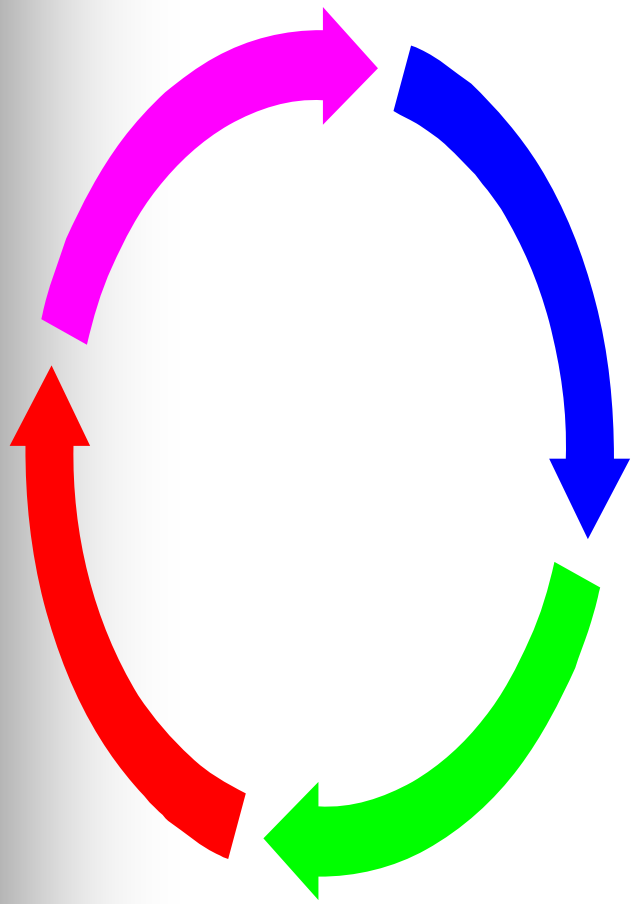
Developing a Lake Management Plan

Why Plan?

Basic Planning Process Elements



- Goals
- Inventory
- Analysis
- Alternatives
- Recommendations
- Implementation
- Monitoring

