Minnesota Statewide Conservation and Preservation Plan

INSTITUTE ON THE
ENVIRONMENT
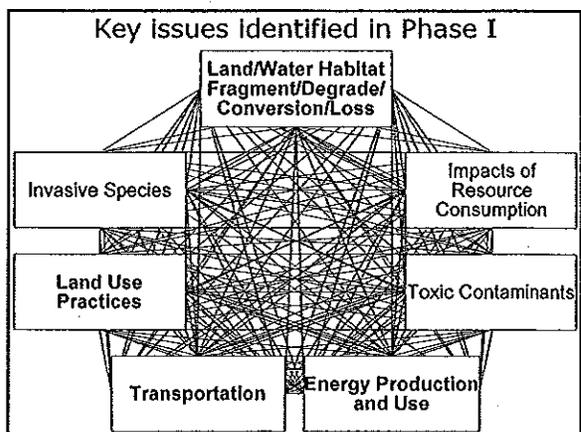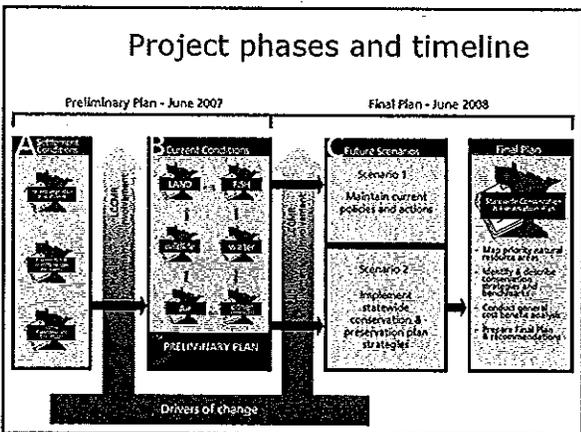
UNIVERSITY OF MINNESOTA
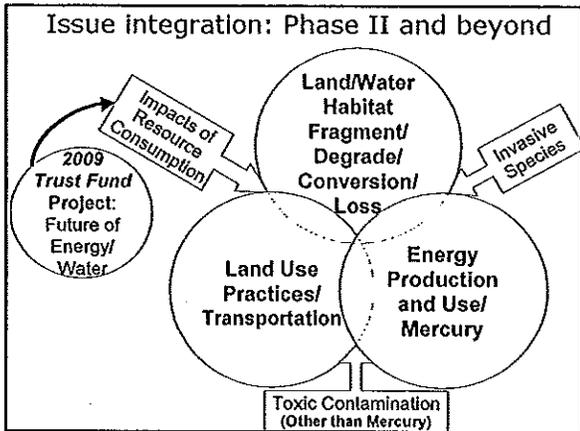
C|R Planning   Bonestroo

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Presenters

- Deb Swackhamer, Univ. of Minnesota
- Jerry Niemi, Univ. of Minnesota NRRI
- Anne Kapuscinski, Univ. of Minnesota
- John Shardlow, Bonestroo
- Les Everett, Univ. of Minnesota
- Dave Mulla, Univ. of Minnesota

Presentation Goals

- Describe the goals of the project
- Describe the process used to develop the recommendations
- Overview of the recommendations

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


Project phases and timeline

Key issues identified in Phase I

Final Plan Overview 7/8/08

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Issue integration: Phase II and beyond

Interconnections

	Habitat	Land use	Energy	Consumption	Toxics	Transportation	Invasives
Air		✓	✓	✓	✓	✓	
Water	✓	✓	✓	✓	✓	✓	✓
Land	✓	✓	✓	✓	✓	✓	✓
Fish	✓	✓	✓	✓	✓	✓	✓
Wildlife	✓	✓	✓	✓	✓	✓	✓
Recreation	✓	✓	✓	✓	✓	✓	✓

