Minnesota Statewide Conservation and Preservation Plan

Land & Aquatic Habitat Team

7/9/08

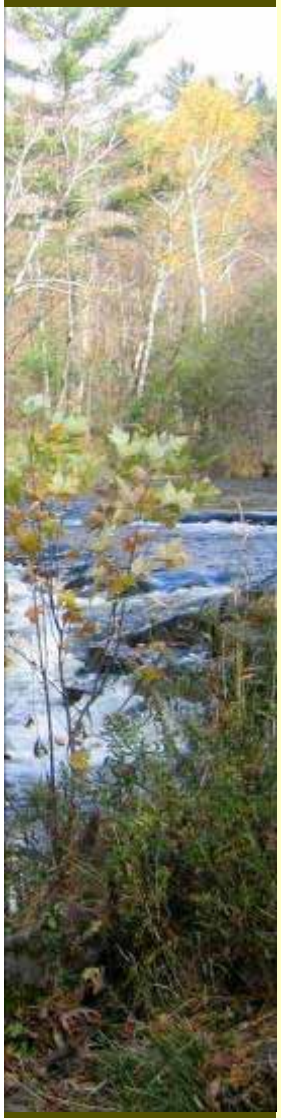
INSTITUTE ON THE ENVIRONMENT

UNIVERSITY OF MINNESOTA

CR Planning Community Resources

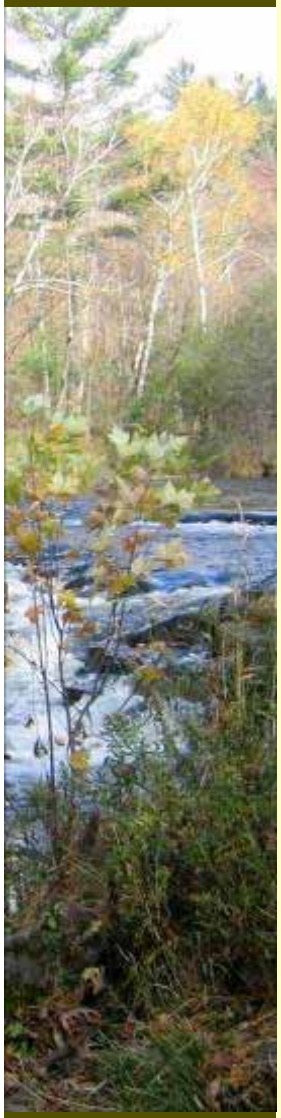
Bonestroo

Presenters



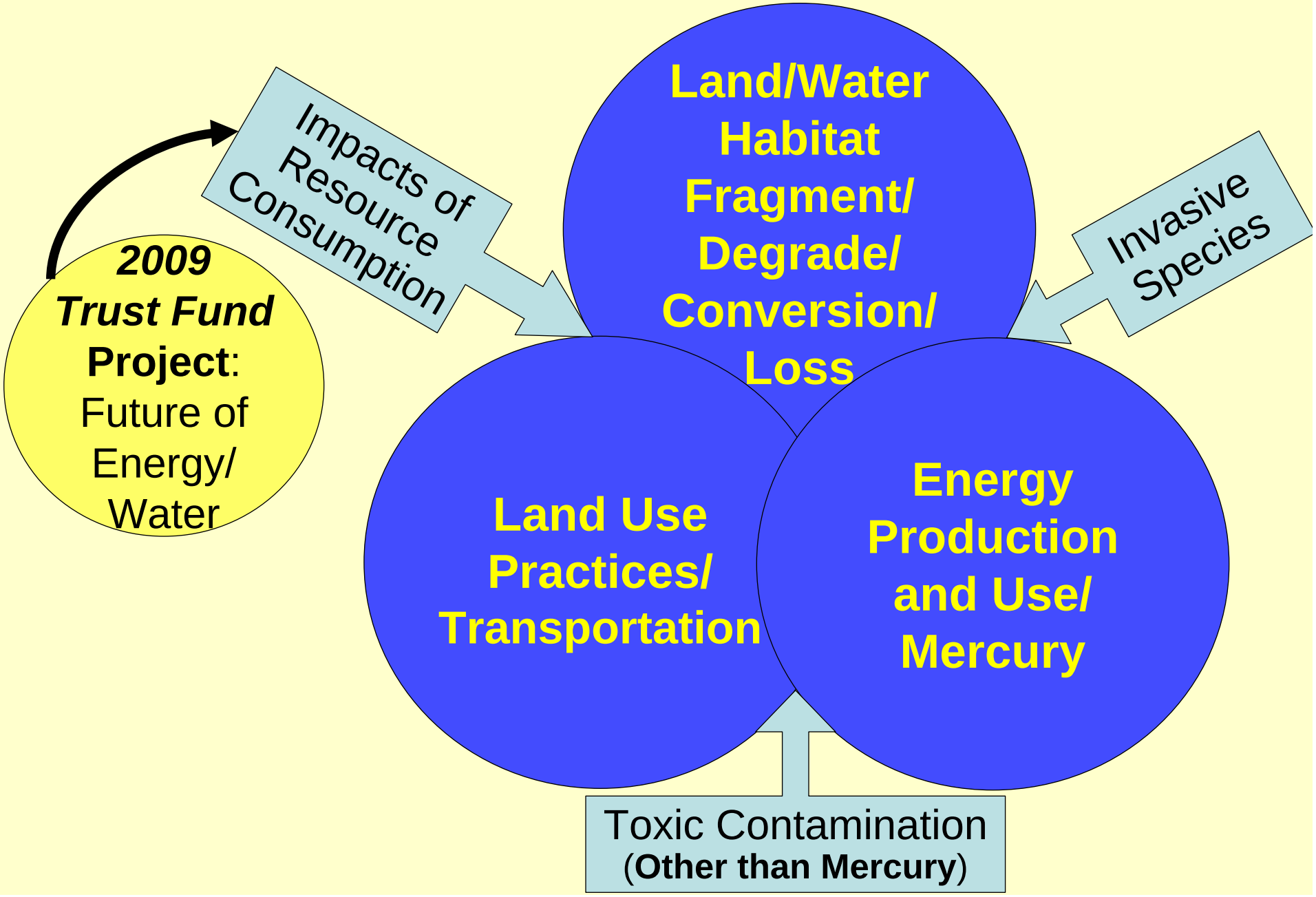
- Deb Swackhamer, Univ. of Minnesota
- Jerry Niemi, Univ. of Minnesota NRRI
- Anne Kapuscinski, Univ. of Minnesota
- George Host, Univ. of Minnesota NRRI

Goals of the Project

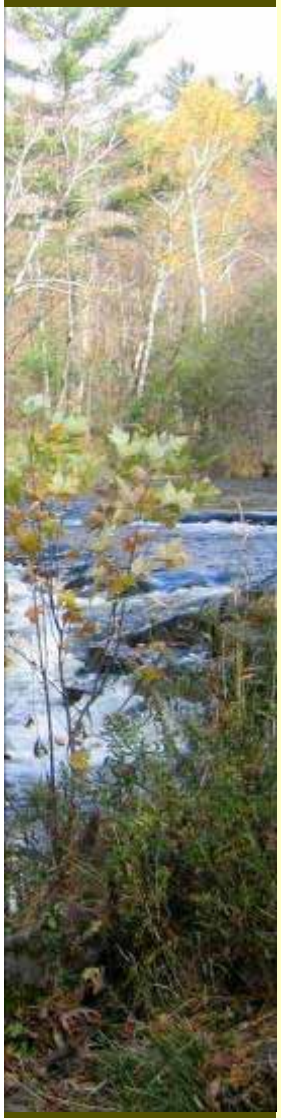


- Comprehensive inventory and assessment of Minnesota's environment and natural resources
- Review, analyze, integrate, & build upon existing information and plans pertaining to Minnesota's environment and natural resources
- Identify & prioritize important issues and trends affecting MN's environment and natural resources
- Develop and prioritize recommendations for strategies to best address issues and trends

Issue integration: Phase II and beyond

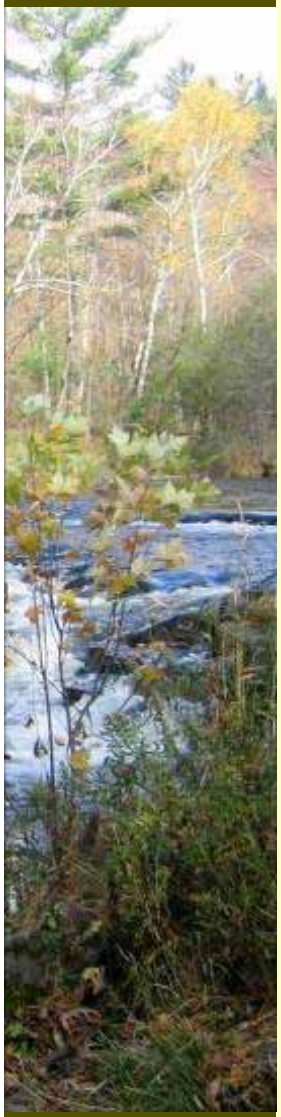


Phase II Products



- Priority area mapping
- Recommended conservation strategies
- Trend analysis supporting recommendations
- Evaluating conservation strategies

Framework for Integrated Resource Conservation and Preservation



Integrated Planning

Critical Land Protection

Land and Water Restoration

Sustainable Practice

Economic Incentives for Sustainable Society

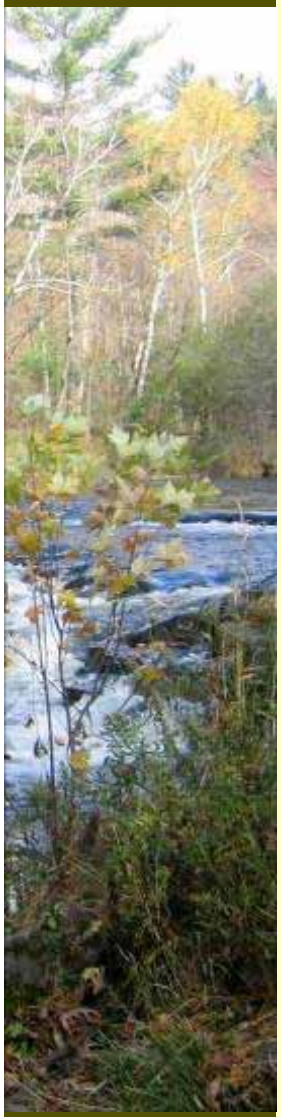
Knowledge Infrastructure

Natural Resource Values Assessment of Recommendations

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

	Number	Recommendation
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 entities 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 perennial 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 groundwaters 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 and Aquatic Habitat Conservation: Products



- Identify/map critical land & aquatic areas necessary to maintain/improve:
  - Water quality
  - Biodiversity
  - Sustainable outdoor recreation
  - Quality of Minnesota habitats
- Identify strategies & policies needed to maintain or restore critical land & water areas

Habitat Team recommendations:

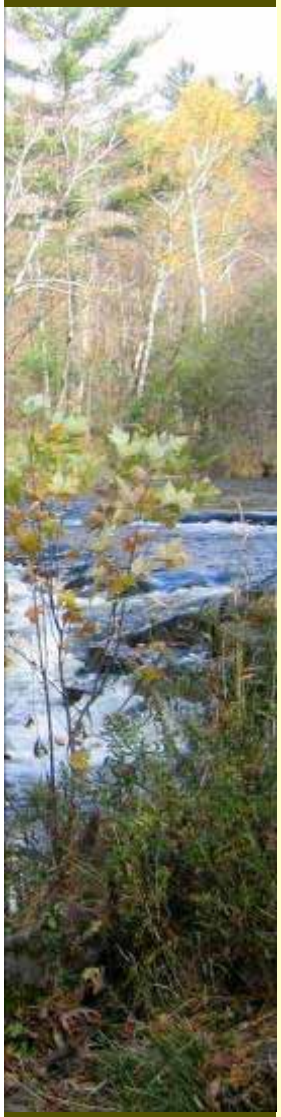
- Have potential impact on multiple drivers of change
- Operate at landscape and watershed scales
- Assist in adaptation to climate change

Natural Resource Values Assessment of Recommendations

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

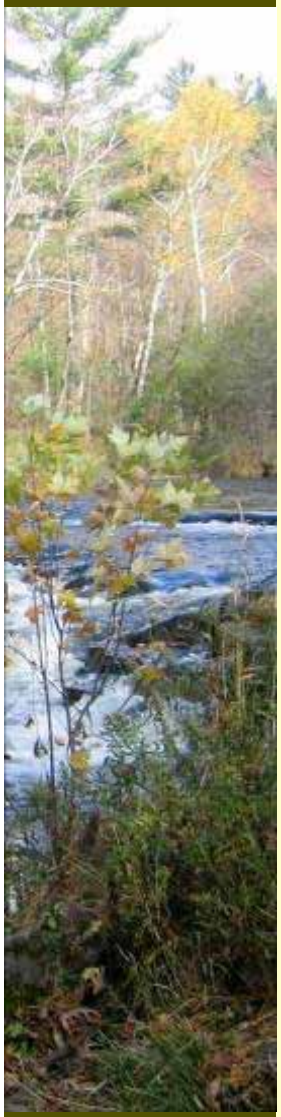
	Number	Recommendation	Air Quality	Water Quality/Quantity	Terrestrial Habitat Quality	Soil Quality	Human Health	Biodiversity	Aquatic Community Health	Economic Health	Recreational/Cultural/Aesthetic Value	Mitigation/Adaptation	Climate Change
HABITAT	Habitat 2	Protect critical shorelands of streams and 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	○	◐	◐	○	●	◐	○	◐	●	●	○

Mapping habitat quality: Methods and results



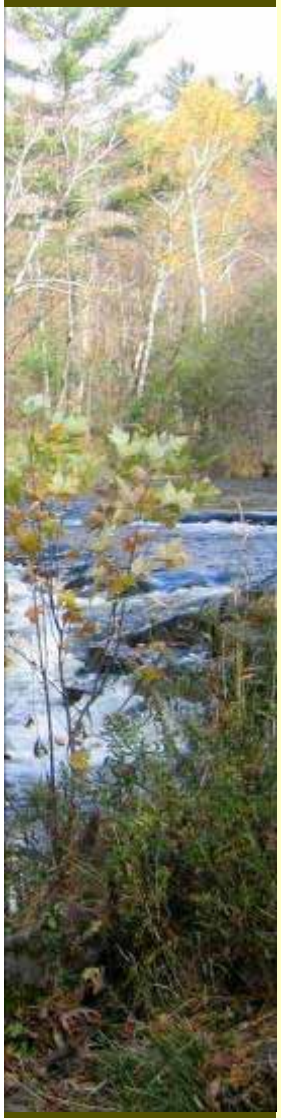
- Goal: to prioritize important areas for conservation
- Statewide
- Use existing information
- Integrative – analyzes both positive (resources) and negative (threats to resources) information

What makes this study unique



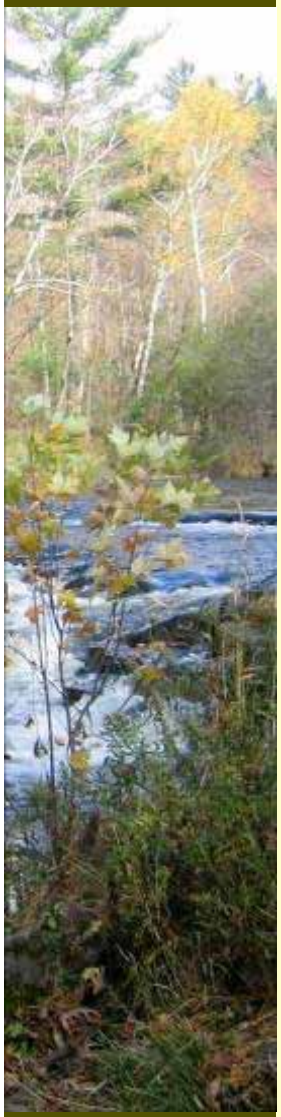
- Collaboration with major natural resource management agencies provided access to most comprehensive and up-to-date data sets and expert knowledge
- Highly integrated data sets
- View across the spectrum of terrestrial and aquatic resources

Data used



- High resolution (30 meter cells) for most data sets
- Terrestrial data summarized by township (2,543)
- Aquatic data summarized by lakeshed (2,746)
- High resolution offers opportunity to conduct more specific or localized analysis

Terrestrial data
Resources and threats to resources



- Sites of Biodiversity Significance
- DNR GAP layers
  - Species of Greatest Conservation Need (SGCN)
  - Game species
  - Habitat
  - Land Stewardship
- USFWS bird potential habitat models
- CRP lands
- Wildland urban interface/intermix
- Road density
- Housing density and density change

Priorities analyzed for each Ecological Subsection

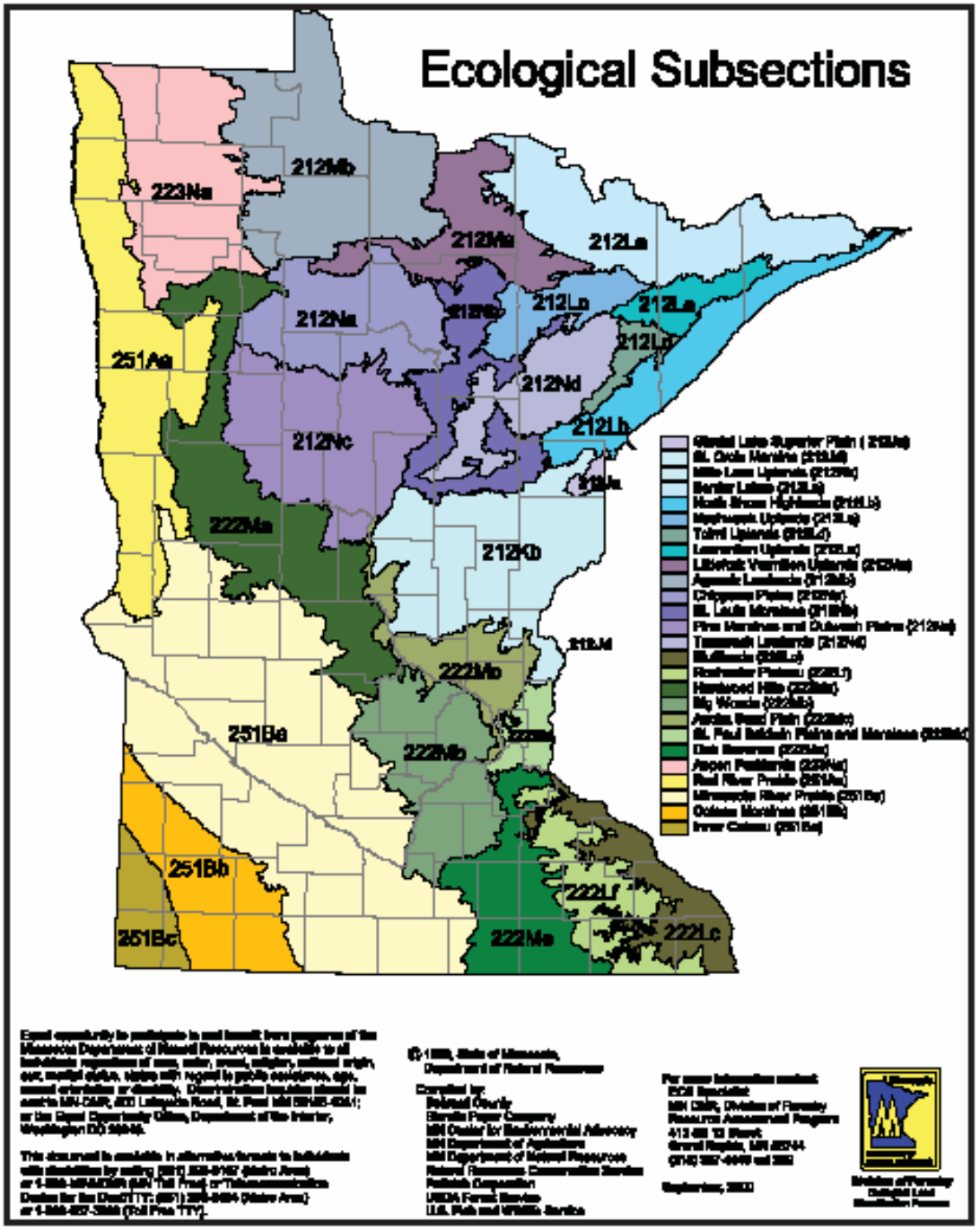


Figure H1. Minnesota Ecological Subsections. Credit: MnDNR.

