA-7601.104	Waterman Spring-Little Sioux	3	3	0.022	0.000	0.022	7,908	0	7,908
IA-7601.105	Weber-Little Sioux	6	2	0.022	0.017	0.039	9,433	7,635	17,069
IA-7601.106	Weber Creek-Little Sioux	10	3	0.025	0.020	0.045	9,433	7,635	17,069
IA-7601.107	Wenger-Little Sioux	6	2	0.050	0.001	0.050	21,752	286	22,038
IA-7601.108	West Aldrich-Little Sioux	2	1	0.031	0.000	0.031	46,448	0	46,448
IA-7601.109	West Beaver-Little Sioux	5	1	0.025	0.002	0.027	20,174	1,603	21,777
IA-7601.111	West Fork No.1-Little Sioux	4	1	0.030	0.035	0.064	25,660	29,807	55,468
IA-7601.112	West Fork No.3-Little Sioux	6	2	0.024	0.003	0.027	12,383	1,317	13,700
IA-7601.115	West Wolf Creek-Little Sioux	9	3	0.123	0.000	0.123	35,571	0	35,571
IA-7601.116	Westside-Little Sioux	4	2	0.050	0.000	0.050	30,223	0	30,223
IA-7601.117	Willow Creek-Little Sioux	6	2	0.066	0.008	0.074	31,708	3,901	35,609
IA-7601.119	Windy Hill-Little Sioux	9	4	0.127	0.000	0.127	34,746	0	34,746
IA-7601.121	Wolf Creek-Little Sioux	9	7	0.144	0.000	0.144	20,613	0	20,613
IA-7601.123	Woods Hollow-Little Sioux	3	2	0.028	0.001	0.028	13,674	388	14,062
IA-7601.124	Woodward Glen-Little Sioux	1	1	0.013	0.007	0.020	13,156	6,903	20,060
IA-7601.125	Zellmer-Little Sioux	7	2	0.048	0.007	0.055	19,976	2,822	22,798
IA-7601.126	Arcola-Little Sioux	5	1	0.003	0.052	0.055	1,939	35,508	37,447
IA-7601.127	Parnell-Little Sioux	15	7	0.187	0.023	0.210	26,947	3,307	30,254
IA-8007.000	Honey Creek	13	4	0.035	0.028	0.063	9,433	7,635	17,069
IA-8008.000	Mule Creek	16	7	0.067	0.055	0.122	9,433	7,635	17,069
IA-9017.000	Southern Iowa	14	4	0.039	0.032	0.071	9,433	7,635	17,069
IA-9018.000	Pathfinders	6	2	0.021	0.017	0.039	9,433	7,635	17,069
IA-9019.000	Golden Hills	4	1	0.011	0.009	0.020	9,433	7,635	17,069
IA-9020.000	Chariton Valley	9	7	0.062	0.050	0.113	9,433	7,635	17,069
IA-9021.000	Geode	2	1	0.013	0.010	0.023	9,433	7,635	17,069
KS-2007.000	Cimarron	4	6	0.037	0.022	0.059	6,153	3,765	9,918
KS-2008.000	Thompsonville	3	2	0.069	0.000	0.069	29,088	0	29,088
KS-2009.000	Walnut Creek	44	60	0.306	0.303	0.609	5,061	5,011	10,072
KS-2010.000	Spring Creek	4	7	0.095	0.007	0.102	13,706	1,041	14,747
KS-2011.000	White Clay-Brewery-Whiskey Cre	25	9	1.858	0.000	1.858	200,224	0	200,224
KS-2012.000	Upper Verdigris	38	187	1.315	1.067	2.382	7,043	5,716	12,759
KS-2013.000	Fall River	27	150	1.433	0.249	1.682	9,540	1,655	11,195
KS-2014.000	Frog Creek	8	16	0.151	0.025	0.176	9,185	1,529	10,714
KS-2015.000	Andale	1	1	0.109	0.012	0.121	137,881	15,372	153,254
KS-2016.000	Nebo Creek	3	9	0.058	0.043	0.101	6,205	4,596	10,800
KS-2017.000	Bee Creek	7	29	0.624	0.105	0.728	21,646	3,635	25,281
KS-2018.000	Middle Caney	15	116	0.762	0.638	1.399	6,595	5,519	12,113
KS-2019.000	Twin Caney	15	79	1.317	0.357	1.674	16,607	4,501	21,109
KS-2020.000	Silver Creek	6	10	0.118	0.021	0.139	11,585	2,045	13,631
KS-2021.000	Little Walnut-Hickory	40	92	1.055	0.304	1.359	11,473	3,304	14,777
KS-2022.000	Grant-Shanghai Creeks	7	12	0.141	0.093	0.234	11,821	7,760	19,581
KS-2023.000	Big Caney	31	170	1.277	1.247	2.524	7,515	7,342	14,857
KS-2024.000	Muddy Creek	2	30	0.112	0.086	0.198	3,788	2,925	6,713
KS-2025.000	Rock Creek	22	58	0.597	0.459	1.057	10,375	7,978	18,353
KS-2026.000	Lakin	4	12	0.409	0.052	0.461	34,398	4,402	38,801
KS-2027.000	Timber Creek	33	98	1.084	3.581	4.665	11,055	36,531	47,586
KS-2028.000	Little Delaware-Mission Creeks &	38	33	0.017	0.508	0.525	515	15,323	15,838
KS-2029.000	Turkey Creek	15	63	0.806	0.266	1.072	12,835	4,240	17,075
KS-2030.000	Irish Creek	15	23	0.140	0.576	0.716	6,165	25,380	31,545
KS-2031.000	North Black Vermillion	30	33	0.364	0.551	0.914	10,911	16,522	27,434
KS-2032.000	Upper Black Vermillion	28	35	0.974	1.093	2.066	27,553	30,918	58,471
KS-2033.000	Upper Wakarusa	17	62	0.705	0.832	1.537	11,443	13,493	24,937
KS-2034.000	Lower Wakarusa	7	20	0.429	0.137	0.566	21,502	6,862	28,365
KS-2035.000	Spillman Creek	18	67	0.465	0.361	0.826	6,982	5,430	12,411
KS-2036.000	Cross Creek	15	67	0.896	0.306	1.202	13,284	4,531	17,815
KS-2037.000	Upper Elk River	27	136	0.933	1.595	2.528	6,838	11,687	18,525
KS-2038.000	Lower Elk River	20	76	0.981	0.530	1.511	12,916	6,986	19,902

P-21	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
KS-2039.000	Upper Salt Creek	39	162	1.488	0.209	1.697	9,170	1,287	10,456
KS-2040.000	Lower Salt Creek	5	28	0.870	0.200	1.069	31,281	7,179	38,460
KS-2041.000	Lyons Creek	15	58	0.507	0.666	1.173	8,686	11,397	20,083
KS-2043.000	Hargis Creek	1	8	0.088	0.027	0.115	11,011	3,444	14,454
KS-2044.000	West Sector Whitewater River	9	75	0.594	0.646	1.241	7,888	8,578	16,466
KS-2045.000	East Sector Whitewater River	6	20	0.291	0.233	0.525	14,564	11,650	26,215
KS-2046.000	Upper Walnut South Sector	2	9	0.080	0.205	0.286	8,582	22,022	30,604
KS-2047.000	North Sector Upper Walnut	23	96	0.484	0.801	1.285	5,022	8,310	13,331
KS-2048.000	Big Creek	6	23	0.199	0.159	0.359	8,706	6,971	15,676
KS-2049.000	Sand Creek	3	19	0.307	0.106	0.413	16,170	5,571	21,741
KS-2050.000	Middle Walnut	8	20	0.285	0.168	0.453	14,524	8,559	23,083
KS-2051.000	Wet Walnut No. 1	9	52	1.055	0.460	1.516	20,360	8,876	29,236
KS-2052.000	Wet Walnut No. 2	23	193	1.367	0.911	2.278	7,072	4,710	11,783
KS-2053.000	Wet Walnut No. 3	9	95	0.467	0.317	0.784	4,899	3,321	8,220
KS-2054.000	Wet Walnut No. 5	3	141	0.293	0.208	0.501	2,072	1,474	3,546
KS-2055.000	Middle Creek (Linn & Miami)	1	7	0.198	0.726	0.924	26,787	97,967	124,754
KS-2056.000	Dry Creek	2	7	0.092	0.008	0.100	12,395	1,100	13,495
KS-2057.000	Peyton Creek	3	12	0.146	0.074	0.219	12,422	6,273	18,695
KS-2058.000	Grasshopper-Coal Creek	22	20	0.784	0.030	0.813	38,769	1,475	40,244
KS-2059.000	Diamond Creek	2	7	0.060	0.016	0.076	8,747	2,317	11,065
KS-2060.000	Middle Creek	7	17	0.429	0.089	0.518	25,123	5,240	30,363
KS-2061.000	Elk Creek	18	31	0.900	1.591	2.491	28,755	50,830	79,584
KS-2062.000	South Fork	8	57	0.847	0.416	1.263	14,932	7,339	22,271
KS-2065.000	South Fork Wolf River	3	4	0.468	0.212	0.680	106,160	48,091	154,251
KS-2801.000	Mission Creek	4	7	0.064	0.052	0.116	9,433	7,635	17,069
KS-8009.000	Aiken-Bee Creek (Upper Bee Cre	1	11	0.099	0.080	0.179	9,433	7,635	17,069
KS-8011.000	Lost Creek	3	6	0.061	0.049	0.110	9,433	7,635	17,069
KS-8012.000	Snipe Creek	6	5	0.049	0.040	0.089	9,433	7,635	17,069
KS-8013.000	Switzler Creek	4	10	0.096	0.078	0.174	9,433	7,635	17,069
KS-9022.000	Cedar Creek	2	3	0.028	0.023	0.050	9,433	7,635	17,069
KS-9023.000	Eagle Creek	2	5	0.048	0.038	0.086	9,433	7,635	17,069
KS-9024.000	See-Kan	2	17	0.165	0.133	0.298	9,433	7,635	17,069
KS-9025.000	Jacobs-Phenis Creek	4	14	0.130	0.105	0.235	9,433	7,635	17,069
KS-9026.000	Sunflower	3	70	0.659	0.533	1.192	9,433	7,635	17,069
KS-9028.000	Upper Duck Creek	4	13	0.124	0.100	0.224	9,433	7,635	17,069
KY-2005.000	Twin Creek	1	1	0.018	0.000	0.018	29,454	0	29,454
KY-2006.000	Cypress Creek	3	3	0.127	0.120	0.247	43,076	40,688	83,764
KY-2008.000	Mud River	23	113	0.177	0.815	0.992	1,567	7,223	8,790
KY-2009.000	Obion Creek	11	25	0.093	0.000	0.093	3,776	0	3,776
KY-2010.000	Donaldson Creek	7	33	0.255	0.180	0.435	7,788	5,487	13,274
KY-2012.000	East Fork of Clarks River	5	30	0.255	0.000	0.255	8,575	0	8,575
KY-2015.000	North Fork of Little River	4	27	0.244	0.125	0.369	9,158	4,702	13,860
KY-2016.000	West Fork of Clarks River	10	32	0.400	0.000	0.400	12,678	0	12,678
KY-2018.000	Caney Creek	10	67	0.245	0.592	0.837	3,662	8,845	12,508
KY-2019.000	Humphrey-Clanton Creek	3	14	0.110	0.184	0.294	7,727	12,878	20,605
KY-2020.000	Big Reedy Creek	2	11	0.117	0.270	0.387	10,478	24,122	34,600
KY-2021.000	East Fork of Pond River	17	104	0.271	0.827	1.098	2,599	7,920	10,519
KY-2022.000	Little Kentucky River	5	25	0.128	0.222	0.350	5,081	8,790	13,870
KY-2023.000	Big Muddy Creek	4	34	0.234	0.285	0.519	6,939	8,442	15,381
KY-2024.000	West Fork of Pond River	6	29	0.076	0.190	0.266	2,602	6,517	9,119
KY-2026.000	Buck Creek	2	15	0.019	0.096	0.115	1,287	6,414	7,701
KY-2027.000	Short Creek	2	5	0.030	0.063	0.093	6,071	12,539	18,610
KY-2028.000	Valley Creek	4	20	0.385	0.231	0.616	19,680	11,830	31,509
KY-2029.000	Upper Tradewater River	7	42	0.055	0.154	0.209	1,312	3,696	5,008
KY-2030.000	Fox Creek	5	25	0.094	0.274	0.368	3,767	11,002	14,770
KY-2031.000	Mill Creek	1	9	0.019	0.335	0.354	2,019	35,326	37,345
KY-2032.000	West Fork of Mayfield Creek	33	14	0.253	0.096	0.349	18,671	7,128	25,800
KY-2033.000	Salt Lick Creek	4	11	0.085	0.260	0.345	7,698	23,501	31,199
KY-2035.000	Red Lick Creek	4	13	0.087	0.357	0.443	6,660	27,460	34,120
KY-2036.000	Banklick Creek	1	10	0.700	0.130	0.831	70,816	13,174	83,990
KY-2037.000	North Fork of Nolin River	2	14	0.242	0.000	0.242	17,913	0	17,913
KY-2038.000	Chamberlain Branch	1	0	0.058	0.013	0.071	150,926	34,274	185,200
KY-2039.000	Stewart Creek	2	1	0.308	0.000	0.308	335,759	0	335,759
KY-2041.000	Pigeon Roost Creek	3	2	0.195	0.800	0.995	82,878	340,512	423,390
KY-8014.000	North Fork of Rough River	1	3	0.026	0.021	0.048	9,433	7,635	17,069
KY-8015.000	Plum Creek	11	9	0.089	0.072	0.161	9,433	7,635	17,069
KY-8016.000	Upper Green River	5	4	0.036	0.029	0.065	9,433	7,635	17,069
KY-9030.000	Owens Creek	1	0	0.003	0.002	0.005	9,433	7,635	17,069
LA-2001.000	Bayou Dupont	15	27	0.105	0.000	0.105	3,888	0	3,888
LA-2002.000	Upper Bayou Nezpique	3	18	0.233	0.343	0.575	13,294	19,583	32,878
LA-2003.000	Upper West Fork of Cypress Bay	3	5	0.030	0.008	0.038	6,713	1,701	8,414
LA-2004.000	Bear Creek	3	6	0.022	0.022	0.044	3,952	3,928	7,880
LA-2006.000	Pleasant Valley/Big Ditch & Scar	5	4	0.021	0.003	0.024	5,460	648	6,108
LA-2008.000	Bayou Rapides	1	41	0.000	0.525	0.525	0	12,885	12,885
LA-2012.000	Lower Toulon Bayou	1	4	0.005	0.008	0.013	1,197	2,218	3,415
LA-2014.000	Bayou Boeuf	2	59	0.144	0.458	0.602	2,443	7,775	10,218
LA-2019.000	Cypress-Black Bayou	2	181	0.047	0.310	0.357	259	1,717	1,976
ME-2001.000	Libby Brook	2	13	0.040	0.074	0.114	3,157	5,814	8,971
ME-2002.000	Presque Isle Stream	5	56	0.208	0.296	0.504	3,720	5,302	9,022
ME-2003.000	Limestone Stream	3	27	0.125	0.179	0.304	4,641	6,617	11,258
ME-2004.000	Cold River-Old Course Saco	2	11	0.289	0.018	0.307	26,914	1,686	28,600
ME-2005.000	Dunham-Davee Brook	3	7	0.137	0.010	0.147	20,661	1,574	22,235
ME-2008.000	Violette Stream	1	10	0.082	0.000	0.082	8,475	0	8,475
MD-2001.000	Little Deer Creek	3	4	0.000	0.107	0.107	0	28,229	28,229
MD-2002.000	Little Youghiogheny River	6	14	0.449	0.938	1.386	31,061	64,924	95,985
MD-2004.000	Gilbert Run	3	15	0.193	1.158	1.351	12,679	76,178	88,857
MD-2008.000	Upper Rock Creek	2	25	0.000	11.646	11.646	0	465,850	465,850
MD-2015.000	Piney Run	1	10	0.156	1.751	1.907	15,024	168,388	183,412
MD-2016.000	St. Mary's River	1	9	0.154	0.007	0.160	17,453	771	18,225
MA-2001.000	Baiting Brook	1	2	0.376	0.000	0.376	202,277	0	202,277
MA-2004.000	Su-As-Co River	9	64	1.859	0.216	2.075	28,827	3,346	32,173
MA-2006.000	Powdermill Brook	2	8	0.112	0.011	0.123	13,616	1,276	14,892
MA-2007.000	Upper Quaboag River	5	17	0.351	0.201	0.552	21,233	12,197	33,430
MA-2008.000	Bradley Brook	1	3	0.223	0.054	0.278	88,675	21,602	110,277
MA-2010.000	Clam River	5	18	0.431	0.300	0.732	23,501	16,347	39,848
MA-2011.000	Pine Tree Brook	1	4	0.451	0.038	0.489	101,132	8,415	109,547
MA-2012.000	Washington Mountain Brook	3	6	0.278	0.870	1.148	47,666	149,164	196,831
MA-2014.000	Diamond Brook	1	1	0.381	0.012	0.392	290,467	8,840	299,308
MA-2802.000	Blackberry River	1	4	0.979	0.031	1.010	238,303	7,513	245,816
MI-2001.000	Little Black River	4	23	0.046	0.018	0.064	1,966	769	2,735

P-22	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
MI-2004.000	Misteguay Creek	3	121	1.485	1.601	3.086	12,276	13,239	25,515
MI-2006.000	North Branch of Mill Creek	1	23	1.517	0.830	2.347	66,256	36,255	102,510
MI-2014.000	East Branch Sturgeon River	2	91	0.019	0.763	0.781	206	8,388	8,594
MI-2017.000	East Upper Maple River	1	11	1.742	10.949	12.690	156,893	986,359	1,143,252
MI-2022.000	Black Creek	2	4	0.118	0.151	0.270	31,503	40,175	71,679
MN-2006.000	Bear Valley	3	4	0.004	0.027	0.032	1,017	6,247	7,264
MN-2007.000	North Branch of Two Rivers	1	31	0.021	0.021	0.042	680	680	1,359
MN-2009.000	Joe River	1	1	0.116	0.289	0.405	215,170	535,429	750,600
MN-2010.000	Crooked Creek	6	28	0.147	0.050	0.197	5,313	1,804	7,117
MN-2013.000	Lakes Okabena & Ocheda	1	12	0.072	0.311	0.384	6,066	26,106	32,173
MN-2014.000	Upper Tamarac River	2	296	0.480	0.263	0.743	1,623	890	2,513
MN-2016.000	Belle Creek	6	29	0.251	0.041	0.292	8,632	1,415	10,047
MN-2018.000	Canby Creek	3	44	0.504	0.395	0.898	11,475	9,001	20,476
MN-2019.000	South Fork Zumbro River	7	44	3.362	0.666	4.027	76,822	15,217	92,039
MN-2020.000	Burnham Creek	1	9	0.444	0.032	0.476	48,637	3,473	52,110
MN-2023.000	Snake River	2	232	0.480	0.000	0.480	2,074	0	2,074
MN-2802.000	Bear Creek	4	2	0.019	0.015	0.034	9,433	7,635	17,069
MN-8017.000	East Willow Creek	6	15	0.144	0.117	0.260	9,433	7,635	17,069
MN-8018.000	Shakopee Creek Pilot Watershed	2	202	1.905	1.542	3.447	9,433	7,635	17,069
MN-9032.000	Chippewa River Fish Barrier	1	168	1.585	1.283	2.868	9,433	7,635	17,069
MN-9033.000	Knife Lake	1	85	0.797	0.645	1.442	9,433	7,635	17,069
MN-9034.000	Lake Linka	1	1	0.009	0.007	0.017	9,433	7,635	17,069
MN-9035.000	Long Tom Lake	1	115	1.083	0.876	1.959	9,433	7,635	17,069
MN-9036.000	Marlu Mill Pond	1	55	0.516	0.418	0.933	9,433	7,635	17,069
MN-9037.000	Pine Lawn Park	1	29	0.271	0.219	0.490	9,433	7,635	17,069
MS-2001.000	Tackett Creek	4	6	0.054	0.044	0.097	9,433	7,635	17,069
MS-2002.000	Ellison Creek	4	4	0.041	0.033	0.075	9,433	7,635	17,069
MS-2003.000	Muddy Creek	19	20	0.349	0.065	0.414	17,457	3,233	20,690
MS-2005.000	West Hatchie Creek	6	22	0.206	0.166	0.372	9,433	7,635	17,069
MS-2006.000	Grays Creek	13	14	0.132	0.107	0.239	9,433	7,635	17,069
MS-2007.000	Second Creek	10	59	0.554	0.448	1.003	9,433	7,635	17,069
MS-2008.000	Chiwapa Creek	10	33	0.312	0.252	0.564	9,433	7,635	17,069
MS-2011.000	Persimmon & Burnt Corn Creeks	4	9	0.084	0.068	0.152	9,433	7,635	17,069
MS-2012.000	Bentonia Creek	9	14	0.130	0.105	0.236	9,433	7,635	17,069
MS-2013.000	Shammack Creek	5	5	0.051	0.042	0.093	9,433	7,635	17,069
MS-2021.000	Town Creek	22	125	45.570	0.000	45.570	364,909	0	364,909
MS-2024.000	Standing Pine Creek	4	16	0.154	0.125	0.279	9,433	7,635	17,069
MS-2025.000	Tuscumbia River	10	86	0.201	0.166	0.367	2,333	1,930	4,263
MS-2026.000	Long Creek	5	6	0.061	0.050	0.111	9,433	7,635	17,069
MS-2028.000	Dry Creek	4	4	0.041	0.034	0.075	9,433	7,635	17,069
MS-2029.000	Holiday Creek	2	10	0.099	0.080	0.178	9,433	7,635	17,069
MS-2032.000	Tallahaga Creek	8	36	0.232	7.081	7.314	6,493	197,866	204,360
MS-2037.000	Big Creek	7	15	0.138	0.111	0.249	9,433	7,635	17,069
MS-2038.000	White Sands-Green Creek	2	3	0.025	0.021	0.046	9,433	7,635	17,069
MS-2040.000	Chunky River	6	17	0.157	0.127	0.284	9,433	7,635	17,069
MS-2041.000	Richland Creek	3	11	0.107	0.086	0.193	9,433	7,635	17,069
MS-2045.000	Upper Leaf River	3	12	0.115	0.093	0.208	9,433	7,635	17,069
MS-2046.000	Copiah Creek	1	4	0.040	0.033	0.073	9,433	7,635	17,069
MS-2050.000	Bahala Creek	5	21	0.196	0.159	0.355	9,433	7,635	17,069
MS-2051.000	Sowashee Creek	4	9	0.773	0.882	1.655	81,582	93,147	174,729
MS-2055.000	Shuqualak Creek	1	4	0.037	0.030	0.067	9,433	7,635	17,069
MS-2060.000	Whites Creek	1	6	0.058	0.047	0.105	9,433	7,635	17,069
MS-2802.000	Porters Creek	2	6	0.053	0.043	0.095	9,433	7,635	17,069
MS-3301.002	Cypress & Puss Cuss Creeks - L	11	37	0.019	0.140	0.158	501	3,790	4,291
MS-3301.004	Greasy Creek-Ltl. Talla	14	7	0.000	0.254	0.254	0	37,643	37,643
MS-3301.005	Hell Creek-Ltl. Talla	5	6	0.000	0.252	0.252	0	45,251	45,251
MS-3301.006	Locks Creek-Ltl. Talla	2	8	0.000	0.170	0.170	0	21,798	21,798
MS-3301.007	Tippah - Ltl. Talla	16	99	0.100	3.295	3.395	1,012	33,386	34,398
MS-3301.009	Mill Creek-Ltl. Talla	4	4	0.000	1.559	1.559	0	347,961	347,961
MS-3301.012	North Tippah Creek-Ltl. Talla	3	3	0.321	0.137	0.459	109,410	46,725	156,135
MS-3301.013	Oaklimeter Creek-Ltl. Talla	14	12	2.020	1.347	3.367	162,203	108,142	270,345
MS-3301.014	Okonatie Creek-Ltl. Talla	2	2	0.271	0.060	0.331	152,054	33,538	185,591
MS-3301.015	Upper Tippah River-Ltl. Talla	5	6	0.000	10.563	10.563	0	1,711,079	1,711,079
MS-3301.016	Upper Tallahatchie River-Ltl. Tall	8	6	1.613	0.634	2.247	278,450	109,436	387,886
MS-3301.017	Ayers Creek-Ltl. Talla	1	1	7.165	0.000	7.165	4,898,877	0	4,898,877
MS-3301.018	East & West Goose Creeks-Ltl. T	2	1	0.011	0.009	0.019	9,433	7,635	17,069
MS-3301.019	Big Springs Creek	2	1	0.008	0.007	0.015	9,433	7,635	17,069
MS-3301.020	Lower Tallahatchie River	3	1	0.012	0.009	0.021	9,433	7,635	17,069
MS-3302.001	Abiaca Creek-Yazoo	22	69	7.888	2.804	10.692	114,854	40,824	155,678
MS-3302.002	Ascalmore Creek-Yazoo	18	34	0.848	0.000	0.848	24,620	0	24,620
MS-3302.006	Big Sand Creek-Yazoo	25	89	4.111	5.176	9.287	46,125	58,083	104,208
MS-3302.007	Black Creek-Yazoo	19	74	11.374	0.000	11.374	152,933	0	152,933
MS-3302.012	Buntyn Creek-Yazoo	4	8	0.247	0.616	0.863	29,709	74,194	103,903
MS-3302.018	Cypress Creek - Yazoo	8	5	2.161	1.345	3.506	412,844	256,892	669,736
MS-3302.020	Eden Creek-Yazoo	2	1	0.000	0.080	0.080	0	69,136	69,136
MS-3302.024	Hickahala Creek-Yazoo	10	3	0.000	0.874	0.874	0	315,566	315,566
MS-3302.027	Hotophia Creek-Yazoo	5	9	0.000	0.179	0.179	0	19,481	19,481
MS-3302.031	Indian Creek - Bobo Bayou	9	35	0.972	0.523	1.495	27,719	14,924	42,644
MS-3302.032	Johnson and Fair-Yazoo	3	2	0.312	0.180	0.492	159,865	92,247	252,112
MS-3302.040	Senatobia Creek-Yazoo	9	3	0.032	0.026	0.058	9,433	7,635	17,069
MS-3302.044	Skuna River-Yazoo	2	2	0.000	0.728	0.728	0	312,218	312,218
MS-3302.051	Tillatoba Creek-Yazoo	13	23	0.215	0.174	0.389	9,433	7,635	17,069
MS-3302.052	Toposhaw Creek-Yazoo	3	2	0.020	0.016	0.035	9,433	7,635	17,069
MS-3302.053	Turkey Creek-Yazoo	9	10	0.091	0.073	0.164	9,433	7,635	17,069
MS-3302.062	Murray Creek-Yazoo	4	5	0.044	0.035	0.079	9,433	7,635	17,069
MS-3302.069	North Fork Tillatoha-Hunter Cree	13	40	1.458	0.785	2.242	36,643	19,731	56,374
MS-3302.073	Long Creek-Yazoo	3	1	0.290	0.134	0.424	280,164	129,267	409,431
MS-3302.076	Otoucalofa Creek-Yazoo	5	8	0.783	0.000	0.783	98,073	0	98,073
MS-3302.077	Pelucia Creek-Yazoo	20	36	0.441	0.621	1.062	12,297	17,338	29,635
MS-3302.078	Perry Creek-Yazoo	3	9	0.000	0.747	0.747	0	86,118	86,118
MS-3302.079	Persimmon Creek-Yazoo	12	11	0.807	0.932	1.739	70,445	81,313	151,758
MS-3302.081	Pigeon Roost Creek-Yazoo	4	2	0.000	4.513	4.513	0	2,320,506	2,320,506
MS-3302.083	Piney Creek-Yazoo	5	6	0.000	1.301	1.301	0	209,769	209,769
MS-3302.084	Potacocowa Creek-Yazoo	20	39	1.743	0.747	2.490	44,241	18,959	63,200
MS-3302.085	Bogue Creek - Yazoo	25	29	0.278	0.225	0.502	9,433	7,635	17,069
MS-9038.000	Kemper County Lake	1	13	0.124	0.100	0.224	9,433	7,635	17,069
MS-9039.000	Upper Yockanookany	4	1	0.014	0.011	0.025	9,433	7,635	17,069
MO-2002.000	East Fork of Big Creek	80	28	0.254	0.085	0.339	9,015	3,012	12,026
MO-2003.000	102 River Tributaries	11	5	0.053	0.102	0.155	9,883	18,873	28,756
MO-2004.000	Tabo Creek	58	28	0.024	0.418	0.441	858	15,160	16,018

