



State and Federal Oversight of Dam Safety Must Be Improved

ASDSO endorses passage of legislation to create a federally administered dam rehabilitation funding program.

The Association of State Dam Safety Officials, in its October 2008 update of the report entitled, *The Cost of Rehabilitating Our Nation's Dams*, estimated that \$16 billion would be needed to repair the most critical dams over the next 12 years. Out of this, needed repairs at publicly owned dams are estimated at \$8.7 billion with the remaining \$7.3 billion needed for privately owned dams.

ASDSO endorses legislation that would provide federal funds to be cost-shared at 65 percent federal to 35 percent state/local for non-federal publicly owned dams. The legislation would provide funds to states based on the number of high hazard dams in each of the participating states.

ASDSO calls on the Obama Administration, within its focus on infrastructure improvement and for the sake of public safety, to reform the National Dam Safety Program.

Since the program was begun in 1996, the National Dam Safety Program has not been funded or administered as effectively as it needs to be. Current oversight by FEMA should be reviewed by the new DHS and FEMA leadership. Efforts should be made to combine the DHS Dams Sector under the Infrastructure Protection Directorate and the National Dam Safety Program under DHS, FEMA. All efforts should be made to create a line item in the DHS budget for the important objectives in the National Dam Safety Program

ASDSO urges all 50 states and US territories to examine the strength of their dam safety regulatory programs.

Roughly 86% of the US dams are regulated (not owned) by state governments. Most states are under-funded and under-staffed, and many do not have complete statutory authority to perform critical regulatory functions such as requiring Emergency Action Plans to warn and evacuate people in the event of a dam failure. (See attached table: *2007 State Dam Safety Program Statistics*.)

The Association of State Dam Safety Officials (ASDSO) is a national non-profit organization of more than 2,400 state, federal and local dam safety professionals and private sector individuals dedicated to improving dam safety through research, education and communications. We represent the dam safety programs of the states and our goal simply is to save lives, prevent damage to property and to maintain the benefits of dams by preventing dam failures.

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Dam failures have caused loss of life and extreme property and economic damages throughout the United States.



No one knows precisely how many lives have been lost because of dam failures, but between the catastrophic Mill River dam collapse in Massachusetts in 1874 to the fatal Ka Loko dam failure in Hawaii in 2006, at least 4,800 people in the U.S. have perished in dam break floods. A string of fatal dam failures during the 1970s killed roughly 300 people. This high human toll forced the issue of dam safety into the public eye, and resulted in immediate full funding for the National Dam

Inspection Program and passage of the National Dam Safety Act in 1986.

Similarly, a firm price cannot be placed on property damages caused by dam failures, but the total is well into the billions of dollars, as evidenced by only a handful of examples:

<i>Buffalo Creek (1972)</i>	<i>\$400 million</i>
<i>Teton (1976)</i>	<i>>\$1 billion</i>
<i>Toccoa Falls (1977)</i>	<i>\$30 million</i>
<i>Lawn Lake (1982)</i>	<i>\$25 million</i>
<i>Silver Lake (2003)</i>	<i>\$102 million</i>
<i>Hope Mills (2003)</i>	<i>\$8.1 million</i>
<i>Big Bay (2004)</i>	<i>\$4.75 million</i>
<i>21 dams in NJ (2004)</i>	<i>\$30 million</i>



When a dam is not properly maintained, it becomes more susceptible to failure, and eventual repairs cost more.

Timely maintenance is the key to avoiding insurmountable repair costs and potential disaster.

At best, putting off repairs will likely cost the dam owner five to ten times as much, fifteen years down the road; at worst, it kills people.

Over a third of our nation's dams are already fifty years old; in another ten years, more than 65% of dams in the U.S. will have reached the half-century mark. As dams age, they require more maintenance, repairs and upgrades.

While the estimated cost of rehabilitating our nation's dams is high—\$50 billion total—\$16 billion for high-hazard potential dams—the collective cost of deferring maintenance on these structures is staggering.

Dams are an essential component of our nation's infrastructure.

