Minnesota Statewide Conservation and Preservation Plan

Land Use Recommendations

7/8/08

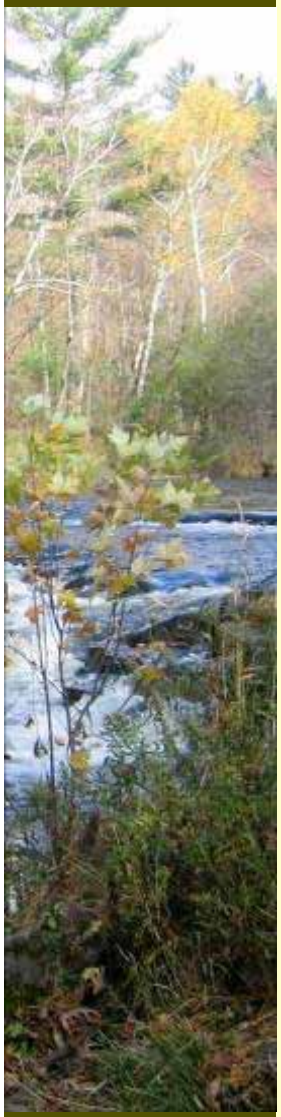
INSTITUTE ON THE ENVIRONMENT

UNIVERSITY OF MINNESOTA

CR Planning Community Resources

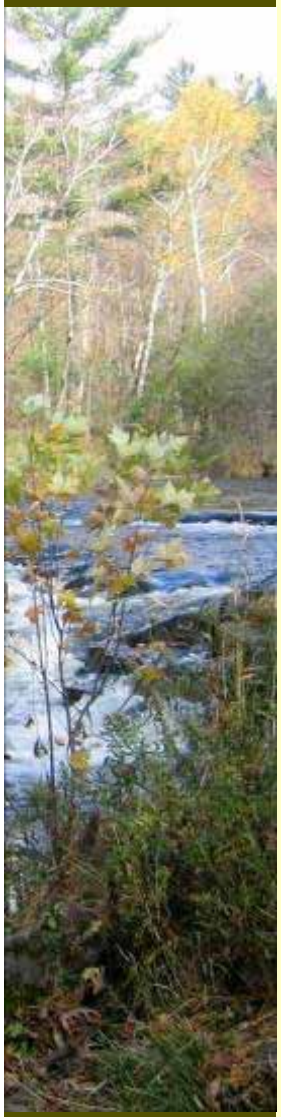
Bonestroo

Presenters



- Deb Swackhamer, Univ. of Minnesota
- John Shardlow, Bonestroo
- Jim Barton, Public Policy Consultant
- Les Everett, Univ. of Minnesota
- Jean Coleman, CR Planning

Phase II Project Organization



Project Coordinators

Core Management Team

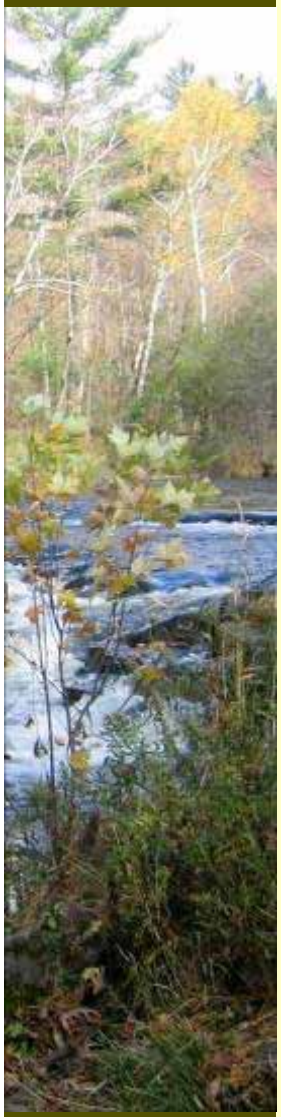
Research Teams			
	Land & Aquatic Habitat Conservation	Land Use Practices/ Transportation	Energy Production and Use/Mercury
Team members			
Partners/ Advisors			

Information, Data, Geographic Information Systems

Outreach

Cost Benefit Analysis

Framework for Integrated Resource Conservation and Preservation



Integrated Planning

Critical Land Protection

Land and Water Restoration

Sustainable Practice

Economic Incentives for Sustainable Society

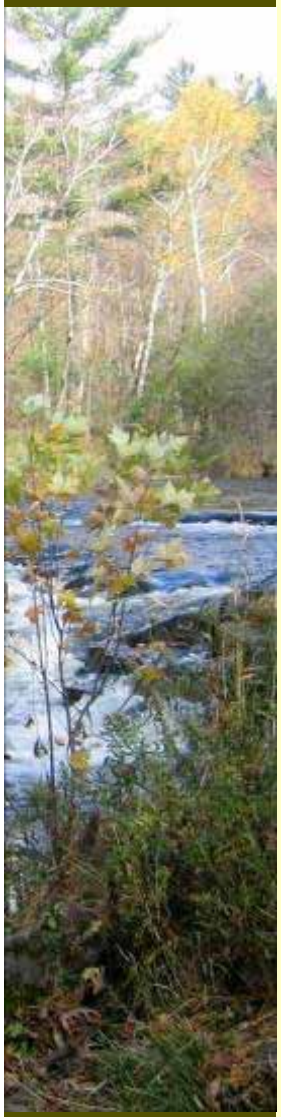
Knowledge Infrastructure

Natural Resource Values Assessment of Recommendations

LEGEND: ● = Critical Impact ◐ = Significant Impact ○ = Negligible Impact

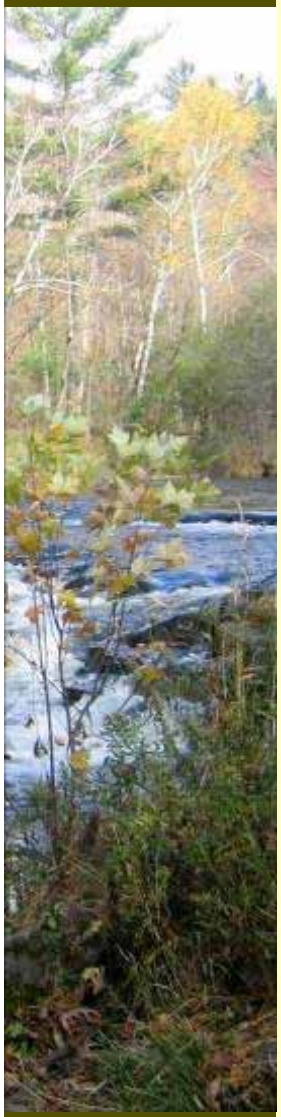
	Number	Recommendation	Air Quality	Water Quality/Quantity	Terrestrial Habitat Quality	Soil/Land Quality	Human Health	Biodiversity	Community Health	Aquatic Economic Health	Spiritual/Aesthetic Value	Recreational/Cultural/ Mitigation/Adaptation	Climate Change
HABITAT	Habitat 2	Protect critical shorelands of streams and lakes	○	●	●	●	○	●	●	●	●	●	●
	Habitat 1	Protect priority land habitats	○	●	●	●	○	●	●	◐	●	●	●
	Habitat 4	Restore and protect shallow lakes	○	●	●	◐	○	●	●	◐	●	●	◐
	Habitat 5	Restore land, wetlands and wetland-associated watersheds	○	●	◐	◐	◐	●	●	◐	●	●	●
	Habitat 6	Protect and restore critical in-water habitat of lakes and streams	○	●	◐	◐	◐	●	●	◐	●	●	●
	Habitat 7	Keep water on the landscape	○	●	◐	●	○	●	●	◐	◐	◐	●
	Habitat 8	Review and analyze drainage policy	○	●	◐	●	○	◐	●	◐	◐	◐	●
	Habitat 3	Improve connectivity and access to outdoor recreation	○	○	◐	○	●	◐	○	●	●	●	○
ENERGY	Energy 1	Develop coordinated laws, policies and procedures for governmental entitites to assess renewable energy production impacts on the environment	◐	●	●	●	◐	◐	●	●	◐	●	
	Energy 13	Invest in research and policies regarding "green payments"	○	●	●	●	○	●	●	○	◐	●	
	Energy 17	Promote policies and incentives that encourage carbon-neutral businesses, homes, communities and other institutions	●	◐	◐	◐	◐	◐	◐	●	◐	●	
	Energy 2	Invest in farm and forest preservation to prevent fragmentation due to development	○	◐	●	●	○	◐	◐	◐	◐	◐	
	Energy 18	Implement policies and incentives to lower energy use of housing stock	◐	◐	○	○	●	○	◐	●	◐	●	
	Energy 16	Provide incentives to transition a portion of MN's vehicle fleet to electrical power and increase renewable electricity production for transportation	●	◐	○	○	●	○	○	◐	○	●	
	Energy 21	Develop standards and incentives for energy capture from municipal sanitary and solid waste and minimize landfill options	◐	◐	○	○	◐	○	◐	◐	◐	◐	
	Energy 19	Promote policies and strategies to implement smart meter and smart grid technologies	◐	○	○	○	◐	○	○	●	◐	●	
	Energy 14	Investigate opportunities to provide tax incentives for renewable energy investors	◐	◐	○	○	◐	○	○	◐	○	●	
	Energy 20	Develop incentives to encourage widespread adoption of passive solar and shallow geothermal heat pumps in new construction	◐	◐	○	○	◐	○	○	◐	○	●	
	Energy 15	Invest in efforts to develop community-based energy platforms	○	◐	○	○	○	○	○	●	◐	◐	
LAND USE - AG	LU Ag 1/Energy 4	Transition renewable fuel feedstocks to perennial crops; Develop policies and incentives to encourage perrennial crop production for biofuels in critical environmental areas	○	◐	◐	◐	○	◐	◐	◐	◐	◐	
	LU Ag 2	Reduce streambank erosion through reduction in peak flows	○	◐	◐	◐	○	◐	◐	◐	◐	◐	
	LU Ag 3	Reduce upland and gully erosion through soil conservation practices	○	◐	◐	◐	○	◐	◐	◐	◐	◐	
LAND USE - COMMUNITY	LU Comm 2	Support local and regional conservation-based community planning	◐	●	●	◐	◐	◐	●	●	●	●	
	LU Comm 3	Ensure protection of water resources in urban areas	○	●	○	◐	○	◐	●	◐	◐	◐	
TRANSPORTATION	Trans 1	Align transportation planning across all agencies; Streamline environmental transportation project review	●	◐	◐	◐	●	◐	◐	●	●	●	
	Trans 3	Reduce non-point source pollution to surface and ground waters from transportation infrastructure	○	●	◐	○	○	◐	●	◐	◐	◐	
LAND USE - FORESTRY	LU Forest 1	Encourage and expand sustainable forestry management on working forest lands	○	◐	●	●	○	●	◐	●	●	●	
	LU Forest 2	Protect large blocks of forest land	○	◐	●	●	○	●	◐	●	●	●	

Land Use Practices: Products



- Identify public/private land use choices needed to:
  - Improve environmental quality
  - Anticipate and adapt to environmental changes in Minnesota
- Identify land use practices & policies to best support these choices

Land Use Practices Team



- Focus is on how land is used on a particular parcel or site
- Three major types of land uses in Minnesota
  - Urban/Community
  - Agriculture
  - Forest

Land Use Trends:

Population growth

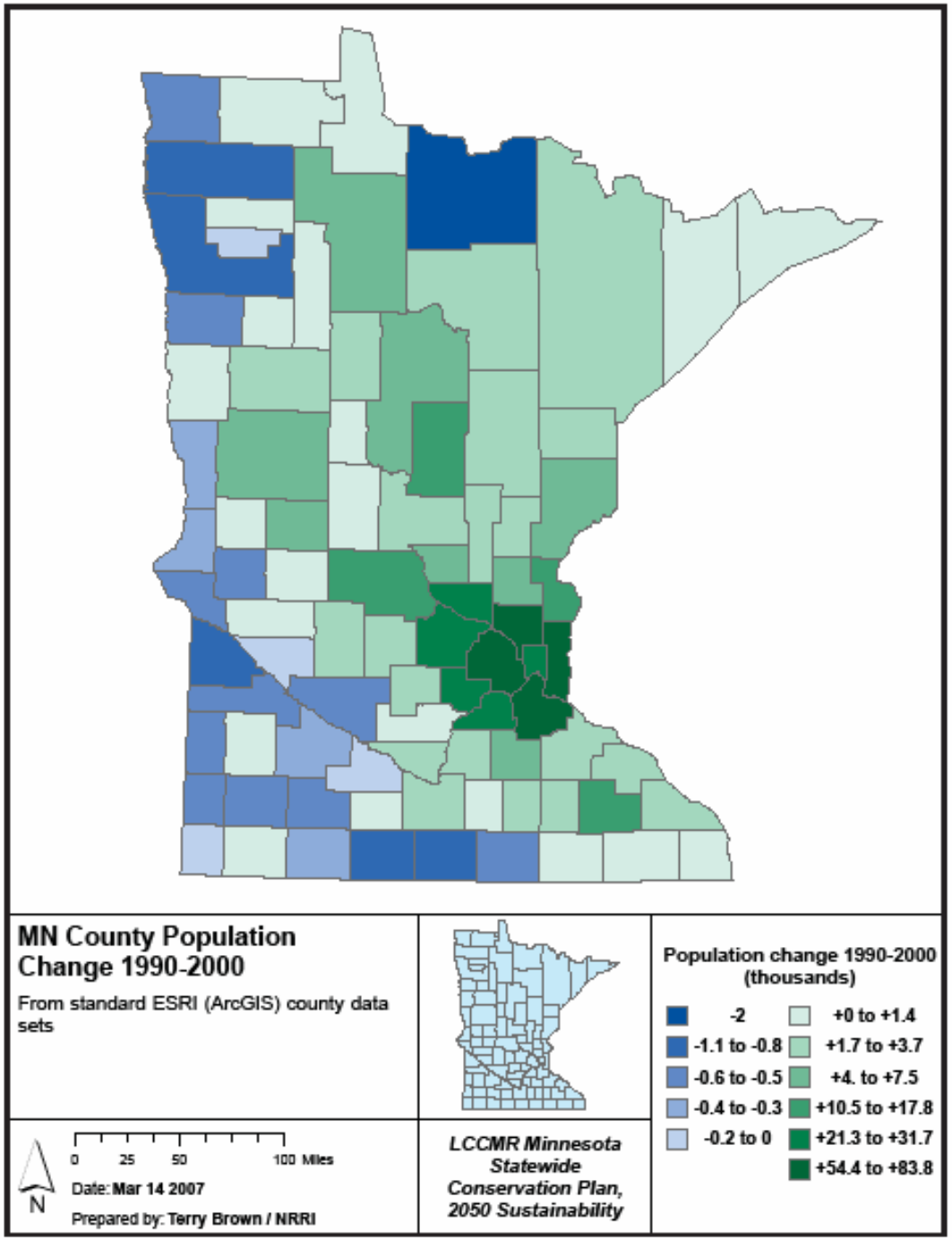
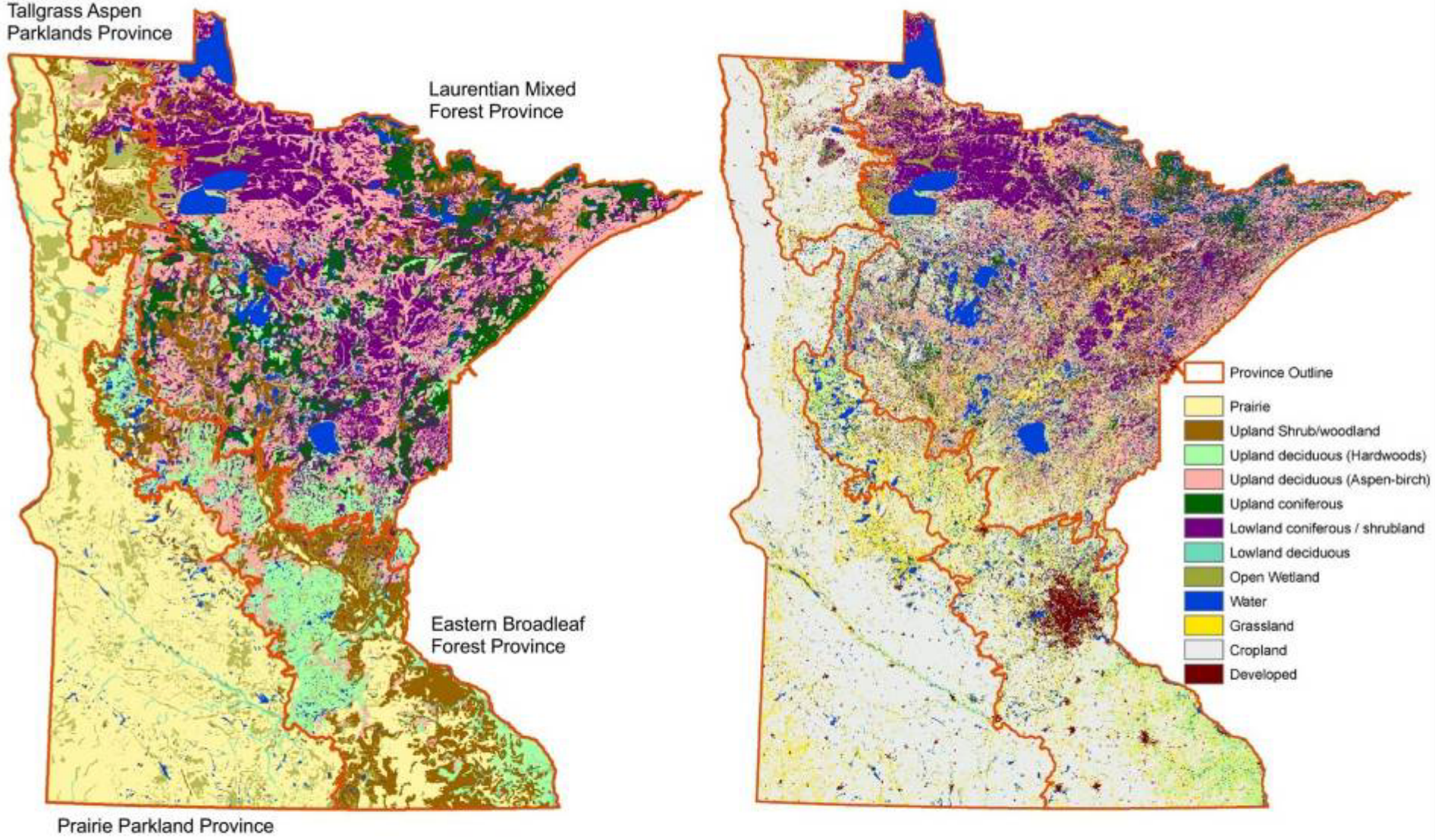


Figure L1. Minnesota County Population Change 1990-2000. Credit: Terry Brown, NRRI.