Phase II Products

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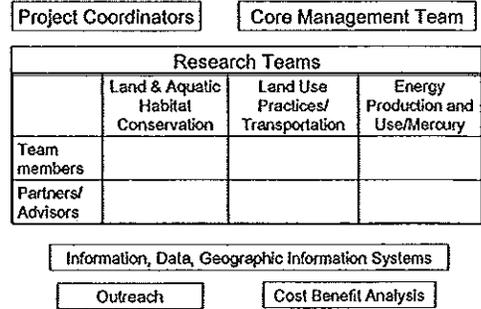- Evaluating conservation strategies

Evaluating conservation strategies: Assessment of costs and benefits
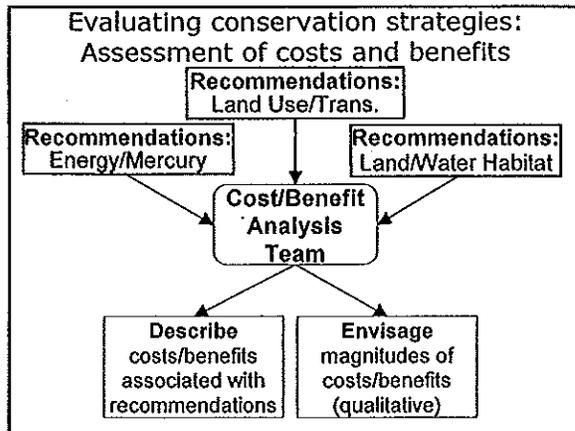
Assessment of Costs and Benefits

- Objectives
  - Better understand potential costs and benefits of selected recommendations
  - Estimate the order of magnitude of potential costs and benefits from the literature for selected recommendations
- Method
  - *Brainstorming sessions:* Identification of key costs and benefit items
  - *Survey:* Better understand various aspects of costs and benefits
  - *Literature survey:* Identify relevant cost/benefit estimates from the literature

Example: Wetland restoration

- Key benefits (total: $7.6M – $230.5M):
  - Mitigation of flooding: $4.1M – $148M per year
  - Improvement in water quality: $2.5M – $27.3M per year
  - Provision of critical habitat: $1M - $55.2M per year
- Key costs (total: $20.3M – $67.9M):
  - Restoration and management: $2.8M - $42M
  - Opportunity cost (avoided farm production): $5M - $12.7M
  - Land acquisition: $11.8M
  - Easements: $0.72M - $1.4M
- Estimated cost effectiveness (benefit/cost): 0.38 – 3.38

Stakeholder evaluation of recommendations

- Multiple avenues inviting people to comment
  - Advisors to the project teams
  - Website
  - Presentations
  - Outreach Forums
  - Final Forum on July 14th in Mankato
- Reached over 2,000 people at presentations
- Comments compiled in Appendix VII
- Comments reviewed by teams in writing final recommendations

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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

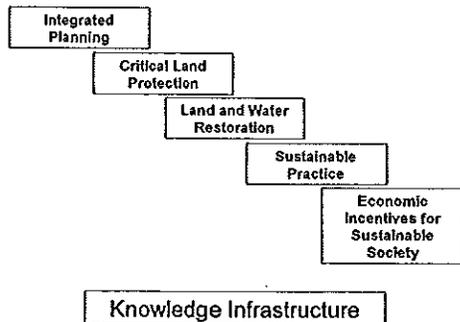## Phase I & II team members and project advisors

Over 100 scientists, professionals, agency staff, and citizen groups involved from the beginning of the project

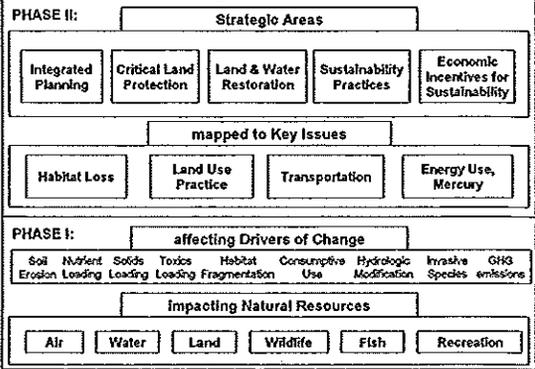|	Land & Aquatic Habitat Conservation	Land Use Practices/ Transportation	Energy Production and Use/Mercury	Cost Benefit Analysis	GIS and Data Support
University of MN	25	15	15	5	15
Bonestroo/ CR Planning	5	3			4
Citizen groups	7	11	4		
Agency staff	7	5	3		