Dams provide vital benefits including flood protection, water supply, hydropower, irrigation and recreation. Imagine the impact of losing a major reservoir or flood control dam:

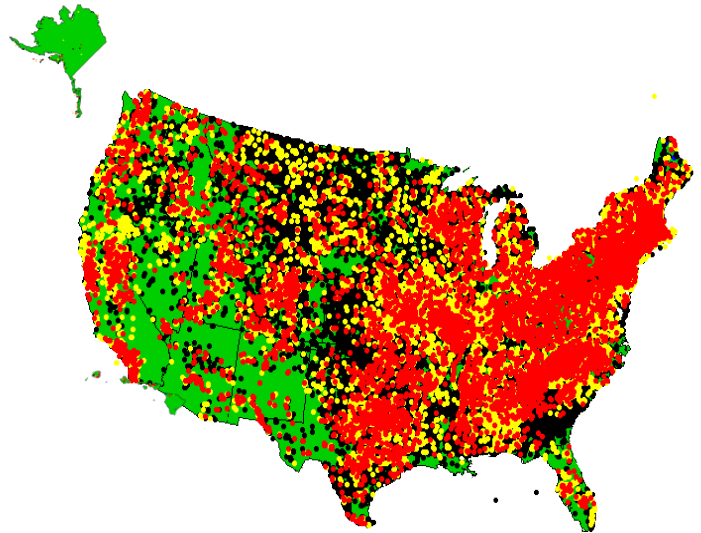
- Would there be catastrophic flooding? How many homes and businesses might be flooded? How many people displaced?
- Would there be adequate water for domestic use? Irrigating crops? Caring for livestock? Fighting fires?
- Are local utilities dependent on hydropower? How many lives and jobs could be affected by temporary shutdown or closure of an industry dependent on hydropower?
- How would transportation systems—roads, railroads, navigable waterways—be affected?
- How would economies and areas dependent on recreation be affected should the reservoir be lost?



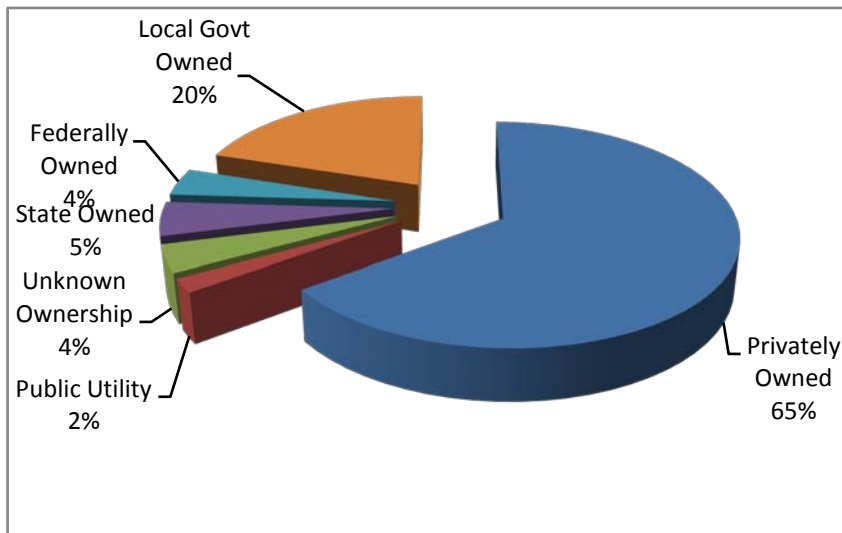
Dams in the United States

States regulate the vast majority of US dams...

Number of Dams in the National Inventory of Dams (2007)	82,645
Number of NID-Size Dams under State Regulation (2007).....	70,713
Number of High-Hazard Potential Dams reported to be State-Regulated (2007)	9,849
Number of Deficient State-Regulated High-Hazard Potential Dams reported in 2007.....	1,819



Dam Ownership in the U.S.



Red Dots = High-hazard potential dam, typically defined as a dam whose failure or mis-operation will cause loss of human life and significant property destruction.

Yellow Dots = Significant-hazard potential dam, typically defined as a dam whose failure or mis-operation will cause significant property destruction.

Black Dots = Low-hazard potential dam, typically defined as a dam whose failure or mis-operation will cause minimal property destruction.

Source: The National Inventory of Dams (NID). NID data is submitted by each state dam safety agency to the NID, administered by the US Army Corps of Engineering Topographic Engineering Center.

The National Inventory of Dams (NID)

The NID is administered by the US Army Corps of Engineers Topographic Engineering Center and is updated every other year. It includes both state and federally regulated dams that:

- Are classified as having High or Significant hazard potential or,
- Are classified as having Low Hazard potential but equal or exceed 25 feet in height AND 15 acre-feet storage or,
- Are classified as having Low Hazard potential but equal or exceed 50 acre-feet storage AND 6 feet height.

