Hard Lessons In Riparian Restoration

A
Red River Regional Council / Red River RC&D Project

Examples of degraded riparian areas

Examples of degraded riparian areas

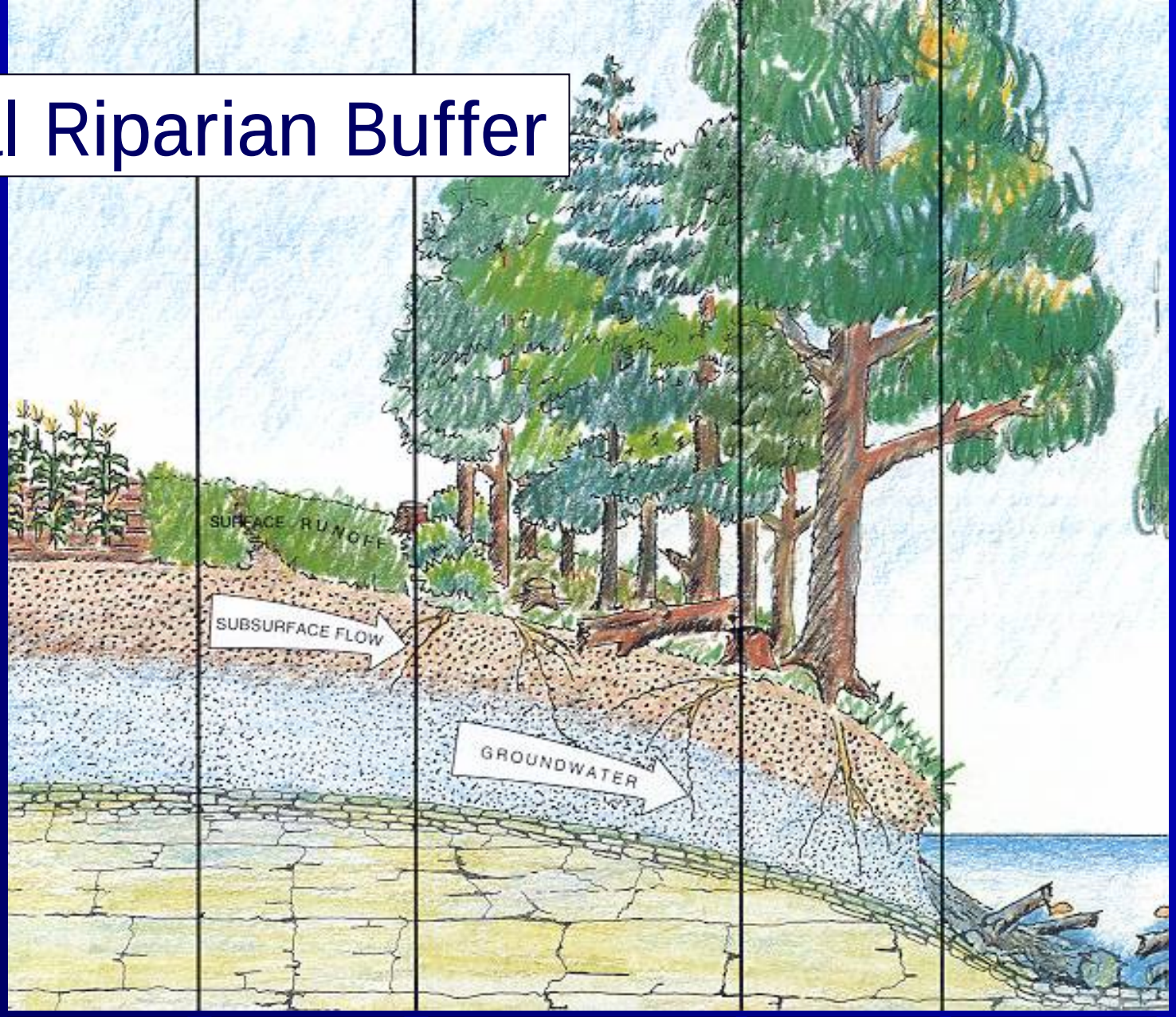
What's the problem?

- Nonpoint Source Pollution is the leading cause of impairment
  - 60% Agriculture
  - 17% Hydrologic or Habitat Modification
  - 10% Riparian Vegetation Removal
    - 70-90% Natural Riparian Ecosystems Gone

Benefits of a Healthy Riparian Zone

- Erosion Control and Streambank Stability
- Water Quality
- Wildlife Habitat and Biodiversity
- Flood Damage Reduction
- Recreation and Education

