Appendix A
St. Louis River System Remedial Action Plan
Stage II Recommendations

Stage II RAP Recommendation
[1 - SIGN]

Approved by Stewardship Workgroup 8/10/93

Approved by Citizens Advisory Committee 8/24/93

Mailed to implementors 9/8/93

Approved by Superior City Council 10/5/93

Impaired Use: Body Contact

Recommendation: *The appropriate health or government agency (Douglas County Health Department or City of Superior) should post "No Swimming" signs at Hog Island Inlet and Newton Creek. Signs should carry warnings about contamination problems present in these areas to discourage unauthorized use by children and adults.*

Problem: Human health problems encountered by people swimming in Hog Island Inlet or Newton Creek

Children play in Newton Creek and swim at Hog Island Inlet. However, these waters are not suitable for body contact recreation. There are toxic contaminants in the sediment and there have been numerous reports of people experiencing skin and respiratory problems after swimming or working in these waters.

The Minnesota Pollution Control Agency and the Wisconsin Department of Natural Resources (DNR) have received reports over the years of oil, chemical, and tar residues on the water's surface at Hog Island Inlet. Complaints have also been registered about smells emanating from the sediments and waters of Newton Creek and Hog Island Inlet (pp. IV-60 of Stage I Report). Newton Creek/Hog Island Inlet is one of the contaminated sediment hot spots identified by the Stage I Report. A Wisconsin DNR sediment study found that the contaminants in the sediment include polynuclear aromatic hydrocarbons (PAHs), a class of organic compounds, many of which are cancer causing. The levels of benzo(a)pyrene, one of the PAHs, are estimated to be 55 times greater than the Wisconsin human cancer criterion for this compound (pp. 87, Appendix D of Stage I Report).

There have been numerous incidents of skin and respiratory problems experienced by people swimming or working in Newton Creek and Hog Island Inlet. During the permit reissuance process for the Murphy Oil wastewater discharge to Newton Creek, letters were submitted by a Superior resident complaining of swimmers developing rashes and receiving ammonia burns after swimming in the creek. A March 15, 1992 article in the Duluth News Tribune stated that children in the East End neighborhood swim out near Hog Island at the mouth of Newton Creek. One of the swimmers dived into the water and came up "white and wrinkled". In the spring and summer of 1993, researchers from the Wisconsin Department of Natural Resources, the U.S. Environmental Protection Agency Laboratory, and the UM-Duluth Natural Resources Research Institute experienced headaches, light headedness, nausea, and skin irritation while sampling bottom sediments in these waterbodies.

Goal: To educate people about the danger of swimming in Hog Island Inlet or Newton Creek and to discourage people from swimming in these waterbodies.

Recommended Actions:

1) The Citizens Advisory Committee should forward this recommendation to the Douglas County Health Department, Superior City Council President, and the City of Superior Mayor recommending the placement of "No Swimming" signs at these two water bodies.

Implementors: City of Superior and Douglas County Health Department.

Timeframe: The recommendation should be forwarded to the above named groups immediately.

Stage II RAP Recommendation
[2 - LAND ACQUISITION]

Approved by Habitat Workgroup 8/14/93

Approved by Citizens Advisory Committee 8/24/93

Introduction:

The Stage I RAP document identified several impairments within the Area of Concern related to habitat and natural systems. In preparing Stage II recommendations to remediate these impairments, the Habitat Work Group expanded the geographic and functional ranges of the habitat issue. First, as did the Stage I document, the Habitat Work Group is focusing on the lower watersheds of the St. Louis and Nemadji rivers but it is doing so with the full understanding that only watershed-wide perspectives and actions can properly address key issues. Second, rather than limit its investigations to the impaired uses, the Work Group is developing a comprehensive approach to issues and responses related to insuring restoration and sustenance of features and processes essential to biodiversity values.[1]

This paper addresses the use of land acquisition as one tool to protect, preserve and insure for future management critical natural resources.

Problems and Impaired Uses Addressed:

The Stage I RAP document identified the following problems of relevance to the impaired use categories of degraded fish and wildlife populations and loss of fish and wildlife habitat:

-Wetland losses are continuing in the St. Louis River watershed. Historically, an estimated 3,000 acres of marsh and open water have been filled in the lower estuary. Between 1981 and 1991 the net (documented) wetland loss in the watershed was 438 acres.

-High rates of sedimentation in the estuary with the ensuring turbidity and reduced light penetration limit macrophyte growth and may inhibit shoreland wetland communities thereby limiting fish and wildlife habitat. (However, the limited information on aquatic vegetation and wetland habitat is not sufficient to prove degradation.)

-The population of great blue herons at the rookery near Billings Park (actually located on Kimballs Bay) on the Wisconsin Shore has been declining in recent years. This decline is likely due to human disturbance from housing developments on the shore (in a nearby new subdivision).

-Piping plover, a federally endangered species, has not nested in the estuary since 1985 due to loss of suitable breeding habitat. Human development of historical nesting sites, natural succession of vegetation, rapid increases in competing colonial species, and human disturbance have all contributed to the extirpation of the piping plover from the Area of Concern.

[1]The Habitat Work Group anticipates that one outcome of its activities in preparing Stage II RAP recommendations will be a comprehensive management proposal for the St. Louis River estuary. This document, tentatively titled the *St. Louis River Biodiversity Conservation Plan: The Estuary*, will address the broader issues of biodiversity which will incorporate all Stage I habitat related issues and their Stage II recommendations.

-Although historically abundant, lake sturgeon populations were lost from the St. Louis River estuary for a variety of reasons, including past water quality degradation and over fishing.

The Stage I impaired uses are specific examples of broader habitat issues existing throughout the two watersheds that the Work Group intends to address through these recommendations. These issues include:

-Loss of encroachment upon habitat of all types including wetlands, aquatic areas, forests, openings, and transitional zones. While attention is focused on rare or special habitat types, the goal of biodiversity demands maintenance of substantial masses representing all habitat types.

-Specific plant and animal species (ex: common terns) of value are lost or diminished due to loss of habitat or adverse impacts from adjacent development.

-Improper development encourages erosion causing loss of upland habitat, sedimentation of wetland and aquatic habitat, undesired alterations of stream flow, and degradation of water quality.

To enable desired restoration, reclamation and management actions by obtaining long-term protection of valuable natural resources.

Specific Issues and Opportunities:

The following specific parcels of land or opportunities are recommended for acquisition:

1. WERCO Property

A private company, WERCO, owns over 5,000 acres of undeveloped land in Wisconsin adjacent to the St. Louis River between Oliver and the Wisconsin/Minnesota border. This property covers about five miles of undeveloped shoreline, contains most of the watershed of the Red River, and possesses thousands of undeveloped acres of upland forest. The shore areas provide outstanding aquatic habitat for fish and wildlife and offer superb scenery for residents and tourists. The upland forests and shore areas contain a mix of biotic communities offering excellent habitat for a rich blend of plant and animal life.

Among key features of the site are:

-Five miles of undeveloped river shoreland including fourteen islands and various types of wetlands that support the valuable river and Lake Superior sport fishery. Most of the walleye of western Lake Superior spawn in the one mile of the St. Louis River below the Fond du Lac dam. The river reach bordered by the WERCO property is directly downstream of this spawning area and provides important nursery habitat. The area will also be used by sturgeon once the reintroduced population reaches maturity. In 1989 the WDNR recognized this value by purchasing 60 acres of shoreland and wetlands to help protect the walleye fishery.

-Over five thousand acres of upland forest, primarily aspen cover type, providing extensive habitat. This land area connects with the Fond du Lac State Forest and Jay Cook State Park properties in Minnesota creating an impressive block of forest and river land. As the value of large tracts for insuring biodiversity is becoming known, it is evident that retaining this block is vital to an esturaine area where such tracts are rare.

-The property encompasses most of the Red River watershed, which is a trout stream.

-The shoreline and Red River watershed feature rugged, steep terrain in red clay soil that is highly erodible under improper land and vegetation management. Optimum protection of habitat and water quality would be afforded by protecting this shoreland and steeply sloped drainage area from disturbance.

-The St. Louis River bordered by the WERCO land possesses islands, wetlands and wooded steep banks providing a remarkably wild setting for recreational uses including boating, bird watching, fishing, hiking,

hunting, and skiing. These values are all the more important given the lands location within a few minutes of the Duluth-Superior metropolitan area's 135,0000 inhabitants.

-An important snowmobile trail traverses the southern portion of the land. The quality of the adjacent land area greatly enhances the value of this trail for attracting important winter tourism traffic to the area.

-The WERCO tract in the upper estuary and Allouez Bay in the lower estuary are the largest, essentially undeveloped tracts left within the estuary; even Superior's municipal forest has roads and adjacent development. These large tracts not only provide key habitat sites, but they also are critical to the ecological processes that sustain those sites.

2. Minnesota Power Property

Minnesota Power has decided to sell 22,000 acres of land along the St. Louis, Cloquet, and Whiteface rivers. The company initially intended to sell several hundred acres to a private developer whose plans for a seasonal housing project sparked a local reaction that lead to the formation of the St. Louis River Management Board. The Board is completing a comprehensive management plan for the two watersheds (all of the Cloquet and that portion of the St. Louis River above the Fond du Lac dam). Recent legislation dedicated $1 million for land acquisition. The Board has devised criteria identifying key lands to be acquired (property will be owned by the State). The criteria focus on areas with ecological, cultural and historical values. Public ownership and proper management of these lands will not only insure maintenance of the desired values on the lands themselves but also will generate benefits for the lower reaches of the St. Louis River; these values include reduction of sedimentation, fish and wildlife habitat, and stream flow control.

3. Other sites that will be investigated for recommended acquisition include the following sites identified in the Harbor Natural Resource Management Plan (MIC) and cited in the Stage I RAP document; private lands intermingled on Grassy Point (Duluth side); private lands near mouth of Nemadji River; Clough (Whiteside) Island; Oliver Bridge marsh and Bear Island; Olson's Pond (Swamp Lake). Other sites that emerge during the Work Group's review will also be evaluated.

Recommended Actions:
(Note: this paper is the first version of what is anticipated to be an evolving series of recommendations. It is expected that a fuller set of recommendations concerning land acquisition and control will emerge by the time the final Work Group report is completed)[1]

1. The Wisconsin DNR should acquire, through fee title purchase and donation, lands owned by WERCO along and near the St. Louis River in Douglas County whose proper management would minimize erosion and sedimentation along the Red River (which contributes its sediment load to the St. Louis River), protect wetlands along the St. Louis River, protect and enhance fish and wildlife habitat along both rivers, and provide a significantly large block of undeveloped land essential to the maintenance of habitat types and species dependent upon those habitat types requiring such large blocks of land.

2. The St. Louis River Board should acquire, on behalf of the State of Minnesota, through fee title purchase and donation, lands that meet the high priority acquisition criteria set forth in the St. Louis River Management Plan. Once acquired, the St. Louis River Board, the Minnesota DNR, and other interested parties, should prepare site management plans compatible with the River Management Plan, the proposed St. Louis River Biodiversity Plan, and such regional resource planning processes as the Great Lakes Bioreserve.

Reasons for Recommending these Actions:

[1]One part of the proposed biodiversity plan for the estuary will address sources of revenue and fund-raising. It is anticipated there will be a recommendation that interested private parties initiate a permanent fund-raising program to generate revenues to help implement the St. Louis River Biodiversity Plan. Uses of these funds would include acquisition of land and easements, education, research, restoration and reclamation, and other related activities.

Existing regulations to protect wetlands and vital habitat areas from adverse development are adequate in many situations. So, too, are efforts to educate and assist private property owners regarding natural resources protection and management. However, in the absence of outright prohibitions on development, any adequately zoned property can be developed causing some amount of degradation. The only sure way to insure ongoing desired land management of key resources is to acquire development rights and/or fee title to the land.

For the specific lands referenced in this recommendation, the owners want to sell the land outright.

Time Frame:

1. The WDNR already is in the process of administrative rule changes that would allow acquisition of property for stream bank protection under the Stewardship Program.

2. The St. Louis River Board has initiated discussion with Minnesota Power regarding land acquisition and donations; actual acquisition actions may be started later in 1993.

Implementors: Wisconsin DNR, St. Louis River Board, Minnesota DNR.

