CHAPTER 3. DAM FAILURE

Dams and reservoirs serve a very important role for Wyoming residents and industry. Rarely, however, the dams fail, either completely or partially, and become a significant hazard for those downstream. Dam failures fall within four classifications: overtopping, foundation failure, structural failure, and other unforeseen failures. Overtopping failures result from the uncontrolled flow of water over, around, and adjacent to the dam. Earthen dams are most susceptible to this type of failure. Overtopping failures account for approximately 28% of all dam failures. Foundation and structural failures are usually tied to seepage through the foundation of the main structure of the dam. Deformation of the foundation or settling of the embankment can also result in dam failure. Structural failures account for approximately 28% of all dam failures nationwide, and foundation problems account for another 25%. Earthquakes or sabotage account for 12% of dam failures, inadequate design and construction account for the remaining 7% of failures.

In 1981, the U.S. Army Corps of Engineers completed an inspection program for nonfederal dams under the National Dam Inspection Act (P.L. 92-367). This was a four-year work effort and included compiling an inventory of about 50,000 dams and conducting a review of each state's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams. Part of the inspection included evaluating the dams and assigning a hazard potential based on the effects downstream should one of the dams fail. The dams were rated (1) high, (2) significant, and (3) low hazard.

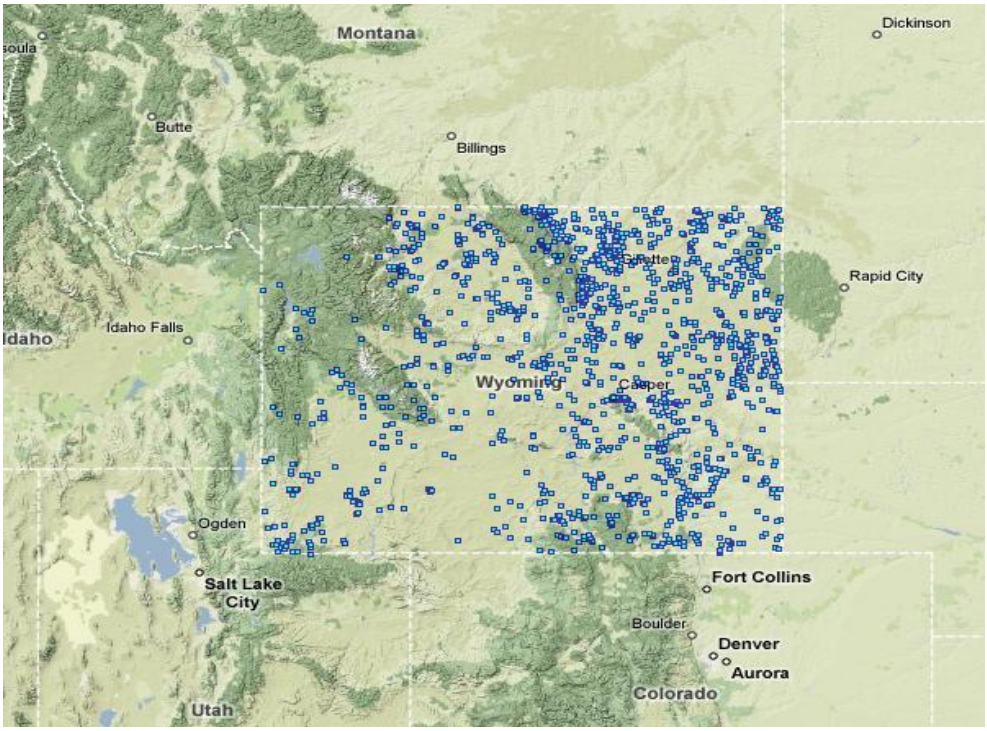

Figure 3.1 Dams in National Inventory of Figure 3.1

The Corps of Engineers based the hazard potential designation on such items as acre-feet capacity of the dam, distance from nearest community downstream, population density of the community, and age of the dam. High hazard dam failures would involve property losses over $1 million and have probable loss of life. Significant hazard dam failures would cause over $1 million in property damage and involve possible loss of life. There were 1,458 dams in Wyoming that were reviewed by the Corps of Engineers. Of that number 38 were rated high hazard, 56 were rated significant hazard, and the remaining 1,364 were rated low hazard. The Wyoming State Engineers Office inspects dams over 20 feet high or with a storage capacity of 50 acre-feet or more, although smaller dams are also inspected in highly populated areas. There are 1,386 dams that are inspected by the State Engineer once every five years. Of those dams, 79 are rated high hazard, 115 were rated significant hazard, and 1,192 were rated low-hazard by the Wyoming State Engineer's Office. Figure 3.2 shows the dams that are inspected by the Wyoming State Engineers Office.

Converse County has 70 dams that are listed in the National Inventory of Dams maintained by the U.S. Army Corp of Engineers. Of this number, 68 are privately-owned, one is state-owned and one is owned by the federal government. Fifty-three of the 70 dams were constructed wholly or in part for irrigation purposes. Other purposes listed for the dams are water supply, fire protection, stock water, fish pond, wildlife pond, or recreation. The majority of dams impound only a small amount of water. One dam, LaPrele is made or concrete, the remaining 69 dams are earthen. A listing of NID dams in the county is on file at the Converse County Emergency Management Office.