Ideal Riparian Buffer



Cropland	Runoff Control	Managed Forest	Undisturbed Forest	Stream Channel

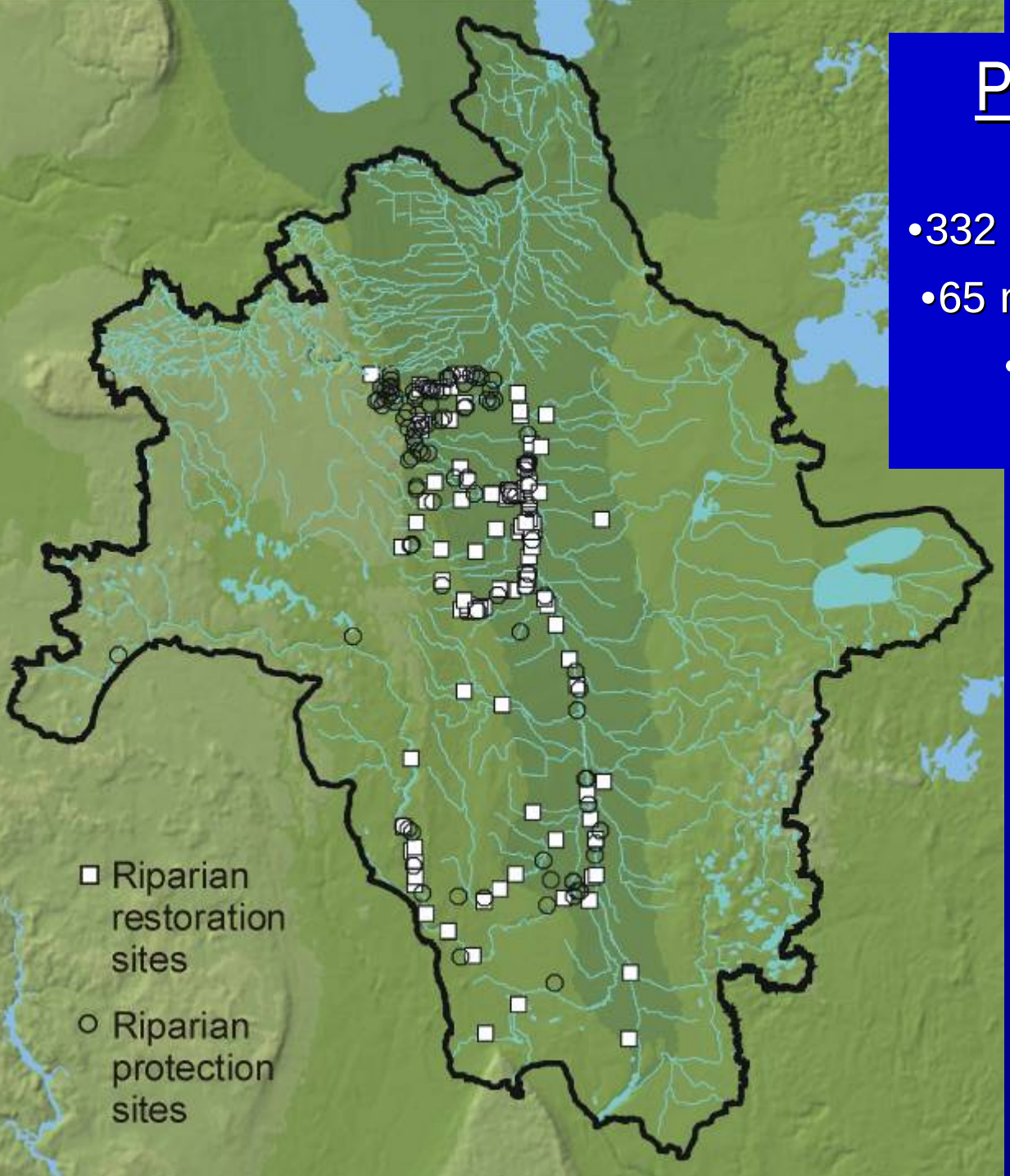
Examples of healthy riparian areas

How do we have proper functioning Riparian Buffers?

Restoration

Protection

Management



Project Progress

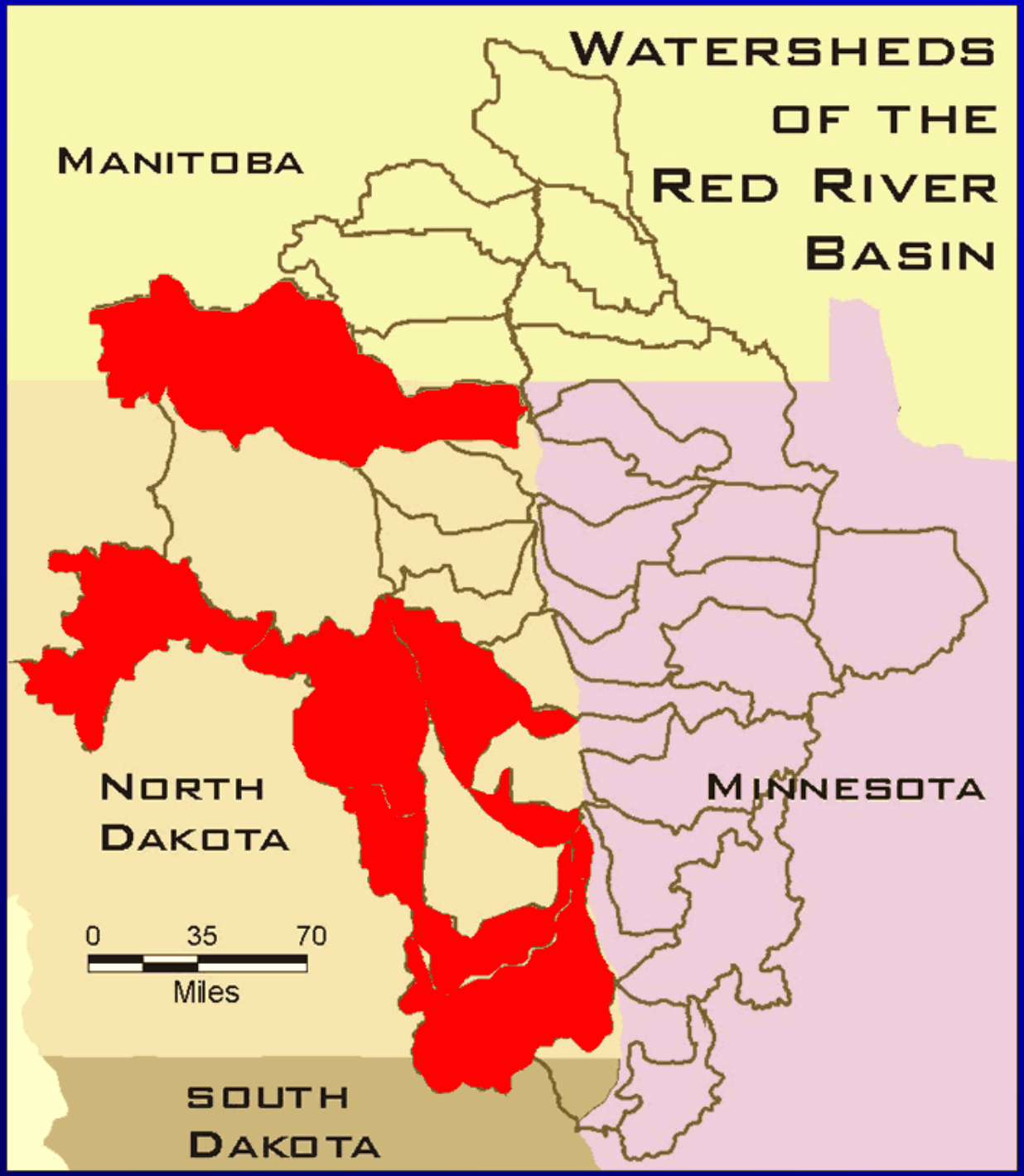
- 332 Riparian Management Plans
- 65 miles of riparian restoration
- 7 Demonstration Sites
- Over 300 requests