0 20 40 80 Miles

N

Date: **June 12, 2007**

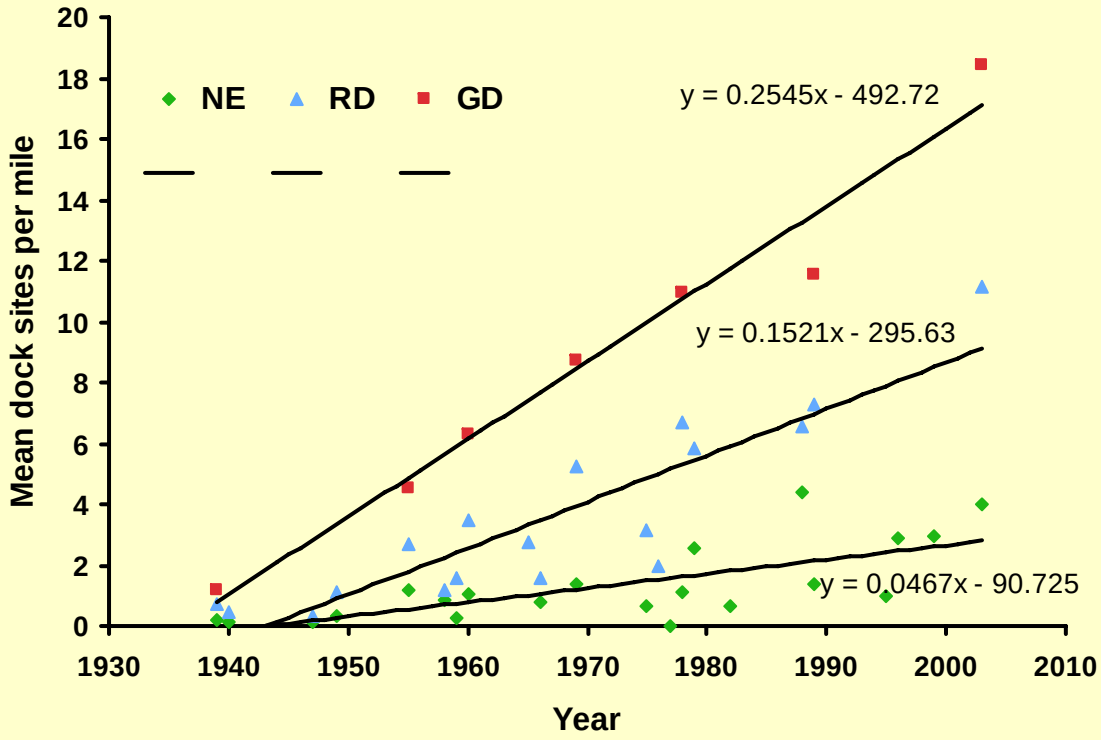
Prepared by: **Daren Carlson / MNDNR**

Landcover Change, 1890 to 1990

1890 data from Marschner, 1990 data from USGS/GAP

LCCMR Minnesota Statewide Conservation Plan

Increase in shoreline development



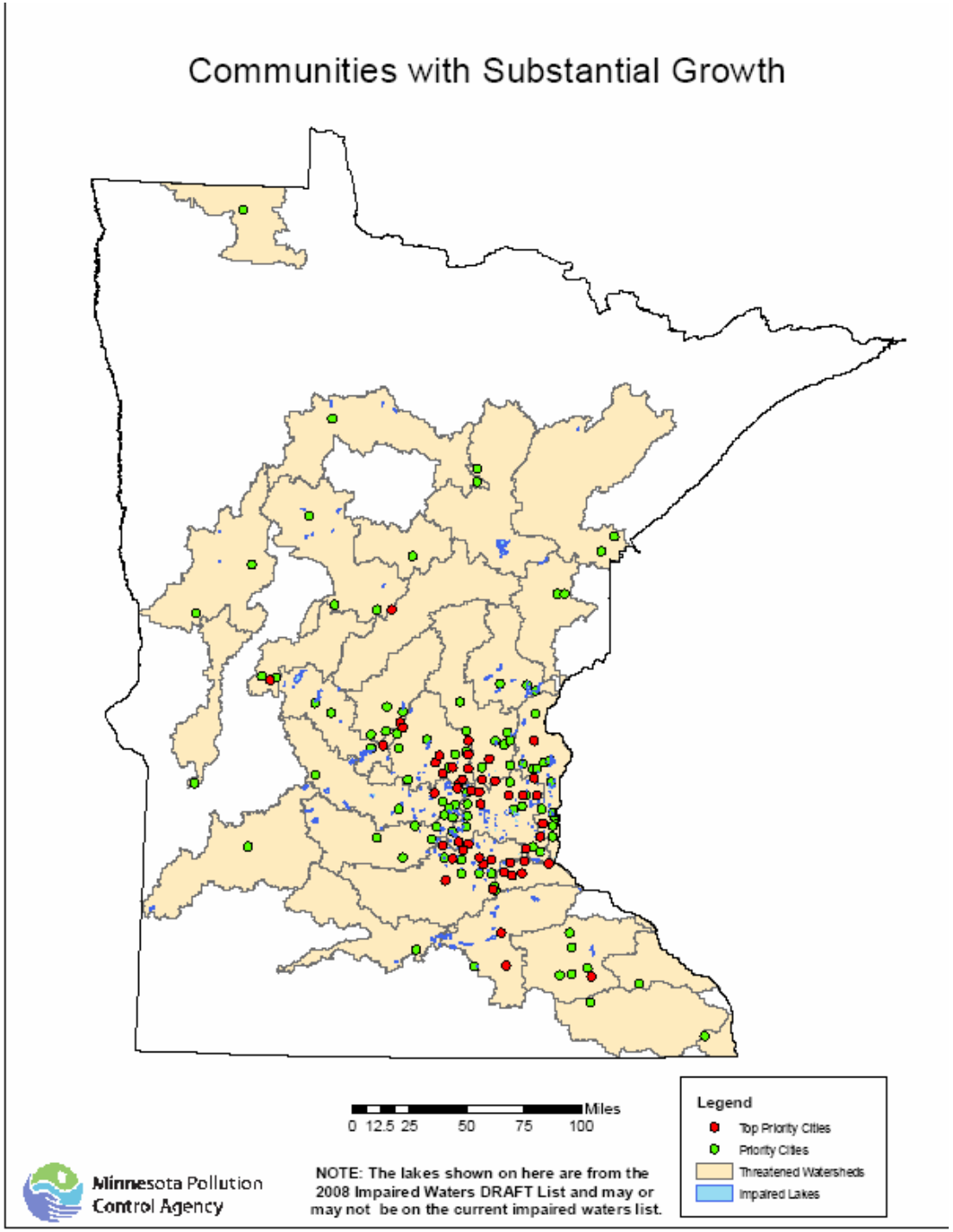
Increase in impervious surface:

An additional 893,506 acres by 2020.

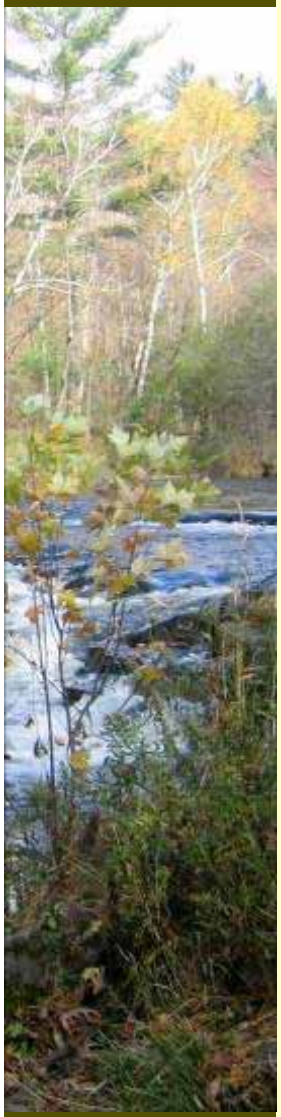
<u>1,396 square miles</u>

93% of these communities are located in just 9 watersheds.

✓Most are in the Mississippi Basin.

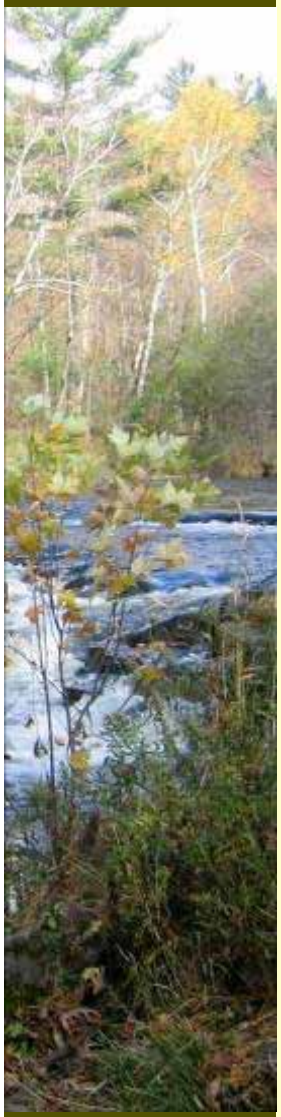


Community Land Use



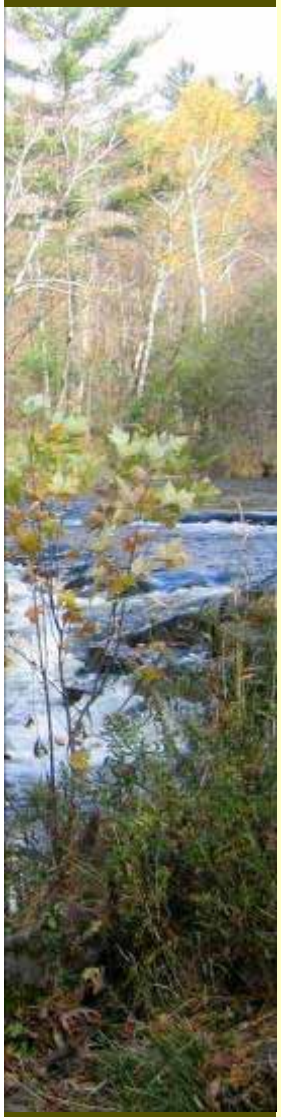
- *Community LU 1:* Fund and implement a state land use, development, and investment guide
  - A recommendation endorsed by all three teams
  - To define, quantify, and unify state natural resource goals and investment objectives

State Guide



- Identify state goals relating to natural resources, land use, and investments
- Engage public in setting goals
- Describe how state investments will be coordinated, integrated and staged to meet the goals
- Establish priorities for allocation of state investments

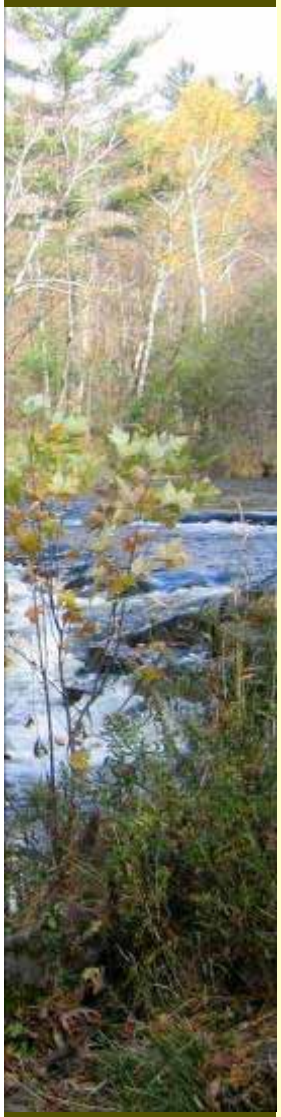
Community Land Use



- *Community LU 2:* Support local and regional conservation-based planning
  - 2A. Demonstrate conservation-based planning through pilot projects
    - In a variety of communities – urban, developing edge, rural
    - Along a rapidly developing transportation corridor
    - AUAR certified comprehensive plan

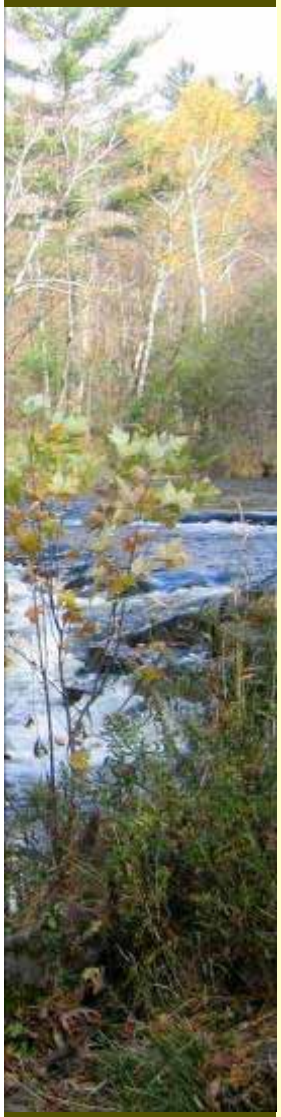
Conservation-based planning in all communities

Conservation-based planning



- *Community LU 2:* Support local and regional conservation-based planning
  - 2B. Provide incentives to local governments and conservation organizations for conservation-based planning
    - Assistance for planning
    - Assistance for implementation

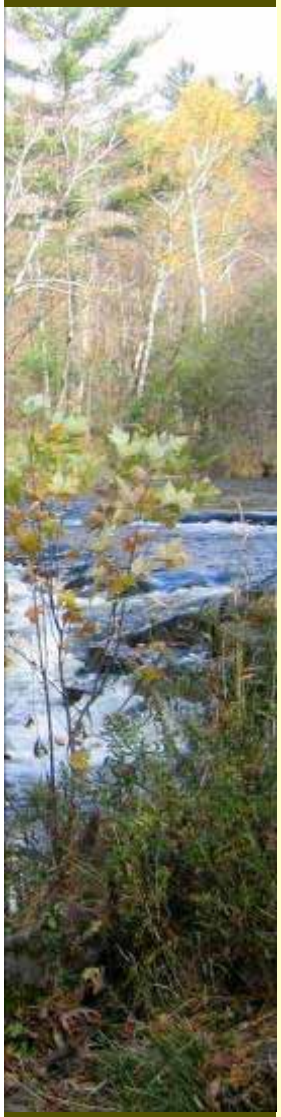
Conservation-based planning



2C. Provide tools and technical assistance for conservation-based planning

- Carbon calculator for communities
- Improve agricultural land preservation tools
- Develop and deliver outreach materials
- Establish a MN Natural Resources and Development Partnership – intergovernmental
- Invest in building state agency assistance capabilities

Conservation-based planning



- *Community LU 2:* Support local and regional conservation-based planning

  2D. Invest in generating base data and information necessary to support conservation-based planning

  - MLCCS in areas vulnerable to near-term development or conversion
  - Update statewide land cover databases and remote sensing capabilites