Funding Sources:

1. The resources for the WERCO effort will be identified through the WDNR's feasibility study. It is anticipated that the WDNR will use its Stewardship Program. Other funds, if needed, may come from the USFWS North American Wetlands Conservation Act, land donations by WERCO, and various private sources. The establishment of a permanent private fund-raising program could augment the development of land acquisition revenues, generate the local match for acquisition efforts such as the WERCO property, and instill greater local ownership in the estuary management program.

2. The Minnesota Power land acquisition will rely on the existing $1 million State appropriation and a negotiated matching land donation by Minnesota Power. Private or other public resources may also be used. Additional State funding will be sought for other acquisition priorities (possibly including other Minnesota Power properties) set by the St. Louis River Board.

Stage II RAP Recommendation
[3 - GOLF]

Written by Koth (MPCA)

Approved by Pollution Prevention/Control Workgroup 8/19/93

Citizens Advisory Committee approves recommendation 10/26/93

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *The existing turf management education efforts of the University of Minnesota-Extension and University of Wisconsin-Extension should be coordinated to make these courses more available to Twin Ports residents. In addition, the courses should contain more information on the alternatives to and environmental implications of using pesticides and fertilizers.*

Problem: Golf courses contribute to non-point pollutant loading through their use of lawn chemicals.

Goal: To educate local golf course operators and turf managers about their role in abating non-point source pollution.

Recommended Actions:

1) Educate golf course owners and operators and turf managers about environmental implications of using lawn chemicals and possible alternatives to these chemicals.

-The University of Minnesota-Extension Service periodically offers Professional Turf Management Seminars where they discuss the use of lawn chemicals and their effect on the environment. This program is not advertised to Douglas County residents.

-The University of Wisconsin-Extension currently offers an annual one-day turf management program in Eau Claire.

-The Citizens Advisory Committee should write a letter to the UM-Extension in Duluth and the UW-Extension in Spooner in support of these seminars and encourage a cooperative effort. This effort could be a joint MN/WI seminar held in the Twin Ports. At the least, the two Extension offices should inform each other when they are offering programs of this type. The UW-Extension may want to send out notices to Douglas County residents on turf management seminars offered in Duluth by the UM-Extension. These seminars are nearby and would likely be easier to attend than the annual program in Eau Claire. The CAC letter should also encourage both Extension offices to include more information on environmental impacts and alternatives to lawn chemicals in their programs.

Timeframe: This can be done immediately.

Implementors: University of Minnesota Extension-Duluth, University of Wisconsin Extension-Spooner

Funding Sources: Since these programs are ongoing, additional funding should not be necessary. It is simply a matter of coordinating efforts between the Minnesota and Wisconsin Extension offices and emphasizing environmental protection during the training seminar.

Stage II RAP Recommendation
[4 - SHIP WASTE]

Written by Musick (MPCA)

Approved by Pollution Prevention/Control Workgroup 9/16/93

Steering Cmte. sends to IA TAC for review 10/13/93

Reviewed by Cmdr. Gilbert (U.S. Coast Guard)

Reviewed and approved by IATAC with revisions and an additional action added dealing with effluent standards 12/16/93

Approved by Citizens Advisory Committee with one minor revision 1/25/94

Impaired Use: Beach Closings/Body Contact

Recommendation: *The U.S. Coast Guard should enforce the fecal coliform and suspended solids standards and consider requiring additional standards for the wastewater discharge from Type I and II marine sanitation devices on commercial vessels.*

Problem: Some commercial vessels are exceeding the fecal coliform standards for Type II marine sanitation devices and thus discharging waters with high fecal coliform levels.

Most commercial lake vessels (lakers) use Type II marine sanitation devices to treat their human wastes. A Type II marine sanitation device is designed to treat wastewater and discharge it to a waterbody. The effluent from this device is supposed to have a fecal coliform count less than or equal to 200 mpn/100 ml and suspended solids less than or equal to 150 mg/l.

33 CFR Ch. 1 Sect. 159.7 states that "After January 30, 1980, no person may operate any existing vessel equipped with installed toilet facilities unless it is equipped with an operable Type II or III (marine sanitation) device ...". These devices are certified by the Coast Guard (33 CFR Ch. 1 Subpart B) to perform at specific levels, i.e., Type II devices produce an effluent having a fecal coliform count not greater than 200 mpn/100 ml and suspended solids not greater than 150 mg/l. If the devices do not meet these certified standards, they are not operable. A vessel with effluent exceeding the fecal coliform or suspended solids standards should technically not be operating until the marine sanitation device can produce effluent that meets the standards.

Based on a 1980-81 marine vessel discharge study in the Duluth/Superior harbor, the wastewater discharges of 51% of the 99 ships tested had fecal coliform levels greater than the 200 mpn/100 ml standard for Type II marine sanitation devices. A mid-1980's study of this type in the Cleveland, Ohio Coast Guard District found that 75% of the 700-1000 vessels tested had discharges of fecal coliform in exceedance of the standard. Thus, it is very likely that over half of the commercial vessels that visit the Duluth/Superior harbor discharge wastewater that exceeds the 200 mpn/100 ml fecal coliform standard for Type II marine sanitation devices. Based on conservative estimates, approximately 0.5 million gallons/year of wastewater is discharged from lakers into the Duluth/Superior harbor.

Ocean-going vessels can have any type of treatment device so long as they don't discharge untreated wastes into the navigable waters of the U.S. If it is assumed that all these ships have Type II devices, they would discharge approximately 0.04 million gallons/year of wastewater into the harbor (based on assumptions used for the laker calculations, pps. V-43 to V-44 of Stage I Report).

Goal: To eliminate the discharge of improperly treated wastewater from commercial vessels into Lake Superior and the Duluth/Superior harbor

Recommended Actions:

1) The U.S. Coast Guard should develop and implement an annual sampling and enforcement program dealing with wastewater discharges from commercial vessels.

-The Coast Guard is responsible for inspecting commercial vessels for compliance with federal regulations (33 CFR Part 159) on wastewater discharge. However, this inspection appears to be limited to the initial installation of a marine sanitation device. The Coast Guard does not revisit a ship to determine if the device is operating according to standards. Since studies have shown that the majority of commercial vessels do not have properly operating marine sanitation devices, self-enforcement of these regulations is not effective.

-A sampling plan should be developed whereby the Coast Guard boards the vessels and the wastewater discharge is sampled under their observation. The sample should be sealed on board and handled through normal chain-of-custody procedures. That is, the sample should be handled so that the lab results can be used for enforcement proceedings if necessary. The ship operator would be responsible for getting the sample to the lab (there are several local labs that could do fecal coliform and suspended solids analysis) and paying for the sample delivery and analysis.

-[The Coast Guard sampling plan will be added to this recommendation at a later date.]

2) When the marine sanitation device standards were developed in the early 1970's, the intent was that ship wastewater would be consistent in quality with effluent from land based wastewater treatment plants. To maintain this consistency, the U.S. Coast Guard should consider expanding the number of effluent standards for marine sanitation devices and making the existing suspended solids standard consistent with the federal standard.

-Following are minimum federal effluent standards for wastewater treatment systems:

Total BOD (biochemical oxygen demand)	45 mg/l*****
pH	6.0 - 9.0
Total Phosphorus	1 mg/l
Total Suspended Solids	45 mg/l*****

***** Based upon federal wastewater discharge limitations for a 7-day average.
No daily maximum has been established.

Reason for the Choice of this Recommended Action: This action calls for enforcement and updating of existing regulations for marine sanitation devices on U.S. vessels. Another alternative that was considered was the designation of Minnesota and Wisconsin waters of Lake Superior and the St. Louis River as a "No (Wastewater) Discharge Zone". Under a No Discharge Zone, vessels would not be able to discharge sewage to these waters. This alternative would require the states to apply to the U.S. EPA for this designation and to prove that this designation is necessary for the protection and enhancement of the quality of these waters. The states would also need to have adequate existing facilities for the safe and sanitary removal and treatment of sewage from vessels.

Timeframe: The Coast Guard could implement this recommendation as soon as a sampling plan is developed unless new legislation or regulation is needed. If legislation or regulation is needed, implementation will have to be delayed accordingly.

Implementors: U.S. Coast Guard

Funding Sources: The vessel operator/owner would be responsible for paying for the effluent sample delivery and analysis. The Coast Guard could observe the sampling as part of its existing inspection program.

Stage II RAP Recommendation
[5 - FISH PATHOLOGY]

Written by D. Brooke (LSRI) and Koth (MPCA) with input from Drs. Beasley and Eurell (Univ. of IL-Urbana Champaign)

Approved by ad hoc workgroup 10/28/93

Reviewed by Univ. of IL (Beasley, Eurell), U.S. EPA (R. Johnson), Len Anderson, MPCA (Fredrickson), Anne Pilli, Fond du Lac Reservation (Schwarzkopf), WDNR (Schrank, Pratt, Schram), MDNR (Marcino)

Steering Cmte. sends to CAC 1/12/94

Citizens Advisory Committee approves recommendation with minor revisions 1/25/94

Impaired Use: Fish Tumors and Deformities

Recommendation: *Conduct a pathological/histological study of non-migratory fish populations in the St. Louis River/harbor. This study should be part of a comprehensive long-term monitoring program.*

Problem: Preliminary investigations of white suckers in the Duluth/Superior harbor indicate that these fish are under stress (i.e. exhibiting various pathologies), however, there is very little pathological or histological data on fish in the Area of Concern.

Since 1991 and 1992, the participants in the Envirovet Program, in cooperation with the University of MN-Duluth and the Lake Superior Research Institute at UW-Superior, have been sampling and analyzing white suckers taken from the Duluth/Superior harbor and the waters around the Apostle Islands. (The Envirovet Program is a four-week summer course for veterinarians, veterinary students, and others pursuing careers in aquatic animal medicine and environmental health. Participants are trained in diseases and toxicoses of aquatic animals. The program directors are aquatic toxicologists from the University of Illinois.) The white suckers sampled in the harbor had more liver lesions, cataracts, and extensive peritoneal fibrosis (scar tissue) and low red blood cell counts (anemia) as compared to the fish sampled in the Apostle Islands. These health problems may indicate that the fish in the harbor area are under stress from the environment.

In 1993, white suckers were sampled in Chequamegon Bay (southern shore of Lake Superior) and the Duluth/Superior harbor. Based on the diversity of bottom-dwelling organisms and traditional water quality parameters, Chequamegon Bay is considered to be moderately impacted by human activities. The Duluth/Superior harbor is considered to be severely impacted. The suckers from Chequamegon Bay had less gross lesions, cataracts, and fibrosis than the suckers from the Duluth/Superior harbor. Hematocrit (blood) measurements showed that the

Chequamegon Bay suckers had consistent blood cell counts as opposed to the anemic blood conditions of the suckers in the Duluth/Superior harbor.

Goal: Since the preliminary data on white suckers in the Duluth/Superior harbor indicates that the sampled suckers may be stressed by their environment, the goal is to determine the health of non-migratory fish populations in the Area of Concern and determine environmental stressors that may be impacting these populations.

Recommended Actions:

1) Determine the extent of the health problems in non-migratory fish populations in the Area of Concern (AOC).

- Select one or two species of fish whose populations reside primarily within the AOC. The migratory nature of the fish species should be considered in this decision. An understanding of the life history of these populations would be necessary for correlating observed health problems with the toxicants of interest in the AOC.

-Determine a minimum sample size and the sample sites within the Duluth/Superior harbor and the St. Louis River. This will allow a determination of the geographic extent of the health problems and show whether the health problems seen in the preliminary sampling are an isolated case or widespread.

-Select appropriate control sites (i.e. Apostle Islands, Chequamegon Bay) where non-migratory fish populations are less likely to be impacted by environmental stresses.

-Use the Health Assessment Index (HAI) developed by Ron Goede of the Utah Department of Fish and Game or a similar index to analyze the health of the fish. The HAI requires the user to examine the condition of fish in relation to the following parameters: thymus, fins, spleen, hindgut, kidney, skin, liver, eyes, gills, pseudobranchs, parasites, hematocrit, leucocrit, and serum protein. Different points are assigned to different conditions in the fish. The more severe the health problem, the higher the index points. The indices for the fish from the AOC can be compared with data from the control sites and statistically analyzed.

2) If the sampling shows that the study fish populations in the AOC are <u>not</u> stressed as compared to populations at the control sites, the study should be concluded.