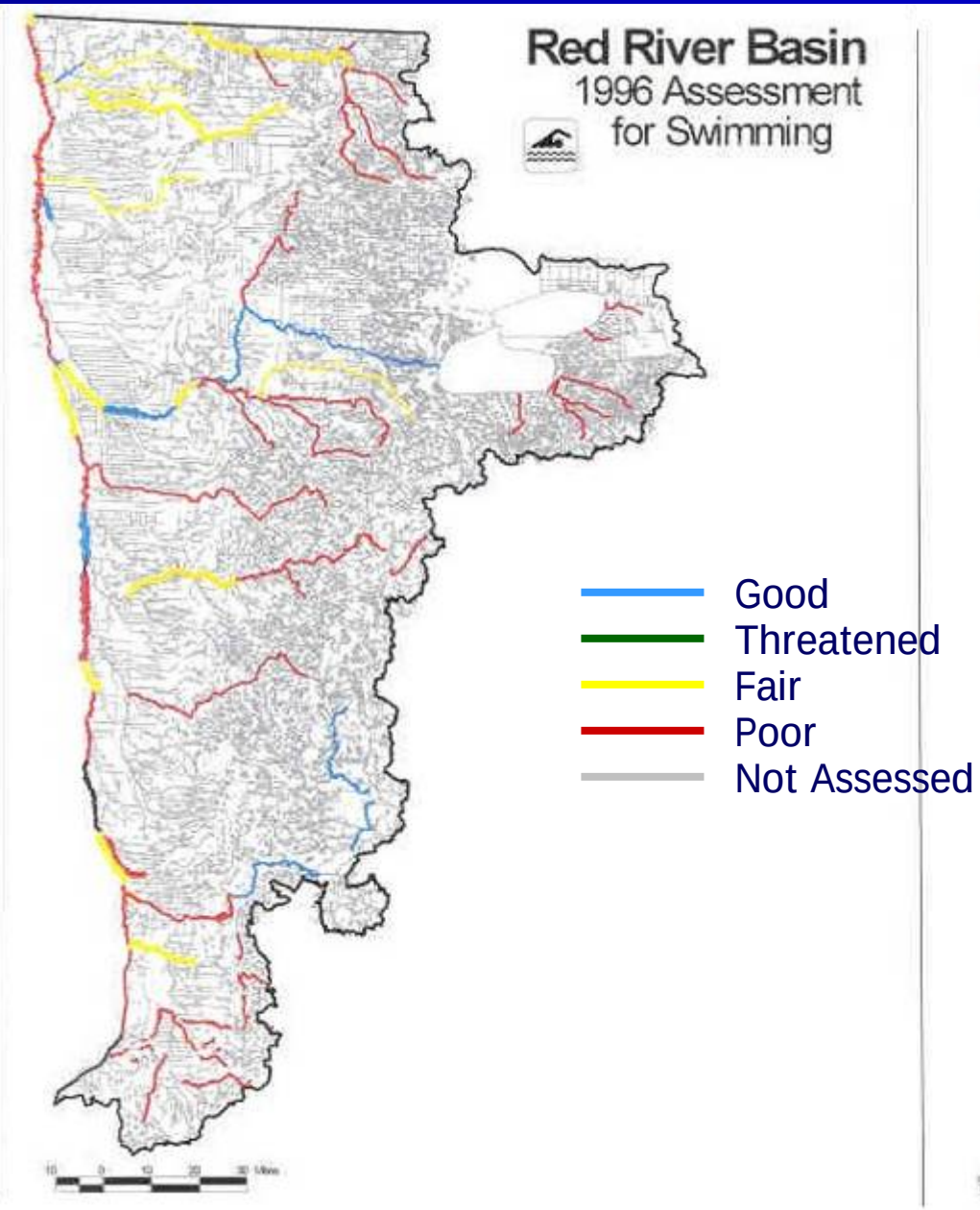
Definition of Riparian

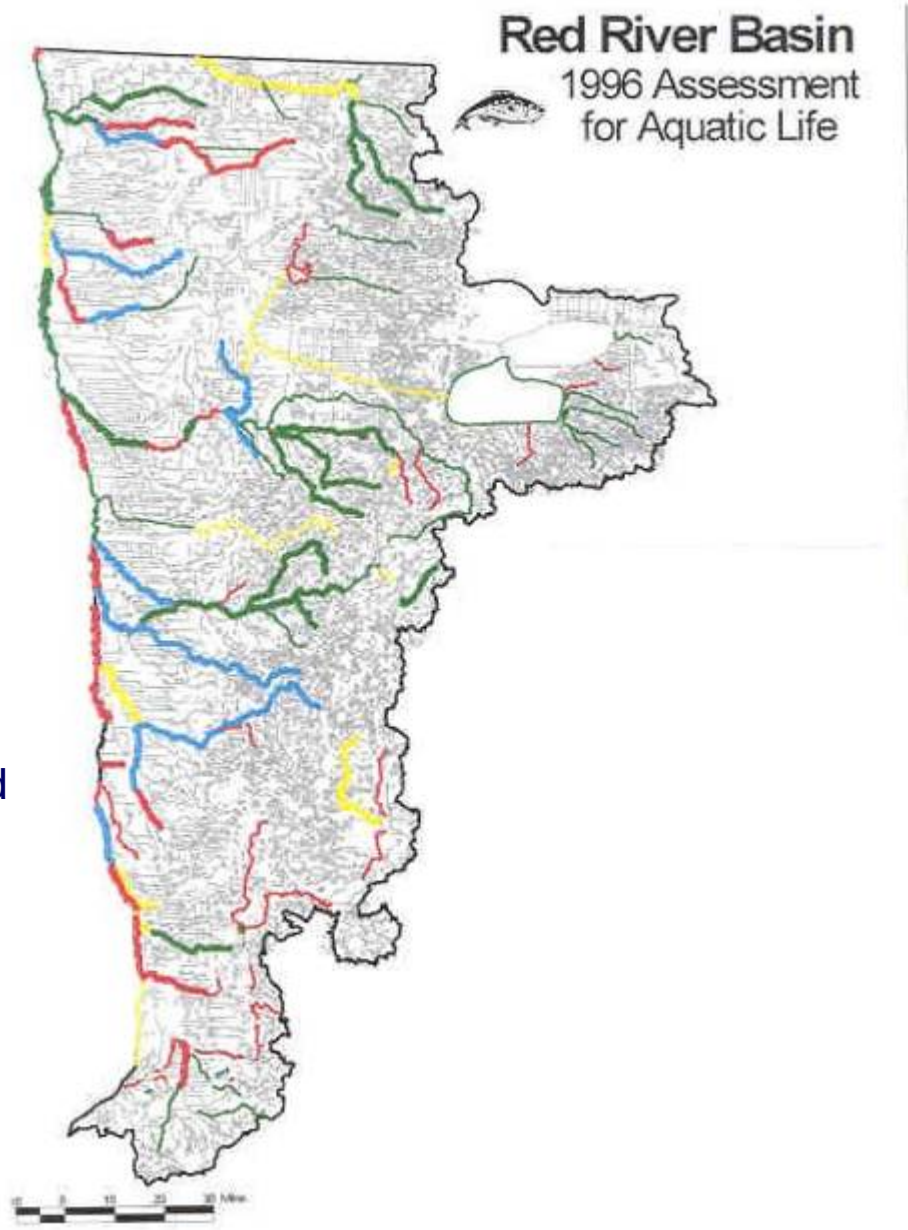
- "*At the smallest scale, the riparian zone is the immediate water's edge where some specialized plants and animals form a distinct community.*
- *At a larger scale, the riparian zone is the area periodically flooded by high-water, the stream banks and floodplain.*
- *At the largest scale, the riparian zone is the band of land that has significant influence on the stream ecosystem, and/or is significantly influenced by the stream*." Malcomb Hunter

Assessing Restoration Need

- Utilize existing information
- Technology
- Local knowledge
- Field reconnaissance


Watersheds of the Red River Basin
Manitoba
North Dakota
Minnesota
South Dakota
0
35
70
Miles


Red River Basin
1996 Assessment
for Swimming
Good
Threatened
Fair
Poor
Not Assessed


Red River Basin
1996 Assessment
for Aquatic Life

Use of LiDar and aerial photo for riparian assessment.

Working with landowners and local agencies to assess problems and implement solutions.