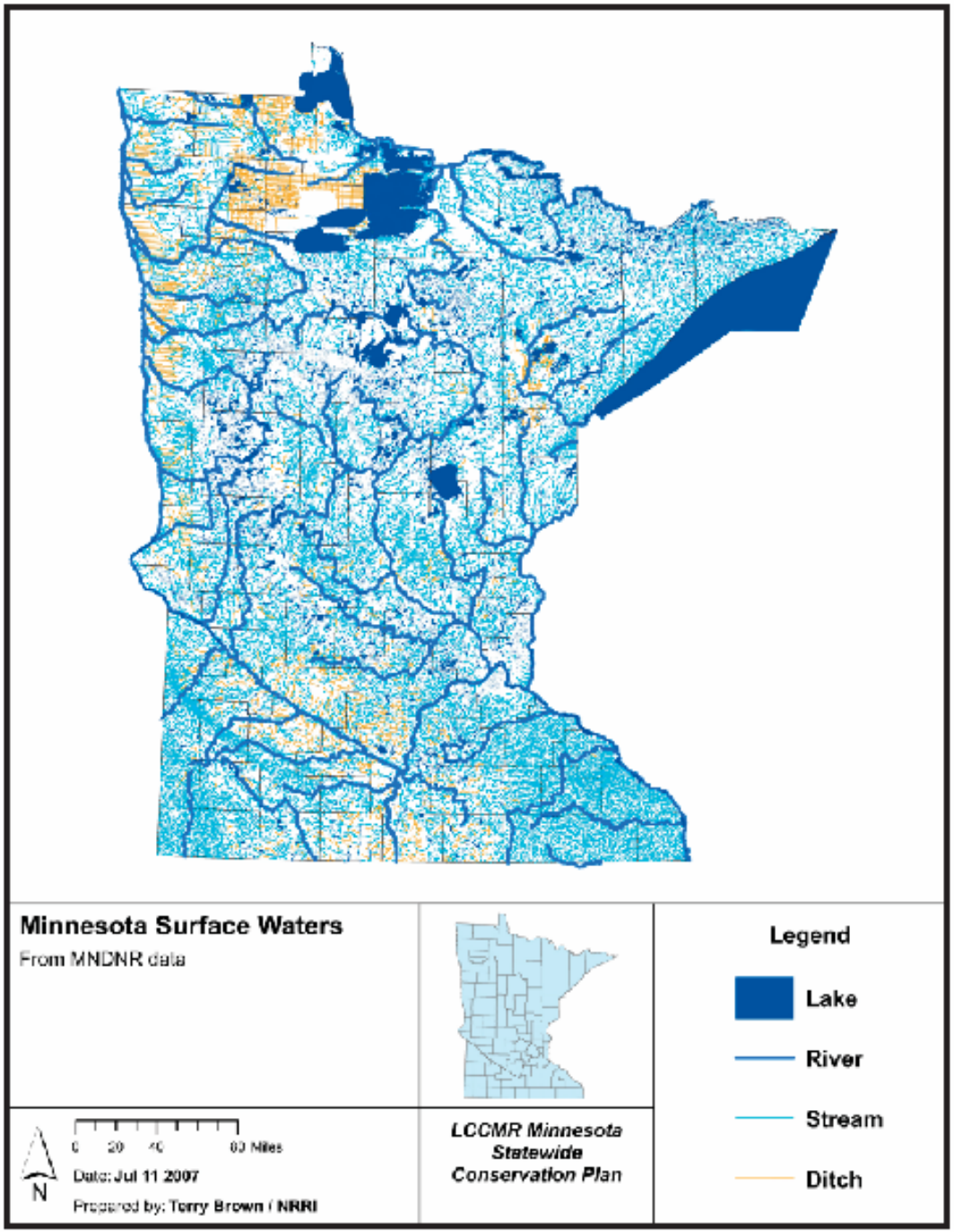
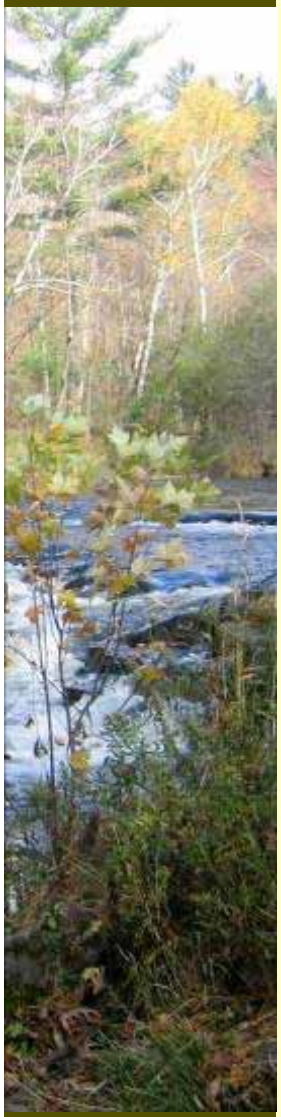


Figure 1: Surface waters in Minnesota. Credit: Terry Brown, University of Minnesota

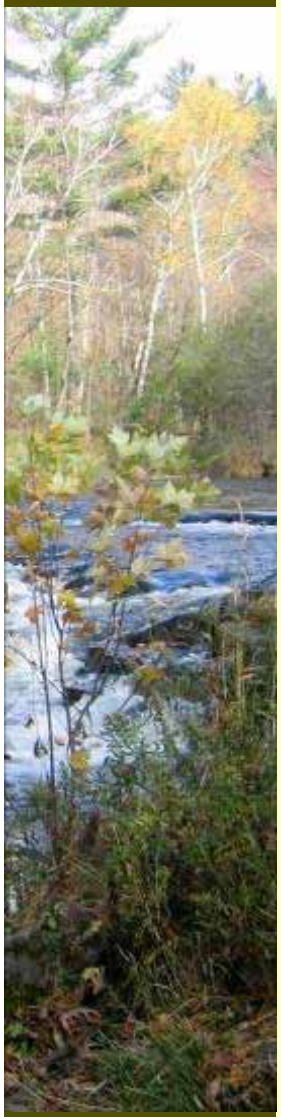
Interconnected pattern of lakes and streams in Minnesota

Community Land Use



- *Community LU 3:* Ensure protection of water resources in urban areas by evaluating and improving current programs
  - Impaired waters and TMDL
  - NPDES stormwater permitting
  - Nondegradation for all waters
  - Shoreland management

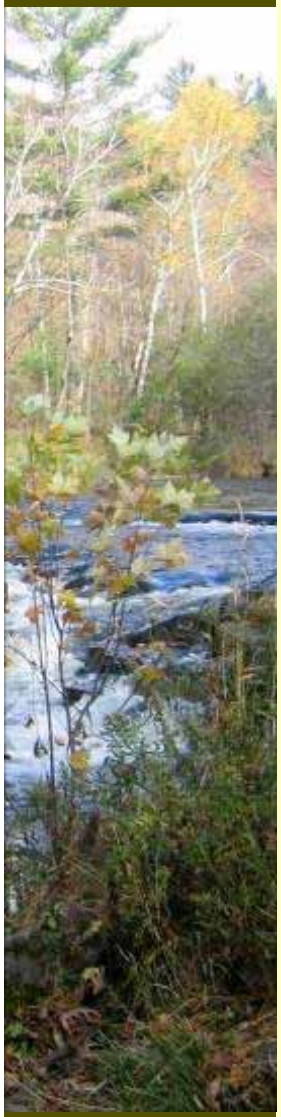
Protect water resources in urban areas



3A. Credit system for stormwater and low-impact development (LID) best management practices (BMPs)

- Good scientific and research suport
- Specific and detailed design guidelines
- Quantification of benefits
- Integration into all levels of stormwater regulations – State, city, watershed, etc.

Protect water resources in urban areas



3B. Simple modeling for TMDL compliance

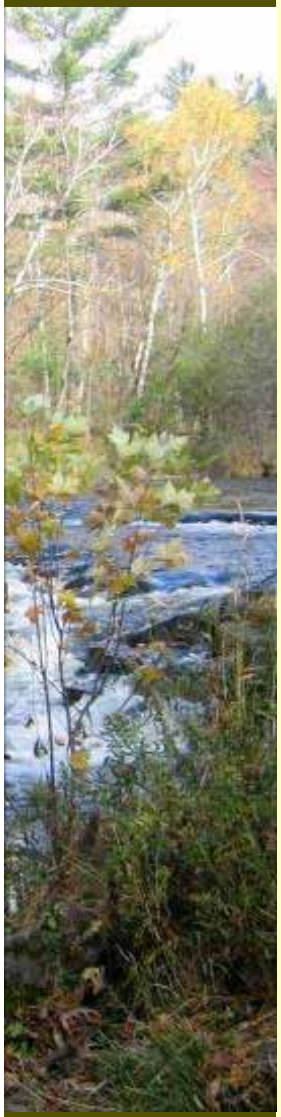
- Review current model
- Integrate with the credit system for stormwater and LID BMPs
- Develop an integrated loading rate and total load reduction model
- Prepare guidance documents
- Integrate model into TMDL protocols and implementation plans
- Develop and implement outreach and training

Protect water resources in urban areas

3C. TMDL BMP implementation monitoring

- Draft and implement a program of detailed BMP monitoring
- Selected representative watersheds
- Monitoring beyond the waterbody; monitor the watershed

Protect water resources in urban areas

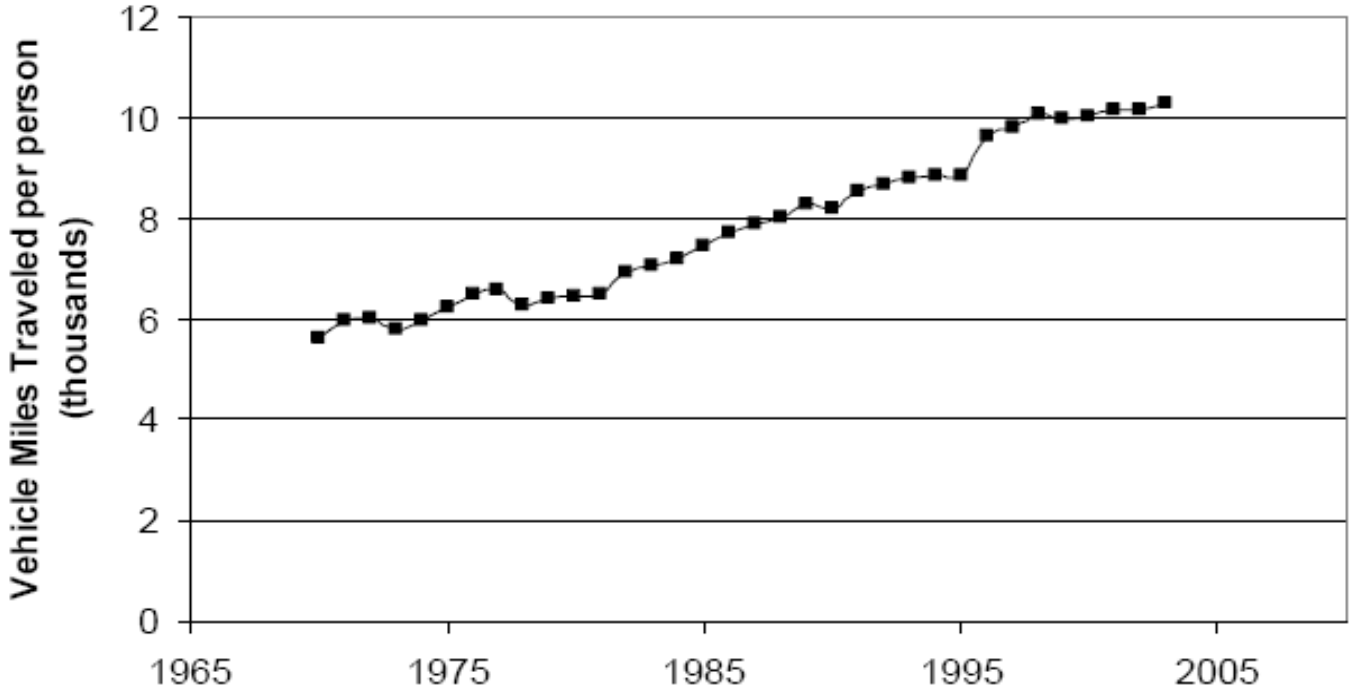


3D. Water quality media campaign

- Build on existing program to enhance public education and awareness of stormwater pollution prevention strategies
- Further develop and expand the "*Minnesota Water – Let's Keep It Clean!*" campaign
- Mass media
- Materials for educators and municipal staff

Transportation trends: We are driving more miles

Annual Vehicle Miles Traveled per person in Minnesota, 1970-2004

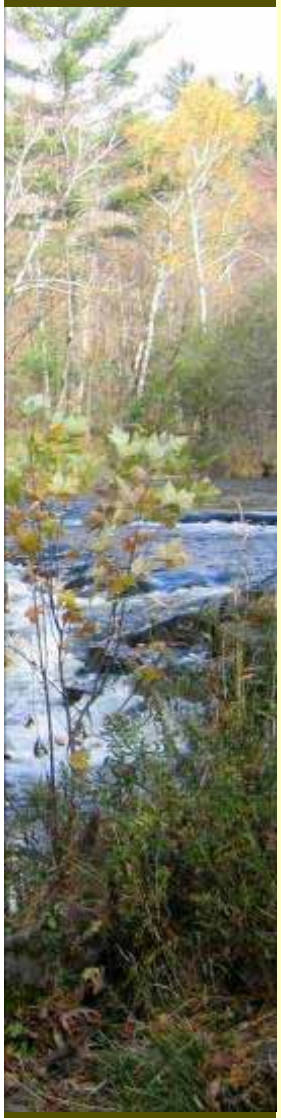


Source: MPCA

Transportation

- *Transportation 1:* Align transportation planning across state agencies and integrate transportation project development and review across state, regional, metropolitan and county/local transportation, land use and conservation programs
  - 1A. Institute interagency alignment of planning to coordinate transportation with other state planning cycles
  - 1B. Integrate streamlined statewide environmental transportation project review with other statewide and cross-jurisdictional planning

Transportation planning



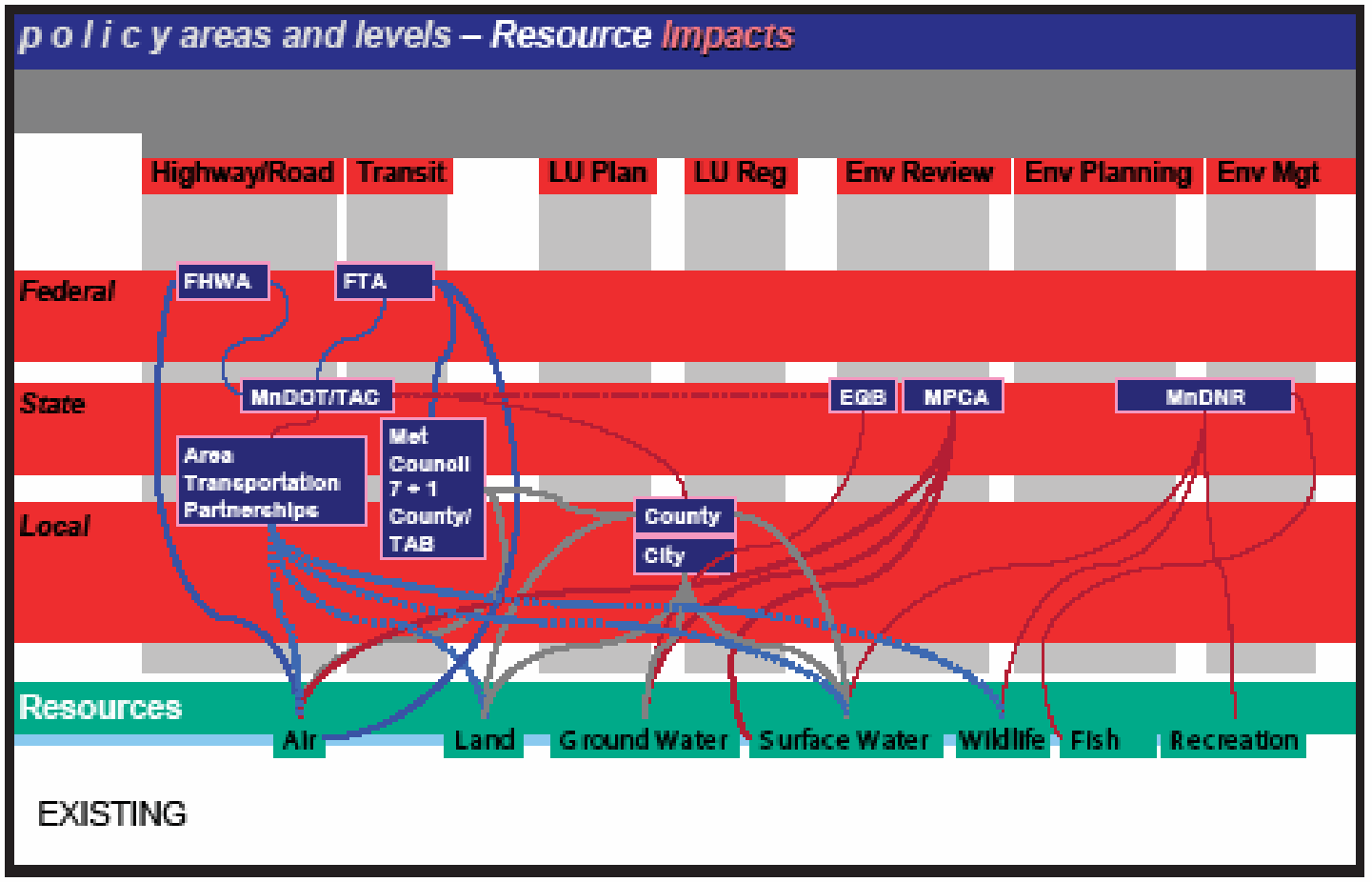


Figure T5. Policy areas and levels - Resource Impacts. Credit: Lance Neckar, UM

Transportation

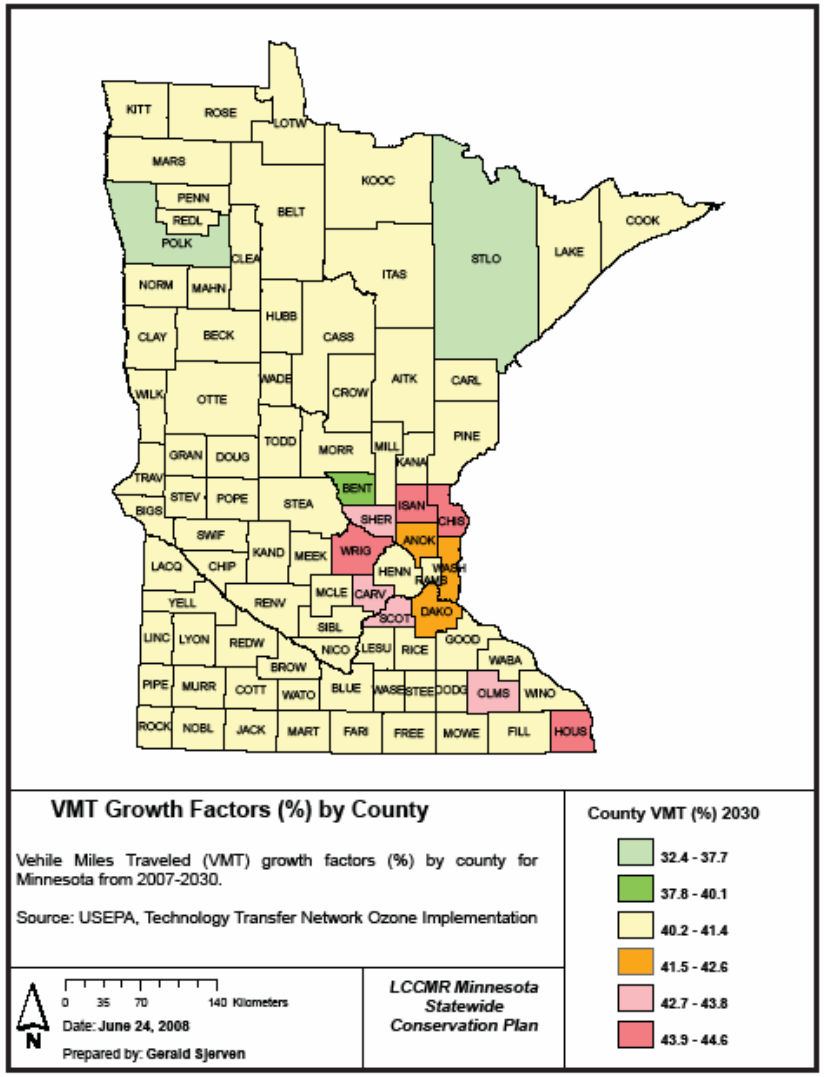


Figure T4. VMT Growth Factors (%) by County. Credit: Gerald Sjerven, Natural Resources Research Institute

