6.0 Resource Management Strategies

FDR projects can be constructed with no significant net environmental loss and can be made to enhance natural resources. Involvement of appropriate environmental agencies in the planning and implementation process will help to ensure that adverse environmental impacts are avoided, minimized or mitigated. Flood control projects may provide opportunities for both FDR and environmental enhancement. These opportunities will be explored with the Mediation Agreement related PT whenever the RLWD begins to implement a project.

A key component of the planning process and future project development will involve utilizing a watershed-wide hydrologic model to assess and develop alternatives and solutions to water management problems in the RLWD.

The RLWD held numerous meetings of the TAC/CAC to identify FDR and NRE issues and opportunities. The tables in Appendix 1 and Appendix 2 represent a compilation of the top ranked (1, 2 and sometimes 3) priority action items for FDR, water quality, erosion and natural resources from an overall watershed perspective and by subwatershed. These action items represent some of the top priorities for the RLWD to address in the upcoming decade. The complete rankings are found in Appendix 5.

Stream flow in the lower and middle portions of the RLWD are characterized by high peak flows and low-to-intermittent base flows. Local citizens and their representative leadership have repeatedly and consistently identified flood control as the highest priority watershed management issue. This is understandable because frequent devastating floods have caused tremendous economic and social hardship. Low flows are a less noticeable problem affecting the riverine environment and limiting related recreational and economic development opportunities. The water quantity goal of the RLWD is to reduce damaging flood flows and, to the extent practical, convert high peak flows to sustaining base flows.

Stream flow problems and their solutions are not only local matters. In fact, without a broader focus, it is quite possible to solve problems in one area at the expense of another. It is also possible to solve specific local problems in ways that diminish the practicality of solving broader area or regional problems. These adverse consequences have been all too common characteristics of historic water management efforts. Avoiding their perpetuation requires commitment to an overall plan that is based on a comprehensive approach to water management.

Solution of the RLWD's stream flow problems is unlikely to be accomplished by the construction of any one project or at any one point in time. Rather, it is expected to require multiple applications of various techniques which may take place over a long period of time. Projects may be undertaken by different jurisdictions within government and by private individuals and groups. Other activities within the basin may also potentially affect stream flows or may affect the long term feasibility of flood control solutions. The importance of this plan is to provide a framework for future water management and related activities to ensure that all of the elements, however and whenever implemented, will fit together in a complimentary way.

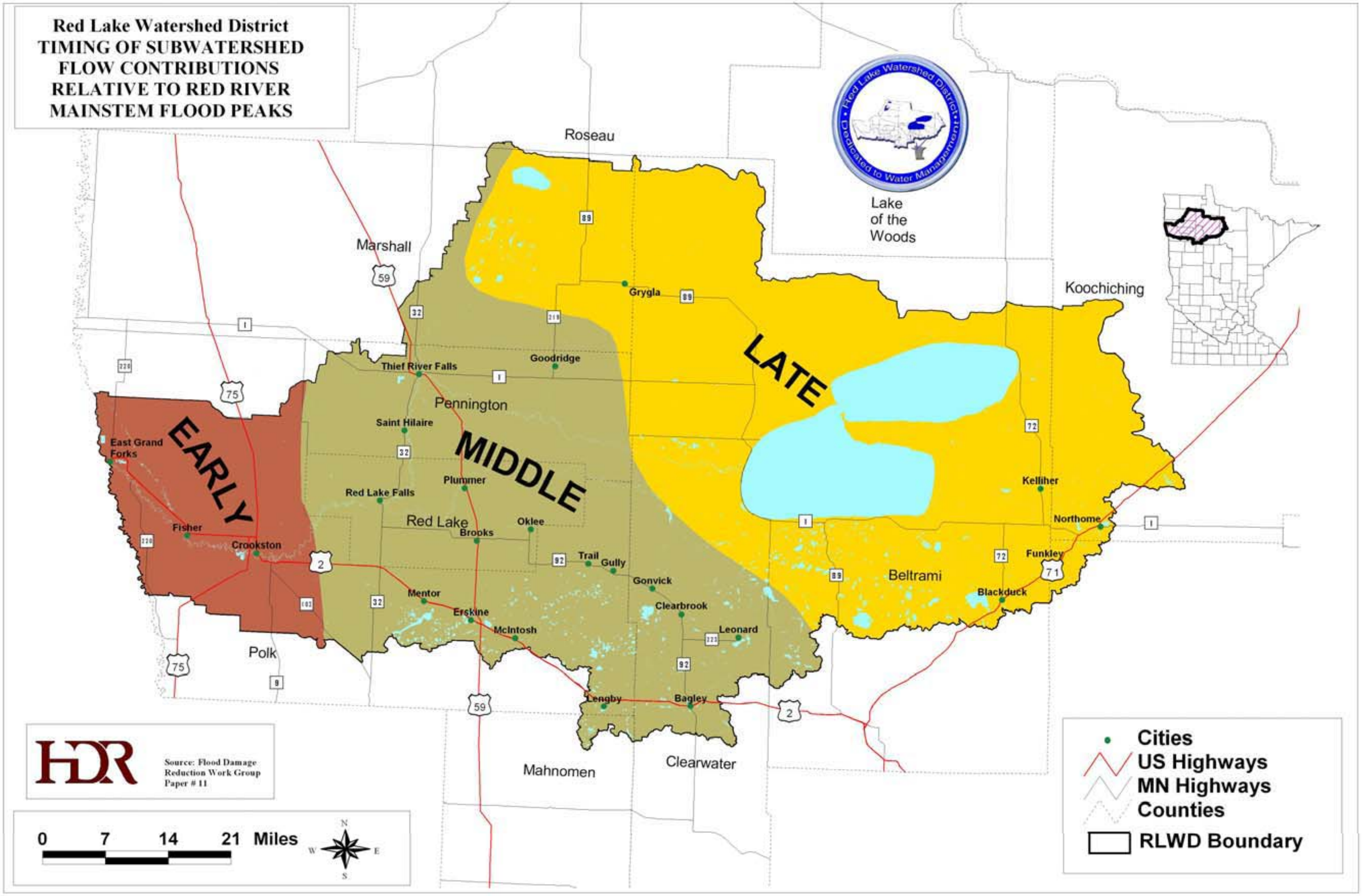
6.1 Effect of Flood Timing

During major flood events, almost all areas of the watershed contribute flood water. However, due to location or other characteristics, some areas may consistently contribute more to the peak flow which is the more damaging portion of a flood hydrograph. The selection and design of appropriate FDR measures will depend on the timing of an area's flood water contribution to flooding in other areas of the basin.