Complementary efforts

- There are many complementary efforts such as:
  - Clean Water Council
  - Great Outdoors Minnesota/ Campaign for Conservation
  - MN Climate Change Advisory Group
  - Lake Pepin TMDL process
  - Regional Council of Mayors sustainability initiative
- Multiple State agency efforts
- We have reviewed and learned from their efforts

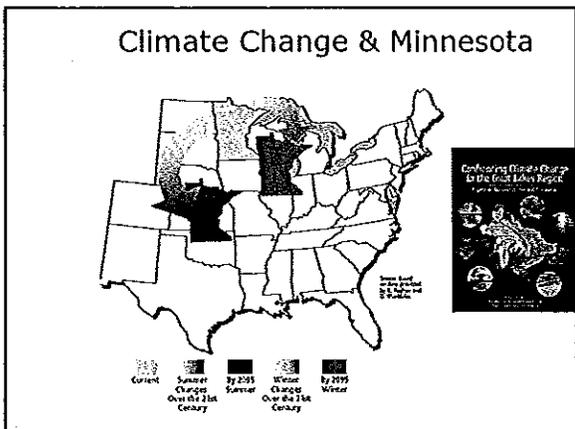## Framework for Integrated Resource Conservation and Preservation

Integrated Planning

Critical Land Protection

Land and Water Restoration

Sustainable Practice

Economic Incentives for Sustainable Society

Knowledge Infrastructure

Strategic Framework
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PHASE II: Strategic Areas

Integrated Planning	Critical Land Protection	Land & Water Restoration	Sustainability Practices	Economic Incentives for Sustainability

mapped to Key Issues

Habitat Loss	Land Use Practice	Transportation	Energy Use, Mercury

PHASE I: affecting Drivers of Change

Soil Erosion	Nutrient Loading	Solids Loading	Toxics Loading	Habitat Fragmentation	Consumptive Use	Hydrologic Modification	Invasive Species	GHG emissions

impacting Natural Resources

Air	Water	Land	Wildlife	Fish	Recreation

Natural Resource Values Assessment of Recommendations

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Climate Change & Minnesota

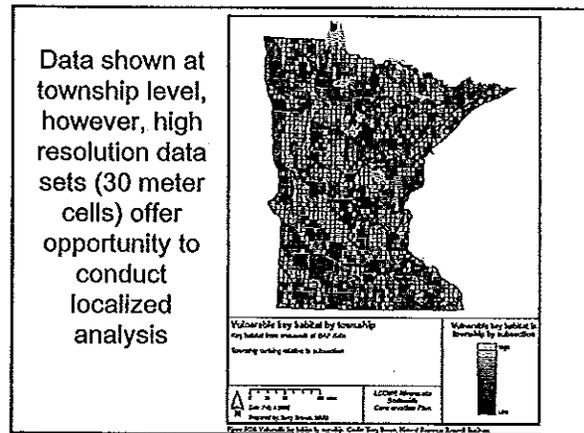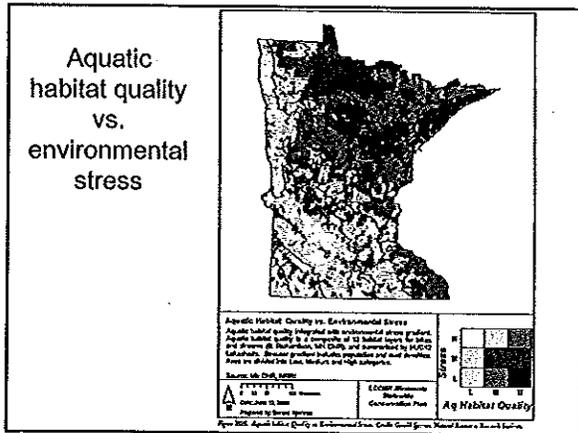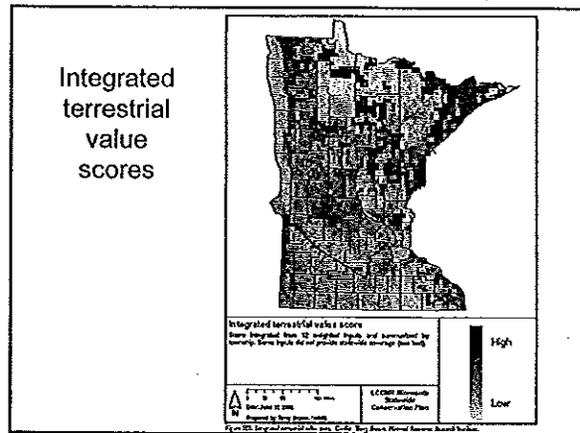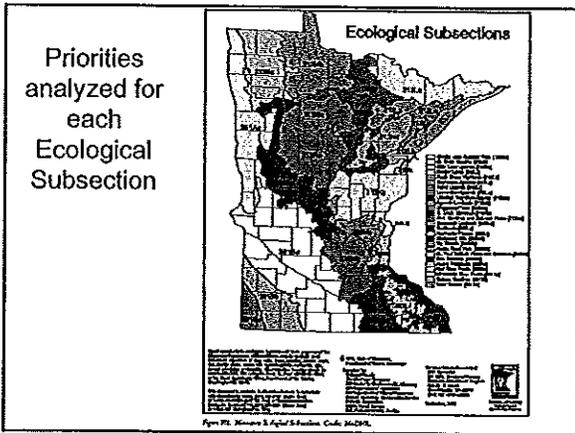## Team Recommendations