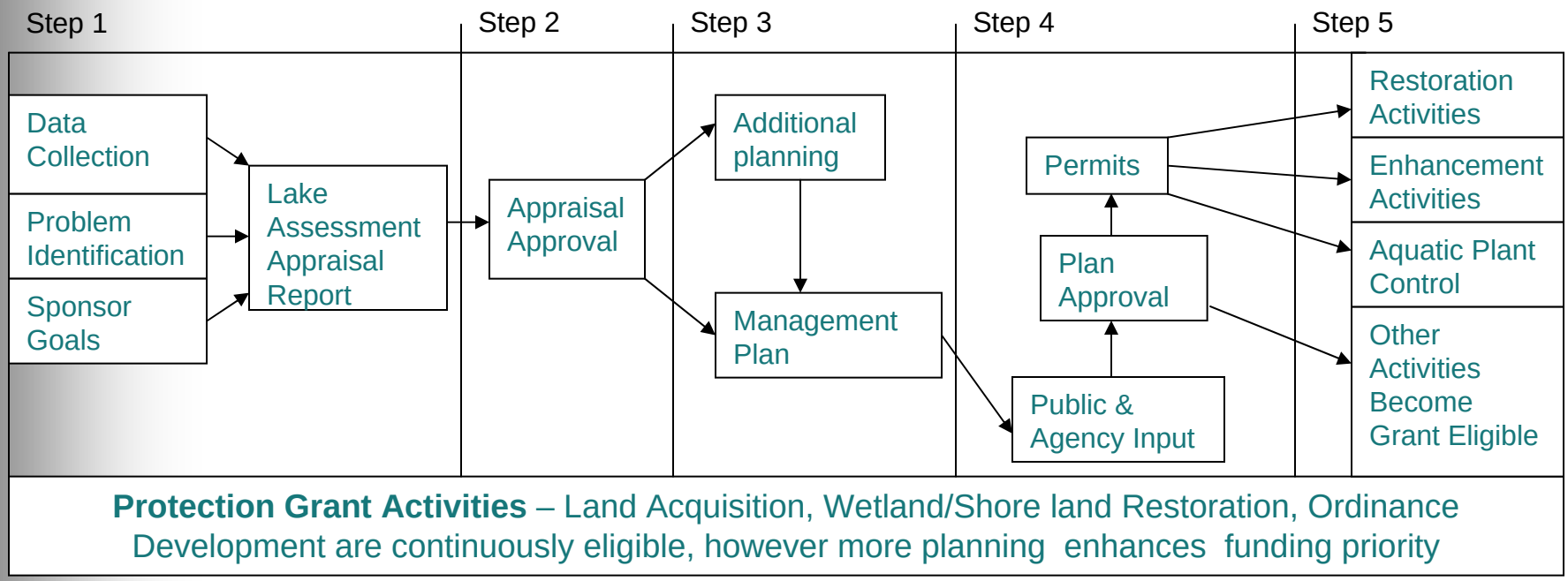
Planning Approach for Lakes

Stepped iterative process

1) **Assessment/Appraisal** - "Ball parks" lake, provides focus, sets direction and appropriate level of planning.

2) **Comprehensive Management Planning** - Repeats process in detail to address specific management needs. Long term and broad vision.

3) **Action/Project Plans** – Focused short term (1-3 years) details with specific objectives. Implements Management plan.



Step 1. Appraisal - Collect existing easy to obtain data including one year of basic water quality data. ID what is known about the lake, perceived problems and what people desire. An assessment characterizes the resource, determines ecological potential and sets general management strategy. Lays the groundwork for all future activities.
Protection Activities are continuously eligible - do not require plan approval. However, some data for application requirements
Step 2. Appraisal Approval - DNR & partners agree on general lake management directions. Sets foundation for future management and avoids unnecessary planning. Check point for data entry into DNR system. Approved study plan including a commitment to phased planning grants.
Step. 3.Management Plan - Creation of a management plan with specific management objectives. May proceed on single track i.e. APM, water quality, lake use, habitat or be comprehensive. Level of additional planning dependent on complexity of issues
Step 4. Plan Approval - The sponsor adopts the plan after public and DNR and other agency's input. Environmental Assessments and permits issued if required. Sponsor may apply for protection grants for implementation.
Step 5. - Implementation

Getting Started

- Advisory Committee or Study Team
- Define the Study Process
- Communication and Education Plan
- General Goals
- Identify Problems

Study Team

Stakeholders

- Lake Residents
- Lake Users
- Watershed landowners
- Government
- Tribes
- Business

Functional Needs

- Science & Technology
- Politics
- Finance
- Law & Enforcement
- Education & Communication

Goals: Maintain or Improve?

Inventory & Data Collection

Problem Identification
Assessing Current Conditions

- Lake natural features and limnological characteristics
- Watershed conditions
- Water quality
- Institutional and sociological information
- Historical information
- Previous studies, reports, maps

Sources of Information

Surface Water Integrated Monitoring System (SWIMS)