OR

If the initial sampling shows that the health of the study fish populations in the AOC are being negatively impacted by environmental factors, the study should be expanded.

-Depending upon the results of the initial sampling, expanded studies would be tailored to examine specific issues. For example, if the suspected causative agent(s) are bioaccumulative chemicals such as PCBs or dioxins, then analytical chemistry analyses of fish tissue would be useful. Other studies could focus on specific function analysis (e.g., immunocompetence of fish leucocytes could be measured). Because the liver is the predominant detoxifying organ, a histopathologic exam of its tissue would be indicative of chronic exposure to chemical contaminants.

-The degree and nature of chemical contamination in the sediments of the selected study sites would also warrant analyses. Water column and sediment samples should be taken at the same locations where the fish were sampled. These samples should be analyzed for known toxicants that have been reported within the AOC. This information would be necessary for correlating observed health problems with toxicants.

Reason for the Choice of this Recommended Action: This action was chosen since there is little or no data on the physical health of fish in the Area of Concern. A study of one or more non-migratory fish populations will provide information that can be used to make policy decisions on the actions that need to be taken in regards to pollution prevention.

Timeframe: A study of this type could be started as soon as funding is available. The only restriction in the timeframe is that the sampling plan must be developed by the spring/summer season so that there is enough time to conduct the sampling before the harbor and river freeze over. The entire study should take approximately 1 1/2 to 2 1/2 years.

Implementors: The University of Illinois Envirovet researchers wish to continue their work on a project of this nature. The Wisconsin DNR has conducted preliminary trials within the AOC to determine the effectiveness of the Health Assessment Index in analyzing fish health. With this information in hand, the Wisconsin DNR has requested funding from the U.S. EPA to develop a long term monitoring program which would include a determination of fish health.

Collaborative efforts could be undertaken between the Wisconsin DNR and/or Minnesota DNR and local research organizations such as the UM-Duluth Natural Resources Research Institute, U.S. Environmental Protection Agency Laboratory, or UW-Superior Lake Superior Research Institute.

Funding Sources: It is possible that the U.S. EPA Great Lakes National Program Office (see attached pre-proposal submitted 8/93) or the Minnesota Legislative Commission on Minnesota Resources (proposals not submitted for current funding cycle) would fund a pathological/histological study of this type.

Stage II RAP Recommendation
[6 - TAINTING]

Written by Koth (MPCA) with input from Schwarzkopf (Fond du Lac Reservation)

Reviewed by ad hoc workgroup including Len Anderson, Anne Pilli, WDNR (Pratt), Fond du Lac Reservation (Schwarzkopf), MDNR (Spurrier) 12/30/93

Steering Cmte. sends to CAC 1/12/94

Citizens Advisory Committee approves recommendation with one minor revision 1/26/94

Potential Impaired Use: Fish Tainting

Recommendation: *No action is recommended at this time. However, if abnormal smelling fish are again found in the Fond du Lac or Thomson Reservoirs by a resource management agency, a fish tainting study should be undertaken.*

Problem: Fish in the Thomson and Fond du Lac Reservoirs may have a tainting problem as indicated by strong, abnormal smells of some fish.

The Stage I document could not conclusively identify fish tainting as an impairment that exists in the St. Louis River. Prior to the construction of the Western Lake Superior Sanitary District facility in 1979, there were numerous complaints about the taste of fish caught in the St. Louis River. Since 1979, there have been few or no formal complaints to the state agencies about fish taste.

A 1980 taste test conducted by the University of Minnesota-Duluth showed that the taste of fish in the river upstream of the WLSSD facility had improved after construction of this facility. However, the study questioned whether some tainting of fish flesh was now occurring downstream of this facility.

As part of the Stage I process, area fishery managers and local sport fishing organizations were contacted to determine if fish tainting was still a problem. The consensus was that it is no longer a problem.

However, while collecting fish for a 1992 study on mercury concentrations in fish, the Fond du Lac Reservation technicians reported that smallmouth bass from the Thomson and Fond du Lac Reservoirs had a strong abnormal smell. The technicians had extensively sampled fish upriver of the reservoirs and thus were in a good position to note a difference in smell. They described the smell as "moldy" or "something in a jar that has rotted".

In addition, Len Anderson, a Cloquet high school biology teacher, stated that the local kids have a simple rule for deciding whether to keep fish they catch from the reservoirs and the river. If the fish smells bad, they throw it back. Anderson stated that classroom complaints of bad smelling fish have declined in the last five years; however, the fact that the residents even have this rule dealing with fish smell indicates that there is a potential problem.

Inquiries have been made recently to the Minnesota PCA and Minnesota DNR about the fish smell problem in the two reservoirs. The Minnesota PCA collected fish for mercury, PCB, and dioxin analysis in the two reservoirs in July, 1992. They noticed no abnormal smelling fish. The Minnesota DNR conducts yearly fish sampling in the two reservoirs. They noticed no abnormal smelling fish during their annual sampling.

Recommended Actions:

1) The Minnesota DNR, Minnesota Department of Health, or the Fond du Lac Reservation could conduct a study of fish tainting/smell in the Fond du Lac and Thomson Reservoirs, however, it is questionable whether abnormal smelling fish would be found. Caged fish could be placed at various locations in the two reservoirs to determine if they are tainted after a specified length of time. However, if the compound that gives the fish the abnormal smell is isolated to a few spots or episodic in nature, it would be luck if the fish cages were placed in the contaminated spots or were put in the water at the right time. Thus, a study of fish tainting in the reservoirs is not recommended unless an episode of abnormal smelling fish is reported by a resource management agency.

Stage II RAP Recommendation
[7 - LAWN EDUCATION]

Written by Koth (MPCA)

Approved by Pollution Prevention/Control Workgroup 8/19/93

Reviewed by MPCA (Thomas, Reetz); WDNR (Prey)

Citizens Advisory Committee approves recommendation with minor changes 2/22/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *The following public education activities should be undertaken: the "Don't Dump" program of labeling storm sewers should be completed in Duluth and pursued in Superior and an education effort should be started to educate citizens about the proper "disposal" of yard wastes and the proper use and application of lawn chemicals.*

Problem: Area of Concern residents contribute to non-point pollution through improper disposal of materials in storm sewers and improper use of lawn chemicals

Goal: To educate the local population about their role in the abatement of non-point source pollution.

Recommended Actions:

1) Fully implement the "Don't Dump" program that educates the public about the effects of dumping materials such as antifreeze into storm sewers. This should be conducted in two phases.

a) The first phase involves implementing the "Don't Dump" program in Duluth and Superior.

-The MN Board of Water and Soil Resources (BWSR), MN Pollution Control Agency, South St. Louis County Soil and Water Conservation District, and the Western Lake Superior Sanitary District (WLSSD) are planning to label storm sewers in Duluth with a stencil that says "Don't Dump, Drains to Lake Superior". In addition, they have created a brochure that outlines the problems that occur due to dumping in storm sewers. While permission for the program was obtained from the city, the program was not implemented in 1993 as planned. It should be fully implemented in Duluth in early 1994.

-The program should also be instituted in Superior. The Wisconsin DNR should contact the Superior Public Works Department, explain the program and its merits, and ask for city permission and possible assistance with implementing this program. As in Duluth, the stenciling could be a school and community project where city residents do the stenciling. The stenciling could be done in conjunction with the stormwater management plan that may be developed by the Wisconsin DNR and the construction of new stormwater handling facilities by the City of Superior.

b) The second phase involves implementing this program in Cloquet. The Minnesota Pollution Control Agency should take the lead in this effort.

2) Educate residents about the harmful effects of introducing grass clippings and other yard waste into the storm sewer system.

-WLSSD should develop a public service announcement (psa) that explains proper disposal of grass and yard wastes. The psa should encourage methods that reduce the need to dispose of grass clippings such as using recycling lawn mowers or cutting the grass more often. The psa could be developed in conjunction with the opening of the proposed composting and yard waste facility on Courtland Street.

-If the Superior yard waste facility is developed by the time WLSSD produces the public service announcement, the Superior Public Works Office should contact WLSSD to see if they can put information about the location of the Superior yard waste facility into the public service announcement.

-The Wisconsin DNR stormwater outreach person should work with the Duluth News-Tribune and the Evening Telegram to develop an article or series of articles on the effect of putting yard wastes in the storm sewers and the proper disposal of these wastes. In addition, the Recycling Coordinator in Superior could write an article in his newsletter about composting yard wastes.

-Brochures on home composting should be handed out at the RAP display. Some of the existing brochures are listed below:

WDNR -Home Composting: Reap a Heap of Benefits
Yard Care - Do Your Share!
Grass Clippings: Good As Gold for Your Lawn
Composting: Wastes to Resources Composting Systems

UM Extension - Composting: Yard Waste to Resource
Backyard Composting ($0.25/brochure)
Minnesota "Don't Bag It" Lawn Care Program

-Mail a yard waste disposal and composting information flier with the utility bill from Minnesota Power and the Superior Water, Light & Power Company or with the Duluth and Superior water bill. The flier should specifically state that grass clippings should not be disposed of in the street.

3) Educate residents about the proper use and application of lawn chemicals and alternatives to lawn chemicals. There are numerous existing brochures dealing with this topic thus there is no need to develop new information. The RAP should acquire some of these brochures and display them whenever the RAP display is used at community/public functions. Some of the existing brochures are listed below:

UW Extension - Rethinking Yard Care
Lawn and Garden Pesticides
Lawn and Garden Fertilizers
Lawn Maintenance and Problems

UM Extension - Consumer Choices: Home Garden Pesticides ($0.50/brochure)
Clean Water - Pesticide Selection Can Make a Difference
Using Lawn Fertilizers and Pesticides Responsibly
($0.50/brochure)
Responsible Use of Lawn Care Pesticides ($0.50/brochure)
Preventing Pollution Problems from Lawn and Garden Fertilizers

Timeframe:

1) The "Don't Dump" program in Duluth should be implemented in spring 1994. The stencils have already been made and the brochure is complete. The Superior program should be implemented in summer/fall 1994 when the stencils are

available. The "Don't Dump" program in other municipalities should be implemented as stencils, paint, and volunteers are available.

2) The WLSSD yard waste facility should be constructed by late 1994 and thus the public service announcement could be developed in that time frame. It is not known if or when the Superior yard waste facility will be open. Other recommended activities could take place as soon as possible. The brochures on composting are presently available and should be handed out at RAP displays immediately.

3) Brochures on proper use and handling of lawn chemicals are presently available and should be used at RAP displays immediately.

Implementors: MN Board of Water and Soil Resources, Minnesota PCA, South St. Louis County Soil & Water Conservation District, WLSSD, Wisconsin DNR, Superior Public Works Department, Superior Recycling Coordinator, Minnesota Power, Duluth Water & Gas Department, and/or Superior Water Light & Power, City of Superior, volunteers

Funding Sources:

1) The funding for the Duluth "Don't Dump" program has already been obtained. Costs for the Superior "Don't Dump" program can be minimized by borrowing the "Don't Dump" stencils when the Duluth stenciling is finished, using paint donated by WLSSD, and using volunteers to do the stenciling.

2) WLSSD would provide the funding for the public service announcement. Superior may need to contribute some money to have their facility location listed on the announcement. The articles in the newspapers will not cost anything.

3) There may be a minor cost to purchase some of these brochures. However, it is possible that the agencies may be willing to donate the brochures if we pursue that tack.

Stage II RAP Recommendation
[8 - NEMADJI]

Written by Plass (WDNR)

Approved by Pollution Prevention/Control Workgroup 8/19/93 (Subsequently expanded to recommend implementation funding in Minnesota as well as Wisconsin).

Reviewed by WDNR (Malishke, Gallagher, Adams); South St. Louis SWCD (Taylor); SCS (Sandstrom, Stewart); LCD (Schultz)

Citizens Advisory Committee approves recommendation with changes 2/22/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *Minnesota and Wisconsin should secure funding in order to implement the recommendations that will be generated by the Nemadji River Basin Project.*

Problem: The Nemadji River is a major source of sediment to the St. Louis River.