MCBS Site of Biodiversity

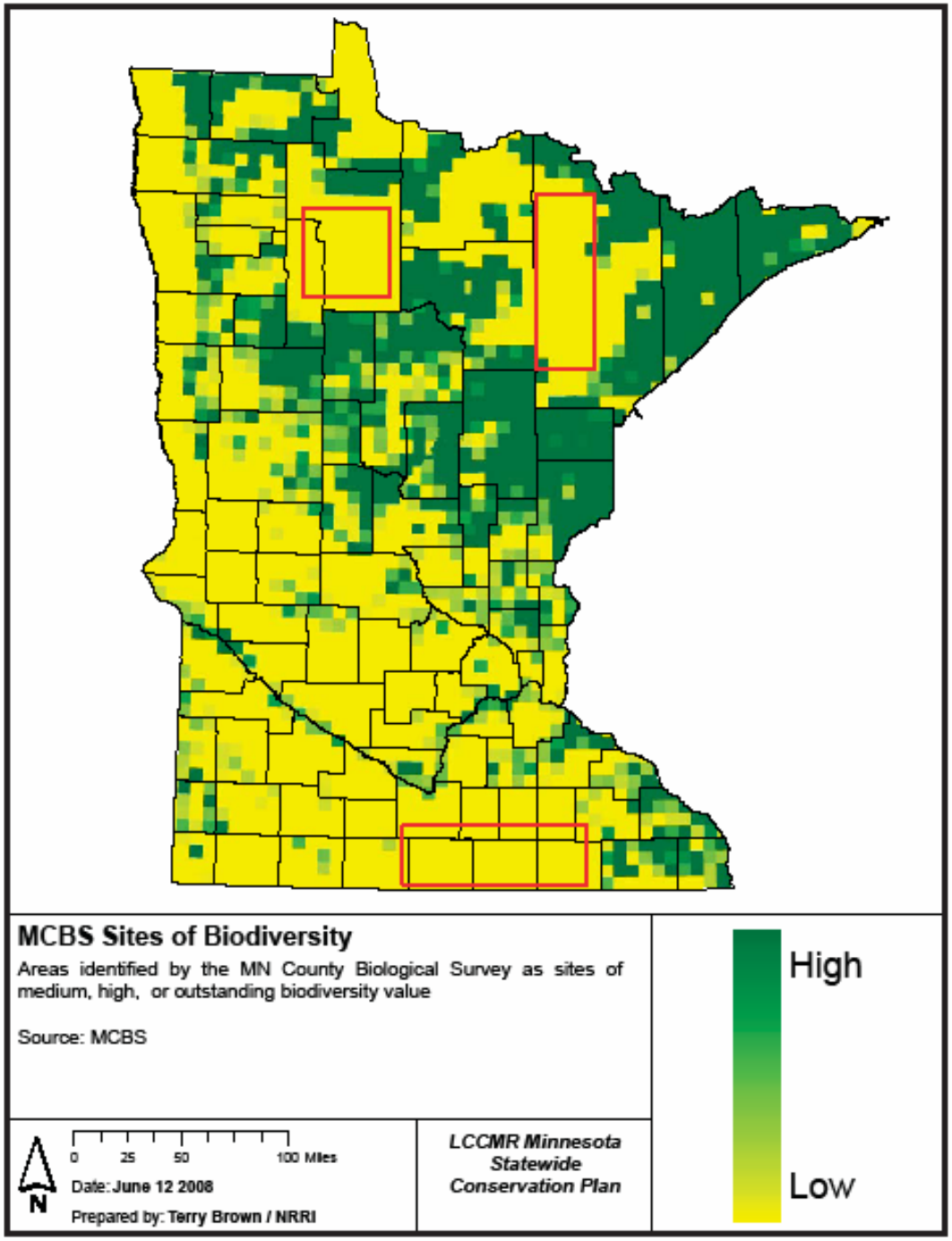


Figure H2. MCBS Sites of Biodiversity. Credit: Terry Brown, Natural Resources Research Institute.

Potential species richness based on habitat

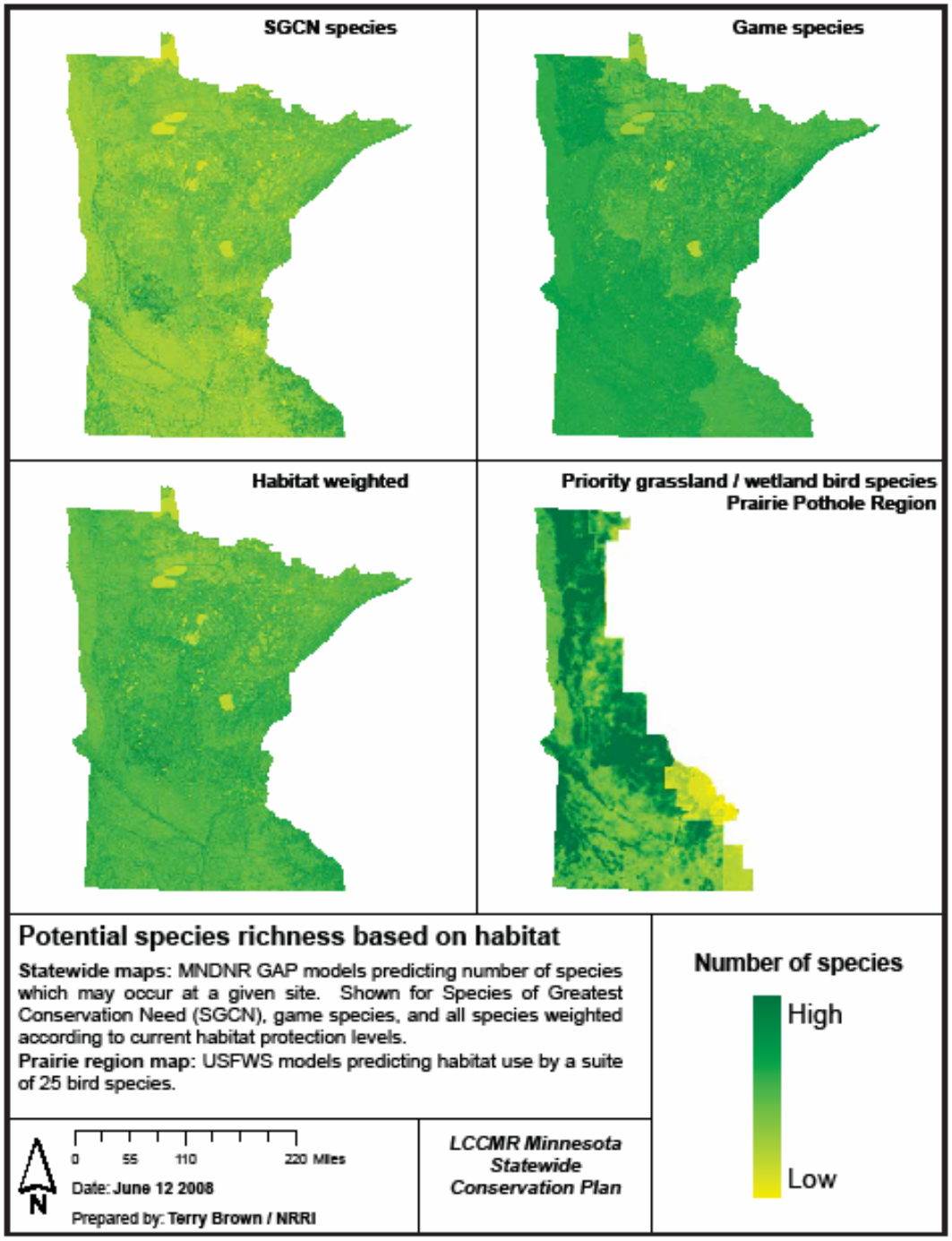


Figure H3. Potential species richness based on habitat. Credit: Terry Brown, Natural Resources Research Institute.

Land status:

CRP

Wild/urban interface

Wild/urban intermix

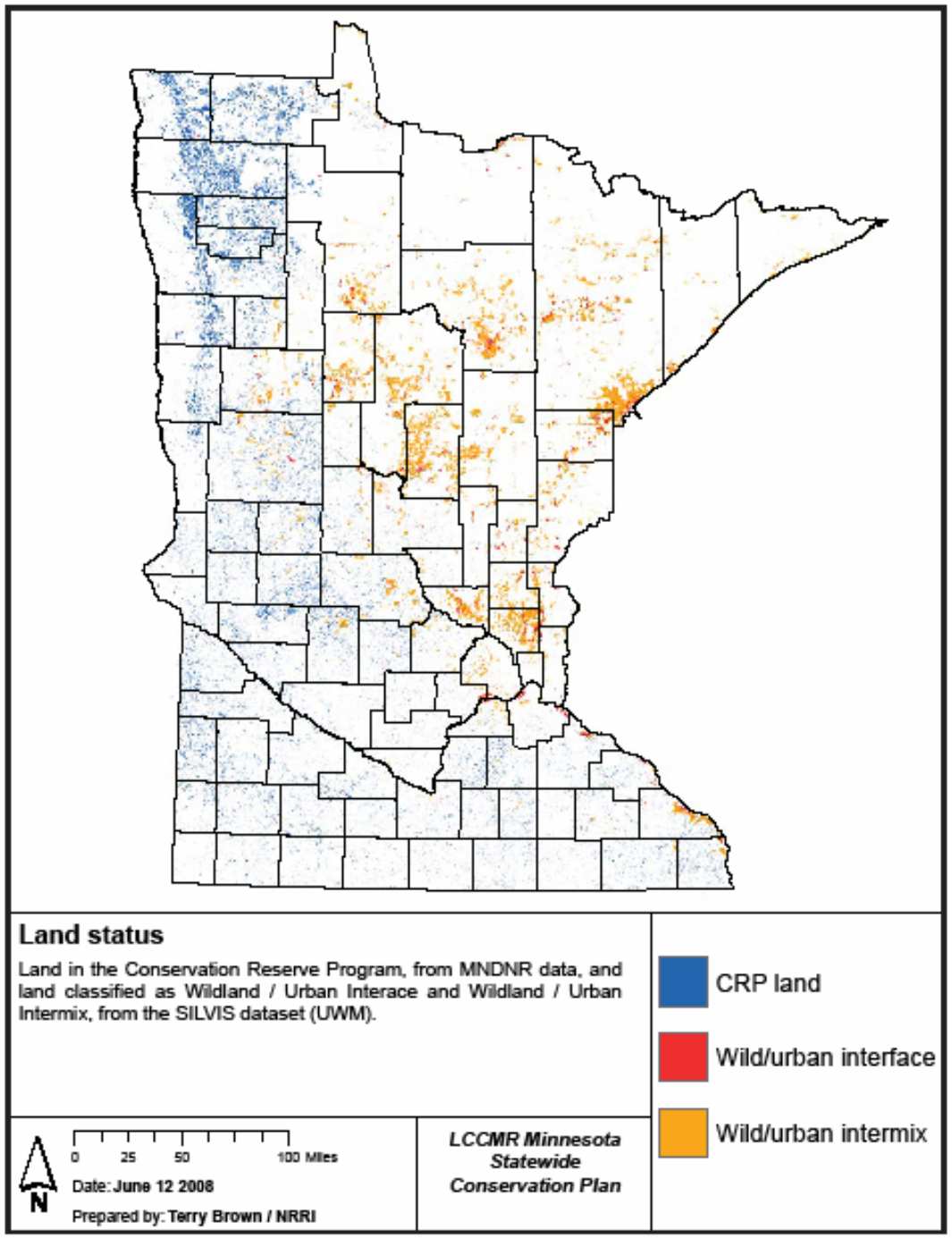


Figure H4. Land Status. Credit: Terry Brown, Natural Resources Research Institute.

Road density index by township

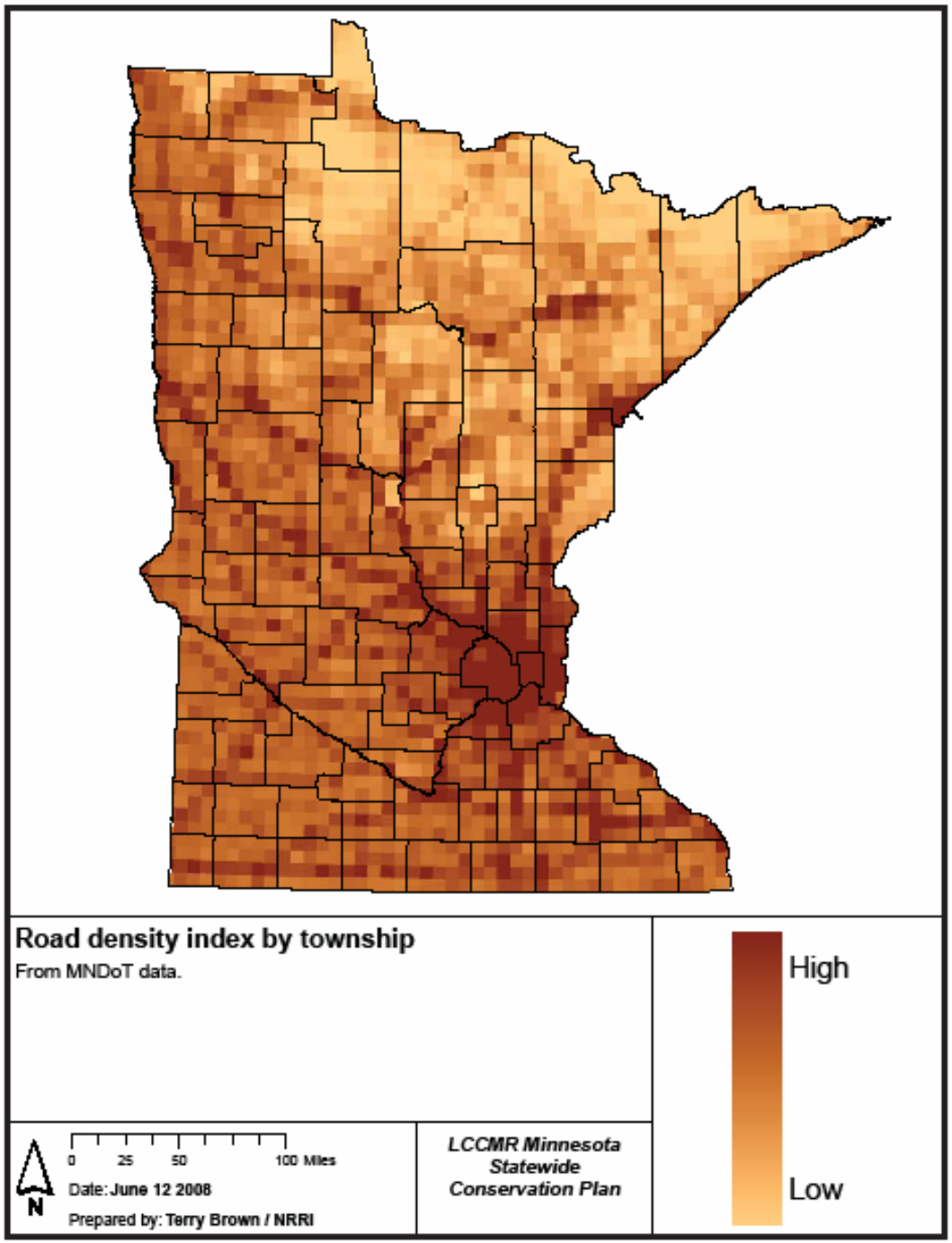


Figure H5. Road density index by township. Credit: Terry Brown, Natural Resources Research Institute.

