US EPA ARCHIVE DOCUMENT

Integration of Probabilistic Surveys, Intensive Watershed Designs, and Targeted Sampling for Monitoring and Assessing Surface Waters in Minnesota

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Minnesota Pollution Control Agency

Overview

- Summarize various approaches used to monitor MN Lakes, Streams, and Wetlands [Condition Monitoring]
- Integration/coordination of the various designs in Minnesota
- Discuss partnership opportunities with National Surveys

Lake Water Quality Assessment Program

10 Year Monitoring Strategy

Area (acres)	#	Monitoring Design
> 500	~800	Census
100 - 500	~4000	Targeted; selection based on Citizen Monitoring, Remote Sensing, and/or Local Interest
< 100	~7000	

high

Priority

low

- Monitor ~100 Lakes/Year
- Assess swimmable use (primary contact)
- Indicators: TP, Chl-a, Secchi Depth
- 305(b) report/303(d) list

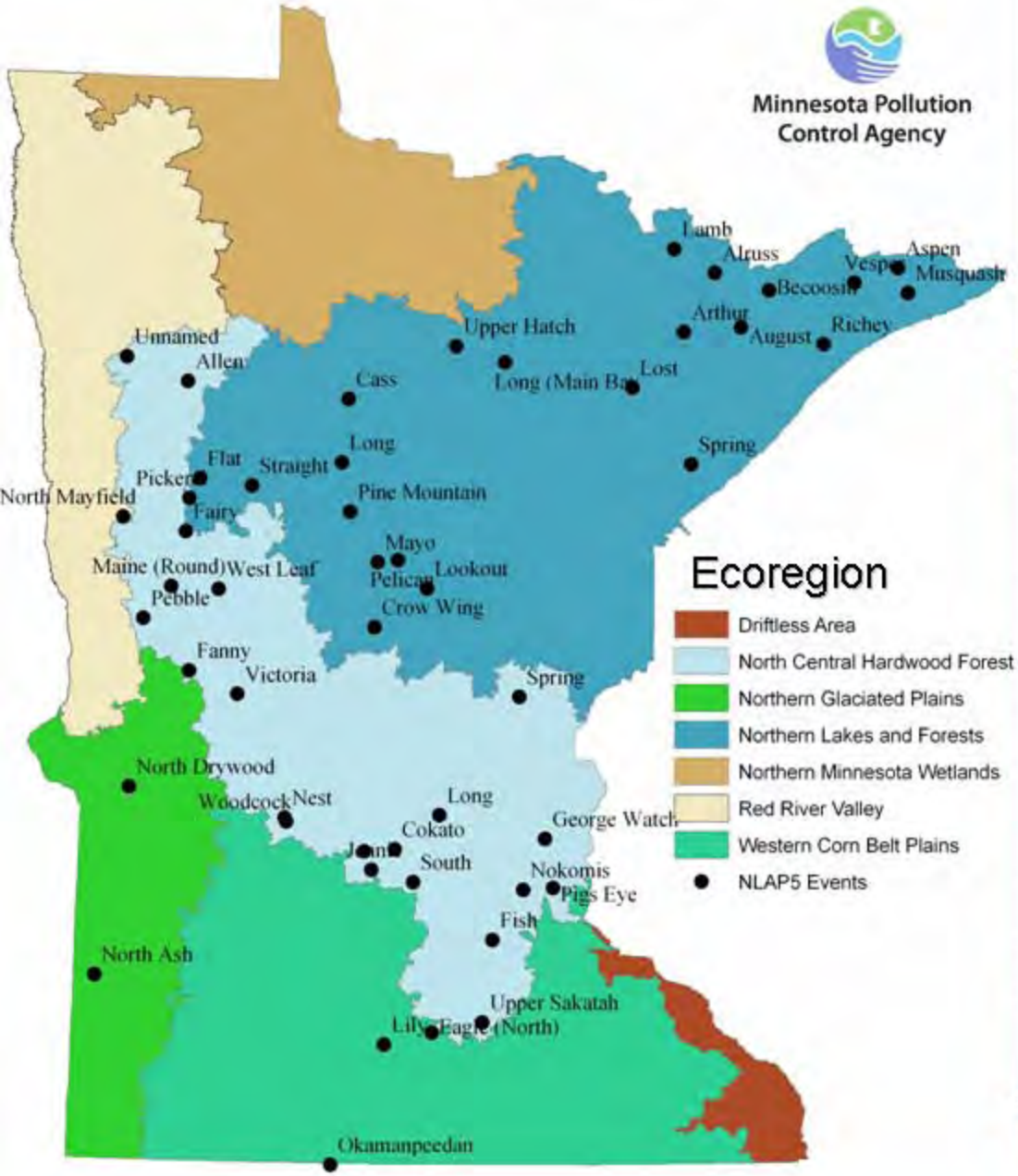
Other Lake Assessment Programs

	Monitoring Design	Indicators	Outcomes
Citizen Lake Monitoring (CLMP)	Fixed-Station	Secchi Depth	Status & Trends (individual lakes)
CLMP+	Fixed-Station	TP, Chl-a, DO, Secchi, Temp	Supplement CLMP dataset
Remote Sensing	Census (lakes > 20 acres)	Water Clarity	Statewide Status & Trends