Phosphorus levels in the St. Louis River suggest a eutrophic condition. Cook and Ameel (1983) estimated that 90% of the nutrient loadings to St. Louis Bay in 1982 were from non-point sources (Stage I, pp. IV-55 to IV-57; V-32). Phosphorus readily binds to soil particles, and can be washed into water bodies along with sediment. The Nemadji River is considered responsible for nearly half of the 200,000 cubic yards of sediment that is annually dredged from the harbor by the US Army Corps of Engineers. This high sediment loading is a potentially significant source of phosphorus.

Goal: To reduce phosphorus and sediment loading from the Nemadji River watershed. (See related recommendations concerning runoff from urban and rural areas, and erosion from construction sites).

Recommended Actions:

One of the CAC's initial recommendations (September 1992) was that "the Nemadji River watershed should be the subject of a basin project to reduce erosion and sedimentation. This project should have a watershed-wide focus, determine the extent and causes of the nonpoint problems in the watershed, and formulate strategies to implement practices to reduce erosion and sedimentation. The project should build on previous work such as the Red Clay Project. The project should cover the entire watershed, which is approximately half in Minnesota and half in Wisconsin."

The Nemadji River Basin Project has been funded and will generate information about the river and develop a grass-roots effort to recommend remedial actions and best management practices (BMPs) to restore beneficial uses to the river system.

1) Wisconsin and Minnesota DNRs should be the lead agencies to implement the Nemadji River Basin Project recommendations. The DNRs should pursue funding from the Soil Conservation Service 566 Small Watershed Project program. The Minnesota DNR should also seek funds from the Minnesota Board of Soil and Water Resources. The Wisconsin DNR should evaluate the river as a possible Priority Watershed under Wisconsin's Nonpoint Source Pollution Abatement Program. Other agencies and major landowners (e.g. Carlton County Land Department, Douglas County Land Department, Carlton County Soil and Water Conservation District) should assist with recommendation implementation.

Timeframe: The states could seek funding for implementation after the project generates the needed information and recommendations.

Implementors: The project will be led by the Soil Conservation Service; cooperators include federal, state and local units of government, plus universities, organizations and special interest groups. Implementation funds should be sought by Minnesota DNR and Wisconsin DNR.

Funding Sources: The federal 566 Small Watershed Project program, MN Board of Soil and Water Resources, and the Wisconsin Nonpoint Source Pollution Abatement Program could potentially provide funds to implement the project recommendations. These efforts to secure implementation funding could be undertaken by existing staff.

Stage II RAP Recommendation
[9 - RUFFE]

Written by Busiahn (USFWS) and Collins (MDNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Reviewed by WDNR (Schram)

Approved by Citizens Advisory Committee 3/16/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Limit the success of the naturalized population of ruffe (Gymnocephalus cernuus), by restoring and maintaining a healthy, resilient, and diverse aquatic ecosystem. Actions to eradicate or reduce the ruffe population in the St. Louis River estuary are not recommended until greater success can be assured.*

Problem: The population of ruffe, an exotic fish first collected at Minnesota Point in 1986, now surpasses populations of many native fishes in the Duluth/Superior harbor. The rise in the ruffe population corresponds to a decline in several native fish populations.

The ruffe was introduced to North America at the Port of Duluth- Superior in the late 1980's. Ruffe probably were introduced to the port through the discharge of ballast water from an oceangoing vessel. Control of ruffe populations in the St. Louis River Estuary began in 1988 by the Wisconsin and Minnesota Departments of Natural Resources. A program of enhancing predator populations was initiated and is being evaluated. Preliminary results suggest that this control program has had little or no effect in reducing ruffe populations.

Ruffe are capable of rapid population increases. Since they were first collected in July 1986, (Pratt et al. 1992) ruffe have become the most numerous species in trawl samples taken by the U.S. Fish and Wildlife Service in the St. Louis River estuary (Selgeby 1993a, 1993b). During the same period, several native species of fish (i.e., emerald shiner, spot-tailed shiner, yellow perch, walleye) have declined in the trawl catch.

The ruffe has been found to be an aquatic nuisance species as defined by the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, Public Law 101-646. An Aquatic Nuisance Species Task Force was created in 1990 to deal with exotic aquatic species. The Task Force is composed of the U.S. Fish & Wildlife Service Director, the Under-Secretary of Commerce for Oceans and Atmosphere, the U.S. Environmental Protection Agency (EPA) Administrator, the Commandant of the U.S. Coast Guard, the Assistant Secretary of the Army (Civil Works), and others. A committee of this Task Force, the Ruffe Control Committee, submitted a Ruffe Control Program to the Task Force in August 1993. The goal of the control program is to prevent or delay the spread of ruffe through the Great Lakes and inland waters by containing the species to its current (1992) range in western Lake Superior (Ruffe Control Committee, 1993.)

Goal: A healthy and well-balanced aquatic ecosystem, where native species can live and reproduce naturally and are not restricted from thriving due to the presence of exotic species. (Goal no. 10 from Stage I RAP, page II-4.)

Recommended Actions:

1) The Minnesota and Wisconsin Departments of Natural Resources should continue to restore and maintain a healthy and well-balanced aquatic ecosystem. Management efforts should focus on enhancing water quality, preserving high quality aquatic habitat, restoring or enhancing degraded habitats, and maintaining a balanced food web in a state that fosters native species and deters exotics.

2) No action should be taken at this time to attempt to eradicate the ruffe or reduce it to ecologically insignificant levels.

3) Continue research on the basic biology and behavior of the ruffe. Research could identify a "weak link" in ruffe physiology, genetics, or behavior that might lead to an effective control in the future. Additional research could also provide an enhanced array of tools for the control and management of other aquatic nuisance species.

4) Begin research to examine the effect of ruffe on fish populations in Europe or other areas where the species has a longer history of establishment. Research should focus on providing better predictive models for the impact ruffe will have in Lake Superior over the long-term.

5) The states and federal governments should continue to develop regulations to prevent the transport of this and other aquatic nuisance species to new areas.

Reason for the Choice of These Recommended Actions:

Other alternatives were determined to be not feasible due to economic cost, low probability of success and unacceptable environmental costs. It is probably infeasible to eradicate the ruffe population in the St. Louis River system. Less than total eradication would likely result in rapid re-colonization by the ruffe. It is likely feasible to reduce the ruffe population, though at a high cost, with possible severe incidental damage, and with little benefit. Population reduction efforts may do more long-term damage to native species than to ruffe. While the conditions that allowed the establishment of the St. Louis River ruffe population are not known with certainty, ruffe invaded the St. Louis River system while it was in a recovery phase (see Stage I RAP pages III-19-20, IV-14), and may have taken advantage of weaknesses in the ecosystem (Busiahn 1993). If, as the Ruffe Control Committee believes, the ruffe invasion is a symptom of larger ecosystem health problems, restoring and maintaining the aquatic ecosystem would minimize the adverse effects of ruffe with the least cost and the greatest long-term benefit.

Other alternatives considered included:

a) Eradicate ruffe from the St. Louis River System by piscicide treatment.
b) Eradicate ruffe from the St. Louis River System by some as-yet-undiscovered biotechnical method.
c) Reduce ruffe populations by treating concentrations of ruffe with a piscicide.
d) Reduce ruffe populations by physical removal with nets.
e) Reduce ruffe populations by enhancing predator populations.

Timeframe: These recommendations support ongoing efforts. No new actions are recommended.

Implementors: Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, National Biological Survey, U.S. Fish and Wildlife Service, and Wisconsin Department of Natural Resources.

Funding Sources: Additional funding to support these recommendations should be pursued by the appropriate management or research agency. Habitat restoration and enhancement monies should be provided by the Departments of Natural Resources and the U.S. EPA through its Great Lakes National Program Office. Efforts to improve water quality for the benefit of the aquatic ecosystem should continue to be funded by the U.S. EPA, Minnesota Pollution Control Agency and the Wisconsin Department of Natural Resources. Funding of basic biology research on the ruffe should continue to be a priority of the National Biological Survey, the U.S. EPA and the U.S. Fish and Wildlife Service, and could be coordinated through the Great Lakes Panel on Aquatic Nuisance Species established by the Great Lakes Commission.

References

Busiahn, T. R. 1993. Can the ruffe be controlled before it becomes your problem? Fisheries 18(8):22-23.

Pratt, D. M., W. H. Blust, and J. H. Selgeby. 1992. Ruffe, *Gymnocephalus cernuus*: newly introduced in North America. Can. J. Fish. Aquatic. Sci. 49:1616-1618.

Ruffe Control Committee. 1993. Ruffe control program. Aquatic Nuisance Species Task Force. Washington, D.C.

Selgeby, J.H. 1993a. Status of Ruffe in the St. Louis River Estuary, 1992, with Emphasis on Predator Prey Relations. Minutes of the Lake Superior Committee, Great Lakes Fishery Commission, Ann Arbor, MI.

Selgeby, J.H. 1993b. Trophic Relations of Ruffe and the Status of Ongoing Research in the St. Louis River Estuary, Lake Superior, 1992. Report to the Great Lakes Fishery Commission, Lake Superior Committee, March 31, 1993.

Stage II RAP Recommendation
[10 - HERONS]

Written by Collins (MDNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Reviewed by City of Superior (Morgan), WDNR (Strand)

Approved by Citizens Advisory Committee 3/16/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Locate and protect the current heron rookery and manage public lands in the Area of Concern (AOC) to ensure that appropriate habitat exists for at least one Great Blue Heron rookery.*

Problem: The population of Great Blue Herons at the rookery near Billings Park on the Wisconsin shore had declined in the years prior to 1992. This decline is likely due to human disturbance from housing developments on the shore (Stage I Report, pp IV-24.).

The Billings Park heron rookery was abandoned by the breeding season of 1992 after a home was built within the rookery. The location of the current rookery is not known, but reports of a new rookery on Dwight's Point have been received by the Superior Municipal Forest Committee and the Wisconsin Department of Natural Resources (DNR). Recommendations for protection and management of the current rookery should be made on a site specific basis once it is found. Because heron rookeries are temporary, management for Great Blue Herons must include management of suitable potential rookery sites.

Goal: To ensure that suitable habitat for at least one Great Blue Heron rookery exists in the AOC and that human disturbance at occupied sites does not result in premature rookery abandonement.

Recommended Actions:

1) Wisconsin DNR should investigate reports of a new heron rookery on Dwight's Point in the Superior Municipal Forest. Information about rookery sites should be solicited from the public and investigated by the Minnesota or Wisconsin DNR as appropriate.

2) Once the rookery is located, the Wisconsin or Minnesota DNR should initiate the appropriate form of management protection at the site for the duration of use by the heron colony. Appropriate management actions could include informing the landowner about the heron rookery and developing a land management plan for the rookery if the owner is amenable, signing a memorandum of agreement with the landowner for management of the rookery, establishing a conservation easement or special designation, swapping the land, or acquiring fee title to the land.

3) The City of Superior should manage appropriate areas within the Superior Municipal forest to provide the types of trees and structure required for heron rookeries. This could include a) protecting streamside areas that have or in the future could have large trees suitable for heron nesting, and b) planting tree species favored for nesting by Great Blue Herons at appropriate streamside locations.

4) The City of Superior, through special designation, should protect the natural values of the Superior Municipal Forest to prevent recurrence of the type of development pressure that resulted in the abandonment of the former rookery.

5) The Wisconsin Department of Natural Resources, after acquiring the lands in the St. Louis and Red Rivers Stream Bank Protection Area, should manage appropriate areas of the property to provide the types of trees and structure required for heron rookeries.

Timeframe: Information leading to the location of the new rookery should be investigated immediately. Protection of the rookery site should be initiated as soon as the colony is located. Designation and management of appropriate areas within the Superior Municipal forest as Wildlife Management Areas for Great Blue Herons could be done immediately as part of the Superior Municipal Forest Plan which is currently under development. Evaluating additional special designation options and enhancing protection of the Superior Municipal Forest could begin immediately as part of the Forest Plan. Management of appropriate areas within the St. Louis and Red River Stream Bank Protection Area for Great Blue Herons should begin when the property is acquired.

Implementors: Superior Municipal Forest Committee, Superior City Council, Minnesota DNR, Wisconsin DNR.

Funding Source: These recommended actions require no additional funding.