Three levels of riparian reconnaissance:

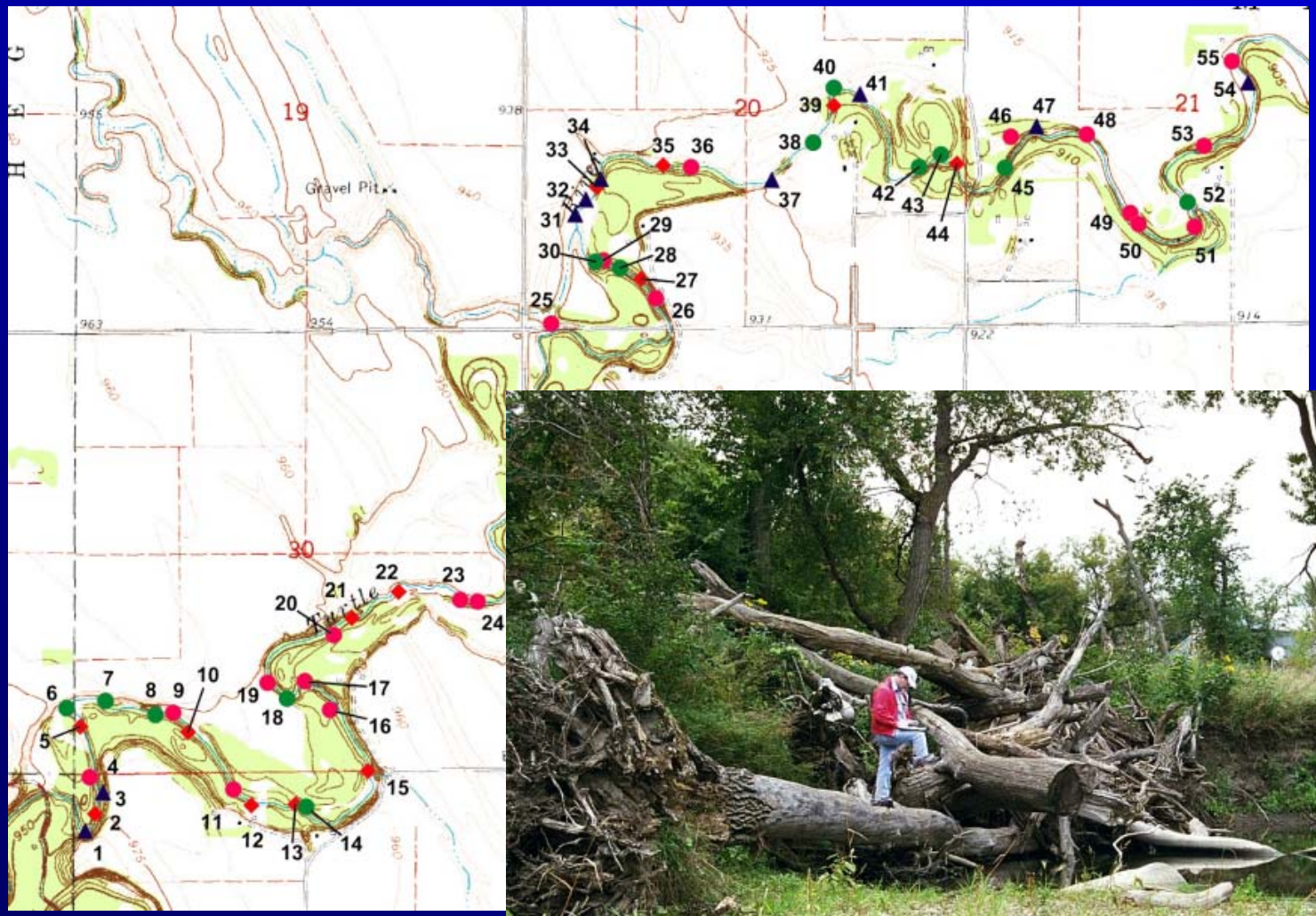
Government aerial

Three levels of riparian reconnaissance:

Local aerial

Three levels of riparian reconnaissance:

Ground



Using GPS and GIS for riparian assessment and reconnaissance

Prioritizing Projects and Choosing Solutions

- Scale of the problem
- Complexity of solution
- Cost to benefit ratio
- Cooperation
- $$$$$

Large scale problems with complex solutions

Large scale problems with complex solutions

Small scale problems with relatively simple solutions

Large scale problems with relatively simple solutions

RAPID ASSESSMENT PROTOCOL
RED RIVER RIPARIAN PROJECT

This Rapid Assessment Protocol is designed to provide the Project Coordinator and the Site Management and BMP/Monitoring Sub-committee members with sufficient information for determining whether a proposed site has merit for detailed characterization and potentially restoration under the Red River Riparian Project.

Legal description of project area:

Township: 152N
Range: 53W
Section: NE ¼ Section 30

Name of river or stream: Turtle River

Length of reach feet: 250 ft

Name(s) of landowner(s): Greg Frokjer

Address: Rte 1 Box 21F, Arvilla, ND 58214

Phone: H: (701) 594-6007
W: (701) 772-7379

Pictures: 1) from bridge, facing west
2) from bridge, facing west (zoomed in to cutbank)
3) from end of headcut in drainage ditch facing south
4) from cutbank, facing bridge (east)

Landowner Objectives (The purpose of this section is to determine the objectives of the landowner with respect to land use and management and ultimately acceptable management practices for restoring riparian areas at the proposed site).

Name of person interviewed: Greg Frokjer Interviewer: Erica Olson Date: 6/27/02

What problems are evident at this site (ex., loss of vegetation, erosion, unstable streambanks, water quality, etc.)? erosion, headcutting of drain (from the north, adjacent to the county road) into the river

What land management techniques are presently being practiced at this site?
farmed field just north of river

Specifically, are the following a problem at the site?

- Trees are all the same species or size? no
- Disease evident in trees? no
- Native woody vegetation along the river or stream has been removed? no
- The understory (brush, seedlings) is absent? no
- Noxious weeds are present? no
- Severe streambank erosion is evident? yes
- Excessive erosion is evident in riparian areas? yes
- Is water quality degraded and how? no

What are the landowner's objectives with respect to this site?

- Establish riparian forest buffer? no!
- Stabilize streambank? yes
- Reduce sediment deposition? no
- Improve water quality? no
- Improve or establish wildlife and what species? no
- Reduce flooding impacts? no

After characterization and evaluation of the site for restoration, would the following management options be acceptable to you?