P-23	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
MO-2005.000	Panther Creek	12	20	0.063	0.056	0.119	3,158	2,776	5,933
MO-2006.000	Hoover-Frankum	10	8	0.006	0.087	0.092	721	10,711	11,432
MO-2007.000	South Fork of Blackwater River	18	22	0.126	0.050	0.175	5,804	2,290	8,094
MO-2008.000	Callahan Creek	7	14	0.073	0.080	0.153	5,412	5,880	11,291
MO-2009.000	Bear Creek	14	21	0.067	0.124	0.191	3,141	5,856	8,997
MO-2010.000	Wellington-Napoleon	17	7	0.064	0.052	0.116	9,433	7,635	17,069
MO-2011.000	Grindstone-Lost-Muddy Creek	52	93	0.568	0.647	1.215	6,132	6,982	13,115
MO-2012.000	Willow-Cravens	13	9	0.716	0.121	0.837	75,637	12,741	88,378
MO-2013.000	Durgens Creek	16	11	0.014	0.118	0.132	1,233	10,638	11,871
MO-2014.000	Williams Creek	3	8	0.043	1.886	1.930	5,446	237,415	242,862
MO-2015.000	Little Sni-A-Bar	18	22	0.048	0.157	0.205	2,123	6,990	9,113
MO-2016.000	Buck and Doe Run Creeks	19	16	0.135	0.210	0.345	8,482	13,204	21,686
MO-2017.000	Clarence Cannon Memorial	9	20	0.156	0.047	0.203	7,946	2,406	10,352
MO-2018.000	Lost Creek	8	17	1.422	0.021	1.443	84,415	1,261	85,675
MO-2019.000	Upper Little Black River	12	53	0.149	1.480	1.628	2,790	27,791	30,581
MO-2020.000	Lower Little Black River	1	15	0.239	0.261	0.500	15,944	17,379	33,323
MO-2021.000	Mozingo Creek	4	22	0.109	3.701	3.810	4,871	164,907	169,778
MO-2025.000	Troublesome Creek	127	45	0.291	0.416	0.707	6,416	9,174	15,590
MO-2026.000	Grassy Creek	40	14	0.110	0.168	0.278	8,139	12,442	20,581
MO-2027.000	Big Creek-Hurricane Creek	124	41	0.378	0.512	0.890	9,239	12,505	21,744
MO-2028.000	West Fork of Big Creek	143	59	0.516	1.293	1.809	8,676	21,735	30,411
MO-2029.000	East Locust Creek	81	27	0.477	0.267	0.744	17,754	9,916	27,670
MO-2030.000	Upper Locust Creek	89	34	0.400	0.533	0.933	11,658	15,540	27,198
MO-2032.000	East Yellow Creek	61	20	0.211	0.288	0.499	10,450	14,237	24,688
MO-2033.000	Moniteau Creek	56	20	0.248	0.367	0.615	12,340	18,278	30,617
MO-2034.000	Marthasville Town Branch	1	1	0.000	0.040	0.041	457	37,912	38,369
MO-2035.000	Hickory Creek	5	2	1.181	0.130	1.312	707,348	78,105	785,453
MO-2036.000	East Fork of The Grand River	22	11	0.176	0.178	0.354	16,394	16,574	32,967
MO-2801.000	Fourche Creek	9	45	0.426	0.345	0.771	9,433	7,635	17,069
MO-8019.000	East Branch of South Fork of Bla	20	6	0.059	0.048	0.106	9,433	7,635	17,069
MO-9041.000	Green Hills RC&D	23	1	0.009	0.007	0.016	9,429	7,632	17,061
MO-9044.000	Southwest Missouri RC&D	2	1	0.001	0.001	0.002	1,516	1,227	2,743
MT-2001.000	Lower Willow Creek	1	72	0.004	0.163	0.167	57	2,276	2,333
MT-2002.000	Box Elder Creek	1	20	0.395	0.000	0.395	19,753	0	19,753
MT-2003.000	Jawbone Creek	2	3	0.029	0.002	0.031	8,889	601	9,491
MT-2004.000	Shelby	2	4	0.623	0.088	0.711	139,383	19,716	159,099
MT-2005.000	Cedar Creek	1	13	0.133	0.062	0.195	10,441	4,914	15,355
MT-2006.000	Sidney Water Users Association	2	1	0.031	0.672	0.704	30,901	665,795	696,696
MT-2007.000	Beaver Creek	1	79	0.107	0.798	0.905	1,355	10,099	11,454
MT-2008.000	Big Spring Creek	4	98	1.356	0.703	2.060	13,794	7,152	20,946
MT-2009.000	Newlan Creek	1	43	0.409	0.331	0.741	9,433	7,635	17,069
MT-2011.000	Baker Lake	1	5	0.120	0.019	0.139	25,550	4,062	29,611
NE-2005.000	Plattsmouth	5	1	0.040	0.006	0.045	50,306	7,449	57,755
NE-2006.000	Oak Creek	28	63	0.988	0.986	1.974	15,683	15,637	31,320
NE-2007.000	Wildhorse Creek	3	27	0.242	0.026	0.268	8,892	967	9,860
NE-2008.000	Antelope Creek	3	61	0.224	0.019	0.243	3,661	309	3,970
NE-2009.000	Mud Creek	15	38	0.252	0.676	0.928	6,599	17,666	24,265
NE-2010.000	Bowman-Spring Branch	7	17	0.080	0.024	0.104	4,742	1,438	6,180
NE-2011.000	Wilson Creek	67	67	0.634	0.991	1.625	9,415	14,716	24,131
NE-2012.000	Turtle Creek	1	2	0.002	0.028	0.031	1,065	13,666	14,731
NE-2013.000	Cure Creek	1	1	0.032	0.000	0.032	30,676	0	30,676
NE-2014.000	Buckley Creek	6	17	0.044	0.066	0.110	2,603	3,882	6,485
NE-2015.000	Plum Creek	32	32	0.695	0.252	0.947	21,689	7,882	29,571
NE-2016.000	Gering Valley	10	27	1.113	10.881	11.994	41,602	406,753	448,354
NE-2017.000	Big Indian Creek	35	126	1.414	1.096	2.510	11,258	8,731	19,989
NE-2018.000	Bear-Pierce-Cedar Creek	30	51	0.951	0.210	1.161	18,573	4,098	22,671
NE-2019.000	Bellwood	13	26	0.792	0.204	0.996	30,439	7,856	38,295
NE-2020.000	Pilger Creek	1	4	0.097	0.009	0.106	26,879	2,483	29,362
NE-2021.000	Dry Creek South	6	23	0.185	0.020	0.206	8,215	895	9,109
NE-2022.000	Jones Creek	2	2	0.095	0.017	0.113	40,988	7,524	48,512
NE-2023.000	Dorchester	4	5	0.212	0.032	0.244	45,967	7,034	53,001
NE-2024.000	Stamford	2	2	0.121	0.017	0.138	59,043	8,109	67,152
NE-2025.000	Rock Creek (Pawnee)	11	8	0.106	0.070	0.176	13,040	8,555	21,594
NE-2026.000	Spring Creek (Johnson)	21	26	0.384	0.111	0.495	14,977	4,325	19,302
NE-2027.000	Cub Creek	21	58	1.067	0.188	1.255	18,438	3,252	21,690
NE-2028.000	Cottonwood Creek	12	24	0.401	0.110	0.511	16,829	4,617	21,446
NE-2029.000	Brule	1	11	0.078	0.012	0.090	7,153	1,089	8,241
NE-2030.000	Upper Big Nemaha	70	94	2.105	8.067	10.173	22,284	85,399	107,682
NE-2031.000	Ziegler Creek	8	14	0.000	0.205	0.205	0	14,524	14,524
NE-2032.000	Thirty-Two Mile Creek	6	58	0.404	0.135	0.539	6,947	2,313	9,260
NE-2033.000	Mission Creek	7	17	0.459	0.094	0.553	26,412	5,393	31,805
NE-2034.000	Spring Creek (Dawson)	6	110	1.232	0.158	1.389	11,209	1,436	12,644
NE-2035.000	Corporation Gulch	1	2	0.160	0.737	0.897	70,922	327,691	398,613
NE-2036.000	Papillion Creek	13	10	0.000	0.405	0.405	0	38,767	38,767
NE-2037.000	Clatonia Creek	8	19	0.298	0.044	0.342	15,878	2,363	18,240
NE-2038.000	Upper Medicine Creek	4	99	0.156	0.121	0.277	1,582	1,230	2,812
NE-2039.000	Lower Medicine Creek	2	77	0.208	0.128	0.336	2,695	1,661	4,356
NE-2040.000	Aowa Creek	33	52	0.743	0.404	1.147	14,341	7,803	22,144
NE-2041.000	Clear Creek	2	27	0.277	0.047	0.324	10,280	1,742	12,022
NE-2042.000	Winnebago-Bean Creek	10	8	0.000	0.324	0.324	0	42,345	42,345
NE-2043.000	Tekamah-Mud Creek	9	20	0.337	0.503	0.840	16,446	24,579	41,025
NE-2045.000	South Fork	11	13	0.033	0.431	0.463	2,519	33,294	35,813
NE-2046.000	Long Branch	23	33	0.442	1.127	1.570	13,468	34,342	47,810
NE-2047.000	Blackwood Creek	11	190	0.232	0.303	0.535	1,219	1,593	2,812
NE-2051.000	South Branch Little Nemaha	19	37	0.529	0.939	1.468	14,334	25,471	39,805
NE-2053.000	Swan Creek	21	111	1.957	0.416	2.373	17,582	3,733	21,315
NE-2054.000	Wolf-Wildcat Creek	7	34	0.632	1.598	2.230	18,814	47,581	66,395
NE-2056.000	Middle Big Nemaha	8	44	0.465	0.022	0.486	10,528	491	11,019
NE-2057.000	Buck and Duck Creeks	2	14	0.129	0.105	0.234	9,433	7,635	17,069
NE-2058.000	Wilbur Watershed	1	1	0.007	0.006	0.013	9,433	7,635	17,069
NE-8021.000	Brownell Creek	20	9	0.085	0.069	0.153	9,433	7,635	17,069
NE-8022.000	Dry Creek	10	31	0.293	0.237	0.531	9,433	7,635	17,069
NE-8023.000	Indian Creek	31	29	0.270	0.219	0.489	9,433	7,635	17,069
NE-8024.000	Upper Salt Creek	40	43	0.407	0.330	0.737	9,433	7,635	17,069
NE-8025.000	Upper Salt Swedeburg	5	4	0.036	0.029	0.065	9,433	7,635	17,069
NE-9063.000	North Central RC&D	3	18	0.167	0.135	0.302	9,433	7,635	17,069
NE-9140.000	Panhandle RC&D	10	51	0.477	0.386	0.863	9,433	7,635	17,069
NV-2001.000	Peavine Mountain	4	6	0.000	1.532	1.532	0	257,506	257,506
NV-2002.000	Upper Meadow Valley	1	203	0.037	0.104	0.141	183	513	696
NV-2004.000	Elko	3	14	0.023	0.918	0.941	1,670	67,999	69,669

P-24	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
NH-2002.000	Oliverian Brook	1	11	0.071	0.073	0.144	6,717	6,856	13,573
NH-2003.000	Souhegan River	13	56	0.480	0.081	0.561	8,538	1,432	9,971
NH-2005.000	Baker River	7	49	0.317	0.097	0.414	6,491	1,989	8,480
NH-2006.000	Dead River	1	6	0.089	0.458	0.547	13,803	70,616	84,419
NH-2007.000	Sugar River	1	5	0.044	0.062	0.106	8,126	11,265	19,391
NH-2801.000	Cold River-Old Course Saco	1	3	0.290	0.018	0.308	96,624	5,989	102,614
NJ-2002.000	Stony Brook	7	11	0.165	0.176	0.340	14,701	15,712	30,413
NJ-2004.000	Paulins Kill	3	1	0.052	0.009	0.061	42,764	6,983	49,747
NJ-2010.000	Assunpink Creek	8	43	4.873	3.167	8.040	113,244	73,592	186,837
NJ-2013.000	Furnace Brook	1	3	0.173	0.218	0.391	60,194	75,960	136,153
NJ-9070.000	Toms River - Turnmill Pond	1	3	0.028	0.023	0.051	9,433	7,635	17,069
NM-2003.000	Hatch Valley Arroyos	6	19	0.140	0.000	0.140	7,437	0	7,437
NM-2004.000	Dona Ana Arroyo	2	9	0.344	0.000	0.344	37,791	0	37,791
NM-2005.000	Upper Rio Penasco	3	15	0.095	0.000	0.095	6,142	0	6,142
NM-2006.000	Zuber Draw	3	106	0.137	0.000	0.137	1,292	0	1,292
NM-2007.000	Caballo Arroyos	5	9	0.079	0.000	0.079	9,262	0	9,262
NM-2008.000	Tramperos Creek	2	91	0.087	0.000	0.087	953	0	953
NM-2009.000	Prop Canyon & Tributaries	2	28	0.056	0.000	0.056	2,001	0	2,001
NM-2010.000	Saltpeter Creek	1	18	0.029	0.000	0.029	1,647	0	1,647
NM-2011.000	Pecos Arroyo	1	19	0.048	0.000	0.048	2,464	0	2,464
NM-2012.000	Santa Cruz River	7	19	0.417	0.000	0.417	21,776	0	21,776
NM-2013.000	Upper Gila Valley Arroyos	12	29	0.110	0.000	0.110	3,841	0	3,841
NM-2014.000	Fillmore Arroyos	3	22	0.082	0.000	0.082	3,760	0	3,760
NM-2015.000	Tortugas Arroyo	2	22	1.637	0.000	1.637	75,873	0	75,873
NM-2016.000	Hackberry Draw	2	10	1.113	0.000	1.113	112,396	0	112,396
NM-2017.000	Apache-Brazito-Mesquite Arroyos	4	42	0.225	0.000	0.225	5,344	0	5,344
NM-2019.000	Cass Draw	2	36	0.080	0.000	0.080	2,252	0	2,252
NM-2020.000	Anthony Arroyo	1	5	0.217	0.000	0.217	43,824	0	43,824
NM-2021.000	Crow, Broad, and Placitas Arroyo	2	188	1.453	0.000	1.453	7,711	0	7,711
NM-2022.000	Sibley, Green, Jaralosa, and Can	3	123	1.012	0.000	1.012	8,219	0	8,219
NM-2023.000	Sebastian Martin-Black Mesa	7	6	0.434	0.000	0.434	73,736	0	73,736
NM-2026.000	T or C Williamsburg Arroyos	1	20	2.559	0.000	2.559	127,090	0	127,090
NM-2027.000	Eagle-Tumbleweed Draw	1	181	5.277	0.000	5.277	29,105	0	29,105
NM-2028.000	Cottonwood-Walnut Creek	2	109	0.256	0.000	0.256	2,343	0	2,343
NM-2802.000	Running Water Draw	1	128	1.210	0.979	2.189	9,433	7,635	17,069
NM-8026.000	Sandia Mountain Tributaries	1	4	0.039	0.031	0.070	9,433	7,635	17,069
NM-8027.000	Upper Rio Hondo	1	122	1.151	0.932	2.082	9,433	7,635	17,069
NM-9071.000	La Mesilla	1	0	0.003	0.002	0.005	9,433	7,635	17,069
NM-9072.000	Las Cruces Arroyo	1	2	0.016	0.013	0.028	9,433	7,635	17,069
NY-2002.000	Conewango Creek	9	37	0.359	0.000	0.359	9,687	0	9,687
NY-2003.000	Ischua Creek	7	45	0.444	0.000	0.444	9,808	0	9,808
NY-2007.000	Genegantslet Creek	2	7	0.023	0.000	0.023	3,347	0	3,347
NY-2009.000	Nanticoke Creek	9	33	0.176	0.000	0.176	5,351	0	5,351
NY-2010.000	Little Choconut, Finch Hollow and	8	16	0.496	0.000	0.496	30,415	0	30,415
NY-2011.000	Patterson-Brixius and Grey Creek	2	6	0.166	0.000	0.166	29,655	0	29,655
NY-2012.000	Batavia Kill	3	20	0.873	0.000	0.873	42,604	0	42,604
NY-2014.000	Newtown-Hoffman Creeks	5	31	0.800	0.000	0.800	25,695	0	25,695
NY-2016.000	Higinbotham Brook	1	1	0.092	0.000	0.092	106,165	0	106,165
NY-2019.000	Mill Brook	2	3	0.270	0.000	0.270	78,346	0	78,346
NY-2020.000	Deposit Creek	1	0	0.310	0.000	0.310	2,815,500	0	2,815,500
NY-2021.000	Brandywine Creek	1	1	0.165	0.000	0.165	198,514	0	198,514
NY-2025.000	Virgil Creek	1	18	0.616	0.000	0.616	34,068	0	34,068
NY-2027.000	Beaver Brook	1	2	0.226	0.000	0.226	111,464	0	111,464
NY-8028.000	Dean Creek	2	1	0.012	0.009	0.021	9,433	7,635	17,069
NY-9073.000	Seneca Trail	1	0	0.003	0.002	0.005	9,433	7,635	17,069
NY-9074.000	Central New York	4	7	0.067	0.054	0.121	9,433	7,635	17,069
NC-2003.000	Deep Creek	15	56	0.359	0.063	0.422	6,476	1,132	7,608
NC-2004.000	Bear Creek	7	21	0.589	0.292	0.880	27,668	13,704	41,371
NC-2009.000	Muddy Creek	9	37	0.364	0.243	0.608	9,849	6,572	16,421
NC-2013.000	Town Fork Creek	10	50	0.805	0.140	0.945	16,002	2,788	18,790
NC-2025.000	Crabtree Creek	10	69	2.761	2.817	5.579	39,771	40,578	80,349
NC-2028.000	Stewarts Creek-Lovills Creek	1	16	0.555	0.139	0.694	35,754	8,963	44,717
NC-2035.000	Dutchman Creek	9	48	0.413	0.439	0.852	8,550	9,092	17,642
NC-2037.000	Little Yadkin River	18	12	0.183	0.070	0.253	14,674	5,607	20,282
NC-2045.000	Second Broad River	19	27	0.624	0.738	1.362	23,144	27,354	50,498
NC-2046.000	County Line Creek	1	48	0.115	0.852	0.966	2,384	17,714	20,098
NC-2047.000	Limestone Creek	1	2	0.529	0.825	1.354	228,888	357,110	585,998
NC-2801.000	Cane Creek	1	15	0.423	0.404	0.827	28,800	27,471	56,271
NC-8029.000	Third Creek	11	36	0.338	0.274	0.612	9,433	7,635	17,069
NC-9076.000	Lake Burlington	2	2	0.015	0.013	0.028	9,433	7,635	17,069
ND-2002.000	Swan-Buffalo Creek	3	94	0.859	0.076	0.935	9,088	810	9,898
ND-2004.000	Elm River	3	121	0.211	0.018	0.230	1,742	151	1,893
ND-2005.000	Tewaukon	3	17	0.162	0.063	0.224	9,552	3,714	13,265
ND-2006.000	North Branch Forest River	4	42	0.264	0.015	0.279	6,276	361	6,637
ND-2008.000	Middle-South Branch Forest Rive	3	149	0.671	0.191	0.862	4,514	1,281	5,795
ND-2011.000	Willow Creek-Park River	2	35	0.882	0.119	1.001	25,510	3,429	28,939
ND-2013.000	Boundary Creek	2	38	0.424	0.222	0.646	11,057	5,776	16,833
ND-2014.000	Middle Branch-Park River	5	86	0.971	0.000	0.971	11,308	0	11,308
ND-2015.000	Mott Dam	1	3	0.083	0.000	0.083	25,886	0	25,886
ND-2017.000	Square Butte Creek	4	105	0.038	0.403	0.441	362	3,837	4,198
ND-2019.000	Upper Turtle River	8	128	1.502	0.392	1.894	11,703	3,055	14,759
ND-2020.000	English Coulee	1	54	0.821	0.000	0.821	15,341	0	15,341
ND-8030.000	Tongue River	10	154	1.456	1.178	2.634	9,433	7,635	17,069
ND-9077.000	Mcdowell Dam	1	6	0.058	0.047	0.105	9,433	7,635	17,069
OH-2003.000	Upper Wabash	3	19	0.135	0.161	0.296	6,990	8,371	15,361
OH-2004.000	Marsh Run	1	0	0.246	0.389	0.635	2,239,594	3,535,403	5,774,997
OH-2005.000	Chippewa Creek	8	37	0.477	0.242	0.719	13,018	6,613	19,631
OH-2007.000	East Fork of Buck Creek	4	3	0.044	0.012	0.055	15,757	4,167	19,924
OH-2009.000	Rush Creek	19	88	0.614	0.634	1.248	7,008	7,236	14,245
OH-2010.000	West Fork Duck Creek	2	10	0.147	0.262	0.409	14,183	25,282	39,465
OH-2012.000	Margaret Creek	5	17	0.097	0.546	0.643	5,569	31,361	36,929
OH-2016.000	Pine Creek	1	2	0.012	0.016	0.028	5,839	7,407	13,245
OH-2019.000	North Hocking River	1	1	0.043	0.000	0.043	45,732	0	45,732
OH-2027.000	Four Mile Creek	4	3	0.194	0.224	0.418	60,286	69,822	130,108
OH-8031.000	Upper Hocking	16	27	0.252	0.204	0.456	9,433	7,635	17,069
OK-2002.000	Big Wewoka Creek	41	128	1.007	0.357	1.364	7,858	2,786	10,644
OK-2003.000	Little Wewoka Creek-Graves Cre	16	72	0.317	0.187	0.504	4,417	2,613	7,030
OK-2004.000	Long Branch Creek	11	19	0.091	0.000	0.091	4,815	0	4,815
OK-2005.000	Sandy Creek	29	86	0.827	0.209	1.036	9,572	2,424	11,996
OK-2006.000	Little Deep Fork Creek	56	129	1.169	0.248	1.416	9,076	1,924	11,000