State-Regulated Dams

States have the enormous challenge of regulating about 86% of the dams in the US, leaving a relatively small percentage under federal regulation. State dam safety programs submit biennial statistics on dams that they regulate to the NID. Other state program performance statistics are submitted annually to ASDSO.

The Potential for Catastrophic Dam Failures Is Increasing.

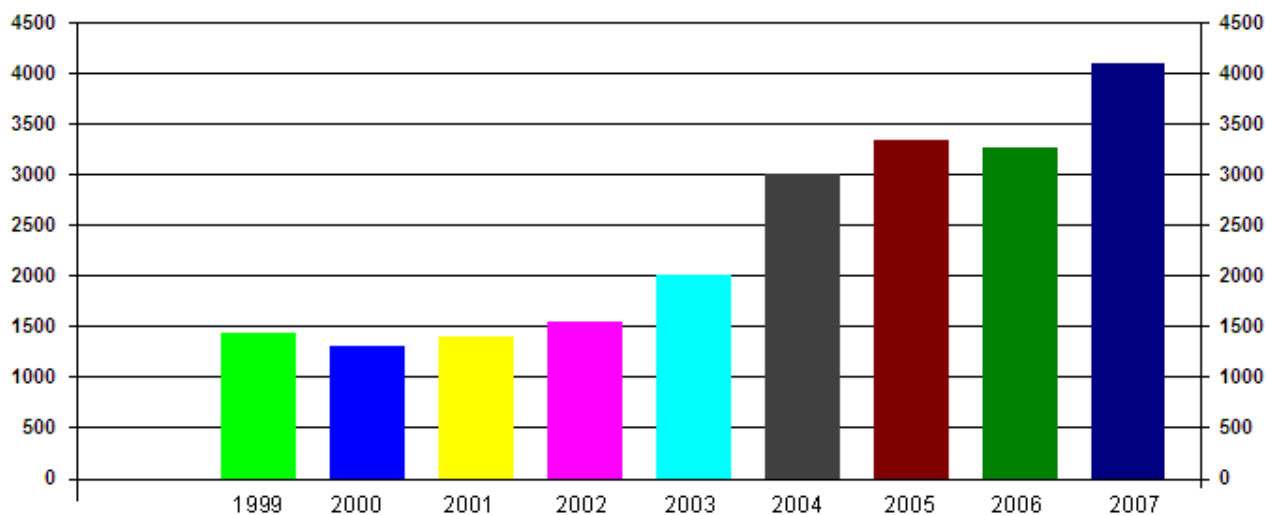
Since 1999, the recorded number of state-regulated deficient dams (those with structural or hydraulic deficiencies leaving them susceptible to failure) has risen by 188%—from 1,427 to 4,095. Only 21% of these dams are now being or have been rehabilitated in the last year.

Eliminating this backlog requires that the number of repairs consistently outstrips the number of identified deficient dams.

Currently:

- 4,095 state-regulated dams are in need of remediation.
- 1,819 of these deficient dams are classified as high-hazard-potential dams, and 1,126 are classified as significant-hazard-potential dams.