National Lakes Assessment Project: MN

- Probabilistic Survey Design
- Enhance regional/national scale results with additional random sites to support state scale surveys
- Sample collection during summer of 2007 using standardized protocols
- Indicators measured represent biological condition, recreational use, and trophic status
- MN Contributors: Pollution Control Agency, Dept. of Natural Resources, US Forest Service

National Lake Assessment



Lakes, Ponds, and Reservoirs

Assessing the Nation's Waters

- 41 lakes ranging from 10 to 16,314 acres (Cass Lake)
- Added 9 lakes to gain statewide estimates of condition (±10% with 95% confidence)
- Good regional coverage across 4 ecoregions with 98% of MN lakes;

Stream Biological Monitoring Program

1990 – 1994 - Red and Minnesota Assessments (Fish IBI): Targeted Site Selection

1996 - Initiated rotating basin assessments (Fish & Invert IBIs): Probabilistic & Targeted

2005 - Collected data from all 10 major river basins

2006 - Repeated probabilistic survey in initial basin (St. Croix)

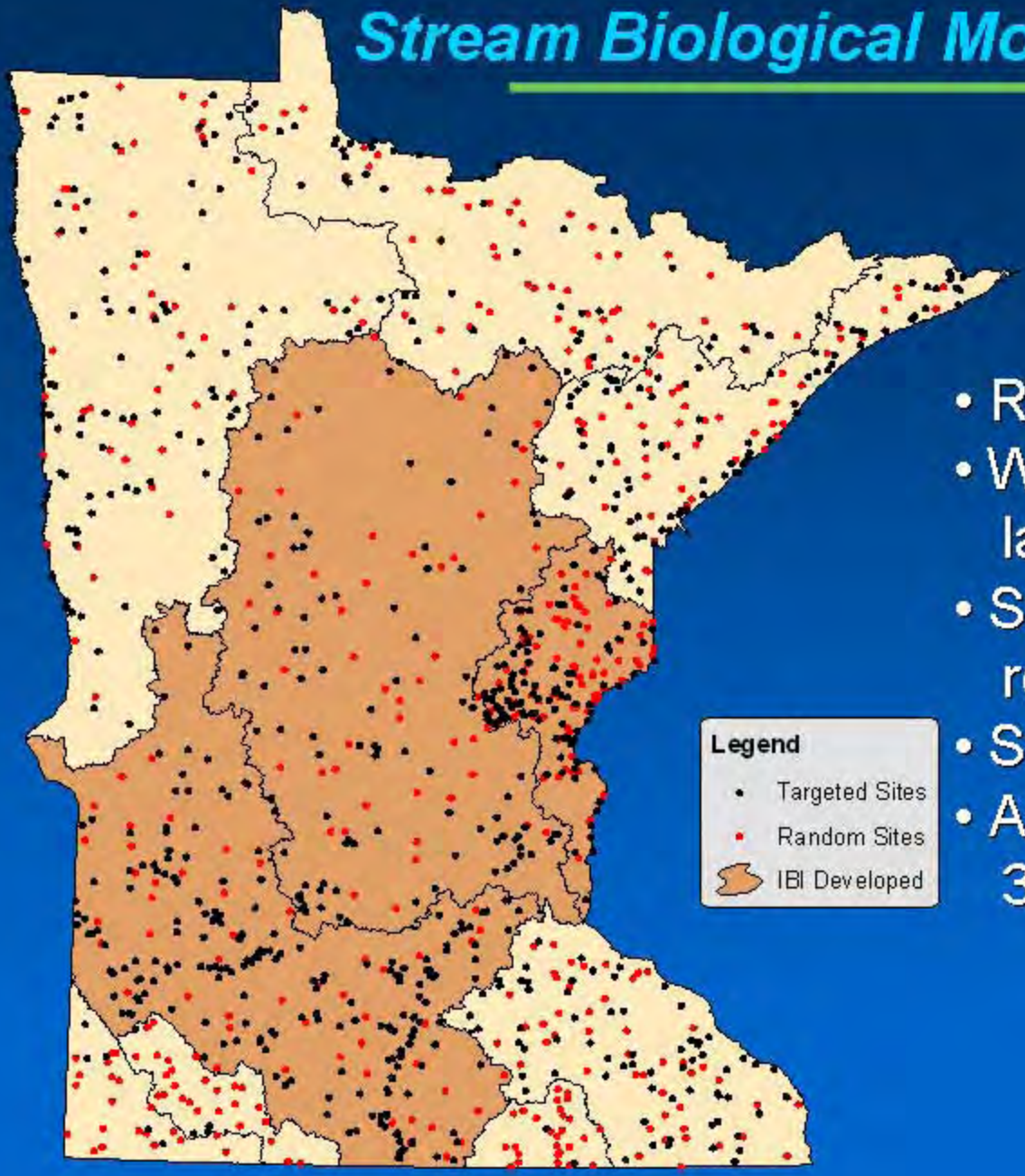
- Initiated Intensive Watershed design (Snake River): Targeted/Systematic Site Selection