For purposes of discussion, we have divided the RLWD into three timing zones shown on the generalized map in Figure 20 and described below. The zones are labeled early, middle and late, based on when water from each area tends to arrive at the outlet of the RLWD.

1. Early. Most of the runoff from these areas typically moves through ahead of the major flood flows from other areas of the watershed. Usually, these areas are close to the outlet of the watershed and/or are well drained. Slowing down or storing water from these areas could increase downstream flood damages if water is released during the flood peak. Conversely, speeding up the removal of water from these areas may provide downstream peak flow reduction.
2. Middle. Runoff from these areas typically coincides with the flood peak at the outlet of the watershed. Modification of flows from these areas will potentially provide the greatest flood control benefits. Slowing down or storing water from these areas will be especially beneficial if releases can be delayed until after floodwaters have receded. Speeding up the water could also be beneficial if it would move through ahead of the peak. Ideally the timing of flows from these areas could be controlled to allow either early or late release.
3. Late. Most of the runoff from these areas typically moves through after the major flood flows from other areas of the watershed. Usually, late areas are the most remote within the watershed, are poorly drained, or their runoff is delayed by existing storage facilities. Slowing down flood water from these areas will always reduce downstream peak flows and will generally provide the greatest benefit within the watershed. Conversely, speeding up water from these areas will likely increase downstream flood damages.

Figure 20
Three Timing Zones



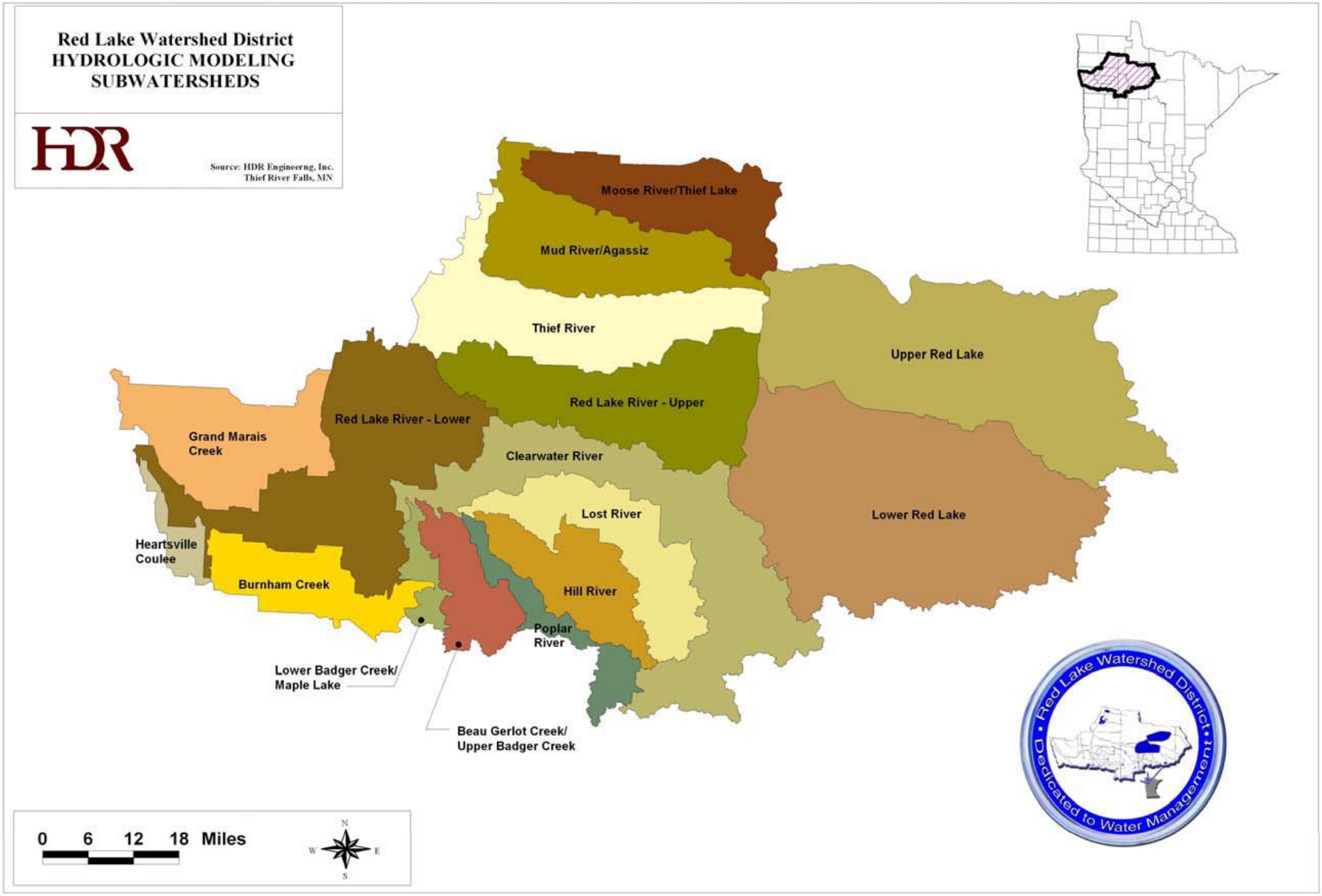
Note that the timing of an area's flood water contribution depends on the location of the downstream damage center being considered. Knowledge of the timing of flows within the RLWD and the Red River Basin continues to be developed based on gage data from actual flood events and by hydrologic modeling. Therefore, the maps shown lack detail and should not be considered final. However, it is evident that for most floods on the Red River, water from the RLWD would be middle or late water. Therefore, from a Red River Basin perspective, FDR measures that store, slow down, or reduce runoff would be the most appropriate. These runoff reduction measures should be located primarily within the middle and late areas of the RLWD.

6.2 HYDROLOGIC MODEL

A hydrologic model has been developed for the entire RLWD as part of the overall watershed planning process. The model will be used to evaluate and investigate possible solutions to RLWD water problems. This model will be used to predict stream flows at a number of predetermined points within each subwatershed for various rainfall events and intensities.

This tool will be extremely useful to the RLWD when analyzing the runoff characteristics of water that originates from snowmelt and rainfall events. The model will be used in flood forecasting, planning and locating sites for impoundments, studying subwatershed areas for the potential to store water in wetlands, analyzing a watershed for culvert sizing, water quality studies and time of travel analysis, sediment loading analysis, analysis of how in place and proposed ditching affects the runoff and many other applications (Figure 21).

