5.0 Historic Flood Problems

Since early European settlement, flooding has been the principal water resource problem in the Red River of the North Basin. The basin is particularly susceptible to severe flooding due to its flat topography and the northward flow direction of the Red River. When the river overtops its channel banks, vast areas of flat adjacent land become inundated. During spring snowmelt, the thaw generally begins in the southern reaches. The northern reaches of the river, normally frozen for a longer period, inhibit the northward flow and can thus aggravate the flooding problem.

The catastrophic flood damages over the years represent a substantial burden to the local, regional and national economy. In view of this flooding problem, in 1976 the Minnesota State Legislature passed legislation allowing the existing watershed districts to join together in a common effort under a Joint Powers Agreement. The Red River Watershed Management Board (RRWMB) was formed to plan, develop and manage the water resources to reduce damages from flooding.

The Watershed Law in Minnesota (Chapter 103D) was comprehensive enough to embody the intent and purpose without amendment. Therefore, the watershed districts were the logical choice among existing governmental units to initiate the task of flood flow and damage reduction.

Presently, RRWMB's members consist of the following eight watershed districts:

- Bois de Sioux Watershed District
- Joe River Watershed District
- Middle River-Snake River Watershed District
- Red Lake Watershed District
- Roseau River Watershed District
- Sandhill River Watershed District
- Two Rivers Watershed District
- Wild Rice Watershed District

The Red River of the North is the only major North American river flowing north. This fact, combined with other regional characteristics of its 23 tributaries in both Minnesota and North Dakota, makes flooding in this river basin a very complex phenomenon with a high frequency.

Past efforts in dealing with the flooding problem concentrated solely on the effects of single projects on local areas or sub-basins, but neglected the overall basin-wide objective. USACE, SWCDs and others have constructed impoundments, dams, levees, channels and other flood control structures in an attempt to alleviate the flooding problem. Unfortunately, these efforts are developed for a specific area and can result in inadequate consideration of the basin-wide effect of these structures on FDR. As a result, it is likely that certain areas may not realize the full potential of FDR, which might otherwise be attainable had it been possible to coordinate them under a management plan. The process of seeking prompt solutions to meet the water resources needs is also hampered by the fact that the basin crosses several political boundaries.

The RRWMB acts as a central coordinating and funding agency for members of the eight watershed districts in the Red River of the North Basin in Minnesota. The RRWMB assumes a leadership role necessary for the proper and efficient water resources planning, development and management.

5.1 HISTORIC FLOODS

The major flood of 1950 at Crookston was caused by runoff from snowmelt followed by a prolonged rainfall. A peak flow of 20,400 cubic feet per second (cfs) was reached on April 23, 1950. The stream flow receded to 11,000 cfs and increased again following moderately heavy precipitation. The river crested on May 7, 1950 with a peak discharge of 27,400 cfs. The volume of flow at Crookston in excess of the channel capacity was 406,700 ac-ft, equivalent to nearly 3 inches of runoff from the 2,550 square miles of drainage area below the Upper and Lower Red lakes. In Crookston, the low-lying residential areas were flooded. Most of the business district did not sustain flood damage due to a higher elevation of the area.

The flood in April 1965 was caused by heavy rainfall on frozen soil. It produced a crest stage at Crookston exceeding the 1950 flood peak stage. Urban flood damage at Crookston and East Grand Forks was lessened by successful emergency protective measures and levees constructed following the 1950 flood.

In 1966, a severe blizzard occurred in early March depositing a thick blanket of snow with a high water content over most of the Red River Basin. At Crookston, the peak flow of 21,500 cfs occurred on April 3, 1996 and a peak stage only 1.3 feet lower than the record 1950 flood resulted. A sudden siege of freezing weather during the peak runoff period, together with the massive emergency protective measures, which included raising and strengthening existing levees and blasting a large ice jam, prevented catastrophic damages at Crookston.

Flooding of the Red Lake River happened again in the spring of 1967. The snowmelt produced a peak flow of 18,300 cfs at Crookston. Sandbagging low areas and other emergency measures resulted in only minor urban damages at Crookston and the communities along the Red River.

Another flood occurred in April 1969. An inch of rain fell after the melting snow, which contained an average water equivalent of 5 inches. The Red Lake River crested at 1.5 feet above the 1965 previous high stage at Crookston. The peak flow was 28,400 cfs (provisional) on April 12, 1969

The situation at Crookston was extremely critical, as the high flood stage was not forecast until two days prior to the time of the flood crest. Thus, the city had only two days to raise the existing flood barriers, primarily with sandbags, to prevent inundation of one-half of the residential area. Through tremendous local efforts by hundreds of volunteers, about $3.6 million in damages were prevented.

In 1969, serious flood losses were experienced along the Red Lake River and its tributaries. The very large flood volume from the Red Lake River contributed substantially to the 1969 record flood of the century on the Red River at Grand Forks, East Grand Forks and the extensive farming area further downstream.

Other damaging floods at Crookston occurred in 1897, 1919 and 1962. There was also flooding in 1974, when a reading of 15,000 cfs occurred. In 1978, the flood record shows a reading of 15,300 cfs, and in 1979, a reading of 20,500 cfs was recorded. There have been other floods in the 1980s and early 1990s and then the historic flood of 1997 (25,000-27,000 cfs) which fundamentally changed the landscape of many cities within the entire Red River Valley.

The 1997 spring flooding along the Red Lake River and the Red River of the North broke most existing flood records in Minnesota. The Federal Emergency Management Agency's (FEMA) estimate of public infrastructure damage in Minnesota from the flood was approximately $300 million. Total flood damages and associated economic impacts were estimated to be as high as $2 billion.

5.1.1 Contributing Climatic Conditions to 1997 Flood

- ❖ Heavy autumn precipitation.

  Much of Minnesota received 6 or more inches in late October and November, 1996.

  Many areas received 4 or more inches above normal.

  Most of Minnesota was in the 95th percentile (a one in 20 year event).

- ❖ Extraordinary winter snowfall.

  Much of Red River and upper Minnesota River basins received over 6 feet of snowfall.

  - Some areas had over 8 feet of snowfall.
  - Many areas received two to three times the average snowfall.

  Over 40 percent of Red River Basin (Minnesota portion) and uppermost reaches of Minnesota Basin were in 99th percentile (near or exceeding record snowfall).

  - Two-thirds of the Red River reach was in the 99th percentile.
  - Historically, no greater area of the Red River Basin has ever been in the record snowfall category in any past season. 1996-97 snowfall exceeded 1896-97 (severe Red River flooding a century ago) snowfall by 25-50 percent in much of the Red River Basin (Minnesota portion).
  - Less than 10 percent of the basin was covered by the record snowfall in 1896-97.

- ❖ Less than ideal snowmelt scenario.

  There were few mid- and late winter melting days.

  Large temperature fluctuations occurred in early April.

  - Up to 10 degrees above normal in first week of month.
  - Up to 20 degrees below normal in second week of month.

- ❖ Heavy early spring precipitation

  Two or more inches of precipitation (rain and snow) fell in western Minnesota April 5-6, 1997.

  Normal monthly April precipitation amounts to approximately two inches for the region.

5.2 EXISTING MEASURES FOR FLOOD DAMAGE REDUCTION

The cities of Crookston and East Grand Forks are in the process of having federal flood control projects constructed by the USACE. In addition, in response to the historic floods of 1997, many farmstead ring dikes, acquisition and relocations and small community flood control projects have been constructed and implemented in an effort to clear floodplains and reduce flood damage potential. In accordance with the mediation agreement, all future FDR projects will be developed by a PT with an eye for multiple objectives and benefits.