- *Transportation 2:* Reduce per capita vehicle miles of travel (VMT) through compact mixed-use development and multi-modal and intermodal transportation systems

Impacts of transportation infrastructure on natural resources

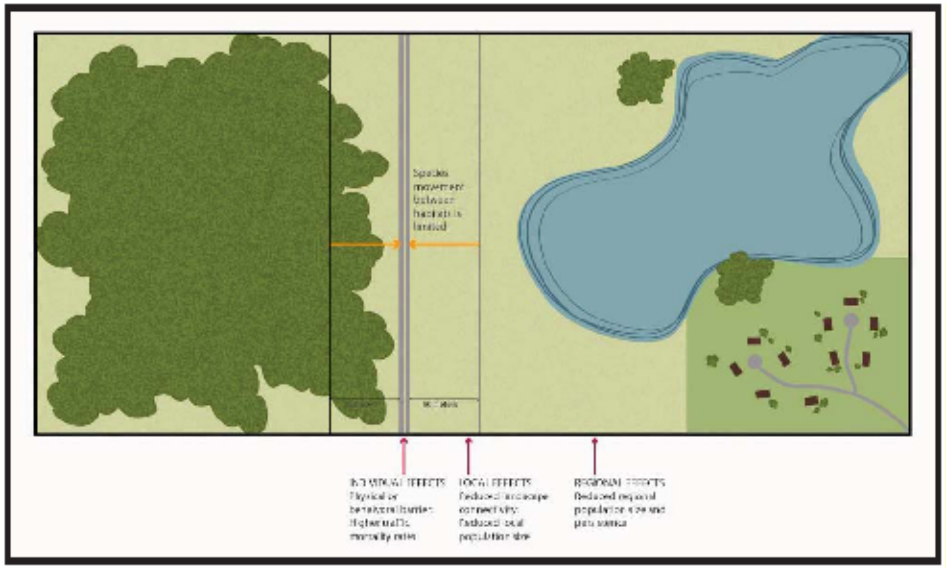


Figure T1. Fragmentation Effects of Transportation Infrastructure. Credit: Katherin Thering, UM Metropolitan Design Center.

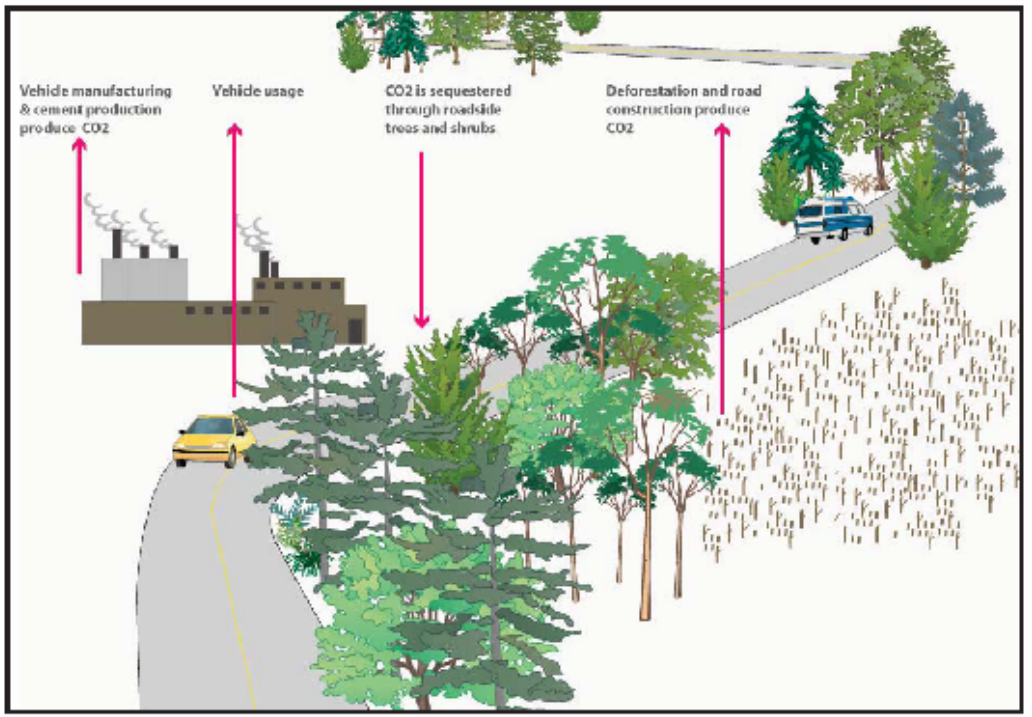


Figure T2. An overview of some of the elements of the 'carbon footprint' of vehicular transportation. Credit: Katherin Thering, UM Metropolitan Design Center.

Transportation

- *Transportation 3:* Develop and implement sustainable transportation research, design, planning, construction practices, regulations, and competitive incentive funding that minimizes impacts on natural resources, especially habitat fragmentation and non-point water pollution

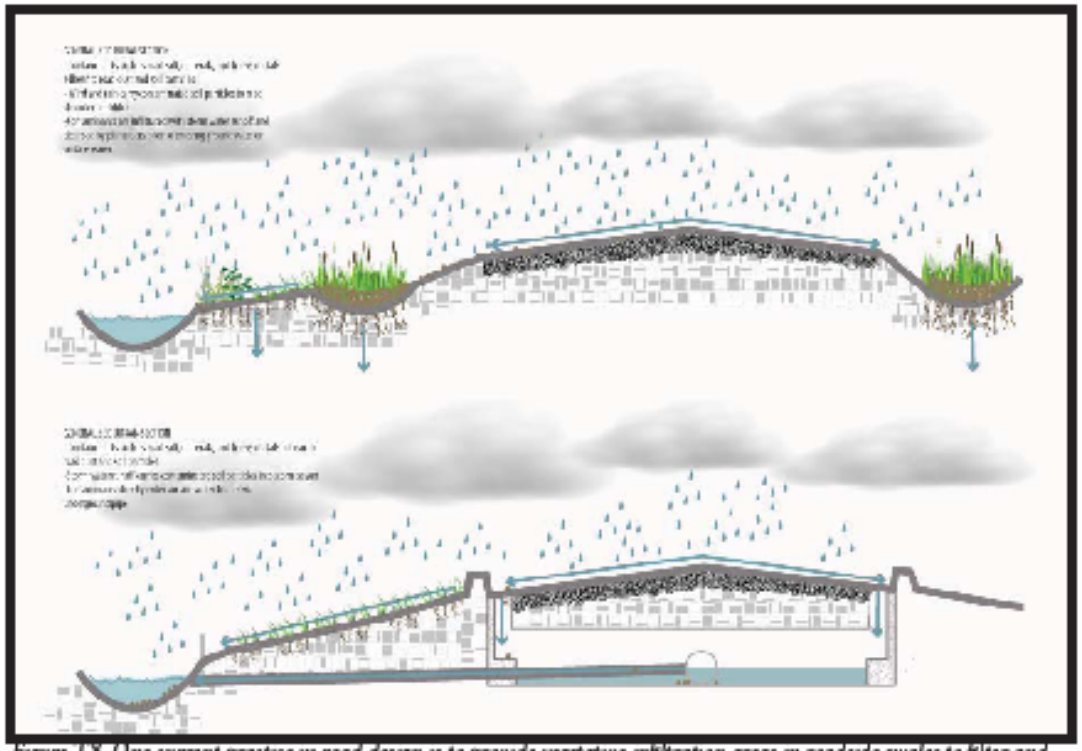
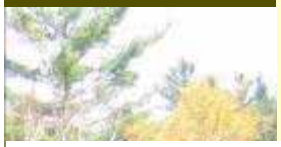
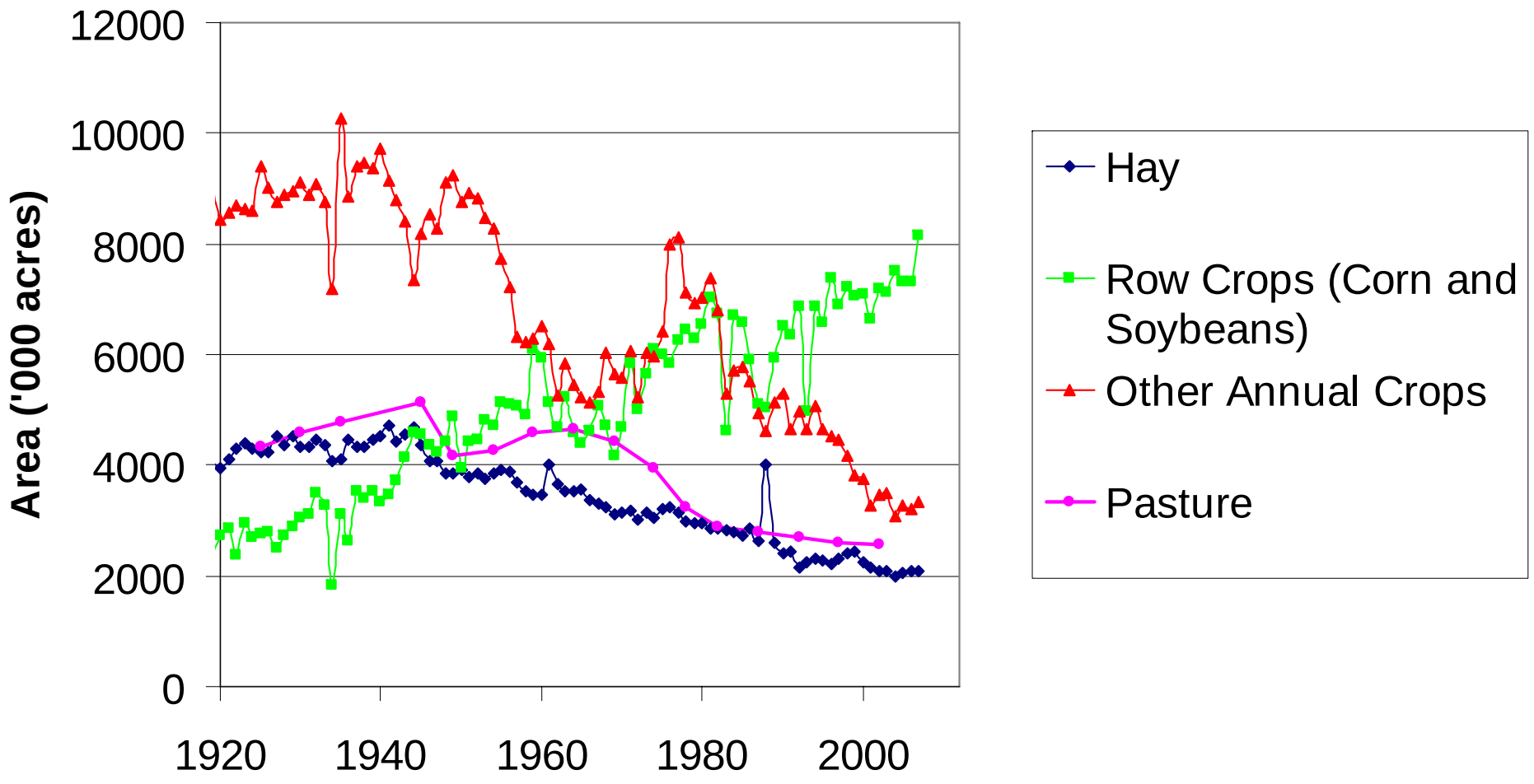


Figure 18. One current practice in road design is to provide vegetative infiltration areas in roadside swales to filter and slow runoff from paved surfaces. Curb and gutter additions to roads that accompany the changes in functional classification (e.g. to urban arterial) are especially detrimental near water bodies.. Credit: Katherin Thering, UM Metropolitan Design Center.

Trend in agricultural land use





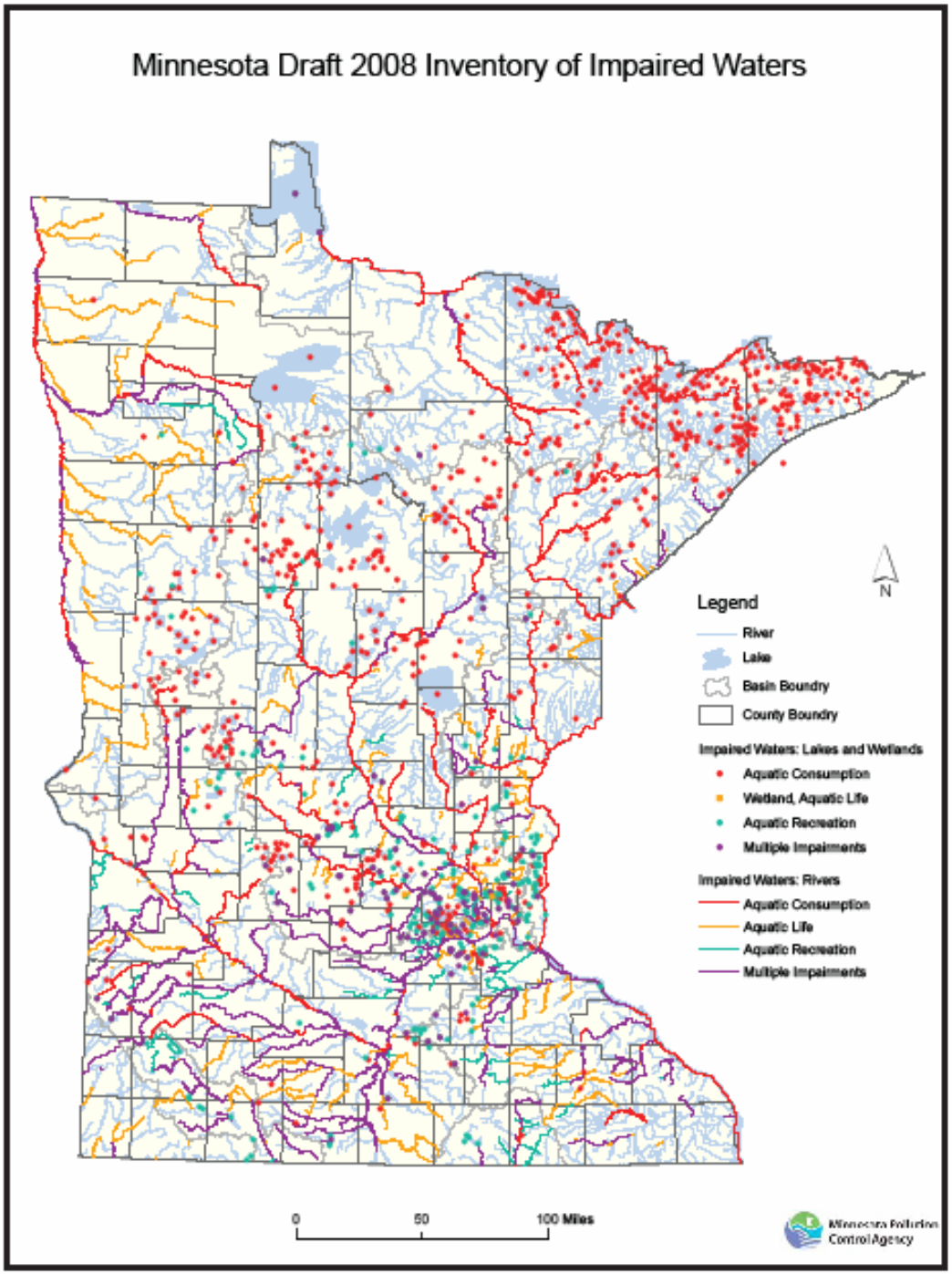
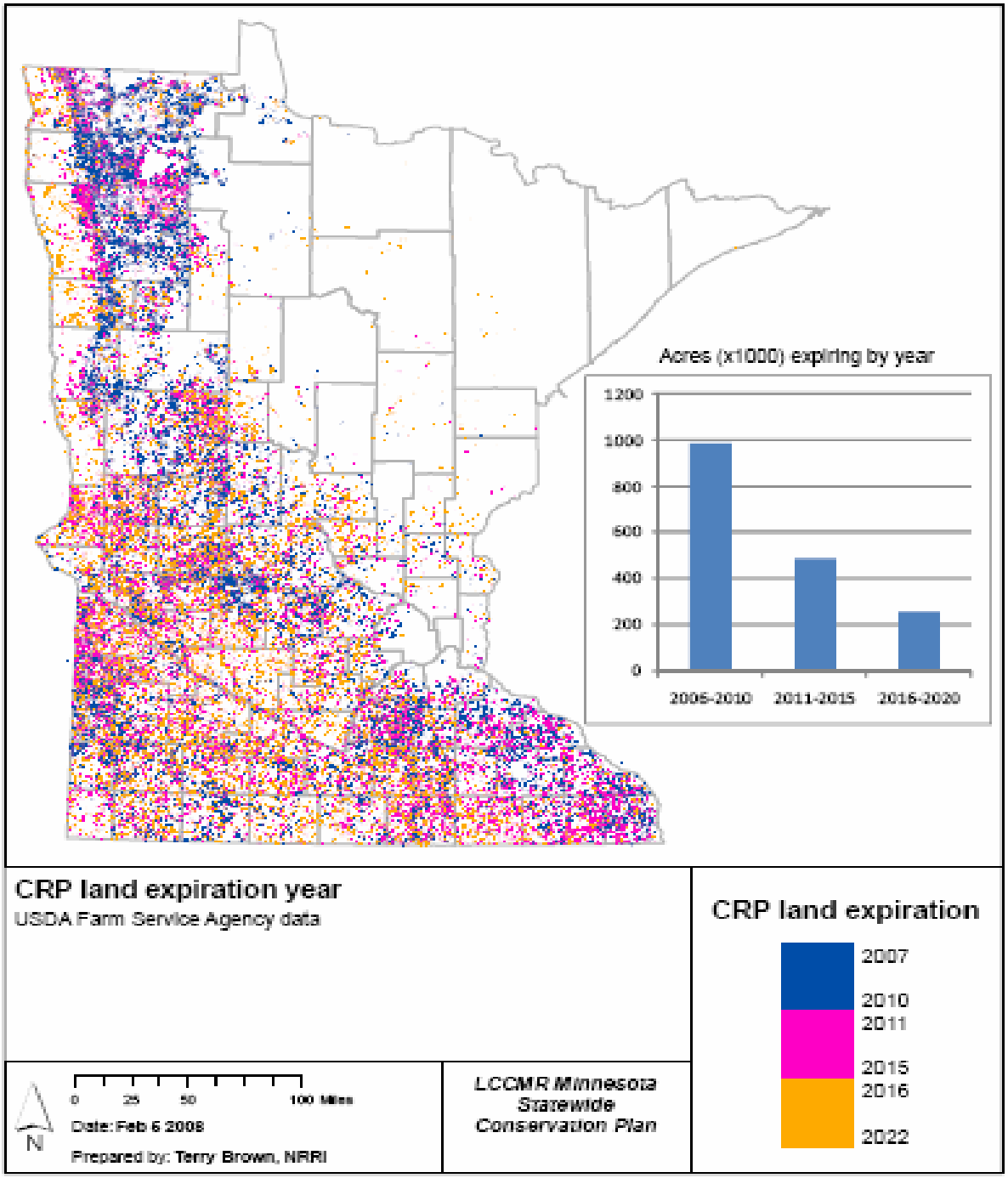


