

# REFORESTATION EFFORTS Along the Red River in North Dakota

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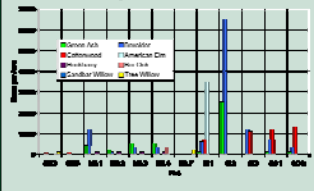
## Abstract

In the spring of 1997, the Red River of the North and tributaries experienced the flood of the century. Damage was extensive and 8,000 acres were entered into perpetual flood plain easements. Since much of the easement area had been originally forested, agencies initially planned extensive reforestation efforts. A wide assortment of planting stock types and planting designs were used. By the third year of the program, tree planting efforts had diminished due to establishment failures and high costs. Most subsequent easements were seeded with an assortment of native and introduced forbs and grasses. Newly emerged forest cover, estimated at about 5000 acres, resulted primarily from natural regeneration. Though the elevation changes along the Red River are often quite small, the effects can be quite pronounced. Slight changes in elevation (as little as 10 inches) can result in completely different vegetation. Higher elevations contain pure stands of switchgrass and big bluestem. Mid level elevations consist primarily of dense, tall cottonwood stands. Lower elevations are dominated by sedges, reed canarygrass, and annuals. These vegetation changes occur within as little as 5 vertical feet. Other factors that have impacted the vegetation established include: time of flooding, duration of flooding, existing ground cover, previous land use, time at which grass seeding or tree planting efforts were initiated, weed pressure, and deer. Though there are similarities in existing cover types ten years after the 1997 flood, each property has a unique set of characteristics that is reflected in the species mix and health and vigor of the current vegetation. To date, it appears that the natural regeneration establishes in very small dense stands of two to five species. The many variables within this riparian zone make statistical analysis of the reforestation efforts problematic. This poster is a collection of natural reforestation observations over the past ten years.

## Recent History – EWP Red River Valley

- Cropped to small grains, sugar beets, potatoes, dry beans prior to 1997.
- Farmers had adapted to spring floods of the past. Flood debris was cleared from fields in time to grow bountiful crops most years prior to the mid 1990s.
- Growing season floods delay planting and/or destroy crops. Increasing incidence of growing season floods caused huge economic losses and encouraged participation in the Emergency Watershed Program (EWP).
- Flood of 1997 qualified many farms for inclusion into EWP.
- Easements on 8,000 Red River Valley acres were accepted beginning 1998.
- Cropping ceased in 1997 on all easement acres.

## Tree Species Occurrence

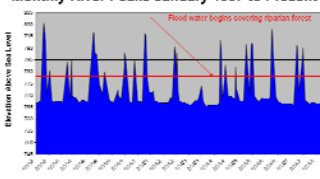


## Geologic and Flooding Background

- River gradient is 1.25"/mile.
- Red river flows north; ice in the channel can restrict flood flows.
- Overland flooding (breakout from tributaries) can cause flooding from multiple directions.
- April 1997 flood reached 13.5 feet above flood stage (35 feet above normal river levels). \*\*
- 20 floods covered riparian fields and forests, in part or in whole, since 1907, 13 during the growing season (April 15 - Sept 15). \*\*
- Incidence of growing season floods has increased since mid 1990s. \*\*\*

\*\* Donald P. Richard, Dept of Geoscience, NDSU  
\*\*\* USGS stream gaging data (Drapkin, ND)  
\*\*\*\* Farmer contacts and USGS observations

