9.0 Implementation Plans

This section of the plan addresses recommended management activities for Crooked Lake over the next five years. These activities discussed will be in the order identified at the public workshop of major issues facing Crooked Lake. The discussion of each issue will be organized as follows:

Management Activity is the activity title

Description provides a brief explanation of the activity

Goal(s) gives objective(s) of management activity

Specific Components & Notes includes details of activity methods

Measures are quantitative actions to be taken to achieve goal

Milestones are actions as results of the Measures

Implementation Timeline

Responsible Person for this Activity provides contact information

Educational Component Related to this Activity is broken down into:
Audience Involved, Educational Goals, Activities Used

The Management Activities are:

9.01 Annual Chemical Treatment
9.02 Annual Plant Survey
9.03 Application for Treatment of 20% of Littoral Zone
9.04 Boat Inspection
9.05 Buffer Strips
9.06 Curb Cut Rain Gardens
9.07 Dam Inspection
9.08 Dredge Boat Channel
9.09 Enforcement Blitz
9.10 Ground Water Monitoring
9.11 Increased Garbage Pick Up
9.12 Pond Inspection
9.13 Install Garbage Cans & Signage
9.14 Lake Core Samples
9.15 Lake Level Monitoring
9.16 Lake Water Quality
9.17 (Aquatic) Plant Restoration

Management Activity	**9.01 Annual Chemical Treatment**
Description	Involves application of liquid or pelletized herbicides applied to target area or to plants directly
Goal	Reduce Eurasian watermilfoil and Curly leaf pondweed to below nuisance levels: Plants rarely reach the surface Navigation and recreational activities not generally hindered Stem density is 0-160 stems/m^2 Biomass is 0-50 g dry wt/ m^2 Estimated Total Phosphorus (TP) load is <1.7 lbs/acre
Specific Components & Notes:	Aquatic plants growing in public waters are owned by the state and can interfere with riparian property owners' access to lakes. The use of herbicides in lakes to control submerged vegetation, or the destruction of emergent vegetation by any means, require DNR permits. Overall program coordination within DNR is managed by staff in Ecological Services. Permit applications require the following items: 1. <u>Applicant information</u>: a. Crooked Lake Area Association 13415 Heather St NW Coon Rapids, MN 55433 b. (763) 422-0682 c. Permit Number 2. <u>Lake information</u>: Crooked Lake, Anoka County Inventory Number: 02-0084-00 3. Treatment information: Justification Fee information Enclosures
Measures	Plants rarely reach the surface Navigation and recreational activities not generally hindered Stem density is 0-160 stems/m^2 Biomass is 0-50 g dry wt/ m^2 Estimated Total Phosphorus (TP) load is <1.7 lbs/acre
Milestones	CLAA Board action on DNR permit application Bids for annual application

Implementation Timeline	March: Apply to DNR for Aquatic Plant Management Permit Mid-March to Mid April: Seek bids from licensed aquatic herbicide applicators Mid to End of April: Apply herbicide
Responsible Person for this Activity	Agency: Crooked Lake Area Association Title: President Phone: (763) 422-0682

Educational Component Related to this Activity:

The Audience Involved	Educational Goals	Activities Used
Lakeshore Owners	Areas to be treated	Newsletter Webpage for treatment
City Council Members	Benefits of treatment	Annual report

Management Activity	**9.02 Annual Plant Survey**
Description	A survey of aquatic macrophyte species distribution, diversity, and frequency in Crooked Lake
Goal	The primary goals of surveying aquatic macrophytes are 1) Comparing year-to-year data within a lake, 2) Comparing data among lakes.
Specific Components & Notes:	The formal quantitative survey is conducted at pre-determined sampling locations distributed evenly over the lake surface (point-intercept method). This method, when combined with a boat survey to gather additional information on areas not sampled directly, will best characterize the lake plant community. The baseline sampling should be conducted between early July and mid-August. Although changes (such as biomass) in the plant community through this long sampling window might complicate data interpretation, we are mostly interested in species diversity and frequency, variables that should be fairly constant through the growing season.
Measures	Surveys completed Surveys budgeted Surveys planned
Milestones	Publication/posting of past survey data Mapping of past survey data Budgeting and planning for survey
Implementation Timeline	September – Budget adoption & preliminary work plan January – Annual work plan June – Conduct survey
Responsible Person for this Activity	Agency: Crooked Lake Area Association Title: President Phone: (763) 422-0682

