



# State and Federal Oversight of Dam Safety Must Be Improved

## ***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?



## ***But, 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>	\$400 million
<i>Teton (1976)</i>	>\$1 billion
<i>Toccoa Falls (1977)</i>	\$30 million
<i>Lawn Lake (1982)</i>	\$25 million
<i>Silver Lake (2003)</i>	\$102 million

<i>Hope Mills (2003)</i>	\$8.1 million
<i>Big Bay (2004)</i>	\$4.75 million
21 dams in NJ (2004)	\$30 million
<i>Kingston (2008)</i>	>\$1 billion

# When a dam is not properly maintained or upgraded, 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. Nearly half of our nation's dams are already fifty years old; in another ten years, nearly 70% of dams in the U.S. will have reached the half-century mark.

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## Dams in the United States

*States regulate the vast majority of US dams.*

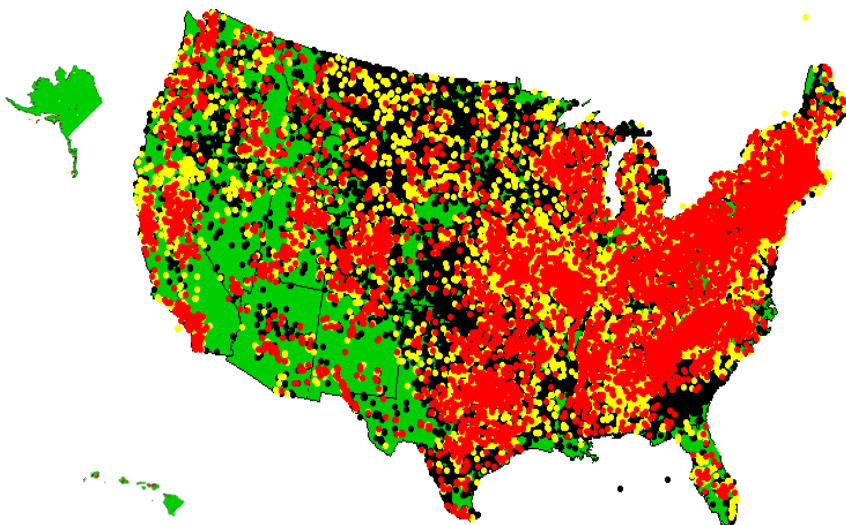
Number of Dams in the National Inventory of Dams (2016) ..... 90,580

Number of NID-Size Dams under State Regulation (2016)..... 63,047

Number of NID-Size High-Hazard Potential Dams reported to be State-Regulated (2016) ..... 11,936

Number of Deficient State-Regulated High-Hazard Potential Dams reported in 2016\* ..... 1,780

\*2016 data from NID condition assessment with only 85% of State-Regulated HHP dams being reported



**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.

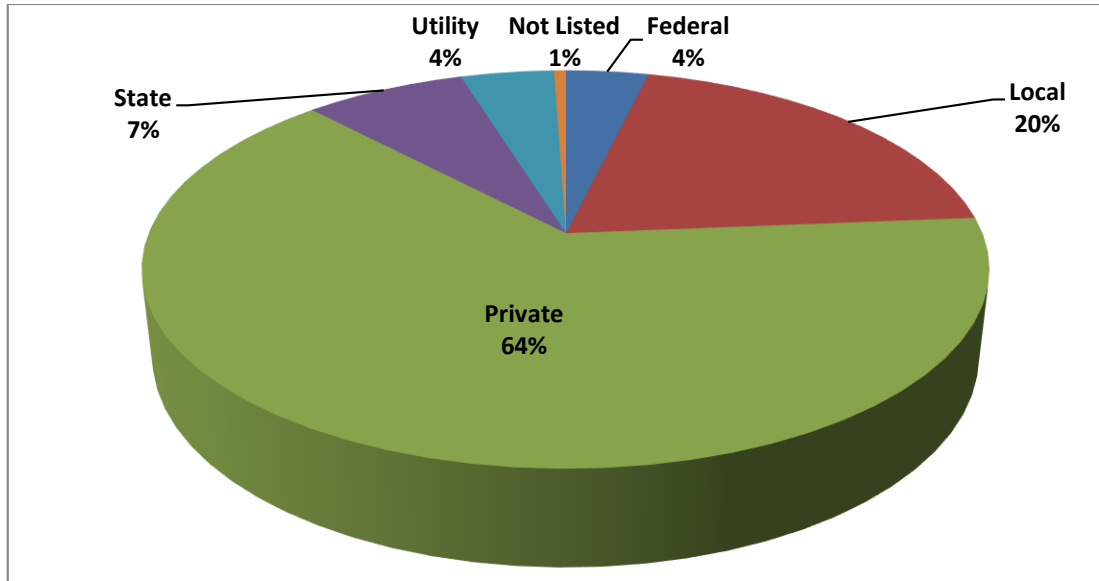
Source: The National Inventory of Dams (NID). NID data is submitted by each state & federal dam safety agency to the NID, administered by the US Army Corps of Engineering Topographic Engineering Center.