Population/ housing density

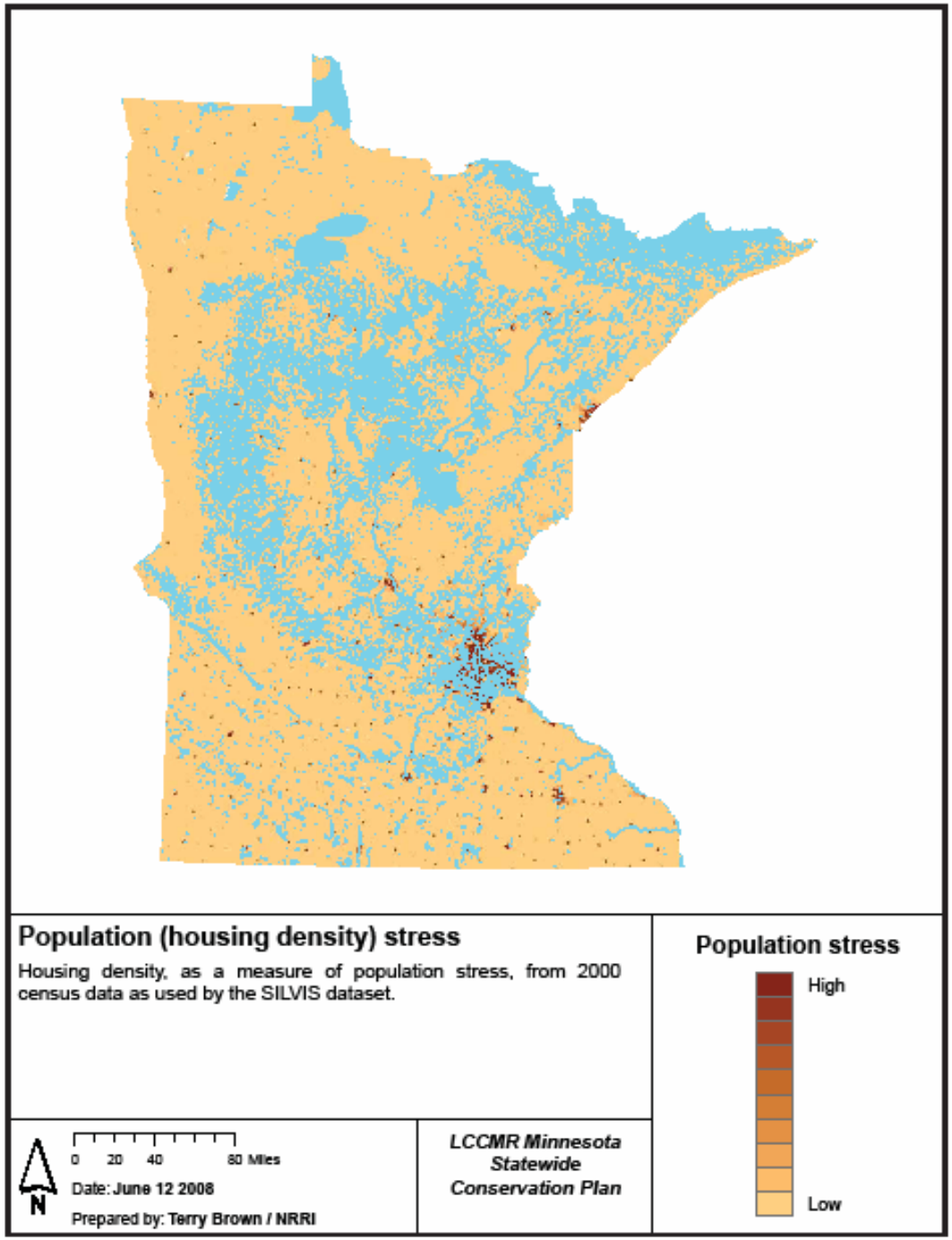
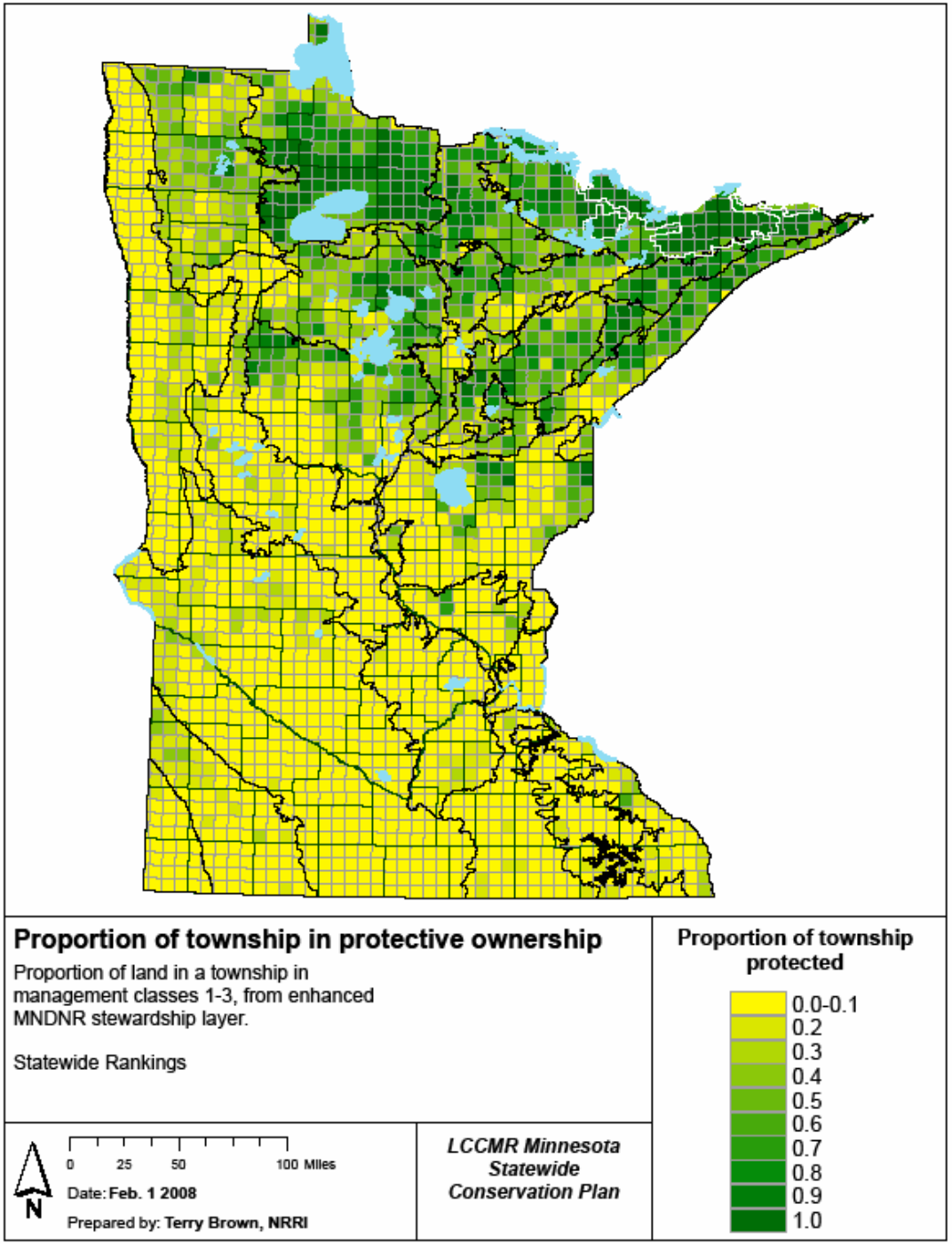


Figure H6. Population (housing density) stress. Credit: Terry Brown, Natural Resources Research Institute.

Proportion of township in protective ownership



Integrated terrestrial value scores

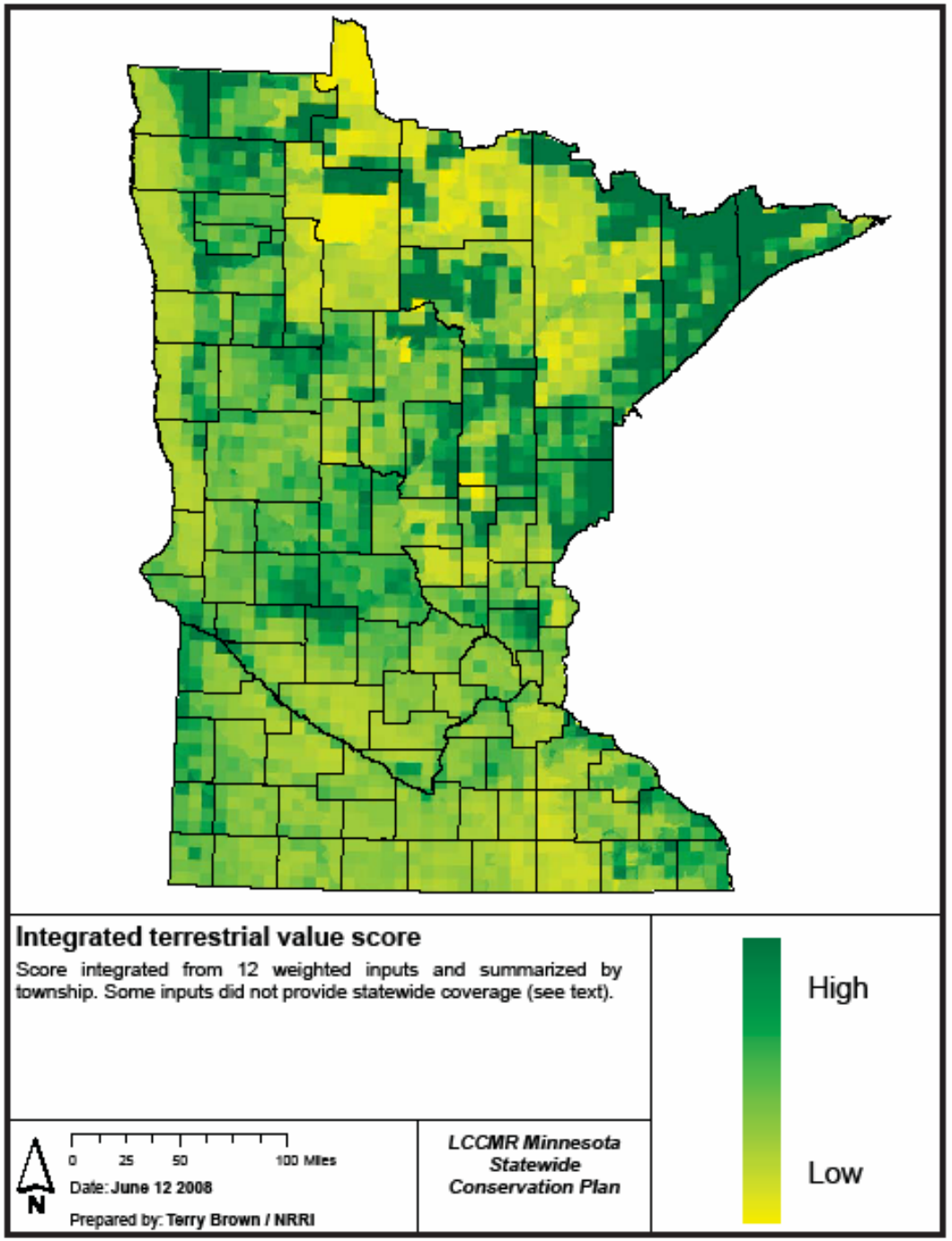


Figure H7. Integrated terrestrial value score. Credit: Terry Brown, Natural Resources Research Institute.

Vulnerable key habitat by township

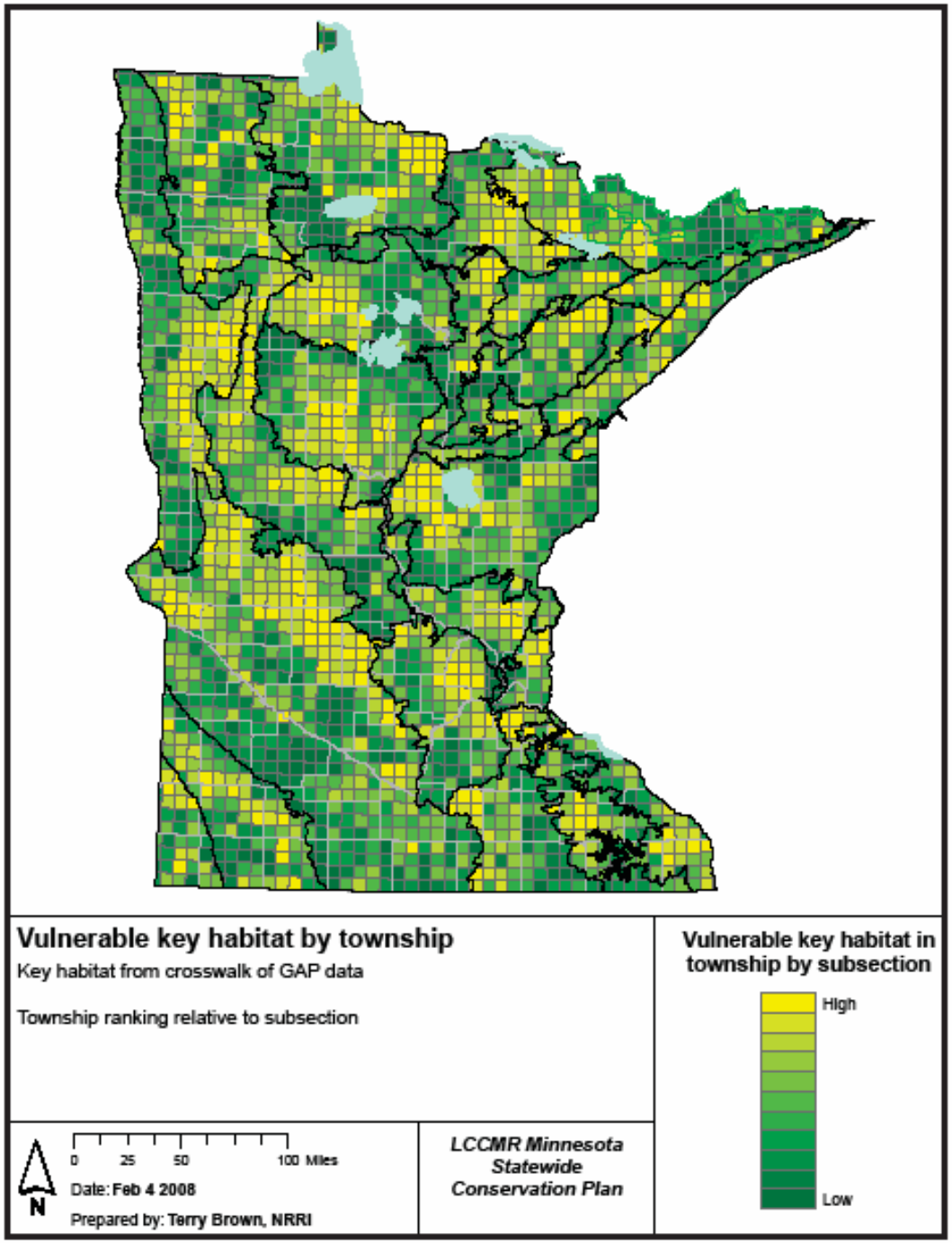
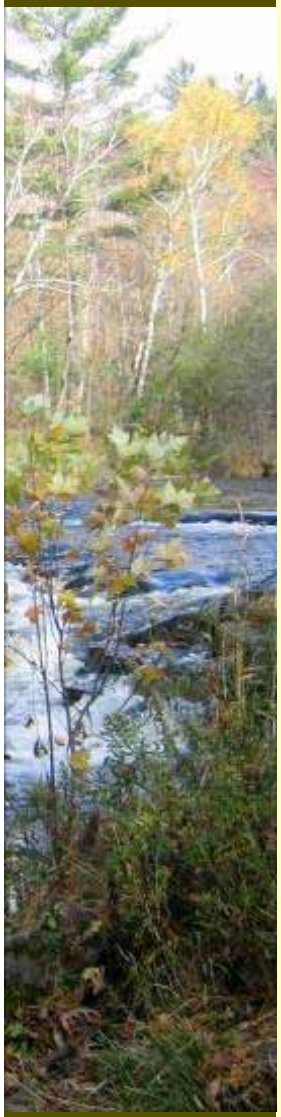


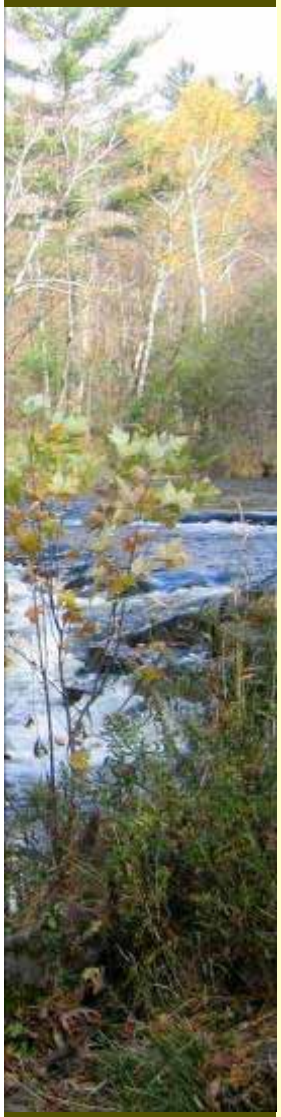
Figure H16. Vulnerable key habitat by township. Credit: Terry Brown, Natural Resources Research Institute.