Figure L4. Minnesota Inventory of Impaired Waters. Credit: MPCA.

Impaired waters are being evaluated and identified.

Federal law requires action to protect and improve these waters.



Conservation Reserve Program

Year of expiration of enrolled acreage

Agricultural Land Use

- *Agricultural LU Strategy 1:*
  As much as possible, transition renewable fuel feedstocks to perennial crops
  - 1A. Invest in research to determine ecoregion and site-specific suitability and management of perennial species for fedstock for biofuels and other products
  - 1B. Investigate, analyze and adopt policy that will transition biofuel feedstocks to perennial crops

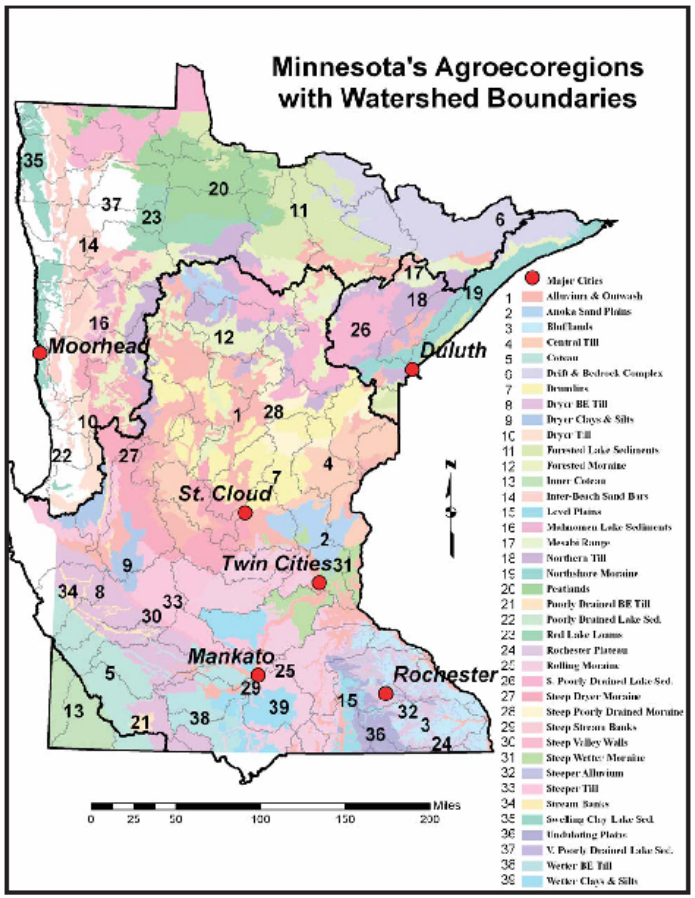
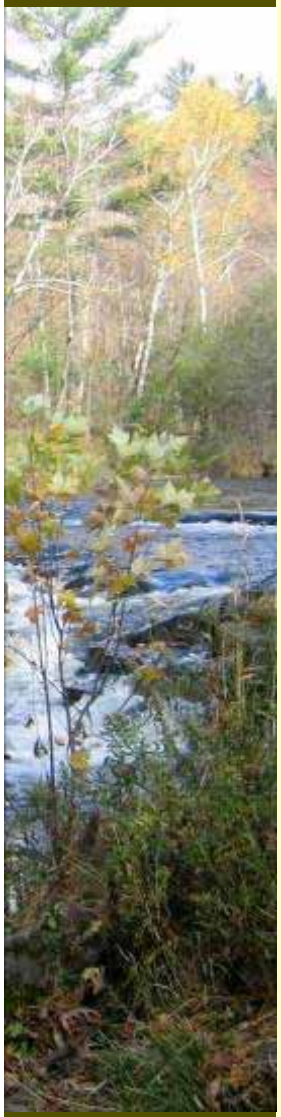
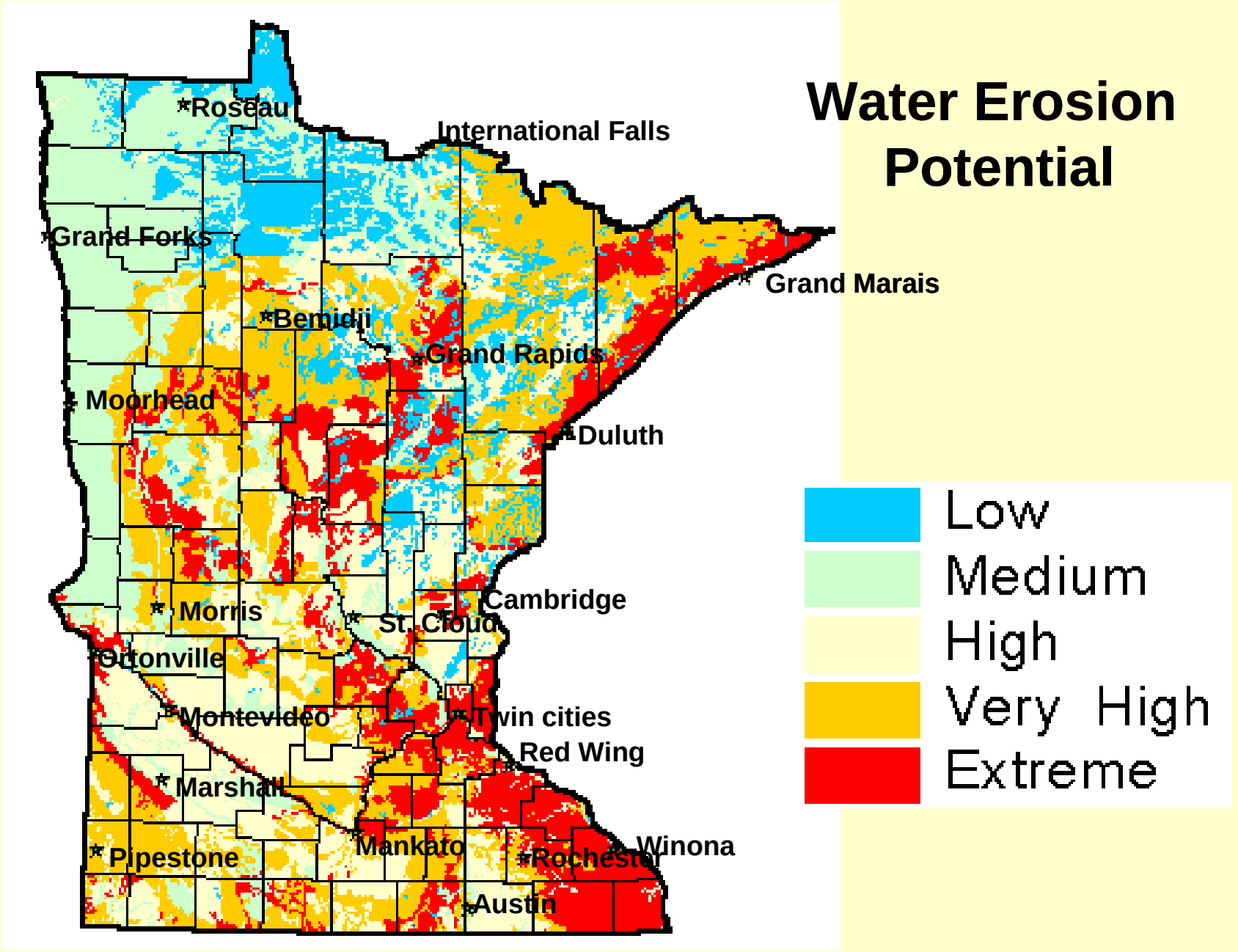


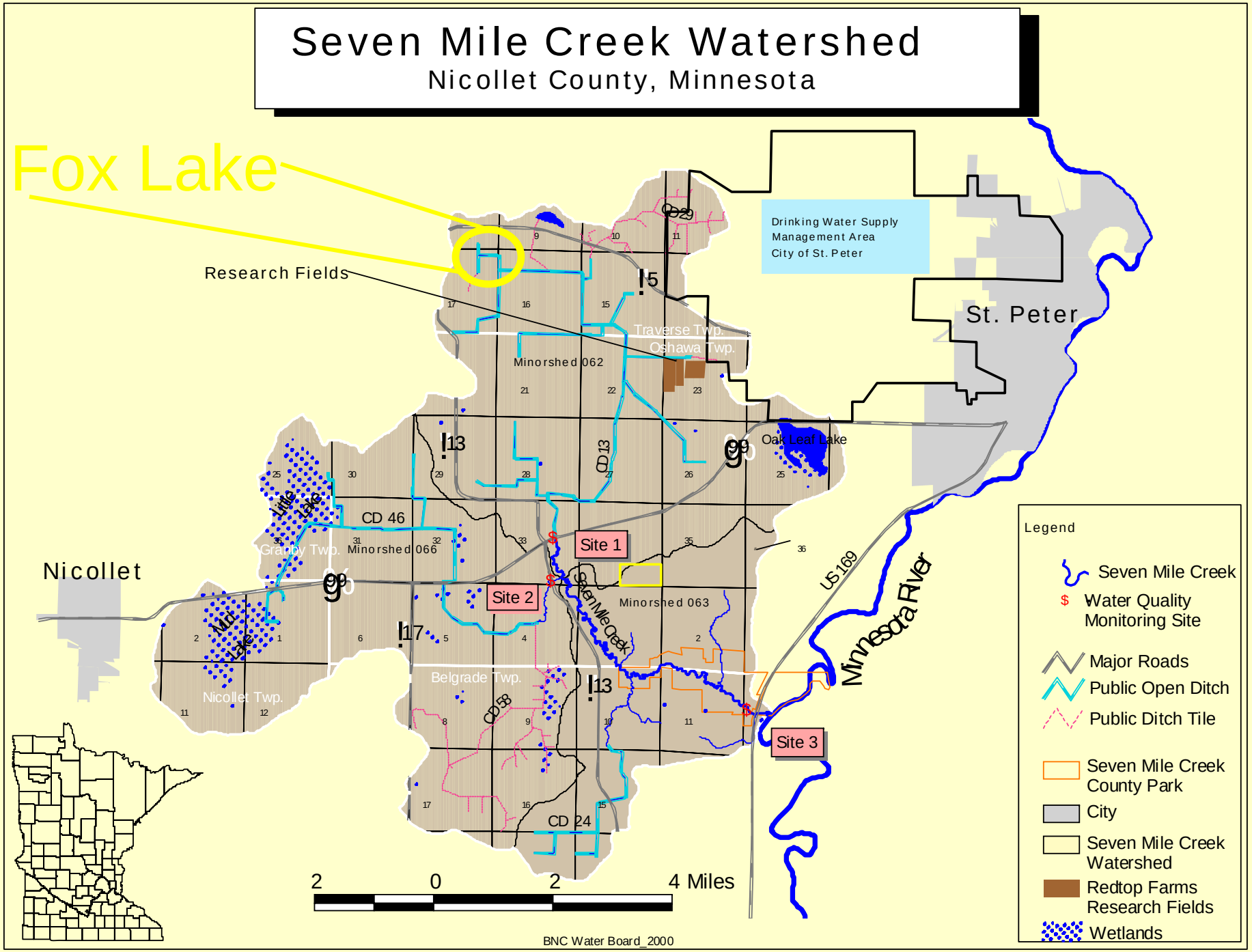
Figure 1.9. Minnesota agro-ecoregions differ significantly in suitability for perennial species that can serve as feedstocks for biofuels and othe products. Growing season length and temperature, precipitation, and soil characteristics are important determinants of species suitability. Credit: David Mulla, University of Minnesota