Stage II RAP Recommendation
[11 - FISH STRANDING]

Approved by Habitat Preservation, Reclamation and Management Work Group with a minority opinion filed by Minnesota Power 11/5/93

Reviewed by IATAC with suggested changes and a recommendation to the CAC that they not approve the recommendation as written 11/19/93

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Discussed by CAC which came to no consensus on the recommendation 11/23/93

Rewritten and approved by the Habitat Work Group after incorporating IATAC and CAC concerns 2/28/94

Modifications suggested by CAC Steering Committee and agreed to by Work Group Chair 4/7/94

IATAC reviewed and recommended approval by CAC with some minor revisions 4/20/94

Citizens Advisory Committee reviews and approves recommendation 4/26/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Minnesota Power should continue to improve operating procedures at dams on the St. Louis River to prevent stranding of fish and eggs.*

Problem: Operation of the Fond du Lac dam can affect walleye spawning success.

Stranding and mortality of adults and eggs has been observed under erratic flow conditions (RAP Stage I Report, p. IV-19.) The lower St. Louis River provides important habitat for walleye and many other fish species. Other desirable fish populations are likely also affected by operation of the St. Louis River hydroelectric dams.

The most recent fish stranding incident (May 1992) was caused by an equipment malfunction and lack of on-site confirmations of dam gate operation. Minnesota Power has made significant equipment improvements and revised operating procedures (including inspection during spawning and low flow periods) at the Fond du Lac dam to reduce the likelihood of a recurrence of the problems that resulted in the most recent stranding event.

Goal: Operate and manage the dams at Knife Falls, Cloquet, Scanlon, Thompson, and Fond du Lac to ensure that fish and fish eggs are not stranded due to operational procedures

Recommended Actions:

1) Minnesota Power has and should continue to modify the operating procedures of the Fond du Lac dam to prevent recurrence of the conditions that resulted in the most recent fish stranding event. Recent modifications include improvements to monitoring equipment (initial gate opening can be set only at gate hoist cart that is on-site, electric monitoring alarm improved), and removing the gate hoist cart during the spawning season after setting the minimum flow.

Minnesota Power currently conducts physical observations on-site after the initiation of and through the duration of the spawning season. These monitoring results will be reported to the Minnesota and Wisconsin DNR Area Fisheries Managers on an annual basis; abnormal conditions will be reported immediately.

2) Minnesota Power and Minnesota DNR should develop ramping rates for Thompson and Fond du Lac dams which are operationally feasible and which reduce the potential for fish stranding to the greatest extent practicable. In general, a ramping rate of 10% change in flow over a six hour period should be used as guidance when possible.

3) Minnesota Power, Minnesota DNR and Wisconsin DNR should establish a system to monitor and evaluate current and future modifications of operating procedures to ensure that adequate information is available to continually improve operations.

Reason for the Choice of these Recommended Actions: The Recommended Actions provide for cooperation, information sharing and consistency in the protection of the aquatic community habitat in the St. Louis River.

A ramping rate of no more than 10% change in flow per six hours may not always be possible due to hydrology, river hydraulics, and physical operating conditions. Changes in the natural flow of the St. Louis River occur regularly in greater magnitude than 10% per six hours. Adherence to a fixed ramping rate could result in unacceptable fluctuations of the ponds including the risk of overtopping the dams. A better solution is to use ramping rates that consider actual flow conditions. Certain periods of flow (for example low flow conditions) are more critical, in terms of ramping, than others.

For increasing flows, the critical range occurs when previously dry areas, such as the bypass reaches, initially become flooded. Ramping of these flows, as is done at Thompson, provides for the safety of channel hikers. Additionally, fish in the bypass pools see a gradually increasing flow, rather than a rapid deluge. As the flow increases above several thousand cubic feet per second, and the entire channel is wetted, each increment of flow has less and less impact, other than cumulatively on elevation, rendering continued ramping rates meaningless. For decreasing flows, the critical range occurs when a full channel is no longer wetted. If areas dry up too quickly, fish can be stranded. Minnesota Power utilizes a ramping schedule for these flows at Thompson and Fond du Lac dams.

Time Frame: These recommended actions could be implemented immediately.

Implementors: Minnesota Power, Minnesota and Wisconsin Departments of Natural Resources.

Funding Sources: No additional funding is necessary. Most of these recommended actions require enhancing communication and a restructuring of monitoring schedules that require no additional funding.

Stage II RAP Recommendation
[12 - DAM RELICENSING]

Approved by Habitat Preservation, Reclamation and Management Work Group with a minority opinion filed by Minnesota Power 11/5/93

Reviewed by IATAC with suggested changes and a recommendation to the CAC that they not approve the recommendation as written 11/19/93

Discussed by CAC which came to no consensus on the recommendation 11/23/93

Rewritten and approved by the Habitat Work Group after incorporating IATAC and CAC concerns 2/28/94

Modifications suggested by CAC Steering Committee and agreed to by Work Group Chair 4/7/94

IATAC reviewed and recommended approval by CAC with some minor revisions 4/20/94

Citizens Advisory Committee reviews and approves recommendation (with abstention by Minnesota Power) 4/26/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *In the development of the Environmental Impact Statement (EIS) for the licensing of the St. Louis River dams operated by Minnesota Power, the Federal Energy Regulatory Commission (FERC) should define optimum aquatic habitat in all sections of the river including the bypass reaches and evaluate and quantify the impact of all levels of flows through the bypass reaches on aquatic habitat, social, and economic considerations.*

Problem: Operation of the dams on the St. Louis River can affect aquatic habitat in the river.

The lower St. Louis River provides important habitat for walleye and many other fish species. Fish populations can be affected by operation of the St. Louis River hydroelectric dams.

In response to the relicensing application to the FERC, a significant amount of data has been gathered on instream flow requirements for fish species in the St. Louis River since publication of the Stage I Remedial Action Plan (RAP). New information allows for more specific recommendations to deal with the issues raised in the Stage I RAP.

Minnesota Power and the Minnesota Department of Natural Resources have both completed intensive research and modeling efforts to identify specific instream flow requirements for fish species in the St. Louis River. These data, and recommendations of minimum or optimum flows have been provided to FERC as a part of the relicensing application process. Readers interested in the details of methodology, results, and other environmental issues are referred to the following documents:

Scoping Document 1: St. Louis River Basin Environmental Impact Statement. FERC Project Nos. 2360 St. Louis River Hydroelectric Project, 2363 Cloquet Hydroelectric Project, Federal Energy Regulatory Commission, Office of Hydropower Licensing, Washington, D.C. July 7, 1993.

MDNR Review and Revision of the Hydrologic Analyses for Ungaged Minor Watersheds in the St. Louis River Watershed. Minnesota Department of Natural Resources, March 15, 1993.

Review of the St. Louis River Project Gaging and Monitoring System. Minnesota Department of Natural Resources, March 15, 1993.

MDNR Reservoir Modeling and Natural Inflow Hydrology Testing for the St. Louis River Project. Minnesota Department of Natural Resources, March 15, 1993.

Instream Flow Studies Supporting the St. Louis River Hydroelectric Project Relicensing. BEAK Consultants Inc. for Minnesota Power. Sept. 1990.

Response to FERC's Request for Information - St. Louis River Hydroelectric Project. Minnesota Power. Volume I of III. June 17, 1993.

Many additional concerns relating to operation of the St. Louis River dams have been raised by participants in the Remedial Action Planning process. These concerns will be addressed during the development of the EIS because they were raised by other participants. Other considerations, while potentiality important, are somewhat speculative, and hence are not included under the Recommended Actions below. However, the issues have been raised as being of concern by members of the RAP process. The potential for dam operations to influence the establishment of wild rice is an example of one such concern. It was also suggested that FERC evaluate the potential for proposed flow regimes and dam operations to influence sediment liberation and its effect on downstream environments, exposure to contaminated sediments, and uptake of contaminants from sediments. It was suggested that the various flow regimes identified by the different interveners might have impacts on wildlife habitat, recreational value, and property values in and around the upstream reservoirs. While these issues may warrant attention, this recommendation does not address these broad, watershed-wide considerations.

Goal: Operation and management of the dams at Knife Falls, Cloquet, Scanlon, Thompson, and Fond du Lac to ensure that adequate instream flows are provided to protect aquatic habitat of the St. Louis River.

Recommended Actions:

1) The Federal Energy Regulatory Commission (FERC) should investigate, through the Environmental Impact Statement (EIS) process, the impacts on optimum aquatic habitat of various flows through the bypassed stream reaches and the impacts of reductions from those flows due to other environmental, social and economic considerations. Specific concerns to be identified in the EIS should include:

a) Determine the optimum aquatic habitat possible in the St. Louis River Area affected by the dams. Due to many factors that influence the results of the Instream Flow Incremental Methodology (IFIM,) differing flow rates may, on occasion, provide similar amounts of habitat. The optimum flow selected for assessment should be the one that shows the least variation in habitat quantity due to flow changes (i.e., an IFIM Habitat vs. Flow curve with a flatter peak would suggest protection from variability whereas a steeper peak would suggest greater variability).

b) Assess all of the impacts (including environmental, social, and economic) of flow regimes through the bypassed stream reaches that represent reductions from the provision of optimum aquatic habitat. Proposed minimum flow requirements identified by the applicant and other interveners provide a range of flow regimes to evaluate. All flow regimes should be compared against the potential habitat provided by the optimum flows specified in part a).

c) Evaluate the potential impacts of flow regimes on power generation and possible replacement of decreased generation. Sources of replacement energy should include coal fired turbine, conservation, demand reduction, and purchases from the grid.

2) Minnesota Power, Minnesota DNR and Wisconsin DNR should establish a system to monitor and evaluate current and future modifications of operating procedures to ensure that adequate information is available to continually improve operations.

3) Evaluation of flow rates and their effects on fish habitat should be initiated. Results of these tests should be used to modify optimum instream flow rates.

Reason for the Choice of these Recommended Actions: Recommended Action 1 identifies a baseline by which to evaluate habitat impacts of required instream flows. The provision of optimum aquatic habitat in the bypass stream reaches may not be the best alternative given the other, potentially conflicting values that need to be addressed. However, informed decision making requires that losses to habitat be compared to the ideal situation (from the aquatic community perspective) of optimum aquatic habitat. A compromise position, one that balances environmental, social and economic concerns will be developed by FERC when it issues the license for the St. Louis River Project dams. This recommended action identifies one baseline for the comparisons that must be made to establish the proper balance for the compromise position. The other Recommended Actions provide for cooperation, information sharing and consistency in the protection of the aquatic community habitat in the St. Louis River.

Time Frame: The Draft EIS for the impacts of the St. Louis River Project is currently being prepared. Recommendations to FERC should be made as soon as possible to ensure that issues are addressed in the EIS. Therefore, these recommended actions should be implemented immediately.

Implementors: Federal Energy Regulatory Commission (FERC), Minnesota Power, Minnesota DNR, Wisconsin DNR.

Funding Sources: This recommendation will likely not increase the cost of the EIS which is presently being developed.

Stage II RAP Recommendation
[13 - POINT]

Written by Collins (MDNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Reviewed by City of Superior (Morgan, Weems, Vito); City of Duluth (Kimball, Majewski); WDNR (Strand)

Approved by Citizens Advisory Committee 4/26/94

Impaired Use: Loss of Fish and Wildlife Habitat

Recommendation: *The cities of Duluth and Superior and the states of Minnesota and Wisconsin should protect all of the undeveloped and natural areas of Minnesota (Park) and Wisconsin Points, and should restore natural plant communities to provide optimum habitat for breeding and migrating wildlife. The jurisdictions should also protect and maintain the conditions that sustain the natural geophysical dynamics associated with these bay-mouth bar ecosystems.*

Problem: Residential and commercial development, past management activities, and harbor maintenance activities have affected the quality and quantity of plant and animal habitat on Minnesota and Wisconsin Points.

Past development and land management activities on both Minnesota and Wisconsin Points have altered the native plant communities. However, portions of these two areas still contain high quality plant and animal communities.

Spring migrant passerine birds moving north reach the southern shore of Lake Superior and are funneled westward to Minnesota (Park) Point and Wisconsin Point. These migrating birds often become grounded on Minnesota Point and Wisconsin Point during periods of poor visibility. Without abundant, high quality habitat available to restore body fat reserves that were depleted during migration, these migrants likely suffer high mortality. Previous management of Minnesota and Wisconsin Points has, in some instances, reduced habitat quality for migrating passerine birds. For example, removal of native shrubs and other plants to provide an open, park-like understory likely reduces habitat quality for breeding and migrating birds.