**The National Inventory of Dams (NID) - [nid.usace.army.mil](http://nid.usace.army.mil)**

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.

## Dam Ownership in the U.S.



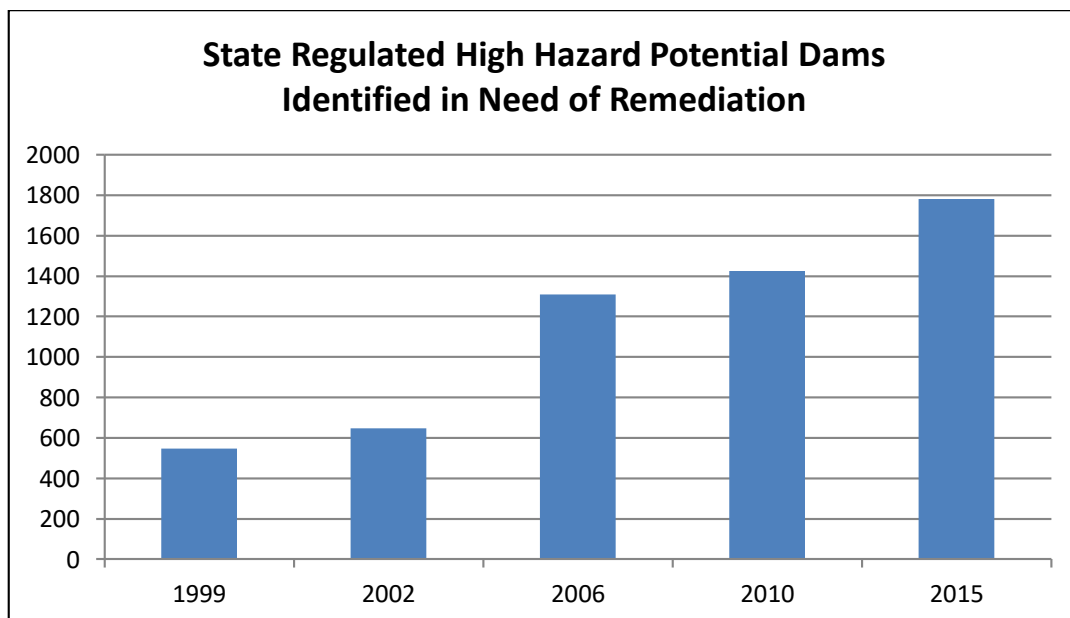
### **States-Regulate the Majority of Dams in the U.S.**

States have the enormous challenge of regulating about 70% of the dams in the US. The federal agencies own or regulate about 6% of the dams and 26% of the dams in the NID list no regulatory agency. 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.**

In the last 15 years, the recorded number of state-regulated deficient dams (those with structural or hydraulic deficiencies leaving them susceptible to failure) more than quadrupled. Eliminating this backlog requires that the number of repairs consistently outstrips the number of identified deficient dams, but for the past several years statistics show that for every high-hazard-potential dam repaired, nearly two more dams have been declared deficient.