Figure 21
Modeling Subwatersheds



6.3 DATA COLLECTION / GIS

Geographic Information Systems (GIS) technology was used where possible, for the collection of data and presentation in an effort to facilitate the plan update process and provide a working tool for future watershed management.

Existing layers of GIS data were used as base data. The accuracy of this data is not always precise, thus it is considered as planning level quality. This existing information is available statewide. Additional data specific to the RLWD was collected and added to the database. This information includes:

- Hydrologic Curve Numbers
- Legal Ditch Systems – All Jurisdictions
- Rain Gage Monitoring Locations
- Protected Waters
- Stream Gage Monitoring Locations
- Soils
- Sub-watershed Delineations
- Climatic Data
- Water Quality

6.4 RLWD HEC-GEOHMS HYDROLOGIC MODEL CALIBRATION

There are 16 separate subwatersheds and 14 separate HMS subwatershed models. The Mud, Moose and Thief River subwatersheds were combined into one HMS model. In order to run the models for the entire watershed district, a Visual Basic application was developed to interactively and systematically run each subwatershed, starting upstream and moving downstream for any particular system analysis, in a Windows environment.

All parameters within the HMS models were developed using publicly available GIS data in Arcview and exported to HMS. Thus, the parameters and how they were developed are consistent at a minimum. All of the models can be run, either individually or as a system. The final piece of the project was to calibrate the model(s), via adjustment of the Clark Method's R value (basin storage). Within the models, this value was arbitrarily set at two, which is regionally appropriate, but should be adjusted accordingly. This is the area where calibration efforts were focused.

The calibration process was as follows:

Select a significant recent rainfall event(s) to calibrate against. Two significant and similar events are May 12-15, 1998 and May 7-10, 1999. The spatial and temporal distributions were different, but the resulting mainstem flows were similar. The 1999 event was chosen as an event to evaluate and compare.

Choose two subwatersheds (and tributary subwatersheds) with a USGS gage near the outlet to calibrate: Mud-Moose-Thief and Clearwater. Clearwater was selected.

Develop the Theissen rain gage weighting ratios for each calibration run. The Theissen polygon method was used to identify where to put our "rain gages," and then determine the gage weighting ratios to apply to each sub-basin in the HMS model. The actual model gage input would be generated from the NEXRAD data in terms of rain depth and temporal distribution.

Based upon these exercises, adjust subwatershed R values in both calibrated and similar non-calibrated subwatersheds as appropriate.

Calibrate the entire system to compare to the Red Lake River flows at Crookston for the stated events.

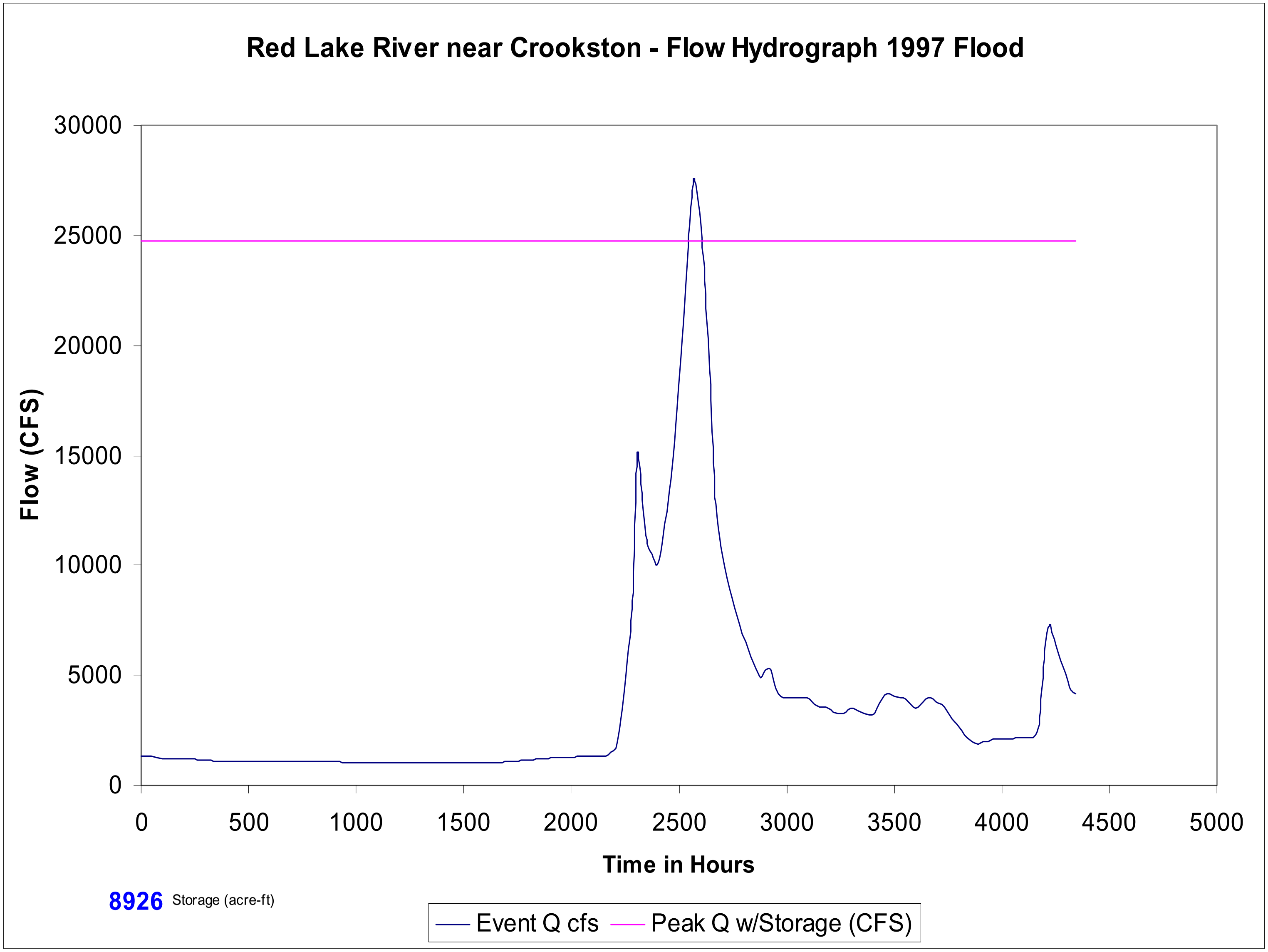
6.5 MODEL RESULTS

In the visioning phase of the planning process, a "reasonable" goal of peak flow reduction on the Red Lake River in Crookston was set at 10 percent. Crookston was selected, as opposed to East Grand Forks, since the USGS gage is located in Crookston. This peak flow reduction goal would be attained by reducing runoff volume using any one of the FDR methods available such as land use changes, impoundments, wetland restorations, etc.