P-25	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
OK-2007.000	Bear-Fall Coon Creek	31	98	1.046	0.144	1.190	10,632	1,464	12,096
OK-2008.000	Whitegrass-Waterhole Creek	9	23	0.831	0.696	1.527	36,390	30,456	66,846
OK-2009.000	Salt Creek	35	55	0.959	0.170	1.129	17,583	3,126	20,709
OK-2010.000	Upper Clear Boggy Creek	49	130	1.003	0.262	1.265	7,715	2,011	9,726
OK-2011.000	Caney-Coon Creek	3	30	0.074	0.299	0.373	2,498	10,087	12,585
OK-2012.000	Leader-Middle Clear Boggy Cree	33	60	0.784	0.163	0.947	12,989	2,708	15,697
OK-2013.000	Fourche Maline Creek	14	112	0.709	0.927	1.636	6,309	8,250	14,559
OK-2014.000	Upper Black Bear Creek	72	213	0.965	0.185	1.149	4,538	868	5,406
OK-2015.000	Timber Creek	7	45	0.214	0.000	0.214	4,794	0	4,794
OK-2018.000	Upper Red Rock Creek	43	131	0.551	0.048	0.599	4,203	364	4,568
OK-2019.000	Sallisaw Creek	34	146	0.969	2.026	2.995	6,661	13,921	20,582
OK-2020.000	Cane Creek	21	77	0.553	0.003	0.556	7,231	33	7,265
OK-2022.000	Upper Blue River	2	2	0.010	0.004	0.014	6,110	2,412	8,521
OK-2023.000	Cottonwood Creek	16	61	0.418	0.031	0.450	6,875	518	7,392
OK-2024.000	Delaware Creek	13	39	0.260	0.502	0.762	6,603	12,763	19,366
OK-2026.000	Caney Creek	14	27	0.130	0.167	0.296	4,767	6,133	10,900
OK-2027.000	Waterfall-Gilford Creek	11	13	0.000	0.123	0.123	0	9,446	9,446
OK-2028.000	Tri-County Turkey Creek	31	90	0.605	0.119	0.723	6,756	1,325	8,080
OK-2029.000	Stillwater Creek	34	73	1.303	1.296	2.599	17,769	17,663	35,432
OK-2030.000	Lower Clear Boggy Creek	23	61	0.380	0.218	0.598	6,207	3,563	9,770
OK-2031.000	Salt-Camp Creek	5	21	0.163	0.826	0.989	7,612	38,549	46,162
OK-2032.000	Okmulgee Creek	2	15	0.314	0.142	0.456	20,953	9,483	30,435
OK-2033.000	Upper Bayou Creek	8	32	0.158	0.250	0.407	4,984	7,896	12,880
OK-2034.000	Lower Bayou Creek	15	38	0.831	0.391	1.221	21,954	10,327	32,280
OK-2037.000	Four Mile Creek	1	7	0.624	0.263	0.887	88,814	37,354	126,169
OK-2038.000	Uncle John Creek	12	81	0.527	0.190	0.717	6,497	2,342	8,839
OK-2039.000	Quapaw Creek	38	73	1.185	0.791	1.976	16,321	10,901	27,222
OK-2040.000	Upper Elk Creek	35	143	1.148	0.296	1.444	8,054	2,077	10,131
OK-2041.000	Rock Creek	4	25	0.098	0.398	0.496	3,943	15,989	19,933
OK-2042.000	Frogville Creek	2	2	0.192	0.330	0.522	88,391	152,064	240,455
OK-2043.000	Lambert Creek	2	4	0.062	0.146	0.208	17,029	39,675	56,704
OK-2044.000	Otter Creek	4	21	0.189	0.028	0.217	9,010	1,329	10,339
OK-2045.000	Caston-Mountain Creek	5	46	0.340	0.625	0.965	7,340	13,484	20,824
OK-2046.000	Canyon View Creek	4	9	0.100	0.010	0.110	11,341	1,121	12,462
OK-2047.000	Cotton-Coon-Mission Creek	11	50	0.287	0.368	0.655	5,719	7,324	13,042
OK-2049.000	Fitzgerald-Soldier Creek	5	17	0.148	0.307	0.454	8,473	17,610	26,083
OK-2051.000	Jack Creek	10	41	0.481	0.106	0.588	11,857	2,621	14,478
OK-2052.000	Lower Black Bear Creek	19	73	0.548	1.650	2.199	7,476	22,498	29,974
OK-2053.000	Lower Red Rock Creek	7	13	0.078	0.033	0.111	5,826	2,479	8,305
OK-2054.000	Okfuskee Tributaries	29	88	0.885	0.917	1.801	10,050	10,410	20,461
OK-2055.000	Pryor Creek	8	10	0.037	0.018	0.055	3,840	1,860	5,701
OK-2056.000	Brushy-Peaceable Creek	18	53	0.665	0.144	0.809	12,539	2,711	15,250
OK-2057.000	Paint Creek	1	5	0.165	0.041	0.207	30,579	7,657	38,236
OK-2058.000	Lost-Duck Creeks	9	21	0.423	0.070	0.492	19,758	3,250	23,008
OK-2059.000	Deep Red Run-Coffin Creek	2	73	0.412	3.688	4.099	5,614	50,304	55,918
OK-2060.000	Kadashan Bottom	5	7	0.155	0.061	0.216	23,310	9,274	32,584
OK-2061.000	Cow Creek	29	49	0.804	0.109	0.913	16,250	2,209	18,460
OK-2063.000	Upper Muddy Boggy Creek	24	73	0.361	0.134	0.495	4,963	1,849	6,812
OK-2065.000	Kickapoo Nations Creek	5	41	0.273	2.141	2.415	6,639	52,009	58,648
OK-2066.000	Robinson Creek	5	13	0.088	0.547	0.635	7,065	43,707	50,771
OK-2068.000	Carney Creek	1	7	0.065	0.008	0.073	9,590	1,204	10,794
OK-2070.000	Turkey Creek	3	7	0.071	0.041	0.112	9,513	5,565	15,078
OK-2073.000	Dry Creek	8	8	0.135	0.003	0.139	17,675	425	18,099
OK-2074.000	North Deer Creek	1	39	0.146	2.684	2.830	3,784	69,724	73,508
OK-2078.000	Middle Deep Red Run Creek	1	7	0.106	0.084	0.190	15,027	12,000	27,027
OK-2801.000	Big Caney Creek	1	3	0.021	0.021	0.042	6,335	6,452	12,787
OK-3101.001	Caddo Creek-Washita	28	143	0.806	1.589	2.395	5,621	11,075	16,695
OK-3101.003	Barnitz Creek-Washita	76	152	0.606	0.181	0.787	3,994	1,194	5,188
OK-3101.004	Delaware Creek-Washita	2	9	0.014	0.032	0.046	1,472	3,449	4,921
OK-3101.005	Bear Hybarger - Criner Creek-Wa	33	45	1.108	0.027	1.135	24,548	597	25,144
OK-3101.006	Cowden Laterals-Washita	13	32	0.186	0.127	0.314	5,763	3,928	9,691
OK-3101.007	Colbert Creek-Washita	3	7	0.153	0.007	0.160	20,605	876	21,481
OK-3101.008	Cobb Creek-Washita - Fast Runr	12	55	0.177	0.111	0.288	3,230	2,033	5,263
OK-3101.009	Chigley Sandy Creek-Washita	14	21	0.131	0.079	0.211	6,229	3,778	10,007
OK-3101.010	Cherokee Sandy Creek-Washita	19	49	0.294	1.249	1.543	6,012	25,501	31,513
OK-3101.011	Cavalry Creek-Washita	30	53	0.486	0.294	0.780	9,105	5,521	14,627
OK-3101.012	Dead Indian-Wildhorse Creek-Wa	12	66	0.200	0.260	0.460	3,044	3,955	7,000
OK-3101.013	Buttler Laterals-Washita	9	9	0.054	0.037	0.091	6,221	4,240	10,461
OK-3101.014	Broken Leg Creek-Washita	3	10	0.028	0.022	0.049	2,796	2,169	4,966
OK-3101.015	Boggy Creek-Washita	36	70	0.425	0.177	0.602	6,061	2,525	8,586
OK-3101.016	Bitter Creek-Washita	19	26	0.274	0.149	0.423	10,603	5,787	16,390
OK-3101.018	Big Kiowa Creek-Washita	6	19	0.033	0.045	0.078	1,722	2,372	4,094
OK-3101.020	Beaver Dam Creek-Washita	6	18	0.046	0.023	0.069	2,564	1,304	3,868
OK-3101.021	Bear Creek-Washita	10	13	0.058	0.000	0.058	4,340	0	4,340
OK-3101.022	Finn Creek-Washita	35	51	1.011	0.751	1.762	19,879	14,767	34,646
OK-3101.023	Roaring Creek-Washita	40	56	0.797	0.307	1.104	14,166	5,454	19,620
OK-3101.024	Beaver Creek-Washita	15	53	0.280	0.158	0.438	5,266	2,971	8,237
OK-3101.025	Tonkawa Creek	13	19	0.409	0.145	0.554	21,194	7,525	28,719
OK-3101.026	Rush Creek-Washita	54	112	2.535	0.566	3.101	22,611	5,047	27,658
OK-3101.027	Saddle Mountain Creek-Washita	12	48	0.192	0.105	0.297	4,000	2,193	6,192
OK-3101.029	Sandstone Creek-Washita	42	73	0.360	0.046	0.407	4,952	635	5,588
OK-3101.030	Sergeant Major Creek-Washita	6	17	0.044	0.018	0.061	2,523	1,024	3,547
OK-3101.031	Soldier Creek-Washita	12	40	0.227	0.107	0.334	5,745	2,713	8,458
OK-3101.032	South Clinton Laterals-Washita	16	23	0.148	0.081	0.229	6,357	3,507	9,864
OK-3101.033	Round Creek-Washita	9	33	0.295	0.048	0.343	8,980	1,456	10,436
OK-3101.034	Sugar Creek-Washita	51	148	3.116	0.049	3.165	21,047	332	21,379
OK-3101.035	Wayne Creek-Washita	2	6	0.019	0.012	0.032	3,427	2,150	5,577
OK-3101.036	Turkey Creek-Washita	12	48	0.189	0.321	0.510	3,983	6,750	10,733
OK-3101.037	Upper Washita Creek-Washita	35	187	0.372	0.490	0.862	1,987	2,620	4,608
OK-3101.039	Washington Creek-Washita	3	7	0.021	0.041	0.062	2,863	5,725	8,587
OK-3101.040	Whiteshields Creek-Washita	19	12	0.131	0.030	0.161	11,397	2,579	13,976
OK-3101.041	Winter Creek-Washita	24	44	0.462	0.115	0.577	10,448	2,606	13,054
OK-3101.042	Fort Cobb Laterals-Washita	9	22	0.139	0.095	0.234	6,217	4,238	10,455
OK-3101.043	Quartermaster Creek-Washita	36	104	0.636	0.097	0.733	6,109	932	7,041
OK-3101.044	Spring Creek-Washita	4	73	0.039	0.026	0.065	532	363	895
OK-3101.046	Wildhorse Creek-Washita	107	275	3.112	3.083	6.195	11,333	11,228	22,561
OK-3101.047	Rock Creek-Washita	17	41	0.343	0.068	0.410	8,452	1,675	10,127
OK-3101.048	Ionine Creek-Washita	3	1	0.014	0.001	0.015	18,783	1,136	19,919
OK-3101.049	Kickapoo Sandy Creek-Washita	20	27	0.265	0.000	0.265	9,737	0	9,737
OK-3101.051	Nine Mile Creek-Washita	18	39	0.147	0.098	0.245	3,737	2,503	6,241

P-26	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
OK-3101.052	Oak Creek-Washita	14	34	0.254	0.389	0.642	7,428	11,366	18,795
OK-3101.053	Mill Creek-Washita	18	27	0.118	0.040	0.158	4,451	1,492	5,943
OK-3101.054	Little Washita River-Washita	45	109	0.887	0.573	1.461	8,144	5,262	13,406
OK-3101.055	Owl Creek-Washita	15	12	0.070	0.123	0.193	5,654	9,971	15,625
OK-3101.056	Maysville Laterals-Washita	21	16	0.438	0.000	0.438	27,908	0	27,908
OK-3101.057	Panther Creek-Washita	6	14	0.138	0.014	0.151	9,714	953	10,667
OK-3101.058	Peavine Creek-Washita	10	36	0.168	0.052	0.220	4,671	1,449	6,120
OK-3101.059	Pennington Creek-Washita	3	12	0.007	0.014	0.020	553	1,095	1,648
OK-3101.060	Gyp Creek-Washita	1	4	0.020	0.014	0.034	5,339	3,639	8,978
OK-3101.061	Rainy Mountain Creek-Washita	29	159	0.758	0.493	1.251	4,757	3,096	7,853
OK-8032.000	Double Creek	6	27	0.256	0.207	0.463	9,433	7,635	17,069
OK-9078.000	Boiling Springs	1	4	0.040	0.032	0.072	9,433	7,635	17,069
OK-9079.000	Fourteen Mile Creek	2	5	0.043	0.035	0.078	9,433	7,635	17,069
OK-9080.000	Scraper Hollow Creek	2	4	0.034	0.028	0.062	9,433	7,635	17,069
OK-9081.000	Whitewater Creek	2	7	0.068	0.055	0.123	9,433	7,635	17,069
OR-2006.000	Middle Fork of Hood River	1	9	0.000	2.706	2.706	0	309,307	309,307
OR-2007.000	Sutherlin Creek	2	13	1.606	0.156	1.762	119,823	11,641	131,464
OR-2009.000	Wolf Creek	2	36	0.000	0.743	0.743	0	20,391	20,391
OR-2022.000	Deadman-Bullard	1	4	0.280	0.000	0.280	73,656	0	73,656
PA-2001.000	Lackawaxen Tributaries	7	5	0.112	0.025	0.136	20,847	4,652	25,499
PA-2002.000	Little Schuylkill River	5	35	1.047	0.158	1.205	29,859	4,496	34,354
PA-2003.000	North Fork Cowanesque River	1	3	0.026	0.016	0.042	7,640	4,584	12,225
PA-2004.000	Greene-Dreher	7	13	1.440	0.304	1.745	111,470	23,559	135,029
PA-2005.000	Saul-Mathay Run	2	2	0.114	0.016	0.130	46,828	6,737	53,566
PA-2006.000	Mill Creek (Tioga)	3	4	0.329	0.066	0.395	75,838	15,210	91,049
PA-2007.000	Mill Run	3	14	0.184	0.037	0.221	12,844	2,587	15,431
PA-2008.000	Dunlap Creek	2	3	0.353	0.113	0.466	102,826	32,982	135,808
PA-2009.000	Brodhead Creek	2	14	0.704	0.097	0.801	51,959	7,185	59,145
PA-2010.000	Martin Creek	2	1	0.123	0.025	0.148	114,238	22,923	137,161
PA-2011.000	Kaercher Creek	3	3	0.181	0.036	0.217	58,015	11,432	69,447
PA-2012.000	Brandywine Creek	5	42	1.753	4.417	6.170	41,311	104,074	145,384
PA-2013.000	Sandy Creek	2	58	0.192	0.040	0.232	3,333	691	4,024
PA-2014.000	Little Shenango River	6	84	0.269	0.413	0.682	3,221	4,943	8,164
PA-2015.000	Briar Creek	2	8	0.063	0.038	0.102	7,854	4,778	12,632
PA-2016.000	Marsh Creek	3	13	0.507	0.104	0.612	38,907	7,992	46,899
PA-2017.000	Middle Creek	3	55	0.647	0.115	0.762	11,836	2,109	13,945
PA-2019.000	Mauch Chunk Creek	1	6	0.065	0.012	0.077	10,941	2,098	13,039
PA-2020.000	Neshaminy Creek	8	51	3.825	10.023	13.848	75,221	197,108	272,329
PA-2021.000	Jacobs Creek	3	42	1.463	0.273	1.736	35,153	6,555	41,709
PA-2023.000	Cross Creek	2	15	0.364	1.458	1.822	24,728	99,082	123,810
PA-2801.000	Harmon Creek	8	13	0.953	0.191	1.144	74,054	14,819	88,873
PA-2802.000	Wheeling Creek	2	71	4.645	0.465	5.110	65,521	6,557	72,078
PA-9082.000	Penn Gameland Water Fowl, Fre	5	2	0.014	0.011	0.025	7,359	5,956	13,315
PA-9084.000	Conneautville	1	0	0.003	0.002	0.005	9,433	7,635	17,069
PA-9085.000	Two Mile Run	1	8	0.079	0.064	0.143	9,433	7,635	17,069
PA-9086.000	Springville	1	1	0.006	0.005	0.010	9,433	7,635	17,069
PA-9087.000	Northmoreland	1	2	0.015	0.012	0.027	9,433	7,635	17,069
SC-2002.000	Coneross Creek	4	23	0.203	0.273	0.476	8,954	12,007	20,961
SC-2003.000	Brushy Creek	4	12	0.109	0.158	0.267	9,150	13,293	22,442
SC-2004.000	Wateree Creek	4	17	0.058	0.136	0.194	3,476	8,173	11,650
SC-2005.000	Huff Creek	5	23	0.046	0.194	0.240	2,021	8,423	10,443
SC-2006.000	Broadmouth Creek	4	8	0.065	0.107	0.172	7,984	13,150	21,134
SC-2007.000	Hills Creek	1	8	0.103	0.109	0.212	12,294	13,097	25,391
SC-2008.000	Duncan Creek	6	37	0.141	0.236	0.377	3,778	6,329	10,107
SC-2009.000	Thicketty Creek	7	42	0.212	0.097	0.310	5,077	2,329	7,406
SC-2012.000	Big Creek	2	7	0.271	0.193	0.464	36,559	25,978	62,537
SC-2013.000	Beaverdam Creek (Edgefield)	2	6	0.083	0.166	0.249	14,443	28,951	43,394
SC-2015.000	Three & Twenty Creek	4	12	0.162	0.180	0.342	13,796	15,296	29,093
SC-2016.000	Fishing Creek	4	20	0.138	0.117	0.255	7,050	5,967	13,016
SC-2020.000	Georges Creek	1	5	0.031	0.174	0.205	6,607	37,423	44,029
SC-2022.000	South Tyger River	4	47	0.095	0.749	0.844	2,002	15,815	17,817
SC-2024.000	Beaverdam Creek (Oconee)	4	18	0.230	0.247	0.477	12,941	13,855	26,796
SC-2025.000	Brown's Creek	1	6	0.053	0.093	0.146	8,555	14,989	23,544
SC-2026.000	Cane Creek	4	36	0.328	0.489	0.817	9,110	13,603	22,713
SC-2027.000	Jackson-Mill Creek	4	30	0.075	0.175	0.249	2,476	5,803	8,279
SC-2028.000	Little Lynches Creek	1	3	0.065	0.064	0.129	20,721	20,326	41,048
SC-2029.000	North Tyger River	1	9	0.131	0.445	0.576	14,134	47,824	61,958
SC-2030.000	Beaverdam-Warrior Creeks	5	26	0.118	0.221	0.339	4,498	8,430	12,928
SC-2031.000	Rocky Creek	4	19	0.270	0.411	0.681	14,530	22,131	36,661
SC-2033.000	Hollow Creek	1	6	0.063	0.094	0.158	11,079	16,471	27,550
SC-2035.000	Oolenoy River	3	6	0.176	0.631	0.807	28,599	102,510	131,109
SC-2038.000	Rabon Creek	3	99	0.271	1.005	1.275	2,742	10,175	12,918
SC-2040.000	Little River	14	8	0.481	0.052	0.533	62,449	6,711	69,160
SC-8033.000	Twelve Mile Creek	7	35	0.326	0.263	0.589	9,433	7,635	17,069
SC-9089.000	Tinkers Creek	1	12	0.113	0.092	0.205	9,433	7,635	17,069
SD-2001.000	Silver Creek	6	12	0.278	0.424	0.702	24,072	36,667	60,739
SD-2003.000	Pattee Creek	4	17	0.162	0.638	0.800	9,747	38,476	48,223
SD-2004.000	Wild Rice Creek	4	31	0.421	0.713	1.134	13,562	22,961	36,523
SD-2006.000	Brule Creek	8	13	1.117	0.348	1.464	83,895	26,119	110,014
SD-2011.000	Upper Deer Creek-Lake Hendrick	1	17	0.126	0.282	0.409	7,526	16,811	24,337
SD-2012.000	Spring-Bull Creek	3	25	0.280	0.185	0.464	11,248	7,436	18,684
SD-2014.000	Mud Creek	1	6	0.063	0.091	0.155	10,643	15,393	26,037
SD-2015.000	Union Creek	5	3	0.185	0.019	0.204	66,212	6,608	72,820
SD-2017.000	Lower Little Minnesota River-Big	1	4	0.000	3.012	3.012	0	754,924	754,924
SD-8034.000	Scott Creek	2	2	0.017	0.014	0.031	9,433	7,635	17,069
SD-9090.000	North Central	6	6	0.054	0.044	0.098	9,433	7,635	17,069
SD-9091.000	Black Hills	1	0	0.002	0.001	0.003	9,433	7,635	17,069
SD-9092.000	Lower James	1	1	0.007	0.006	0.013	9,433	7,635	17,069
SD-9093.000	Randall	13	12	0.110	0.089	0.199	9,433	7,635	17,069
SD-6000.000	Lake Herman	3	23	0.215	0.174	0.390	9,433	7,635	17,069
TN-2002.000	Johnson Creek	5	16	3.790	0.379	4.170	233,116	23,312	256,428
TN-2003.000	Thompson Creek	5	7	3.120	0.130	3.249	466,999	19,445	486,444
TN-2005.000	Indian Creek	4	14	0.161	0.036	0.198	11,573	2,614	14,187
TN-2006.000	Meridian Creek	3	8	0.912	0.083	0.995	112,652	10,220	122,872
TN-2008.000	Jennings Creek	10	25	0.730	0.075	0.805	29,559	3,032	32,592
TN-2010.000	Porter's Creek	10	19	6.176	2.473	8.649	329,023	131,745	460,768
TN-2011.000	Bear Creek	2	2	0.123	0.021	0.144	53,411	9,143	62,554
TN-2012.000	Cypress Creek	12	12	2.949	0.304	3.254	251,018	25,905	276,923
TN-2013.000	Reelfoot-Indian Creek	11	77	3.207	0.675	3.882	41,695	8,774	50,469
TN-2014.000	Houser Creek	2	3	1.966	2.367	4.333	630,012	758,670	1,388,682