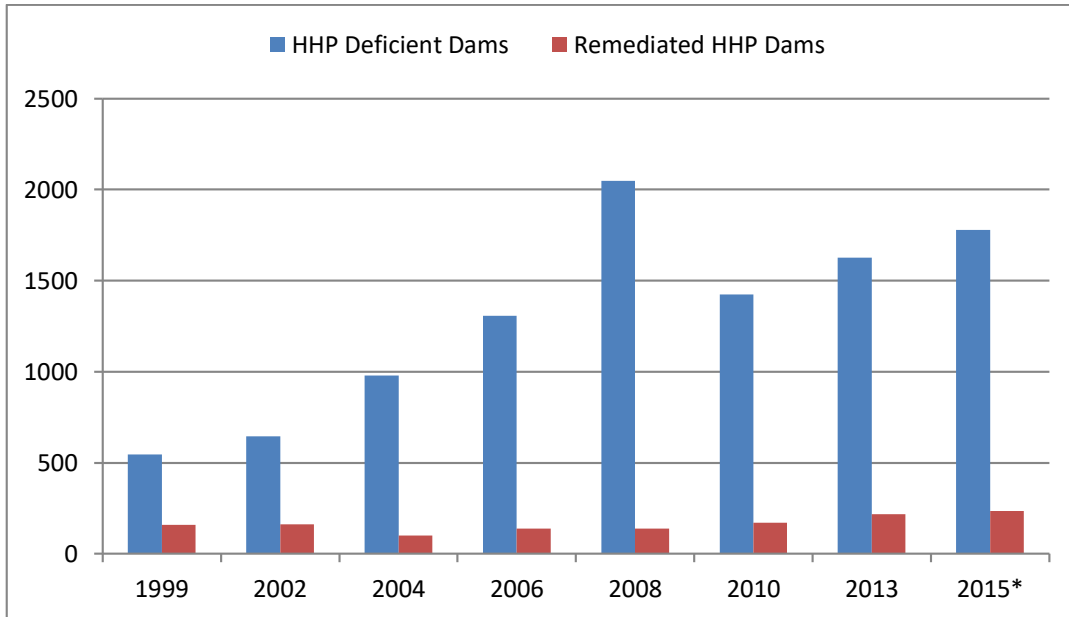
### **State-Regulated High-Hazard Potential Dams Identified to be in Need of Remediation**



STATE-REPORTED DATA	1999	2002	2006	2008	2015*
Total Deficient Dams	1427	1536	3349	4404	NR
HH-Potential Deficient Dams	546	646	1308	2047	1780
HH-Potential Dams- Remediation Completed in the Identified Year	159	163	139	140	235

\*2015 data from 2016 NID condition assessment with only 85% of State Regulated HHP dams being reported

### Remediation Needs: High-Hazard-Potential Dams



\*2015 data from NID condition assessment with only 85% of State Regulated HHP dams being reported.

\*In 2009 the NID began collecting condition rating data on high hazard potential dams and this information will be used to record state-regulated deficient dams in the future. For the 2016 NID update 85% of state-regulated high hazard potential dams were rated and 1780 were rated Poor or Unsatisfactory, those considered in need of remediation. States voluntarily submit this data and the number of dams not rated continues to decrease.

“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.

While the estimated cost of rehabilitating our nation’s dams is high—well over \$60 billion, including more than \$18.7 billion for high-hazard potential non-federal dams—the collective cost of deferring maintenance on these structures is staggering.

## ***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 nearly 12,000 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, 1998-2015\***

<b>1998</b>	<b>2001</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>	<b>2010</b>	<b>2012</b>	<b>2014</b>	<b>2015</b>
9,057	8,316	8,544	9,806	10,993	11,202	11,405	11,721	11,949

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*\*As reported by state dam safety programs. Regulators determine a dam's hazard potential classification based on the downstream consequences of a dam failure or incident, such as overtopping or mis-operation.*

**Hazard potential 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 that many high-hazard potential dams are deficient, proving that—in many instances—the stringent standards are not being met.*