- Widening of the riparian buffer zone where needed? no
- Controlled access of livestock to river? N/A
- Exclusion of livestock from riparian area? N/A
- Conversion to a rotational grazing system? N/A
- Restoration of riparian wetlands? N/A
- Revitalization of riparian zone? no

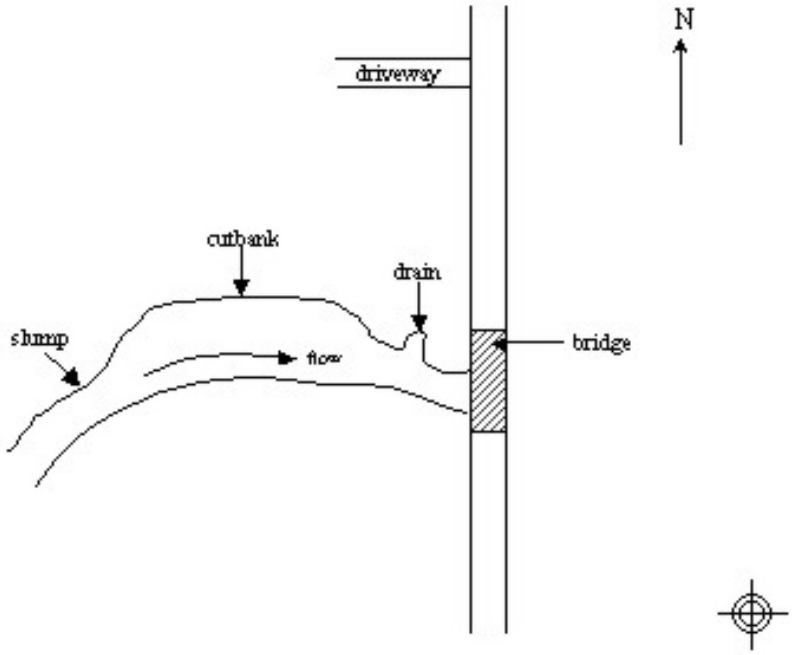
Site Location and Map

Legal location of site:

Township: 152N
Range: 53W
Section: NE ¼ Section 30

Other comments on location of site including access:

Map of site including land use, location of stream, riparian areas, specific problem areas observed, roads (including access), culverts, bridges, springs, wells, dikes, levees, etc.:



Pictures 3 and 4 of 4

Project Organization

- Advisory Committee:
  - Local landowners

Dakota Science Center

RC & D MAKING THINGS HAPPEN!

NORTH DAKOTA State Water Commission

North Dakota Department of Health

STATE OF MINNESOTA DEPARTMENT OF NATURAL RESOURCES

USDA NRCS Natural Resources Conservation Service

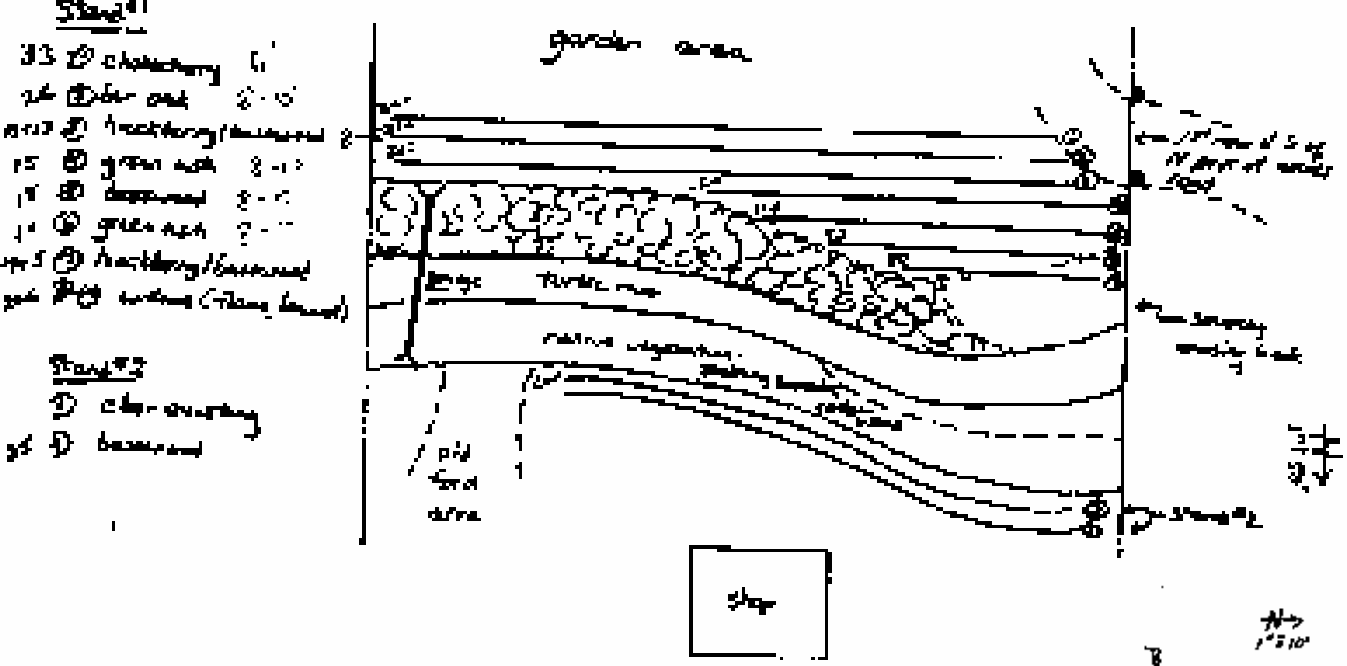
North Dakota Game & Fish

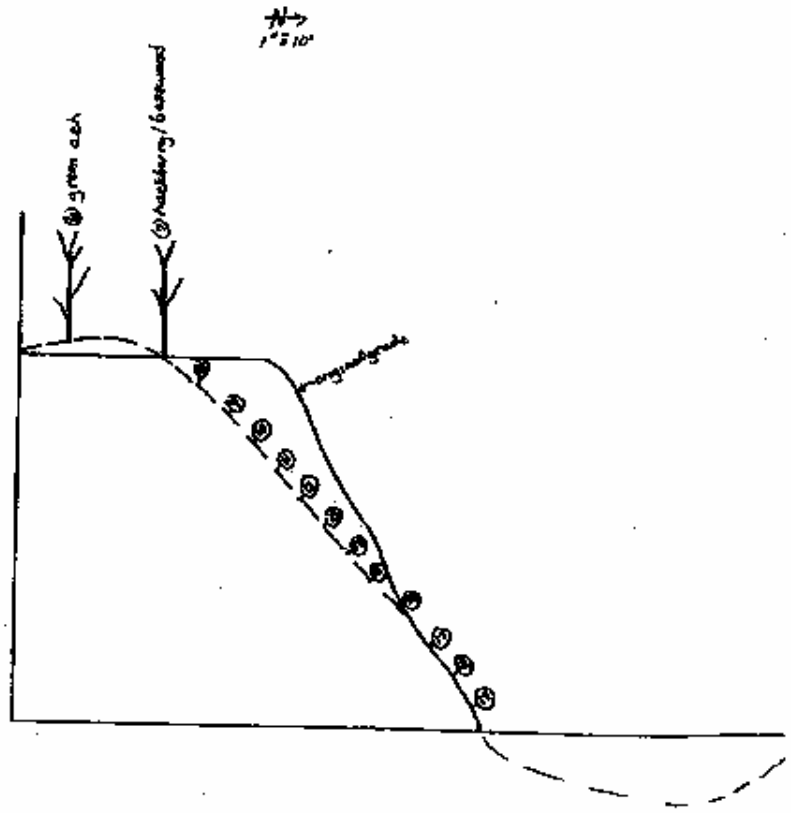
Minnesota Pollution Control Agency

Restoration Examples

“Lessons by Mother Nature”