Sand dune communities in the Great Lakes are increasingly rare. Lake Beach (Lake Superior Section) Sand Subtype communities are classified as Critically Endangered in Minnesota (MN DNR 1993) for example. While the Minnesota-Wisconsin Point system is undoubtedly critical to the health of the estuary, little is known about the ecosystem functions provided by these bay-mouth bars. On Minnesota Point, habitat alterations have occurred through residential and commercial development. Alterations on both Points have occurred due to the development and maintenance of the harbor. Development pressure is likely to increase. Wisconsin Point has had relatively little development since it is preserved under the city park system. However, the potential always exists for areas such Wisconsin Point, to receive pressure for development in the future.

Goal: Restore and maintain native plant and animal communities on Minnesota and Wisconsin Point to provide migrating birds with abundant, high quality habitat for resting and recharging body reserves before crossing the open waters of Lake Superior and to provide native wildlife with abundant natural habitat for nesting and rearing young.

Recommended Actions:

1) The City of Superior should protect Wisconsin Point from possible future development by designating the area as a natural preserve, and educating the public about the area's unique ecosystem. Further encroachment on the natural areas of Wisconsin Point should be prohibited.

-The Superior Waterfront Plan recommends that Wisconsin Point be designated a Natural Sand Dune Ecosystem Preserve. In addition, the plan calls for consolidation of parking and construction of vehicle barriers to preserve habitat. The Waterfront Redevelopment Commission should explore additional existing special designation programs (e.g., State Natural Areas Program) that may be appropriate for providing long-term protection to the unique ecological resources of Wisconsin Point. They should also pursue the other actions called for in the Waterfront Plan.

-The Commission and the City of Superior should educate the users of Wisconsin Point and the public in general about the unique Wisconsin Point ecosystem.

2) The City of Superior, with assistance from the Wisconsin DNR, should initiate a habitat management program on Wisconsin Point that would enhance protection of native plants and plant communities, increase indigenous fruit bearing shrubs and herbs, promote the expansion of native plant communities, and reestablish native plant communities that have been lost.

3) The City of Duluth and all other landowners should provide permanent protection to the undeveloped portions of Minnesota Point and prohibit further encroachment on the Point's natural areas.

-Among the potential actions to achieve this are designating Minnesota Point a Sand Dune Ecosystem Preserve, selling or donating land to a land trust and selling or donating development rights to a conservancy group. The City of Duluth should explore additional existing special designation programs that may be appropriate for providing long-term protection to the unique ecological resources of Minnesota Point.

4) Residents of Minnesota Point are encouraged to assume active stewardship of the natural areas of Minnesota Point (e.g., develop management plans, acquire property or development rights, monitoring, restoration, etc.).

5) The Minnesota DNR and the City of Duluth should initiate a habitat management program on Minnesota Point and Hearding Island that would enhance protection of native plants and plant communities, increase indigenous fruit bearing shrubs and herbs, promote the expansion of native plant communities and reestablish native plant communities that have been lost.

6) The cities of Duluth and Superior should, in cooperation, develop and implement a management plan for the protection and restoration of the biological, ecological and geophysical dynamics and features of the Minnesota-Wisconsin Point bay-mouth bar ecosystem. Affected property owners should be contacted and encouraged to participate in the planning process. The Metropolitan Interstate Commission's Harbor Technical Advisory Committee should be approached to assist in the development of a cooperative management strategy.

Reason for the Choice of these Recommended Actions: These actions will provide much needed additional protection to the unique and high quality ecological resources of Minnesota and Wisconsin Points. They will call attention to research needs, and will aid in the restoration of plant and animal habitat on the bay-mouth bar and within the estuary.

Timeframe: The recommendations to protect Minnesota and Wisconsin Points should be forwarded to the appropriate city Offices of Planning, Parks Departments, County Boards and state DNRs for immediate action. The recommendations to restore native plant communities should be forwarded to the Department of Natural Resources in each state. Proposals for restoration work can be developed and implemented as soon as the appropriate field staff have reviewed the recommendations.

Implementors: City of Duluth, City of Superior, Minnesota Department of Natural Resources, Wisconsin Department of Natural Resources, Landowners (public and private) of Wisconsin and Minnesota Points, and the Harbor Technical Advisory Committee of the Metropolitan Interstate Commission.

Funding Sources: No funding is needed to implement the recommended actions with regard to special designations. These recommendations can be implemented by the local units of government through routine administrative procedure. Funding for the restoration of native plant communities can be requested through the EPA Great Lakes National Program Office and from the state DNRs.

References

MN DNR. 1993. Minnesota's Native Vegetation: a Key to Natural Communities. MN DNR Biological Report No. 20. Minnesota Department of Natural Resources Natural Heritage Program, St. Paul, MN.

Waterfront Task Force. March 1990. Waterfront Plan - City of Superior, Wisconsin.

Stage II RAP Recommendation
[14 - DULUTH INFILTRATION/INFLOW]

Written by Taylor (SWCD) and Koth (MPCA) with input from the City of Duluth and WLSSD

Approved by Pollution Prevention/Control Workgroup with subsequent reorganization per workgroup instructions 10/14/93

Reviewed by MPCA (Stollenwerk, Gillen), City of Duluth (K. Larson), WLSSD (McLaughlin), WDNR (C. Olson)

Reviewed by IATAC who had suggestions for changes plus an added review by the Duluth Realtor's Association 2/17/94

Approved by Citizens Advisory Committee with the knowledge that the point-of-sale provision was being discussed with the Realtors' Association 4/26/94

The point-of-sale provision is revised based on concerns of the Duluth Realtors' Association 5/5/94

Revised recommendation is approved by the Citizens Advisory Committee 5/24/94

Impaired Use: Beach Closings/Body Contact

Problem: High flows during storm events cause sewage bypasses into the Duluth/Superior harbor and Lake Superior.

Many parts of Duluth have an inflow and infiltration (I & I) problem. Inflow occurs when rainwater is channeled into the sanitary sewer rather than the stormwater system. The roof drains, footing drain and sump pumps on many Duluth homes are connected to the sanitary sewer. In addition, landscaping around many houses directs stormwater towards the house, increasing the amount of water that is removed by the footing drains and thus the sanitary sewers. This roof runoff and groundwater does not require treatment and does not need to be routed to a sewage treatment facility. An average home can produce as much as 1400 gallons of inflow in a typical rainstorm. Infiltration is the leakage of ground water into the sanitary sewers through old or defective pipes.

When large volumes of stormwater are channeled into the sanitary sewers during rainstorms, sewage pump stations are unable to handle the increased flow and untreated sewage overflows directly into the St. Louis River, Lake Superior, and tributary creeks. Sanitary sewers back up, overflowing into streets and basements, and leaving raw sewage behind. From March to July 1993, 11 overflow episodes were reported involving a total of 7 different pumping stations. Overflows commonly occurred at Duluth Station #1 and WLSSD Station #16. About half of the overflows were of an unknown quantity. The overflows of known quantity ranged from 15,000 gallons to 1,000,000 gallons. The 1993 overflows occurred in a year with 32.35 inches of rainfall, slightly above the average annual rainfall of 30.00 inches.

The overflows are large potential sources of microbial contamination since human waste can be a source of pathogens and other organisms that cause disease and sickness. In addition to the pumping station overflows, during large flow events the Western Lake Superior Sanitary District (WLSSD) treatment plant cannot effectively remove solids which can contain metals. The facility has violated its lead standard in the past since solids (and the attached lead) were washed into the St. Louis River with the effluent.

Most of the I & I problem is coming from inflow from footing and roof drains around private homes. Stormwater gets into sanitary sewers in 15 minutes to one hour after a rainstorm starts. It is impossible for a significant quantity of water to percolate through the four feet of clay soil that lies above most home-to-street sewer lines in Duluth in a 15 minute to

one hour time span. Therefore, house-to-street lines cannot be the main problem. City pipes and manholes are not flawless, but are being continuously repaired in an ongoing sanitary sewer maintenance program. Also, when considering rain that falls on a street, only direct leakage into a sanitary sewer manhole could produce peaks within one hour of a rainstorm, since almost all (all but one) combined storm/sanitary sewers in the city of Duluth have been separated and the streets are even more impervious than clay soil. To have such a short response time, the water must enter the sanitary system via direct piping (i.e., directly attached roof drains, most of which have been disconnected) or through relative porous and permeable soils. The only place such soils are found in most areas of Duluth is in the fill that is placed above the footing drains around houses when the drains were installed. Only here are the pervious soils necessary for such a short response time found. Also, the city has been continuously fixing pipes since the 1970's and no significant I & I reductions have resulted. Clearly, the problem lies with private roof and footing drains.

Building codes have prohibited roof connections to the sanitary sewer system since 1947 and footing drain connections to the sanitary sewer system in new construction since 1977 (Duluth code sec.43-31). Prior to 1977, footing drains were required to be hooked up to the sanitary system. The 1992 "sump pump" ordinance requires the disconnection of roof and footing drains in existing homes. However, without a timeframe and without a funding source, the ordinance is largely unenforceable. No other requirements exist for periodic inspection or retrofitting of older homes' sanitary/stormwater routing systems.

Goal: To eliminate inputs of rainwater and groundwater into the sanitary sewers so sewage bypasses into the Duluth/Superior harbor and Lake Superior will no longer occur during storm events.

Recommendation 1: *The City of Duluth should amend the building codes to require that existing homes be brought up to current plumbing code.*

Recommendation 2: *The City of Duluth should prioritize neighborhoods to define areas with the most severe inflow problems and immediately begin to eliminate the I & I problem with the available resources. They should also vigorously pursue funding to deal with the inflow problem from residential sanitary systems.*

Recommendation 3: *The City of Duluth should set up a mechanism to ensure that homeowners do not dismantle sump pump, roof drain, and/or footing drain connections that are in compliance with building codes in order to illegally connect them back to the sanitary sewer system.*

Recommendation 4: *The City of Duluth should continue maintaining the sanitary sewer system to minimize infiltration problems.*

Recommendation 1: *The City of Duluth should amend the building codes to require that existing homes be brought up to current plumbing code.*

Recommended Actions:

1) The City of Duluth should enact an enforceable ordinance requiring the inspection and, where necessary, the retrofitting of homes' sewer systems.

-The ordinance must specify time frames for retrofitting and include penalties for noncompliance.

-The ordinance should require that connections between sumps and sanitary sewers be blocked, sump pumps be properly installed, and water from roof and footing drains be channeled in an approved way that does not reintroduce the water into sanitary sewers or endanger adjacent property.

-The ordinance would specify the amount and duration of a special sewer user fee which would be added to all sewer bills and used to finance pre- and post-retrofitting inspections, and possibly some of the costs of the actual retrofitting.

2) The City of Duluth should let bids for initial inspection and public education services and contract with the successful bidder to inspect all existing homes to determine which homes are and are not in compliance. The City of Duluth has already begun background work to resolve the details of the inspection contract and to determine recommended retrofitting practices.

-The cost of the pre- and post-retrofitting inspections could be paid by a sewer user fee added to all sewer bills. This could be either a straight fee or an percentage based on use (fee per gallon discharge).

-The actual costs of retrofitting will be paid by the homeowner, with possible assistance from grants and/or low-interest loans. Recommendation 3 discusses potential funding sources and the management of these funds.

-After the retrofitting is complete, homes will be reinspected by the city for compliance.

Reasons for the Choice of These Recommended Actions:

1) The problem of inflow and infiltration is serious. It is probable that the Minnesota Pollution Control Agency (MPCA) will withhold sewer extension permits if the city does not dramatically reduce its I & I problem in the next eight years. The MPCA did stop processing permits for a brief time in 1991. After that, the city pledged to fix the problem within ten years. The city will be studying several homes and WLSSD will be contracting with LHB Engineering to examine area low-income Housing and Urban Development homes in an attempt to identify and price alternative practices to sump/sanitary connections that would be applicable to different homes depending on lot and neighborhood characteristics. Under the current city plan, homeowners will be provided with the recommended practices at the time of initial home inspection. Based on preliminary work, an average retrofitting cost of $1000-1500 per house is likely. All homes contributing to the problem need to be retrofitted, and eight years is barely enough time to enact/amend an ordinance, inspect over 20,000 homes, allow for compliance time, and then re-inspect for ordinance enforcement. This alternative would begin the inspection/retrofitting process now.