Educational Component Related to this Activity:

Audience	Goals	Activities
Lakeshore Owners	1. Awareness of vegetative makeup of the Lake	Winter meeting presentation
City Councils (Andover & Coon Rapids)	2. Awareness of distribution of plants in the Lake	Lake management plan on Website Survey results on Web

Management Activity	**9.03 Apply for Treatment of 20% of Littoral Zone**
Description	Involves application of liquid or pelletized herbicides applied to target area or to plants directly over 20% of the littoral zone.
Goal	Reduce Eurasian watermilfoil and Curly leaf pondweed to below nuisance levels: Plants rarely reach the surface Navigation and recreational activities not generally hindered Stem density is 0-160 stems/m^2 Biomass is 0-50 grams dry wt/ m^2 Estimated Total Phosphorus (TP) load is <1.7 lbs/acre
Specific Components & Notes:	Apply for a permit to apply pesticides to submerged vegetation in 20% of the littoral zone (M.R. 6280.0350, Subp 4, A). The procedure for increasing the size/percent of the treatment area is essentially the same as for chemical treatment except that applicant is requesting a variance from the 15% policy. Limiting chemical treatment to 15% of the littoral zone is a standard that attempts to allow a reasonable, but not excessive portion of the lake to be treated. By limiting treatment areas, the 15% rule also forces treatment to occur in the highest priority areas; limiting treatment to 20% of littoral zone achieves the same ends.
Measures	1. Plants rarely reach the surface 2. Navigation and recreational activities not generally hindered 3. Stem density is 0-160 stems/m^2 4. Biomass is 0-50 grams dry wt/m^2 5. Estimated Total Phosphorus load is <1.7 lbs/acre
Milestones	1. CLAA Board action on DNR permit application 2. Bids for annual application
Implementation Timeline	March: Apply to DNR for Aquatic Plant Management Permit Mid-March to Mid April: Seek bids from licensed aquatic herbicide applicators Mid to End of April: Apply herbicide
Responsible Person for this Activity	Agency: Crooked Lake Area Association Title: President Phone: (763) 422-0682

Educational Component Related to this Activity:

Audience	Goals	Activities
Lake Shore Owners	Areas to be treated	Newsletter Webpage for treatment
City Council Members	Benefits of treatment	Annual report

Management Activity	**9.04 Boat Inspection**
Description	Monitor the public access and watch for boats, trailers, or other equipment that may contain plant fragments or other material that can be viably introduced to the lake.
Goal	To intercept all boats leaving from or coming to Crooked Lake which carry invasive species, and oversee the disposal of those species so that they do not enter the lake.
Specific Components & Notes:	The presence of inspectors should: 1. Occur during high use periods 2. Provide an enforcement presence by photographing and documenting equipment containing plant fragments 3. Emphasize invasive species and general public education on the nature of the lake by providing individual with Crooked Lake and Invasive Species Brochure
Measures	Number of inspections Number of brochures distributed
Milestones	Annual training by MDNR Annual volunteer schedule
Implementation Timeline	Annually April: Train boat inspection volunteers May: Begin inspections
Responsible Person for this Activity	Agency: Crooked Lake Area Association Title: President Phone: (763) 422-0682

Educational Component Related to this Activity:

Audience	Goals	Activities
Boat Inspection Volunteers	1. How to approach a boater 2. How to inspect a boat 3. How to identify invasive species 4. How to properly dispose of invasive species	Lecture Film Brochure
Boaters	1. How to inspect a boat 2. How to identify invasive species 3. How to properly dispose of invasive species	Demonstration by volunteer Brochure

Management Activity	**9.05 Buffer Strips**
Description	Buffer strips are a vegetated area bordering a lake or stream that exist or are established to: • Protect water quality • Stabilize shoreline • Provide aquatic and terrestrial habitat For water quality, buffer strips work by intercepting sheet flow of surface water before it reaches the water body. By slowing the water and forcing it to flow through the buffer vegetation, increased settling occurs as well as filtration. In addition, the plants take up and utilize the nutrients deposited in the buffer.
Goal	Twelve buffer strip projects within the next five years
Specific Components & Notes:	The Anoka Conservation District (ACD) has a buffer strip program where they provide technical and financial assistance to homeowners in the design and construction of buffer strips. Financial assistance is usually 50%.
Measures	Number of projects annually Percent of lake frontage in buffer strip
Milestones	Crooked Lake Area Association winter meeting Annual sign up ACD annual report Crooked Lake annual report
Implementation Timeline	
Responsible Person for this Activity	Agency: Anoka Conservation District Title: Water Quality Specialist Phone: 763-434-2030