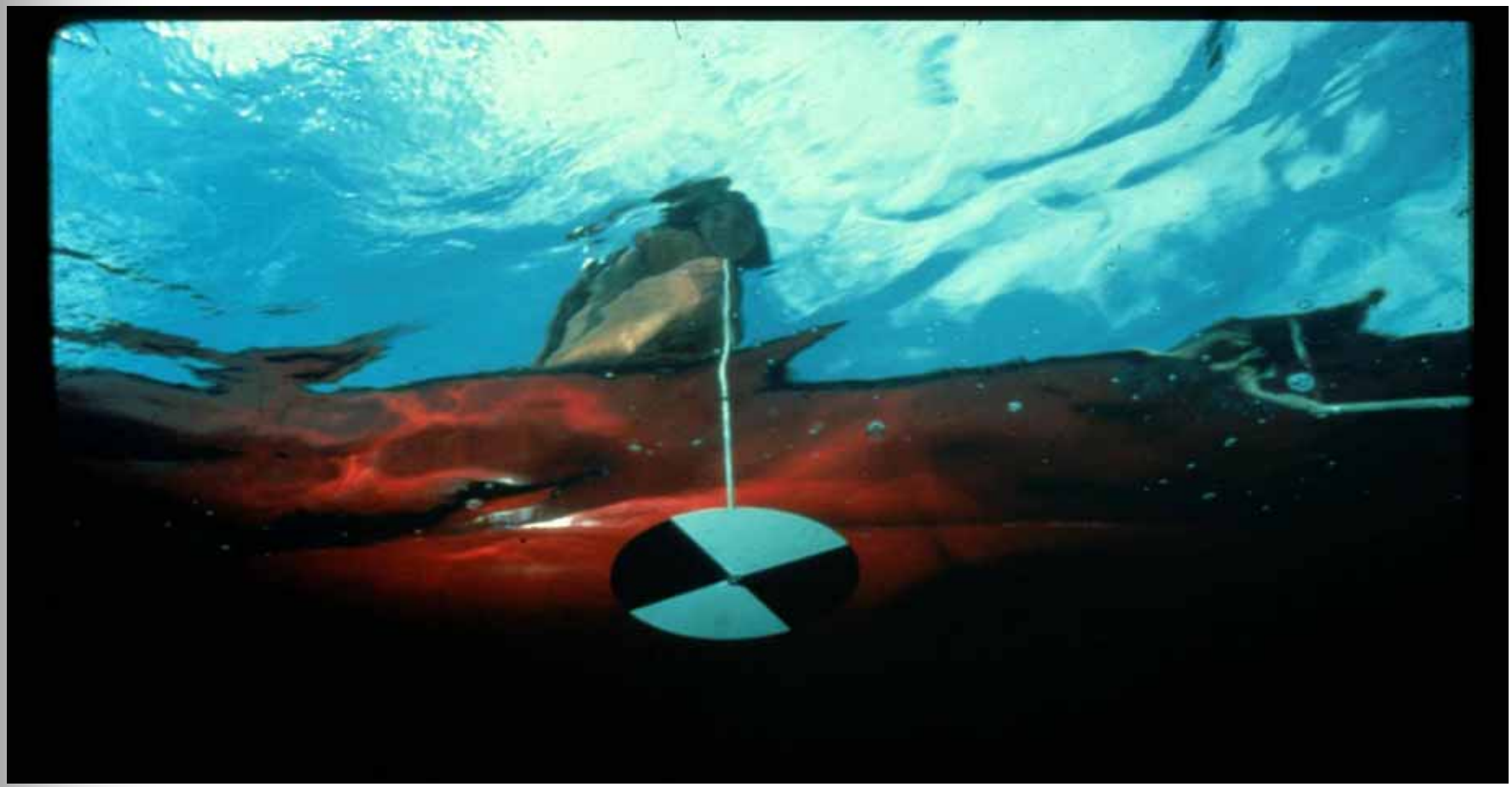
- DNR Regional Offices/ Service Center
- County Land Conservation, Zoning Office
- US Geological Society
- Regional Planning Commissions
- University of Wisconsin
- Historical societies, newspaper archives
- **User and Opinion Surveys**

Problem Identification
Assessing Current Conditions

Water Quality

Problem	Metric
Algae Blooms	Nutrients
Anoxic Hypolimnion	Secchi
Fish Kills	Chlorophyll
Sedimentation	Temperature & Dissolved O2
Internal Nutrient Loading	Sediment Nutrient Release Rates