As an example, the 1997 flood hydrograph for the Red Lake River in Crookston (Figure 22) was evaluated by theoretically reducing the peak flow volume by 10 percent. The volume of water in excess of this flow equated to approximately 9,000 ac-ft. Assuming an ideal volume reduction effectiveness factor of three, the resulting volume reduction in the upstream contributing watershed would need to be about 30,000 ac-ft. This increase is due to the limitations of targeting volume reduction/storage to occur exactly at the right time of the proposed peak reductions, much like turning off a faucet. Because this is not realistic, planners must anticipate additional volume reductions are required to achieve specific peak flow reductions. A factor of three is attainable with volume reductions placed in the critical middle contributing areas.

The watershed was modeled as a network of sub-basins, reaches and reservoirs, which are subdivided depending on land use, soils and topography. Additional sub-basins have been or will be developed for areas that have potential projects identified, or for critical damage sites.

Figure 22
1997 Flood Hydrograph



6.5.1 Flood Damage Reduction

Flooding is a major problem within much of the RLWD. This problem is primarily related to geology, topography, weather and land use. The Flood Damage Reduction Work Group (FDRWG) in Minnesota seeks to provide PTs and others with science-based and consensus-based tools to enable more effective FDR within the basin.

A fundamental premise is that FDR along the main stem of the Red River and the lower reaches of its major tributaries (glacial lakebed region) is substantially dependent on the types and locations of FDR and related measures implemented upstream. Flooding in the glacial lakebed region of the basin is substantially affected by runoff timing and volume from upstream areas. Runoff timing and volume are, in turn, substantially affected by the topography, soils, precipitation and land use within different regions of the basin, as well as by the types and locations of FDR and NRE measures that may be implemented. A basin-wide FDR framework is outlined in FDRWG Technical and Scientific Advisory Committee (TSAC) Paper #11, which will better enable a coordinated approach to integrate various FDR and associated NRE measures that are most effective for achieving the overall goals envisioned by the Red River Basin Mediation Agreement adopted in December 1998.

The goal of this framework identified in TSAC Paper #11 is to implement various types of FDR measures individually, or in concert, at locations for which they are best suited to achieve FDR benefits locally and in the watershed, while also contributing to reduction of main stem flooding risk. This framework includes FDR measures that are also NRE measures and promotes multi-purpose projects as outlined below.

There are critical concepts about runoff timing and volume in relation to flood peaks on the main stem of the Red River and facts about variations in topography, soils, precipitation and evaporation within the Minnesota portion of the basin, as foundations for defining the expected peak flow reduction effects of implementing various FDR measures within different areas of the RLWD. Available geologic, topographic, meteorologic and historical flood data, as well as computed runoff travel times, are used to illustrate these concepts and to define "early," "middle," and "late" runoff areas within the RLWD.

A wide array of alternative FDR measures are identified, categorized and discussed, including pros, cons and general recommendations for the best areas in which to implement these measures to optimize overall FDR benefits. A summary table is presented for the identified array of FDR measures with ratings of potential for peak flow reduction on the main stem when these measures are implemented in early, middle, or late runoff areas relative to the main stem. It should be noted that there are a number of measures, such as abandonment of flood-prone areas and the retirement of flood-prone lands, that can be implemented within these areas. Such measures should be given careful consideration when evaluating the overall effectiveness of proposed solutions.

6.5.2 Summary of Flood Damage Reduction Measures

FDR measures can be grouped into the four general categories outlined below. These categories and measures are listed here and discussed in more detail in subsequent sections.

- ❖ Reduce Flood Volume

  Restore or create wetlands (providing infiltration and evapotranspiration)

  Use cropland best management practices (BMPs) to increase infiltration and evapotranspiration

  Convert cropland to prairie or other types of perennial grassland (e.g., Conservation Reserve Program (CRP) and Reinvest in Minnesota (RIM), to increase infiltration and evapotranspiration)

  Convert land use to forest (forested areas generally have the lowest runoff coefficients, due to high interception and evapotranspiration)

  Other beneficial uses of stored runoff

- ❖ Increase Conveyance Capacity

  Channelization (increasing the flow capacity of existing channels or flowages)

  Drainage (creating new or improved conveyance capacity)

  Diversions (of flood waters around a current damage area)

  Setting back existing levees (to restore floodway capacity)

  Increasing road crossing capacity

- ❖ Increase Temporary Flood Storage

  Impoundments (with or without a normal pool, to detain water in excess of downstream channel capacity)

  Restored or created wetlands (functioning as impoundments)

  Drainage (to lower surface water and groundwater levels, which increases infiltration and temporary storage in the upper soil horizons)

Culvert sizing (to increase temporary storage by widespread metering of runoff close to its source)

Setting back existing levees (to restore floodplain storage areas)

Overtopping levees (to utilize diked floodplain storage capacity when critically needed)

- Protection/Avoidance

  Urban levees

  Farmstead levees

  Agricultural levees

  Evacuation of the floodplain (removing people and flood-prone facilities and converting to more flood-compatible land uses)

  Floodproofing

  Flood warning and emergency response planning

Many projects will combine two or more of these methods. Specific application of each method is dependent on design and location.

- Reducing runoff volume is always beneficial, especially if done in the middle and upper parts of a watershed.
- Increasing flood storage is most beneficial in the middle and upper parts of a watershed.
- Increasing conveyance is most beneficially done in the lower parts of a watershed.
- Protection measures are most beneficially applied in the middle and lower parts of a watershed.

Many of these methods have been used extensively throughout the RLWD. Most still have application as part of future FDR projects. The challenge for watershed district managers is to develop projects containing one or more of these methods while adhering to the flood damage and natural resource protection goals and principles established by the working group. Similarly, the challenge for natural resource managers, especially in the Red River Basin, is to incorporate FDR goals to the greatest extent possible in their development and operational plans.

6.5.3 Flood Damage Reduction Strategies

Accomplishing the broad FDR described above will require consideration of a full range of structural and non-structural strategies. Specialized strategies such as adequate flood warning systems and ring dikes will help prevent loss of human life and damage to farm structure, homes and communities. Meeting other goals will require strategies that reduce overland flooding, provide storage and/or maintain or provide adequate conveyance. The work group agreed that a combination of strategies may be needed to maximize the effectiveness of any particular strategy. These strategies potentially include:

- Wet Dams

  A dam constructed to maintain a permanent pool of water while providing temporary storage of stream flows for flood control. It may also provide wildlife habitat and recreation.