Total # of State Regulated Dams Identified to be in Need of Remediation



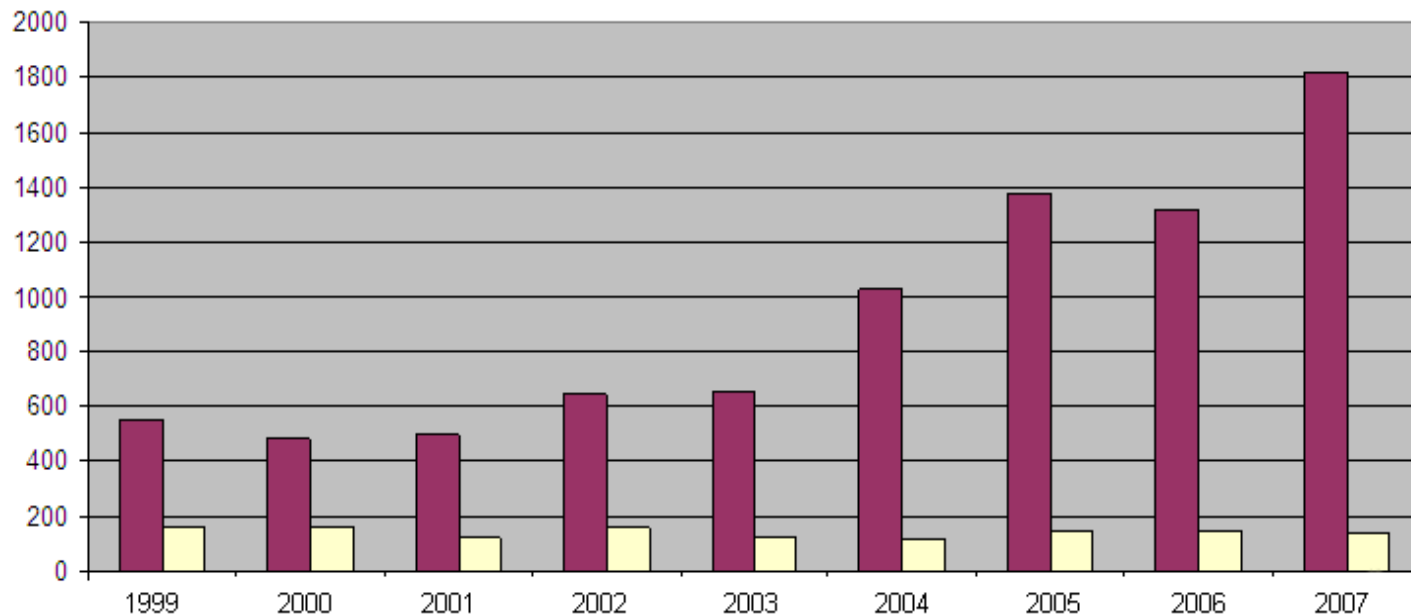
STATE-REPORTED DATA	2001	2002	2003	2004	2005	2006	2007
Total Deficient Dams	1390	1536	2004	3009	3340	3349	4095
HH-Potential Deficient Dams	495	646	649	1022	1379	1308	1819
HH-Potential Dams-Remediation Complete	129	162	123	123	152	139	141

“Remediation” is defined as a solution to remove the dam safety problem. This can include solutions such as the addition of a larger spillway, repair of the structure, or removal of the dam.

“Deficient” is defined as a dam that is not capable of performing safely under all required design pool and loading conditions. Note: Each state may have different definitions and standards.

Remediation Needs: High-Hazard-Potential Dams

■ HH-Potential Deficient Dams □ Remediated HH-Potential Dams



The Number of High-Hazard Potential Dams is Increasing



The number of high-hazard-potential dams (dams whose failure would cause loss of human life) is increasing. Since 1998, the number of state-regulated high-hazard-potential dams has increased from 9,300 to over 10,000 now. The cause of this increase is due to a combination of new dam construction and reclassification of existing dams from lower hazard-potential classifications to high-hazard-potential as a result of population encroachment.

State-Regulated High-Hazard-Potential Dams, 1998-2007

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
9,057	9,314	9,368	8,316	9,833	9,566	8,544	9,525	9,806	9,849

NOTE: Regulators determine a dam's hazard potential classification based on the downstream consequences should the dam fail or have a serious incident; the classification has absolutely nothing to do with a dam's condition or safety. **A high-hazard potential classification does NOT mean the dam is deficient.**