2007 - Phase II of Snake R. survey; Initiate Phase I of intensive design in two new watersheds

Future - Continue basin assessments: Probabilistic

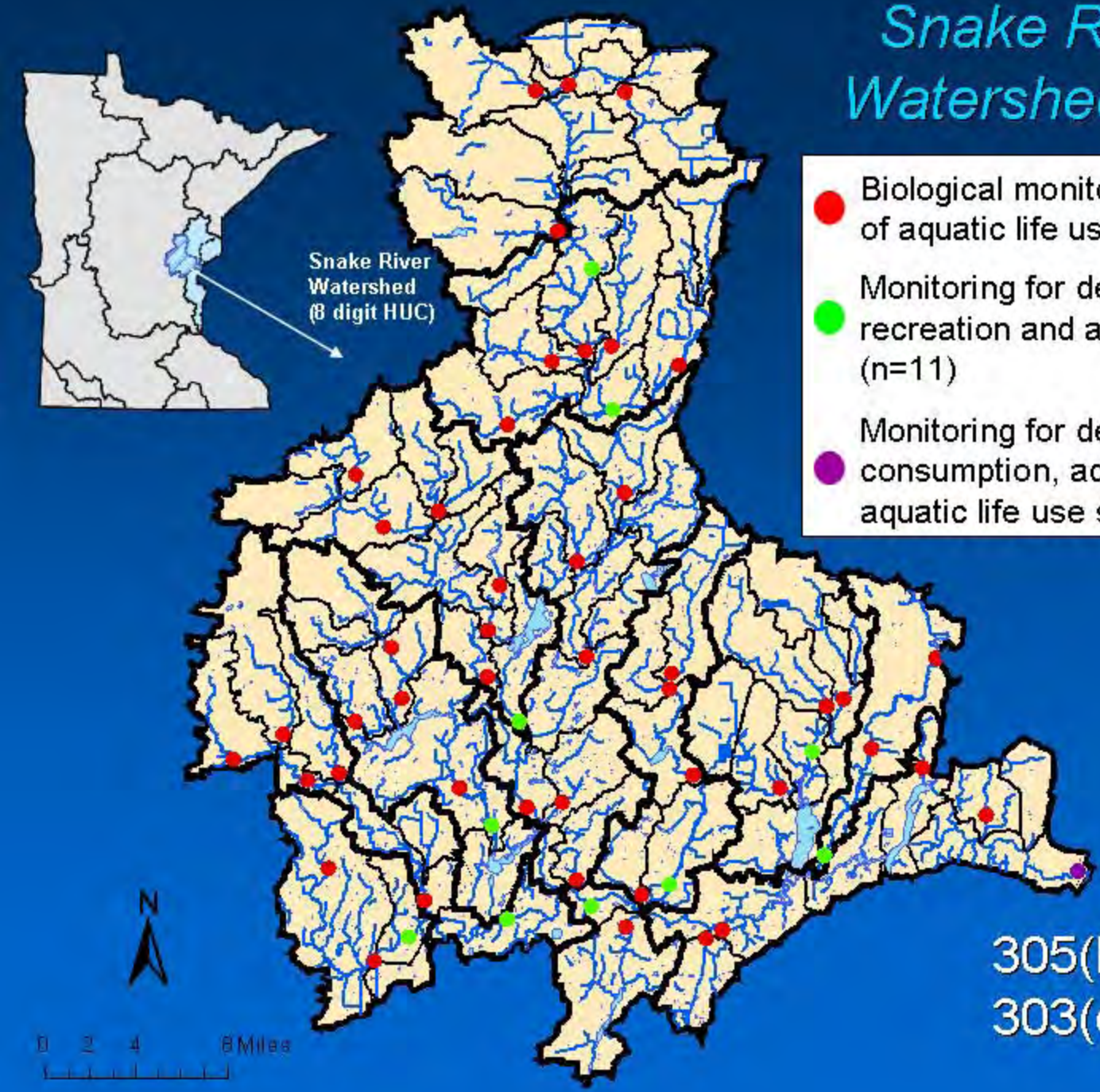
- Continue intensive watershed surveys

Stream Biological Monitoring 1990-2006