P-27	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
TN-2015.000	Cane Creek	7	22	3.235	1.250	4.485	144,166	55,693	199,860
TN-2016.000	Cub Creek	3	7	2.949	0.079	3.028	395,900	10,540	406,441
TN-2017.000	Pine Creek	2	4	5.760	1.421	7.181	1,604,522	395,792	2,000,314
TN-2019.000	Line Creek	1	4	0.012	0.082	0.094	2,644	18,597	21,241
TN-2022.000	Middle Fork-Obion River	9	39	3.790	0.724	4.515	96,107	18,368	114,475
TN-2023.000	Weatherford-Bear Creek	2	16	0.312	0.225	0.537	19,608	14,154	33,762
TN-2031.000	Mud Creek	5	12	0.435	0.208	0.644	37,157	17,761	54,917
TN-2034.000	Sweetwater Creek	4	9	2.553	1.039	3.592	286,226	116,501	402,727
TN-2035.000	Red Boiling Springs	3	3	0.158	0.626	0.784	56,731	225,109	281,839
TN-2036.000	Hurricane Creek	3	6	0.064	0.279	0.343	11,153	48,277	59,431
TN-2038.000	McNairy-Cypress Creek	9	22	0.574	0.474	1.048	25,620	21,152	46,772
TN-2039.000	North Fork-Forked Deer River	19	4	0.140	0.140	0.279	33,432	33,432	66,864
TN-2801.000	Muddy Creek	1	6	0.054	0.044	0.097	9,433	7,635	17,069
TN-2804.000	Three Cypress Creek	1	2	0.153	0.007	0.160	99,951	4,782	104,734
TN-8035.000	Mary's Creek	7	3	0.030	0.025	0.055	9,433	7,635	17,069
TN-8036.000	Sand Creek	2	2	0.023	0.019	0.042	9,433	7,635	17,069
TN-9094.000	Cane Creek Putnam	1	2	0.020	0.016	0.035	9,433	7,635	17,069
TX-2005.000	Cummins Creek	20	72	1.643	0.097	1.740	22,799	1,349	24,149
TX-2006.000	Lower Brushy Creek	17	37	1.389	0.225	1.614	37,169	6,010	43,179
TX-2007.000	Upper Brushy Creek	29	106	1.009	0.874	1.883	9,518	8,243	17,761
TX-2009.000	Johnsons Draw	7	96	1.018	0.022	1.040	10,572	232	10,804
TX-2010.000	Sulphur Creek	9	75	1.150	0.069	1.219	15,333	924	16,256
TX-2011.000	York Creek	16	71	1.203	0.222	1.426	17,025	3,146	20,171
TX-2013.000	Alamo Arroyo	2	94	0.194	0.003	0.198	2,058	35	2,093
TX-2014.000	Diablo Arroyo	2	55	0.145	0.002	0.147	2,639	41	2,680
TX-2015.000	Langford Creek	11	17	0.277	0.023	0.301	16,754	1,419	18,172
TX-2016.000	Auds Creek	13	18	0.270	0.009	0.279	15,243	504	15,747
TX-2017.000	Upper Lake Fork Creek	23	68	0.701	0.085	0.786	10,348	1,254	11,602
TX-2018.000	Dry Devils River and Lowrey Dra	13	156	2.363	0.018	2.381	15,110	114	15,224
TX-2019.000	Chiltipin-San Fernando Creek	8	129	0.741	0.132	0.873	5,748	1,023	6,771
TX-2020.000	San Diego-Rosita Creeks	10	170	0.061	0.407	0.468	362	2,398	2,760
TX-2022.000	Martinez Creek	6	29	0.367	0.292	0.658	12,720	10,121	22,841
TX-2023.000	Caney Creek	12	32	0.306	0.006	0.312	9,491	173	9,664
TX-2024.000	Tehuacana Creek	28	144	2.452	0.548	2.999	17,057	3,809	20,867
TX-2025.000	Olmitos and Garcias Creeks	7	132	0.248	0.085	0.333	1,873	641	2,514
TX-2027.000	Mimms Draw	1	4	0.139	0.000	0.139	32,602	0	32,602
TX-2028.000	East Keechi Creek	10	45	0.263	0.022	0.285	5,815	495	6,309
TX-2029.000	Plum Creek	18	76	0.609	0.286	0.895	7,993	3,755	11,748
TX-2030.000	Kickapoo Creek	6	35	0.411	0.000	0.411	11,652	0	11,652
TX-2031.000	Macho Arroyo	1	15	0.066	0.000	0.066	4,446	0	4,446
TX-2032.000	Madden Arroyo	1	13	0.125	0.000	0.125	9,980	0	9,980
TX-2033.000	Upper Las Moras Creek	2	9	0.210	0.000	0.210	24,286	0	24,286
TX-2034.000	Camp Rice Arroyo	1	44	0.267	0.000	0.267	6,138	0	6,138
TX-2035.000	Lower Plum Creek	10	44	0.753	0.116	0.869	16,954	2,616	19,570
TX-2036.000	Town Branch	2	1	0.140	0.190	0.330	109,955	149,538	259,494
TX-2037.000	Northeast Tributaries of the Leon	26	102	0.806	0.079	0.885	7,878	776	8,654
TX-2038.000	Kent Creek	6	7	0.113	0.107	0.220	16,191	15,390	31,581
TX-2040.000	Salado Creek	14	100	0.917	4.794	5.711	9,165	47,892	57,058
TX-2041.000	Valley Creek	19	99	0.649	0.597	1.246	6,526	5,998	12,524
TX-2042.000	Logan Slough Creek	3	4	0.015	0.496	0.511	3,613	123,406	127,019
TX-2043.000	Nolan Creek	13	42	0.925	0.191	1.116	22,239	4,593	26,832
TX-2044.000	Pine Creek	13	48	0.631	0.000	0.631	13,030	0	13,030
TX-2045.000	Upper Bosque River	27	157	1.343	0.369	1.712	8,569	2,353	10,922
TX-2046.000	Hondo Creek	3	20	0.095	0.035	0.130	4,849	1,768	6,617
TX-2047.000	Big Creek	2	1	0.045	0.016	0.060	45,190	15,817	61,008
TX-2048.000	Attoyac Bayou	13	72	0.778	1.282	2.059	10,768	17,746	28,515
TX-2049.000	Castleman Creek	6	20	0.591	0.135	0.726	30,081	6,880	36,961
TX-2050.000	Donahoe Creek	6	17	0.158	0.027	0.184	9,050	1,540	10,590
TX-2051.000	Duck Creek	17	107	1.300	0.238	1.538	12,179	2,231	14,410
TX-2053.000	Escondido Creek	2	11	0.488	0.046	0.534	43,213	4,054	47,268
TX-2054.000	Williams Creek	4	16	0.106	0.048	0.154	6,791	3,074	9,865
TX-2055.000	Choctaw Creek	23	39	1.162	1.334	2.496	29,803	34,216	64,019
TX-2056.000	Rush Creek	11	105	0.511	0.163	0.674	4,853	1,550	6,404
TX-2057.000	North Cuero	2	2	0.232	0.022	0.255	122,327	11,762	134,089
TX-2058.000	Ruckers Creek	1	6	0.029	0.016	0.045	4,656	2,507	7,162
TX-2059.000	Pecan Creek	4	3	0.229	0.037	0.266	73,156	11,776	84,932
TX-2060.000	Farmers Creek	23	37	0.514	0.173	0.687	13,780	4,643	18,424
TX-2061.000	Bennett Creek	4	56	0.144	0.106	0.250	2,561	1,886	4,447
TX-2063.000	Mill Creek	1	10	0.067	0.587	0.654	6,912	60,479	67,390
TX-2066.000	Aquilla-Hackberry Creek	16	25	0.466	0.291	0.756	18,471	11,517	29,988
TX-2068.000	Lakeview	24	94	1.628	0.018	1.646	17,386	191	17,577
TX-2069.000	Comal River	5	75	0.948	0.216	1.163	12,628	2,874	15,502
TX-2070.000	Lower Running Water Draw	4	134	0.819	0.130	0.949	6,092	964	7,056
TX-2071.000	Running Water Draw	2	134	0.057	0.697	0.754	427	5,220	5,647
TX-2072.000	Hog Creek	2	42	0.199	0.070	0.269	4,737	1,677	6,413
TX-2073.000	Upper Cibolo Creek	4	34	0.406	0.420	0.826	11,920	12,346	24,266
TX-2074.000	Ecleto Creek	5	29	0.140	0.223	0.363	4,879	7,807	12,686
TX-2076.000	Sanderson Canyon	11	151	3.844	0.293	4.137	25,538	1,945	27,483
TX-2077.000	Hitson, C&L and Washburn Draw	3	222	2.243	0.647	2.890	10,099	2,913	13,012
TX-2078.000	Cornudas, North and Culp Draws	1	97	0.698	0.331	1.029	7,189	3,405	10,594
TX-2079.000	Deport Creek	1	6	0.178	0.017	0.194	31,170	2,941	34,111
TX-2082.000	Leona River	3	48	1.354	0.329	1.683	27,996	6,791	34,787
TX-2083.000	McClellan Creek	13	206	0.389	0.525	0.914	1,891	2,554	4,445
TX-2084.000	Paluxy River	19	116	1.610	0.458	2.068	13,922	3,961	17,883
TX-2085.000	Red Deer Creek	4	14	0.139	0.041	0.180	9,568	2,855	12,423
TX-2086.000	Willow Creek	2	17	0.131	0.051	0.182	7,919	3,113	11,032
TX-2087.000	Elm Creek (Cen-Tex)	34	85	0.819	0.561	1.380	9,613	6,584	16,197
TX-2088.000	Pollard Creek	2	7	0.352	0.001	0.353	54,074	172	54,245
TX-2090.000	Three-Mile and Sulfur Draw	2	36	0.475	0.166	0.641	13,162	4,614	17,776
TX-2091.000	Upper San Marcos River	5	78	3.884	0.249	4.133	49,682	3,187	52,869
TX-2092.000	Hamilton Creek	3	4	0.280	0.000	0.280	68,434	0	68,434
TX-2093.000	West Fork of Buffalo Creek	1	7	1.321	0.000	1.321	186,436	0	186,436
TX-2094.000	Elm Creek (1250)	3	76	0.675	0.185	0.860	8,893	2,444	11,338
TX-3101.000	Upper Washita River	38	305	0.707	0.530	1.237	2,320	1,737	4,058
TX-3501.004	North Trinity Laterals-Trinity	4	3	0.314	0.072	0.386	123,635	28,159	151,794
TX-3501.005	Mountain Creek-Trinity	3	16	0.127	0.367	0.494	8,189	23,563	31,752
TX-3501.006	North Creek-Trinity	17	52	0.324	0.092	0.416	6,255	1,769	8,023
TX-3501.007	Pilot Grove Creek-Trinity	52	71	1.859	0.343	2.202	26,114	4,818	30,932
TX-3501.009	Richland Creek-Trinity	125	231	3.615	0.340	3.955	15,662	1,472	17,134
TX-3501.010	Rosser Trinidad Laterals-Trinity	2	15	0.114	0.066	0.180	7,448	4,308	11,756

P-28	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
TX-3501.011	Rowlett Creek-Trinity	6	30	0.434	0.027	0.460	14,365	889	15,254
TX-3501.013	Salt Creek and Laterals-Trinity	17	45	0.246	0.286	0.532	5,435	6,325	11,760
TX-3501.017	Ten Mile Creek-Trinity	2	3	0.035	0.141	0.175	12,596	51,197	63,794
TX-3501.019	Upper East Fork Laterals-Trinity	28	51	0.993	0.236	1.229	19,311	4,583	23,894
TX-3501.021	Village & Walker Creeks-Trinity	8	9	0.103	0.153	0.256	11,917	17,746	29,663
TX-3501.025	West Fork above Bridgeport-Trini	8	29	0.292	1.463	1.754	10,087	50,588	60,675
TX-3501.027	Sister Grove Creek-Trinity	37	58	1.341	0.093	1.434	23,315	1,613	24,927
TX-3501.029	Cedar Creek-Trinity	91	209	2.464	6.855	9.319	11,775	32,760	44,535
TX-3501.030	Chambers Creek-Trinity	137	354	3.076	7.259	10.335	8,682	20,485	29,167
TX-3501.031	Clear Creek-Trinity	62	153	2.055	0.000	2.055	13,471	0	13,471
TX-3501.032	Clear Fork of Trinity River-Trinity	34	82	1.233	0.025	1.257	15,008	299	15,308
TX-3501.033	Denton Creek-Trinity	97	220	3.080	1.453	4.532	14,014	6,610	20,624
TX-3501.036	East Fork Above Lavon-Trinity	64	118	2.246	2.186	4.432	19,029	18,518	37,546
TX-3501.038	East Laterals of the Trinity-Trinity	4	32	0.110	0.266	0.375	3,461	8,405	11,866
TX-3501.043	Gray's Creek-Trinity	14	26	0.239	0.162	0.401	9,309	6,307	15,616
TX-3501.045	Hickory Creek-Trinity	9	17	0.182	0.070	0.253	10,697	4,135	14,832
TX-3501.049	Lake Creek-Trinity	3	12	0.041	0.059	0.101	3,412	4,887	8,299
TX-3501.050	Little Elm and Laterals-Trinity	17	37	0.333	0.017	0.350	9,031	455	9,486
TX-3501.051	Lower East Fork Laterals-Trinity	13	34	0.401	0.474	0.875	11,680	13,795	25,475
TX-3501.052	Elm Fork-Trinity	35	93	1.867	0.000	1.867	19,994	0	19,994
TX-3501.053	Big Sandy Creek-Trinity	38	60	0.968	0.546	1.514	16,092	9,087	25,179
TX-3601.001	Home Creek-Middle Colorado	21	128	0.706	0.020	0.726	5,500	157	5,657
TX-3601.002	Upper Pecan Bayou-Middle Colo	25	199	1.150	0.556	1.706	5,770	2,792	8,563
TX-3601.004	Turkey Creek-Middle Colorado	13	51	0.314	0.047	0.361	6,204	927	7,132
TX-3601.005	Southwest Laterals-Middle Colora	7	31	0.360	0.417	0.777	11,644	13,488	25,132
TX-3601.006	Southeast Laterals-Middle Colora	10	29	0.245	0.136	0.381	8,503	4,737	13,240
TX-3601.007	Northwest Laterals-Middle Colora	17	116	0.700	0.017	0.716	6,040	145	6,184
TX-3601.008	Northeast Laterals-Middle Colora	6	21	0.180	0.063	0.242	8,665	3,014	11,680
TX-3601.009	Mustang Creek-Middle Colorado	11	69	0.269	0.047	0.316	3,877	676	4,553
TX-3601.010	Mukewater Creek-Middle Colorad	10	43	0.612	0.867	1.479	14,368	20,346	34,714
TX-3601.011	Jim Ned Creek-Middle Colorado	37	287	1.513	0.391	1.904	5,275	1,364	6,639
TX-3601.012	Deep Creek-Middle Colorado	6	22	0.183	0.336	0.520	8,522	15,641	24,163
TX-3601.013	Clear Creek-Middle Colorado	8	68	0.463	0.718	1.181	6,781	10,531	17,312
TX-3601.014	Brownwood Laterals-Middle Colo	22	69	9.066	1.714	10.780	131,135	24,795	155,930
TX-3601.015	Brown-Mullin-Middle Colorado	7	28	0.149	0.075	0.223	5,234	2,636	7,870
TX-3601.016	Brady Creek-Middle Colorado	42	528	4.608	0.978	5.586	8,727	1,852	10,578
TX-3601.017	Blanket Creek-Middle Colorado	19	82	0.269	0.261	0.531	3,268	3,173	6,440
TX-3601.018	Lower San Saba River-Middle Co	16	84	0.446	0.129	0.574	5,301	1,528	6,828
TX-8037.000	Calaveras Creek	7	28	0.263	0.213	0.476	9,433	7,635	17,069
TX-8038.000	Cow Bayou	29	53	0.503	0.407	0.909	9,433	7,635	17,069
TX-8040.000	Green Creek	13	46	0.434	0.351	0.786	9,433	7,635	17,069
TX-8047.000	Escondido Creek	11	45	0.424	0.343	0.768	9,433	7,635	17,069
TX-9099.000	Bosque Bottomlands	2	4	0.040	0.032	0.072	9,433	7,635	17,069
TX-9123.000	Town Creek	1	1	0.006	0.005	0.010	9,433	7,635	17,069
TX-9125.000	Upper Caney Creek	1	1	0.013	0.011	0.024	9,433	7,635	17,069
UT-2003.000	Glenwood	1	16	0.038	0.000	0.038	2,349	0	2,349
UT-2004.000	Greens Lake	3	3	0.027	0.022	0.049	9,433	7,635	17,069
UT-2005.000	North Fork of Ogden River	1	10	0.095	0.077	0.172	9,433	7,635	17,069
UT-2006.000	American Fork-Dry Creek	5	90	0.849	0.687	1.536	9,433	7,635	17,069
UT-2007.000	Miller-Biglow	2	5	0.046	0.037	0.082	9,433	7,635	17,069
UT-2008.000	Blue Creek-Howell	1	97	0.293	0.000	0.293	3,014	0	3,014
UT-2009.000	Minersville	2	23	0.623	1.503	2.126	26,839	64,796	91,635
UT-2010.000	Ferron	10	172	1.627	1.317	2.944	9,433	7,635	17,069
UT-2011.000	Monroe-Annabella	3	4	0.427	0.000	0.427	100,251	0	100,251
UT-2012.000	Vernon	1	26	0.245	0.199	0.444	9,433	7,635	17,069
UT-2013.000	Warner Draw	11	27	0.984	7.750	8.733	35,868	282,622	318,490
UT-8041.000	Mt. Pleasant Creek	2	17	0.166	0.134	0.300	9,976	8,075	18,051
UT-8042.000	Santaquin	1	4	0.037	0.030	0.066	9,433	7,635	17,069
UT-9126.000	Beaver Meadows	1	8	0.075	0.060	0.135	9,433	7,635	17,069
UT-9132.000	Dinasaur Land	1	2	0.019	0.015	0.034	9,433	7,635	17,069
VT-2002.000	Jewell Brook	4	7	0.500	0.150	0.650	72,616	21,763	94,379
VA-2002.000	Mountain Run	5	28	0.250	0.139	0.389	8,960	4,990	13,950
VA-2003.000	Roanoke Creek	14	77	0.493	0.050	0.542	6,366	642	7,008
VA-2004.000	Marrowbone Creek	1	11	0.107	0.013	0.119	9,598	1,133	10,732
VA-2005.000	Buffalo Creek	9	47	0.438	0.000	0.438	9,233	0	9,233
VA-2006.000	Beaver Creek	1	9	0.084	0.034	0.118	8,875	3,562	12,437
VA-2007.000	Muddy Creek	2	5	0.036	0.019	0.055	7,891	4,301	12,192
VA-2008.000	Leatherwood Creek	5	30	0.082	0.076	0.158	2,712	2,518	5,230
VA-2010.000	Little River	2	7	0.077	0.066	0.143	10,790	9,294	20,084
VA-2011.000	Beautiful Run	8	11	0.067	0.027	0.093	6,147	2,448	8,595
VA-2012.000	White Oak Run	1	5	0.071	0.027	0.099	14,124	5,392	19,515
VA-2013.000	Johns Creek	4	31	0.144	0.089	0.233	4,624	2,859	7,483
VA-2014.000	Horse Pasture Creek	2	7	0.056	0.011	0.068	8,284	1,682	9,966
VA-2015.000	Little Falling River	3	20	0.043	0.044	0.087	2,114	2,194	4,307
VA-2016.000	South Anna River	9	49	0.124	0.187	0.311	2,514	3,804	6,318
VA-2017.000	Willis River	11	73	0.155	0.085	0.240	2,134	1,170	3,304
VA-2018.000	Cherrystone Creek	2	20	0.021	0.042	0.063	1,038	2,064	3,102
VA-2019.000	Potomac Creek	2	33	0.082	0.316	0.398	2,495	9,621	12,117
VA-2021.000	Upper Clinch Valley	2	5	0.292	0.148	0.440	64,544	32,708	97,251
VA-2022.000	Slate River	5	43	0.107	0.082	0.189	2,464	1,889	4,353
VA-2023.000	Pohick Creek	6	15	0.282	0.291	0.574	18,869	19,451	38,319
VA-2024.000	Upper Blackwater River	2	4	0.158	0.039	0.197	35,608	8,774	44,382
VA-2025.000	Ni River	1	25	0.050	0.436	0.487	2,015	17,416	19,431
VA-2027.000	Buffalo River	3	20	0.279	0.806	1.085	13,981	40,400	54,381
VA-2029.000	Bush River	7	97	0.681	2.127	2.808	7,039	21,978	29,017
VA-2030.000	Cedar Run	2	20	0.268	1.172	1.440	13,715	60,010	73,725
VA-2031.000	Great Creek	1	41	0.211	0.344	0.555	5,181	8,432	13,613
VA-2042.000	Ararat River	7	2	0.048	0.062	0.109	20,065	25,935	46,001
VA-2801.000	Stewarts Creek-Lovills Creek	1	21	0.197	0.160	0.357	9,433	7,635	17,069
VA-0701.001	South River-Potomac	13	37	0.486	0.000	0.486	13,241	0	13,241
VA-0701.002	Shoemaker River-Potomac	3	10	0.216	0.170	0.387	20,662	16,254	36,916
VA-0701.004	Upper North River-Potomac	3	47	0.824	0.000	0.824	17,441	0	17,441
VA-0701.008	Stoney Creek-Potomac	2	12	0.245	0.057	0.301	20,527	4,742	25,269
VA-0701.010	Lower North River-Potomac	6	60	0.423	0.004	0.427	7,034	71	7,105
VA-0701.012	Dry Run-Potomac	2	5	0.184	0.002	0.186	39,168	463	39,631
VA-8043.000	East Fork Falling River	3	10	0.097	0.079	0.176	9,433	7,635	17,069
WA-2008.000	Locke	1	1	0.050	0.005	0.055	55,075	5,433	60,507
WA-2009.000	Silver Lake	1	39	0.006	0.117	0.123	159	2,967	3,126
WA-2013.000	Newman Lake	1	28	0.169	0.000	0.169	5,982	0	5,982
WV-2002.000	Upper Grave Creek	7	2	0.714	0.029	0.743	389,954	15,799	405,753

P-29	POINTS BENEFITS DATA			AVERAGE ANNUAL BENEFITS IN MILLIONS OF DOLLARS			AVERAGE ANNUAL BENEFITS PER SQ-MI OF CONTROL ($)		
WATERSHED PROJECTS (CONT.)		BASE DATA							
ID	NAME	# OF FWRS	TOTAL CONTROL	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS	FLOOD BENEFITS	NON FLOOD BENEFITS	TOTAL BENEFITS
WV-2003.000	Dave's Fork-Christian's Fork	3	2	0.290	0.048	0.339	121,454	20,194	141,648
WV-2004.000	Marlin Run	1	1	0.165	0.000	0.165	131,715	0	131,715
WV-2005.000	Bonds Creek	1	1	0.152	0.011	0.163	297,484	22,191	319,674
WV-2006.000	Brush Creek	10	17	0.427	1.649	2.076	25,210	97,387	122,597
WV-2007.000	Polk Creek	8	7	0.324	0.059	0.382	49,209	8,912	58,121
WV-2008.000	Saltlick Creek	5	20	0.310	0.058	0.368	15,680	2,926	18,606
WV-2010.000	Upper Deckers Creek	7	16	0.422	0.345	0.767	25,911	21,211	47,122
WV-2011.000	Big Ditch Run	1	1	0.214	0.637	0.851	182,595	544,368	726,963
WV-2013.000	Harmon Creek	6	7	0.064	0.052	0.117	9,433	7,635	17,069
WV-2014.000	Blakes Creek-Armour Creek	1	2	0.263	0.214	0.477	107,969	87,608	195,577
WV-2015.000	Upper Buffalo Creek	7	12	1.236	1.384	2.620	101,341	113,438	214,779
WV-2016.000	Wheeling Creek	5	134	18.616	0.130	18.747	138,608	970	139,578
WV-2017.000	Elk Twomile Creek	3	2	0.328	0.063	0.391	211,394	40,753	252,147
WV-2020.000	Pond Run	1	2	1.518	0.137	1.655	807,239	72,962	880,201
WV-2021.000	Mill Creek	6	96	1.058	4.854	5.912	11,008	50,481	61,489
WV-2024.000	Pocatalico River	2	19	0.292	2.708	3.000	15,564	144,117	159,681
WV-2026.000	Upper Mud River	1	51	0.385	1.286	1.672	7,514	25,080	32,594
WV-2032.000	Howard Creek	1	14	1.862	0.242	2.104	137,620	17,881	155,501
WV-2034.000	Elkwater Fork (Upper Tygart)	1	8	0.000	2.062	2.062	0	244,927	244,927
WV-0701.001	Lunice Creek-Potomac	3	9	0.348	0.084	0.432	36,878	8,910	45,789
WV-0701.003	Lost River-Potomac	3	43	0.829	1.699	2.528	19,352	39,645	58,998
WV-0701.004	Patterson Creek-Potomac	31	135	1.952	0.627	2.579	14,458	4,643	19,101
WV-0701.006	Warm Springs Run-Potomac	8	2	0.249	0.281	0.530	147,131	166,525	313,656
WV-0701.008	New Creek-Whites Run-Potomac	9	13	0.421	0.055	0.476	31,325	4,131	35,456
WV-0701.009	North and South Mill Creek-Poto	4	15	0.857	0.861	1.718	58,467	58,745	117,212
WV-0701.010	South Fork River-Potomac	23	108	3.775	0.000	3.775	34,917	0	34,917
WV-8044.000	Salem Fork	7	2	0.022	0.018	0.040	9,433	7,635	17,069
WV-9133.000	Charles Fork	1	4	0.037	0.030	0.066	9,433	7,635	17,069
WV-9135.000	Pullman	1	0	0.003	0.002	0.005	9,433	7,635	17,069
WV-9136.000	Walker Creek	1	6	0.054	0.044	0.098	9,433	7,635	17,069
WV-9140.000	Jumping Branch	1	3	0.027	0.022	0.048	9,433	7,635	17,069
WV-6001.000	North Fork of Hughes River	1	91	0.855	0.692	1.547	9,433	7,635	17,069
WI-2002.000	Lost Creek	3	4	0.021	0.004	0.025	5,183	1,104	6,287
WI-2003.000	Mill Creek	8	14	0.072	0.035	0.107	5,093	2,509	7,602
WI-2004.000	Coon Creek	14	21	0.059	0.071	0.130	2,843	3,457	6,299
WI-2005.000	Alma-Mill Creek	6	11	0.038	0.000	0.038	3,484	0	3,484
WI-2006.000	Bogus Creek	2	4	0.039	0.000	0.039	8,794	0	8,794
WI-2007.000	Bad Axe	8	77	0.185	0.643	0.829	2,397	8,328	10,725
WI-2008.000	Bay City	1	4	0.083	0.000	0.083	21,219	0	21,219
WI-2009.000	South Nelson	1	2	0.023	0.000	0.023	12,939	0	12,939
WI-2011.000	Twin Parks	9	43	0.120	0.375	0.495	2,783	8,702	11,486
WI-2012.000	West Fork Kickapoo	7	31	0.148	0.115	0.263	4,798	3,739	8,537
WI-2013.000	Garden Valley (Rose Valley)	1	5	0.015	0.000	0.015	2,868	0	2,868
WI-2014.000	Glen Hills	10	26	0.077	0.175	0.252	2,933	6,657	9,591
WI-2015.000	Knight's Creek	3	7	0.060	0.004	0.064	8,355	536	8,891
WI-2016.000	Plum Creek	4	24	0.046	0.437	0.483	1,941	18,545	20,486
WI-2017.000	Plain-Honey Creek	3	16	0.056	0.126	0.182	3,631	8,085	11,716
WI-2018.000	Otter Creek	2	30	0.000	0.674	0.674	0	22,442	22,442
WI-2019.000	Tri-Creek	1	4	0.021	0.003	0.024	4,742	563	5,305
WI-2020.000	Blackhawk-Kickapoo	1	2	0.018	0.001	0.018	7,975	241	8,215
WI-2023.000	Poplar River	1	12	0.345	0.132	0.477	28,629	10,990	39,619
WI-8045.000	Klinkner	1	2	0.023	0.018	0.041	9,433	7,635	17,069
WI-8046.000	MLSNA	1	1	0.014	0.011	0.025	9,433	7,635	17,069
WI-9137.000	Halls Creek Wildlife Flowage	1	5	0.047	0.038	0.084	9,433	7,635	17,069
WY-2001.000	Pine Ridge-Case Bier	2	35	0.083	0.097	0.180	2,409	2,808	5,217
WY-2002.000	London Flats-Bovee	4	14	0.139	0.019	0.159	10,034	1,405	11,439
WY-2003.000	Angell Draw	1	5	0.246	0.000	0.246	46,996	0	46,996
WY-2004.000	Boulder Lake	1	130	0.000	0.289	0.289	0	2,227	2,227
WY-2005.000	Arnold Drain	1	5	0.058	0.000	0.058	11,295	0	11,295
WY-2006.000	North Fork Powder River	1	26	0.000	0.286	0.286	0	11,042	11,042
WY-2012.000	Spring Canyon	1	7	0.196	0.000	0.196	27,140	0	27,140
WY-2013.000	Upper North Lavure River	1	46	0.434	0.351	0.785	9,433	7,635	17,069
WY-9139.000	Spring Branch- Ore	1	6	0.052	0.042	0.094	9,433	7,635	17,069
WY-6002.000	Willow Park	1	33	0.314	0.254	0.568	9,433	7,635	17,069
PR-2001.000	Anasco River	2	1	0.200	0.308	0.508	179,854	277,815	457,668
MA-9031.000	Wild Acres Dam	1	1	0.000	0.000	0.000	0	0	0
MS-2020.000	Chuquatonchee Creek	14	0	0.000	0.000	0.000	0	0	0
MO-2001.000	Platte River Tributaries	8	3	0.000	0.000	0.000	0	0	0
MO-7113.000	Lost Creek	10	0	0.000	0.000	0.000	0	0	0
MT-9200.000	Bitter Root	2	6	0.000	0.000	0.000	0	0	0
MT-9201.000	Headwaters	1	19	0.000	0.000	0.000	0	0	0