- Land and Aquatic Habitat Team
- Land Use Team
  - Community
  - Agricultural
  - Forestry
- Transportation
- Energy Production and Use/ Mercury

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

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Mapping habitat quality: Methods and results

- Goal was to prioritize important areas for conservation
- Use existing information
- Integrate positive (resources) and negative (threats to resources) information

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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

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Priorities analyzed for each Ecological Subsection

Integrated terrestrial value scores

Aquatic habitat quality vs. environmental stress

Data shown at township level, however, high resolution data sets (30 meter cells) offer opportunity to conduct localized analysis

Land Protection

- *Habitat 1:* Protect priority land habitats
- *Habitat 2:* Protect critical shorelands of streams and lakes
  2A. Acquire high-priority shorelands
  2B. Protect private shoreland via economic incentives and other tools
- *Habitat 3:* Improve connectivity and access to outdoor recreation

Land & Water Restoration

- *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
  6A. Restore habitat structure within lakes
  6B. Protect and restore in-stream habitat
  6C. Protect deep-water lakes with exceptional water quality

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Sustainable Practice

- *Habitat 7:* Keep water on the landscape
- *Habitat 8:* Review and analyze drainage policy

Knowledge Infrastructure

- *Habitat 9:* Overall research on land and aquatic habitats
- *Habitat 10:* Research on near-shore habitat vulnerability
- *Habitat 11:* Improve understanding of ground water resources
- *Habitat 12:* Improve understanding of watersheds to multiple drivers of change
- *Habitat 13:* Habitat and landscape conservation education and training for all citizens
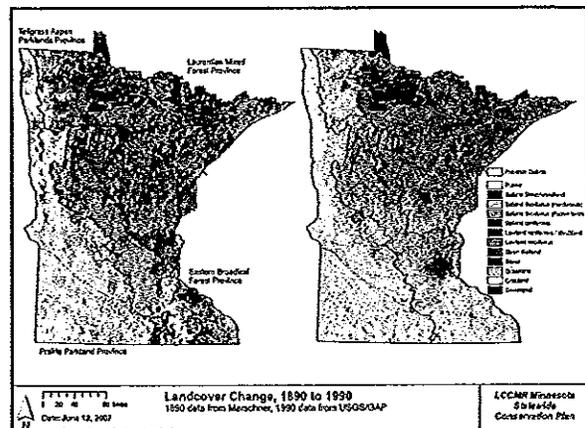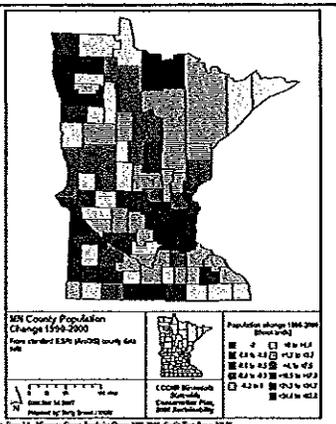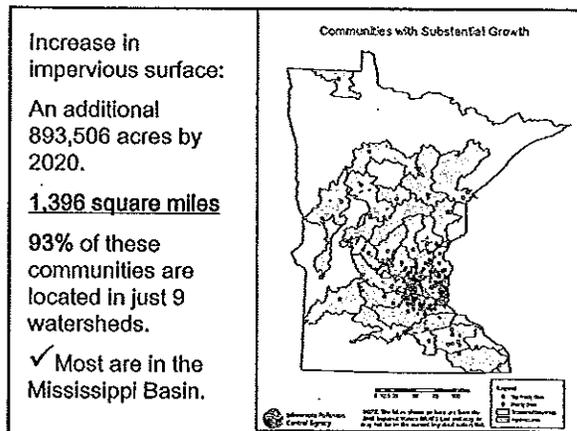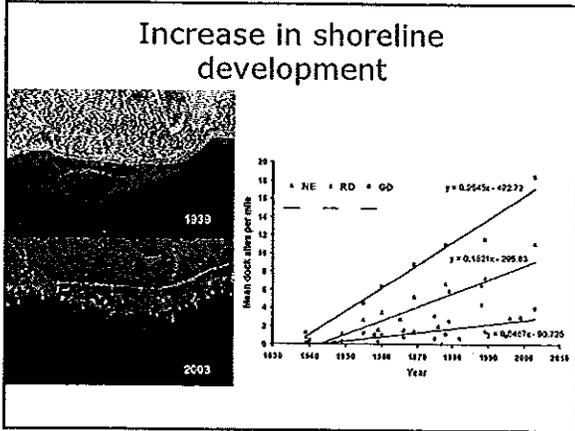
Land Use Practices: Products

- 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
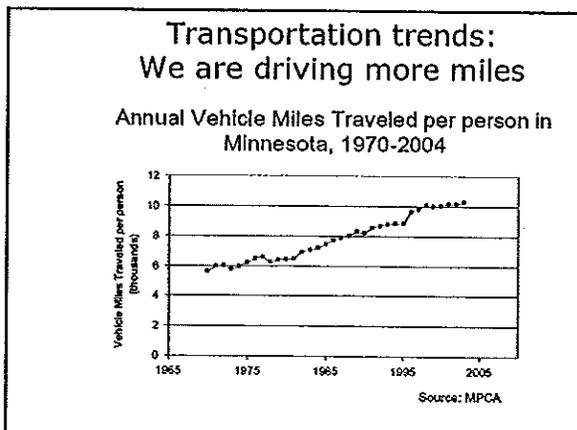 - Agriculture
  - Forest

Land Use Trends:

Population growth
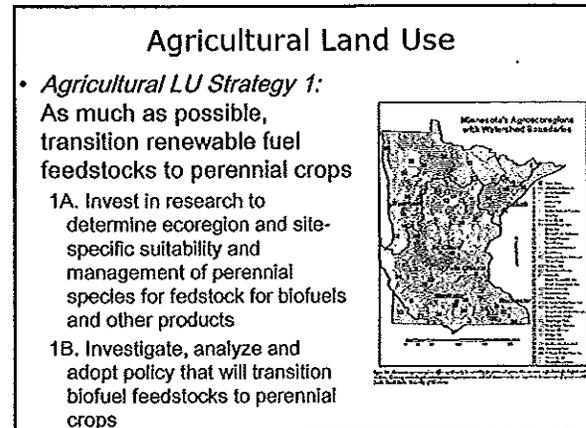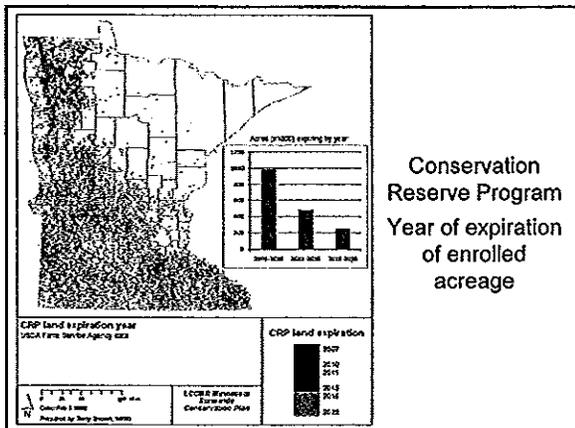
Increase in shoreline development

Increase in impervious surface:

An additional 893,506 acres by 2020.

1,396 square miles

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

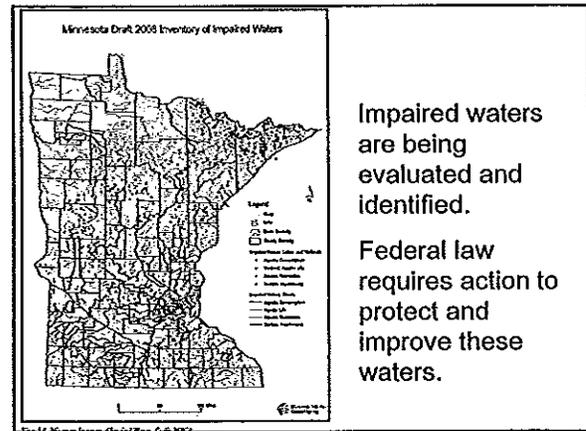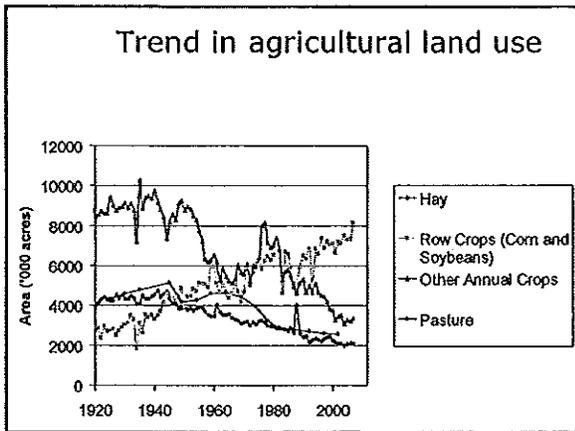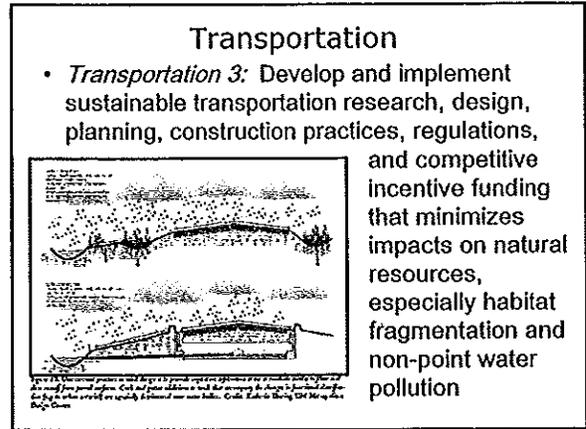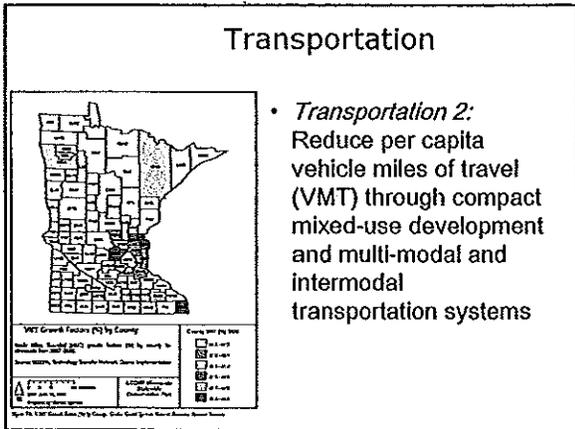✓ Most are in the Mississippi Basin.