- Rotating Basin Design
- Wadeable streams and large rivers
- St. Croix and Upper Miss. reports completed
- St. Croix re-sampled 2006
- Assessments used for both 305(b) and 303(d)

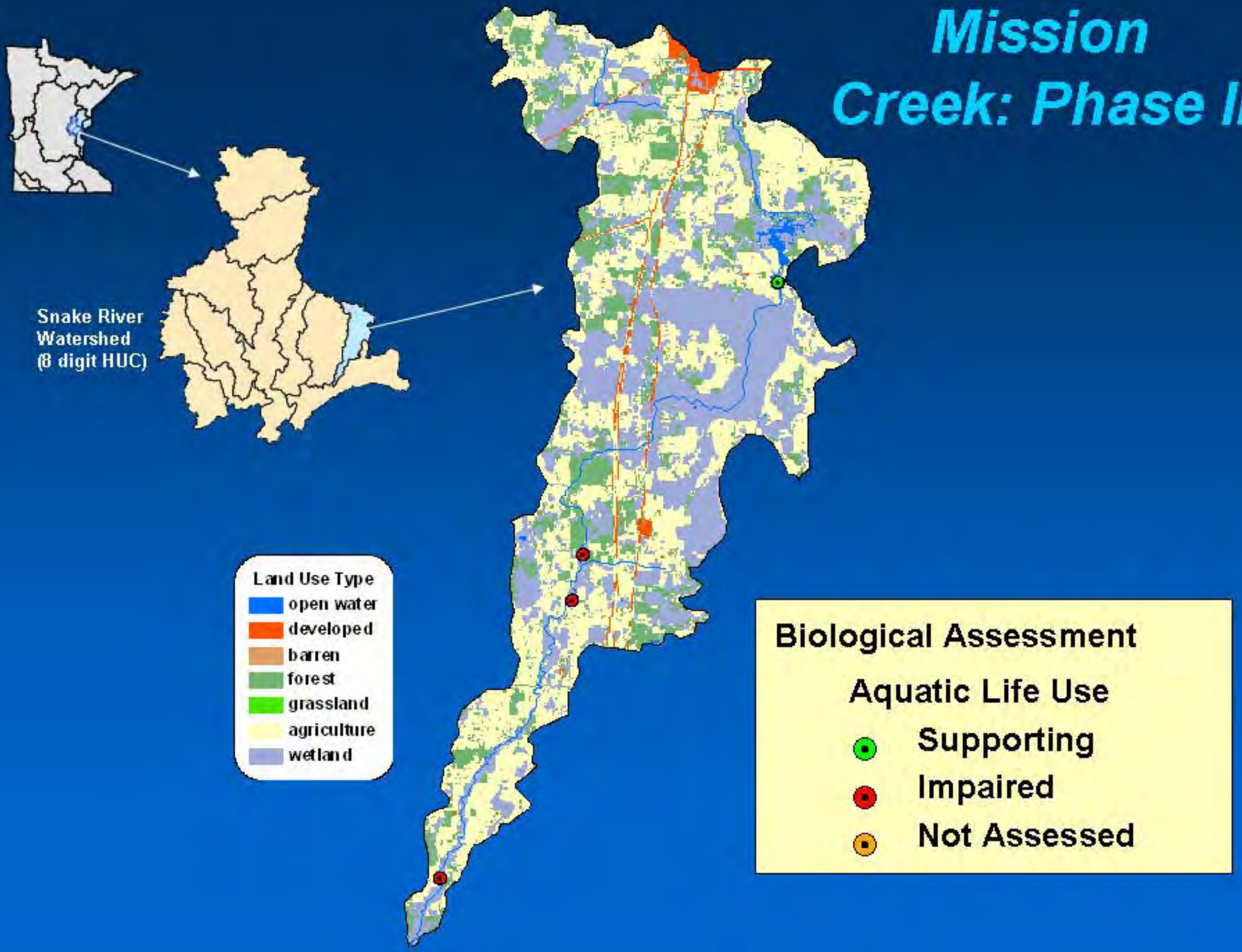
Snake River Intensive Watershed Pilot: Phase I