Appendix 5

Listing of Funded Rehabilitation Projects as of April 2020

Status of All Funded Rehabilitation Projects
April 15, 2020

State	NID	Dam Name	Status
AL	AL00910	Choccolocco Creek 11	Completed
AR	AR00281	Muddy Fork of Illinois River 4	Implementation
AR	AR00286	Muddy Fork of Illinois River Site 1	Planning
AR	AR00332	West Fork Point Remove 7	Implementation
AR	AR00453	Big Creek 6	Implementation
AR	AR00845	Poteau River 8	Implementation
AR	AR00847	Poteau River 5	Completed
AR	AR01101	Muddy Fork of Illinois River 3	Implementation
AZ	AZ00027	Florence FRS	Implementation
AZ	AZ00066	Graveyard Wash	Planning
AZ	AZ00067	Stockton Wash FRS	Planning
AZ	AZ00082	Powerline FRS	Implementation
AZ	AZ00083	Magma No. 1	Completed
AZ	AZ00084	Vineyard Road FRS	Planning
AZ	AZ00085	Rittenhouse	Planning
AZ	AZ00108	White Tanks 3	Completed
AZ	AZ00109	White Tanks 4	Completed
AZ	AZ00138	Fredonia	Implementation
AZ	AZ00143	Buckeye FRS No. 1	Implementation
AZ	AZ00168	Guadalupe FRS	Planning
CA	CA00794	Matanzas Creek Dam 794	Planning
CO	CO00463	Dry Creek Dam	Completed
CO	CO00512	Boxelder Creek B-3	Planning
CO	CO00534	Fisher Peak FPC-2	Planning
CO	CO01406	Boxelder Creek B-2	Planning
CT	CT00657	Farm Brook Site 1	Planning
CT	CT01546	Farm Brook Site 2a	Planning
CT	CT01547	Farm Brook Site 2b	Planning
CT	CT05002	Norwalk Site 2	Planning
GA	GA00034	Mill Canton Creek 3	Planning
GA	GA00036	Mill Canton Creek 6	Planning
GA	GA00037	Mill Canton Creek 7	Planning
GA	GA00038	Mill Canton Creek 8	Planning

State	NID	Dam Name	Status
GA	GA00039	Mill Canton Creek 10	Planning
GA	GA00040	Mill Canton Creek 12	Planning
GA	GA00424	Little Sandy and Trail Creek 1	Completed
GA	GA00430	South River 4	Completed
GA	GA00553	Settingdown Creek 54	Planning
GA	GA00554	Settingdown Creek 56	Planning
GA	GA00555	Settingdown Creek 59	Planning
GA	GA00556	Settingdown Creek 4	Planning
GA	GA00557	Settingdown Creek 6	Planning
GA	GA00567	Settingdown Creek 27	Planning
GA	GA00588	Yellow River RCD Y-3	Implementation
GA	GA00589	Yellow River Y-14	Completed
GA	GA00590	Yellow River Y-15	Completed
GA	GA00592	Gwinnett Co. RCD Y-17	Completed
GA	GA00595	Haynes-Bushy Fork Creek Num	Implementation
GA	GA00603	Marbury Creek 22	Implementation
GA	GA00804	Sallacoa Creek 77	Completed
GA	GA00964	Sandy Creek 15	Completed
GA	GA00986	Sandy Creek 23	Implementation
GA	GA01113	Bull Creek12	Implementation
GA	GA01490	Yellow River 16	Implementation
GA	GA01491	Noonday Creek 17	Implementation
GA	GA01512	Little River 25	Planning
GA	GA01646	Palmetto Creek 1	Implementation
IA	IA01252	Glen Ellen 2-2	Completed
IA	IA01253	Glen Ellen 3-2	Completed
IA	IA01254	Glen Ellen 3-1	Completed
IA	IA01664	Indian Creek 2	Completed
IL	IL00693	Shoal Creek 4	Planning
KS	KS02100	Little Walnut Hickory Dam 19	Implementation
KS	KS02126	Muddy Creek WJD Dam 4-6	Planning
KS	KS02129	Rock Creek 2	Implementation
KS	KS02409	Switzler Creek 7	Completed
KS	KS02415	Spring Creek R1	Completed
KS	KS03937	Wakarusa Lower 24	Completed

State	NID	Dam Name	Status
KS	KS05289	Upper Walnut North Sector FR	Implementation
KS	KS05290	Upper Walnut North Sector FR	Implementation
KY	KY00200	East Fork Clarks River FRS 32	Implementation
KY	KY00336	Plum Creek 18	Completed
KY	KY00766	Red Lick Creek FRS 12	Implementation
KY	KY00769	Red Lick Creek MPS 1	Implementation
LA	LA00040	Upper W. Fork Cypress Bayou #3	Planning
LA	LA00041	Upper W. Fork Cypress Bayou #2	Planning
LA	LA00345	Upper W. Fork Cypress Bayou #1	Planning
MA	MA00604	Arm Brook Dam MA-411	Planning
MA	MA00605	Powdermill Brook	Planning
MA	MA00681	Rawson Hill Brook Dam MA-30	Implementation
MA	MA00998	HOP Brook Dam MA-303	Implementation
MA	MA01000	Nichols Dam MA-301	Completed
MA	MA01191	Delaney Dam Complex MA-309	Planning
MA	MA01195	Tyler Dam MA-310	Implementation
MA	MA01229	Lester G.Ross Dam MA-311	Implementation
MA	MA02598	Allen Site	Planning
MD	MD00139	Piney Run Dam 1	Planning
MO	MO10011	Williams Creek 2	Completed
MO	MO20730	Lost Creek B-2	Completed
MS	MS00075	Chicopa Black 54	Completed
MS	MS00076	Chicopa Black 55	Completed
MS	MS00077	Chicopa Black 53	Completed
MS	MS00079	Black Creek 21	Completed
MS	MS00425	Second Creek Str. No. 6A	Implementation
MS	MS00427	Second Creek Str. No. 6B	Implementation
MS	MS00435	Second Creek 12	Completed
MS	MS00602	Chiwapa Creek Str. No. 65	Completed
MS	MS00604	Chiwapa 29	Completed
MS	MS00605	Chiwapa 3	Completed
MS	MS00623	Town Creek Dam No. 24	Planning
MS	MS00891	Hubbard-Murphree Str Y-17-72	Completed
MS	MS01036	Hubbard-Murphree Str Y-17-73	Completed
MS	MS01037	Hubbard-Murphree Y-17a-74	Completed

State	NID	Dam Name	Status
MS	MS01056	Big Sand Creek Str. Y-32-9a	Planning
MS	MS01060	Big Sand Creek Str Y-32-11	Planning
MS	MS01477	Persimmon 5	Completed
MS	MS01478	Persimmon 30	Completed
MS	MS01480	Persimmon 7	Completed
MS	MS01482	Persimmon 2	Completed
MS	MS01483	Persimmon 3	Completed
MS	MS01642	Shammack Creek 2	Completed
MS	MS01645	Town Creek Dam No. 16	Planning
MS	MS01897	Town Creek Dam No. 24	Planning
MS	MS01920	Greasy Creek LT-1A-11	Planning
MS	MS02231	Richland Creek Site 2A	Implementation
MS	MS02727	Richland Creek Site No. 3	Implementation
NC	NC00262	Deep Creek 19A	Planning
NC	NC00263	Deep Creek 21	Planning
ND	ND00036	N.Branch Forest River Dam #1	Planning
ND	ND00043	Middle S. Branch Forest River Dam #1	Planning
ND	ND00054	Renwick Dam (Tongue River M-4)	Completed
ND	ND00055	Tongue River M-3	Planning
ND	ND00056	Tongue River Dam T-7-1 (Olson)	Planning
ND	ND00083	Tongue River Dam T-3-1 (Bourbanis)	Planning
ND	ND00386	Middle South Branch Forest River #4	Planning
ND	ND00391	Upper Turtle River Dam 9	Planning
NE	NE00068	Oak Middle Creek 82B	Implementation
NE	NE00090	Turtle Creek 2	Completed
NE	NE00092	Papillion Creek. S-32	Completed
NE	NE00489	Indian Creek 15-A	Implementation
NE	NE00505	Upper Salt Creek 3-A	Implementation
NE	NE00522	Upper Salt 19-B	Completed
NE	NE00523	Upper Salt 35-A	Completed
NE	NE00533	Upper Salt 10-A	Completed
NE	NE00559	Dry Creek 2-A	Planning
NE	NE00892	Wilson Creek 8-H	Completed
NE	NE00914	Upper Big Nemaha 25C	Implementation
NE	NE01000	Mud Creek 2-A	Implementation

State	NID	Dam Name	Status
NE	NE01751	Papillion Creek. S-31	Completed
NE	NE01818	Papillion Creek S-27	Completed
NE	NE01883	Papillion Creek W-3	Completed
NE	NE02369	Blackwood 11-A	Planning
NH	NH00178	Baker Site 5	Planning
NH	NH00207	Souhegan 26	Planning
NH	NH00210	Souhegan 12A South	Planning
NH	NH00476	Souhegan 25B	Planning
NH	NH00878	Souhegan 12A North	Planning
NJ	NJ00543	Assunpink Creek Dam No. 8	Planning
NM	NM00208	Hatch Valley Arroyos Site 6	Implementation
NM	NM00238	Santa Cruz 3A	Completed
NM	NM00250	Upper Gila Arroyos No. 6	Implementation
NM	NM00253	Upper Gila Site 6	Implementation
NM	NM00260	Santa Cruz Site 1	Planning
NM	NM00270	Tortugas Arroyo Watershed Site 1	Planning
NM	NM00274	Hackberry Draw 1	Completed
NM	NM00275	Hackberry Draw Site 2	Implementation
NM	NM00278	Sandia Mt Tribs. 1	Completed
NV	NV00078	West Wash Dam	Planning
NY	NY00355	Dean Creek WS - Pylkas Dam	Planning
NY	NY00560	Ischua Creek Dam Site 2	Planning
NY	NY00609	Conewango Creek Dam Site 13	Planning
NY	NY00680	Pelto Dam	Planning
NY	NY00719	Little Choconut 2	Implementation
OH	OH00083	Margaret Creek 2	Completed
OH	OH00437	W. Fork Duck Creek 6	Completed
OH	OH00680	Upper Hocking R23	Completed
OH	OH00706	Margaret Creek 6	Planning
OH	OH00708	West Fork Duck Creek 7	Completed
OH	OH00722	Upper Hocking 8	Completed
OH	OH00960	Margret Creek 1	Planning
OH	OH01086	Chippewa 8-D	Completed
OH	OH01565	Rush Creek 7-C	Completed
OH	OH02010	Chippewa 3-A	Completed

State	NID	Dam Name	Status
OK	OK00078	Sallisaw Creek 15	Completed
OK	OK00079	Sallisaw Creek 16	Completed
OK	OK00081	Sallisaw Creek 18M	Completed
OK	OK00083	Sallisaw Creek 20	Completed
OK	OK00088	Sallisaw Creek 26	Completed
OK	OK00090	Scraper Hollow 2	Planning
OK	OK00631	Barnitz Creek 11	Completed
OK	OK00637	Barnitz Creek 5	Completed
OK	OK00640	Barnitz Creek 14	Completed
OK	OK00641	Barnitz Creek 1	Completed
OK	OK00930	Sandstone Creek 17A	Completed
OK	OK00932	Sandstone Creek 16A	Completed
OK	OK00937	Sandstone Creek 12	Completed
OK	OK01026	Sergeant Major Creek 1	Completed
OK	OK01027	Sergeant Major Creek 2	Completed
OK	OK01110	Turkey Creek 9	Completed
OK	OK01133	Cavalry Creek 6	Completed
OK	OK01231	Sallisaw Creek FRS No. 28	Implementation
OK	OK01232	Sallisaw Creek Multipurpose St	Implementation
OK	OK01233	Sallisaw Creek FRS No. 30	Implementation
OK	OK01234	Sallisaw Creek 32	Implementation
OK	OK01236	Sallisaw Creek 34	Implementation
OK	OK01237	Sallisaw Creek 36	Planning
OK	OK01283	Upper Clear Boggy Creek 33	Completed
OK	OK01284	Upper Clear Boggy Creek 34	Completed
OK	OK01285	Upper Clear Boggy Creek 35	Completed
OK	OK01286	Upper Clear Boggy Creek 36	Completed
OK	OK01318	Big Wewoka 29	Completed
OK	OK01437	Upper Black Bear Creek 62	Implementation
OK	OK01507	Caney Coon Creek 2	Completed
OK	OK01515	Cottonwood Creek 16	Implementation
OK	OK01516	Cottonwood Creek 17	Completed
OK	OK02004	Mill Creek 18	Completed
OK	OK02009	Rock Creek 16	Completed
OK	OK02010	Rock Creek 15	Completed

State	NID	Dam Name	Status
OK	OK02135	Quapaw Creek 15	Implementation
OK	OK02155	Caston Mountain 1	Planning
OK	OK02166	Fourche Maline 7	Implementation
OK	OK11014	Cottonwood Creek 54	Implementation
OK	OK11038	Sugar Creek L-44	Completed
OK	OK11057	Sallisaw Creek 33	Implementation
OK	OK11066	Boiling Springs 1	Implementation
OK	OK12043	Uncle John 10	Planning
OK	OK12051	Cottonwood Creek 15	Completed
OK	OK12181	Caston Mountain 2	Planning
OK	OK13260	Upper Clear Boggy 26	Implementation
OK	OK20568	Cobb Creek FRS No. 3	Implementation
OK	OK20569	Cobb Creek 2	Completed
OK	OK20570	Cobb 1	Completed
OK	OK20591	Fort Cobb Laterals 10	Completed
OK	OK20678	Upper Elk Creek 23D	Implementation
OK	OK20699	Double Creek 1	Completed
OK	OK20700	Double Creek 2	Completed
OK	OK20701	Double Creek 3	Completed
OK	OK20703	Double Creek 5	Completed
OK	OK20704	Double Creek 6	Completed
OK	OK20794	Sugar Creek L-43	Completed
OK	OK22093	Double Creek 4	Completed
OR	OR00443	Plat I (OR-R-475)	Planning
OR	OR00451	Clear Branch Dam (OR-R-4862)	Planning
OR	OR00463	Cooper Creek (OR-R-496)	Planning
PA	PA00028	North Fork Cowanesque PA-406	Completed
PA	PA00033	Marsh Creek-Lake Hamilton P	Implementation
PA	PA00037	Beechwood Lake PA-454	Implementation
PA	PA00086	Lackawaxen Creek Martin Dam PA-	Planning
PA	PA00087	Lackawaxen Creek Finkleday Dam PA-	Planning
PA	PA00088	Lackawaxen Tributaries Varcoe Dam	Planning
PA	PA00097	Lackawaxen Tributaries Garrett Dam	Planning
PA	PA00177	Rainbow Dam PA-460	Implementation
PA	PA00415	Kintz Creek PA-439	Implementation

State	NID	Dam Name	Status
PA	PA00802	Core Creek Park PA-620	Implementation
PA	PA00903	Beaver Creek PA-433	Implementation
PA	PA01213	Conneautville Dam PA-112	Implementation
PA	PA01505	Hibernia Park Dam PA-436F	Implementation
TN	TN15103	Pine Creek 4 - Howard Baker	Implementation
TN	TN15727	Marys and Sand Creek 8	Completed
TN	TN15739	Mary's Creek 9	Implementation
TN	TN15752	Mary's Creek 10	Planning
TN	TN15769	Mary's Creek 4	Planning
TN	TN15770	Mary's Creek 11	Planning
TN	TN15775	Marys and Sand Creek 7	Completed
TX	TX01108	East Fork Above 5-A	Completed
TX	TX01109	East Fork Above Lavon 4	Implementation
TX	TX01110	East Fork Above Lavon Site 3-E	Completed
TX	TX01111	East Fork Above Lavon 3-C	Completed
TX	TX01112	East Fork Above Lavon 3D	Completed
TX	TX01113	East Fork Above Lavon 17	Completed
TX	TX01116	East Fork Above Lavon 2B	Completed
TX	TX01117	East Fork Above Lavon Site 2A	Completed
TX	TX01118	East Fork Above Lavon 1A	Completed
TX	TX01186	Clear Fork of the Trinity 33	Planning
TX	TX01266	Chambers Creek-Trinity River 4	Planning
TX	TX01268	Chambers Creek-Trinity River 6	Planning
TX	TX01271	Chambers Creek Trinity River 1	Implementation
TX	TX01272	Chambers Creek Trinity River S	Implementation
TX	TX01309	Mountain Creek Site 10	Completed
TX	TX01325	Upper Brushy Creek Site 32	Completed
TX	TX01328	Lower Brushy Creek Site 20	Implementation
TX	TX01365	Upper Brushy Creek Site 7	Implementation
TX	TX01366	Upper Brushy Creek 13A	Completed
TX	TX01452	Calaveras Creek Site 10	Completed
TX	TX01459	Calaveras Creek 6	Completed
TX	TX01461	Martinez Creek Site 1	Completed
TX	TX01462	Martinez Creek Site 2	Completed
TX	TX01463	Martinez Creek Site 3	Completed

State	NID	Dam Name	Status
TX	TX01464	Martinez Creek 6A	Completed
TX	TX01465	Martinez Creek 5	Completed
TX	TX01466	Martinez Creek 4	Completed
TX	TX01546	Comal River Site 4	Planning
TX	TX01575	Plum Creek 5	Completed
TX	TX01576	Plum Creek 6	Completed
TX	TX01577	Plum Creek Site 10	Implementation
TX	TX01579	Plum Creek Site 12	Implementation
TX	TX01705	Olmitos and Garcias Creeks Site 7	Completed
TX	TX02337	Nolan Creek 15	Completed
TX	TX02545	Williams Creek Site 3	Completed
TX	TX02546	Williams Creek Site 2	Planning
TX	TX03341	Cedar Creek Site 87A	Implementation
TX	TX03357	Lower East Fork Laterals - Trinity River	Planning
TX	TX03358	Lower East Fork Laterals Site 10	Planning
TX	TX03420	Lower Plum Creek Site 28	Implementation
TX	TX03428	Plum Creek Site 21	Implementation
TX	TX03515	Kickapoo Creek 4	Planning
TX	TX03524	Kickapoo Creek 5	Planning
TX	TX04731	Lower Running Water Draw Sit	Implementation
TX	TX04902	Upper Cibolo Creek 2	Planning
TX	TX06844	Big Sandy Creek 26	Planning
UT	UT00212	Millsite	Implementation
UT	UT00276	Silver Lake Flat	Completed
UT	UT00299	Tibble	Completed
UT	UT00340	Glenwood Debris Basin	Implementation
UT	UT00387	Santaquin Debris Basin	Planning
UT	UT00396	Warner Draw Debris Basin	Implementation
UT	UT00397	Stucki Debris Basin	Implementation
UT	UT00398	Gypsum	Implementation
UT	UT00408	Bigelow Debris Basin	Planning
UT	UT00412	Greens Lake 2	Planning
UT	UT00415	Greens Lake 3	Planning
UT	UT00416	Greens Lake 4	Planning
UT	UT00418	Frog Hollow Debris Basin	Implementation

State	NID	Dam Name	Status
UT	UT00472	Dry Creek	Implementation
UT	UT00533	Sand Hollow	Planning
UT	UT00561	Miller Canyon Debris Basin	Planning
UT	UT00584	Grove Creek Debris Basin	Completed
UT	UT00585	Battle Creek Debris Basin	Completed
UT	UT00665	Ivins 1	Completed
UT	UT00666	Ivins 2	Completed
UT	UT00667	Ivins 3	Completed
UT	UT00668	Ivins 4	Completed
UT	UT00669	Ivins 5	Completed
UT	UT00670	Ivins 6	Completed
VA	VA00301	Beaver Creek 1	Planning
VA	VA01501	South River 26	Completed
VA	VA01502	South River 25	Completed
VA	VA01504	South River 10A	Completed
VA	VA01505	Upper North River No. 10	Completed
VA	VA01507	Upper North River No. 77	Implementation
VA	VA01508	South River 23	Completed
VA	VA04502	Johns Creek No. 1	Implementation
VA	VA04702	Mountain Run No. 11	Completed
VA	VA04703	Mountain Run No. 50	Completed
VA	VA05907	Pohick Creek Dam No. 8	Completed
VA	VA05922	Pohick Creek Dam No. 4	Completed
VA	VA05923	Pohick Creek Dam No. 2	Completed
VA	VA05928	Pohick Creek 3	Completed
VA	VA08908	Marrowbone Creek Dam No. 1	Completed
VA	VA14302	Cherrystone No. 1	Implementation
VA	VA14303	Cherrystone No. 2A	Implementation
VT	VT00014	Jewell Brook Dam #1	Planning
VT	VT00015	Jewell Brook Dam #2	Planning
VT	VT00016	Jewell Brook Dam #3	Planning
VT	VT00017	Jewell Brook Dam #5	Planning
WI	WI00014	Otter Creek 9	Completed
WI	WI00348	Alma Mill 2	Completed
WI	WI00349	Alma Mill 3	Completed

State	NID	Dam Name	Status
WI	WI00351	Alma Mill 5	Completed
WI	WI00363	Twin Parks 10	Completed
WI	WI00380	Plum Creek 19	Completed
WI	WI00388	Mill Creek 10	Completed
WI	WI00392	Plain Honey Creek 3	Completed
WI	WI00395	Glenn Hills 2	Completed
WI	WI00402	Klinkner Pilot Structure	Completed
WI	WI00410	Bad Axe 24	Completed
WV	WV02304	New Creek 14	Completed
WV	WV03909	Blakes Creek - Armour Creek Site 7	Planning
WV	WV05117	Wheeling Creek 25	Implementation
WV	WV05507	Brush Creek 9	Planning
WV	WV05510	Brush Creek 14	Planning
WV	WV05511	Brush Creek 15	Planning
WV	WV05701	New Creek 1	Planning
WV	WV05706	New Creek 17	Planning
WV	WV07706	Upper Deckers Creek 1	Implementation
WY	WY00557	North Fork Powder River - Dull	Implementation

Appendix 6

In Case of Dam Failure
Break Glass!

In Case of Dam Failure
Break Glass!

These materials have been developed for use as an aid in case of a dam failure or if a major structural problem occurs on a dam. This information should be considered as a starting point to help get prepared during a difficult and often confusing time. It should be modified as needed to meet a specific situation. It is not intended that the information called for in the attached forms be gathered on dams unless there is such an event. However, as Emergency Action Plans (EAP) are developed, it is advisable to include this information in them.

Introduction:

Dam failure, or even a near failure, is fortunately not a common occurrence, but as many of the flood control dams reach the end of their planned designed life span, the risk of such an event increases. And, as more development occurs downstream from dams, the risk of loss of life and property damage increases.

Watershed sponsors, state dam safety agency officials, Natural Resources Conservation Service staff and others who be involved in dealing with a dam failure or a major problem with a dam must be prepared for such an event.

State and local officials will be required to provide information to the public and provide leadership with emergency response. They will also be asked to help determine the cause of the problem, future actions, etc. and must be prepared to deal with the situation in a safe, organized and timely manner. All dam catastrophes will include interaction with the media.

The enclosed materials provide tools for personnel in preparing for media briefings, responding to questions from the media, and other actions.

It is vitally important to be prepared and take a proactive role in such a disaster.

Gathering Information & Preparing a Statement Immediately After Event

1. Gather available information about the dam (see attached sheet).

2. Gather facts about the current situation (damage, rainfall event, etc.)

3. Prepare a brief statement with known facts.

4. Ensure the statement is brief and to the point. Do not speculate on problem causes or other issues.

5. The statement should include:

    a. identify yourself, your agency and your role in this event and identify the state dam safety agency.

    b. Describe the event that occurred if any before the problem or failure (inches of rainfall / time frame / area covered by storm).

    c. Express sympathy for any loss of lives, injuries, and loss of property.

    d. Provide details about the dam: purpose of dam, age of dam, who built the dam, ownership of dam, dam sponsors, brief details of watershed project.

    e. Describe the kind of damage that has occurred to the dam or what is the current situation.

    f. Describe downstream situation, homes, buildings, etc.

    g. Describe actions included in the emergency plan and which of these actions have been implemented.

    h. Make the point that dams are inspected at least annually and give the last inspection date on the dam. List any deficiencies that were noted during the last inspection and note what actions had been taken to correct these deficiencies.

    i. Note that the cause of the failure or problem is under investigation and details on the cause will be forthcoming. The_____will be the agency that will determine the exact cause of the problem.

    J. (End statement with a sentence) (Be sure to check facts before making statements). The (number) flood control dams in (state) have protected people, property and natural resources for __ years. This is the first failure or major problem of this magnitude to date. This is a very rare event, but one that is very serious and unfortunate.

Responding to the Media

Questions From The Media:

1. You control the information you provide the press. Do not be pressured into speculating on areas that you do not have information and facts.

2. Provide only the facts and don't speculate, don't estimate costs, or try to place blame on anyone, agency, or sponsor.

3. Getting information out as fast as possible will help avoid speculation and erroneous information.

4. If a question is asked that you don't feel comfortable in answering or you don't have the exact information, simply reply you don't have that information at this time.