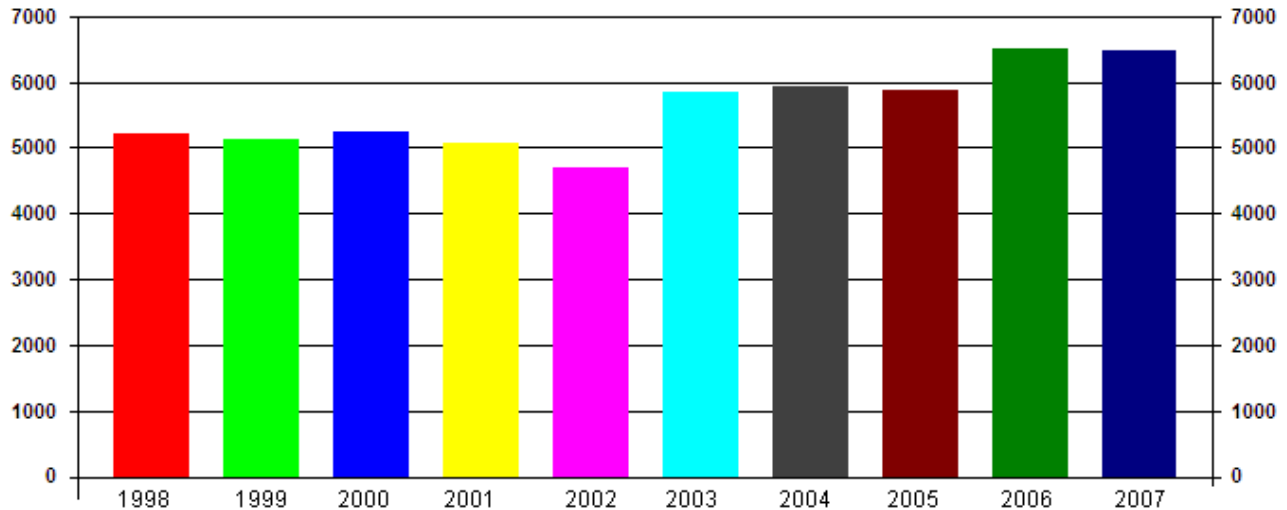
Dams that have a high hazard rating are supposed to meet very stringent standards so that they can withstand all credible extreme events such as floods and earthquakes; yet states have determined many high-hazard potential dams as deficient, proving that—in many instances—the stringent standards are not being met.

The Good News

Although much remains to be done, efforts are underway to improve dam safety in the US. Organizations like ASDSO and the American Society of Civil Engineers (ASCE) advocate strong state and federal programs, promote awareness of the need for improvement of the nation's infrastructure, and support federal legislation to launch a dam rehabilitation financing program.

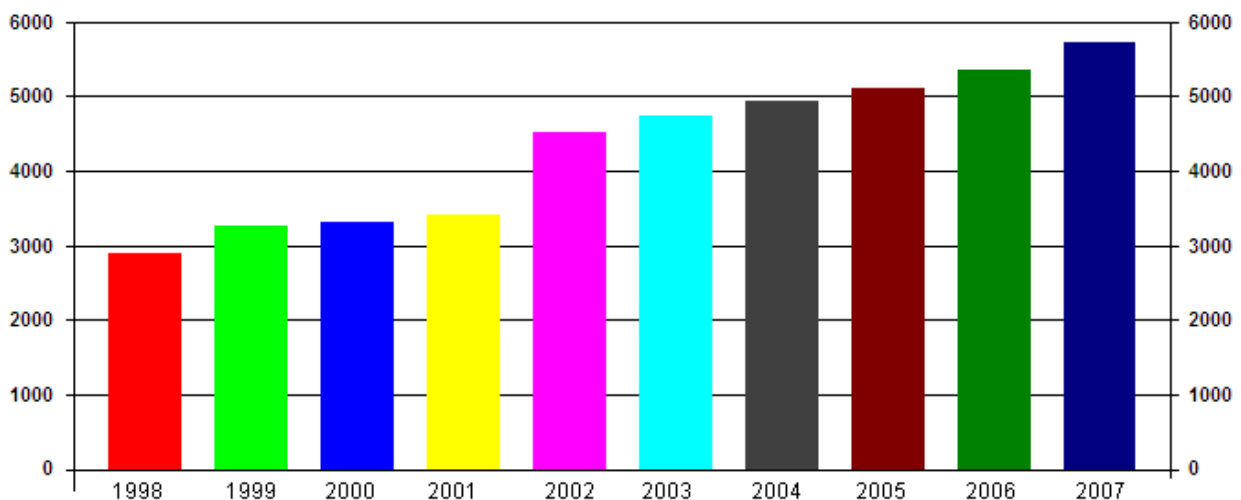
The number of state dam inspections is increasing.

Inspections of State Regulated High Hazard Potential Dams



States are reducing the risk to the public by increasing the number of current emergency action plans (EAPs) on high-hazard potential dams.