2) The outlying areas serviced by WLSSD also contribute to I & I problems. A house sewered into the system in a semi-rural location can contribute as much stormwater to the sanitary sewer system as a single house in a densely urbanized area. However, most of the smaller communities within the WLSSD service area are well into three year plans designed to reduce their I & I contributions. Duluth, the largest single city in the WLSSD service area, is just beginning to deal with the I & I problem.

Recommendation 2: *The City of Duluth should prioritize neighborhoods to define areas with the most severe inflow problems and immediately begin to eliminate the I & I problem with the available resources. They should also vigorously pursue funding to deal with the inflow problem from residential sanitary systems.*

Recommended Actions:

1) The City of Duluth should initially concentrate their efforts on those areas of the city that have repeated and severe sewage bypass problems due to I & I. The watershed basins were prioritized in a 1992 I & I reduction study by RREM, Inc. and have been reprioritized recently due to persistent overflows at several facilities. The top priority basins should be dealt with first.

2) The City of Duluth should pursue funding to disconnect roof and footing drains from the sanitary sewer system. One funding source that should be examined is the State Revolving Loan Fund. This fund is available for sanitary wastewater projects. Based on some initial agency contacts, it is likely that the fund could be used for the I & I problem since the result of I & I is sewage bypasses and occasional permit exceedances from the wastewater treatment plant. Funds are available for planning, design, and construction.

-To start the Revolving Loan Fund process, the city needs to apply for inclusion on the Project Priority List kept by the MPCA. State Rules 7077 describe this procedure.

-If revolving loan funds are acquired by the city, it is recommended that the funds be managed through a private or non-political fund management agency such as the Arrowhead Regional Development Commission (ARDC), the federal Housing and Urban Development office, the Housing Redevelopment Authority, or the Community Action Program. Removing politics from fund awards would help make the award process more equitable and remove the potential charge of favoritism to specific neighborhoods. The funds should be awarded in the form of loans to homeowners. In addition, grants should be available for lower income homeowners.

Recommendation 3: *The City of Duluth should set up a mechanism to ensure that homeowners do not dismantle sump pump, roof drain, and/or footing drain connections that are in compliance with building codes in order to illegally connect them back to the sanitary sewer system.*

Recommended Actions:

1) Once the city completes its project to bring homes up to code, city staff should develop a plan of action aimed at deterring homeowners from connecting stormwater drains and sump pumps back to the sanitary sewer. In some newer homes, the homeowners have cut the PVC pipe from the sump to the outside, attached a hose to the sump pump, and directed the water into a laundry tub and back into the sanitary sewer. The following options should be considered:

Option 1: Adopt a point-of-sale trigger ordinance that requires compliance with stormwater building codes prior to sale of a private residence.

Approximately 1200 homes are sold each year in Duluth. The City of Duluth should require that these homes be in compliance with stormwater building codes prior to sale. Before a home is sold, the roof and footing drain and sump pump connections should be inspected by a city building inspector or a designated qualified inspector such as a plumbing contractor. The roof and footing drains and sump must be in compliance with the building codes that prohibit discharge of storm water into the sanitary sewer system. If they are connected to the sanitary sewer system, the home must be retrofitted prior to sale. An affidavit of compliance with these building codes should be filed in the city building inspector's office prior to sale of the home.

Option 2: Revise the Minnesota Association of Realtors disclosure form to include stormwater connections in a home.

The disclosure form is a list of possible problems that can occur with a home such as a leaky basement or roof or low water pressure. The form is filled out and signed by the homeowner and is available to the potential buyers. The purpose of the form is to inform the potential buyer of existing or potential problems. The form should be revised to include connections of sump pumps, roof drains, or footing drains to the sanitary sewer. The City of Duluth could contact the Duluth Area Association of Realtors to initiate this effort.

Option 3: Require homeowners to sign and return a form to the city Building Inspection Office that certifies that stormwater connections are in compliance with city building codes.

The city could send out this form on a rotating basis (e.g. different neighborhoods could be targeted each

year). This form could be part of the property tax form or could be sent out with the utility bill. City building inspectors would then randomly select homes to inspect to determine compliance with the stormwater building code. Building inspection staff may need to assist some homeowners in determining if their homes are in compliance with the stormwater building code.

Option 4: Conduct random inspections of homes in Duluth to determine compliance with the stormwater building code.

City building inspectors could conduct random inspections of homes each year to determine compliance with the building code.

Reasons for the Choice of These Recommended Actions:

Option 1: It is likely that the seller, not the buyer, will absorb the cost of the retrofitting. If the seller has any appreciable equity built up in the home, a point-of-sale trigger would cause the expense of retrofitting to be incurred at a time when the seller has funds available. Homes in most neighborhoods in Duluth have appreciated 15-25% in the last four years. If homeowners knew that they would have to pay to bring their sump pump connections up to code when the home is sold, it might discourage illegal disconnection of sump-to-lawn outlets.

Option 2: The disclosure form is not mandatory in Minnesota, however, most home sellers that use a realty agency fill out a disclosure form. If the homeowners know that they'll need to disclose this information when selling their home, it might discourage illegal disconnection of sump-to-lawn outlets.

Option 3: Options 1 and 2 only deal with homes being sold. Thus, the majority of homes in the city would not be covered under these options. Option 3 places the burden of enforcement on the homeowner who must fill out and return the compliance form and on the city staff who must mail out the forms, determine if forms are returned, and conduct random inspections. All homes in the city would be covered by this option.

Option 4: This option places all the enforcement burden on the city staff who must conduct the random inspections. Under this option, the city would have to determine how many homes they want to cover each year.

Recommendation 4: *The City of Duluth should continue maintaining the sanitary sewer system to minimize infiltration problems.*

Recommended Actions:

1) The City of Duluth should continue to maintain and correct problems with the sanitary sewer system so as to minimize infiltration problems. Maintenance efforts of this type have been conducted by the city since the 1970's.

Implementor: City of Duluth

Timeframe: The development of model ordinances and discussions with the city of Duluth, the real estate industry, and building inspectors/supervisors could begin immediately. A target date of fall 1994 could be set for ordinance acceptance. Existing home inspections could begin as soon as funds are available for this effort. To assist the city with its ongoing efforts, it has been suggested that this recommendation be presented to the Duluth City Council in a formal presentation as soon as the recommendation clears the RAP process.

Funding Sources: The sewer fee would pay for the initial and final home inspections. The retrofitting cost would be borne by the homeowner with possible assistance from grants or low-interest loans, possibly from the Minnesota State Revolving Loan Fund. The city could charge the seller a fee for plan review and home inspection.

Stage II RAP Recommendation
[15 - BOATING PRACTICES]

Written by D. Brooke (LSRI) and Labadie (U.S. ACOE Canal Park Marine Museum)

Approved by Stewardship Workgroup 11/16/93

Reviewed by WDNR (Plass) and MPCA (Musick, Leppälä)

Reviewed by CAC which requests that information on Coast Guard activities and oil disposal be added to the recommendation 3/16/94

Revised recommendation approved by Stewardship Workgroup 4/12/94

Revised recommendation approved by Citizens Advisory Committee 5/24/94

Impaired Use: Aesthetics

Recommendation: *Inform the public about environmentally safe boating practices through education and inspection activities.*

Problem: Contaminants enter the water through routine maintenance and cleaning of recreational watercraft.

This recommendation deals with two particular sources of contaminants: boat bilge water and cleaning water. Water being emptied from recreational watercraft directly into the lake often contains gasoline and oil. Solvents used to clean recreational watercraft are often rinsed off directly into the waters of the lake.

Goal: Prevent discharge of contaminated waters from recreational watercraft into waterbodies, thereby preventing further degradation of the AOC. Increase recreational boaters' awareness of the detrimental environmental effects of particular maintenance and cleaning practices and provide boaters with more environmentally sound options.

Recommended Actions:

1) Post signs at boat launches and marinas that discourage boaters from bailing oily bilge water into the bay/river. (Federal regulations prohibit discharge of any material that creates an oily sheen or emulsion to the water.)

-The sign should be graphic but simple, with as few words as practical. It could be designed using a cartoon format. The St. Louis River System Remedial Action Plan and the U.S. Coast Guard should be listed on the signs as the sponsors.

-Initial contacts were made to four marina owners/operators explaining the project and requesting their endorsement. Individuals were contacted from the Barker's Island, Spirit Lake, Harbor Cove, and Lakehead Boat Basin marinas. All were in favor of the project and individuals from the Spirit Lake and Lakehead Boat Basin marinas thought that the signs would be much more effective than the brochures.

-Two other areas within the Duluth/Superior port have docking facilities for recreational craft (Minnesota Slip and a location on Park Point). The Sky Harbor Airport has facilities for small aircraft, and thus has the potential for creating similar waste materials. Contacts should also be made to personnel associated with these facilities. Contacts should also be made to local units of government and the state agencies (i.e., City of Superior, City of Duluth, MN DNR, and WDNR) regarding the boat launches.

2) Distribute educational/informational brochures to recreational boaters through mailings from recreation organizations and sporting goods stores.

-Solicit the permission and assistance of marinas and retail outlets for the distribution of brochures (*e.g.* brochures could be included in flier mail-outs and/or billings by the marina). In addition, brochures can be posted in various prominent locations.

-Preliminary contacts were made to Northwest Outlet - Superior and United Northern Sportsmen (Milt Pelletier) regarding their willingness to distribute brochures in their mailings. They indicated a willingness to disseminate the information.

-Some of the information contained in the brochure should include the following:

-Avoid use of petrochemicals and other cleaning solvents whenever possible. Rinse and clean boat with a brush instead of using soap. If boat is stained, use phosphate-free detergent.

-Fuel overflows from gas tanks create oily bilge water. Use oil absorbent pads as a means of removing spilled fuel from the bilge water. Following absorption of the oily material onto the pads, remaining water could be discharged into the lake. The pads can be disposed of in trash cans if the excess oil is squeezed out of the pad and recycled properly. Overflows can also be prevented by estimating fuel consumption relative to tank capacity.

-Brochures could be designed by LSRI staff as part of their public outreach efforts. Staff from the U.S. Army Corps of Engineers also indicated a willingness to help with the brochure's design.

3) Request that marina owners and operators participate in efforts to reduce pollutants entering the watershed. Marina owners could do all or some of the following:

-provide trash bins for paper and other wastes,
-provide and maintain a used oil drum that would make it easier to recycle waste oil,
-provide a drum for used solvents such as bottles of mineral spirits, acetone, and denatured alcohol,
-provide facility for proper disposal of fish waste since this waste cannot be landfilled or disposed of in the water,
-provide and maintain adequate pump-out facilities.

(Barker's Island Marina already provides a used oil drum, used solvent drum, and pump-out facilities. Lakehead Boat Basin provides pump-out facilities.)

4) Support education and enforcement activities of the U.S. Coast Guard that will deter littering by recreational boaters and prevent discharges of oil to the water.

-The U.S. Coast Guard plans to undertake the following activities in the 1994 boating season:

-Working with the Coast Guard Auxiliary, they will educate boaters on requirements to keep oil out of the environment by using the Coast Guard Auxiliary informational booths and pamphlets at boat shows or other locations.

-Working with the Auxiliary and Power Squadron, they will incorporate material into existing training classes to remind recreational boaters of their responsibility to keep oil and garbage out of the water.

-Using Auxiliary boats, they will conduct harbor patrols, especially in the marinas, to ensure that recreational boaters are not pumping oily waste into the water or throwing garbage over the side.

-They will work with marina owners to ensure that they are providing required trash receptacles for their customers.

Implementors: Lake Superior Research Institute, U.S. Coast Guard, U.S. Army Corps of Engineers, marinas, boat launch operators/owners, sporting goods stores

Timeframe: Implementation of the first two actions is contingent on obtaining funding for brochures and signs. Ideally, brochures could be distributed in the "off" season for boating (*i.e.* winter), and signs erected for the start of the following (spring) season, perhaps for spring 1995. Asking marinas to provide waste drums and pump-out facilities could be undertaken at any time. The Coast Guard activities will occur in the 1994 boating season.