LOSS OF WATER CLARITY



Problem Identification
Assessing Current Conditions

Watershed

Problem	Metric
Ag Land Runoff	Nutrient and Sediment Loads (lbs/acre)
Urban Stormwater Runoff	Land Use Assessment
Barnyard Runoff	Land Management Assessment
Wetland Loss	Surface and Groundwater Watershed Delineation
Critical Habitat Loss	

LAND USE AND WATERSHED IMPACTS

Problem Identification
Assessing Current Conditions

Recreation

Problem

User Conflicts

Metric

Accident rates

User surveys

Boat per acre

Piers and access sites per acre

Problem Identification
Assessing Current Conditions

Aquatic Plants

Problem	Metrics
Too many - impairs navigation or recreation	Percent Area Coverage
Too few - limited habitat	Species Composition
Exotics/invasives	Density/Diversity
	Floristic Quality Index
	Biomass lbs/acre

AQUATIC PLANTS

- Habitat
- Energy Dissipation
- O_2 Producers

Problem Identification
Assessing Current Conditions

Fisheries

Problem	Metric
Unbalanced Fisheries	Species composition
Stunted Growth	Age length ratio
Rough Fish Dominance	lbs. or fish per acre
Poor Success	Catch per effort

FISH

Planktivore

Piscivore

Benthivore

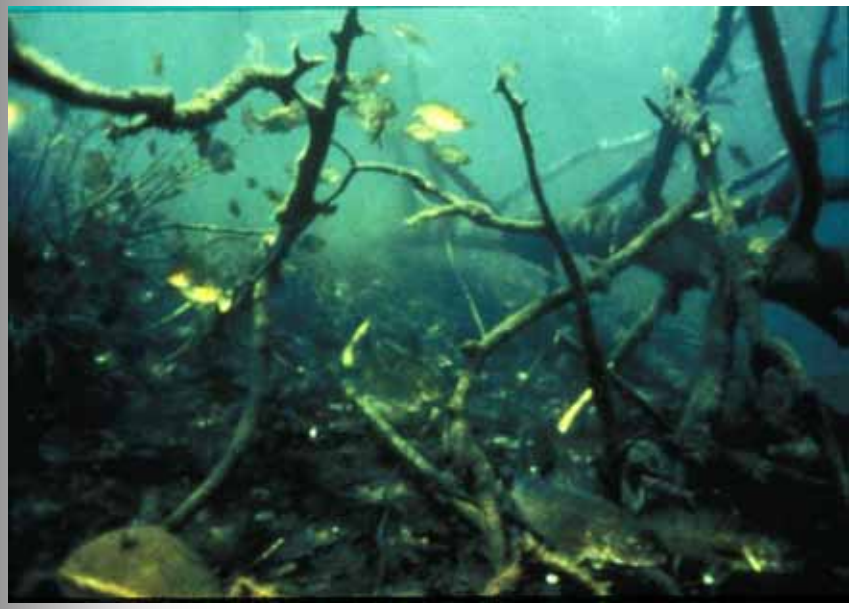
Problem Identification
Assessing Current Conditions

Near Shore Habitat

Problem

Limited habitat

Aesthetics



Metric

Substrate

Woody Cover

Structure of Vegetation

Structures/mile

Variation in Depth and Gradients

Analysis

Determining Management Objectives

Compare Current Conditions to Reference or Benchmark Conditions

- Historical Conditions
- Establish Standards or Guidelines
- Comparison to Similar Lakes
- Expected or Predicted Conditions Using Models
- Revisit Goals and User Survey Results
- Sensitivity Analysis

Appraisal Tools
Models

WISLEAP Ecoregion Model

Compares the lake in question against a set of reference lakes for the Ecoregion.

Includes a statistical framework to compare against Ecoregion means for TP, Chl a and Secchi depth.