State Regulated High Hazard Potential Dams with an EAP



2007 Statistics on Dams and State Safety Regulation - Association of State Dam Safety Officials

State	2007 NID Dams	State-Determined Deficient Dams			State-Reg. Dam Remediations			State Budget	Staff	
		Total	HH	SH	Tot'l	HH	SH		FTEs	Dams/ FTE
Alabama	2,218	NA	NA	NA	NA	NA	NA	NA	0	NA
Alaska	100	22	4	5	4	1	2	108,000	1	82
Arizona	328	43	34	9	3	3	0	718,716	7	34
Arkansas	1,208	21	19	1	0	0	0	323,000	3	119
California	1,494	69	57	5	34	23	7	9,518,000	59	21
Colorado	1,806	9	3	2	41	12	13	1,695,200	14	138
Conn.	728	3	0	2	10	5	3	525,000	5	237
Delaware	61	6	6	0	0	0	0	1,070,000	1	49
Florida*	853	0	0	0	0	0	0	18,200,000	77	11
Georgia	4,814	147	147	0	10	10	0	727,009	9	431
Hawaii	132	46	30	7	0	0	0	380,250	5	31
Idaho	407	9	1	4	1	0	1	296,321	5	114
Illinois	1,462	0	0	0	0	0	0	266,000	5	330
Indiana	1,047	538	100	147	0	0	0	425,000	5	218
Iowa	3,340	31	12	13	1	0	0	20,000	1	2,660
Kansas	5,707	18	4	1	14	3	1	616,847	10	600
Kentucky	1,057	89	28	41	3	1	1	1,550,420	5	213
Louisiana	554	20	13	4	0	0	0	383,500	6	90
Maine	337	13	3	10	1	0	1	36,914	2	554
Maryland	319	37	12	13	28	12	6	557,194	6	66
Mass.	1,624	246	56	190	9	2	3	1,034,000	8	217
Michigan	985	27	4	5	1	1	0	295,000	3	334
Minnesota	1,030	72	7	14	6	0	5	365,000	4	256
Mississippi	3,433	35	29	2	12	3	0	62,079	4	978
Missouri	5,206	38	35	3	9	8	1	261,779	5	133
Montana	3,256	25	12	7	1	1	0	414,191	4	687
Nebraska	2,284	0	0	0	0	0	0	328,730	6	385
Nevada	461	27	7	2	1	0	0	207,000	2	372
New Hamp.	629	57	13	10	9	2	4	865,000	9	341
New Jersey	820	315	62	224	20	5	12	1,254,000	20	86
New Mexico	500	167	90	36	1	1	0	495,200	6	66
New York	1,971	48	48	0	2	2	0	1,597,642	14	373
N. Carolina	2,891	215	142	37	16	11	2	1,098,500	16	298
N. Dakota	838	18	4	9	3	0	2	220,000	5	256
Ohio	1,587	524	117	181	17	9	2	1,353,500	12	133
Oklahoma	4,701	150	150	0	0	0	0	257,856	3	1,476
Oregon	896	8	6	2	0	0	0	212,400	2	533
Penn.	1,517	529	263	72	22	9	4	2,238,094	25	130
Puerto Rico	35	0	0	0	0	0	0	600,000	9	4
Rhode Isl.	181	2	1	1	0	0	0	117,247	1	536
S. Carolina	2,419	6	3	2	1	0	1	0	3	927
S. Dakota	2,503	67	10	5	11	2	3	150,000	2	1,566
Tennessee	1,168	6	3	2	6	2	2	348,200	8	82
Texas	6,975	103	100	1	8	3	3	435,915	7	1,068
Utah	858	84	84	0	2	1	1	713,300	6	101
Vermont	357	6	1	4	6	2	0	330,000	2	260
Virginia	1,637	125	45	41	4	1	1	1,366,453	5	336
Washington	745	29	18	9	4	1	3	1,038,401	8	122
W. Virginia	558	30	27	3	5	4	0	470,425	6	60
Wisconsin	1,140	13	9	0	14	1	0	713,500	6	584
Wyoming**	1,468	2	0	0	1	0	0	224,528	5	290
Total	82,645	4,095	1,819	1,126	341	141	84	56,485,311	442	160

FTE = Full Time Equivalent Staff
 HH = High-Hazard Potential Determined Dam
 SH = Significant-Hazard Potential Determined Dam
 EAP = Emergency Action Plan
 Association of State Dam Safety Officials

* FL: Budget numbers show construction budget only – no program funds identified.
 **WY: Budget shown here is one-half of biennial budget.

Since 2000, more than 45 dam failures have been documented throughout the US.