## Monthly River Peaks January 1997 to Present



## 2008 Findings

- Most areas are fully stocked with perennial vegetation.
- Individual plots are very dense or overstocked with only a few species.
- Red River Valley vegetation, after 10 years, is a mosaic of herbaceous vegetation and/or trees and shrubs.
- Slight changes in elevation influence species composition at any point on the land.
- Annual weeds and Canadian thistles have decreased markedly (from 60-80% ground cover initially to < 5% presently).
- Dense sods of quackgrass, smooth brome, prairie cordgrass, and reed canarygrass have hindered natural reforestation in spots. Where grass stands are thick enough, no tree regeneration has been observed in 10 years.
- According to local landowners, extended growing season floods, ice shearing or ice heaving have, in the past, removed some or all of the woody plants, some of the herbaceous perennials, and set back plant succession to its earliest stages.
- Since 1997, growing season flooding has:
  - Drowned forest regeneration on some sites.
  - Initiated a younger age class of woody plants.
  - Left mud flat growing to annual weeds.
  - Left a dense sod of quackgrass or prairie cordgrass.
- According to long time local residents, the newly established riparian forest won't be resistant to flood and ice impacts for several more decades.
- Seeding a diverse native grass mix increases initial plant diversity, and provides perennial understorey to the developing riparian forest.

## Summary

- ✓ Using nursery stock and locally harvested cuttings to establish riparian forests in the Red River Valley was not successful.
- ✓ In the absence of fire and spring ice flow, riparian forest vegetation re-establishes through natural regeneration.
- ✓ Plant succession rapidly shifts vegetation to a mosaic pattern.
- ✓ Minor elevation differences strongly impact stand composition by affecting:
  - Duration and frequency of flooding.
  - Duration and frequency of soil saturation.
  - When and where floating seeds have access to moist soil.
- ✓ Recent summer flooding events and/or timely rains have provided moist soil at the time of cottonwood seed dispersal, even in areas seeded to grass.
- ✓ Native grass and forb plantings are usually successful.
- ✓ Riparian forests have established, through natural regeneration, on approximately 70% of the Emergency Watershed Program acres along the Red River of the north.

Along the Red River of the North, cessation of cropping allows riparian forest establishment on most sites.

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Drew Van Dusen, Planning Specialist, NRCS, Bismarck, ND  
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Dr. Jim Zakarias, Extension Forester, NDSU, Fargo, ND

## Specific History on Views 1-3

- Seeded to a mix of native grasses and forbs late spring 1999.
- Deer browsed trees to tops of thistles 1999-2001 on the entire area.
- Border rows of trees shrubs planted fall 1999, plantings failed.
- Dense stand of grass, volunteer cottonwood, willow, and thistles summer 2000 (grass and tree species sorted by micro elevation changes).
- Trees began growing out of deer reach in 2002.

## Locations of 2008 Ground Photos (July 2005 Flood)



## Trees and Warm Season Grasses - View #1 (July 2008)



## Micro Elevation Affects Vegetation - View #2 (July 2008)



## Specific History on View 4

- No cropping since 1997.
- Border rows of trees planted June 2001; few survived.
- No grass was seeded.
- Dense stands of annuals at lower elevations.
- Fringe of volunteer ash and cottonwood at upper elevations.
- Deer pressure on trees has been moderate.

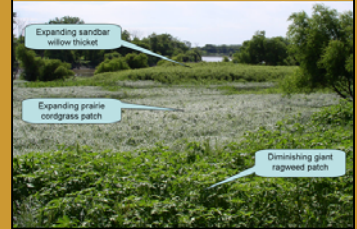
## Locations of 2008 Ground Photos (July 2005 Flood)



## Early Succession - View #4 (August 2006)



## Dense, Monoculture, Mosaic - View #4 (July 2008)



## Impacts of Elevation on Species Composition

From highest to lowest elevations, the following is generally observed across an elevation change of approximately 5 feet.

- ◆ Perennial grasses with few trees.
  - ◆ Perennial grasses with recent (3-4 years old) hardwood tree recruitment.
  - ◆ Dense stands of cottonwood, green ash, American elm, and/or boxelder with or without perennial grass cover (8-10 years old).
  - ◆ Dense cover of sedges, quackgrass, prairie cordgrass, scattered annuals with recent (3-4 years old) recruitment of cottonwood.
  - ◆ Annual weeds, sedges, prairie cordgrass, reed canarygrass, bare soils.
- Species change observed with elevation differences as small as 8-10 inches.

## Contact Information

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