  Can be designed with gated or automatic draw-down control outlet structures.

  A constant source of inflow is needed for pool maintenance.

  A management plan incorporating downstream predicted peak-flows is essential to maximize FDR potential.

- Dry Dams

  A dam constructed for temporary storage of stream flows during flood events.

  Can be designed with gated or automatic draw-down control outlet structures.

  Duration of designed storage depends on downstream channel capacity.

  A management plan incorporating downstream predicted peak-flows is essential to maximize FDR potential.

- ❖ On-stream Storage

  A structure placed across the cross-section of a stream's topography causing flood flows to form a pool.

  Utilizes existing landscape features to maximize control capability.

  May cause alterations to pre-project plant communities in a summer storm event.

  Allows for control of flows from entire watershed above the point of construction.

- ❖ Off-stream Storage

  A storage structure placed adjacent to a water course to receive diverted flood flows.

  Potential for construction and effectiveness dependent on the area topography.

  Allows for maintaining a free-flowing stream in non-flood flow conditions and can ensure a stream flow during flood events.

  Duration of storage can be extended to ensure maximum downstream benefits.

  Allows for control of flows from entire watershed above the point of construction.

Note: On/off stream storage can have either gated or un-gated outlet controls. With gated storage the project's management plan can adapt to future conditions. With fixed draw-down features, the release of stored water is pre-determined.

- ❖ Flood Storage Wetlands

  An outlet control structure is constructed on previously drained wetland which may contain a permanent pool.

  Some natural wetland functions can be restored and maintained.

  Can reduce the runoff from a watershed's contributing area in direct relation to the size of the temporary pool created thereby reducing downstream discharges.

  Secondary goals may be wildlife enhancement, water quality improvement, stream flow stabilization, provide infiltration for groundwater recharge and reduce erosion.

- Wetland Restoration

  Wetlands restored to pre-drainage hydrology and appropriate native vegetation.

  May provide flood storage benefits based on hydrologic setting, outlet configuration and antecedent moisture conditions.

- River Corridor Restoration

  The area adjacent to a stream is restricted to non-rotational farming practices or within a city is designated as a green belt and zoned against building activity.

  Effectiveness based on degree of flow control accomplished.

  Can be effective in reducing streambank erosion and downstream sediment deposition.

  Provide a haven and travel route for wildlife.

  Reduces downstream flow velocities and allows for restoration of natural ecosystem.

  May provide additional floodplain storage during flood events.

- Setback Levees

  Levees (dikes) are built parallel to and a reasonable distance (e.g., meander belt width) away from water courses to contain flows and increase riparian storage of above-bank flows.

  Can prevent flooding of adjacent land and resulting cross-country sheet-flooding.

  May increase downstream flows by removing traditional routing and storage.

  May create an impediment to drainage of adjacent land and minor watershed outlets.

- Riparian Buffer Strips

  The land adjacent to streams is permanently seeded/planted to appropriate vegetation.

  Reduces erosion and filter runoff from affected land.

  Reduces cropland losses by taking land out of annual production.

  Provides a haven/travel corridor for wildlife and access for stream maintenance.

- Dredging and Channelization

  Channel modification or removal of accumulated sediment to increase channel capacity.

  May increase downstream flows.

  May reduce flooding due to increased channel flow efficiency and timing of discharge.

  Disrupts stream ecology and equilibrium and may cause downstream erosion and sedimentation.

- Storage Easement

  Compensation is paid to landowners for the public or private benefit of storing water on their land.

  Offsets lost land value do to required land use change.

  Provides and incentive for project development where needed.

- Retirement of Land

  Converts land from agricultural production to permanent vegetation.

  Reduces surface runoff during and/or after precipitation storm events.

  Significantly reduces erosion of soil from affected area.

  Provides for wildlife habitat.

- Land Use

  Land use changes may alter downstream flows.

  Increased areas of intensively cultivated crops may increase storm event runoff.

  Land use changes are influenced by economics and federal, state and local policy.

  Flood plain land uses compatible with periodic flooding may accomplish FDR.

- Best Management Practices

  A practice or combination of practices that are determined to be the most effective and practicable means of treating a resource problem at levels compatible with environmental quality goals.

- Gating Ditches

  Adjustable controls are placed on culverts in channels to regulate stream flow.

  Topography of the affected area determines the technically appropriate control used.

- Culvert Sizing

  Graduated sizing of culverts within a ditch system to provide a degree of control.

  Equity is an important consideration.

  The smaller the drainage area is, the more effective culvert sizing can be in accomplishing meaningful, effective control.

- Drainage

  Modification of the hydrology of the land by providing drainage-ways to convey surface or subsurface water from cultivated or occupied areas.

  Water conveyed by drainage of agricultural land in the higher elevation areas of a watershed may increase downstream flows.

In Table 7, FDR measures are rated in terms of appropriateness for local and downstream FDR, based on location in the watershed in relation to timing of runoff to the main stem. A plus sign (+) indicates application of a particular FDR measure would normally have a positive effect downstream on the main stem of the Red River or the lower reaches of its major tributaries (i.e., it would result in a reduction in downstream peak flows). A minus sign (-) indicates a likely negative effect on downstream flooding, and a zero (0) indicates a likely insignificant effect on downstream flooding. Double plus signs (++) and double negative signs (--) indicate more substantial positive or negative effects on downstream flooding.

Table 7
Expected Peak Flow Reduction Effects on the Red River Main Stem of FDR Measures Applied in Early, Middle and Late Areas Upstream

Flood Damage Reduction Measure	Early* Upstream Area	Middle* Upstream Area	Late* Upstream Area
1) Reduce Flood Volume	+	++	++
a) Wetlands	+	+	++
b) Cropland BMPs	+	++	++
c) Conversion to grassland	+	++	++
d) Conversion to forest	+	++	++
e) Other beneficial uses of stored water	+	++	++
2) Increase Conveyance Capacity	+	-	--
a) Channelization	+	-	--
b) Drainage	+	-	--
c) Diversion	+	Variable	-
d) Setting back existing levees (to increase conveyance capacity)	+	-	--
e) Increasing bridge capacity	+	-	-
3) Increase Temporary Flood Storage	Variable	++	+
a) Gated impoundments	+	++	++
b) Ungated impoundments	-	+	+
c) Restored or created wetlands	-	+	+
d) Drainage	-	+	++
e) Culvert sizing	-	+	+
f) Setting back existing levees (to increase floodplain storage)	+	++	+
g) Overtopping levees	++	+	Variable
4) Protection/Avoidance	Variable	Variable	Variable
a) Urban levees	-	-	-
b) Farmstead levees	-	-	-
c) Agricultural levees	-	-	-
d) Evacuation of the floodplain	-	-	-
e) Floodproofing	-	-	-
f) Warning and emergency response	-	-	-

**Location of FDR measure relative to the Red River main stem at the international border*

In order to achieve this peak flow reduction of 10 percent, each subwatershed was assigned a portion of the goal to achieve the net result downstream. In accordance with the hydrologic model, the following subwatersheds were evaluated using these volume reductions in order to achieve the goals.