Communities with Substantial Growth

Community Land Use

- *Community LU 1:* Fund and implement a state land use, development, and investment guide

- *Community LU 2:* Support local and regional conservation-based planning
  - 2A. Demonstration projects
  - 2B. Incentives
  - 2C. Tools and technical assistance
  - 2D. Investment in base data

Community Land Use

- *Community LU 3:* Ensure protection of water resources in urban areas by evaluating and improving current programs
  - 3A. Credit system for stormwater and low-impact development (LID) best management practices (BMPs)
  - 3B. Simple modeling for TMDL compliance
  - 3C. TMDL BMP implementation monitoring
  - 3D. Water quality media campaign

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

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Transportation

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

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

Trend in agricultural land use

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

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
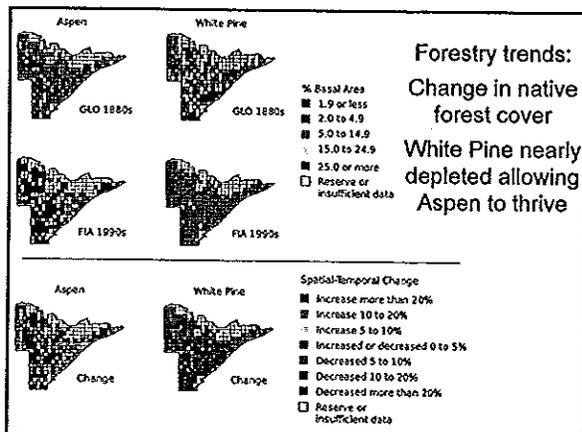
Agricultural Land Use

- *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 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
- *Forestry 2:* Assess tools for forest land protection
- *Forestry 3:* Support and expand sustainable practices on working forested lands

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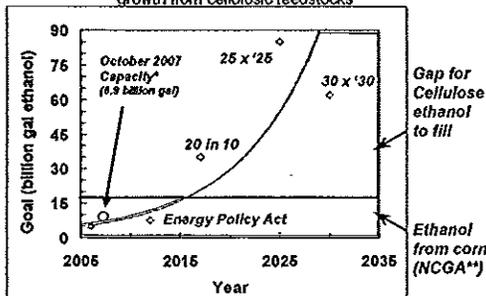
Energy Production and Use: Products

- Identify energy trends/impacts, including the areas of:
  - Biofuels
  - Conservation of fossil fuels
- Identify/map priority natural resource areas likely to be affected
- Identify energy-related investment & policy choices that impact natural resources

## Three Overarching Goals – Multiple Recommendations in Each

A. Promote alternative energy production strategies that balance or optimize production of food, feed, fiber, and fuel with protection or improvement of environmental quality

B. Promote a healthy economy, including strategies that promote local ownership of alternative energy production and processing infrastructure, where appropriate

C. Promote energy conservation efforts among individuals, businesses, communities and institutions

Goal A: Promote Alternative Energy Production Strategies

Ethanol production will continue to grow, with most expected growth from cellulosic feedstocks
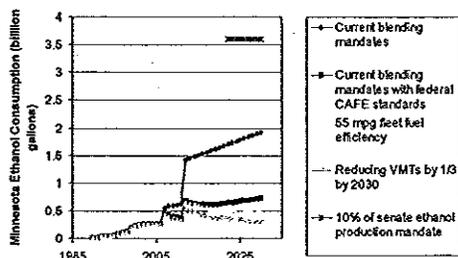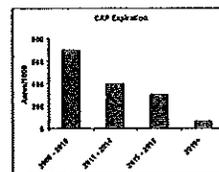

Impacts of Biofuel Industry on Cropping System Change
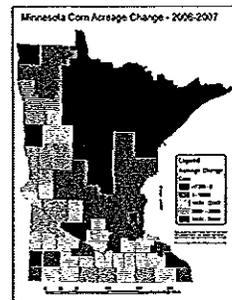
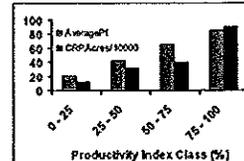## Goal A: Promote Alternative Energy Production Strategies

Ethanol demand in Minnesota will also continue to grow.