- Biological monitoring for determination of aquatic life use support (n=58)
- Monitoring for determination of aquatic recreation and aquatic life use support (n=11)
- Monitoring for determination of aquatic consumption, aquatic recreation, and aquatic life use support (n=1)

305(b) Reporting &
303(d) Listing

Mission Creek: Phase II



National Stream and River Assessments

MN Participation

- Site reconnaissance
- Methods/Assessment Comparability (Fish & Inverts)
  - WSA vs. MN Methods
- Provided Reference (Least-impacted) sites for ecoregion expectations

Large & Great Rivers Assessments

- Large River Method Comparison (Fish & Inverts)
- Great River Method Comparison (Fish only) – planned for 2007

Wetland Biological Monitoring Program

1992 – 2006 - Monitoring efforts focused on indicator development: Targeted Site Selection

2003 - First wetland probabilistic survey conducted: Redwood River Watershed

2007 - Indicators developed statewide for depressional marshes: Plant and Invertebrate IBIs

- Initiate first phase of statewide wetland probabilistic survey

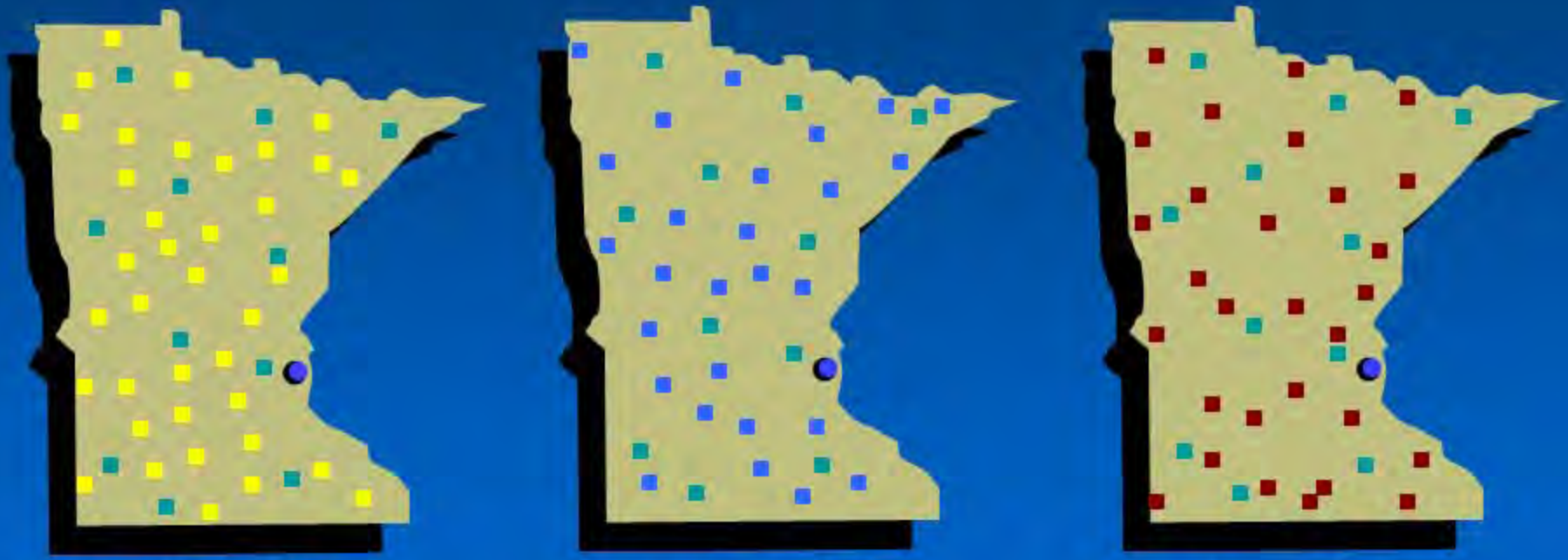
Future - Develop condition indicators for other wetland types: Targeted Site Selection