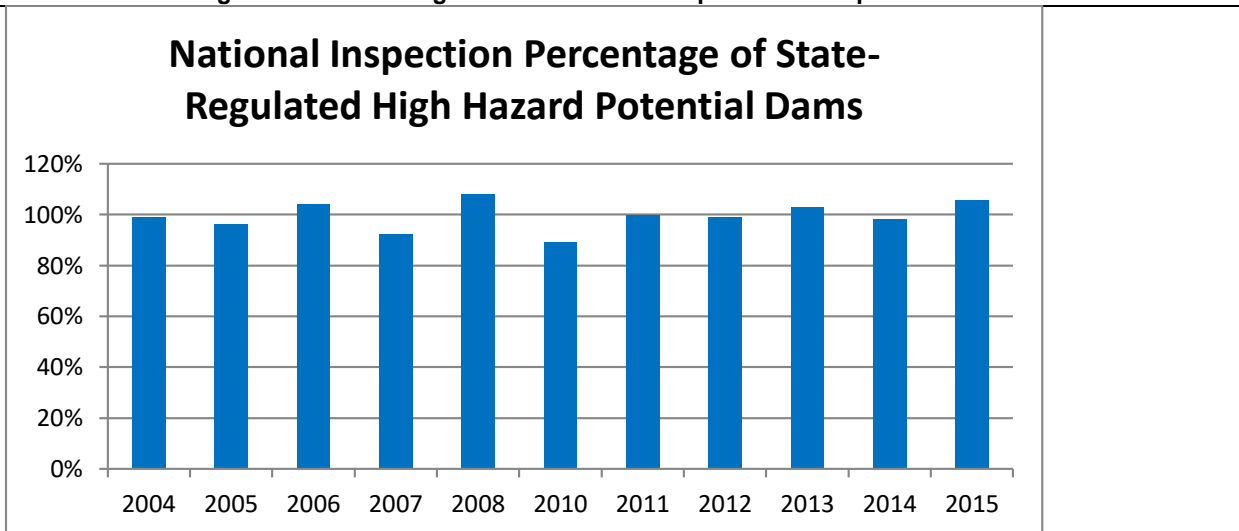
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## The Good News

Although much remains to be done, efforts are underway to improve dam safety in the US. Organizations such as ASDSO and the American Society of Civil Engineers (ASCE), with the National Dam Safety Program at FEMA, 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 (a measure just passed in the last Congress).

**State inspection of high hazard potential dams remains strong. The national average for the inspection of high hazard potential dams has remained relatively steady over the reporting period of 1998 to 2015.**

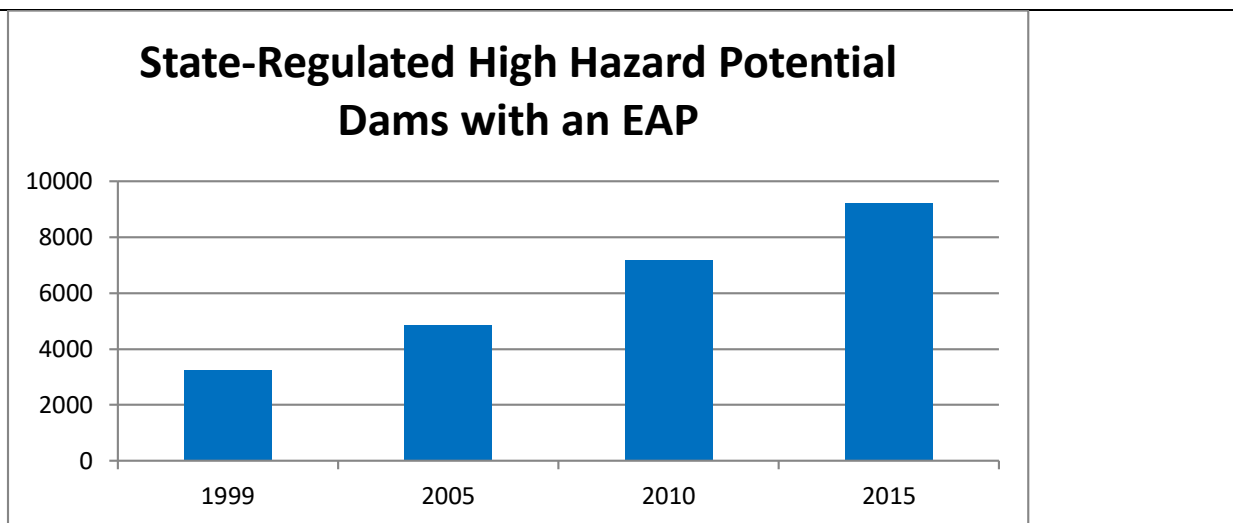
Percentage of Scheduled High Hazard Potential Inspections Completed\*



\*Inspection percentages vary above and below 100% for any given year based on a state's inspection frequency and scheduling.