- Thief River: 10,000 ac-ft
- Clearwater River: 10,000 ac-ft
- Red Lakes: 0 ac-ft (currently gate controlled)
- Upper Red Lake River: 5,000 ac-ft
- Lower Red Lake River: 5,000 ac-ft
- Grand Marais: 5,000 ac-ft (does not contribute to Crookston)

6.5.4 Environmental Considerations

A range of environmental issues should be considered when investigating FDR projects. The types of projects outlined previously in this section can have negative and beneficial effects on natural resources. In general, projects at sites that displace or eliminate quality habitats should be avoided in favor of projects at sites that include features that connect, restore and/or rehabilitate quality habitats. Projects at sites that offer multipurpose opportunities for both FDR and NRE are most likely to be permitted and funded. Several existing impoundments within the RLWD are good examples of multipurpose projects that provide both FDR and NRE (e.g., Thief Lake WMA, Agassiz NWR, Moose River). The Red River Basin FDRWG Technical and Scientific Advisory Committee has produced several reference documents to consider when investigating FDR projects (See Technical Paper 11, Technical Paper 13, and "A Users Guide to Natural Resources Efforts in the Red River Basin" in particular).

As a part of prioritizing issues for overall watershed implementation, the CAC compared the various FDR and NRE categories to each other with the categories receiving the most points being perceived as the highest priority for the RLWD to address. The overall FDR and NRE rankings are as follows:

Table 8
Flood Damage Reduction Rankings

OVERALL WATERSHED FLOOD DAMAGE REDUCTION RANKINGS (TOTAL POINTS)	
Flood Damages	14
Flooding	12
Drainage	10
Stream Flows	8
Lake Levels	6
Groundwater	4
Other Flood Damage Issues	2
Drought	0

Table 9
Natural Resource Enhancements Rankings

OVERALL WATERSHED NATURAL RESOURCE ENHANCEMENTS RANKINGS (TOTAL POINTS)	
Erosion and Sedimentation	10
Water Quality	8
Fish and Wildlife Habitat	6
Water Based Recreational Activities	4
Unique Water/Land Related Issues	1
Other Natural Resource Issues	1

A multiple objective management strategy additionally requires identification and integration of the natural resource goals with the flood management goals. Multiple objective management strategies require that a watershed and ecological systems approach must be used to design and evaluate potential flood control projects since linked relationships between physical, biological and chemical processes controlling the natural resource environment can be disrupted or enhanced by changes resulting from a project. A systems perspective is consequently imperative to address fully the integration of flood control and NRE.

