

# APPENDIX III

## *Preliminary Plan Recommendations*

### Preliminary Recommendations for LCCMR Funding Priorities

This appendix contains the same information handed out to the LCCMR on June 20th, 2007 by the Statewide Conservation and Preservation Plan project team. Below are our top preliminary recommendations for funding priorities, and list of the most pressing issues facing Minnesota's natural resources, and details on key drivers of change for each resource area.

#### *Recommendations that would provide benefits to multiple natural resources*

- Identify, protect and manage Strategic Land Areas that contribute relatively more to conservation
- Establish statewide habitat corridors using consistent methodology and criteria
- Acquire important data on a regular basis (e.g., LIDAR, parcel and land cover)
- Manage development to decrease effects on resources
- Increase understanding of potential effects of climate change on resources
- Increase understanding of effects of contaminants on resources

#### *Overview of most pressing issues*

- Land use change/development/land disturbance
- Habitat fragmentation/loss/erosion
- Climate change
- Contaminants
- Consumptive use
- Invasive species
- Energy production
- Transportation
- Demographics
- Human health

### Primary Drivers of Change

A major focus of the first phase of the project has been identifying the key drivers of change affecting each natural resource area. Each research team began by identifying proximal drivers, those acting most closely upon the resource, and then mapping them to higher order drivers (see Figure 1, facing page).

The teams, with the assistance of outside experts from relevant state agencies, then ranked these drivers by their relative impact on a common set of "elements of sustainability" (see Table 1, facing page). As an example, for the Fish resource, the proximal driver Nutrient Loading affects sustainability elements Water Quality (medium), Fish Health (high), and Human Health (low), among others.

The rankings were mathematically analyzed to rank the proximal drivers in order of total impact (integrated across elements of sustainability) on the resource. The resulting list of top-ranked drivers (i.e. those with the

most overall impact on the resource) forms the backbone of this report as well as the recommendations to the LCCMR on high-impact areas to focus on in the current-year Request for Proposal.

Following is a list of primary drivers of change for each resource area, and below each, the recommendations related to each driver.

## Air – Drivers of Change

### *Climate Change*

- Invest in projects similar to projects traded on the Chicago Climate Exchange
- Study effects of biofuels on greenhouse gases

### *Energy Production*

- Assess the effects on air of changing from coal to natural gas
- Study effects of biofuels on air pollution

### *Transportation*

- Encourage greater use of natural gas, hybrids, biodiesel and electric vehicles
- Increase the use of public transportation and make it less polluting
- Assess barriers to the use of public transportation
- Increase bike paths for commuting

## Land – Drivers of Change:

### *Strategic Land Areas*

- Identify land areas that contribute disproportionately to conservation
- Protect and manage these lands

### *Soil Erosion*

- Acquire high resolution elevation data (using LIDAR) to gain accurate slope information and measure erosion rates
- Develop better estimates of erosion from gullies, ravines, and streambanks
- Evaluate watershed scale impacts of erosion control practices
- Restore annual surveys of crop residue cover after planting

### *Land Use Change*

- Establish habitat corridors statewide using consistent methodology and criteria
- Obtain and regularly update GIS land parcel data – make it comprehensive and broadly available, and establish a method for consistent updating
- Obtain and regularly update current land cover data – ensure consistent and frequent updating, and include all native plant communities
- Improve updating of soil surveys
- Create a GIS portal interface integrating land cover, soils, and bedrock geological information

## *Habitat Fragmentation*

- Research the effects of fragmentation on species and genetic diversity
- Conserve native genetic material
- Understand GMO effects on native plants – literature review
- Integrate and assess information on contaminated sites and contaminant sources (landfills, brownfields, pesticide spills, pollutant sources, etc.)
- Expand scope of monitoring for contaminants in the landscape

## **Wildlife – Drivers of Change**

### *Land Use Change and Fragmentation*

- Perform land cover mapping at regular intervals to understand changes in wildlife habitat
- Identify priority natural areas and corridors (hubs and connections) to preserve for wildlife - statewide
- Identify how to make all aspects of the land network (urban to agricultural to natural) more supportive for wildlife

### *Development*

- Determine how to build urban and exurban areas and retain the highest possible species diversity

### *Disease and Invasive Species*

- Research the (currently unknown) effects of diseases and invasive species and human structures on wildlife

## **Water – Drivers of Change**

### *Land Use Change*

- Invest in management and protection of Strategic Land Areas that affect water
- Manage development to reduce erosion and pollutant loading
  - » Focus on shoreland development
  - » Focus on fast-growing urban areas
  - » Promote shoreline buffers
  - » Promote urban and construction Best Management Practices (BMPs)
- Support research to quantify the benefits of BMPs and Low Impact Development (LID)
- Support water quality monitoring and assessment

### *Contaminants*

- Assess the impacts of emerging contaminants discharged to surface waters (pharmaceuticals, perfluorochemicals, pesticides, endocrine disruptors)
- Assess the impacts of contaminants from urban activities (construction, transportation, impervious areas)
- Support research on how to reduce, minimize, remove, or remediate contaminants

### *Consumptive Use and Energy*

- Measure the impact of water withdrawals on ground water – focus on the relationship between withdrawal vs. recharge
- Determine the impacts of different renewable energy options on water quantity and quality

### *Fish – Drivers of Change*

#### *Aquatic Invasive Species*

- Develop effective ways to stop or reduce spread of harmful invaders – urgently needed for VHS!
- Develop more effective methods of controlling aquatic invasive species
- Improve risk assessments for potentially harmful new invaders
- Create solutions to restore native communities after invasive species are under control

#### *Land Disturbance*

- Invest in protection of Strategic Land Areas to reduce nutrients and solids loading to surface waters
- Create tools to predict when cumulative land disturbances will alter fish communities
- Evaluate consequences of land use policies for fish communities

#### *Aquatic Habitat Loss*

- Create tools to predict reductions in fisheries productivity due to lake habitat losses
- Evaluate effectiveness of BMPs for shoreline habitat restoration
- Create tools to predict effects of shoreline development with and without BMPs on fish communities

#### *Climate Change*

- Fill crucial data gaps to predict and monitor effects of climate change, including effects on lake and stream water and nutrient budgets, temperatures linked to other climate data, and on-game fish, aquatic invertebrates, and aquatic plants
- Develop methods to predict the effects of climate change combined with other stressors on fish communities

#### *Fish Stocking*

- Develop guidance on environmentally appropriate source populations and species for stocking to:
  - » Restore fish communities
  - » Adapt to climate change
  - » Support fishing
- Evaluate effects of stocked fish on:
  - » Genetic diversity and fitness of wild fish (same species)
  - » Entire aquatic communities (other species)
- Evaluate effects of current fish stocking on anglers' experience – quality and quantity of fish caught

### *Contaminants*

- Monitor endocrine disruptors and pharmaceuticals:
  - » Distribution in surface waters
  - » Effect on fish health
  - » Biological response in fish in contaminated waters

## Outdoor Recreation – Drivers of Change

### *Land Use Change*

- Assess how changing land use patterns affect demand for, and supply of, the recreation resource

### *Human Health*

- Measure physical and mental health benefits of outdoor recreation:
  - » Perceived and attained benefits
  - » Measure actual activity via biophysical data

### *Demographics*

- Assess preferences for, and constraints to, recreation among racially/ethnically diverse population segments and inter-generational groups

### *Climate Change*

- Research how the effects of climate change will affect recreation users and recreation providers in Minnesota, including:
  - » Lack of snow and ice
  - » Lower water levels
  - » Change in land cover and water quality/quantity
  - » Higher summer temperatures
  - » Longer spring and fall seasons