Aquatic data – Resources



- Key rivers
- Wetland communities and habitat analysis
- Trout streams and trout lakes
- TNC portfolio lakes
- Sturgeon, walleye, cisco lakes
- Open water and wetlands
- Shallow, wildlife, waterfowl, and wild rice lakes

Aquatic data – Threats to resources



- Population density
- Road density
- Percent agriculture and urban lands in lakesheds
- Percent invasives in lakes

Integrated aquatic habitat quality index

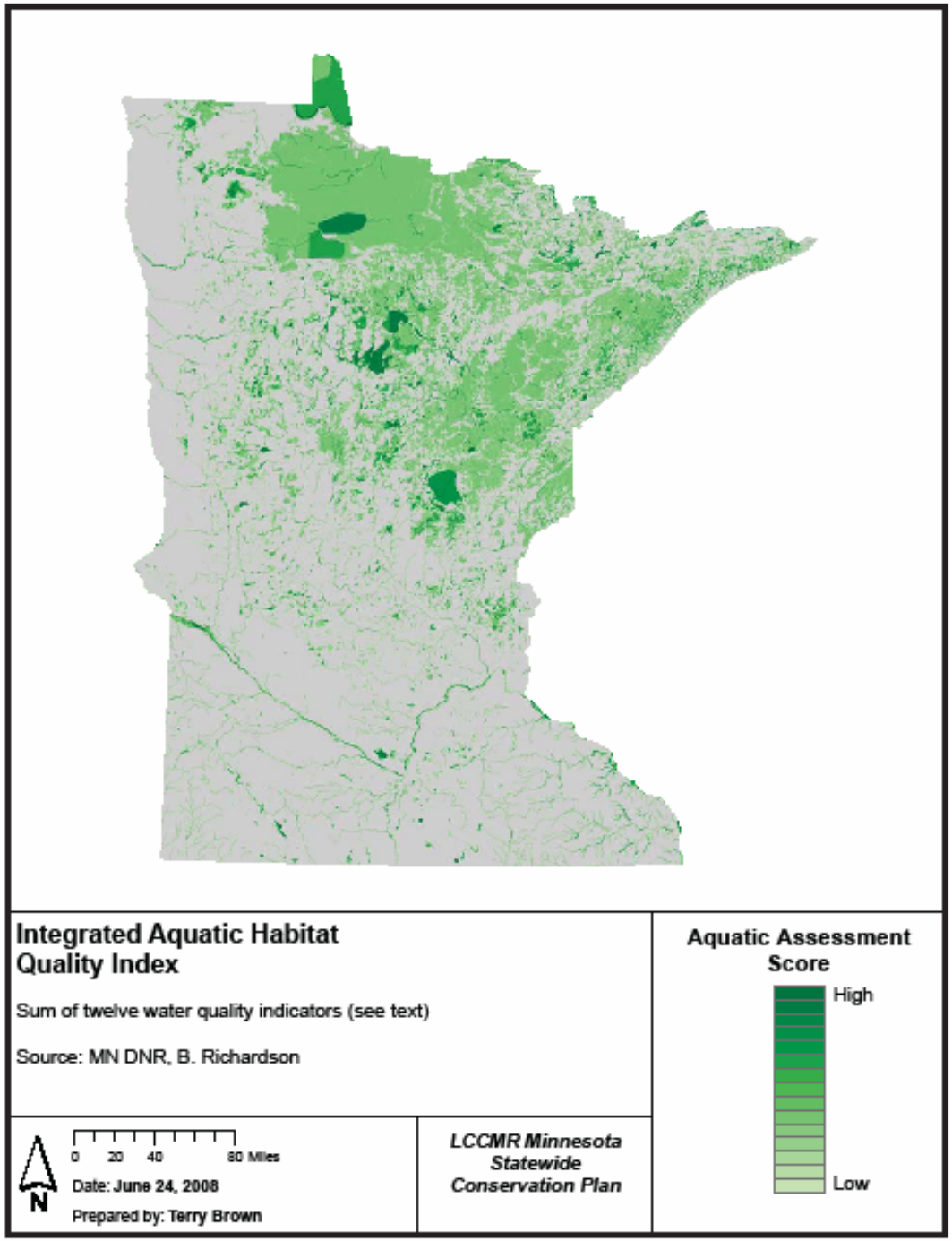


Figure H8. Integrated Aquatic Habitat Quality Index. Credit: Bart Richardson, MnDNR.

Integrated aquatic habitat scores

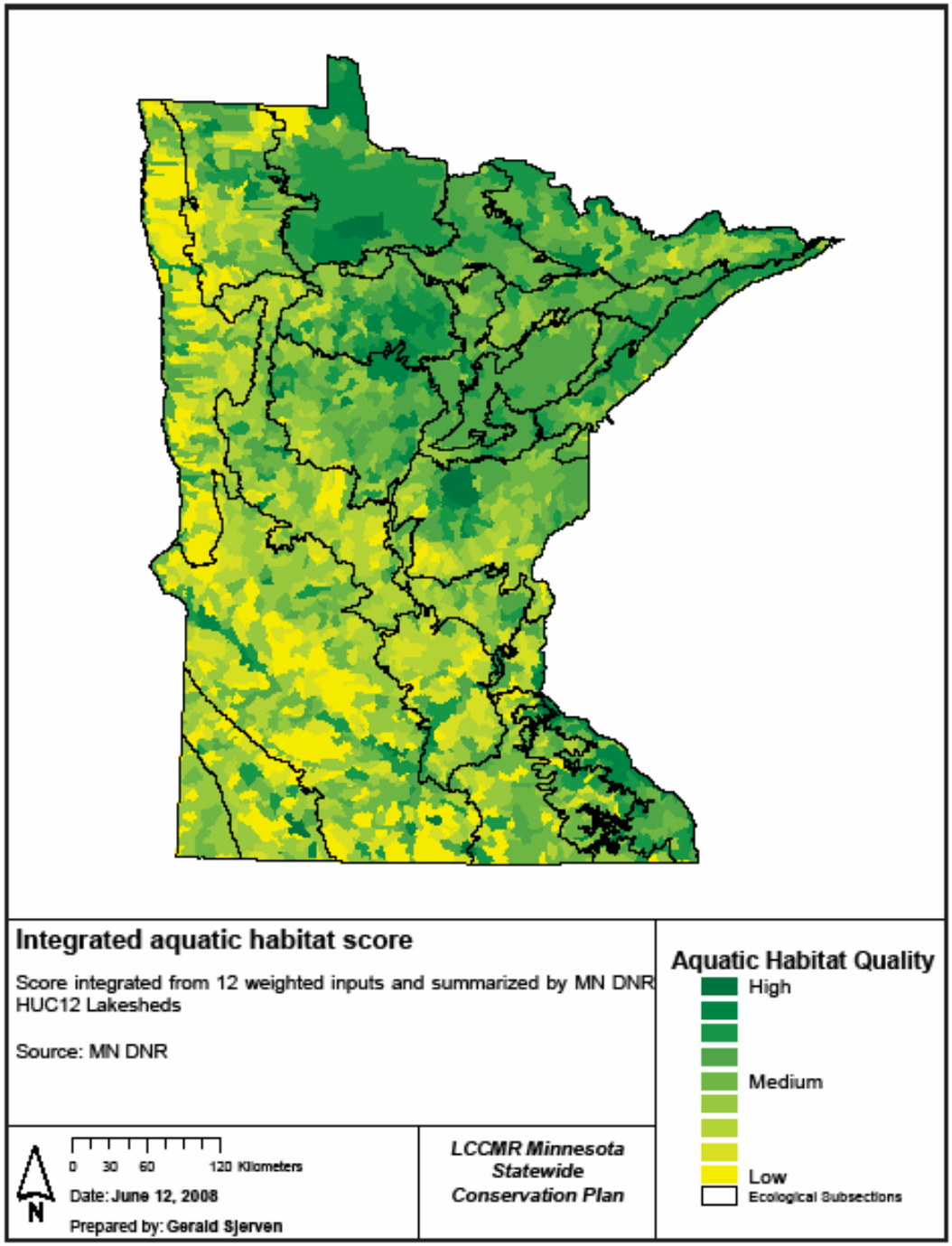


Figure H9. Integrated aquatic habitat score. Credit: Gerald Sjerven, Natural Resources Research Institute.

Housing density index

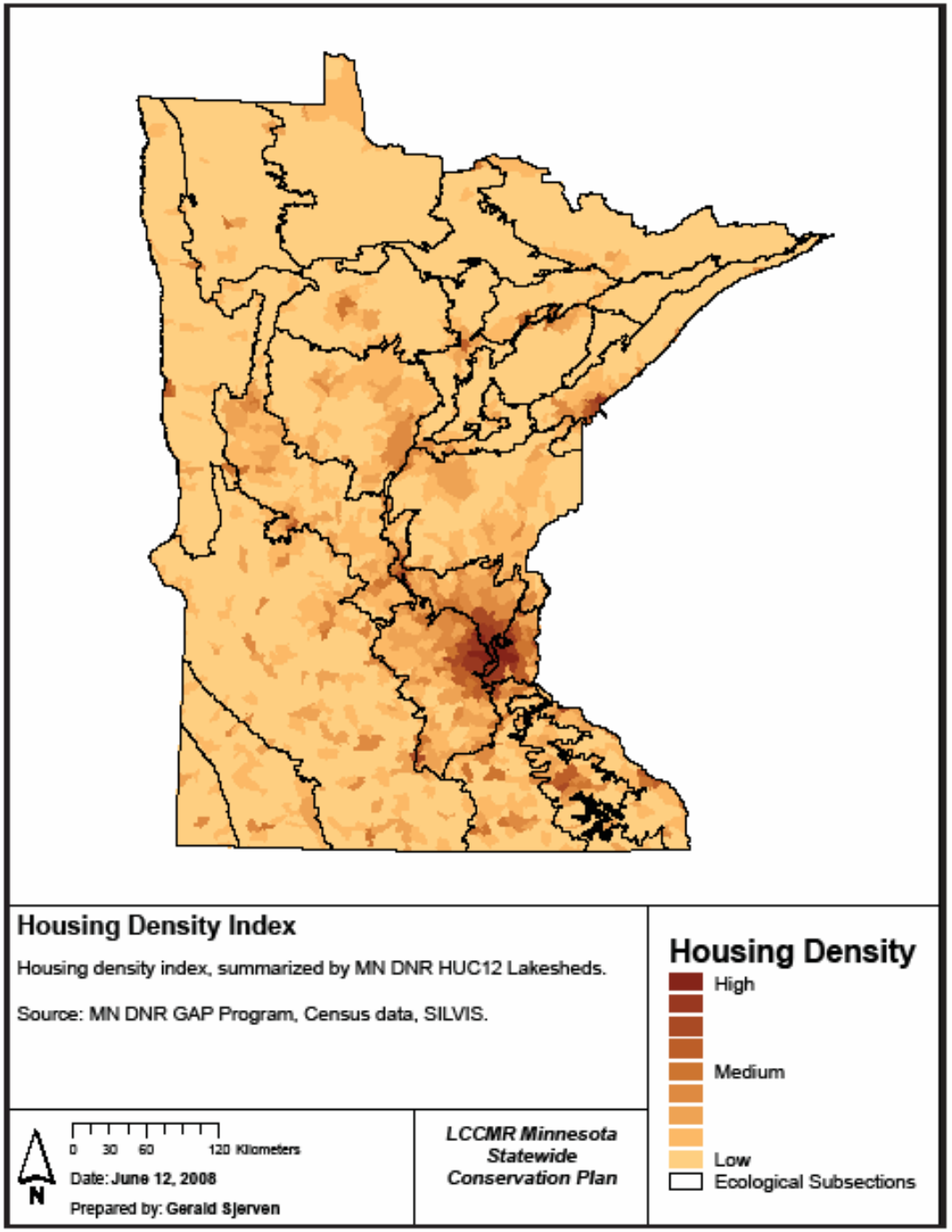


Figure H10. Housing Density Index. Credit: Gerald Sjerven, Natural Resources Research Institute.

Road density index

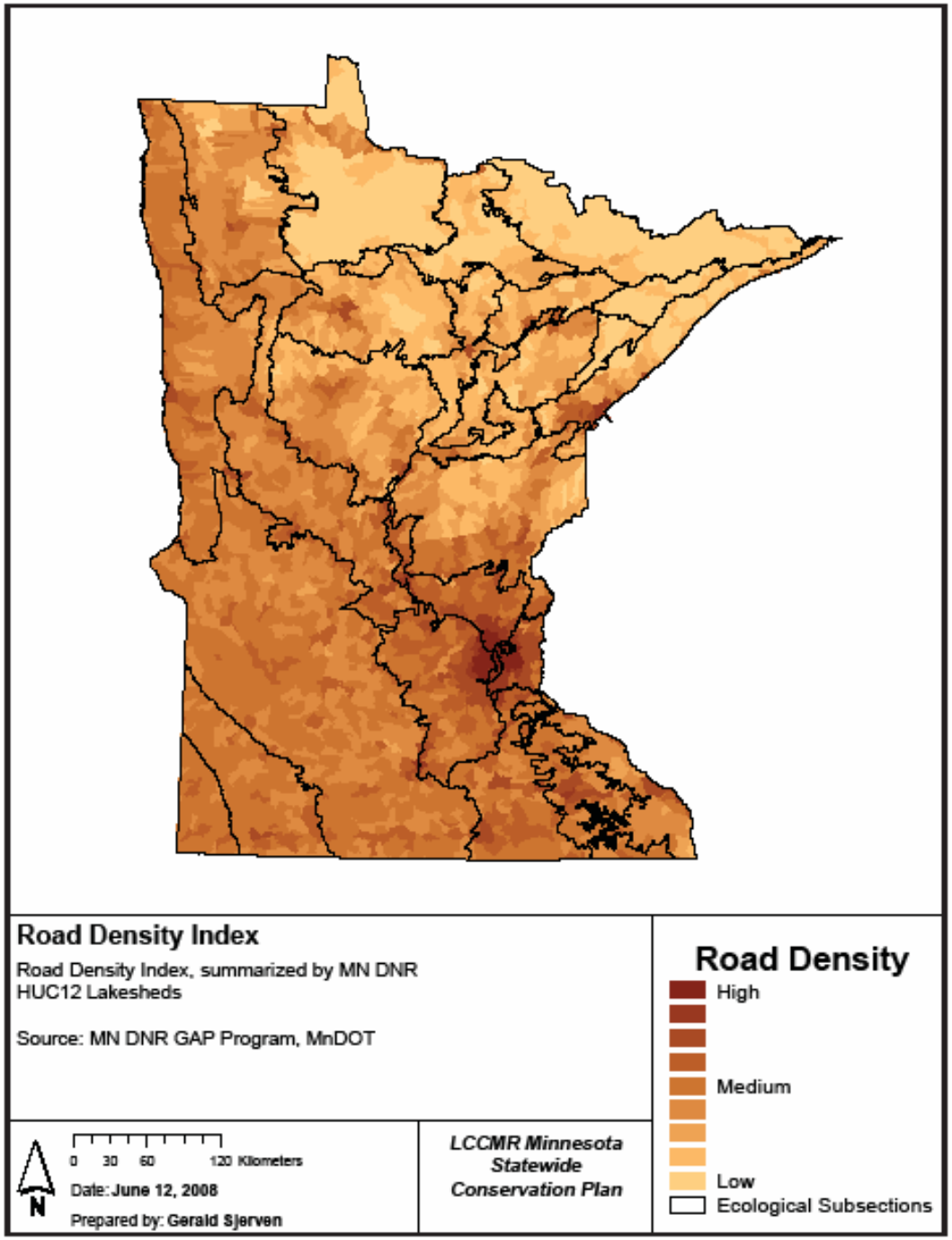


Figure H11. Road Density Index. Credit Gerald Sjerven, Natural Resources Research Institute.

Agricultural land use

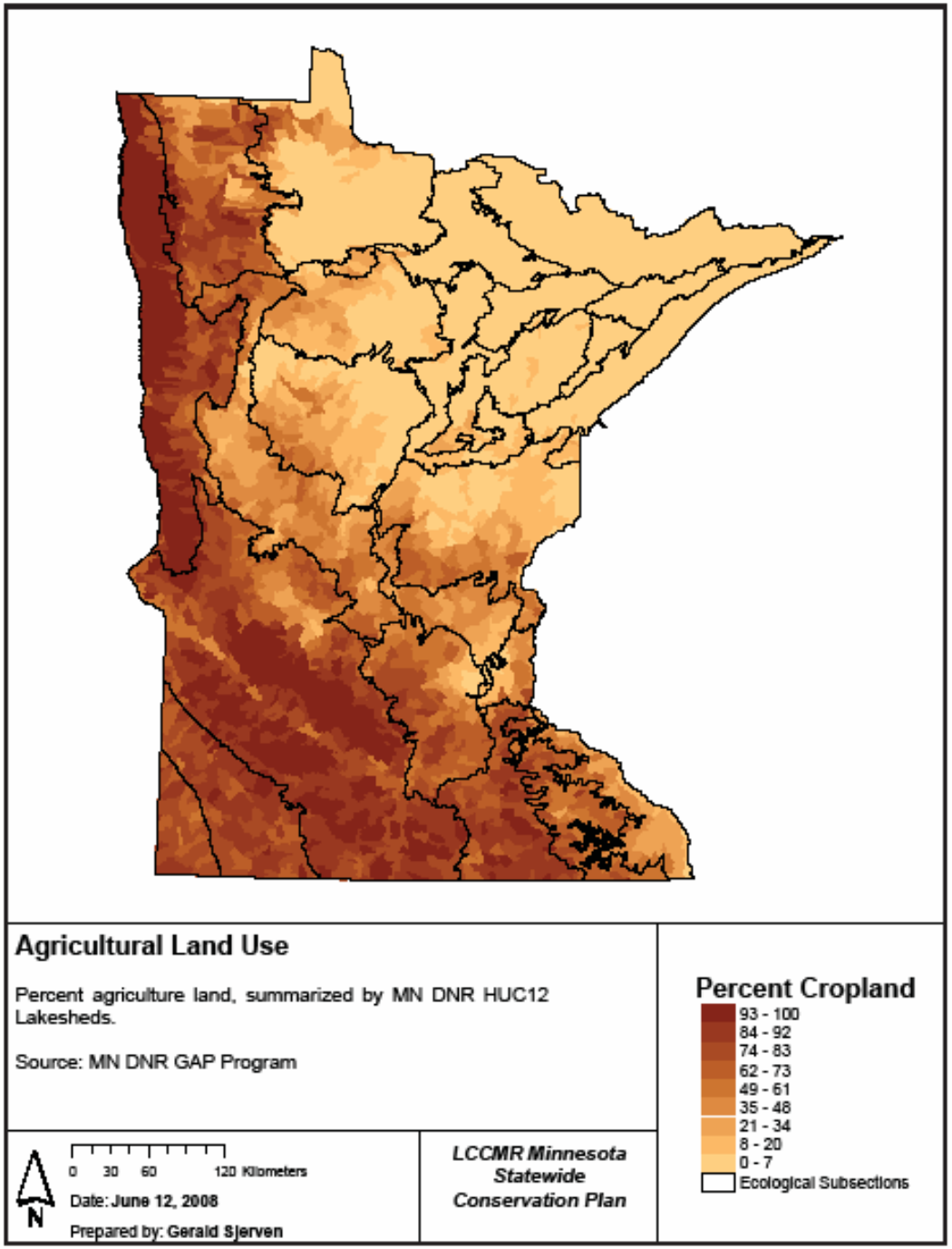


Figure H12. Agricultural land Use. Credit: Gerald Sjerven, Natural Resources Research Institute.