Educational Component Related to this Activity:

Audience	Goals	Activities
Lakeshore Homeowners	Program awareness	Brochure Annual meeting presentation Article in Crooked Lake Area Association Newsletter
	Programs options and benefits	Brochure Program description on web

Management Activity	**9.06 Curb Cut Rain Gardens**
Description	A rain garden is a planted depression that is designed to absorb rainwater runoff from impervious urban areas like roofs, driveways, walkways, and compacted lawn areas. This reduces rain runoff by allowing stormwater to soak into the ground (as opposed to flowing into storm drains and surface waters which causes erosion, water pollution, flooding, and diminished groundwater). Rain gardens can cut down on the amount of pollution reaching creeks and streams by up to 30%. Native plants are recommended for rain gardens because they generally don't require fertilizer and are more tolerant of local climate, soil, and water conditions. The plants — a selection of wetland edge vegetation, such as wildflowers, sedges, rushes, ferns, shrubs and small trees — take up excess water flowing into the rain garden. Water filters through soil layers before entering the groundwater system. Root systems enhance infiltration, moisture redistribution, and diverse microbial populations involved in biofiltration. Also, through the process of transpiration rain garden plants return water vapor into the atmosphere. A more wide-ranging definition covers all the possible elements that can be used to capture, channel, divert, and make the most of the natural rain and snow that falls on a property.
Goal	Reduce neighborhood impact on Crooked Lake
Specific Components & Notes:	• Rain gardens for individual houses or buildings are generally between 100 to 400 square feet in size, although they can be much larger if you have a very large impervious area to treat. • The exact size of the garden should be determined by calculating the square footage of roof or pavement which will drain to the garden, and making the garden about 30% of this area. • Rain gardens should be sited in a level to gently sloping area and at least 10 feet from building foundations. • If a building has rain gutters, it is usually simplest to site the garden where rainwater from one of the gutter downspouts can easily be directed into the garden. • Edging (rocks, cobbles, plastic, etc.) can be used to create a defined look and help keep out weeds & grass. • Be aware of underground service lines or utilities! Call the local utility company or Gopher State One Call before digging!

Cuts in the curb allow stormwater to enter the gardens from the street.

Measures Reductions in the volume and quality of runoff from the subwatershed

Milestones
Demonstration grant application
Location and survey work for rain gardens
Construction

Implementation Timeline Spring

Responsible Person for this Activity

Agency:	City of Andover
Title:	Natural Resources & SWPPP Coordinator
Phone:	763-755-5100

Educational Component Related to this Activity:

Audience	Goals	Activities
Home owners	Nature of rain gardens	Rain garden brochure
	Condition of Crooked Lake	Presentation at Crooked Lake Area Association winter meeting

Management Activity	**9.07 Dam Inspection**
Description	Ensure that the earthen dam and outlet of Crooked Lake is in proper repair
Goal	Detect and repair, if needed, dam leakage
Specific Components & Notes:	The dam was inspected in fall 2008. Water levels were at least 0.5 feet below the toe of the lake side of the dam. No leakage was observed and no signs of recent discharge were observed.
Measures	Inspection completed every 5 years
Milestones	Inspection Report every 5 years Annual county water atlas
Implementation Timeline	Fall 2008 (completed) Fall 2013

Responsible Person for this Activity	Agency:	Coon Creek Watershed District
	Title:	Administrator
	Phone:	763-755-0975

Educational Component Related to this Activity:

Audience	Goals	Activities
Lakeshore Owners	Notification of inspection results	Lake association newsletter