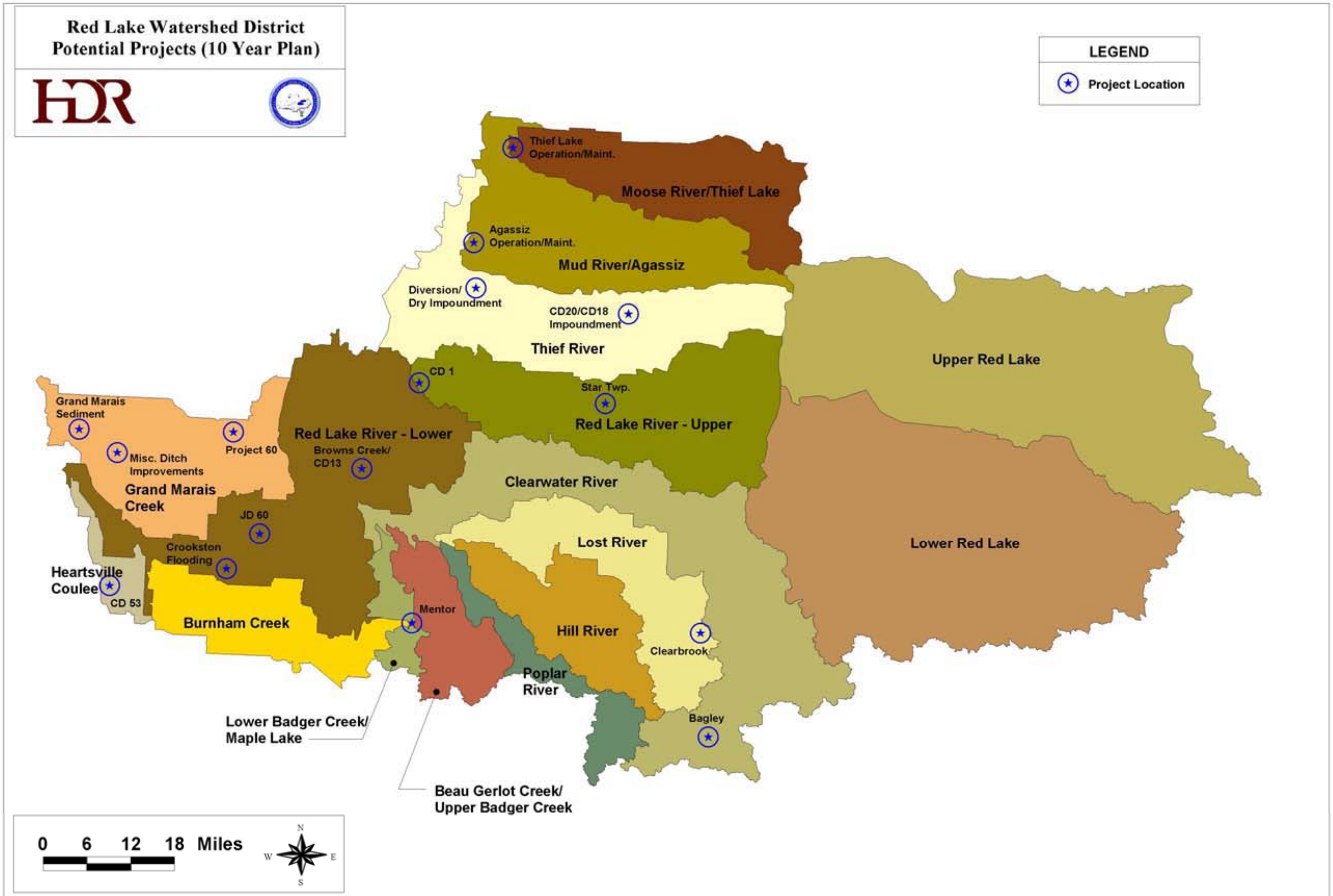
6.6 OVERALL WATERSHED FDR AND NRE VISION, GOALS AND OBJECTIVES

Any flood mitigation program first requires a clear and quantitative definition of the flooding problem. Identification of where, when, how long and extent of the flood impacts are basic to beginning the development of a flood control program within the given watershed. The RLWD held numerous meetings of the TAC/CAC to identify FDR and NRE issues and opportunities (Appendix 1 and Appendix 2). The issues identified by the TAC/CAC were used to develop implementation strategies for the plan subwatersheds for FDR and for the entire watershed for NRE issues. A multiple objective management strategy additionally requires identification and integration of the natural resource goals with the flood management goals.

Multiple objective management strategies require that a watershed and ecological systems approach must be used to design and evaluate potential flood control projects since linked relationships between physical, biological and chemical processes controlling the natural resource environment can be disrupted or enhanced by changes resulting from a project. A systems perspective is consequently imperative to address fully the integration of flood control and NRE.

Based on these goals, the potential projects that have been identified for FDR appear in Figure 23. The project locations shown in Figure 23 are conceptual in nature and not intended to describe a specific project location.

Figure 23
Potential Projects



6.7 VISIONING WORKSHOP RESULTS

To develop a greater sense of watershed purpose, agency and community buy-in, the RLWD conducted a series of workshops to establish an overall mission statement for the watershed and then developed specific visioning statements for each of the major areas of concern including water quantity and quality, erosion and natural resources. The vision statements were intended to reflect the consensus of the joint TAC/CAC as to the desired future condition for the watershed in each specific area of outcome. Workshop results are presented for each of four issue areas: 1) Water Quality, 2) Water Quantity, 3) Erosion and 4) Natural Resources, separately below. Some groups developed ideas in addition to vision and goals, and the natural resources group developed subwatershed specific goals. The additional ideas and subwatershed goals are all presented below. The visions and goals will be used as the basis for determining the final visions and policies in the watershed plan. The various additional ideas will also be considered in the formation of objectives, policies, strategies and actions of the plan (Appendix 8).

6.7.1 Water Quantity

The science and engineering behind FDR projects has evolved greatly over the last several decades and especially since the original formation of the RLWD. It is now widely recognized and accepted that FDR projects can be constructed with no significant net environmental loss and can be made to enhance natural resources. Involvement of appropriate environmental agencies in the planning and implementation process will help to ensure that adverse environmental impacts are avoided, minimized or mitigated. Flood control projects may provide opportunities for both FDR and environmental enhancement. These opportunities will be explored with the FDR PT whenever the RLWD begins to find a solution in a problem area. To this end, the Water Quantity Subcommittee recommended the following vision statement be adopted by the RLWD to address water quantity:

6.7.1.1 The Vision: We envision a reduction in flood damages with active cooperation and education of constituents and public partners.

Goal 1: Reduce peak flows from the Red Lake River at East Grand Forks and Crookston by 10 percent, and reduce corresponding flood stages by approximately 1 foot.

Goal 2: Reduce runoff volume contributing to peak flows by 30,000 ac-ft.

Goal 3: Special projects – Actively seek and identify projects to implement based upon problems identified by stakeholders.

Goal 4: Educate – Develop an outreach program that promotes an understanding of the policies and activities of the RLWD.

***Goal 5*:** Floodplain – participate in floodplain management programs affecting urban and agricultural areas.

6.7.2 Water Quality

The goals of the RLWD water quality program include the evaluation of water quality, identification of pollution sources, water quality improvement and public education. The means of achieving these goals may vary depending upon the purpose of the monitoring being conducted. The RLWD monitoring program consists of a long-term monitoring program, special studies and investigative monitoring. Other organizations within the RLWD are also collecting water quality data. These include high schools involved in the River Watch program, the Red Lake MnDNR, the MPCA and Soil and Water Conservation Districts. The RLWD intends to work closely with other natural resource professionals in order to coordinate monitoring efforts and share information. The Red River Basin Monitoring Advisory Committee and the Red River Basin Water Quality Team are two groups that facilitate this cooperation among agencies. To this end, the Water Quality Subcommittee recommended the following Vision Statement be adopted by the RLWD to address water quality:

6.7.2.1 The Vision: We envision that there will be measured improvement in water quality in the majority of district water bodies through increased knowledge in location and sources of problems with the RLWD, improved public education, interagency cooperation and project implementation.

Goal 1: Increased knowledge of sources that cause water quality problems

Potential Policies, Objectives, Strategies and Actions:

Increased knowledge: Intensive, major subwatershed-based water quality studies (like the Clearwater Nonpoint)

Lower Red Lake River

Thief River

Increase investigative monitoring

All the RLWD

Increased number of long-term monitoring sites and increased frequency (monthly vs. quarterly)

Improved lake water quality data

Studies (Maple, Pine, Cameron, Bartlett)

TMDL studies, involvement in Best Professional Judgment groups

Timely submission and sharing of data and results

Begin new tile drainage studies

Goal 2: Improve Public Education

Potential Policies, Objectives, Strategies and Actions:

Renew and expand river watch project

Improve the RLWD's website

Develop educational materials (phosphorus, etc.)