Urban land use

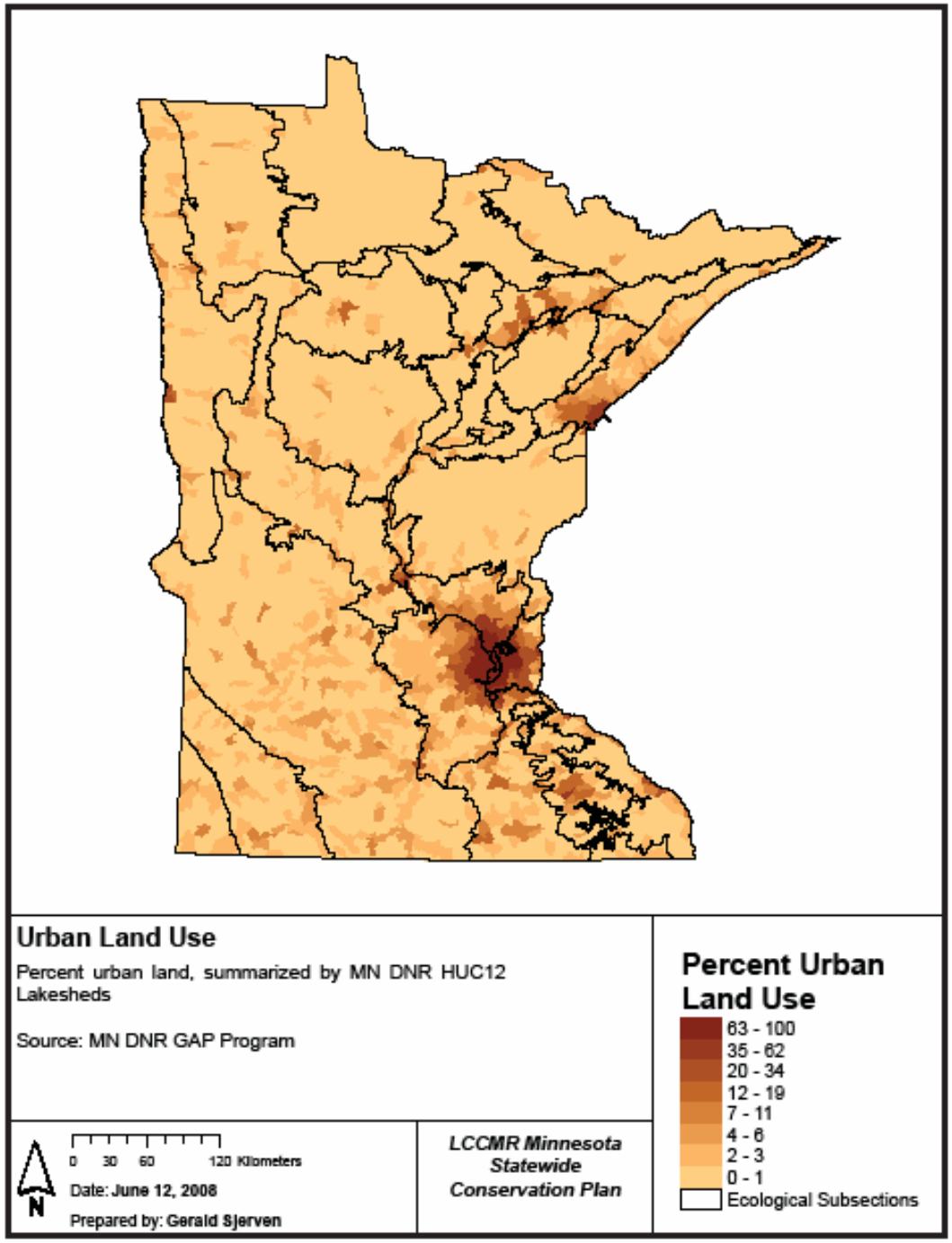


Figure H13. Urban Land Use. Credit: Gerald Sjerven, Natural Resources Research Institute.

Lakeshed invasives

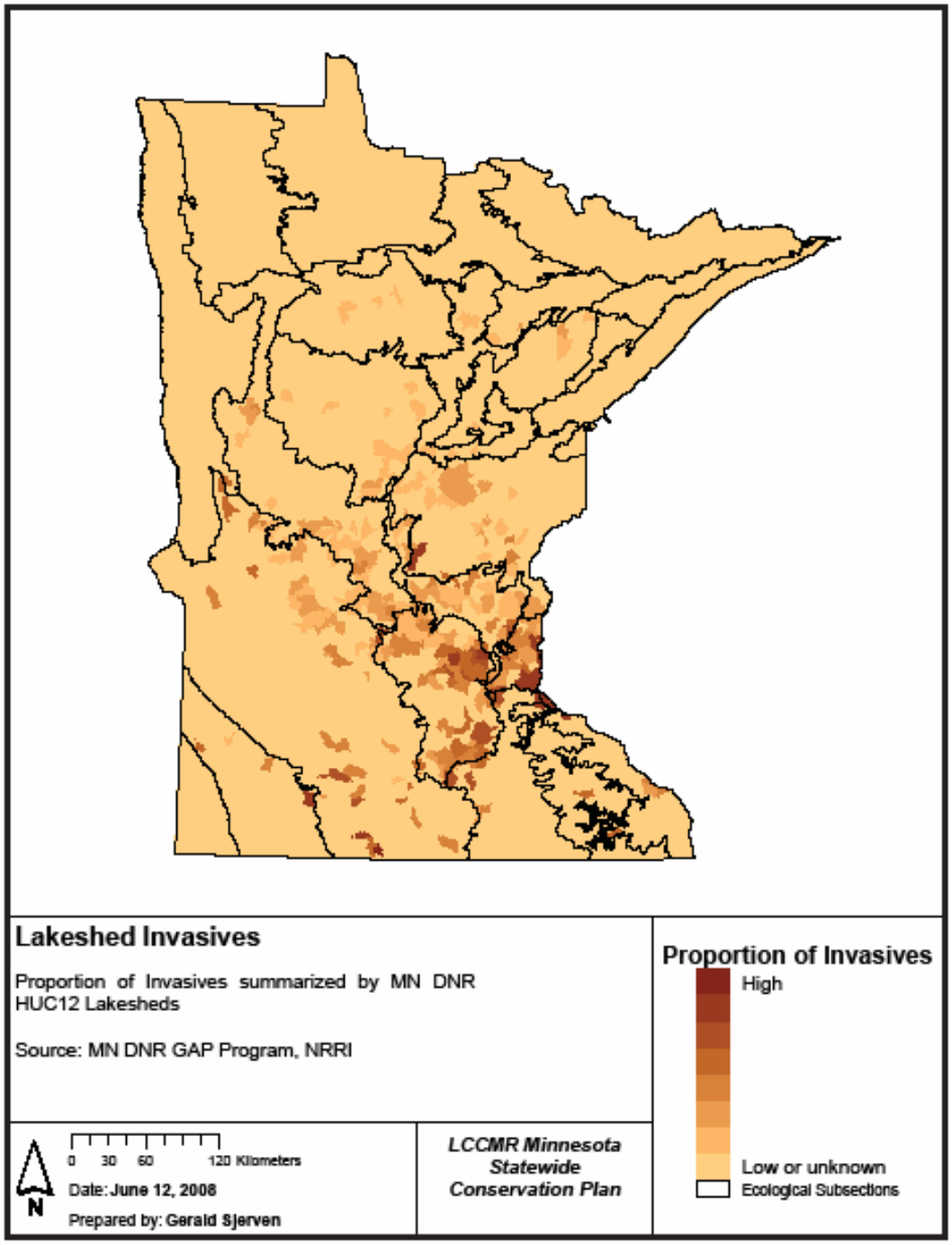


Figure H14. Lakeshed Invasives. Credit: Gerald Sjerven, Natural Resources Research Institute.

Aquatic habitat quality vs. environmental stress

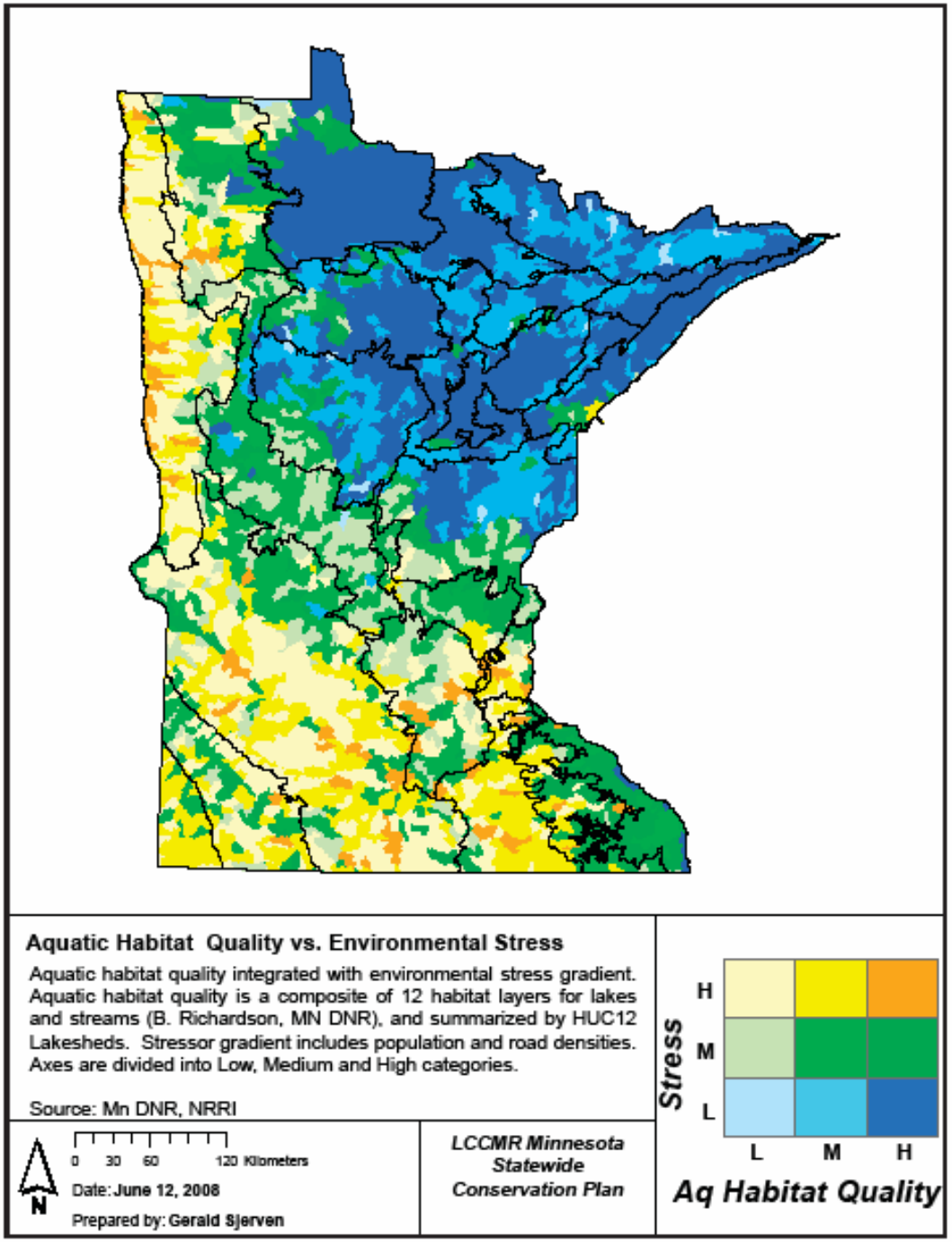
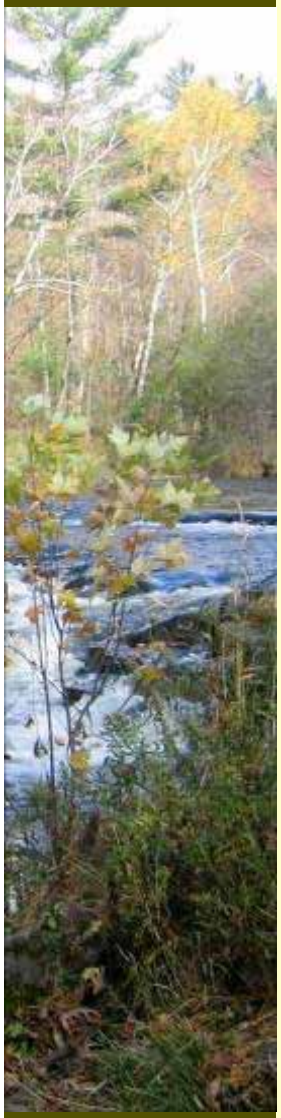


Figure H15. Aquatic habitat Quality vs. Environmental Stress. Credit: Gerald Sjerven, Natural Resources Research Institute.

DataPortal



- Supplemental to the Statewide Plan
- Provide access to spatial and tabular data
  - Access most contemporary sources
  - Provide for integration of different kinds of data
  - Allow non-technical users to ask questions
  - Answers in terms of maps and reports

Four regional examples

- Statewide mapping scalable to local level
- Northeast
- Western
- Twin Cities metropolitan area
- Red River Valley

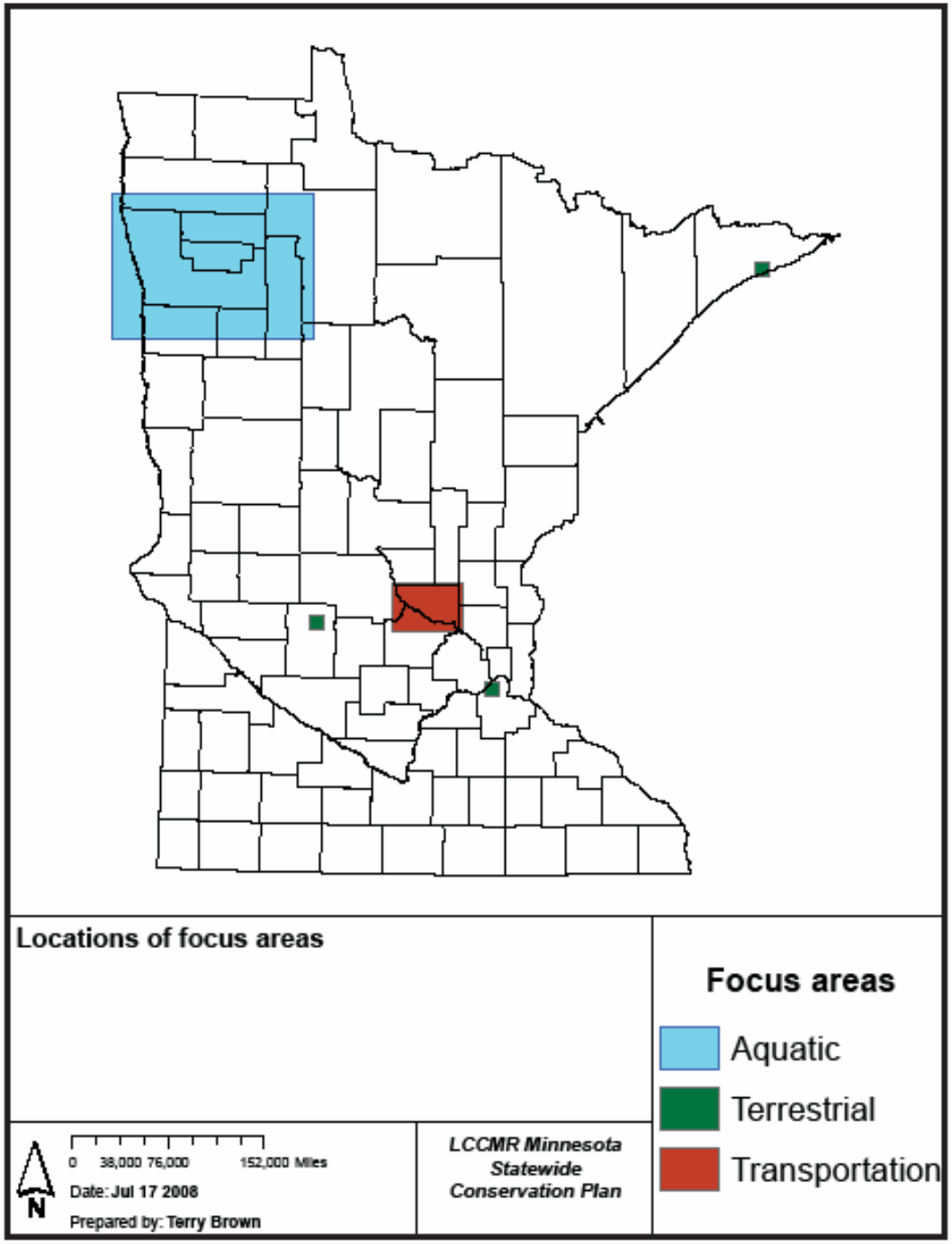
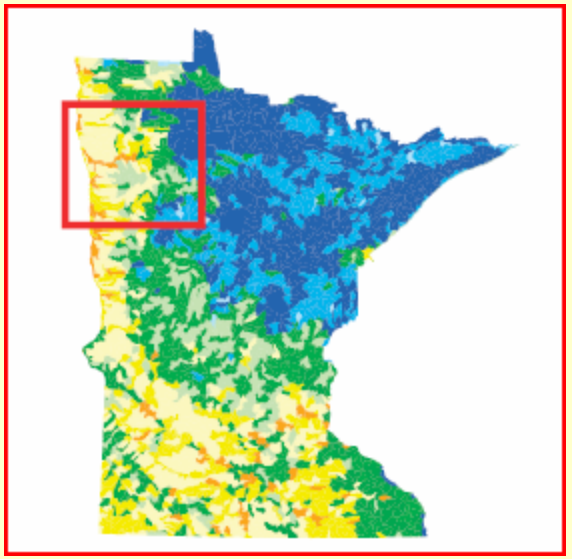
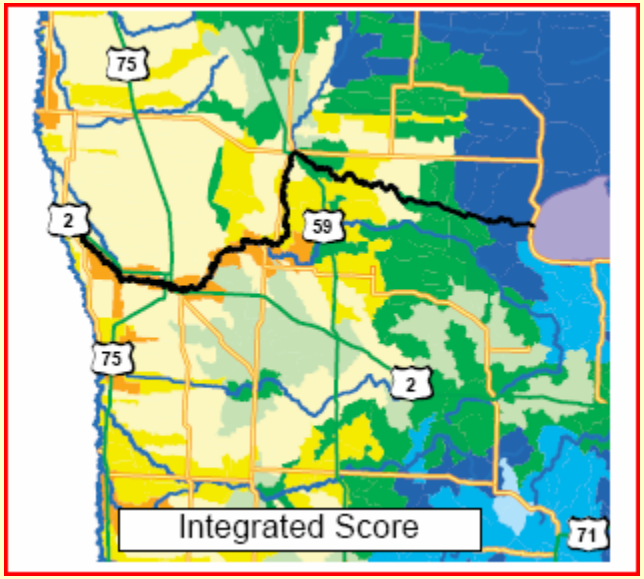


Figure H17. Locations of terrestrial and aquatic focus areas. Transportation Example is covered in the Transportation Team Recommendations section. Credit: Terry Brown, Natural Resources Research Institute.