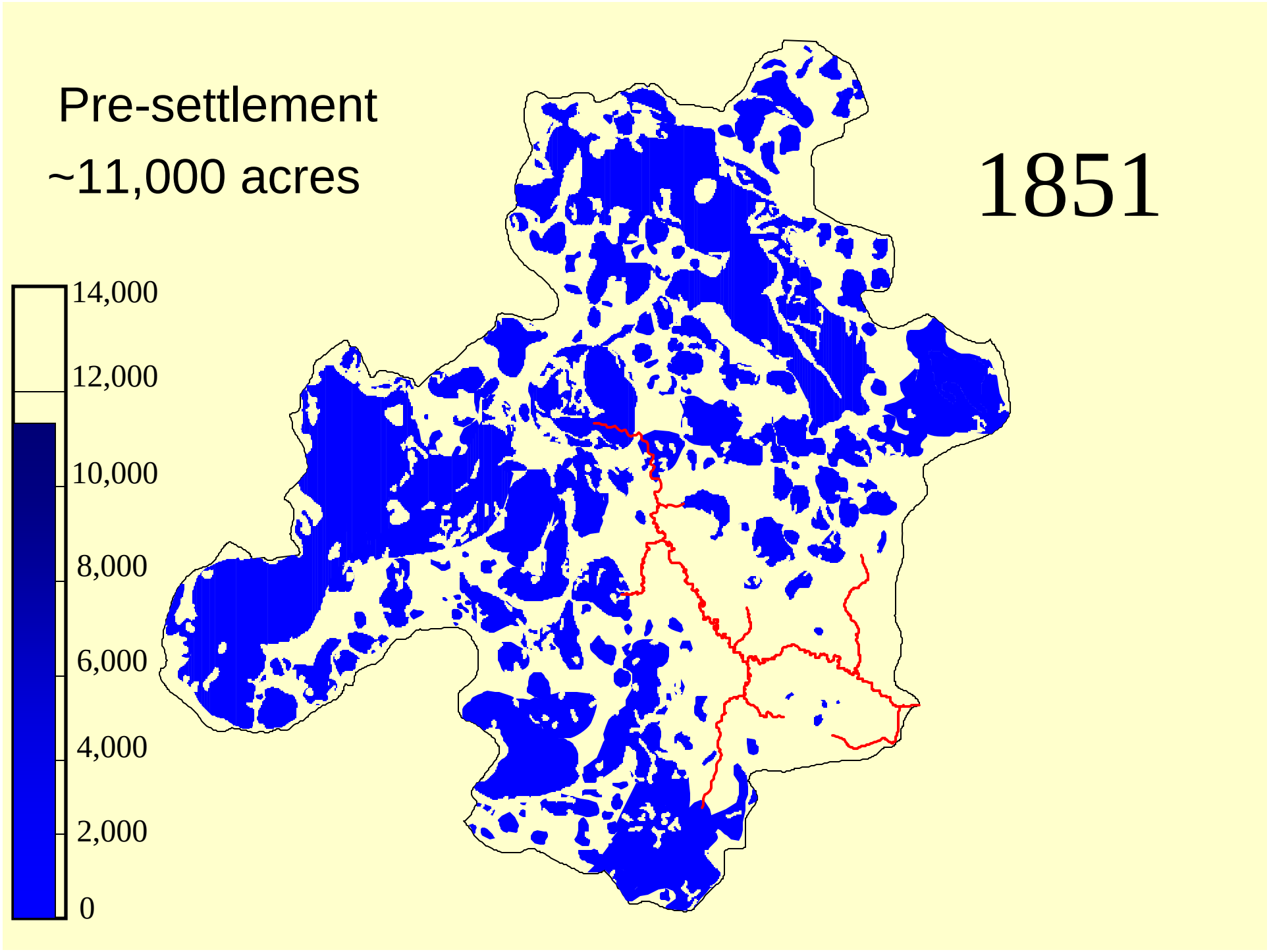
Agricultural Land Use

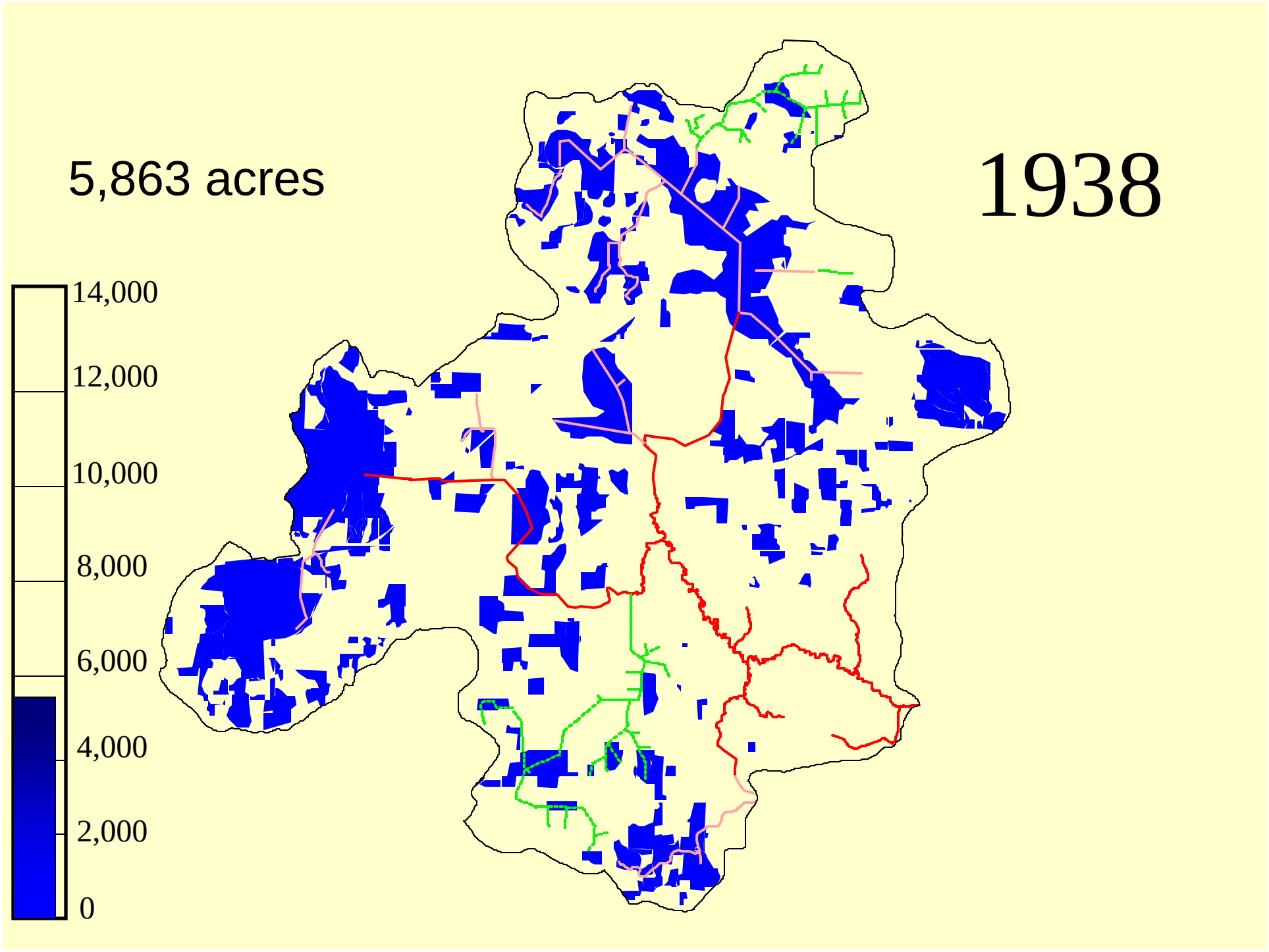


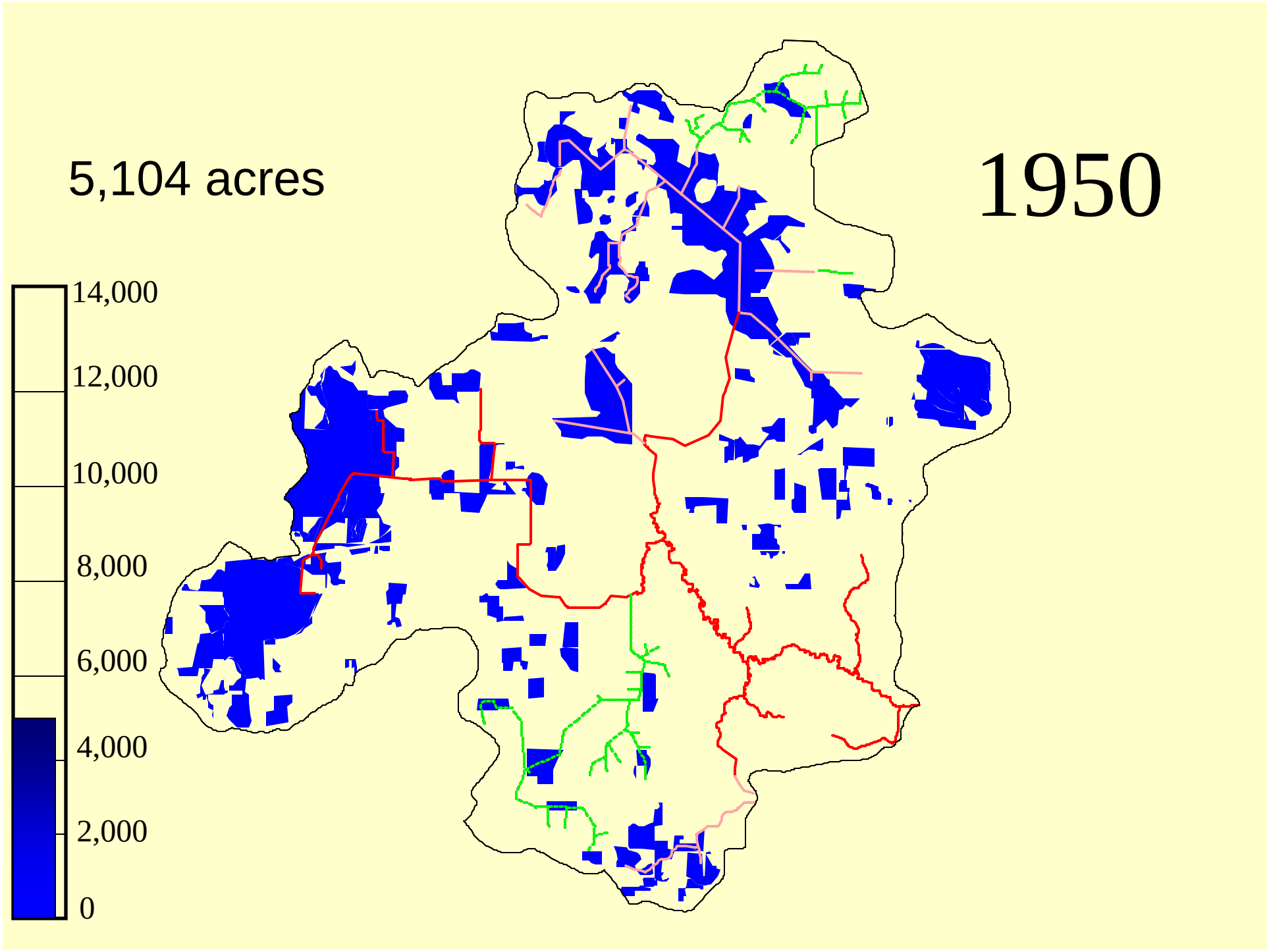
- *Agricultural LU Strategy 2:* Reduce streambank erosion through reductions in peak flows
  - 2A. Invest in research to determine the quantitative relationship among trends in precipitation, artificial drainage systems, and stream hydrology
  - 2B. Set research-based goals for peak flow reductions
  - 2C. Invest in strategically targeted programs for reduction of peak flows
  - 2D. Investigate, analyze, and adopt science-based policy that strengthens mitigation of peak flows from artificial drainage systems

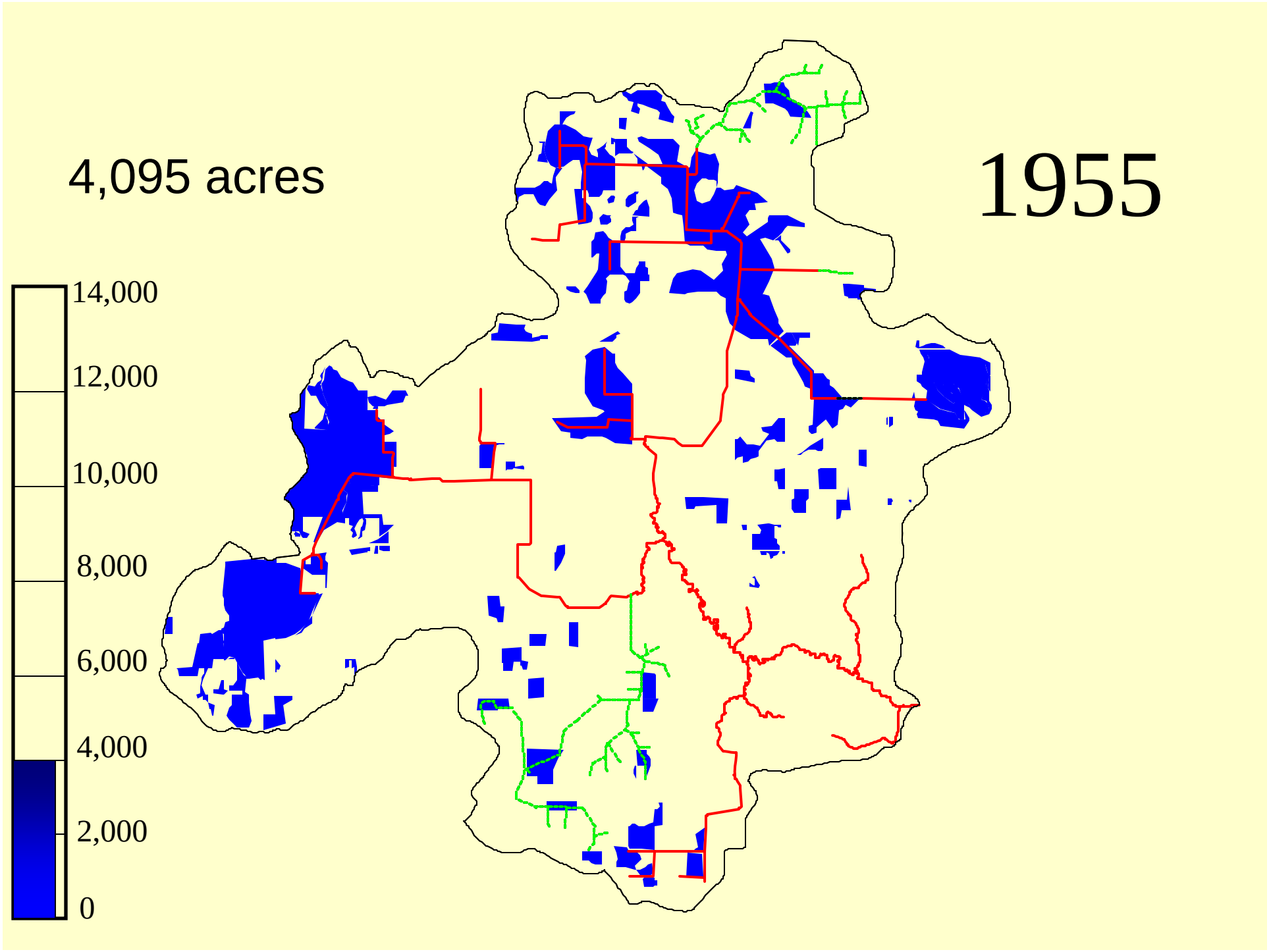

Water Erosion Potential
*Roseau
International Falls
*Grand Forks
Grand Marais
*Bemidji
*Grand Rapids
*Moorhead
*Duluth
Cambridge
*Morris
*St. Cloud
*Ortonville
*Montevideo
*Twin cities
Red Wing
*Marshall
*Pipestone
Mankato
*Rochester
Winona
*Austin
Low
Medium
High
Very High
Extreme

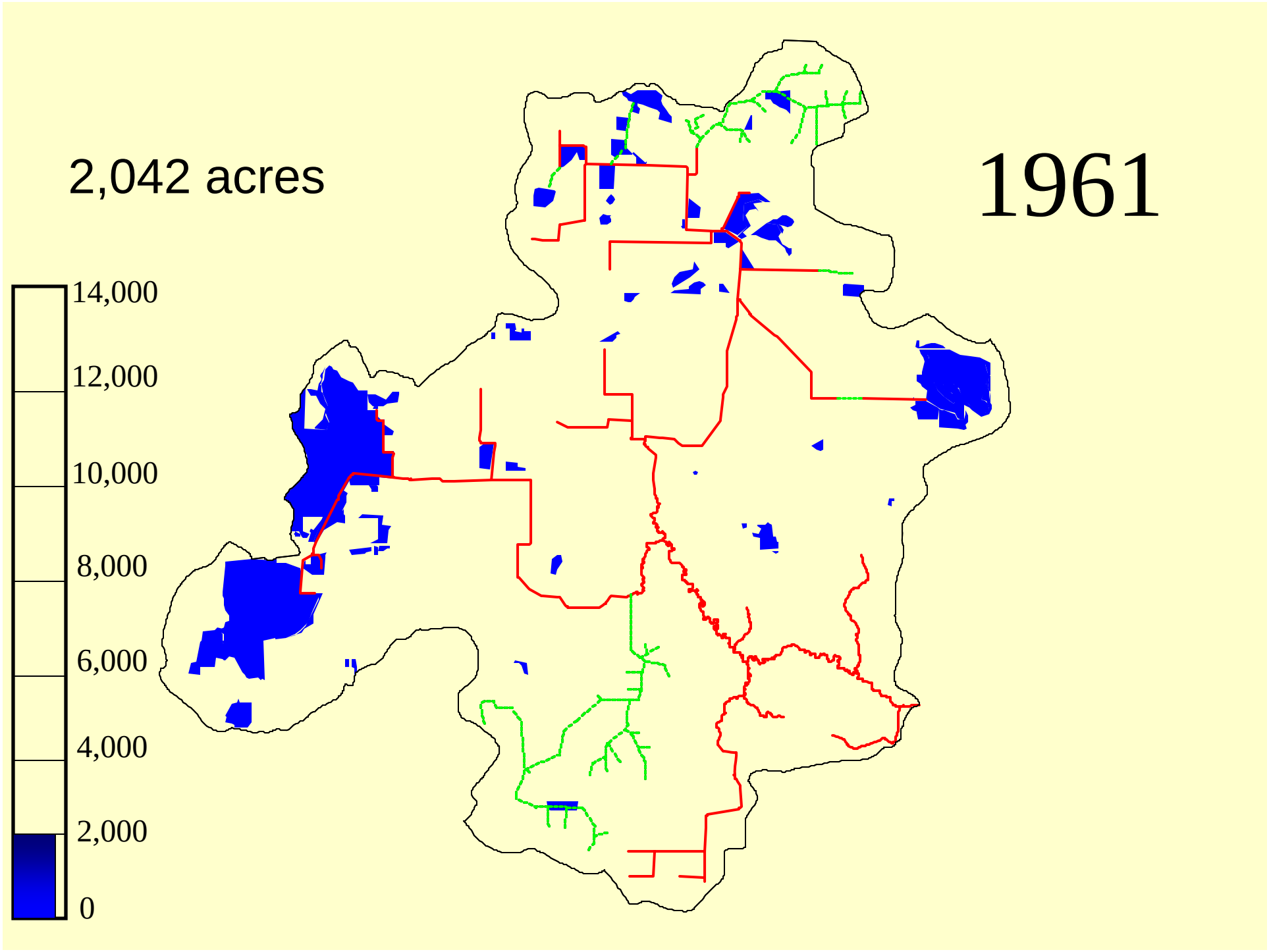

Seven Mile Creek Watershed
Nicollet County, Minnesota
Fox Lake
Research Fields
Drinking Water Supply
Management Area
City of St. Peter
St. Peter
Traverse Twp.
Oshawa Twp.
Minorshed 062
Oak Leaf Lake
CD 29
CD 13
CD 46
Little Lake
Grandy Twp.
Minorshed 066
Site 1
Site 2
Site 3
Seven Mile Creek
Minorshed 063
US 169
Minnesota River
Nicollet
Mud Lake
Belgrade Twp.
Nicollet Twp.
CD 58
CD 24
2 0 2 4 Miles
BNC Water Board_2000
Legend
Seven Mile Creek
Water Quality Monitoring Site
Major Roads
Public Open Ditch
Public Ditch Tile
Seven Mile Creek County Park
City
Seven Mile Creek Watershed
Redtop Farms Research Fields
Wetlands