Half of Minnesota's Expiring CRP Land Could be Lost

Potential Impacts:
Loss of Wildlife Habitat
Enhanced Erosion
Increased Pesticide Leaching

Goal A: Promote Alternative Energy Production Strategies

- *Energy 1:* Develop coordinated laws, policies, and procedures for governmental entities to assess renewable energy production impacts on the environment
- *Energy 2:* Invest in farm and forest preservation efforts to prevent fragmentation due to development, guided by productivity and environmental vulnerability research
- *Energy 3:* Invest in perennial biofuel and energy crop research and demonstration projects on a landscape scale

Goal A: Promote Alternative Energy Production Strategies

- *Energy 4:* Develop policies and incentives to encourage perennial crop production for biofuels in critical environmental areas
- *Energy 5:* Invest in data collection to support the assessment process
- *Energy 6:* Invest in research to determine sustainable removal rates of corn stover and to establish incentives and BMPs

Goal B: Promote a Healthy Economy

Community-owned wind power is posited to have a greater beneficial impact on the economy compared with corporate-owned wind power

Minnesota's Wind Resource by Estimated Annual Energy Production at 80 Meters
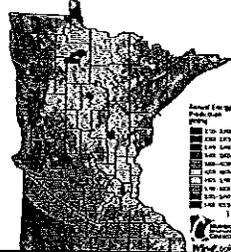

Goal B: Promote a Healthy Economy

- *Energy 13:* Invest in research and policies on implementation strategies and optimal pricing schemes for 'green payments.' These 'green payments' may be applied to perennial energy crop production.
- *Energy 14:* Investigate opportunities to provide tax incentives for individual investors in renewable energy (e.g. for individuals who wish to install solar panels).
- *Energy 15:* Invest in efforts to develop, and research to support, community-based energy platforms for producing electricity, transportation fuels, fertilizer, etc. that are locally/ cooperatively owned.

Goal C: Promote Energy Conservation Efforts

Energy consumption and CO_2 emissions are growing faster than population in Minnesota
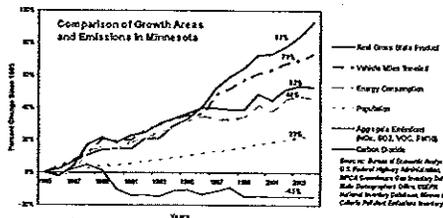
Goal C: Promote Energy Conservation Efforts

- *Energy 16:* Provide incentives to transition a portion of Minnesota's vehicle fleet to electrical power, while simultaneously increasing renewable electricity production for transportation
- *Energy 17:* Promote policies and incentives that encourage carbon-neutral businesses, homes, communities
- *Energy 19:* Promote policies and strategies to implement smart meter and smart grid technology

Energy Team Conclusions

- The recommendations made are a start for the state -- other actions likely will be important as we move into the future

- Many alternative energy scenarios exist -- Biofuel energy production alone is not sufficient

- Policy changes are needed to ensure that perennial biofuels can be grown for renewable energy and environmental benefits, while maintaining production of other annual crops for food, feed and fiber
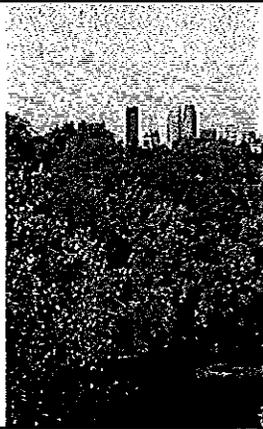
Natural Resource Values Assessment of Recommendations

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Project Goal

To achieve a better future for Minnesota's natural resources

Thank You!

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