5. The more prepared you are, the more it will be viewed that you are in control of the situation.

6. It is likely that the media will ask questions such as:
   - ☐ What is the extent of the damages, loss of lives, etc?
   - ☐ Age of dam?
   - ☐ Who built the dam?
   - ☐ Who is responsible for operation and maintenance?
   - ☐ Who is responsible for damage downstream?
   - ☐ When was the last inspection of the dam occurred?
   - ☐ Has there been other dam failures or similar problems in the state?
   - ☐ Who will repair the dam?
   - ☐ What will be the cost of repairing the dam?
   - ☐ What are the chances of other such problems in the state?
   - ☐ Has the state dam safety agency put anyone on notice of other "unsafe/dangerous" dams? Where are they?
   - ☐ How many dams in the state have had the hazard classification changed due to conditions downstream? Where are they?
   - ☐ How many dams are improperly maintained? Where are they?
   - ☐ What actions are being taken to ensure other dams won't fail?
   - ☐ Who is responsible for the failure?
   - ☐ Is the failure due to neglect or the failure of someone?
   - ☐ Who is responsible for the deaths or injuries?
   - ☐ Who will pay to clean up the mess?
   - ☐ Will the dam be totally removed?
   - ☐ Who will pay for the fines for the environmental damage imposed by state and federal agencies?

While you may not have answers for all these questions immediately, you may need to be prepared to respond rapidly.

Checklist of Information Needed Within Hours after Dam Failure

1. Name of Dam _____
2. Name of watershed _____
3. Location of dam (description from town, etc) _____
4. Watershed sponsor _____
5. Who built the dam? _____
6. Regulated by (state agency) _____
7. Dam owner _____
8. Date dam was built _____
9. Size of watershed _____
10. Last date the dam was inspected _____
11. Have there been previous problems with the dam?

    _____

12. Details on precipitation or other events prior to failure:

    _____

    _____

    _____

13. Emergency Action Plan Details:
    - ☐ Official notification person/agency;
    - ☐ People potentially impacted by failure;
    - ☐ Procedures to be followed.

Where to look for information:

- ☐ Watershed work plans
- ☐ As-built plans
- ☐ National Inventory of dams
- ☐ O&M inspection reports
- ☐ State dam safety agency records

Sample Statement for use When a Dam Fails and There are Fatalities and Severe Property Damages

My name is_____. I am the (title) with the (agency/sponsor).

On (date) a dam located ____ of _____ failed and sadly, it appears from initial reports there have been fatalities. We want to express our sympathy to the families and friends of those lost in this tragedy.

The dam that has failed was constructed under the USDA Watershed Program assisting the _____, who is the local sponsor of the _____ Watershed Project.

At this point we do not know the exact cause of the failure of the dam. We do know that the area received heavy rains in the last ___ days. We are not aware of any problem that existed with the dam prior to the incident, but we will be cooperating with (state dam safety agency officials, FEMA, etc), sponsors of the project and others to help identify potential causes of the failure.

This dam is one of almost 12,000 dams nationwide that NRCS has assisted local communities install in 47 states over the past 70 years. (State) has __of the dams.

The dams have prevented considerable flood damage and have saved many lives over the years. Unfortunately, the dams have been so successful in preventing floods; many times, the public doesn't fully understand the danger involved with the storing of water behind an aging dam.

As with other similar dams, there is an emergency action plan that was immediately implemented after the failure. Some of the actions in the plan that have been carried out by _____are_____, _____ , and _____

This is the first failure of a watershed dam in this state (check this fact). While the failure of a dam like this one is extremely rare, it is a tragedy and we will work quickly to determine the cause of the failure and work to ensure the other flood control dams in the state don't have a similar problem.

Sample Statement After a Near Failure or Serious Problem/Damage Has Occurred to a Dam

My name is_____. I am (title) with the (agency/sponsor).

On (date) a dam known as Dam Number ___,_____Watershed, located _____sustained severe damages to (the dam or spillway or both). There are engineers on the site accessing the extent of the damage and if there is a potential failure of the dam.

The dam that was constructed under the USDA Watershed Program assisting the _____, who is the local sponsor of the_____Watershed Project.

At this point we do not know the full extent of the problem. We do know that the area received heavy rains in the last ____ days. We are not aware of any problem that existed with the dam prior to the incident, but we will be cooperating with the _____sponsors of the project and others to help determine not only the extent of the problem, but the cause of the damage and what will be needed to ensure the safety of the dam and to repair the damage.

This dam is one of almost 12,000 dams nationwide that NRCS has assisted local communities install in 47 states over the past 70 years. (State) has ___ of these watershed dams. The dams have prevented considerable flood damage and have saved many lives over the years.

Unfortunately, the dams have been so successful in preventing floods; many times, the public doesn't fully understand the danger involved with the storing of water behind an aging dam and that sometimes places people downstream from the dams in potential danger.

As with other similar dams, there is an emergency action plan that was in place and followed. Some of the actions in the plan that have been carried out since the identification of the problem by_____ are _____and _____.

The failure of a dam like this one is extremely rare. There has not been a failure of a watershed dam in this state until now (check out this fact). But this is a serious situation and we are doing everything possible to ensure the safety of people downstream. We are also checking other dams to ensure their safety. Now I will ask _____with the ____ agency to provide more information. (Call upon others that have pertinent information).

Appendix 7

Text of
Public Law 78-534

Public Law 78-534, the Flood Control Act of 1944

PUBLIC LAWS - CHAPTER 665
December 22, 1944 [H. R. 4485]

AN ACT

Authorizing the construction of certain public works on rivers and harbors for flood control, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, In connection with the exercise of jurisdiction over the rivers of the Nation through the construction of works of improvement, for navigation or flood control, as herein authorized, it is hereby declared to be the policy of the Congress to recognize the interests and rights of the States in determining the development of the watersheds within their borders and likewise their interests and rights in water utilization and control, as herein authorized to preserve and protect to the fullest possible extent established and potential uses, for all purposes, of the waters of the Nation's rivers; to facilitate the consideration of projects on a basis of comprehensive and coordinated development; and to limit the authorization and construction of navigation works to those in which a substantial benefit to navigation will be realized there-from and which can be operated consistently with appropriate and economic use of the waters of such rivers by other users.

In conformity with this policy:

(a) Plans, proposals, or reports of the Chief of Engineers, War Department, for any works of improvement for navigation or flood control not heretofore or herein authorized, shall be submitted to the Congress only upon compliance with the provisions of this paragraph (a). Investigations which form the basis of any such plans, proposals, or reports shall be conducted in such a manner as to give to the affected State or States, during the course of the investigations, information developed by the investigations and also opportunity for consultation regarding plans and proposals, and, to the extent deemed practicable by the Chief of Engineers, opportunity to cooperate in the investigations. If such investigations in whole or part are concerned with the use or control of waters arising west of the ninety- seventh meridian, the Chief of Engineers shall give to the Secretary of the Interior, during the course of the investigations, information developed by the investigations and also opportunity for consultation regarding plans and proposals, and to the extent deemed practicable by the Chief of Engineers, opportunity to cooperate in the investigations. The relations of the Chief of Engineers with any State under this paragraph (a) shall be with the Governor of the State or such official or agency of the State as the Governor may designate. The term "affected State or States" shall include those in which the works or any part thereof are proposed to be located; those which in whole or part are both within the drainage basin involved and situated in a State lying wholly or in part west of the ninety-eighth meridian; and such of those which are east of the ninety-eighth meridian as, in the judgment of the Chief of Engineers, will be substantially affected. Such plans, proposals, or reports and related investigations shall be made to the end, among other things, of facilitating the coordination of plans for the construction and operation of the proposed works with other plans involving the waters which would be used or controlled by such proposed works. Each report submitting any such plans or proposals to the Congress shall set out therein, among other things, the relationship between the plans for construction and operation of the proposed works and the plans, if any, submitted by the affected States and by the Secretary of the Interior. The Chief of Engineers shall transmit a copy of his proposed report to each affected State, and, in case the plans or proposals covered by the report are concerned with the use or control of waters which rise in whole or in part west of the ninety-seventh meridian, to the Secretary of the Interior. Within ninety days from the date of receipt of said proposed report, the written views and recommendations of each affected State and of the Secretary of the Interior may be submitted to the Chief of Engineers. The Secretary of War shall transmit to the

Congress, with such comments and recommendations as he deems appropriate, the proposed report together with the submitted views and recommendations of affected States and of the Secretary of the Interior. The Secretary of War may prepare and make said transmittal any time following said ninety-day period. The letter of transmittal and its attachments shall be printed as a House or Senate document.

(b) The use for navigation, in connection with the operation and maintenance of such works herein authorized for construction, of waters arising in States lying wholly or partly west of the ninety-eighth meridian shall be only such use as does not conflict with any beneficial consumptive use, present or future, in States lying wholly or partly west of the ninety-eighth meridian, of such waters for domestic, municipal, stock water, irrigation, mining, or industrial purposes.

(c) The Secretary of the Interior, in making investigations of and reports on works for irrigation and purposes incidental thereto must, in relation to an affected State or States (as defined in paragraph (a) of this section), and to the Secretary' of War, be subject to the same provisions regarding investigations, plans, proposals, and reports as prescribed in paragraph (a) of this section for the Chief of Engineers and the Secretary of War. In the event a submission of views and recommendations, made by an affected State or by the Secretary of War pursuant to said provisions, sets forth objections to the plans or proposals covered by the report of the Secretary of the Interior, the proposed works shall not be deemed authorized except upon approval by an Act of Congress; and subsection 9 (a) of the Reclamation Project Act of 1939 (53 Stat. 1187) and subsection 3 (a) of the Act of August 11, 1939 (53 Stat. 1418), as amended, are hereby amended accordingly.

Section 2. That the words "flood control" as used in section 1 of the Act of June 22, 1936, shall be construed to include channel and major drainage improvements, and that hereafter Federal investigations and improvements of rivers and other waterways for flood control and allied purposes shall be under the jurisdiction of and shall be prosecuted by the War Department under the direction of the Secretary of War and supervision of the Chief of Engineers, and Federal investigations of watersheds and measures for run-off and water-flow retardation and soil-erosion prevention on watersheds shall be under the jurisdiction of and shall be prosecuted by the Department of Agriculture under the direction of the Secretary of Agriculture, except as otherwise provided by Act of Congress.

Section 3. That section 3 of the Act approved June 22, 1936 (Public, Numbered 738, Seventy-fourth Congress), as amended by section 2 of the Act approved June 28, 1938 (Public, Numbered 761, Seventy-fifth Congress), shall apply to all works authorized in this Act, except that for any channel improvement or channel rectification project provisions (a), (b), and (c) of section 3 of said Act of June 22, 1936, shall apply thereto, and except as otherwise provided by law: Provided, That the authorization for any flood-control project herein adopted requiring local cooperation shall expire five years from the date on which local interests are notified in writing by the War Department of the requirements of local cooperation, unless said interests shall within said time furnish assurances satisfactory to the Secretary of War that the required cooperation will be furnished.

Section 4. The Chief of Engineers, under the supervision of the Secretary of War, is authorized to construct, maintain, and operate public park and recreational facilities in reservoir areas under the control of the War Department, and to permit the construction, maintenance, and operation of such facilities. The Secretary of War is authorized to grant leases of lands, including structure or facilities thereon, in reservoir areas for such periods and upon such terms as he may deem reasonable: Provided, That preference shall be given to Federal, State, or local governmental agencies, and licenses may be granted without monetary consideration, to such agencies for the use of areas suitable for public park and recreational purposes, when the Secretary of War determines such action to be in the public interest. The water areas of all such reservoirs shall be open to public use

generally, without charge, for boating, swimming, bathing, fishing, and other recreational purposes, and ready access to and exit from such water areas along the shores of such reservoirs shall be maintained for general public use, when such use is determined by the Secretary of War not to be contrary to the public interest, all under such rules and regulations as the Secretary of War may deem necessary. No use of any area to which this section applies shall be permitted which is inconsistent with the laws for the protection of fish and game of the State in which such area is situated. All moneys received for leases or privileges shall be deposited in the Treasury of the United States as miscellaneous receipts.

Section 5. Electric power and energy generated at reservoir projects under the control of the War Department and in the opinion of the Secretary of War not required in the operation of such projects shall be delivered to the Secretary of the Interior, who shall transmit and dispose of such power and energy in such manner as to encourage the most widespread use thereof at the lowest possible rates to consumers consistent with sound business principles, the rate schedules to become effective upon confirmation and approval by the Federal Power Commission. Rate schedules shall be drawn having regard to the recovery (upon the basis of the application of such rate schedules to the capacity of the electric facilities of the projects) of the cost of producing and transmitting such electric energy, including the amortization of the capital investment allocated to power over a reasonable period of years. Preference in the sale of such power and energy shall be given to public bodies and cooperatives. The Secretary of the Interior is authorized, from funds to be appropriated by the Congress, to construct or acquire, by purchase or other agreement, only such transmission lines and related facilities as may be necessary in order to make the power and energy generated at said projects available in wholesale quantities for sale on fair and reasonable terms and conditions to facilities owned by the Federal Government, public bodies, cooperatives, and privately owned companies. All moneys received from such sales shall be deposited in the Treasury of the United States as miscellaneous receipts.

Section 6. That the Secretary of War is authorized to make contracts with States, municipalities, private concerns, or individuals, at such prices and on such terms as he may deem reasonable, for domestic and industrial uses for surplus water that may be available at any reservoir under the control of the War Department: Provided, That no contracts for such water shall adversely affect then existing lawful uses of such water. All moneys received from such contracts shall be deposited in the Treasury of the United States as miscellaneous receipts.

Section 7. Hereafter, it shall be the duty of the Secretary of War to prescribe regulations for the use of storage allocated for flood control or navigation at all reservoirs constructed wholly or in part with Federal funds provided on the basis of such purposes, and the operation of any such project shall be in accordance with such regulations: Provided, That this section shall not apply to the Tennessee Valley Authority, except that in case of danger from floods on the Lower Ohio and Mississippi Rivers the Tennessee Valley Authority is directed to regulate the release of water from the Tennessee River into the Ohio River in accordance with such instructions as may be issued by the War Department.

Section 8. Hereafter, whenever the Secretary of War determines, upon recommendation by the Secretary of the Interior that any dam and reservoir project operated under the direction of the Secretary of War may be utilized for irrigation purposes, the Secretary of the Interior is authorized to construct, operate, and maintain, under the provisions of the Federal reclamation laws (Act of June 17, 1902, 32 Stat. 388, and Acts amendatory thereof or supplementary thereto), such additional works in connection therewith as he may deem necessary for irrigation purposes. Such irrigation works may be undertaken only after a report and findings thereon have been made by the Secretary of the Interior as provided in said Federal reclamation laws and after subsequent specific authorization of the Congress by an authorization Act; and, within the limits of the water users' repayment ability such report may be predicated on the allocation to irrigation of an appropriate portion of the cost of structures and facilities used for irrigation and other purposes. Dams and

reservoirs operated under the direction of the Secretary of War may be utilized hereafter for irrigation purposes only in conformity with the provisions of this section, but the foregoing requirement shall not prejudice lawful uses now existing: Provided, That this section shall not apply to any dam or reservoir heretofore constructed in whole or in part by the Army engineers, which provides conservation storage of water for irrigation purposes.

Section 9. (a) The general comprehensive plans set forth in House Document 475 and Senate Document 191, Seventy-eighth Congress, second session, as revised and coordinated by Senate Document 247, Seventy-eighth Congress, second session, are hereby approved and the initial stages recommended are hereby authorized and shall be prosecuted by the War Department and the Department of the Interior as speedily as may be consistent with budgetary requirements.

(b) The general comprehensive plan for flood control and other purposes in the Missouri River Basin approved by the Act of June 28, 1938, as modified by subsequent Acts, is hereby expanded to include the works referred to in paragraph (a) to be undertaken by the War Department; and said expanded plan shall be prosecuted under the direction of the Secretary of War and supervision of the Chief of Engineers.

(c) Subject to the basin-wide findings and recommendations regarding the benefits, the allocations of costs and the repayments by water users, made in said House and Senate documents, the reclamation and power developments to be undertaken by the Secretary of the Interior under said plans shall be governed by the Federal Reclamation Laws (Act of June 17, 1902, 32 Stat. 388, and Acts amendatory thereof or supplementary thereto), except that irrigation of Indian trust and tribal lands, and repayment therefor, shall be in accordance with the laws relating to Indian lands.

(d) In addition to previous authorizations there is hereby authorized to be appropriated the sum of $200,000,000 for the partial accomplishment of the works to be undertaken under said expanded plans by the Corps of Engineers.

(e) The sum of $200,000,000 is hereby authorized to be appropriated for the partial accomplishment of the works to be undertaken under said plans by the Secretary of the Interior.

Section 10. That the following works of improvement for the benefit of navigation and the control of destructive flood waters and other purposes are hereby adopted and authorized in the interest of the national security and with a view toward providing an adequate reservoir of useful and worthy public works for the post-war construction program, to be prosecuted under the direction of the Secretary of War and supervision of the Chief of Engineers in accordance with the plans in the respective reports hereinafter designated and subject to the conditions set forth therein: Provided, That the necessary plans, specifications, and preliminary work may be prosecuted on any project authorized in this Act to be constructed by the War Department during the war, with funds from appropriations heretofore or hereafter made for flood control, so as to be ready for rapid inauguration of a post-war program of construction: Provided f'urther, That when the existing critical situation with respect to materials, equipment, and manpower no longer exists, and in any event not later than immediately following the cessation of hostilities in the present war, the projects herein shall be initiated as expeditiously and prosecuted as vigorously as may be consistent with budgetary requirements: And provided further, That penstocks and other similar facilities adapted to possible future use in the development of hydroelectric power shall be installed in any dam authorized in this Act for construction by the War Department when approved by the Secretary of War on the recommendation of the Chief of Engineers and the Federal Power Commission.

LAKE CHAMPLAIN BASIN

Modifications of the existing Waterbury, Wrightsville, and East Barre Dams in the Winooski River Basin, Vermont, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 629, Seventy- eighth Congress, second session, at an -estimated cost of $2,120,000.

BLACKSTONE RIVER BASIN

The project for the West Hill Reservoir on the West River, Massachusetts, for flood control and other purposes in the Blackstone River Basin is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 624, Seventy-eighth Congress, second session, at an estimated cost of $1,070,000. The project on Blackstone River for local flood protection at Worcester, Massachusetts, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 624, Seventy-eighth Congress, second session, at an estimated cost of $2,232,000.

The project on Blackstone River for local flood protection at Woonsocket, Rhode Island, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 624, Seventy-eighth Congress, second session, at an estimated cost of $803,000.

The project on Seekonk River, for local flood protection at Pawtucket, Rhode Island, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 624, Seventy-eighth Congress, second session, at an estimated cost of $82,000.

CONNECTICUT RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $30,000,000 for the prosecution of the comprehensive plan approved in the Act of June 28, 1938. as modified by the Act approved August 18, 1941, for the Connecticut River Basin: Provided, Nothing in this Act or in any previous authorization shall be construed to authorize the construction of a dam, other than a flood control type dam, on the main stream of the West River in the towns of Dummerston or Newfane in the State of Vermont: Provided further, That the Army Engineers are authorized and directed to construct eight reservoirs in the West River Basin in Vermont instead of the flood control reservoir authorized by existing law, known as the Williamsville Reservoir in the above mentioned towns, in accordance with an alternative plan submitted by the Vermont State Water Conservation Board as the same may be modified by agreement between the said Board and the Secretary of War and the Chief of Engineers, provided that the Secretary of War determines that the total costs of the alternate plan shall not exceed the sum of $11,000,000 and that the amount of flood control secured by them at the entrance of the waters of the West River into the Connecticut River shall not be less than seventy-five per centum of the flood control which may be secured from the single so-called Williamsville Reservoir now authorized to be constructed by the Army Engineers. Plans, proposals, or reports heretofore authorized for construction at Cambridgeport, Ludlow, South Tunbridge, and Gaysville, in the Connecticut River Basin, or any modification hereafter made of the comprehensive plan for the Connecticut River Basin in Vermont under authority of the Flood Control Act approved June 28, 1938, or of section 3 of the Flood Control Act approved August 18, 1941, shall not be carried out until after compliance with the provisions of paragraph (a) of section 1 of this Act: Provided further, That neither this authorization nor any previous authorization shall be construed to authorize the construction of a dam or reservoir at the Sugar Hill site on the Ammonoosuc River.

THAMES RIVER BASIN

In addition to previous authorizations, there is hereby authorized the completion of the plan approved in the Act of August 18, 1941, for the Thames River Basin at an estimated cost of $7,200,000.

HOUSATONIC RIVER BASIN

The project for the Thomaston Reservoir on the Naugatuck River, for flood control in the Housatonic River Basin, Connecticut, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 338, Seventy- seventh Congress, first session, at an estimated cost of $5,151,000.

SUSQUEHANNA RIVER BASIN

The project authorized by the Act of June 22, 1939, to provide for local protection works on the Susquehanna River at Harrisburg, Pennsylvania, is hereby modified substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 702, Seventy-seventh Congress, second session, at an estimated cost of $2,227,000.

The project for flood protection at Tyrone, Pennsylvania, on the Little Juniata River, Pennsylvania, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 702, Seventy-seventh Congress, second session, at an estimated cost of $1,392,000.

The plan for flood control in southern New York and eastern Pennsylvania authorized by the Act of June 22, 1936, as modified by the Act of August 18, 1941, is hereby further modified to include the South Plymouth and Genegantslet Reservoirs on tributaries of the Chenango River substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 702, Seventy-seventh Congress, second session, at an estimated additional cost of $4,755,000.

ROANOKE RIVER BASIN

The general plan for the comprehensive development of the Roanoke River Basin for flood control and other purposes recommended by the Chief of Engineers in House Document Numbered 650, Seventy-eighth Congress, second session, is approved and the construction of the Buggs Island Reservoir on the Roanoke River in Virginia and North Carolina, and the Philpott Reservoir on the Smith River in Virginia, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in that report at an estimated cost of $36,140,000.

EDISTO RIVER BASIN

The project for local flood control on Edisto River, South Carolina, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 182, Seventy-eighth Congress, second session, at an estimated cost of $139,000.

SAVANNAAH RIVER BASIN

The general plan for the comprehensive development of the Savannah River Basin for flood control and other purposes recommended by the Chief of Engineers in House Document Numbered 657, Seventy-eighth Congress, second session, is approved and the construction of the Clark Hill Reservoir on the Savannah River in South Carolina and Georgia, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in that report at an estimated cost of $35,300,000.

MOBILE RIVER BASIN-ALABAMA-COOSA RIVER BASIN

In addition to previous authorizations, there is hereby authorized the completion of the Allatoona Reservoir on the Etowah River, Georgia approved in the Act of August 18, 1941, at an estimated cost of $14,400,000.

LOWER MISSISSIPPI RIVER

The project for flood control and improvement of the Lower Mississippi River adopted by the Act of May 15, 1928, as amended by subsequent Acts of Congress, is hereby modified in accordance with the recommendations of the Chief of Engineers in House Document Numbered 509, Seventy-eighth Congress, second session, and, as modified, is hereby adopted and there is hereby authorized to be appropriated, in addition to the sums previously authorized, $200,000,000 for the accomplishment of the purposes set forth in said document.

Paragraph (d) of the Lower Mississippi River item in section 3 of the Flood Control Act of August 18, 1941, is hereby construed to authorize reimbursement for the actual market value of lands, rights-of- way, and easements, furnished subsequent to August 18, 1941, for set-backs of main-line Mississippi River levees, regardless of State laws limiting payments to local tax assessment valuations.

The project for flood control on the Boeuf and Tensas Rivers and Bayou Macon, Arkansas and Louisiana, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 151, Seventy- eighth Congress, second session, at an estimated cost of $5,013,000.

The project for flood control on the Big Sunflower, Little Sunflower, Hushpuckena, and Quiver Rivers and their tributaries, and on Hull Brake-Mill Creek Canal, Bogue Phalia, Ditchlow Bayou, Deer Creek, and Steele Bayou, Mississippi, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 516, Seventy-eighth Congress, second session, at an estimated cost of $3,752,000.

The project for flood protection in the backwater area of the Yazoo River authorized in the Flood Control Act of August 18, 1941, is hereby amended to authorize the Chief of Engineers, in his discretion, to include improvements for the protection of the Satartia area at an estimated additional cost of $1,061,000 or, in his discretion, to include improvements for the protection of the Satartia area plus its extension at an estimated additional cost of $1,952,000.

RED-OUACHITA RIVER BASIN

In addition to previous authorizations, there is hereby authorized the completion of the plan approved in the Act of August 18, 1941, for the Little Missouri River in Arkansas, at an estimated cost of $3,800,000.

The project on Red River in the vicinity of Shreveport, Louisiana, for flood control and bank protection is hereby authorized, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 627, Seventy-eighth Congress, second session, at an estimated cost of $3,000,000, except that, in view of the large expenditure already made by local interests, they shall not be required to contribute to the construction cost.

The project for the Blakely Mountain Dam on the Ouachita River, for flood control and other purposes in the Ouachita River Basin, Arkansas, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 647, Seventy-eighth Congress, second session, at an estimated cost of $11,080,000.

ARKANSAS RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $35,000,000 for the prosecution of the comprehensive plan approved in the Act of June 28, 1938, as modified by the Act approved August 18, 1941, for the Arkansas River Basin.

The projects for local flood protection on the Arkansas River are hereby modified and authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 447, Seventy-eighth Congress, second session, at an estimated additional cost of $10,299,400.

The project on tributaries of the Fountaine Que Bouille River for flood protection at Colorado Springs, Colorado, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 186, Seventy- eighth Congress, first session, at an estimated cost of $500,000.

The project on Purgatoire River for local flood protection at Trinidad, Colorado, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 387, Seventy-eighth Congress, second session, at an estimated cost of $909,000.

WHITE RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $45,000,000 for the prosecution of the comprehensive plan approved in the Act of June 28, 1938, as modified by the Act approved August 18, 1941, for the White River Basin.

UPPER MISSISSIPPI RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $10,000,000 for the prosecution of the be appropriated the sum of $10,000,000 for the prosecution of the comprehensive plan approved in the Act of June 28, 1938, for the Upper Mississippi River Basin, including the project for the Red Rock Dam on the Des Moines River for flood control and other purposes, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 651, Seventy- eighth Congress, second session, at an estimated cost of $15,000,000.