Other Appraisal Tools

- Methods using the plant community structure
- Methods using the fish community structure
- Methods using dissolved oxygen
- Methods using the waterfowl community structure
- Methods using amphibian community structure

Lake Appraisal Report

Preliminary Analysis

- Characterize the lake's conditions
- Identify beneficial and desired uses
- Problems, impairments or threats
- Potential causes or sources
- Possible actions to be taken or evaluated
- Determine if protection, management or restoration mode

Lake Conditions

Good

Bad

Protect

Manage

Restore

Management Strategy

Protection Alternatives

Good to excellent conditions

Focus on maintaining or modest improvement of existing conditions

Watershed planning, i.d. critical sites,

Most protective lake class for shoreland zoning

Enforcement and implementation of existing regulations

Education strategies to promote stewardship

Baseline monitoring to detect changes

Establish lake water quality and habitat goals

Management Alternatives

Generally good conditions - few signs of decline or problems to be addressed

Include protection strategies to halt degradation & manage specific problems

Additional inventory and analysis work to diagnose problems and develop specific management plan.

Watershed, recreation, aquatic plants, exotic species, etc.

Establish water quality and habitat goals

Water Quality Objective Setting

WI Lake Modeling Suite (WiLMS)

A Windows application:

- 13 empirical lake models.
- A simple watershed phosphorus export module.
- An internal load estimator and a trophic response module.

- Partition sub watersheds
- Inventory current and future land uses
- Identify potential sources, problems areas
- Calculate loadings
- Develop best management practices plan

Restoration Alternatives

Poor conditions, nuisance algae blooms aquatic plants, unbalanced fishery, not meeting beneficial uses. Complex lakes

Recommend protection and management strategies

More detailed planning to diagnose problems and determine feasibility of management actions.

Establish water quality and habitat goals

Restoration Objective Setting

- Diagnostic and Feasibility Study
- Complex modeling
- Detailed data collection and monitoring needs
- Enhancement versus restoration

Alternative Selection

Achievability Analysis

- What is reasonable given lake potential?
- What management activities are feasible?
- Will action be effective?
- Will it be cost effective?
- Will it be acceptable to public?
- Will water quality and habitat goals be achieved?

Recommendations Plan Development

- Appraisal Report – Assessment of Lake Conditions
- Water Quality and Habitat Goals
- Management Objectives
- Analysis and Methods
- Alternatives Considered
- Recommendations
- Public/Agency Comment
- Implementation – General Timeline and Costs

Adoption and Approval

- Public Input Throughout
- Public & Agency Comment on Draft Plan
- Consider Comments
- Finalize
- Adopt locally
- DNR final review & approval

Implementation

- Priorities
- Schedule/time line
- Funding
- Roles and responsibilities
- Admin
- Legal
- Finance
- I&E

Monitor & Modify

- Long term monitoring plan
- Evaluation - How to track if objectives are being met
- Update periodically

How the process fits lake grants

- Small Scale Planning Grants - $3,000
  - Organize, Prepare and Augment
- Large Scale Planning Grants - $10,000
  - Appraisal Report/Lake Assessment
  - Phased Plan Development
- Lake Protection Grants - $200,000
  - Diagnostic/Feasibility
  - Implementation
- Other Sources

Key Guidance

- Managing Lakes and Reservoirs – NALMS/EPA www.nalms.org
- A Model Lake Plan for a Local Community – UWEX Publication G3606
- Aquatic Plant Management in Wisconsin – UWEX www.uwsp.edu/cnr/uwexlakes/ecology/
- How's the Water? Planning for Recreation Use on WI Lakes and Rivers - UWEX www.uwsp.edu/cnr/uwexlakes/publications/
- Vilas County Lake Resource Guide – Vilas Co. LCD
- Lake Planning Checklist - DNR
- Understanding Lake Data – UWEX pub G3582 www.dnr.wi.gov/org/water/fhp/lakes/under/
- Lake Models www.dnr.wi.gov/org/water/fhp/lakes/laketool.htm
- Assessment and Sampling Methods - DNR

Lake Planning Manual Under Development