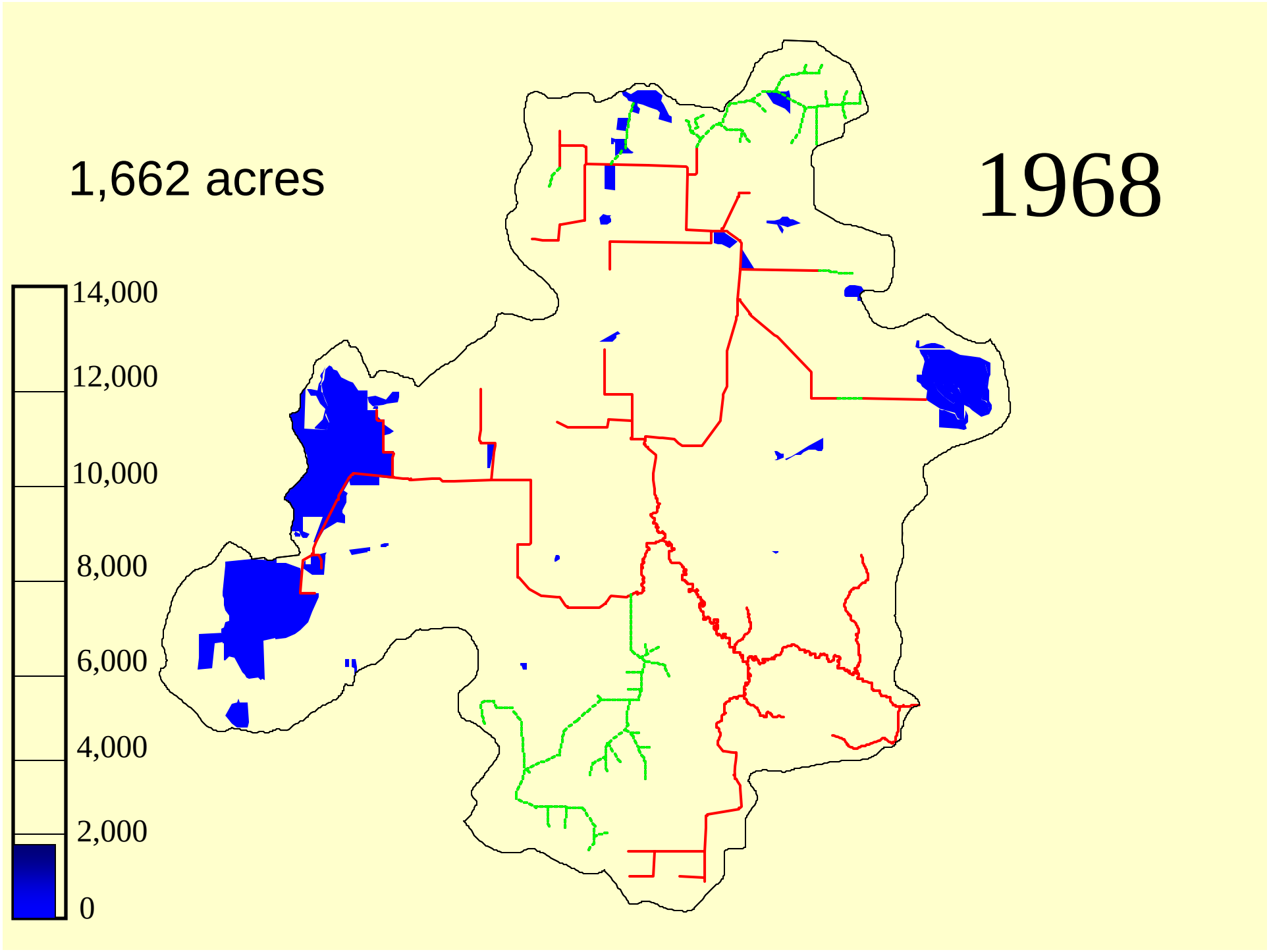

Pre-settlement
~11,000 acres
1851
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