Northwestern Minnesota: The Red Lake River

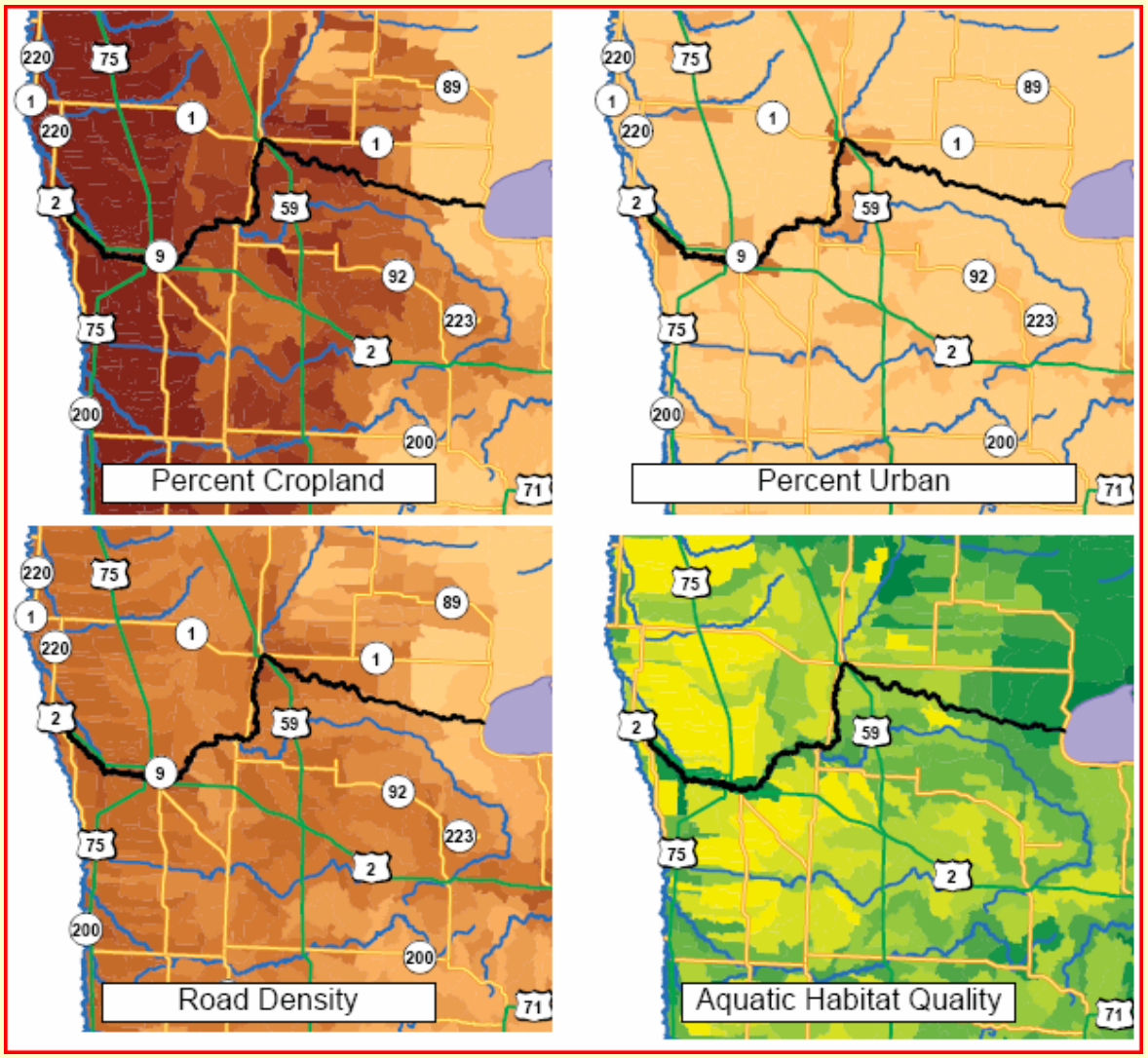


- 6,000 square miles - largest contributing area to the Red River
- High quality habitat, recreation
- Issues
  - Historic dredging & straightening
  - Dam development, wetland drainage
  - Loss of sturgeon, channel catfish, sauger



Northwestern Minnesota: The Red Lake River

- Restoration focus
  - 2005 corridor development plan
  - Dam removal
  - Fishways
- Future issues
  - CRP lands
  - Climate change



Regional Example: Northeast MN

- Heavily forested
- Important recreation
- Working forests
- High SOBS and SGCN
- Protection of water quality, including Lake Superior

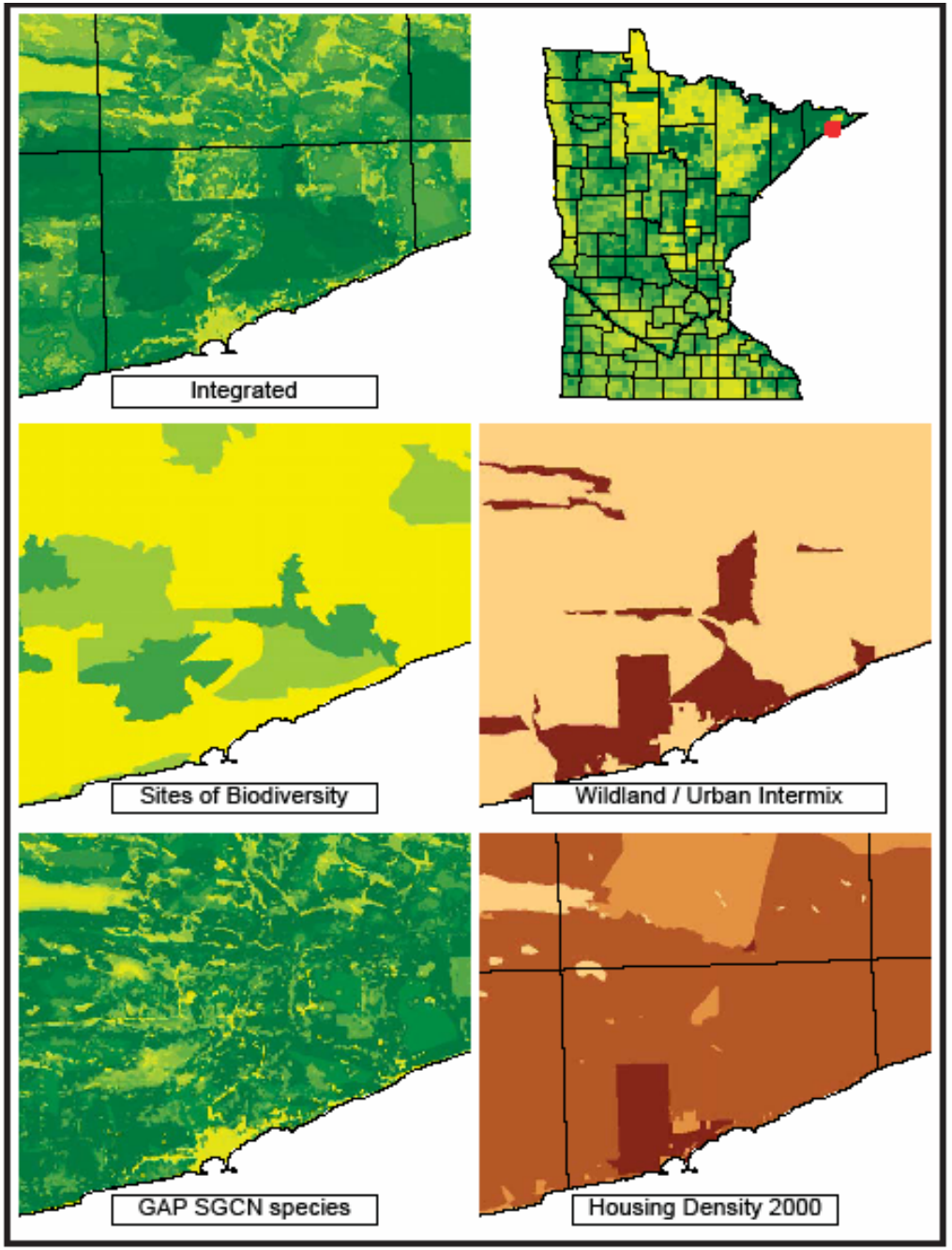


Figure H18. Summary of ecological values and stresses around Grand Marais along the North Shore of Lake Superior, Lake County. Dark areas have higher ecological value and low stress, lighter areas have lower ecological value and high stress. The panel labeled 'Integrated' is the final conservation priority map, while the other panels show selected input variables that were significant contributors to the ecological value/stress pattern in this region. Credit: Nick Danz, Natural Resources Research Institute.

Regional Example: Western MN

- Prairie/broadleaf forest transition
- Private ownership
- Conservation concerns north of Green Lake
- Fragmentation
- Prairie restoration opportunities

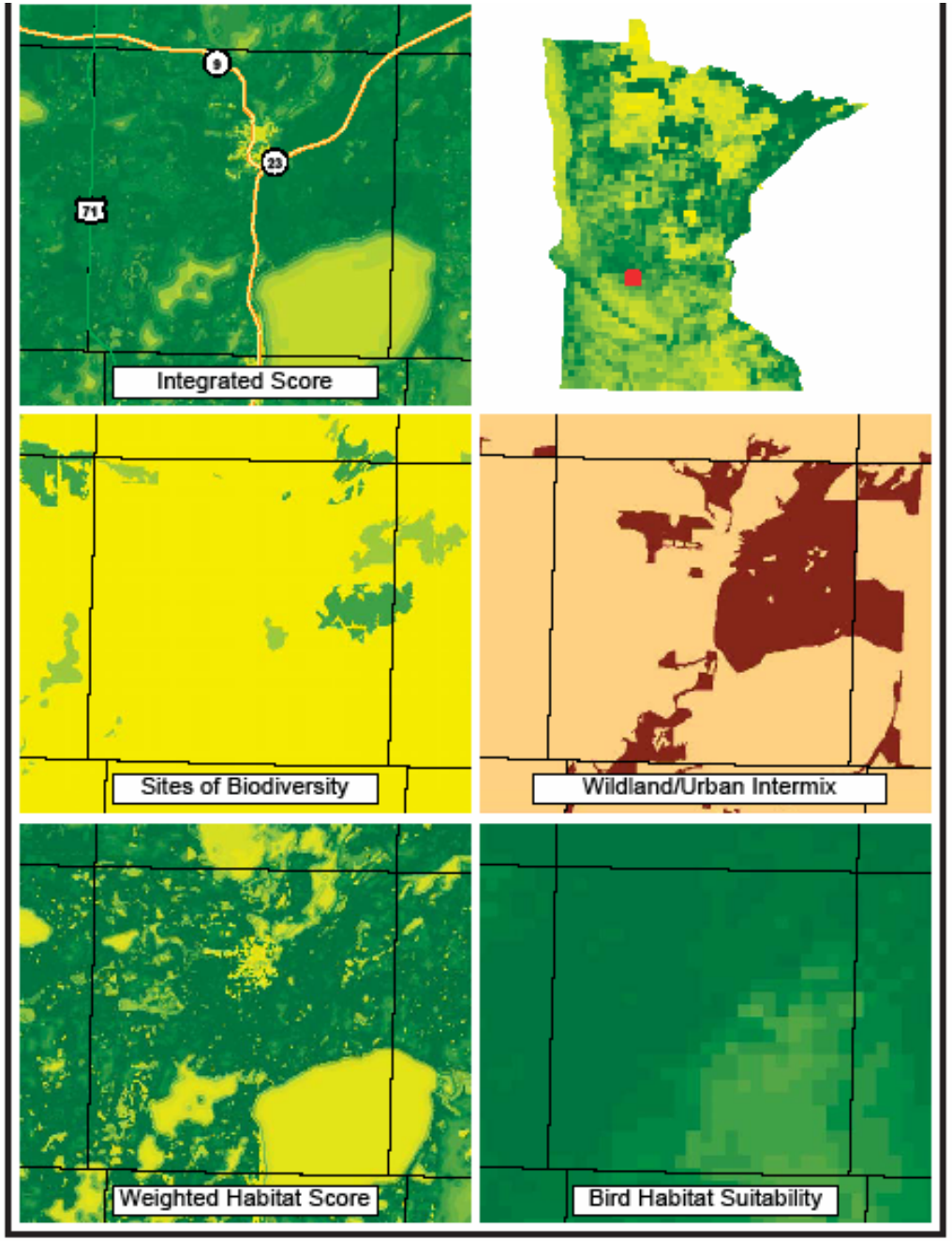


Figure H20. Summary of ecological values and stresses issues in western Minnesota near New London, Kandiyohi County and the Minnesota River Prairie ecological subsection. Dark areas have higher ecological values and low stress, lighter areas have lower ecological values and high stress. The panel labeled 'Integrated' is the final ecological values/stress map, while the other panels show selected input variables that were significant contributors to the pattern in this region. Credit: Nick Danz, Natural

Regional Example: Twin Cities metro

- Formerly oak savannah & lowland riparian forest
- Suburban expansion pressure
- MN River & Lebanon Hills Regional Park
- Protection of public land for recreation, water quality & SOBS/SGCN

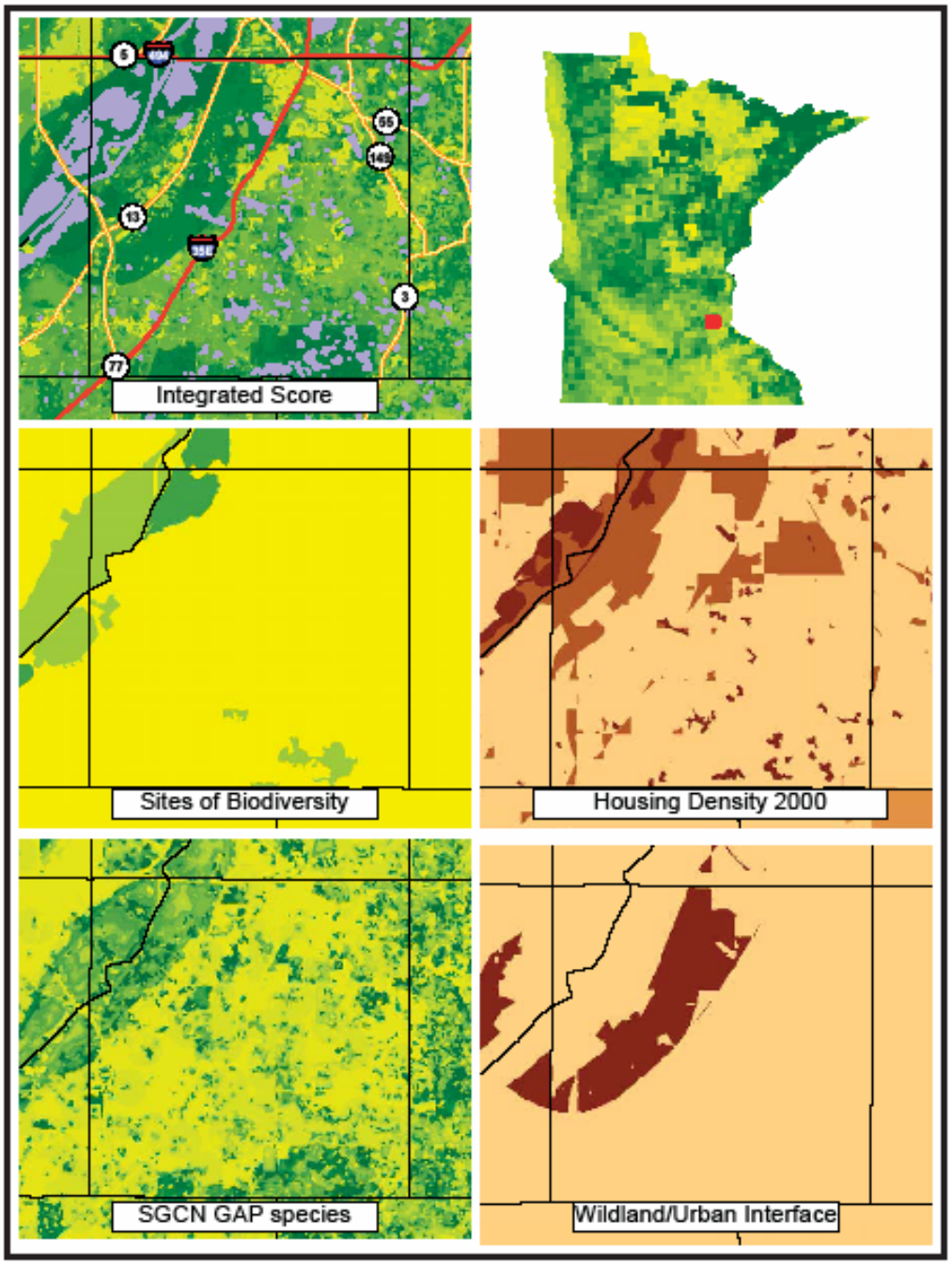
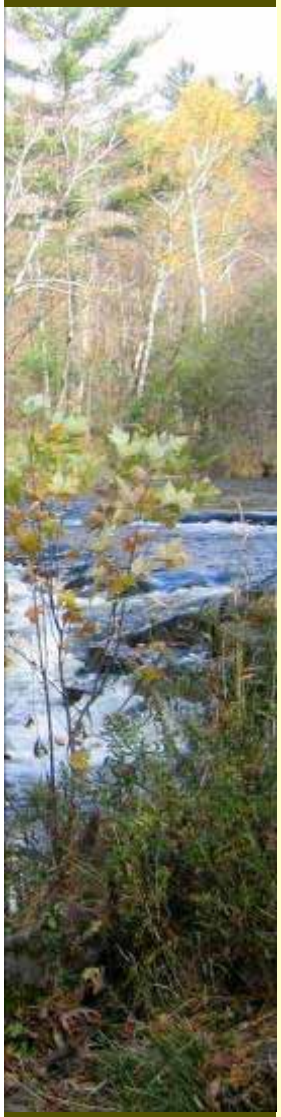