An Incomplete History of Dam Failures in the US (Red - Near Failures)

Date	Dam	Location	Fatalities	Estimated Damages
5/16/1874	Mill River, on the Connecticut River	Williamsburg, MA	139 (incl. 43 children under age of 10)	Destroyed factories, 740 homes in Williamsburg, Leeds, Skinnerville, Haydenville.
5/31/1889	South Fork	Johnstown, PA	2209 (> 1 in 5 Johnstown residents)	\$17 million; almost the entire city was destroyed (1600 homes, 280 businesses demolished).
2/22/1890	Walnut Grove Dam	Near Prescott, Arizona	Unknown; most likely +/- 70, although published estimates range from 10-150	Destroyed town of Seymour (pop: <10); huge economic losses in Wickenburg; washed out new 25'-high diversion dam 12 mi downstream
1897	2 earth dams, Melzingah	New York	7 or more	Unknown
4/6/1900	Austin Dam (present site of Tom Miller Dam)	Austin, Texas	7-10	Powerhouse destroyed
9/30/1911	Bayless Pulp & Paper Mill	Austin, Pennsylvania	88	Unknown
4/14/1915	Lyman, Little Colorado .R.	St. Johns, Arizona	8	\$500,000
1/21/1916	Lower Otay	Near San Diego, CA	30	Unknown
8/2/1916	John Thompson's Mill Dam	on Barren Creek in Claiborne County, Tennessee	24-28 lives lost in flood, # related to failure unknown	Many houses, mills, other buldings, crops, and livestock destroyed, railroad damaged. > \$30,000 in property damage (possibly \$50,000 to \$100,000).
8/9/1916	Two unnamed dams	Betw. Acme & Kayford; Jarrolds Valley, Boone Co, West Virginia	60-75 from flood (unknown if related to failure)	
8/9/1916	Unnamed	Cabin Creek Valley, West Virginia	44-60 from flood (unknown if related to failure)	Extensive damage; esp. to rail, telephone, and coal company. > \$600,000 in damages
12/1918	Masonry Dam (Boxley Burst)	Near North, WA		Destroyed RR line, village of Eastwick.
3/12-13, 1928	St. Francis	California	450+	1200 homes destroyed, 10 bridges washed out
2/7/1932	Eastwick RR Fill	Near North Bend, WA	7	Destroyed RR line and village of Eastwick.
1960	Electric Light Pond	Eagleville, NY	1	
3/6/1963	Spaulding Pond, Mohegan Park	Norwich, CT	6	> \$6 million
6/16/1963	Little Deer Creek	Near Hannah, Utah	1	Summer cabins damaged
12/14/1963	Baldwin Hills	Los Angeles, California	5 killed - Advance warning enabled evac of approx 16,500; 27 injured.	Destroyed 65 houses; miles of streets, water pipes, sewers & gas lines, damaged hundreds of houoses & apartments
6/8/1964	Swift irrigation dam, Marias R. tributary	Swift, Montana (Birch Creek Valley, NW MT)	19	Unknown
6/8/1964	Lower Two Medicine	Lower Two Medicine, NW Montana	9	Unknown
3/24/1968	Lee Lake	Near East Lee, Mass.	2	6 houses destroyed, 20 houses damaged, 1mfg. plant damaged or destroyed
2/ 26/1972	Buffalo Creek	Logan County, West Virginia	125	\$400 million in damages, 546 houses destroyed, 538 houses damaged
4/29/1972	Lake O' Hills	Alaska	1 (10-year-old boy)	Unknown
6/9/1972	Canyon Lake Dam	Rapid City, S.Dakota	200+	\$60-164 million in damages: 3,000 injured.:
2/22/1976	New-found Creek Dam (Bear Wallow)	Buncombe County, near Canton, North Carolina	Family of 4	
6/5/1976	Teton	Near Wilford, Idaho	11	> \$1 billion
7/1977	Sandy Run, 5 others	Near Johnstown, Pennsylvania	5	Unknown
7/1977	Laurel Run	Near Johnstown, Pennsylvania	40	\$5.3 million in damages, 6 houses destroyed, 19 homes damages
11/6/1977	Kelly Barnes Dam	Toccoa Falls, GA	39	\$30 million
1979		Swimming Pool, NY	4	Unknown
12/1981	Coal waste impoundment	Ages (Harlan Co.), Kentucky	1 (Nellie Woolums)	
6/1982	21 dams	Connecticut	12	\$300 million