Management Activity	**9.08 Dredge Boat Landing Channel**
Description	IF 1. Water levels continue to drop, or 2. Sufficient borings of the lake bottom on the north end are taken to define an area where siltation has occurred, Then it may be prudent to pursue a DNR permit for "Works in the bed of public waters" to dredge a channel from the boat access to the main body of the lake.
Goal	Maintain recreational public access to the Lake
Specific Components & Notes:	**Lake Core Samples**: This action is tied to the results of action 9.14 Lake Core Samples and the plotting of those samples to determine and define any siltation that has occurred on the northern end of the lake. **DNR Permit**: A permit would be required from the DNR Division of Waters for work within the bed of a public water; the DNR Area Hydrologist would be the initial contact. **Dredge Disposal Site**: A site near the project site would need to be secured for at least temporary placement of the dredged material to allow it to drain so that it can be handled and trucked from the site. **Contractor**: A contractor with equipment capable of working in shallow water or a dredge would need to be secured.
Measures	Lake level elevations
Milestones	Annual core samples Annual update of core sample map
Implementation Timeline	Depends on the adequacy and number of core samples
Responsible Person for this Activity	Agency: Andover Title: Public Works Director Phone: 763-755-5100

Educational Component Related to this Activity:

Audience	Goals	Activities
Lake Shore Owners	Nature of problem & project	Information meeting Brochure
Public Access Users	Nature of problem & project	Brochure

Management Activity	**9.09 Enforcement Blitz Campaign**
Description	A two-year effort of aggressive police patrol and enforcement to reduce or eliminate illegal dumping and uses occurring on the Lake.
Goal	"Keep Crooked Lake Clean" program
Specific Components & Notes:	Contact the City of Andover to explore adjustments or changes in patrol routes or frequencies. Work with Anoka County sheriff and DNR Conservation Officer to monitor uses occurring on the lake.
Measures	Decrease in large or nuisance debris and garbage on the lake
Milestones	Commitment by City of Andover to increased enforcement CLAA Newsletter article on increased efforts
Implementation Timeline	2009 through 2010
Responsible Person for this Activity	Agency: Andover Title: Public Works Director Phone: 763-755-5100

Educational Component Related to this Activity:

Audience	Goals	Activities
Lake Users	Stewardship and responsible uses of lakes	Brochure

Management Activity	**9.10 Ground Water Monitoring**
Description	This activity involves monitoring the elevations of the surficial aquifer up and down gradient from Crooked Lake.
Goal	To protect ground water supplies
Specific Components & Notes:	Collect and analyze well logs in the hydrogeologic vicinity of Crooked Lake. Develop a Hydrogeologic atlas and picture of the groundwater supply and loss to and from Crooked Lake. Establish transects, wells, and peizometers to monitor the surficial aquifer.
Measures	Surficial groundwater elevations
Milestones	Hydrogeologic atlas Calculation of 1, 5, and 10 year times of travel
Implementation Timeline	2009 Acquire well logs Establish monitoring transects 2010 Develop hydrogeologic atlas
Responsible Person for this Activity	Agency: Coon Creek Watershed District Title: District Administrator Phone: 763-755-0975

Educational Component Related to this Activity:

Audience	**Goals**	**Activities**
Lakeshore and ground watershed Owners	Nature of groundwater	Brochure Articles on nature of groundwater

Management Activity	**9.11 Increased Garbage Pick Up**
Description	This activity involves an aggressive program of garbage and litter pick up at the Crooked Lake public access and park in an effort to present a facility where it is not okay to dump or leave debris.
Goal	"Keep Crooked Lake Clean" program
Specific Components & Notes:	This activity is linked to 9.09 Enforcement Blitz campaign 9.13 Install garbage cans and signage The three activities are intended to work as a single effort to change the perception and nature of the public access
Measures	Garbage hauled Maintenance frequency
Milestones	Decrease in garbage hauled
Implementation Timeline	2009 - 2011

Responsible Person for this Activity	Agency:	City of Andover
	Title:	Public Works Director
	Phone:	763-755-5100

Educational Component Related to this Activity:

Audience	Goals	Activities
Lake Users	Stewardship and responsible uses of lakes	Brochure