Turtle River after 20 in rainfall event



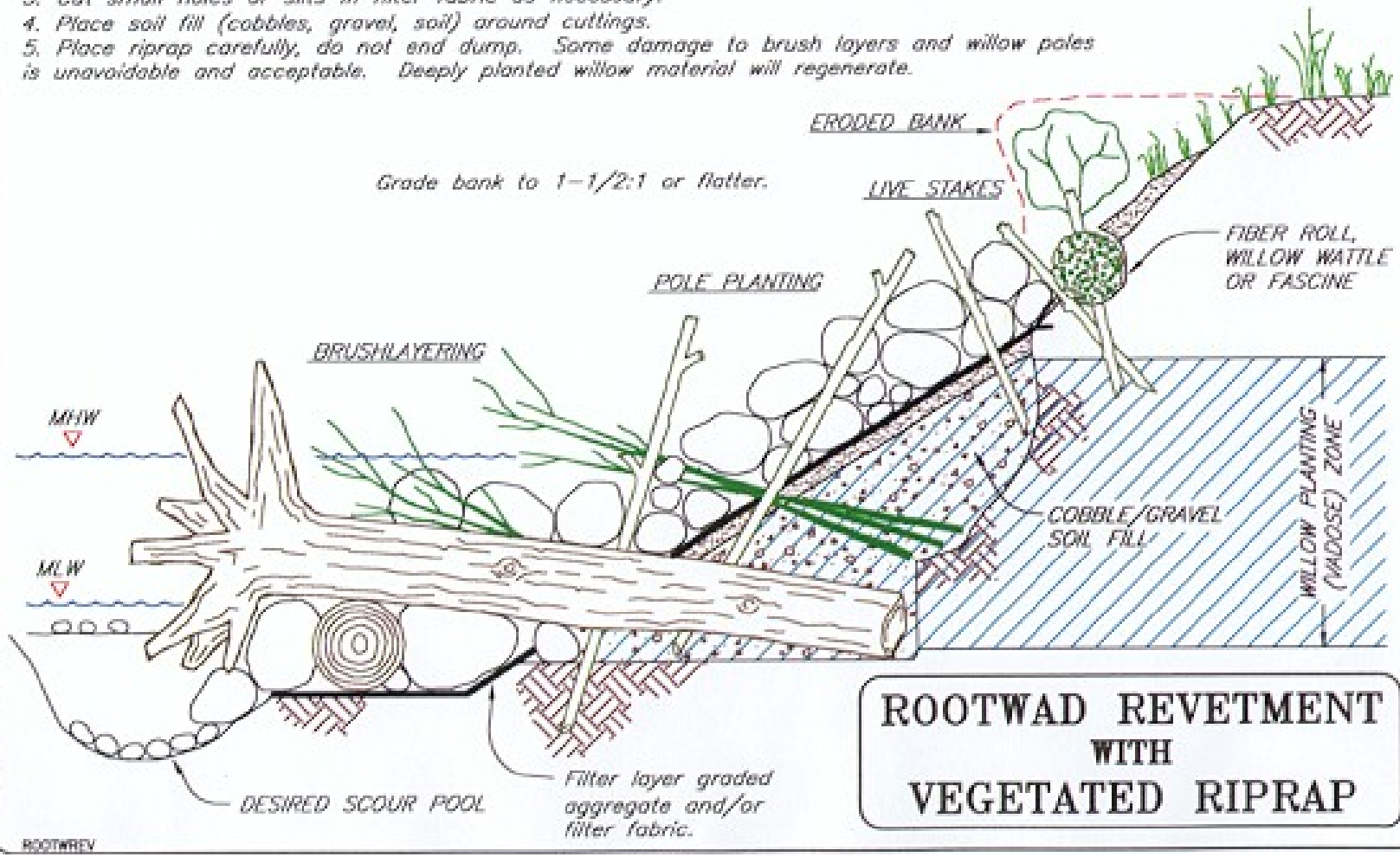


Reshaping and bioengineering design

Two months after completed restoration

Grand Forks Country Club

NOTES:
1. Willow pole planting and brushlayering shall be installed during bank grading and riprap placement to ensure good contact with 'native ground' and soil fill.
2. Willow poles and brush layers shall extend down into expected soil moisture zones (vadose).
3. Cut small holes or slits in filter fabric as necessary.
4. Place soil fill (cobbles, gravel, soil) around cuttings.
5. Place riprap carefully, do not end dump. Some damage to brush layers and willow poles is unavoidable and acceptable. Deeply planted willow material will regenerate.