Figure H21. Summary of ecological values and stresses issues in the Twin Cities metropolitan area near Eagan, Dakota County. Dark areas have higher ecological value and low stress, lighter areas have lower ecological values and high stress. The panel labeled 'Integrated' is the final ecological values/stress map, while the other panels show selected input variables that were significant contributors to the pattern in this region. Credit: Nick Donz, Natural Resources Research Institute

Habitat 1: Protect priority land habitats



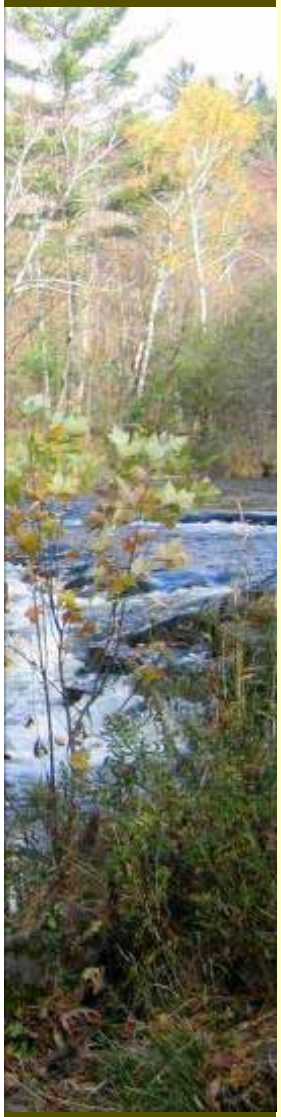
Regionally specific – tiered

- *Tier 1:* <1 to 2% of MN land area - purchase, permanent easements
- *Tier 2:* 3-10% - Conservation focus (CRP, CREP, RIM, etc.)
- *Tier 3:* 10-25% - large ecosystem/habitat patches - BMPs, multiple landowner agreements
- *Tier 4:* Education programs

Habitat 2: Protect critical shorelands of streams & lakes

Shoreline buffers provide multiple benefits

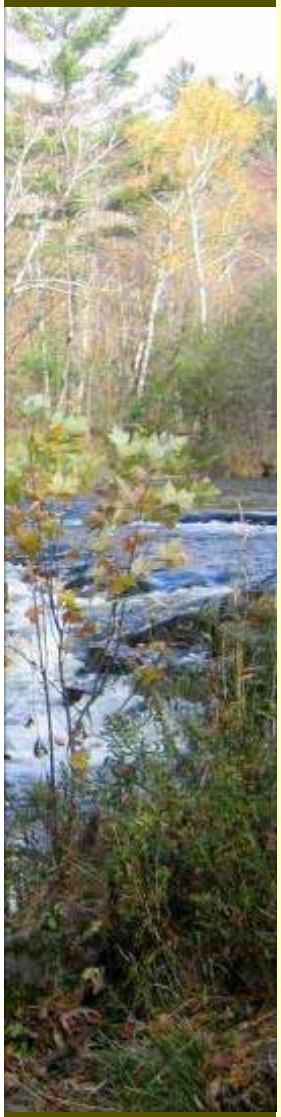
Habitat 2: Protect critical shorelands of streams and lakes



2A. Acquire high-priority shorelands

- *Permanent protection of highest priority shorelands within each ecological subsection*
- Link integrated mapping analysis with other suggestions such as:
  - DNR Aquatic Management Areas Acquisition Plan
  - DNR Duck Recovery Plan
  - TNC Lake Portfolio

Habitat 2: Protect critical shorelands of streams and lakes



2B. Protect private shoreland via economic incentives and other tools

- *Greatly increased and combined use of diverse incentives:*
  - Conservation easements
  - BMPs and technical guidance
  - Shoreland regulations
  - Zoning ordinances
  - Conservation income tax credits

- *Habitat 3:* Improve connectivity and access to outdoor recreation

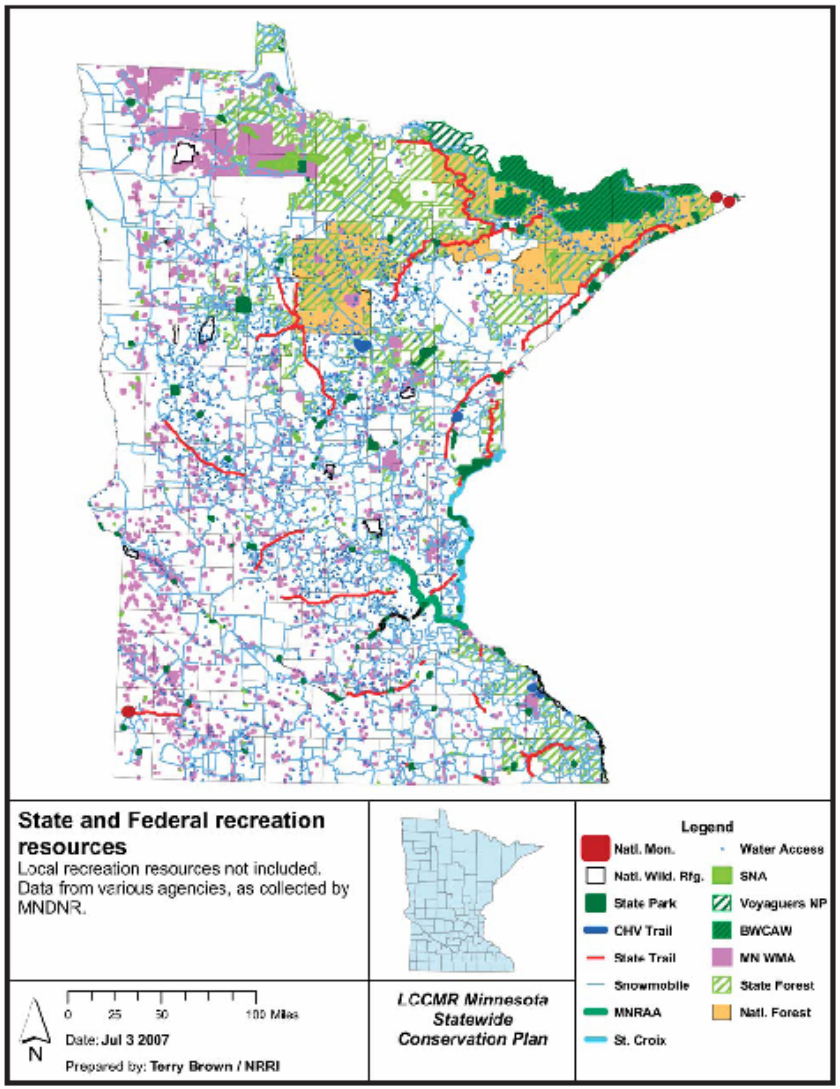
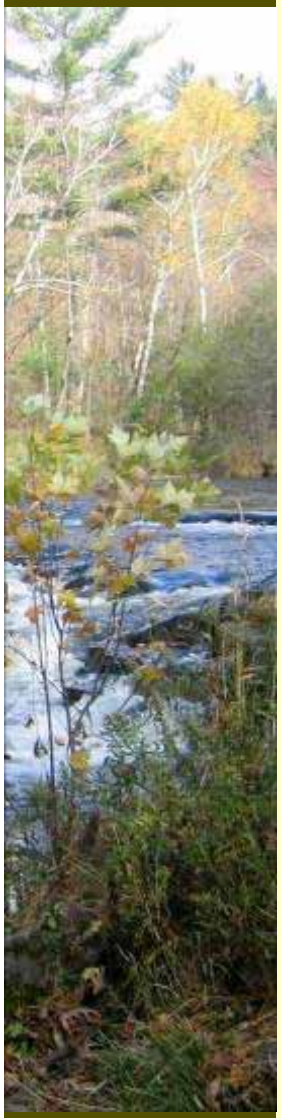


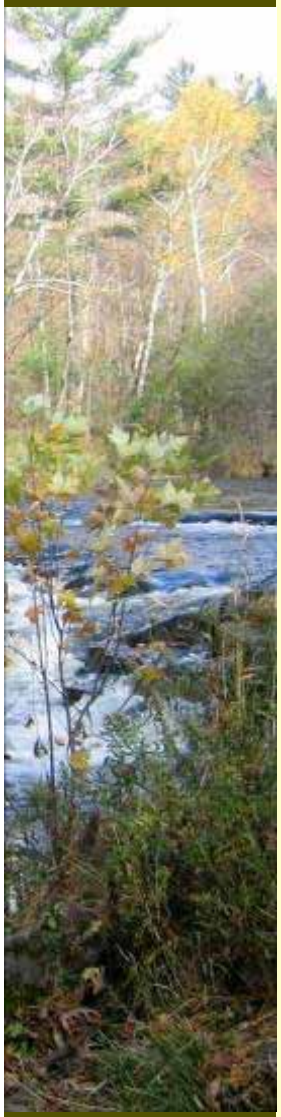
Figure H29. State and Federal recreation resources available in Minnesota. Credit: Terry Brown, University of Minnesota.

- Identify lands for ‘connections’ between protected areas
- Recreation use increasing & more diverse
- Energy considerations – distribution of recreation areas
- Also provides benefits to wildlife, SGCN, etc.

Habitat 4: Restore and protect shallow lakes

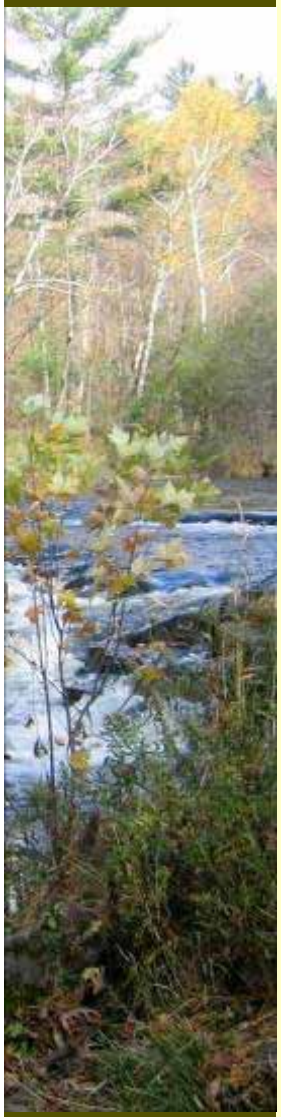


Habitat 4: Restore and protect shallow lakes



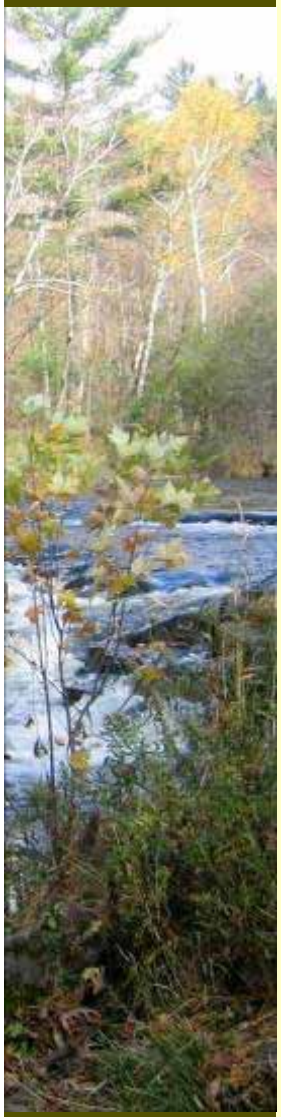
- Accelerate restoration & improvement of shallow lake habitat to reduce number of lakes in turbid water state
- Restore some of the 1000+ drained shallow lakes
- Funding needed for:
  - Conservation easements to restore lakesheds
  - Fish barriers to keep out invasive species
  - Water control structures to allow temporary draw-downs
- Need active management to maintain water quality and habitat

Habitat 5: Restore land, wetlands, and wetland-associated watersheds



- Major wetlands focus in south & western Minnesota
- Increased production in forests, restoration of forests and and wild rice lakes
- Benefits to wildlife, outdoor recreation, etc.
- Benefits natural resources
- Public and especially private land

Habitat 6: Protect and restore critical in-water habitat of lakes and streams



6A. Restore habitat structure within lakes

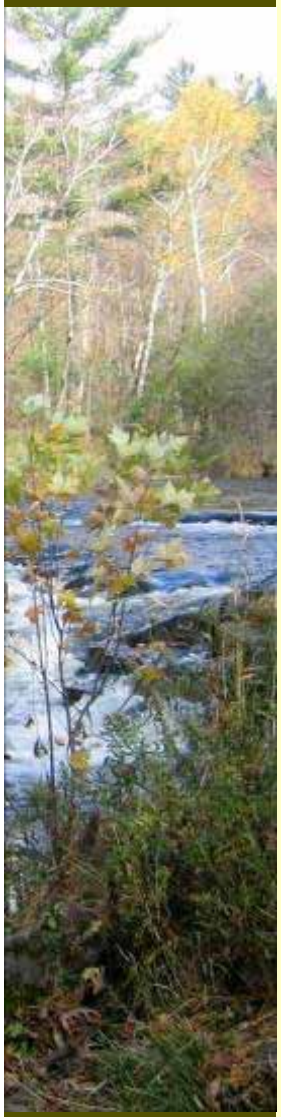
- Program to restore natural features of near-shore areas of lakes
  - Add woody habitat
  - Restore emergent & floating vegetation
  - Work with lake-home owners & lake associations

Habitat 6: Protect and restore critical in-water habitat of lakes and streams

6B. Protect and restore in-stream habitat

- Rivers
  - reduce negative effects of recreational boat traffic
  - reduce negative effects of built structures

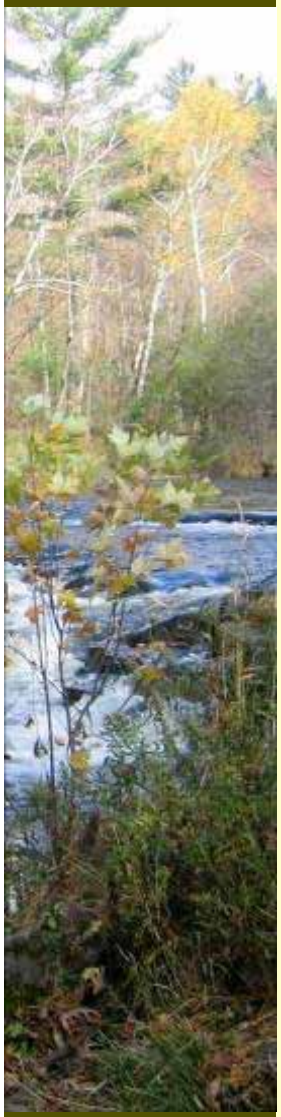
Habitat 6: Protect and restore critical in-water habitat of lakes and streams



6B. Protect and restore in-stream habitat

- Streams - reverse negative effects of channelization
  - Restore riparian vegetation
  - Build two-stage channels

