

area of approximately 5.6 square miles. Mean annual precipitation is 26 inches with an annual snowfall of approximately 50 inches. Lake Coeur d'Alene is the major flood threat affecting the city. Although small businesses exist in the floodplain, most development is residential.

Rathdrum started with the establishment of the post office in 1881 and had a population of 4,816 in 2000. Rathdrum Creek flows southerly through a wooded, residentially developed area in the western part of Rathdrum.

2.3 Principal Flood Problems

Most major floods occur in the drainage basins of Kootenai County during winter and spring when warm rains fall on melting snow. The highest floods are usually winter floods, which result from heavy rainfall augmented by snowmelt. Winter flows can rise from normal to extreme flood peaks in 2 days. Spring floods are more frequent, but lower, and occur primarily during April and May. Spring floods are basically the result of snowmelt, sometimes in combination with rainfall. They can rise from normal to extreme flood peaks within 5 days and remain above flood stages for more than 2 weeks (Reference 5). Low-lying areas of Kootenai County, suitable for development, are subject to these periodic floods.

Since the late 1800s, Kootenai County floods have been remembered for the havoc that they caused not only from inundation, but from massive destruction from severe stream erosion and sediment deposition. The major flooding years have been 1894, 1896, 1917, 1933, 1938, 1964, 1974, 1996, and 1997 (Reference 36).

Very little information could be uncovered regarding earlier floods, but reliable information is available for more recent events.

The January 1974 flood produced flows on the Coeur d'Alene River greater than any flood ever recorded at the Coeur d'Alene River gage since it was placed in 1911 (References 6 through 9). An estimated flow of 79,000 cubic feet per second (cfs) at Cataldo was calculated to be slightly greater than a 1-percent-annual-chance flood. Railroad travel was disrupted and roads were covered with water, making boat travel imperative. Medimont area homes were surrounded by water, thus creating an island. Supplies were flown in by helicopter.

Many residences were flooded along the entire length of the river including bank areas of the adjacent lakes, which were under the influence of the river.

Even though the Coeur d'Alene River system reached a 1-percent-annual-chance flow value, Lake Coeur d'Alene reached only an elevation of 2,137.3 feet (NAVD88). This elevation is 2 feet lower than the 1-percent-annual-chance lake level, without consideration of wave height or runup. Lake Coeur d'Alene has a total drainage area of 3,700 square miles, while the Coeur d'Alene River accounts for only 36 percent of this area. The remainder is contributed by the St. Joe River flowing into the lake from the south.

During 1974, the outflow from Lake Coeur d'Alene reached 46,200 cfs, a 2-percent-annual-chance flood. Flooding did occur, however, along the Spokane River banks, and residences of the Harbor Island area experienced heavy losses caused by flooding.

During the 1974 event, Latour and Wolf Lodge Creeks broke out of their banks and flooded many residences along their paths. As one resident recalled, "There was 9 inches of snow on the ground and then it started to rain. The snow was completely gone in 24 hours." The tremendous volume of water filled streams and rivers throughout the area, including Latour and Wolf Lodge Creeks and the Coeur d'Alene River.

Latour Creek has a total drainage area of 52.4 square miles. A gaging station is located at the 24.8-square-mile point and, during the 1974 event, the flow value was estimated at 1,900 cfs (Reference 9). No discharge information is available for Wolf Lodge Creek. Flooding that occurs on the lower reaches of Wolf Lodge and Latour Creeks is often elevated by flooding cause by backwater effects from Lake Coeur d'Alene and the Coeur d'Alene River, respectively. Each creek can, however, independently cause flooding from rainfall, snowmelt, or a combination of both.

During 1933, Lake Coeur d'Alene reached an elevation of 2,139.8 feet (NAVD88). This level is 0.5 foot greater than the 1-percent-annual-chance level without considering wave effects. This level was the result of a very high volume of runoff from both the Coeur d'Alene and St. Joe Rivers. The Coeur d'Alene River at Latour Creek reached an estimated discharge of 67,000 cfs, a 75-year frequency flood, and was approximately 0.5 foot below the 1974 flood (Reference 9). The Spokane River outflow was 50,100 cfs during 1933 (Reference 6). For the portion of the river above Post Falls Dam to Lake Coeur d'Alene, a high-water profile was collected by the Washington Water Power Company for the 1933 flood. This profile was used for calibration purposes to better define the 1-percent-annual-chance flood profile for this study. No data could be collected for Latour and Wolf Lodge Creeks for the 1933 flood.

Major flooding events along the Spokane River occurred in 1894, 1933, and, more recently, in 1974. The City of Post Falls, north of and adjacent to the Spokane River, was not affected by these major events.

Hauser Lake, the sole flooding source in the City of Hauser, freezes at its lowest level during the winter. During spring, the lake rises to a relatively constant elevation and remains that way throughout the summer. A major rainfall-snowmelt event similar to the one experienced during January 1974 in other watersheds would produce an elevation of 2,191.8 feet (NAVD88). However, this elevation was not reached, and Hauser was unaffected by the 1974 event.

Spirit Lake, the flooding source in the City of Spirit Lake, reached an elevation of 2,447.9 (NAVD88) feet in 1974. This is 0.2 foot below the calculated 1-percent-annual-chance elevation of 2,448.1 feet (NAVD88). The calculated 10-percent-annual-chance elevation is 2,445.8 feet (NAVD88).