ROOTWAD REVETMENT WITH VEGETATED RIPRAP

© 1999 JOHN McCULLAH

ROOTWREV

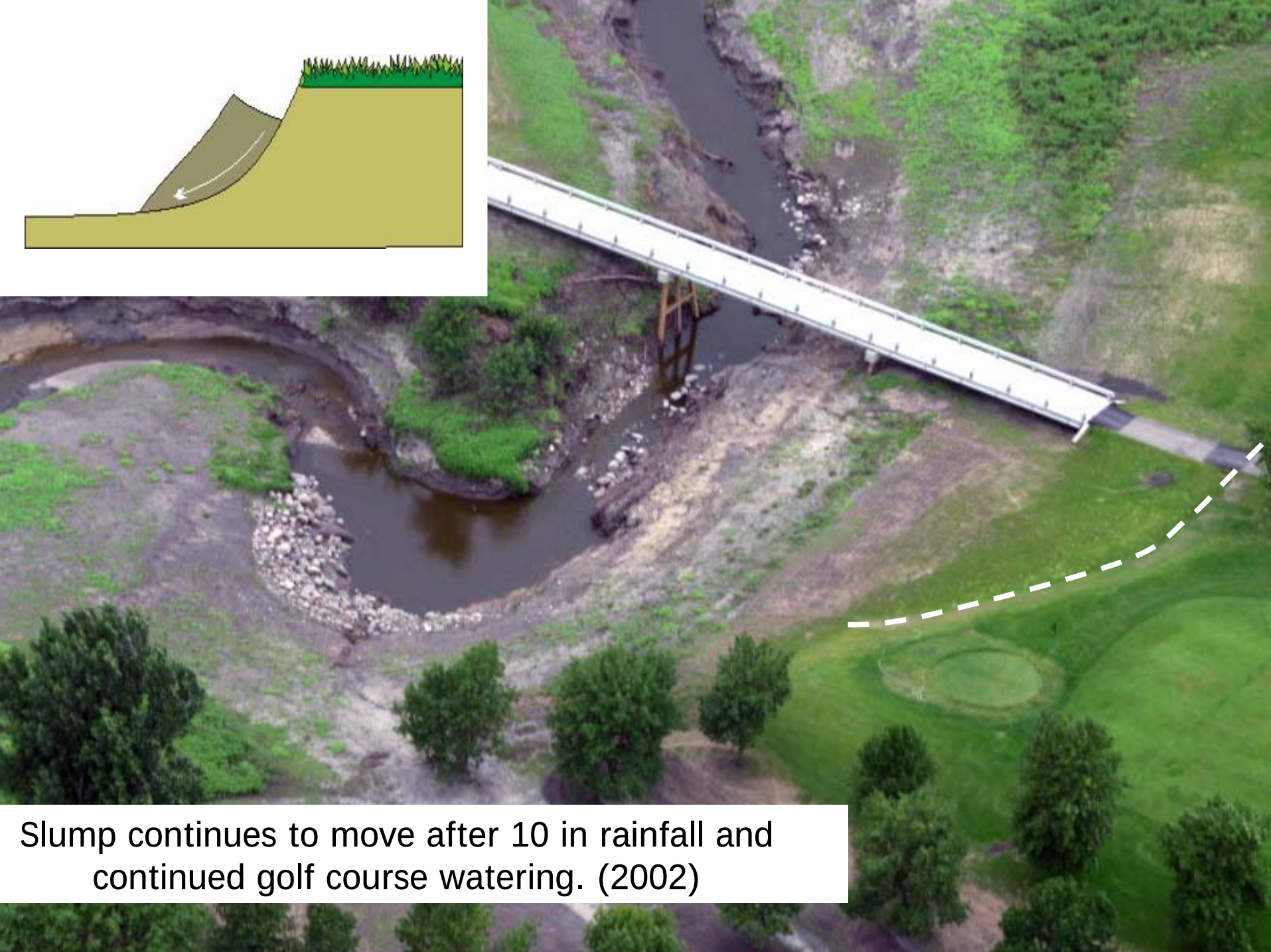
Grand Forks Country Club

Bank reshaping
completed March 2001

Grand Forks Country Club

Project Completed

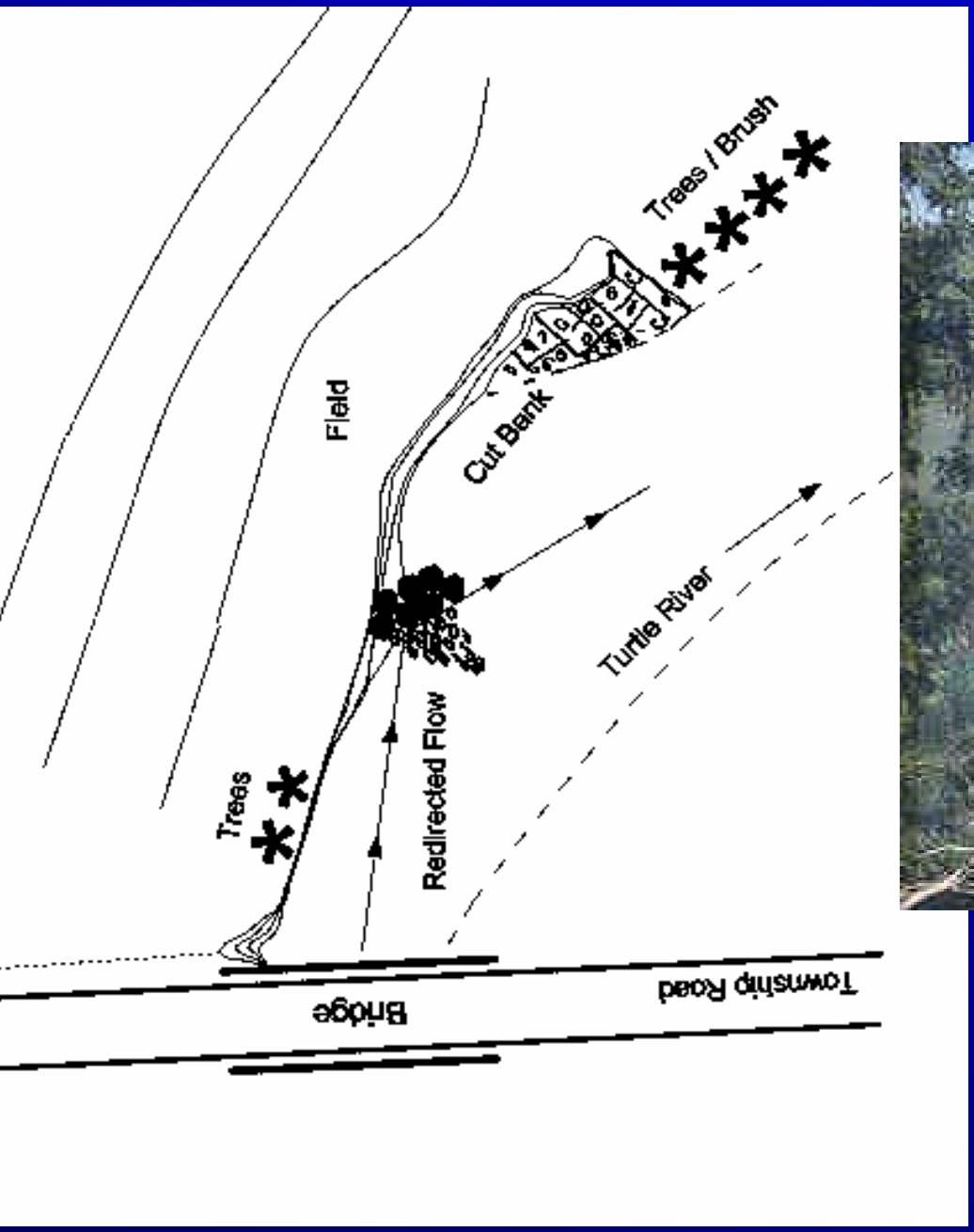
August 2001



Slump continues to move after 10 in rainfall and continued golf course watering. (2002)

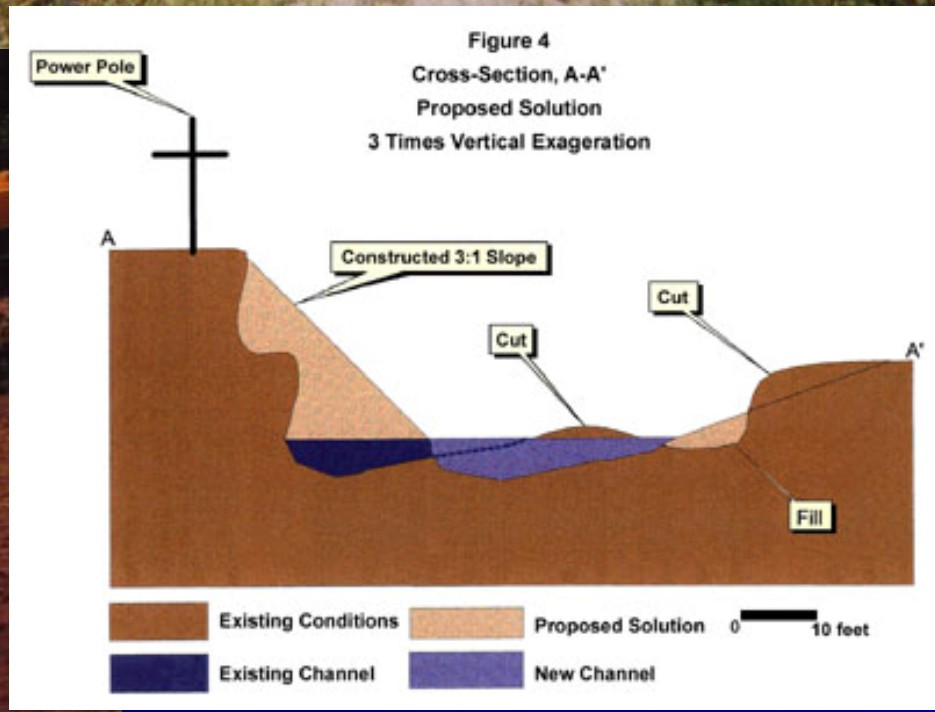
Turtle River near residence after 20 in rainfall