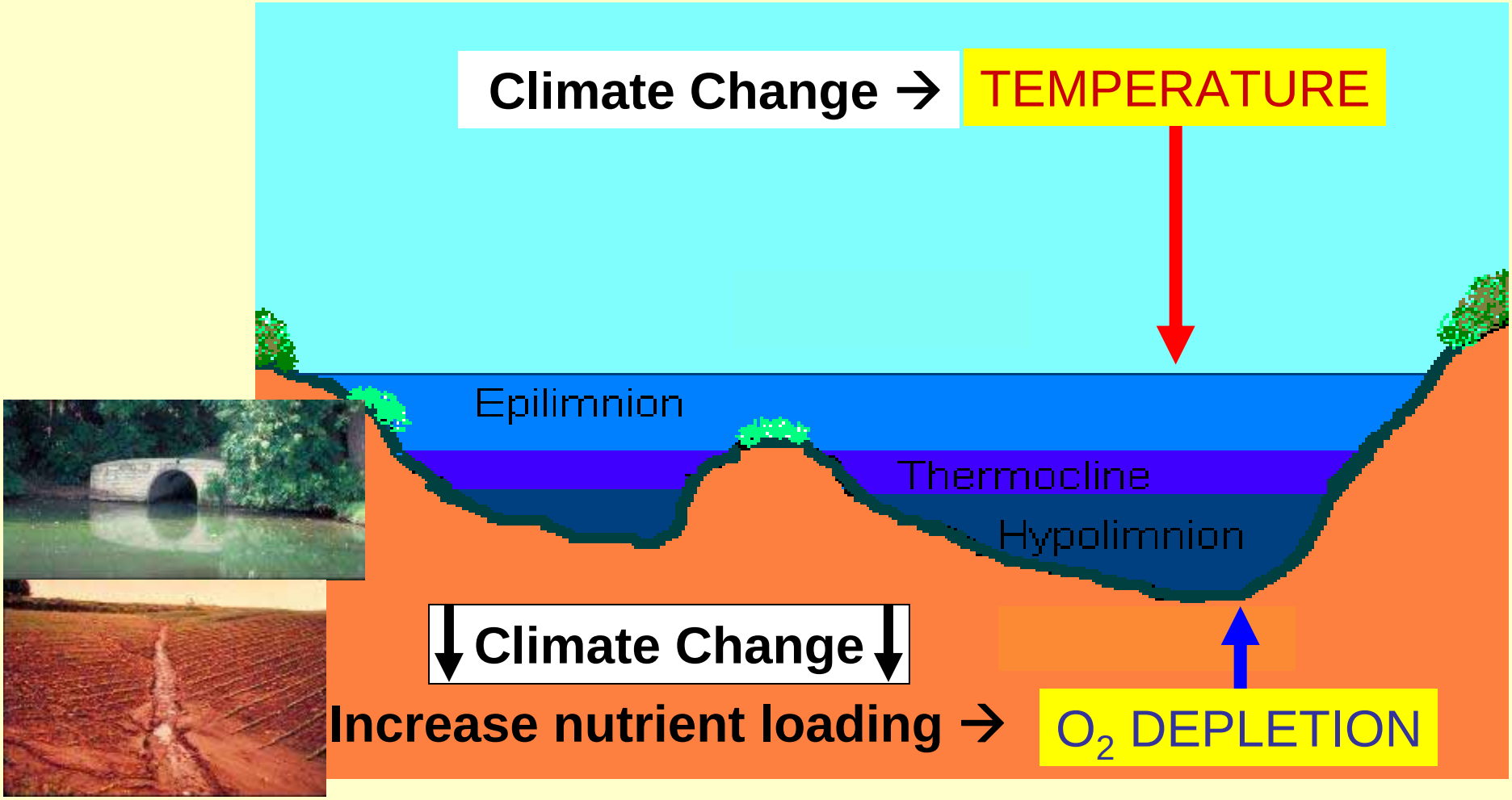
Habitat 6: Protect and restore critical in-water habitat of lakes and streams



6C. Protect deep-water lakes with exceptional water quality

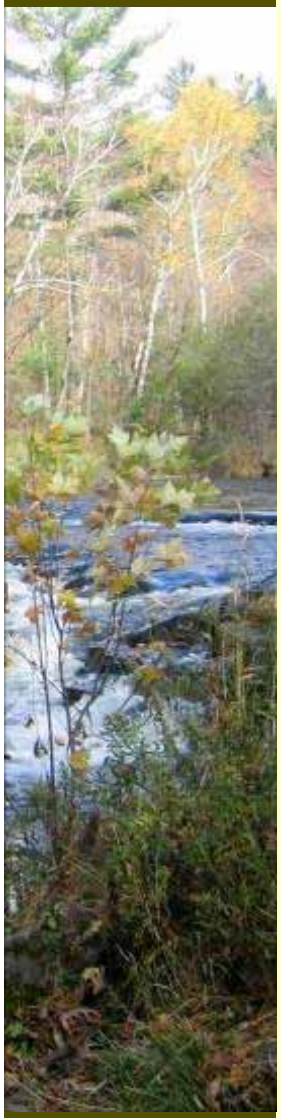
Climate warming and poor land use threaten oxygen levels in deep-water zones (hypolimnion), where cold-water fish find refuge during warm summers

The Temperature -- Oxygen Squeeze



(Images: Don Pereira, DNR)

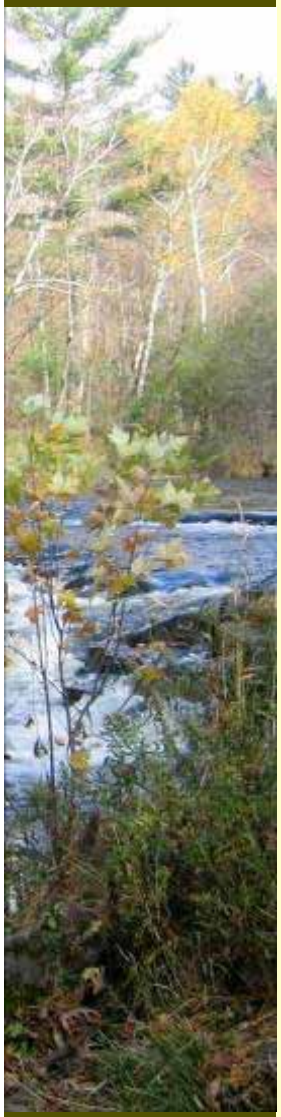
Habitat 6: Protect and restore critical in-water habitat of lakes and streams



6C. Protect deep-water lakes with exceptional water quality

- Identification of refuge lakes is underway
- Need a special commitment to lake watershed protection efforts - acquisition, easements, BMPs, shoreland regulations
- Collaborate with dedicated lake associations and local users

Habitat 7: Keep water on the landscape



Retain water over broader areas and slow down its movement across the landscape to return to more natural conditions.

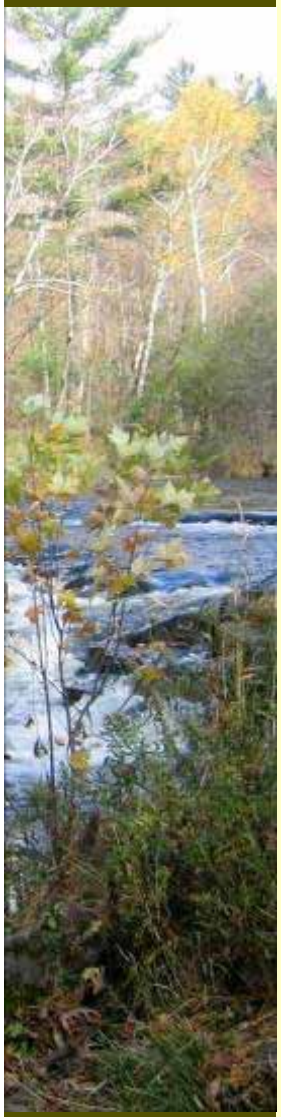
a) enhance and expand perennial vegetation, preferably native plants

b) Storm water controls to infiltrate most of the rainwater

c) Maintain and restore riparian buffers

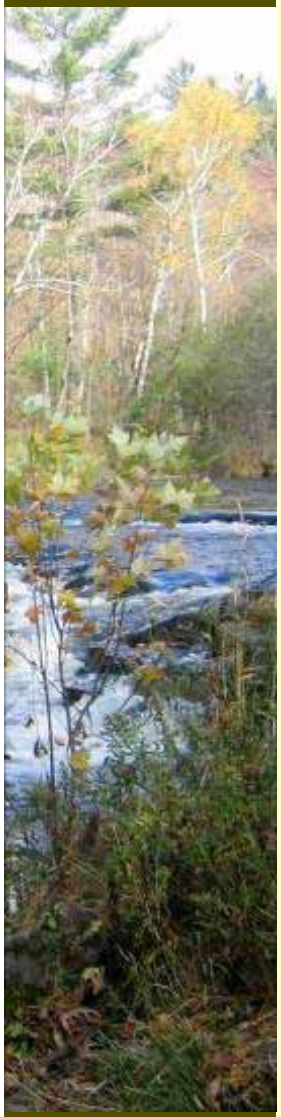
- encourage wider vegetated buffers
- Discourage new drainage tile

Habitat 8: Review and analyze drainage policy



- Invest in comprehensive review and analysis of MN statutes relating to drainage, including chapter 103E on drainage.
  - Complex array of statutes dating back to 1887
- Make recommendations to legislature for removing barriers to and better facilitate restoration of critical wetlands.
- Relevant to other habitat recommendations, e.g. wetlands restoration, keep water on the landscape.

Habitat 9: Overall research on land and aquatic habitats

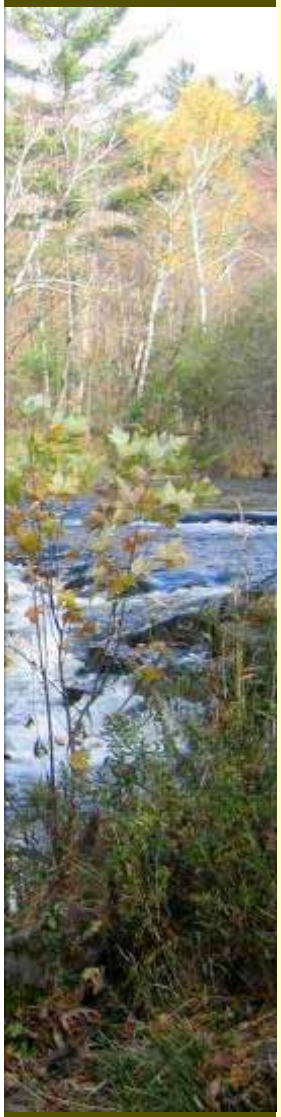


- Research ‘a priori’ can result in cost savings
- Complex process – integration of information
- How much land or aquatic habitat is necessary to maintain or improve MN’s native natural resources?
- Needed for more credible & defensible use of state resources
- Integrate historical and cultural resources
- Establish a proportion of budget to research

Habitat 10: Research on near-shore habitat vulnerability

- Map aquatic species richness
- Refine critical area mapping initiated in this Plan, by identifying sensitive lakeshore areas statewide
- Investigate economic benefits of preserving undeveloped shoreline and trails
- Determine barriers and benefits of good near-shore stewardship by lake-home owners
- Initiate pilot program to change behavior or limit choices on near-shore habitat alterations

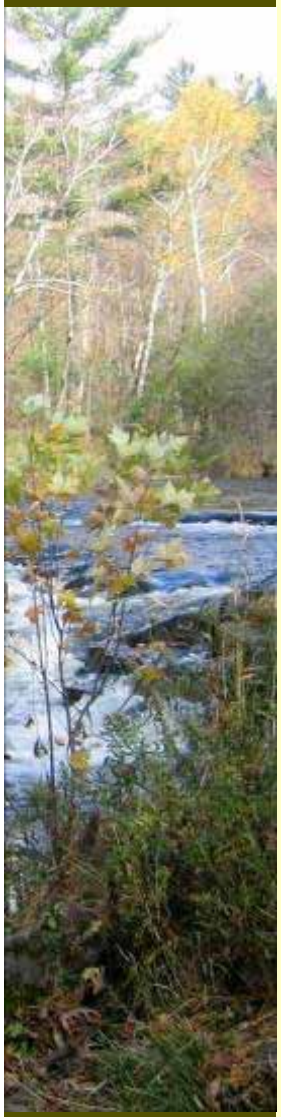
Habitat 11: Improve understanding of ground water resources



Need major, sustained investment to improve information base on ground water & understand connection to surface waters

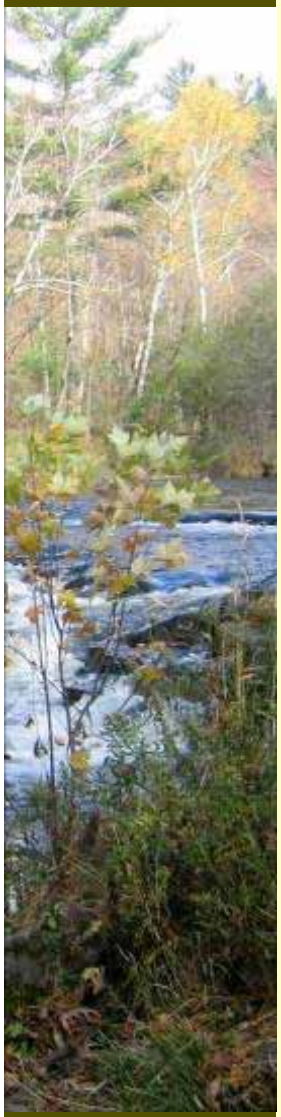
- Complete atlases & combine with assessments to understand what are sustainable withdrawals
- Upgrade monitoring network
- Complete water sustainability research

Habitat 11: Improve understanding of ground water resources



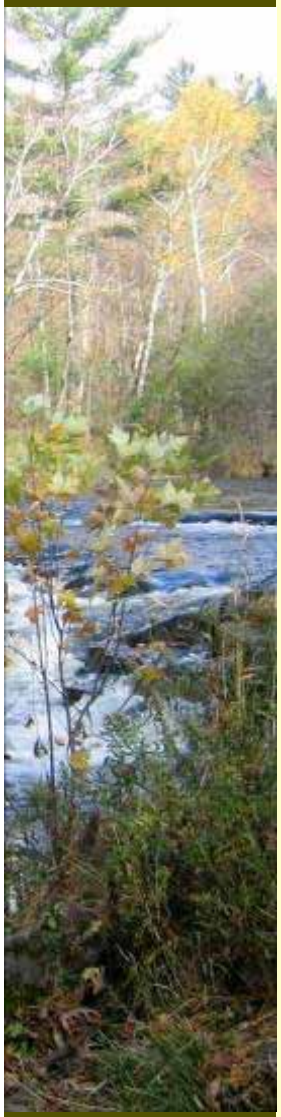
- Investigate seasonally variable stream flows needed by aquatic communities & assess ground water contributions
- Study effects of drainage and other land-use practices on recharge and discharge
- Upgrade monitoring network
- Construct & implement a large-scale, GIS-based hydrologic system framework for understanding how today's decisions affect tomorrow's needs

Habitat 12: Improve understanding of watersheds to multiple drivers of change



- Monitoring, research & evaluation of land use, climate, invasive species, and other changes
- Need improved knowledge in decision-making and management
- Leverage with other state, federal, & private funds (e.g. Clean Water Legacy, NSF, EPA, etc.)
- Requires large-scale experimental design

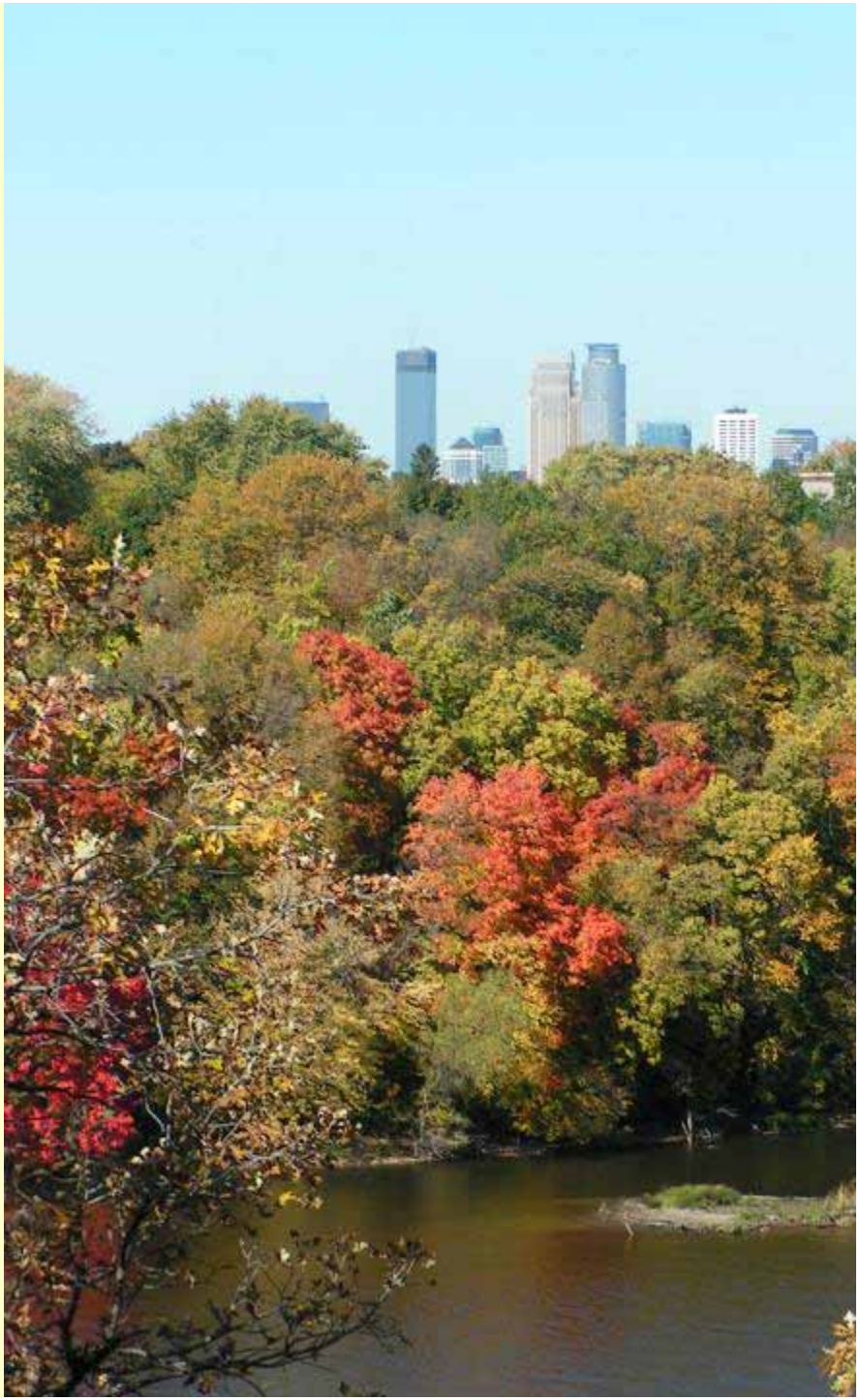
Habitat 13: Habitat and landscape conservation education and training for all citizens



- Citizens need to be educated – e.g. erosion, watershed, landscape, ‘action & impact’
- Population demography – disconnect with natural resources
- Excellent on-going programs – MN Master’s Naturalist Program, WOW, River Friendly Farmers, Healthy Rivers: A Water Course
- Dedicate a proportion of the budget to education

Project Goal

To achieve a better future for Minnesota's natural resources



Thank You!

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