Management Activity	**9.12 Pond Inspection**
Description	The Watershed District will inspect best management practices (BMPs) on a regular basis to ensure proper installation and maintenance Involves inspection of the ditch channel for efficiency and any obstructions or other problems.
Goal	Annually inspect 20% of stormwater infrastructure
Specific Components & Notes:	The inspection will take specific note of any object or condition affecting the course, current, cross section, or quality of the public ditch, drainage way, or conveyance. The District will conduct an annual inspection of the trunk system. The District Inspector will continue to perform a spring flood inspection program at critical points within the hydrologic system. Inspections will occur: 1. During or immediately following installation of BMPs 2. Following severe storms/critical events 3. Prior to seeding deadlines, particularly in the fall 4. Prior to return of escrows 5. On report of issue
Measures	Inspection reports
Milestones	Annual inspection Annual SWPPP report
Implementation Timeline	January – Annual public review and discussion of SWPPP June – Annual report due to NPDES
Responsible Person for this Activity	Agency: City of Andover Title: Public Works Director Phone: 763-755-5100

Educational Component Related to this Activity:

Audience	Goals	Activities
Public Works	How water quality ponds function	Workshop
CLAA members	How water quality ponds function Pond condition	Newsletter

Management Activity	**9.13 Install Garbage Cans and Signage**
Description	Install appropriate number and size of garbage containers that ensures "extra refuse, debris, and material can be disposed of, and the public landing maintains an ordered and policed appearance."
Goal	"Keep Crooked Lake Clean" program
Specific Components & Notes:	This activity is linked to 9.09 Enforcement Blitz campaign 9.11 Increased garbage pick up The three activities are intended to work as a single effort to change the perception and nature of the public access
Measures	Decrease in extra refuse, debris, and material
Milestones	Decrease in garbage hauled Decrease in litter
Implementation Timeline	2009-2011
Responsible Person for this Activity	Agency: City of Andover Title: Public Works Director Phone: 763-755-5100

Educational Component Related to this Activity:

Audience	Goals	Activities
Lake Users	Stewardship and responsible uses of lakes	Brochure Signage

Management Activity	**9.14 Lake Core Sampling**
Description	In 2008 faculty from Coon Rapids Middle School worked with St Cloud State University to have core samples of Crooked Lake taken as part of a National Science Foundation outreach program. The cores were split; half archived at the University of MN Limnological Research Center, the other half at Coon Rapids Middle School. The cores proved valuable in demonstrating the substrate of Crooked Lake and raising the concern of a potential fill area in the northeast portion of the lake. St. Cloud State University has expressed an interest in continued core sampling within Crooked Lake.
Goal	Assessment of Lake substrate
Specific Components & Notes:	Cores – The actual taking and presentation of cores is a vital step. Description of cores – Description of the color and texture of the substrate is invaluable in understanding the lake. Sufficient sampling – sufficient sampling of the northeast portion of the lake is needed to assess whether fill or sedimentation has occurred within the lake.
Measures	Occurrence of sampling
Milestones	Annual sampling Description of the cores Mapping of core locations and profile description
Implementation Timeline	2009-2013
Responsible Person for this Activity	Agency: Crooked Lake Area Association Title: President Phone: (763) 422-0682

Educational Component Related to this Activity:

The Audience Involved	Educational Goals	Activities Used
Lakeshore Owners	Notification of results	Newsletter
Middle School Students	Experiential science	Core Sampling
Middle School faculty	Use of science in management	Core Sampling

Management Activity	**9.15 Lake Level Monitoring**
Description	Understanding lake hydrology including impact of climate or other water budget changes. These data are useful for regulatory, building/development, and lake management decisions such as resolving water level disputes, determining flood elevations, ground water to surface water recharge relationships, surficial ground water fluctuations, flows and trends, and local zoning (floodplain, shoreland).
Goal	Lake water levels will be recorded weekly by volunteers during ice-out conditions.
Specific Components & Notes:	• Install and survey lake gauge • Coordinate volunteers; for example, provide equipment and datasheets • Troubleshoot problems such as moving gauges in low or high water conditions • Receive data, check its quality, and submit to state databases.
Measures	Lake elevation in feet above mean sea level
Milestones	Data periodically submitted to the DNR for inclusion on their Lakefinder website database. Final report in the Anoka Water Almanac
Implementation Timeline	Spring ice-out: install and survey Open water season: volunteers take weekly readings. Late October: remove gauges from lakes in locations where they could be a danger to snowmobiles or others. Feb. 15 following year: rough draft of Anoka Water Almanac report. March 31 following year: final draft of Anoka Water Almanac report.
Responsible Person for this Activity	Agency: Anoka Conservation District Title: Water Quality Specialist Phone: 763-434-2030

Educational Component Related to this Activity:

Audience	Goals	Activities
CLAA, CCWD, Andover, Coon Rapids, DNR	Lake level and trends in levels	Website: DNR, ACD Anoka Water Almanac

Management Activity **9.16 Lake Water Quality Monitoring**

Description Monitor water quality twice monthly from May-September.