**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 EAPs



**2016 Statistics on State Dam Safety Regulation**  
**Association of State Dam Safety Officials – www.damsafety.org**

October 2016

State	NID Dams <i>(Includes all NID-sized dams regulated by state or federal agencies)</i>	State Regulated Dams		Budget	Staff			
		Total	HH		FTEs	Dams/FTE	HH Dams/FTE	
Alabama	2271	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alaska	107	76	17	\$325,250	2	38.0	8.5	
Arizona	384	258	108	\$767,800	4.5	57.3	24.0	
Arkansas	1257	409	114	\$318,269	4.3	95.1	26.5	
California	1585	1250	678	\$13,225,000	61	20.5	11.1	
Colorado	1737	1757	407	\$1,795,433	13	135.2	31.3	
Conn.	746	3111	273	\$750,000	6	518.5	45.5	
Delaware	83	47	43	\$1,041,500	1.2	39.2	35.8	
Florida	1203	1201	79	\$1,012,088	13.9	86.4	5.7	
Georgia	5420	4110	472	\$673,361	10	411.0	47.2	
Hawaii	133	132	123	\$1,052,000	4.5	29.3	27.3	
Idaho	473	490	93	\$328,670	2.95	166.1	31.5	
Illinois	1607	1777	224	\$320,000	3	592.3	74.7	
Indiana	916	1085	240	\$505,000	6	180.8	40.0	
Iowa	3976	3890	91	\$140,000	3	1296.7	30.3	
Kansas	6403	2447	235	\$308,823	3.33	734.8	70.6	
Kentucky	1107	962	182	\$515,283	4	240.5	45.5	
Louisiana	557	494	43	\$660,367	5	98.8	8.6	
Maine	597	598	30	\$77,668	2.25	265.8	13.3	
Maryland	346	487	82	\$865,173	6.75	72.1	12.1	
Mass.	1452	1465	292	\$1,195,868	4.7	311.7	62.1	
Michigan	1005	1049	88	\$392,000	3.2	327.8	27.5	
Minnesota	1097	1015	25	\$420,000	5.8	175.0	4.3	
Mississippi	5114	5679	305	\$476,654	7.5	757.2	40.7	
Missouri	5356	687	465	\$450,375	6	114.5	77.5	
Montana	2960	2909	110	\$690,554	6.85	424.7	16.1	
Nebraska	2970	2873	141	\$395,544	7.4	388.2	19.1	
Nevada	547	685	153	\$277,406	3	228.3	51.0	
New Hamp	645	834	146	\$975,925	7.5	111.2	19.5	
New	825	1702	221	\$1,254,000	13	130.9	17.0	
New	492	298	167	\$581,535	7	42.6	23.9	
New York	1951	5806	404	\$1,583,148	8.5	683.1	47.5	
N Carolina	3444	2561	1235	\$2,064,352	20.85	122.8	59.2	
N. Dakota	898	1223	48	\$330,000	4.25	287.8	11.3	
Ohio	1495	1498	362	\$1,309,746	12.5	119.8	29.0	
Oklahoma	4891	4601	359	\$109,163	4.05	1136.0	88.6	
Oregon	869	967	77	\$352,490	2.25	429.8	34.2	
Penn.	1525	3373	756	\$2,607,154	27	124.9	28.0	
Puerto	38	36	35	\$435,095	2	18.0	17.5	
Rhode Isl.	227	667	96	\$270,581	2.15	310.2	44.7	
S Carolina	2444	2373	178	\$261,458	6.15	385.9	28.9	
S Dakota	2565	2360	46	\$200,000	2.1	1123.8	21.9	
Tennessee	1237	658	149	\$320,000	7.1	92.7	21.0	
Texas	7395	4049	1212	\$1,685,933	26	155.7	46.6	
Utah	833	692	208	\$823,257	7	98.9	29.7	
Vermont	357	429	40	\$383,792	2.25	190.7	17.8	
Virginia	2919	2121	382	\$1,275,284	7	303.0	54.6	
Wash.	784	1040	186	\$1,751,966	9	115.6	20.7	
W. Virginia	614	364	285	\$820,773	5	72.8	57.0	
Wisconsin	1106	916	157	\$752,000	6.75	135.7	23.3	
Wyoming	1617	1540	87	\$316,692	4.73	325.6	18.4	
<b>Total</b>	<b>90,580</b>	<b>81,051</b>	<b>11,949</b>	<b>\$49,444,431</b>	<b>395.26</b>	<b>National 205</b>	<b>National 30</b>	

NID Data is from the 2016 Update

FTE = Full Time Equivalent Staff    HH = High-Hazard Potential Dam