The project authorized by the Act of June 22, 1936, for local flood protection on the Mississippi River at the Sainte Genevieve Levee District Numbered 1, Missouri, is hereby modified substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 727, Seventy-seventh Congress, second session, at an estimated cost of $141,000.

The project on the Des Moines River for local flood protection of Des Moines, Iowa, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 651, Seventy-eighth Congress, second session, at an estimated cost of $270,000.

The project on the Mississippi River for local flood protection at Sabula, Iowa, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 328, Seventy-seventh Congress, first session, at an estimated cost of$25,000.

The project on the Galena River, for local flood protection at Galena, Illinois, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 336, Seventy-seventh Congress, first session, at an estimated cost of$418,000.

The project for flood control on the Illinois River is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 692, Seventy-seventh Congress, second session, at an estimated cost of $111,500.

The project for flood control on Farm Creek, Illinois, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 802, Seventy-eighth Congress, second session, at an estimated cost of $3,017,900.

The project on Elk Creek and Turkey River for local flood protection at Elkport, Iowa, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 700, Seventy-seventh Congress, second session, at an estimated cost of $18,000.

RED RIVER OF THE NORTH BASIN

The projects for flood control for Red Lake River, Minnesota, including Clearwater River, Minnesota, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 345, Seventy- eighth Congress, first session, at an estimated cost of $902,940.

The project for the Bald Hill Reservoir on the Sheyenne River for flood control and other purposes in the Sheyenne River Basin, North Dakota, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 193, Seventy-eighth Congress, second session, at an estimated cost of $810,000.

The projects for the construction of one reservoir on the Pembina River and one on the Tongue River for flood control and other purposes in the Pembina River Basin, North Dakota, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 565, Seventy-eighth Congress, second session, at an estimated cost of $333,800.

The project for the construction of a reservoir on the South Branch of Park River for flood control and other purposes in the Park River Basin, North Dakota, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 194, Seventy-eighth Congress, second session, at an estimated cost of $358,610.

MISSOURI RIVER BASIN

The project adopted by the Act of June 22, 1936, to provide flood protection for the Kansas Citys, Kansas and Missouri, is hereby modified and extended to provide for improvement substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 342, Seventy-eighth Congress, first session, at an estimated additional cost for the modified project of $8,445,000.

In addition to previous authorizations, there is hereby authorized the completion of the plan approved in the Act of August 18, 1941, for Cherry Creek and tributaries, Colorado, at an estimated cost of $7,500,000.

The project on Knife River for local flood control at Beulah, North Dakota, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 252, Seventy-eighth Congress, first session, at an estimated cost of $26,100.

The project on Knife River for local flood control at H1azen, North Dakota, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 252, Seventy-eighth Congress, first session, at an estimated cost of $6,600.

The project on Milk River adopted by the Act of June 22, 1936, to provide local flood protection at Harlem, Montana, is hereby modified substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 103, Seventy- eighth Congress, first session, at an estimated cost of $21,100.

The project on Milk River for local flood protection at Havre, Montana, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 103, Seventy-eighth Congress, first session, at an estimated cost of $313,100.

The project on Boyer River for local flood control on East Fork of Boyer River at Denison, Iowa, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 254, Seventy-eighth Congress, first session, at an estimated cost of $17,830.

The project on Nishnabotna River for local flood control at Hamburg, Iowa, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 253, Seventy-eighth Congress, first session, at an estimated cost of $236,000.

The plan of improvement for local flood protection on the Chariton River, Missouri, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 628, Seventy-eighth Congress, second session, at an estimated cost of $1,610,300.

The project on Bear Creek for local flood protection at Morrison, Colorado, is hereby authorized substantially in accordance with recommendations of the Chief of Engineers in House Document Numbered 356, Seventy-eighth Congress, first session, at an estimated cost of $220,000.

OHIO RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $70,000,000 for the prosecution of the comprehensive plan approved in the Act of June 28, 1938, as modified by the Act approved August 18, 1941, for the Ohio River Basin, including the following projects in tributary basins, namely:

The local flood protection works in the Lake Chautauqua and Chadakoin River area, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 685, Seventy-seventh Congress, second session, at an estimated cost of $135,500;

The local flood protection works at Dillonvale and Adena on Short Creek, Ohio, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 889, Seventy-seventh Congress, second session, at an estimated cost of $158,200;

The local flood protection works at Taylorsville on Salt River, Kentucky, substantially in accordance with the recommendations of the Chief of Engineers in Senate Document Numbered 105, Seventy-eighth Congress, first session, at an estimated cost of $129,350;

The local flood protection works at Latrobe on Loyalhanna Creek, Pennsylvania, substantially in accordance with the recommendations, of the Chief of Engineers in House Document Numbered 444, Seventy-eighth Congress, second session, at an estimated cost of $112,500;

The plan of improvement for flood control and other purposes in the Kentucky River Basin, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 504, Seventy-eighth Congress, second session, at an estimated cost of $23,822,000;

The local flood protection works at Middlesborough on Yellow Creek, Kentucky, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 495, Seventy-eighth Congress, second session, at an estimated cost of $205,200;

The local flood protection works on the Rough River and tributaries, Kentucky, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 535, Seventy-eighth Congress, second session, at an estimated cost of $360,000;

The Turtle Creek Reservoir on Turtle Creek, Pennsylvania, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 507, Seventy-eighth Congress, second session, at an estimated cost of $2,613,000;

The Burr Oak Reservoir on the Hocking River, Ohio, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 762, Seventy- seventh Congress, second session, at an estimated cost of $400,000.

Neither this authorization nor any previous authorization shall be construed to authorize the construction of the Shoals Dam on the East Fork of the White River in Martin County, Indiana, pending submission and adoption by Congress of the report authorized in the, Flood Control Act of August 11, 1939.

That the general comprehensive plan for flood control and other purposes, approved in the Flood Control Act of June 28, 1938, for the Ohio River Basin, is hereby modified to include the construction of flood-control works for the protection of Ridgway, Johnsonburg, Saint Marys, and Brockway and vicinity in the State of Pennsylvania.

GREAT LAKES BASIN

The project for the Panther Mountain Reservoir on Moose River, New York, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 405, Seventy-seventh Congress, first session, at an estimated cost of $600,000.

The project for flood control on Chittenango Creek and tributaries, New York, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 625, Seventy-seventh Congress, second session, at an estimated cost of $111,000.

The projects for flood control on Owasco Inlet and Outlet, Montville and Dry Creeks, State Ditch, and Crane Brook, New York, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 815, Seventy-seventh Congress, second session, at an estimated cost of $64,200.

The project for the Mount Morris Reservoir on the Genesee River, New York, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 615, Seventy-eighth Congress, second session, at an estimated cost of $5,360,000.

COLORADO RIVER BASIN (TEXAS)

In addition to previous authorizations, there is hereby authorized the completion of the plan approved in the Act of August 18, 1941, for the North Concho River, Texas, at an estimated cost of $4,800,000.

In addition to previous authorizations, there is hereby authorized the completion of the plan approved in the Act of August 18, 1941, for Pecan Bayou, Texas, at an estimated cost of $1,560,000.

BRAZOS RIVER BASIN

In addition to previous authorizations, there is hereby authorized the completion of Whitney Reservoir in accordance with the plan approved in the Act of August 18, 1941, for the Brazos River Basin, at an estimated cost of $15,000,000.

RIO GRANDE BASIN

The project on Willow Creek for local flood protection at Creede, Colorado, is hereby authorized' substantially in accordance with the recommendations of the Chief of Engineers in

Senate Document Numbered 104, Seventy-eighth Congress, first session, at an estimated cost of $68,500.

GREAT SALT BASIN

The project on the Sevier River for local flood protection at Redmond, Utah, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 614 Seventy-eighth Congress, second session, at an estimated cost of $281,000.

COLORADO RIVER BASIN

The project for the Alamo Reservoir on the Bill Williams River, Arizona, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 625, Seventy-eighth Congress, second session, at an estimated cost of $3,202,000.

The project on the Little Colorado River for local flood protection at Holbrook, Arizona, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 648, Seventy-eighth Congress, second session, at an estimated cost of $258,000.

SAN DIEGO RIVER BASIN

The project on the San Diego River for local flood protection at San Diego, California, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 635, Seventy-seventh Congress, second session, at an estimated cost of $370,000.

VENTURA RIVER BASIN

The projects on the Ventura River and tributaries for local flood protection at Ventura and Ojai, California, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 323, Seventy- seventh Congress, first session, at an estimated cost of $1,600,000.

SANTA ANA RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $10,000,000 for the prosecution of the projects approved in the Act of June 22, 1936, as modified by the Act of June 28, 1938, for the Santa Ana River Basin and for the protection of Orange County, California, including the projects on Lytle and Cajon Creeks for local flood protection at San Bernardino and Colton, California, in accordance with the recommendations contained in the report of the Chief of Engineers dated February 11, 1944.

LOS ANGELES-SAN GABRIEL BASIN AND BALLONA CREEK

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $25,000,000 for the prosecution of the comprehensive plan approved in the Act of August 18, 1941, for Los Angeles and San Gabriel Rivers and Ballona Creek, California.

PAJARO RIVER BASIN

The plan of improvement for local flood protection on the Pajaro River and tributaries, California is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers m House Document Numbered 505, Seventy-eighth Congress, second session, at an estimated cost of $511,160.

SACRAMENTO-SAN JOAQUIN RIVER BASIN SACRAMENTO RIVER

The projects for the control of floods and other purposes on the Sacramento River, California, adopted by the Acts approved March 1, 1917, May 15, 1928, August 26, 1937, and August 18, 1941, are hereby modified substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 649, Seventy- eighth Congress, second session, at an estimated cost of $50,100,000; and in addition to previous authorizations there is hereby authorized to be appropriated the sum of $15,000,000 for the prosecution of the modified projects: Provided, That this modification of the project shall not be construed to authorize the construction of a high dam at the Table Mountain site but shall authorize only the low-level project to approximately the elevation of four hundred feet above mean sea level, said low-level dam to be built on a foundation sufficient for such dam and not on a foundation for future construction of a higher dam.

The project for the Folsom Reservoir on the American River, California, is hereby authorized substantially in accordance with the plans contained in House Document Numbered 649, Seventy-eighth Congress, second session, with such modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable, at an estimated cost of $18,474,000.

SAN JOAQUIN RIVER

The project for the Isabella Reservoir on the Kern River for flood control and other purposes in the San Joaquin Valley, California, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in his report dated January 26, 1944, contained in House Document Numbered 513, Seventy-eighth Congress, second session, at an estimated cost of $6,800,000.

The plan for the Terminus and Success Reservoirs on the Kaweah and Tule Rivers for flood control and other purposes in the San Joaquin Valley, California, in accordance with the recommendations of the Chief of Engineers in Flood Control Committee Document Numbered 1, Seventy-eighth Congress, second session, is approved, and there is hereby authorized $4,600,000 for initiation and partial accomplishment of the plan.

The project for flood control and other purposes for the Kings River and Tulare Lake Basin, California, is hereby authorized substantially in accordance with the plans contained in House Document Numbered 630, Seventy-sixth Congress, third session, with such modifications thereof as in the discretion of the Secretary of War and the Chief of Engineers may be advisable at an estimated cost of $19,700,000: Provided, That the conditions of local cooperation specified in said document shall not apply: Provided further, That the Secretary of War shall make arrangements for payment to the United States by the State or other responsible agency, either in lump sum or annual installments, for conservation storage when used: Provided further, That the division of costs between flood control, and irrigation and other water uses shall be determined by the Secretary of War on the basis of continuing studies by the Bureau of Reclamation, the War Department, and the local organizations.

The plan of improvement for local flood protection on various streams in the Merced County Stream Group in the San Joaquin Valley is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 473, Seventy-eighth Congress, second session, at an estimated cost of $1,300,000.

The plan of improvement for flood control and other purposes on the Lower San Joaquin River and tributaries, including Tuolumne and Stanislaus Rivers, in accordance with the recommendations of the Chief of Engineers in Flood Control Committee Document Numbered 2, Seventy-eighth Congress, second session, is approved, and there is hereby authorized $8,000,000 for initiation and partial accomplishment of the plan.

The plan of improvement for flood control and other purposes on the Calaveras River and Littlejohn Creek and tributaries, California, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 545, Seventy-eighth Congress, second session, at an estimated cost of $3,868,200.

NAPA RIVER BASIN

The project for the Conn Creek Reservoir on Conn Creek for flood control and other purposes in the Napa River Basin, California, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 626, Seventy-eighth Congress, second session, at an estimated cost of $460,000.

COQUILLE RIVER BASIN

The project for flood protection on the Coquille River, Oregon, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 620, Seventy-seventh Congress, second session, at an estimated cost of $143,000.

NEHALEM RIVER BASIN

The project for flood protection on the Nehalem River, Oregon, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 621 Seventy-seventh Congress, second session, at an estimated cost of $23,000.

WILLAMETTE RIVER BASIN

In addition to previous authorizations, there is hereby authorized to be appropriated the sum of $20,000,000 for the prosecution of the comprehensive plan approved in the Act of June 28, 1938, for the Willamette River Basin, with such modifications thereof as in the discretion of the Chief of Engineers may be advisable.

COLUMBIA RIVER BASIN

The projects on the Snake River for local flood protection at Heise, Roberts, and Weiser, Idaho, are hereby authorized, substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 452, Seventy-seventh Congress, first session, at an estimated cost of $743,000.

The projects on the Palouse River and tributaries for local flood protection at Pullman and Colfax, Washington, are hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 888, Seventy- seventh Congress, second session, at an estimated cost of $478,000.

The project on Alkali Canyon for local flood protection at Arlington, Oregon, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 631, Seventy-seventh Congress, second session, at an estimated cost of $118,000.

WILLAPA RIVER BASIN

The project on the Willapa River for local flood protection at Raymond, Washington, is hereby authorized substantially in accordance with the recommendations *of the Chief of Engineers in House Document Numbered 701, Seventy-seventh Congress, second session, at an estimated cost of $127,000.

CHEHALIS RIVER BASIN

The project on Chehalis River for local flood protection at Hoquiam, Aberdeen, and Cosmopolis, Washington, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 494, Seventy- eighth Congress, second session, at an estimated cost of $669,000.

TERRITORY OF HAWAII

The project on the Hanapepe River for local flood protection at Hanapepe, Island of Kauai, Territory of Hawaii, is hereby authorized substantially in accordance with the recommendations of the Chief of Engineers in the report submitted to Congress by the Secretary of War on March 15, 1944, at an estimated cost of $73,000.

Section 11. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys for flood control and allied purposes, including channel and major drainage improvements, to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its Territorial possessions, which include the following named localities, and the Secretary of Agriculture is authorized and directed to cause preliminary examinations and surveys for run-off and waterflow retardation and soil-erosion prevention on such drainage areas; the cost thereof to be paid from appropriations heretofore or hereafter made for such purposes: Provided, That after the regular or formal reports made on any examination, survey, project, or work under way or proposed are submitted to Congress, no supplemental or additional report or estimate shall be made unless authorized by law except that the Secretary of War may cause a review of any examination or survey to be made and a report thereon submitted to the Congress if such review is required by the national defense or by changed physical or economic conditions: And provided further, That the Government shall not be deemed to have entered upon any project for the improvement of any waterway or harbor mentioned in this Act until the project for the proposed work shall have been adopted by law:

Pasquotank River North Carolina.

Chipola River, Alabama and Florida.

Wacasassa River and it tributaries, Florida, and of adjacent areas in Gilchrest and Levy Counties, Florida.

Oklawaha River and its tributaries, Florida, and of adjacent areas in Alachua and Marion Counties, Florida.

Clear Fork of the Mohican River, in Richland County, Ohio.

Hocking River in Hocking County, Ohio.

Leatherwood Creek, Ohio, with particular reference to flood control and water supply for Cambridge, Ohio.

For flood control, rice irrigation, navigation, pollution, salt-water intrusion, and drainage on all streams and bayous in southwest Louisiana, west of the West Atchafalaya Basin protection levee, and south of the latitude of Boyce; on all streams and bayous in Louisiana lying between the East Atchafalaya Basin protection levee and the Mississippi River; and on Amite River and tributaries, Louisiana.

Choctawhatchee River, Florida.

Scajaquada Creek and its tributaries, New York.

Susquehanna River in the vicinity of Endicott, Johnson City, and Vestal, New York.

Absecon Island, New Jersey, with a view to the protection of Atlantic City, Ventnor, Margate City, Longport, and other areas on the New Jersey coast, that have been affected from floods due to tide and wind.

Juniata River and tributaries, Pennsylvania, with special reference to the proposed Raystown Reservoir.

Rehoboth Beach, Bethany Beach, Lewes, and Fenwick Island, Delaware, and other points along the Delaware coast, with a view to providing protection against damage resulting from erosion and from floods due to wind and tide.

Buffalo River, Minnesota.

Wild Rice River, Minnesota.

Marsh River, Minnesota.

Sand Hill River, Minnesota.

Red Lake River, Minnesota.

Roseau River, Minnesota.

Snake River, Minnesota.

Middle River, Minnesota.

Tamarac River, Minnesota.

Two Rivers, Minnesota.

Warroad River and Bull Dog Creek, Minnesota.

Mississippi River and its tributaries, in the county of Aitkin, Minnesota.

Apple River, Jo Daviess County, Illinois.

Maumee River, Indiana and Ohio.

Indian Creek, Indiana.

Youghiogheny River Basin, Pennsylvania and Maryland.

Reno Beach, Lucas County, Ohio, with a view to protection of the Reno Beach-Howards Farm area and adjacent areas from floods caused by frequent windstorms and from increases in the lake level of Lake Erie.

Arkansas River above Pine Bluff, Arkansas, with special reference to control of caving banks in the vicinity of Hensley Bar and the McFadden Place, in Jefferson County, Arkansas.

Osage River, Missouri and Kansas.

Big Canyon on Washita River in Murray County, Oklahoma.

Deep Red Run in Tillman County, Oklahoma; Big Elk Creek, Little Elk Creek, Salt Fork, Elm Creek, Saddle Mountain, Turkey Creek, Oklahoma.

San Rafael Creek and its tributaries, California.

Napa River, California.

Grand River, South Dakota.

Moreau River, South Dakota.

Corte Madera Creek, Marin County, California.

Bayamon and Hondo Rivers and their tributaries, Municipality of Bayamon, Puerto Rico.

Elkhorn River and its tributaries, Nebraska.

Section 12. That the sum of $950,000,000 is hereby authorized to be appropriated for carrying out the improvements herein by the War Department, the sum of $10,000,000 additional is authorized to be appropriated and expended in equal amounts by the Departments of War and Agriculture for carrying out any examination or survey provided for in this Act and any other Acts of Congress, to be prosecuted by said Departments. The sum of $1,500,000 additional is authorized to be appropriated and expended by the Federal Power Commission for carrying out any examinations and surveys provided for in this Act or any other Acts of Congress, to be prosecuted by the said Federal Power Commission.

The sum of $500,000 additional is authorized to be appropriated as an emergency fund to be expended under the direction of the Secretary of War and the supervision of the Chief of Engineers for the construction of emergency bank protection works to prevent flood damage to highways, bridge approaches and public works: Provided, That pending the appropriation of said sum the Secretary of War may allot from existing flood control appropriations such sums as may be necessary for the immediate prosecution of such bank protection works; such appropriations to be reimbursed from the appropriation herein authorized when made.

Section 13. That the following works of improvement for run-off and waterflow retardation, and soil-erosion prevention, are hereby adopted and authorized in the interest of the national security and with a view toward an adequate reservoir of useful and worthy public works for the post-war construction program to be prosecuted by the Department of Agriculture, under the direction of the Secretary of Agriculture, in accordance with the plans of the respective reports hereinafter designated and subject to the conditions set forth therein: Provided, That the necessary plans and preliminary work may be prosecuted during the war with funds from appropriations heretofore or hereafter made for such works so as to be ready for rapid inauguration of post-war construction: Provided further, That when the existing critical situation with respect to materials, equipment, and manpower, no longer exists and in any event not later than immediately following the cessation of hostilities in the present war, the projects herein shall be initiated as expeditiously and prosecuted as vigorously as may be consistent with budgetary requirements: Provided further, That nothing in this section shall be construed as approving or authorizing the acquisition of any land by the Federal Government until the legislature of the State in which the land lies shall have consented to the acquisition of lands by the United States for the purposes within the scope of this section: Provided further, That there shall be paid annually to the county in which any lands acquired under this section may lie, a sum equal to one per centum of the purchase price paid for the lands acquired in that county or, if not acquired by purchase, one per centum of their valuation at the time of their acquisition.

LOS ANGELES RIVER BASIN

The program on the Los Angeles River watershed is hereby approved substantially in accordance with the recommendation of the Under Secretary of Agriculture in House Document Numbered 426, Seventy-seventh Congress, first session, at an estimated cost to the United States of $8,380,000.

SANTA YNEZ RIVER WATERSHED

The program on the Santa Ynez River watershed is hereby approved substantially in accordance with the recommendation of the Acting Secretary of Agriculture in House Document Numbered 518, Seventy-eighth Congress, first session, at an estimated cost to the United States of $434,000.

TRINITY RIVER BASIN (Texas)

The program on the Trinity River watershed is hereby approved substantially in accordance with the recommendation of the Secretary of Agriculture in House Document Numbered 708, Seventy-seventh Congress, second session, at an estimated cost to the United States of $32,000,000.

LITTLE TALLAHATCHIE RIVER WATERSHED

The program on the Little Tallahatchie River watershed is hereby approved substantially in accordance with the recommendation of the Acting Secretary of Agriculture in House Document Numbered 892, Seventy-seventh Congress, second session, at an estimated cost to the United States of $4,221,000.

YAZOO RIVER WATERSHED

The program on the Yazoo River watershed is hereby approved substantially in accordance with the recommendation of the Acting Secretary of Agriculture in House Document Numbered 564, Seventy-eighth Congress, second session, at an estimated cost to the United States of $21,700,000.

COOSA RIVER WATERSHED (Above Rome, Georgia)

The program on the Coosa River watershed above Rome, Georgia, is hereby approved substantially in accordance with the recommendation of the Acting Secretary of Agriculture in House Document Numbered 236, Seventy-eighth Congress, first session, at an estimated cost to the United States of $1,233,000.

LITTLE SIOUX RIVER WATERSHED

The program on the Little Sioux River watershed is hereby approved substantially in accordance with the recommendation of the Assistant Secretary of Agriculture in House Document Numbered 268, Seventy-eighth Congress, first session, at an estimated cost to the United States of $4,280,000.

POTOMAC RIVER WATERSHED

The program on the Potomac River watershed is hereby approved substantially in accordance with the recommendation of the Assistant Secretary of Agriculture in House Document Numbered 269, Seventy-eighth Congress, first session, at an estimated cost to the United States of $859,000.

BUFFALO CREEK WATERSHED (New York) BUFFALO, CAYUGA, AND CAZENOVIA CREEKS

The program on the watershed of Buffalo Creek and its tributaries, Cayuga, and Cazenovia Creeks, is hereby approved substantially in accordance with the recommendation of the Acting Secretary of Agriculture in House Document Numbered 574, Seventy-eighth Congress, second session, at an estimated cost to the United States of $739,000.

COLORADO RIVER WATERSHED (Texas)

The program on those portions of the Colorado River watershed included in the watersheds of Pecan Bayou, San Saba River, Brady Creek, and the area tributary to the main stream of the Colorado River below its confluence with the Concho River and above the mouth of Pecan Bayou, is hereby approved substantially in accordance with the recommendation of the Assistant Secretary of Agriculture in House Document Numbered 270, Seventy-eighth Congress, first session, at an estimated cost to the United States of
$2,693,000.

WASHITA RIVER WATERSHED

The program on the Washita River watershed is hereby approved substantially in accordance with the recommendation of the Under Secretary of Agriculture in House Document Numbered 275, Seventy-eighth Congress, first session, at an estimated cost to the United States of $11,243,000.

Section 14. That the balance remaining from the authorization of $10,000,000 provided in section 7 of the Flood Control Act approved June 28, 1938, for the five-year period ending June 30, 1944, to correlate the program for the improvement of watersheds by the Department of Agriculture for measures of run-off and waterflow retardation and soil-erosion prevention on the watersheds with the program for the improvement of rivers and other waterways by the Department of War is hereby reauthorized to be expended during the postwar period by the Department of Agriculture for the prosecution of the work authorized in section 13 of this Act: Provided, That not more than 20 per centum of the authorization made available herein shall be expended on any one project.

Section 15. That section 7 of the Act of June 28, 1938 (Public, Numbered 761, Seventy- fifth Congress), is hereby amended by adding at the end of the first sentence thereof the following: "The Secretary of Agriculture is hereby authorized in his discretion to undertake such emergency measures for run-off retardation and soil-erosion prevention as may be needed to safeguard lives and property from floods and the products of erosion on any watershed whenever fire or any other natural element or force has caused a sudden impairment of that watershed: Provided, That not to exceed $100,000 out of any funds heretofore or hereafter appropriated for the prosecution by the Secretary of Agriculture of works of improvement or measures for run-off and waterflow retardation and soil-erosion prevention on watersheds may be expended during any one fiscal year for such emergency measures."

Approved December 22, 1944.

Appendix 8

Text of
Public Law 83-566

Public Law 83-566, the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. Parts 1001-1008, 1010, and 1012)

Public Law 83-566, except for Sections 7 and 11, has been codified in 16 U.S.C. Chapter 18. Except for sections 3a and 14, the sections of Public Law 83-566 do not have titles. Titles were added to the other sections when they were codified. The section numbers used here are those of the act, with the corresponding U.S. Code section numbers and titles shown in parentheses. The text, except for sections 7 and 11, is the U.S. Code version.