Same residential Turtle River site after NRCS design and Riparian Project bioengineering completion



Assessment of eroding Turtle River bank with possible solution of rock jetty.

Park River Restoration



After bank reshaping, student volunteer install willow stakes and sedge plugs. (Fall of construction)

Flooding the following spring damages bioengineering because of narrow channel and no time for root development.

Damage is repaired with rock toe, slight channel modification and installation of willow posts.

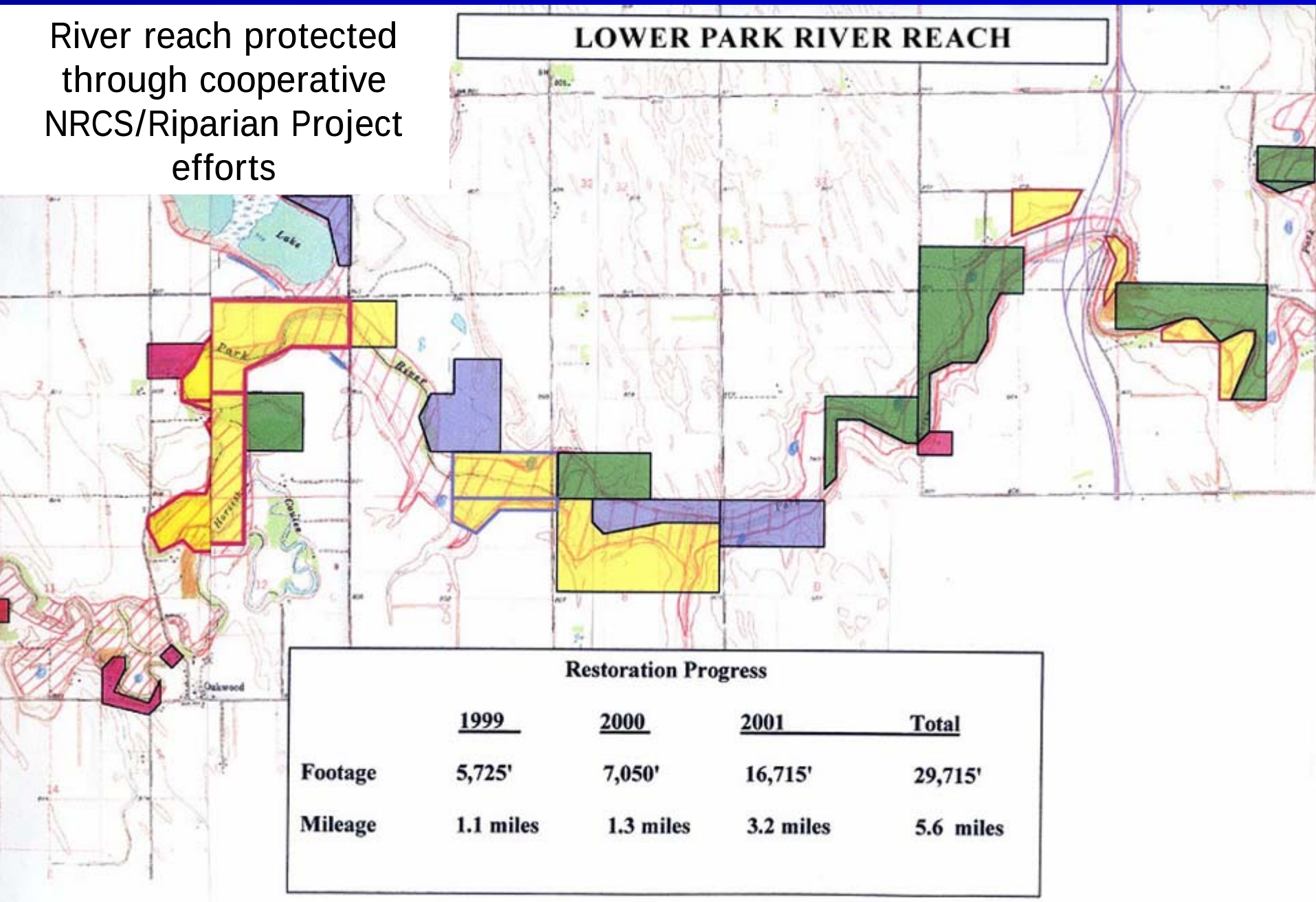
Constructed wetlands for treatment of field runofff and wildlife habitat development.

Assessing Restoration (Success?)

- Photopoint Monitoring
- Stream Visual Assessment
- Channel Characteristics
- Invertebrate Assemblages
- Vegetation Survey
- Water Quality Measures

Biological monitoring for habitat improvement at restoration reaches

River reach protected through cooperative NRCS/Riparian Project efforts



Restoration Progress

	1999	2000	2001	Total
Footage	5,725'	7,050'	16,715'	29,715'
Mileage	1.1 miles	1.3 miles	3.2 miles	5.6 miles

Riparian Project Best Management Practices and Cost Estimates.	
Machine tree planting (scalp plant - may include site preparation)	$16 - $27 / HLFT
Hand planting rooted and non-rooted tree stock.	$0.40 - $1.20 / tree
Hand planting 2' non-rooted stakes (also joint planting in rip-rap)	$0.80 - $1.50 / tree
Planting willow posts (4' and 6') using auger or waterjet stinger	$10 - $12 / post
Willow fascines	$5.99 - $7.99 / foot
Timber Stand Improvement (Scarification)	$106 / acre
Direct seeding of trees	$520 / acre
Site preparation for tree planting or bio-engineering	$40 -$106 / acre
Reshaping stream banks to stable slope (earth moving)	$1.20 - $2.20 / cu yd.
Placement of rock toe	$15 - $25 / cu yd.
Installation of root wads	$100 / root wad
Vegetated gabions	$76 - $125 / gabion
Engineering design and oversight	$78 - $120 / hour
Cultural Resources Survey (conducted where necessary)	$500 - $850 / site

Red River Basin Riparian Project Informational Products

- Website
  www.health.state.nd.us/RRBRP
- Reports
- ND Forestry BMP manual
- Workshops and training
- Site maps and photos