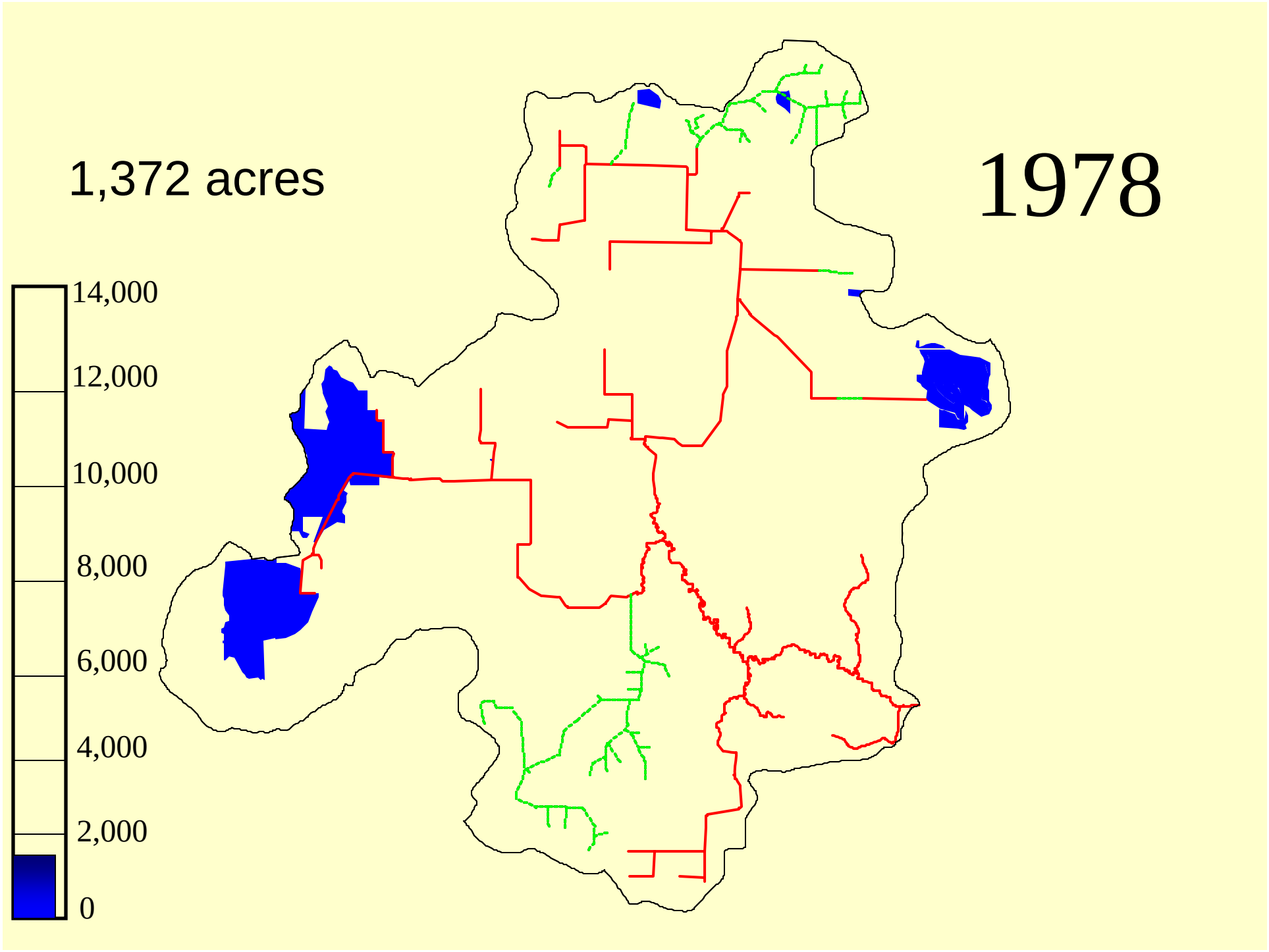

5,863 acres
1938
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

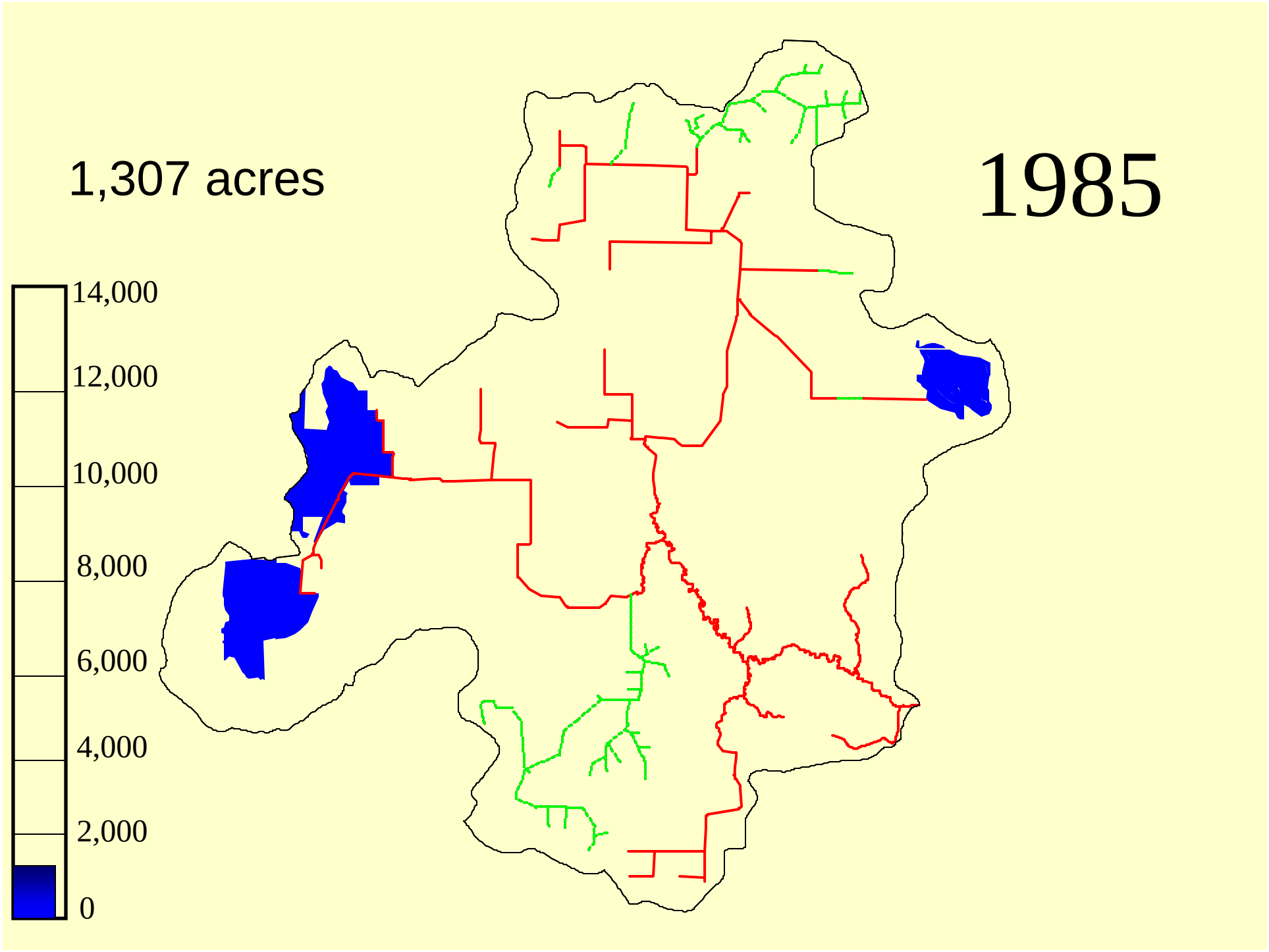

5,104 acres
1950
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0


4,095 acres
1955
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

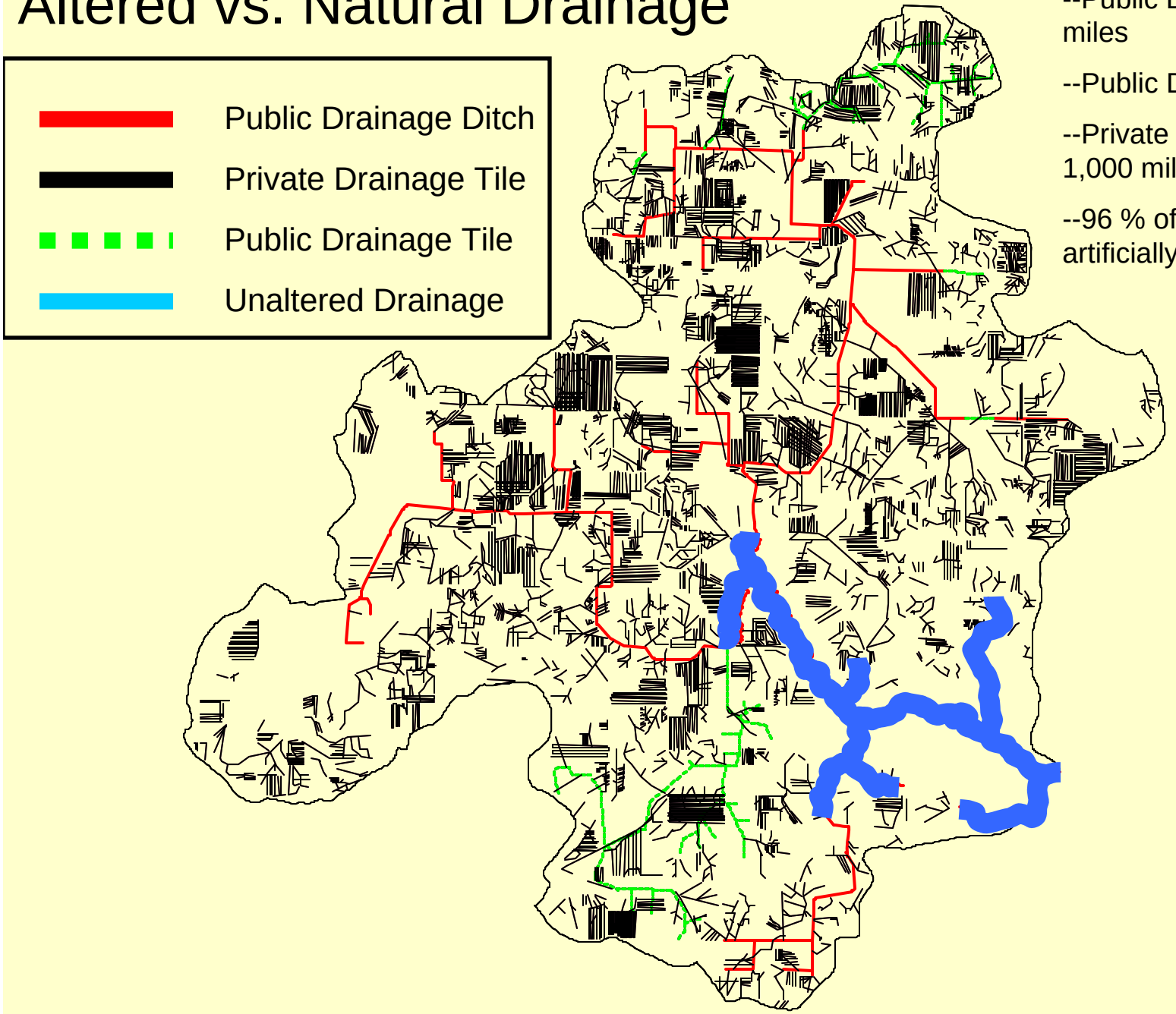

2,042 acres
1961
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0


1,662 acres
1968
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0


1,372 acres
1978
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0


1,307 acres
1985
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

Altered vs. Natural Drainage

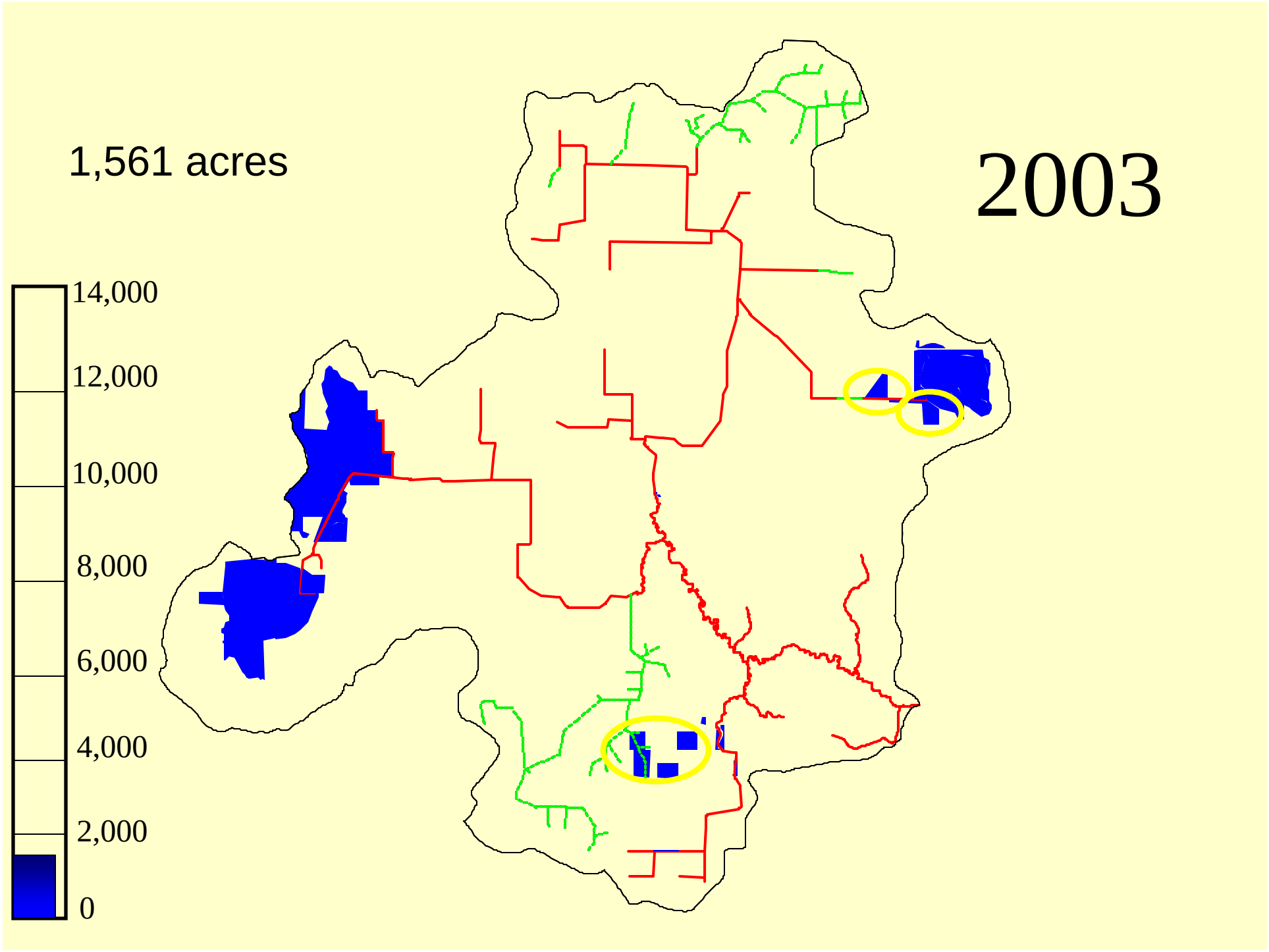


--Public Drainage Ditch = 33 miles

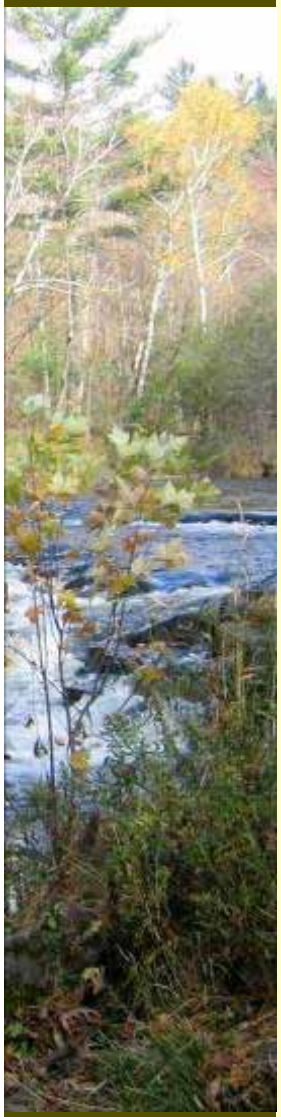
--Public Ditch Tile = 15 miles

--Private Tile Lines = ~ 600-1,000 miles

--96 % of cultivated land is artificially drained

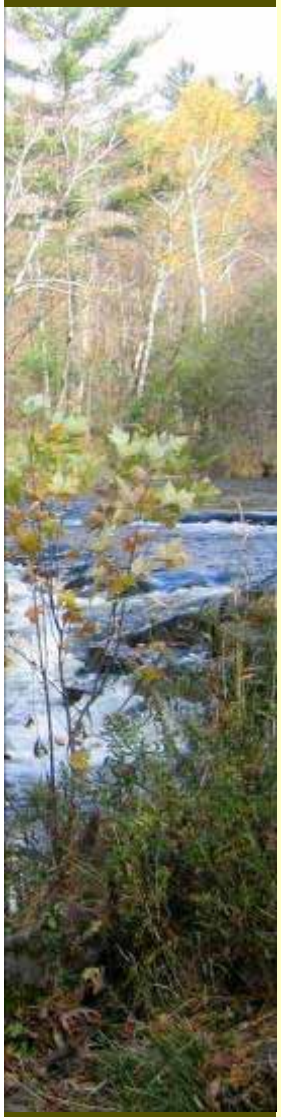

1,561 acres
2003
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

Agricultural Land Use



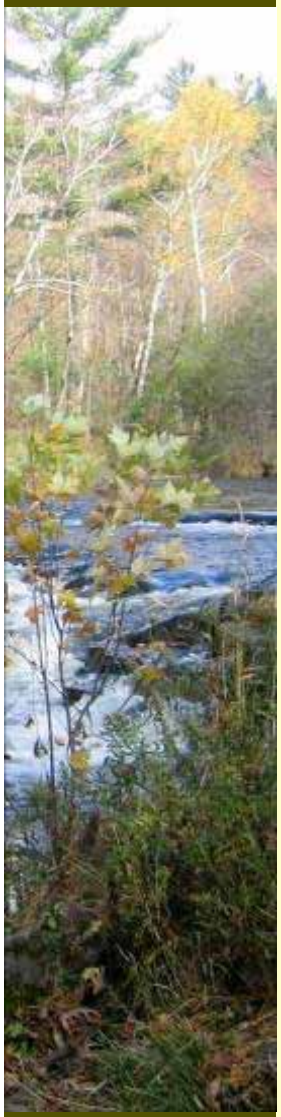
- *Agricultural LU Strategy 3:* Reduce upland and gully erosion through soil conservation practices
  - 3A. Invest in education and incentive programs that target landowners in critical sediment source areas
  - 3B. Investigate the feasibility of developing or amending policy to phase in outcome-driven, practice-flexible soil and water conservation plans for all farms with potential to deliver sediment and nutrients to water bodies

Agricultural Land Use



- *Agricultural LU Strategy 4:* Enable improved design and targeting of conservation through improved and timely data collection and distribution
  - 4A. Invest in basic information to support soil and water protection
    - LIDAR
    - Statewide land cover
    - Maps of artificial drainage network
    - Annual crop residue survey

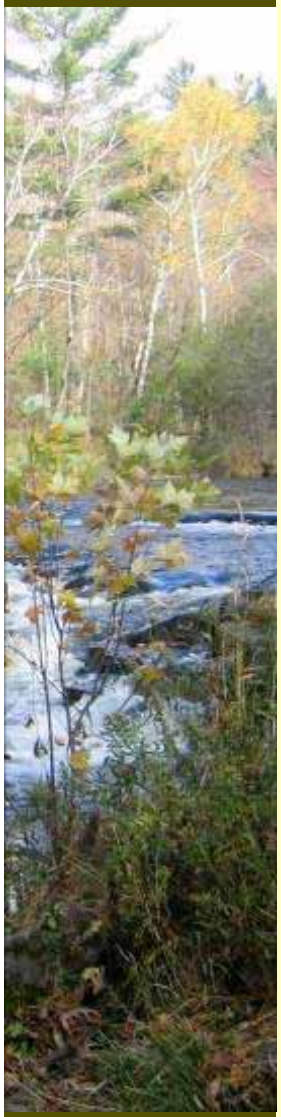
Agricultural Land Use



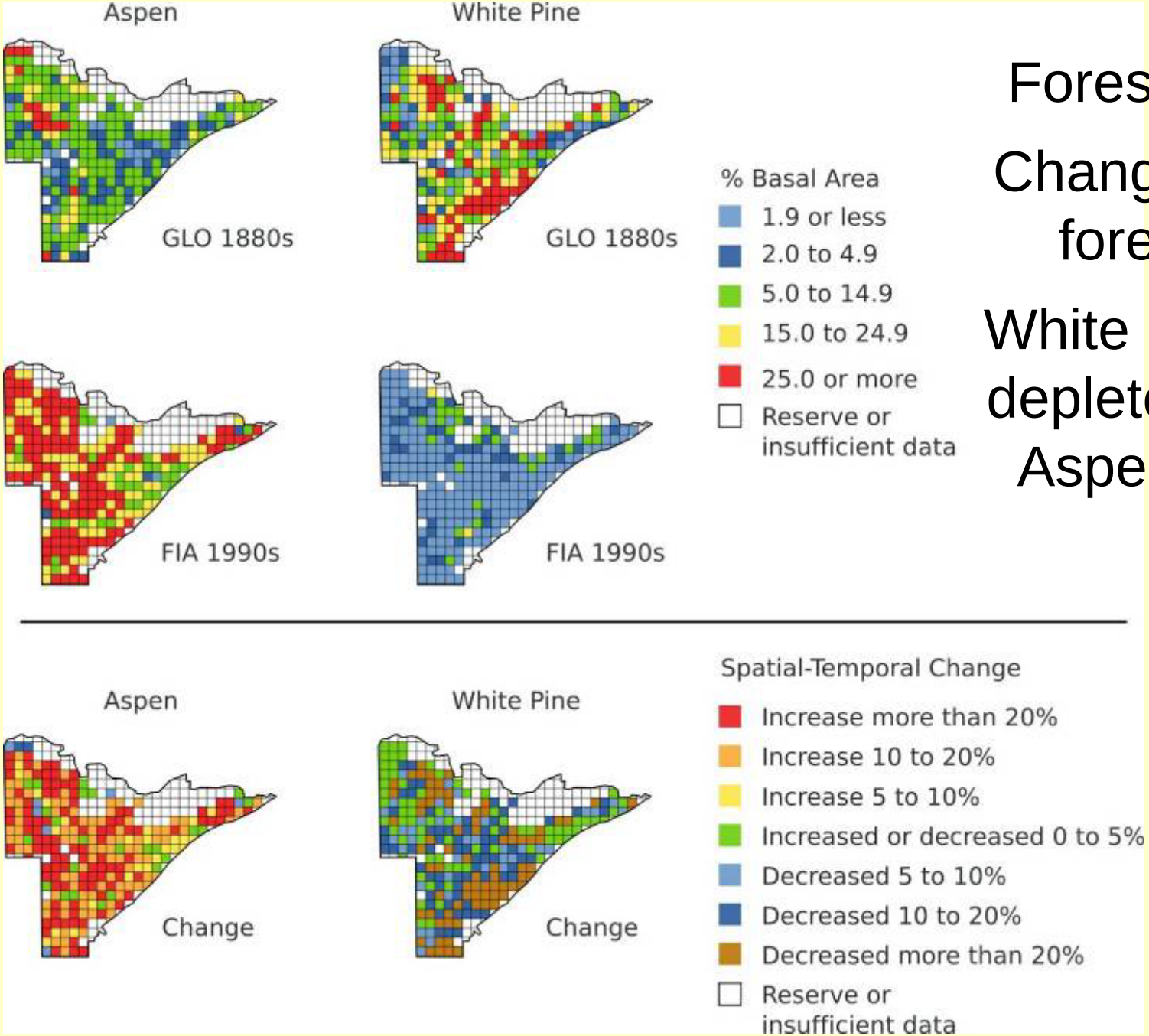
- *Agricultural LU Strategy 5:* Increase protection of important agricultural lands in local land use planning.

  Integrated into state land use, natural resource, and investment guide and conservation-based planning recommendations

Forestry Land Use: Key trends



- Timber industry restructuring
  - Shift out of corporate ownership to individuals
- Forest ownership changes/parcelization
  - Decreasing size of parcels being sold
- Development and forest conversion

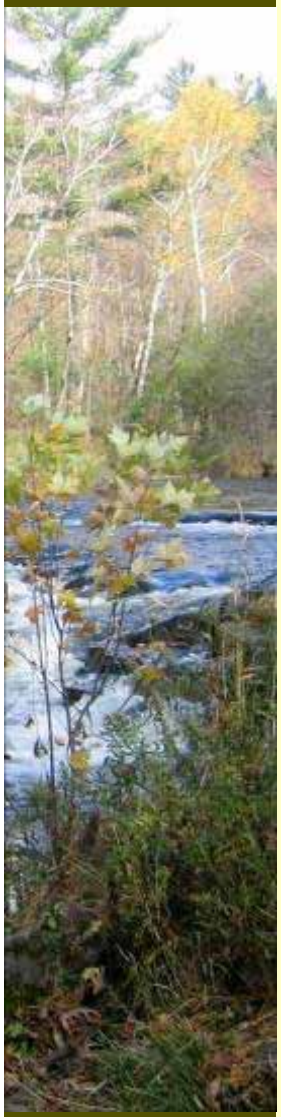


Forestry trends:

Change in native forest cover

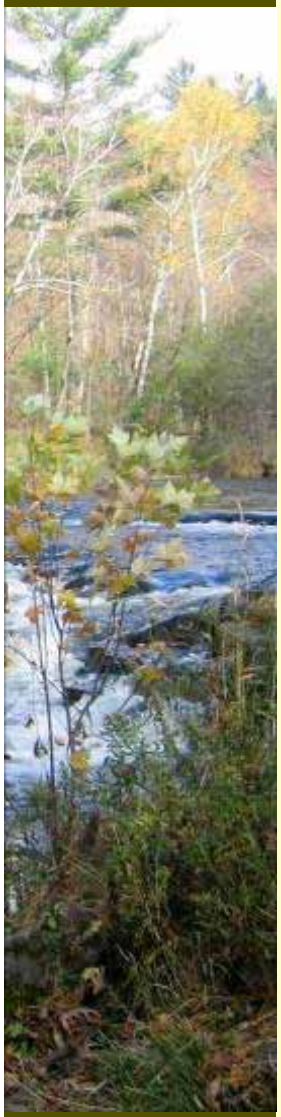
White Pine nearly depleted allowing Aspen to thrive

Forestry Land Use



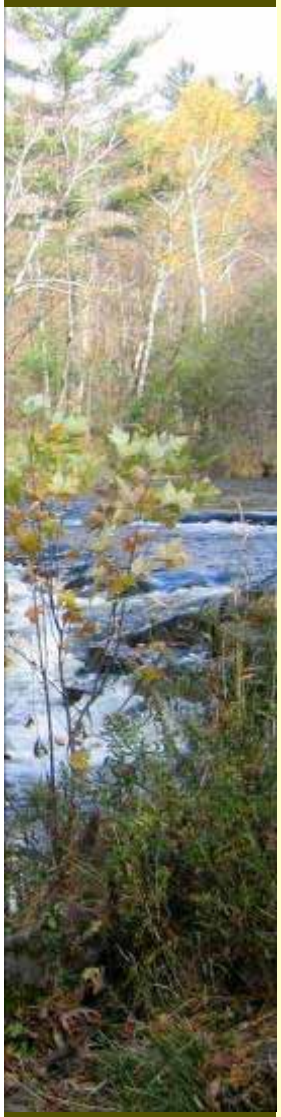
- *Forestry 1:* Protect large blocks of forested land
  - Identify forest lands for protection particularly lands under threat of parcelization and blocks near large blocks of protected forested lands
  - Support and promote permanent protection of working forest lands

Forestry Land Use



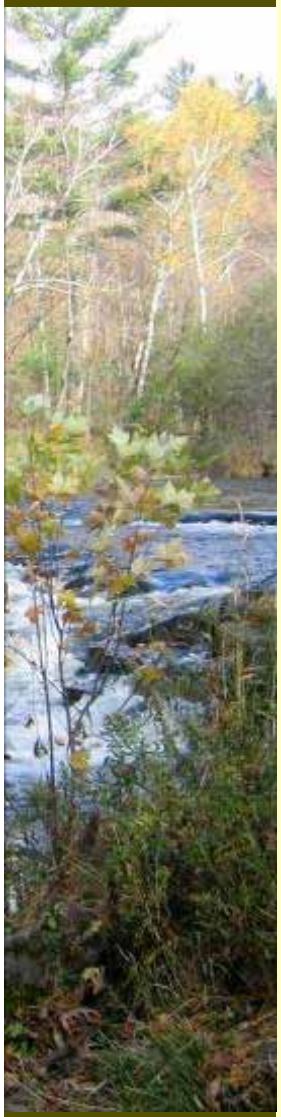
- *Forestry 2:* Assess tools for forest land protection
  - Assess for effectiveness for forest land protection
  - Assess the variety of tools: fee purchase, conservation easements, sustainable management
  - Create a “toolbox” approach to match the best tool with the protection need

Forestry Land Use



- *Forestry 3:* Support and expand sustainable practices on working forested lands
  - Build on Minnesota's history of supporting sustainable practices through the voluntary guidelines
  - Educate consumers to increase demand
  - Educate landowners

Forestry Land Use



- *Forestry 3:* Support and expand sustainable practices on working forested lands
  - Provide incentives
  - Develop and test new management practices for ecosystem resilience
  - Support use of fire to increase forest health and biodiversity

Thank You!

INSTITUTE ON THE
ENVIRONMENT

UNIVERSITY OF MINNESOTA

C R Planning
Community Resources

Bonestroo