- Monitor set of sites in each ecoregion to assess condition trends: Fixed-Station

Probabilistic Statewide Wetland Survey Design: Status & Trends of Wetland Quantity & Quality

3-Panel Interpenetrating Design

Plot Selection: GRTS Survey Design (Areal Resource)



Year (Panel) 1

1580 1 mi² plots

Year (Panel) 2

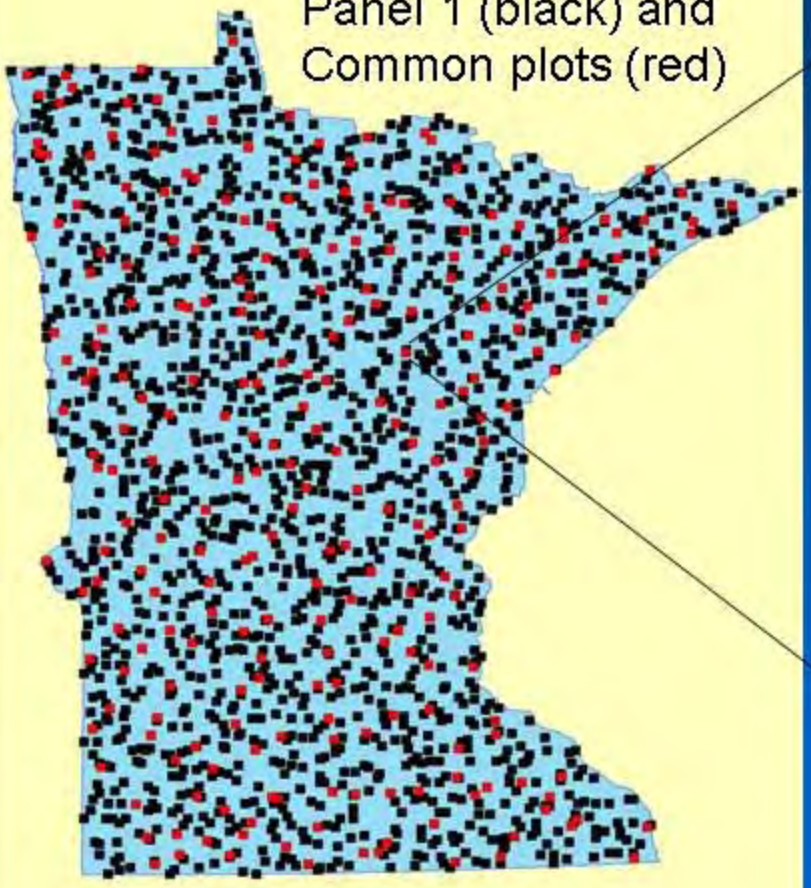
1580 1 mi² plots

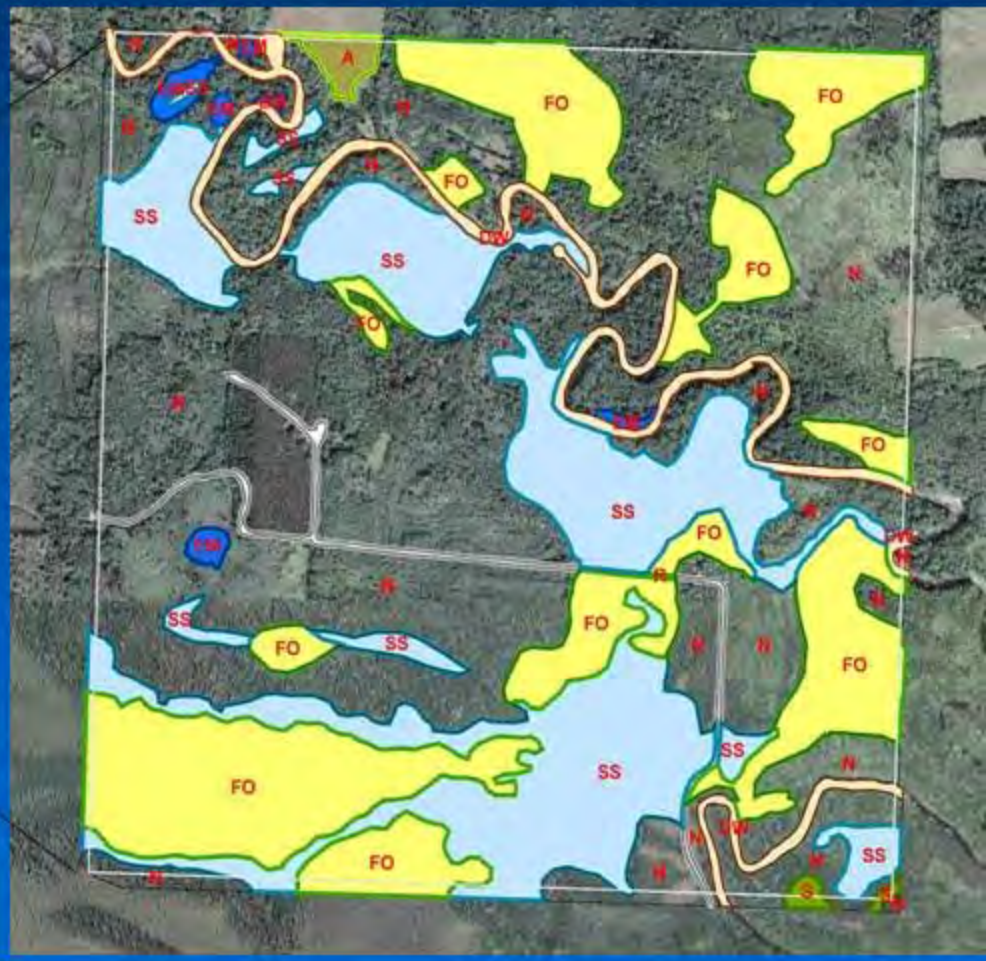
Year (Panel) 3

1580 1 mi² plots

+ 250 Common Plots Sampled each year

Panel 1: 2006 Wetland Quantity Status
2007 Wetland Quality Status





Depressional Wetland Condition Assessment 2007-2009

National Wetland Condition Assessment

- Scheduled for 2011
- MN participating in National Wetlands Monitoring Workgroup discussions
  - Communicating with National Wetland Assessment Team
- Collaboration on Method/Indicator Development??

MN Condition Monitoring Design Matrix

Design	Lakes	Streams	Wetlands
Census	X		
Targeted	X	X	X
Probabilistic	X	X	X
Fixed-Station	X	X	X
Intensive Watershed		X	

Conclusions

- Probabilistic designs support some programs better than others
- Alternative designs needed to better support other program needs (e.g., TMDL)
- Integration of designs will result in most efficient use of monitoring resources

Conclusions

- Integration with National Surveys depends on whether a statewide probabilistic design already exists for the resource:
  - If one exists → comparable assessment endpoints may allow results of State survey to be used supplement National survey, and vice versa
  - If not → supplementing National survey with additional sites is an efficient way to obtain statistically valid statewide estimates of condition.

Questions?

Minnesota Pollution Control Agency