Fernan Lake, located in the City of Fernan Lake, is under the influence of adjacent Lake Coeur d'Alene during the 1-percent-annual-chance flood. However, during a 10-percent-annual-chance flood, Fernan Lake is independent of Lake Coeur d'Alene. Major floods have occurred during the years 1917, 1918, 1933, and more recently, 1974. The most severe flood, that of December 1933, reached an elevation of 2,139.8 feet (NAVD88), 0.5 foot higher than the 1-percent-annual-chance event. During the 1974 flood, an elevation of 2,137.3 feet (NAVD88) was recorded, 2 feet below the 1-percent-annual-chance event. This flood reached four residences along the lake making sandbagging necessary.

The City of Harrison, located on the banks of Lake Coeur d'Alene, is protected from flooding because it is situated on steep slopes, well above the 1-percent-annual-chance stillwater elevation of 2,139.3 feet (NAVD88).

The major flood threat to the City of Coeur d'Alene comes from Lake Coeur d'Alene. Historic events caused by Lake Coeur d'Alene affecting the county also apply to city land in some areas.

Nettleton Gulch within the corporate limits of Coeur d'Alene has been filled in and houses have been built. The flood potential for this area is from runoff upstream of the city. Within the city, the flow will be spread out and very hard to define. Local streets will carry some flow, but houses in the general vicinity will be flooded during a 1-percent-annual-chance event.

Low-lying areas of the City of Rathdrum are subject to periodic flooding caused by overflow of Rathdrum Creek. Most of these areas are adaptable to building development.

No historic information was available describing past flooding in Rathdrum.

The February 1996 flood was the result of snow melt and heavy rain. Flooding occurred throughout northern Idaho and caused an estimated \$100 million in damage. Damage in the Coeur d'Alene River valley was estimated at \$24 million. The settlement of Cataldo was evacuated after water from the Coeur d'Alene River broke through an emergency dike pouring five feet of water into the community. State Highway 41 between Rathdrum and Spirit Lake was covered by two feet of water. The Wolf Lodge Campground was flooded. Roads along Coeur d'Alene Lake were flooded at Beauty Bay and Booth Park. Fourth of July Creek left its banks near Rose Lake. Flood water in French Gulch flooded several homes. Water covered the right lane of westbound I-90 near the Coeur d'Alene River bridge and there were reports of water over roads near Harrison. More than 1650 people registered for disaster housing assistance in north Idaho following the February flood. The Corps of Engineers estimated that it would take at least \$16 million to repair state and county owned levees in north Idaho (Reference 36).

The March/April 1997 flood was the result of record snowfall during the 1996-1997 winter and above normal precipitation in the spring of '97. Anticipating enormous runoff from twice the average snowpack in the Hayden Lake basin, the county undertook

an emergency project that enlarged the spillway and protected the dike from erosion. This modified outlet allowed 20 times the outflow of the original culvert. Flooding began near Avondale Golf Course in mid-March.

"Hauser Lake became the focus of flood problems on April 1. Heavy runoff and scattered rain produced the highest water levels in the past 30 years. Several roads and homes were flooded and damaged. Shoreline erosion occurred and some septic systems were inundated. Some roads remained flooded for over a month. Several roads in the Twin Lakes and Rathdrum areas were also flooded.

As water levels on Coeur d'Alene Lake and the Spokane River continued to rise, residents of Harbor Island began sandbagging on April 22. They would still be adding sandbags a month later. Harbor Island residents, county personnel, fire and highway personnel, National Guardsmen, and volunteers laid an estimated 103,000 sandbags to form a flood wall a mile long. The wall saved residences from major flood damage but about half of the docks on the island suffered extensive damage.

Warming temperatures in late April accelerated the snowmelt. By the end of the month, portions of the Coeur d'Alene valley were under water. The river covered parts of Latour Creek Road, CCC Road and River Road by April 28th, but Cataldo stayed dry. Soon, flood prone areas in the Chain Lakes were inundated. Water covered Kilarney Lake Road, Simpson Road, Bull Run Lake Road and Black Rock Road. The road closures stranded scores of people throughout the Coeur d'Alene valley. Some roads were affected through mid May. Saturated ground and the long duration of high water on the river caused some seepage through dikes near Cataldo. One home was threatened by seepage but reports indicated that pumps controlled the ponding.

Coeur d'Alene Lake exceeded the flood stage of 2133 feet (NAVD88) on May 16th. Washington Water Power records indicate that the lake peaked at 2136.3 feet (NAVD88) on May 19th which is the 4th highest level behind 1933, 1894 and 1974. The lake remained above flood stage until May 23rd. The flooding along the lake caused damage to 62 homes and businesses and covered roads in several areas. The flood also created acres of debris on the lake" (Reference 36).

2.4 Flood Protection Measures

No significant impoundments exist on any of the river systems studied by detailed methods in this report. Lake Coeur d'Alene is a natural lake with a natural outlet to the Spokane River. The Post Falls Dam on the Spokane River, 9 miles below the outlet from Lake Coeur d'Alene, was constructed by the Washington Water Power Company to regulate the lake level to optimize water power production (Reference 10). Based on present operational procedures by the Washington Water Power Company, the Lake Coeur d'Alene water level is held nearly full through the summer recreation season. When the runoff season begins in late winter or spring, no control is exercised over the outflow from Lake Coeur d'Alene. When the lake level increases beyond an elevation of 2,128.8 feet (NAVD88), control passes from Post Falls Dam to the natural lake outlet (Reference 11).