Goal Detect water quality trends and diagnose cause of changes.

Specific Components & Notes: Monitoring is done on the following parameters:

Chlorophyll-a
Conductivity
Dissolved Oxygen (DO)
pH
Salinity
Secchi transparency
Temperature
Total phosphorus (TP)
Turbidity

Detailed data provided annually in the Anoka Water Almanac including summaries of historical conditions and trend analysis.

Measures Standard for each parameter:

Parameter	**Measure**
Chlorophyll-a	Milligrams per liter
Conductivity	mS/cm
Dissolved oxygen	Milligrams per liter & %
pH	
Salinity	Percent
Secchi transparency	Feet & Meters
Temperature	F^o & C^o
Total phosphorus	Milligrams per liter
Turbidity	FNRU (a standard for measurement)

Milestones Work plan for Anoka Conservation District (ACD) and Coon Creek Watershed District (CCWD)
Draft Water Almanac report published

Implementation Timeline January – Work plan for ACD and CCWD
May - Monitoring begins
September - Monitoring ends
Mid-February following year – draft Water Almanac published

Responsible Person for this Activity

Agency: Anoka Conservation District
Title: Water Quality Specialist
Phone: 763-434-2030

Educational Component Related to this Activity:

Audience	**Goals**	**Activities**
Crooked Lakeshore Owners	Awareness of the various types of monitoring	Brochure

Management Activity **9.17 (Aquatic) Plant Restoration**

Description

Approaches to the re-establishment of submerged macrophytes in shallow lakes can be broken down in two basic strategies: Internal and External.

Internal strategies rely on plant regeneration "internal" to the lake by relying on natural development of submerged macrophytes or volunteerism. This strategy relies on the ability of submerged vegetation to develop naturally from:

1. The existing bank of propagules
2. The remaining macrophyte stands
3. Naturally introduced propagation units.

The presence, density, and composition of a seed bank can influence the rate and extent of vegetation establishment. Unsuitable or unsatisfactory conditions for germination and herbivory by fish and waterfowl may delay recolonization.

External strategies rely on artificial support of macrophyte development. The more expensive and maintenance intensive artificial support by planting or seeding of submerged plants may be appropriate if:

1. If viable propagation units of desired macrophytes are insufficient or not viable
2. The lake was to become more turbid and establishment and immediate stabilization by submerged macrophytes was needed to salvage a clear-water state.
3. The promotion of specific low growth macrophytes in particular areas of the lake is required to enable recreational use.

Goal

Densities on native plants at either

1. 0.18-0.25 vegetative plant parts/m^2
2. Ten 10cm long fragment/ m^2
3. 0.4-0.8 complete plants/m2

Specific Components & Notes:

1. Sample lake sediments
2. Estimate the number of macrophyte propagules and viability
3. Determination of ability to naturally recolonize or reliance on external strategy

If external strategies are to be used, then plantings of submerged macrophytes should be carried out early in the season in sheltered bays and in depths not exceeding one meter. Planting should follow the following phases:

1. Trials using test species in small enclosures during the first season (2011)
2. Further protected plantation of successful species and test other species during second season (2012)
3. Natural propagation by sexual and vegetative reproduction

Measures

Changes in trends in plant diversity and richness

Milestones

Sediment samples
Determination of the presence, density, and composition of seed bank
Determination of internal or external strategy

Implementation Timeline

2009:

1. Sediment samples
2. Determination of the presence, density and composition of a seed bank
3. Determination of internal or external strategy

Responsible Person for this Activity

Agency: Crooked Lake Area Association
Title: President
Phone: (763) 422-0682

Educational Component Related to this Activity:

Audience	Educational Goals	Activities
Lakeshore Owners	Plant community makeup & changes	Newsletter Website
DNR Fisheries	Plant community makeup & changes	Annual report
CCWD	Plant community makeup & changes	Website