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Section 3a (16 U.S.C. Section 1003a, “Cost-share assistance”)

Section 4 (16 U.S.C. Section 1004, “Conditions for Federal assistance”)

Section 5 (16 U.S.C. Section 1005, “Works of improvement”)

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Section 7 (Not in U.S.C.)

Section 8 (16 U.S.C. Section 1006a, “Loans or advancements for financing local share of costs; repayment; interest; maximum amount”)

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Section 11 (Not in U.S.C.)

Section 12 (16 U.S.C. Section 1008, “Notification of Secretary of the Interior of approval of assistance; surveys and investigations; report and recommendations; consideration; cost of surveys, investigations, and reports”)

Section 13 (16 U.S.C. Section 1010, “Data”)

Section 14 (16 U.S.C. Section 1012, “Rehabilitation of structural measures near, at, or past their evaluated life expectancy”)

Section 1 (16 U.S.C. Section 1001, “Declaration of policy”)

Erosion, floodwater, and sediment damages in the watersheds of the rivers and streams of the United States, causing loss of life and damage to property, constitute a menace to the national welfare; and it is the sense of Congress that the Federal Government should cooperate with States and their political subdivisions, soil or water conservation districts, flood prevention or control districts, and other local public agencies for the purpose of preventing such damages, of furthering the conservation, development, utilization, and disposal of water, and the conservation and utilization of land and thereby of preserving, protecting, and improving the Nation's land and water resources and the quality of the environment.

Section 2 (16 U.S.C. Section 1002, "Definitions")

For the purposes of this chapter, the following terms shall mean:

The Secretary"—the Secretary of Agriculture of the United States.

"Works of improvement"—any undertaking for—

(1) flood prevention (including structural and land treatment measures),

(2) the conservation, development, utilization, and disposal of water, or

(3) the conservation and proper utilization of land,

in watershed or subwatershed area not exceeding two hundred and fifty thousand acres and not including any single structure which provides more than twelve thousand five hundred acre-feet of floodwater detention capacity, and more than twenty-five thousand acre-feet of total capacity. No appropriation shall be made for any plan involving an estimated Federal contribution to construction costs in excess of $5,000,000, or which includes any structure which provides more than twenty-five hundred acre-feet of total capacity unless such plan has been approved by resolutions adopted by the appropriate committees of the Senate and House of Representatives: Provided, That in the case of any plan involving no single structure providing more than 4,000 acre-feet of total capacity the appropriate committees shall be the Committee on Agriculture, Nutrition, and Forestry of the Senate and the Committee on Agriculture of the House of Representatives and in the case of any plan involving any single structure of more than 4,000 acre-feet of total capacity the appropriate committees shall be the Committee on Environment and Public Works of the Senate and the Committee on Public Works and Transportation of the House of Representatives, respectively. Each project must contain benefits directly related to agriculture, including rural communities that account for at least 20 percent of the total benefits of the project. A number of such subwatersheds when they are component parts of a larger watershed may be planned together when the local sponsoring organizations so desire.

"Local organization"—any State, political subdivision thereof, soil or water conservation district, flood prevention or control district, or combinations thereof, or any other agency having authority under State law to carry out, maintain and operate the works of improvement; or any irrigation or reservoir company, water users' association, or similar organization having such authority and not being operated for profit that may be approved by the Secretary; or any Indian tribe or tribal organization, as defined in section 450b of title 25, having authority under Federal, State, or Indian tribal law to carry out, maintain, and operate the works of improvement.

Section 3 (16 U.S.C. Section 1003, "Assistance to local organizations")

In order to assist local organizations in preparing and carrying out plans for works of improvement, the Secretary is authorized, upon application of local organizations if such application has been submitted to, and not disapproved within 45 days by, the State agency having supervisory responsibility over programs provided for in this chapter, or by the Governor if there is no State agency having such responsibility –

(1) to conduct such investigations and surveys as may be necessary to prepare plans for works of improvement;

(2) to prepare plans and estimates required for adequate engineering evaluation;

(3) to make allocations of costs to the various purposes to show the basis of such allocations and to determine whether benefits exceed costs;

(4) to cooperate and enter into agreements with and to furnish financial and other assistance to local organizations: Provided, That, for the land-treatment measures, the Federal assistance shall not exceed the rate of assistance for similar practices under existing national programs;

(5) to obtain the cooperation and assistance of other Federal agencies in carrying out the purposes of this section;

(6) to enter into agreements with landowners, operators, and occupiers, individually or collectively, based on conservation plans of such landowners, operators, and occupiers which are developed in cooperation with and approved by the soil and water conservation district in which the land described in the agreement is situated, to be carried out on such land during a period of not to exceed ten years, providing for changes in cropping systems and land uses and for the installation of soil and water conservation practices and measures needed to conserve and develop the soil, water, woodland, wildlife, energy, and recreation resources of and enhance the water quality of lands within the area included in plans for works of improvement, as provided for in such plans, including watershed or subwatershed work plans in connection with the eleven watershed improvement programs authorized by section 13 of the Act of December 22, 1944 (58 Stat. 887), as amended and supplemented. Applications for assistance in developing such conservation plans shall be made in writing to the soil and water conservation district involved, and the proposed agreement shall be reviewed by such district. In return for such agreements by landowners, operators, and occupiers the Secretary shall agree to share the costs of carrying out those practices and measures set forth in the agreement for which he determines that cost sharing is appropriate and in the public interest. The portion of such costs, including labor, to be shared shall be that part which the Secretary determines is appropriate and in the public interest for the carrying out of the practices and measures set forth in the agreement, except that the Federal assistance shall not exceed the rate of assistance for similar practices and measures under existing national programs. The Secretary may terminate any agreement with a landowner, operator, or occupier by mutual agreement if the Secretary determines that such termination would be in the public interest, and may agree to such modifications of agreements, previously entered into hereunder, as he deems desirable to carry out the purposes of this paragraph or to facilitate the practical administration of the agreements provided for herein. Notwithstanding any other provision of law, the Secretary, to the extent he deems it desirable to carry out the purposes of this paragraph, may provide in any agreement hereunder for (1) preservation for a period not to exceed the period covered by the agreement and an equal period thereafter of the cropland, crop acreage, and allotment history applicable to land covered by the agreement for the purpose of any Federal program under which such history is used as a basis for an allotment or other limitation on the production of any crop; or (2) surrender of any such history and allotments.

Section 3a (16 U.S.C. Section 1003a, "Cost-share assistance")

(a) Easements

The Secretary may provide cost-share assistance to project sponsors to enable such sponsors to acquire perpetual wetland or floodplain conservation easements to perpetuate, restore and enhance the natural capability of wetlands and floodplains to retain excessive floodwaters, improve water quality and quantity, and provide habitat for fish and wildlife.

(b) Amount

The Secretary shall require that project sponsors of watershed projects provide up to 50 percent of the cost of acquiring easements under subsection (a) of this section.

Section 4 (16 U.S.C. Section 1004, "Conditions for Federal assistance")

The Secretary shall require as a condition to providing Federal assistance for the installation of works of improvement that local organizations shall –

(1) acquire, or with respect to interests in land to be acquired by condemnation provide assurances satisfactory to the Secretary that they will acquire, without cost to the

Federal Government from funds appropriated for the purposes of this chapter, such land, easements, or rights-of-way as will be needed in connection with works of improvement installed with Federal assistance: Provided, That when a local organization agrees to operate and maintain any reservoir or other area included in a plan for public fish and wildlife or recreational development, the Secretary must be authorized to bear not to exceed one-half of the costs of (a) the land, easements, or rights-of-way acquired or to be acquired by the local organization for such reservoir or other area, and (b) minimum basic facilities needed for public health and safety, access to, and use of such reservoir or other area for such purposes: Provided further, That the Secretary must be authorized to participate in recreational development in any watershed project only to the extent that the need therefore is demonstrated in accordance with standards established by him, taking into account the anticipated man-days of use of the projected recreational development and giving consideration to the availability within the region of existing water-based outdoor recreational developments: Provided further, That the Secretary must be authorized to participate in not more than one recreational development in a watershed project containing less than seventy-five thousand acres, or two such developments in a project containing between seventy-five thousand and one hundred and fifty thousand acres, or three such developments in projects exceeding one hundred and fifty thousand acres: Provided further, That when the Secretary and a local organization have agreed that the immediate acquisition by the local organization of land, easements, or rights-of-way is advisable for the preservation of sites for works of improvement included in a plan from encroachment by residential, commercial, industrial, or other development, the Secretary must be authorized to advance to the local organization from funds appropriated for construction of works of improvement the amounts required for the acquisition of such land, easements or rights-of-way; and, except where such costs are to be borne by the Secretary, such advance must be repaid by the local organization, with interest, prior to construction of the works of improvement, for credit to such construction funds: Provided further, That the Secretary must be authorized to bear an amount not to exceed one-half of the costs of the land, easements, or rights-of-way acquired or to be acquired by the local organization for mitigation of fish and wildlife habitat losses, and that such acquisition is not limited to the confines of the watershed project boundaries;

(2) assume (A) such proportionate share, as is determined by the Secretary to be equitable in consideration of national needs and assistance authorized for similar purposes under other Federal programs, of the costs of installing any works of improvement, involving Federal assistance (excluding engineering costs), which is applicable to the agricultural phases of the conservation, development, utilization, and disposal of water or for fish and wildlife development, recreational development, ground water recharge, water quality management, or the conservation and proper utilization of land: Provided, That works of improvement for water quality management must consist primarily of water storage capacity in reservoirs for regulation of streamflow, except that any such storage and water releases must not be provided as a substitute for adequate treatment or other methods of controlling waste at the source, and must be consistent with standards and regulations adopted by the Water Resources Council on Federal cost sharing for water quality management, and (B) all of the cost of installing any portion of such works applicable to other purposes except that any part of the construction cost (including engineering costs) applicable to flood prevention and features relating thereto must be borne by the Federal Government and paid for by the Secretary out of funds appropriated for the purposes of this chapter: Provided, That, in addition to and without limitation on the authority of the Secretary to make loans or advancements under section 1006a of this title, the Secretary may pay for any storage of water for present or anticipated future demands or needs for municipal or industrial water included in any reservoir structure constructed or modified under the provisions of this chapter as hereinafter provided: Provided further, That the cost of water storage to meet future demands may not exceed 30 per centum of the total estimated cost

of such reservoir structure and the local organization shall give reasonable assurances, and there is evidence, that such demands for the use of such storage will be made within a period of time which will permit repayment within the life of the reservoir structure of the cost of such storage: Provided further, That the Secretary shall determine prior to initiation of construction or modification of any reservoir structure including such water supply storage that there are adequate assurances by the local organization or by an agency of the State having authority to give such assurances, that the Secretary will be reimbursed the cost of water supply storage for anticipated future demands, and that the local organization will pay not less than 50 per centum of the cost of storage for present water supply demands: And provided further, That the cost to be borne by the local organization for anticipated future demands may be repaid within the life of the reservoir structure but in no event to exceed fifty years after the reservoir structure is first used for the storage of water for anticipated future water supply demands, except that (1) no reimbursement of the cost of such water supply storage for anticipated future demands need be made until such supply is first used, and (2) no interest shall be charged on the cost of such water-supply storage for anticipated future demands until such supply is first used, but in no case shall the interest-free period exceed ten years. The interest rate used for purposes of computing the interest on the unpaid balance shall be determined in accordance with the provisions of section 1006a of this title.

(3) make arrangements satisfactory to the Secretary for defraying costs of operating and maintaining such works of improvement, in accordance with regulations presented by the Secretary of Agriculture;

(4) acquire, or provide assurance that landowners or water users have acquired, such water rights, pursuant to State law, as may be needed in the installation and operation of the work of improvement;

(5) obtain agreements to carry out recommended soil conservation measures and proper farm plans from owners of not less than 50 per centum of the land situated in the drainage area above each retention reservoir to be installed with Federal assistance; and

(6) submit a plan of repayment satisfactory to the Secretary for any loan or advancement made under the provisions of section 1006a of this title.

Section 5 (16 U.S.C. Section 1005, "Works of improvement")

(1) Engineering and other services; reimbursement; advances

At such time as the Secretary and the interested local organization have agreed on a plan for works of improvement, and the Secretary has determined that the benefits exceed the costs, and the local organization has met the requirements for participation in carrying out the works of improvement as set forth in section 1004 of this title, the local organization may secure engineering and other services, including the design, preparation of contracts and specifications, awarding of contracts, and supervision of construction, in connection with such works of improvement, by retaining or employing a professional engineer or engineers satisfactory to the Secretary or may request the Secretary to provide such services: Provided, That if the local organization elects to employ a professional engineer or engineers, the Secretary shall reimburse the local organization for the costs of such engineering and other services secured by the local organization as are properly chargeable to such works of improvement in an amount not to exceed the amount agreed upon in the plan for works of improvement or any modification thereof: Provided further, That the Secretary may advance such amounts as may be necessary to pay for such services, but such advances with respect to any works of improvement shall not exceed 5 per centum of the estimated installation cost of such works.

(2) Federal construction; request by local organization

Except as to the installation of works of improvement on Federal lands, the Secretary shall not construct or enter into any contract for the construction of any structure: Provided, that, if requested to do so by the local organization, the Secretary may enter into contracts for the construction of structures.

(3) Transmission of certain plans to Congress.

Whenever the estimated Federal contribution to the construction costs of works of improvement in the plan for any watershed or subwatershed area shall exceed $5,000,000 or the works of improvement include any structure having a total capacity in excess of twenty-five hundred acre-feet, the Secretary shall transmit a copy of the plan and the justification therefore to the Congress through the President.

(4) Transmission of certain plans and recommendations to Congress.

Any plans for works of improvement involving an estimated Federal contribution to construction costs in excess of $5,000,000 or including any structure having a total capacity in excess of twenty-five hundred acre-feet (a) which includes works of improvement for reclamation or irrigation, or which affects public or other lands or wildlife under the jurisdiction of the Secretary of the Interior,(b)which includes Federal assistance for floodwater detention structures,(c)which includes features which may affect the public health, or(d)which includes measures for control or abatement of water pollution, shall be submitted to the Secretary of the Interior, the Secretary of the Army, the Secretary of Health and Human Services, or the Administrator of the Environmental Protection Agency, respectively, for his views and recommendations at least thirty days prior to transmission of the plan to the Congress through the President. The views and recommendations of the Secretary of the Interior, the Secretary of the Army, the Secretary of Health and Human Services, and the Administrator of the Environmental Protection Agency, if received by the Secretary prior to the expiration of the above thirty- day period, shall accompany the plan transmitted by the Secretary to the Congress through the President.

(5) Rules and Regulations

Prior to any Federal participation in the works of improvement under this chapter, the President shall issue such rules and regulations as he deems necessary or desirable to carry out the purposes of this chapter, and to assure the coordination of the work authorized under this chapter and related work of other agencies, including the Department of the Interior and the Department of the Army.

Section 6 (16 U.S.C. Section 1006, “Cooperative Programs”)

The Secretary is authorized in cooperation with other Federal and with States and local agencies to make investigations and surveys of the watershed of rivers and other waterways as a basis for the development of coordinated programs. In areas where the programs of the Secretary of Agriculture may affect public or other lands under the jurisdiction of the Secretary of the Interior, the Secretary of the Interior is authorized to cooperate with the Secretary of Agriculture in the planning and development of works or programs for such lands.

Section 7 (Not in U.S.C.)

The provisions of the Act of June 22, 1936 (49 Stat. 1570), as amended and supplemented, conferring authority upon the Department of Agriculture under the direction of the Secretary of Agriculture to make preliminary examinations and surveys and to prosecute works of improvement for runoff and waterflow retardation and soil erosion prevention in the watersheds of rivers and other waterways are hereby repealed: Provided, That (a) the authority of that

Department of Agriculture, under the direction of the Secretary, to prosecute the works of improvement for runoff and waterflow retardation and soil erosion prevention authorization to be carried out by the Department by the Act of December 22, 1944 (58 Stat. 887), as amended, and (b) the authority of the Secretary of Agriculture to undertake emergency measures for runoff retardation and soil erosion prevention authorized to be carried out by section 7 of the Act of June 28, 1938 (52 Stat. 1215), as amended by section 216 of the Act of May 17, 1950 (64 Stat. 163), shall not be affected by the provisions of this section: Provided further, That in connection with the eleven watershed improvement programs authorized by section 13 of the Act of December 22, 1944 (58 Stat. 887), as amended and supplemented, the Secretary of Agriculture is authorized to prosecute additional works of improvement for the conservation, development, utilization, and disposal of water in accordance with the provisions of section 4 of this Act or any amendments hereafter made thereto.

Section 8 (16 U.S.C. Section 1006a, "Loans or advancements for financing local share of costs; repayment; interest; maximum amount")

The Secretary is authorized to make loans or advancements (a) to local organizations to finance the local share of costs of carrying out works of improvement provided for in this chapter, and (b) to State and local agencies to finance the local share of costs of carrying out works of improvement (as defined in section 1002 of this title) in connection with the eleven watershed improvement programs authorized by section 13 of the Act of December 22, 1944 (58 Stat. 887), as amended and supplemented: Provided, That the works of improvement in connection with said eleven watershed improvement programs shall be integral parts of watershed or subwatershed work plans agreed upon by the Secretary of Agriculture and the concerned State and local agencies. A loan or advance under this section shall be made under a contract or agreement that provides, under such terms and conditions as the Secretary considers appropriate, for the repayment of the loan or advance in not more than 50 years from the date when the principal benefits of the works of improvement first become available, with interest at a rate not to exceed the current market yield for outstanding municipal obligations with remaining periods to maturity comparable to the average maturity for the loan, adjusted to the nearest 1/8 of one percent. With respect to any single plan for works of improvement, the amount ofany such loan or advancement shall not exceed $10,000,000.

Section 9 (16 U.S.C. Section 1006b, "Territorial application")

The provisions of this chapter shall be applicable to Hawaii, Alaska, Puerto Rico, and the Virgin Islands.

Section 10 (16 U.S.C. Section 1007, "Authorization of appropriations")

There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this chapter, such sums to remain available until expended. No appropriation hereafter available for assisting local organizations in preparing and carrying out plans for works of improvement under the provisions of section 1003 of this title or clause (a) of section 1006a of this title shall be available for any works of improvement pursuant to this chapter or otherwise in connection with the eleven watershed improvement programs authorized by section 13 of the Act of December 22, 1944 (58 Stat. 887), as amended and supplemented, or for making loans or advancements to State and local agencies as authorized by clause (b) of section 1006a of this title.

Section 11 (Not in U.S.C.)

This Act may be cited as the "Watershed Protection and Flood Prevention Act."

Section 12 (16 U.S.C. Section 1008, "Notification of Secretary of the Interior of approval of assistance; surveys and investigations; report and recommendations; consideration; cost of surveys; investigations and reports")

When the Secretary approves the furnishing of assistance to a local organization in preparing a plan for works of improvement as provided for in section 1003 of this title:

(1) The Secretary shall so notify the Secretary of the Interior in order that the latter, as he desires, may make surveys and investigations and prepare a report with recommendations concerning the conservation and development of wildlife resources and participate, under arrangements satisfactory to the Secretary of Agriculture, in the preparation of a plan for works of improvement that is acceptable to the local organization and the Secretary of Agriculture.

(2) Full consideration shall be given to the recommendations contained in any such report of the Secretary of the Interior as he may submit to the Secretary of Agriculture prior to the time the local organization and the Secretary of Agriculture have agreed on a plan for works of improvement. The plan shall include such of the technically and economically feasible works of improvement for wildlife purposes recommended in the report by the Secretary of the Interior as are acceptable to, and agreed to by, the local organization and the Secretary of Agriculture, and such report of the Secretary of the Interior must, if requested by the Secretary of the Interior, accompany the plan for works of improvement when it is submitted to the Secretary of Agriculture for approval or transmitted to the Congress through the President.

(3) The cost of making surveys and investigations and of preparing reports concerning the conservation and development of wildlife resources shall be borne by the Secretary of the Interior out of funds appropriated to his Department.

Section 13 (16 U.S.C. Section 1010, "Data")

The Secretary shall collect and maintain data on a national and State by State basis concerning -

(1) expenditures for the individual flood control and conservation measures for which assistance is provided under this chapter; and

(2) the expected flood control or environmental (including soil erosion) benefits that will result from the implementation of such measures.

Section 14 (16 U.S.C. Section 1012, "Rehabilitation of structural measures near, at, or past their evaluated life expectancy")

(a) Definitions

For purposes of this section:

(1) Rehabilitation

The term "rehabilitation", with respect to a structural measure constructed as part of a covered water resource project, means the completion of all work necessary to extend the service life of the structural measure and meet applicable safety and performance standards. This may include:

(A) protecting the integrity of the structural measure or prolonging the useful life of the structural measure beyond the original evaluated life expectancy;

(B) correcting damage to the structural measure from a catastrophic event;

(C) correcting the deterioration of structural components that are deteriorating at an abnormal rate;

(D) upgrading the structural measure to meet changed land use conditions in the watershed served by the structural measure or changed safety criteria applicable to the structural measure; or

(E) decommissioning the structure, if requested by the local organization.

(2) Covered water resource project

The term "covered water resource project" means a work of improvement carried out under any of the following:

(A) This chapter

(B) Section 13 of the Act of December 22, 1944 (Public Law 78-534; 58 Stat. 905).

(C) The pilot watershed program authorized under the heading "Flood Prevention" of the Department of Agriculture Appropriation Act, 1954 (Public Law 156; 67 Stat. 214).

(D) Subtitle H of title XV of the Agriculture and Food Act of 1981 (16 U.S.C. 3451 et seq.; commonly known as the Resource Conservation and Development Program).

(3) Structural measure

The term "structural measure" means a physical improvement that impounds water, commonly known as a dam, which was constructed as part of a covered water resource project, including the impoundment area and flood pool.

(b) Cost-share assistance for rehabilitation

(1) Assistance authorized

The Secretary may provide financial assistance to a local organization to cover a portion of the total costs incurred for the rehabilitation of structural measures originally constructed as part of a covered water resource project. The total costs of rehabilitation include the costs associated with all components of the rehabilitation project, including acquisition of land, easements, and rights-of-ways, rehabilitation project administration, the provision of technical assistance, contracting, and construction costs, except that the local organization shall be responsible for securing all land, easements, or rights-of-ways necessary for the project.

(2) Amount of assistance; limitations

The amount of Federal funds that may be made available under this subsection to a local organization for construction of a particular rehabilitation project shall be equal to 65 percent of the total rehabilitation costs, but not to exceed 100 percent of actual construction costs incurred in the rehabilitation. However, the local organization shall be responsible for the costs of water, mineral, and other resource rights and all Federal, State, and local permits.

(3) Relation to land use and development regulations

As a condition on entering into an agreement to provide financial assistance under this subsection, the Secretary, working in concert with the affected unit or units of general purpose local government, may require that proper zoning or other developmental regulations are in place in the watershed in which the structural measures to be rehabilitated under the agreement are located so that –

(A) the completed rehabilitation project is not quickly rendered inadequate by additional development; and

(B) society can realize the full benefits of the rehabilitation investment.

(c) Technical assistance for watershed project rehabilitation

The Secretary, acting through the Natural Resources Conservation Service, may provide technical assistance in planning, designing, and implementing rehabilitation projects should a local organization request such assistance. Such assistance may consist of specialists in such fields as engineering, geology, soils, agronomy, biology, hydraulics, hydrology, economics, water quality, and contract administration.

(d) Prohibited use

(1) Performance of operation and maintenance

Rehabilitation assistance provided under this section may not be used to perform operation and maintenance activities specified in the agreement for the covered water resource project entered into between the Secretary and the local organization responsible for the works of improvement. Such operation and maintenance activities shall remain the responsibility of the local organization, as provided in the project work plan.

(2) Renegotiation

Notwithstanding paragraph (1), as part of the provision of financial assistance under subsection (b) of this section, the Secretary may renegotiate the original agreement for the covered water resource project entered into between the Secretary and the local organization regarding responsibility for the operation and maintenance of the project when the rehabilitation is finished.

(e) Application for rehabilitation assistance

A local organization may apply to the Secretary for technical and financial assistance under this section if the application has also been submitted to and approved by the State agency having supervisory responsibility over the covered water resource project at issue or, if there is no State agency having such responsibility, by the Governor of the State. The Secretary shall request the State dam safety officer (or equivalent State official) to be involved in the application process if State permits or approvals are required. The rehabilitation of structural measures shall meet standards established by the Secretary and address other dam safety issues. At the request of the local organization, personnel of the Natural Resources Conservation Service of the Department of Agriculture may assist in preparing applications for assistance.

(f) Ranking of requests for rehabilitation assistance

The Secretary shall establish such system of approving rehabilitation requests, recognizing that such requests will be received throughout the fiscal year and subject to the availability of funds to carry out this section, as is necessary for proper administration by the Department of Agriculture and equitable for all local organizations. The approval process shall be in writing, and made known to all local organizations and appropriate State agencies.

(g) Prohibition on certain rehabilitation assistance

The Secretary may not approve a rehabilitation request if the need for rehabilitation of the structure is the result of a lack of adequate maintenance by the party responsible for the maintenance.

(h) Funding

(i) Assessment of rehabilitation needs

The Secretary, in concert with the responsible State agencies, shall conduct an assessment of the rehabilitation needs of covered water resource projects in all States in which such projects are located.

(j) Recordkeeping and reports

(1) Secretary

The Secretary shall maintain a data base to track the benefits derived from rehabilitation projects supported under this section and the expenditures made under this section. On the basis of such data and the reports submitted under paragraph (2), the Secretary shall prepare and submit to Congress an annual report providing the status of activities conducted under this section.

(2) Grant recipients

Not later than 90 days after the completion of a specific rehabilitation project for which assistance is provided under this section, the local organization that received the assistance shall make a report to the Secretary giving the status of any rehabilitation effort undertaken using financial assistance provided under this section.