LaPrele is the only high hazard dam in the county. The LaPrele Dam is owned by the LaPrele Irrigation District. As the owner, the irrigation district is responsible for safe operation and dam maintenance. The dam is periodically inspected by the State Engineer's Office. The dam was built of concrete in 1909 for irrigation purposes. LaPrele Creek is the source of water for the reservoir behind the dam. The dam is 135 feet tall and 320 feet wide. Maximum capacity of the dam is 26,850 cubic feet and the maximum discharge is 7,810 cubic feet per second. The dam has an Emergency Action Plan (EAP.) The EAP describes actions to warn and evacuate should that become necessary.

History

There have been a number of dam failures in Wyoming, some of which have caused the loss of life and damage to property. According to the Wyoming State Hazard Mitigation Plan (2008) there has been one documented dam failure in Converse County.

On July 22, 1983 a dam collapsed as a result of heavy rains on the east slopes of the Laramie Range sending a 10-15-foot wall of water through a nearby ranch. The dam collapse happened southwest of Douglas near the LaPrele Reservoir.

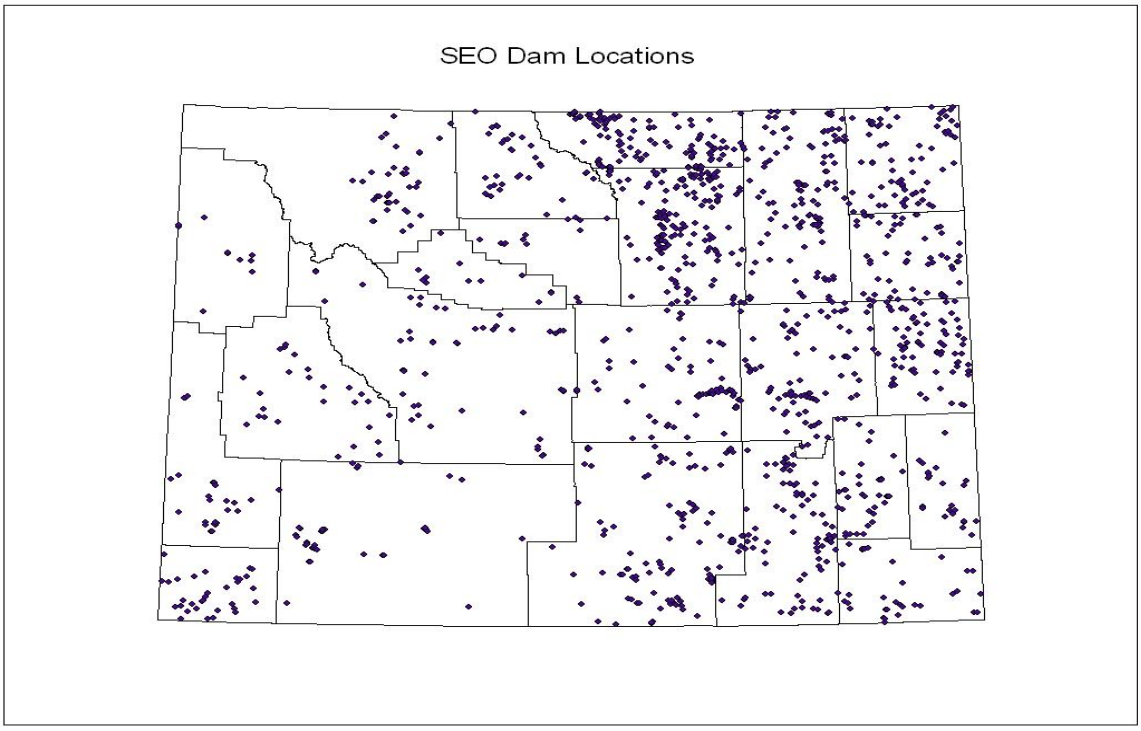

Figure 3.2 Dams Inspected by the Wyoming State Engineers Office and the U.S.B.R.

(Source: Wyoming State Hazard Mitigation Plan, 2008)

Impacts

Only one dam failure has been documented in Converse County. No damage information is available from that incident.

If LaPrele Dam failed, impacts could be catastrophic. According to the LaPrele EAP, the first area of inundation would be the Natural Bridge Park recreation area. Also acording to the EAP, the closest major population center, Douglas, is located 27 miles downstream from the dam and there would be 16 hours from breach to peak flow in Douglas. By the time the flood reached Douglas most of the waters would remain within the designated floodplain area. Unincorporated areas of the county, rural ranches, and Interstate 25 could all experience flooding. There is no history of failure at this dam.

Summary

PROPERTY AFFECTED: Low
POPULATION AFFECTED: Low
PROBABILITY: Low
JURISDICTION AFFECTED: County, Douglas