7/15/1982	Lawn Lake, & then Cascade Lake	Near Estes Park, Colorado	4	18 bridges destroyed, 117 businesses & 108 houses damaged. Campgrounds, fisheries, power plant damaged. \$25 million estimated damages.
6/23/1983	DMAD	Near Delta, Utah	1	Unknown
1/1/1989	Quail Creek	Utah	0	\$12 million in damages
3/29/1989	Nix Club Lake	Rusk County, near Henderson, TX	1	
9/15/1989	Evans & then Lockwood dams	Near Fayetteville, North Carolina	2 children	> \$10 million
10/11/1990	Kendall Lake Dam	Camden, SC	4 (ages 9, 10, 14, & 25)	
7/1994	217 dams throughout state	Georgia	3?	
6/22/1995	Timberlake Dam	Campbell County, near Lynchburg, Virginia	2	Unknown (dam rebuilt; cost nearly \$1 million)
7/17/1995	Folsom Dam Gate Failure	Sacramento, California	0	Minor damage to dam & spillway
3/13/1996	Meadow Pond (or Bergeron Pond) Dam	Alton, New Hampshire	1	\$8 million
3/2001	Saco Lake dam	Ulster Township, Pennsylvania	0	
8/12/2001	Hearns Pond Dam	Delaware	0	\$500,000. 60-acre impoundment drained, washout of US13A near Seaford
9/2002	Windy Hills Lake dam	Harrison County, Mississippi	1(indirect)	
5/13/2003	Silver Lake & Tourist Park dams	Near Marquette, Michigan	0	\$102 M, incl \$127,000 in emergency/ public safety, \$3 M in roads/ bridges, \$10.4 M in utilities, \$4 M fisheries, soils & trees & \$84 M in economic loss
5/26/2003	Hope Mills	Hope Mills, North Carolina	0	est. \$2.1 M damages; 1600 evacuated; estimated cost of rebuilding dam: \$6M
5/27/2003	Lake Upchurch & McLaughlin Lake dams	North Carolina		Lake Upchurch dam reconstruction costs estimated at more than \$350,000.
6/22/2003	Lake Manatee gate failure	Florida	0	2 upstream homes destroyed; 600 homes evacuated
3/12/2004	Big Bay Lake dam	Near Purvis, Southern Mississippi	0	98 homes, 2 churches, fire station, bridge damaged or destroyed; livestock, pets. SBA estimate: >\$2.2 M. \$2.5 M dam, > \$50K Red Cross
6/16/2004	2 dams in Powhatan Wildlife Mgmt Area	Virginia	0	Two 30 acre impoundments
7/3/2004	Small earth dam	Decatur, Arkansas	0	At least 5 businesses damaged
7/13/2004	21 dams	South New Jersey	0	Extensive, >\$30 million estimate, 350 homes flooded
10/11/2004	Victor Lake (aka Upper Stinchomb)	Fayette County, Georgia	0	~20 trailers flooded; ~20 evacuated
11/24/2004	Keith Lake dam	St. Clair County, near Odenville, Alabama	0	Decreased property values, environmental damages, driveways covered with mud, ~20% damage to downstream dam
4/26/2005	Simplot Wastewater Lagoon #1	Near Hermiston, OR	0	Breach of off-channel reservoir resulted in breach of canal, loss of irrigation water, agricultural lands, water/mud damage to farm houses & outbuildings.
7/2/2005	Hadlock Pond dam	NY	0	At least 4 homes destroyed, ~12 w/ moderate to severe damage, SR149 washed out, power outages. > \$1M damages.
9/2005	Lake Pontchartrain levees	New Orleans, LA	>1,000	> \$1 billion
10/18/2005	Whittenton Pond Dam	On Mill R., Taunton, MA	0	~2,000 evacuated
12/14/2005	Taum Sauk	Lesterville, MO	0 (3 children critically injured)	Toops family home demolished; state highway washed out; at least 3 trucks swept from road.
3/14/2006	Kaloko Reservoir Dam	Island of Kauai, Hawaii	7 (see right)	>\$15 million. Victims: Alan Dingwall (30); Aurora Fehring (24); Rowan Fehring (2); Christina McNeese (22) & unborn infant; Daniel Arroyo (33); Timothy Noonan; Wayne Rotstein
6/28-29/ 2006	Needwood Dam	Gaithersburg, MD	0	2200 evacuated for 3 days
4/15/2007	Lee's Fishing Lake Dam	Hamilin, Lincoln Co, WV	0	Nearly 1000 evacuated
4/16/2007	Nottingham Dam	Newmarket, NH	0	"upwards of 1000 evacuated"
4/17/2007	Rainbow Lake Dam	Pittsgrove Township, NJ	0	Vital highway & several other roads washed out; repair will cost "several million" – gas main broken.