Updates

Conduct more outreach and workshops

Lake associations

Water quality monitoring

Improve the quality of RLWD reports

Understandable

Annual/Bi-Annual

Encourage organization of lake associations

Encourage RLWD coalition of lake associations

Find more opportunities to educate groups

Goal 3: Improve Interagency Cooperation

Potential Policies, Objectives, Strategies and Actions:

RRWMB Water Quality Team

RRWMB Monitoring Advisory Committee

TMDL studies

Increase involvement in the state's assessment of waters (every two years)

Increase involvement in TMDL study committee

Promote improved sharing of data

Coordinate monitoring networks

Continue to actively promote FDR workgroups

Work together/cost share on specific projects

Work with other agencies and groups to create educational opportunities

Goal 4: Improve Project Implementation

<u>Potential Policies, Objectives, Strategies and Actions:</u>

Complete Phase II of Clearwater Nonpoint Study (Clearwater Watershed Initiative)

Identify funding for water quality improvement projects

TMDL projects/implementation

Lake Management Plan creation

Implement recommendations of water quality studies

Specific projects

Erosion control on rivers and lakes

Address dissolved oxygen/sediment/phosphorus reduction projects in Thief River subwatershed

Maple Lake phosphorus reduction

Riparian buffer strips/BMPs

Lake restoration projects

- Cameron
- Bartlett

Stream bank/corridor restoration

6.7.3 Erosion

Throughout the identification of issues, the RLWD TAC/CAC identified sedimentation as a major issue facing the RLWD. The sources of sediment are many and include bank erosion and wind and water erosion from agricultural lands. The agricultural erosion appears to be an "easier" problem to solve through education and implementation of BMPs, such as filter strips and no-till residue management. The RLWD hopes to achieve a reduction in erosion and sedimentation through a partnership with local, state and federal funding agencies.

The other larger part of the sedimentation problem is bank erosion. The RLWD recognizes the importance of this problem and that this is actually a more costly problem that will take many years to "fix." The magnitude of the bank erosion problem is beyond the financial and technical capabilities of the RLWD to address individually and will require local, state and federal partners. To this end, the Erosion and Sedimentation Planning Subcommittee recommend the following vision statement be adopted by the RLWD to address erosion and sedimentation.

6.7.3.1 The Vision: We envision a RLWD that will have a reduction in the delivery of sediment to district water bodies and drainage systems through enhanced interagency cooperation and public education on erosion causes and effects.

Goal 1: Reduced agricultural erosion

Goal 2: Decreased sediment to lakes, streams, rivers, drainage systems

Goal 3: Increased use of agricultural BMPs

Goal 4: Increased public understanding

Goal 5: Increased interagency cooperation

Goal 6: To be cost effective and to leverage to the extent practical limited resources.

Potential Policies, Objectives, Strategies and Actions:

Identify sediment sources as bank or field erosion

Support erosion reduction activities of other entities

Coordinate sediment reduction efforts of those in watershed

Educate about causes and effects of erosion leading to sedimentation

Implementation of sediment reducing practices

At some point, break down by region

Additional Erosion Issues and Discussion Points:

- No ditch authority over last mile on systems that outlet into natural draws that deliver sediment to river.
- Sedimentation is the watershed's major concern (not the source).
- The sources of this sediment are many. Some sources (bank erosion) are costly to correct.
- Bank erosion progression worsens moving west across the RLWD.

6.7.4 Natural Resources

Prior to development, the landscape of the RLWD contained as diverse a mix of habitat as any in the Red River Basin. This landscape included a mosaic of prairie, wetlands, peatlands, woodlands and shrublands, with networks of streams coursing throughout that supported an abundance and diversity of fish and wildlife resources. Much of this landscape throughout the watershed has been extensively altered through conversion of native vegetation to agricultural production and through extensive drainage. Drainage activities have created some highly productive agricultural land, but in those areas that are still extensively drained, many of the natural landscape values once present have been lost.

In western portions of the watershed, on the flat lake plain, almost all of the original prairie landscape has been cultivated, and most of the original wetlands have been drained. In central portions of the RLWD, those beach ridge and inter beach ridge areas, many wetlands were drained, and many of the prairie, shrublands and woodlands were converted to cropland in the early and middle 1900s. In many of these areas, land use has once again changed during the past 20 years, and numerous acres of cropland have been converted back to perennial vegetation including prairie, wetlands and woodlands leaving a diverse mix of habitats. In eastern portions of the watershed district, wetlands, shrublands and woodlands and peatlands still dominate the landscape in many areas.

A diverse network of watercourses also exists in the RLWD. The Red Lake River serves as the primary backbone for an entire system of tributary waterways that extend throughout the watershed. These watercourses provide a variety of habitats and conditions that support diverse aquatic communities. In western portions of the watershed, the Red Lake River and its tributaries are low gradient habitats with pools and runs. In central portions of the RLWD, watercourses are relatively high gradient and provide diverse habitats that are particularly important for species like walleye. In eastern portions of the watershed, watercourses range from low gradient headwater streams running through bogs to moderate gradient streams similar to those in the beach ridge area. These watercourse have changed substantially over the years. Some have been channelized, some have lost their riparian corridors, some have been impounded and others remain relatively undisturbed.

The hydrology of all watercourses has also changed due to land use and drainage. This has contributed to channel instability, high peak flows and extended periods of low or no base flow. Numerous fish and wildlife lakes are also present in the RLWD.

Among these lake resources, land use changes, including agriculture and commercial/residential development and the resulting increased potential for eutrophication, have become an issue of concern.

The current landscape of the RLWD presents tremendous opportunities to maintain and enhance the quantity and quality of terrestrial and aquatic habitats that will continue to support diverse and abundant fish and wildlife populations on public and private lands. The vision for the future of the natural resources in this watershed includes blocks of quality grassland, wetland, shrubland and woodland habitats that can sustain diverse populations of wildlife. It includes stable reaches of diverse stream habitats and lake habitats that can sustain diverse populations of fish and aquatic life, and it includes functional connections between many of these habitats.

The following goals, objectives and strategies will help achieve this vision. In most cases, natural resource agencies and private landowners in cooperation with natural resource agencies will be responsible for achieving these watershed goals. The RLWD is expected to support the recommendations described here when they are implementing projects within the RLWD. Agencies encourage the RLWD to reference the natural resource maps in this plan as they implement watershed projects.

6.7.4.1 The Vision: We envision a RLWD with a quantity and quality of habitats that function to sustain diverse and healthy fish and wildlife populations and provide abundant recreational opportunities.

With this vision in mind, special attention should be given to the unique natural resource characteristics and opportunities in this large watershed with a mix of public and private lands with diverse habitats, numerous watercourses and Minnesota's largest lakes. Cooperation among the diverse range of users and managers is essential to maintaining and enhancing these resources.

Goal 1: Maintain existing quality habitats (watercourses, wetlands, lakes, grasslands, brushlands)

Goal 2: Enhance the quality of existing habitats (watercourses, wetlands, lakes, grasslands, brushlands)

Goal 3: Increase the quantity of quality habitats

Goal 4: Educate folks on the functions and value of existing fish and wildlife habitat with inference to how it can be compatible with FDR.

Goal 5: Support recreational use of resources, subwatershed goals