Funding Sources: Possible sources of funding for the signs and brochures include the Great Lakes Protection Fund and various foundations. Some of the foundations that could be contacted include:

1) Henry M. Jackson Foundation
1001 Fourth Avenue
Seattle, WA 98154

2) K-Mart Corporation
3100 West Big Beaver Road
Troy, MI 48084

3) Laidlaw Foundation
950 Yonge Street, Suite 700
Toronto ON, M4W 2J4 CANADA

4) Andrew W. Mellon Foundation
140 East 62nd Street
New York, NY 10021

5) The New-Land Foundation, Inc.
1345 Avenue of the Americas
45th Floor
New York, NY 10105

6) The Pew Charitable Trusts
Suite 501, Three Parkway
Philadelphia, PA 19102-1305

7) Texaco Foundation
2000 Westchester Avenue
White Plains, MY 10650

8) Ameritech Foundation
30 South Wacker Drive, 34th Floor
Chicago, IL 60606

Stage II RAP Recommendation
[16 - FEEDLOT WASTE]

Written by Plass (WDNR)

Approved by Pollution Prevention/Control Workgroup with changes as incorporated herein 8/19/93

Reviewed by Steering Cmte. with new livestock access recommendation. Cmte. recommends that both recommendations go back to Pollution Prevention Workgroup for consideration 10/13/93

Pollution Prevention Workgroup approves two separate recommendations dealing with feedlots [PP1.1] and livestock access [PP1.2] 11/16/93

Reviewed by MPCA (Nelson), WDNR (Malischke), ABDI-LCD (Schultz)

Reviewed by IATAC with minor recommended changes 6/2/94

Approved by Citizens Advisory Committee 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment
Beach Closings/Body Contact

Recommendation: *The South St. Louis Co. and Carlton Co. Soil and Water Conservation Districts (SWCDs) and the Ashland-Bayfield-Douglas-Iron Co. Land Conservation Dept. (ABDI-LCD) should increase their efforts to assist farmers with feedlot management and animal waste control.*

Problem: Certain livestock management practices can contribute high levels of nutrients to water bodies.

Phosphorus levels in the St. Louis River suggest a eutrophic condition. Cook and Ameel (1983) estimated that 90% of the nutrient loadings to St. Louis Bay in 1982 were from non-point sources (Stage I, pp. IV-55 to IV-57; V-32).

One source of nutrients is feedlots. There are no estimates of the nutrient loading to the St. Louis River from these feedlots. While it is unlikely that all the animal waste is going into the river, the nutrient loading from livestock operations could be high.

Approximately 66 livestock operations in south St. Louis County are situated directly on the St. Louis River or its tributaries. There are no estimates available on the number of livestock operations in Douglas County. In a worst case scenario where all the animal waste enters the river or its tributaries, the nutrient load from the 66 livestock operations could be equivalent to that of 52,800 people. This assumes a 50-cow dairy herd which produces waste equivalent to that of the untreated waste from 800 people.

Goal: To reduce phosphorus and sediment loading from agricultural areas. (See related recommendations concerning livestock access (#17) and agriculture erosion (#22)).

Recommended Actions:

1) Good feedlot management and animal waste control practices help reduce nonpoint source phosphorus loading to the St. Louis River. Conditions in Minnesota make these techniques particularly valuable. Because of local soils and drainage patterns, farms and feedlots in St. Louis and Carlton counties are located on or adjacent to streams. Without waste management systems, runoff from dairy and beef operations typically drains directly into streams, without passing through wetlands or other "filters" that could trap nutrients and sediment.

- The South St. Louis County and Carlton County SWCDs and the Ashland-Bayfield-Douglas-Iron Counties LCD should encourage livestock operators to install agricultural waste management systems, and teach them to use the manure efficiently. The limiting factor in implementing these waste management systems is a shortage of technical design assistance. The other components are in place (namely, demand for the systems and cost-share funds to help farmers build them).

- In Minnesota, the SWCDs share an agricultural waste engineering technician. In order to meet the demand for services, each of these offices should have a full-time engineering technician and an assistant. In Wisconsin, the ABDI-LCD should have an additional full-time engineering technician for three to five years, until they are able to catch up with backlogged demand.

Timeframe: These activities should be on-going and could be implemented at any time. The agricultural waste engineering technician position, which is shared by the SSLC and Carlton Co. SWCDs, is funded through July 1994.

Implementors: The SSLC and Carlton Co. SWCDs (in Minnesota) and the ABDI-LCD (in Wisconsin) are the appropriate agencies for promoting good feedlot management and animal waste control practices.

Funding: The agricultural waste engineering technician (shared position) was funded by the U.S. EPA under Section 319 of the Clean Water Act. The land management agencies should seek additional funding or consider reallocating resources in order to fund technical design staff.

Stage II RAP Recommendation
[17 - LIVESTOCK ACCESS]

Written by Taylor (South St. Louis SWCD) and Peterson (Fond du Lac Reservation)

Approved by Pollution Prevention/Control Workgroup to be a joint recommendation with [PP1.1 - FEEDLOTS] 11/16/93

Reviewed by MPCA (Nelson), WDNR (Malischke), ABDI-LCD (Schultz)

Reviewed by IATAC with no recommended changes 6/9/94

Approved by Citizens Advisory Committee with minor revisions 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *St. Louis, Carlton, and Douglas Counties should enact ordinances requiring that any pasturing or watering of livestock on the banks of a stream be addressed in an approved conservation plan. Minnesota and Wisconsin Departments of Natural Resources should consider protecting the most sensitive riparian areas by direct purchase or by acquiring conservation easements.*

Problem: Pasturing or watering livestock on the banks of a stream can destroy fish habitat and reduce water quality through increased erosion and nutrient and bacterial loading.

Livestock pastured on stream banks remove the shade needed to maintain cool waters and stabilize these banks. The stock has free access to walk or wallow in these streams, and this breaks down the stream banks, widening the stream, making it shallower, and therefore more susceptible to temperature fluctuations. Crossing points result in increased erosion and this sedimentation can be lethal to bottom-dwelling riffle organisms that serve as fish food and can destroy nest sites for cold-water fish such as trout. Much of the erosion on some streams results from natural causes and the additional input from cattle is, in some cases, minimal. However, in some cases such as designated trout streams, the effect of improper cattle pasturing and crossing can have a serious effect on fish production.

In Carlton and Douglas counties, there are no regulations to prevent pasturing of livestock to the edge and through the St. Louis River and its tributaries. St. Louis county has an ordinance (number 46, article VI, section 15) regulating livestock access to streams. It states that "In shoreland areas, domesticated animals shall not be picketed, fenced or otherwise contained in shore and bluff impact zones or on steep slopes. However, access to the shore shall be allowed for watering purposes only, on a site to be approved by the Soil Conservation Service."

Goal: To reduce sediment and nutrient loading from agricultural areas into rivers and streams where this loading is interfering with other designated uses of the water bodies.

Recommended Actions:

1) St. Louis, Carlton, and Douglas Counties should enact ordinances requiring that any pasturing or watering of cattle on the banks of a stream be addressed in an approved conservation plan.

-The ordinances should require that conservation plans, to the Resource Management System level of protection, be developed with Soil and Water Conservation District (Minnesota) or Land Conservation Department (Wisconsin) input and approval. Resource Management Systems specifications are defined in Soil Conservation Service field office technical guides and are available from Soil and Water Conservation Districts (SWCD), the Ashland-Bayfield-Douglas-Iron Counties Land Conservation Department (ABDI-LCD), and the

Soil Conservation Service. Approval of a Minnesota DNR or Wisconsin DNR fisheries biologist should also be required on state-designated trout streams.

-The ordinances should give county planning, zoning, or health departments the authority to penalize farmers who fail to obtain and execute an approved plan.

-Additional staff in Minnesota and Wisconsin may be needed to present erosion control options, review plans and make site visits. Federal Soil Conservation Service personnel should be fully utilized by the SWCD's and the ABDI-LCD when considering the ecological aspects of a pasturing/watering conservation plan.

2) The Minnesota DNR and Wisconsin DNR should consider protecting riparian lands by purchasing them or by acquiring conservation easements. Priority should be placed on obtaining rights to areas adjacent to cold water streams with historic or present capability of supporting viable trout populations.

Reasons for the Choice of This Recommended Action:

1) As described in the problem statement above, the effect of the increased erosion caused by cattle can range from insignificant to devastating. The effect of the erosion depends on a number of factors including the banks' slope, the natural temperature of the stream, soil texture, and number of cattle pastured. Recommending a particular solution, such as mandatory fencing, to all farmers is expensive and unnecessary. By requiring an approved plan, the counties have the flexibility to enforce anti-erosion measures where needed, but farmers will not be forced to pay for and install practices of little ecological value. A side-benefit of following Resource Management System specifications should be preservation of vegetation and shading in areas where sediment loadings and/or water temperature increases could degrade cold-water fish habitat. Therefore, approval of a Minnesota or Wisconsin DNR fisheries biologist should be required for cattle access plans on designated trout streams.

2) Public money available for erosion control practice design and construction is limited. This recommended action would allocate funds to projects where the greatest benefit per dollar input could be realized.

Implementors: St. Louis, Carlton, and Douglas Counties, South St. Louis and Carlton County SWCDs, ABDI-LCD, Minnesota DNR, Wisconsin DNR, Soil Conservation Service, St. Louis River Board

Timeframe: A model ordinance has been drafted by the South St. Louis SWCD. This model ordinance could be presented to the counties in 1994, with ordinance acceptance targeted for 1994. Education on pasturing and stream crossing management practices is a current and ongoing activity of the SWCD's and the ABDI-LCD.

Funding: The shared (South St. Louis-Carlton Co. SWCDs) agricultural waste engineering technician position was funded by the U.S. EPA under Section 319 of the Clean Water Act. St. Louis, Carlton, and Douglas counties should increase funding to the SWCD's and the ABDI-LCD to enable the land management agencies to add plan review staff. In addition, the SWCD's and ABDI-LCD should seek additional private, state, or federal grant funding.

The Agricultural Stabilization and Conservation Service (ASCS) has cost share funds available for practices that prevent or minimize damage to waterbodies from livestock. The ASCS provides 75% of the cost of approved practices such as fencing, filter strips, vegetative planting, livestock crossings, and alternate water sources. Before funds will be approved by the ASCS, Soil Conservation Service staff must visit the site and determine the need for these practices.

The Minnesota DNR could potentially use the Environmental Trust Fund as a source of monies for land and easement acquisition.

Stage II RAP Recommendation
[18 - SHORELINE FORESTRY]

Written by Koth (MPCA)

Approved by Pollution Prevention/Control Workgroup 12/15/93

Reviewed by Douglas County Zoning (Olson), St. Louis Co. Health Dept. (Johnson), Douglas Co. Forestry (Epperly), MDNR (Phillips), St. Louis Co. Land Dept. (Heikel), St. Louis River Board (Bartikowski), MPCA (W. Anderson), WDNR (Holaday)

Reviewed by IATAC with no recommended changes 6/9/94

Approved by Citizens Advisory Committee with minor changes 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediments

Recommendation: *Education efforts should be undertaken to educate riparian landowners, loggers, and the general public about shoreland ordinances that deal with forestry practices and vegetative cutting.*

Problem: Rules and requirements on vegetation cutting in shoreland zones may not be known by private landowners, loggers, and the general public.

Carlton, Douglas, and St. Louis counties have ordinances requiring that forestry best management practices (BMPs) be used when cutting vegetation in the shoreland zone. However, this information may not be getting out to riparian landowners and loggers. With this information, a riparian landowner will know that enforcement action can be taken to stop or prevent logging that uses poor management practices. This information can help assure that riparian owners use proper logging techniques or give them a place they can call if they see poor forestry management practices. If loggers are aware of the zoning ordinances they are more likely to use BMPs. The ordinances are as follows:

-Carlton County ordinances define the shoreline as 1000 feet from the ordinary high water level (OHWL) of navigable lakes and 300 ft from the OHWL of navigable rivers and streams. Within this shoreline zone, harvesting of timber and reforestation must use State of Minnesota best management practices (BMPs). Within the shore and bluff impact zone, no intensive cutting of vegetation is allowed. The shore impact zone is 50% of the structure setback. The bluff impact zone involves slopes 25 feet high over a distance of 50 feet with a 30 degree or greater slope.

-Douglas County ordinance Chapter VIII, Section VI, defines the shoreline as 1000 feet from the OHWL of navigable lakes and flowages and 300 ft from the OHWL of navigable rivers and streams. Within 35 feet of the OHWL, only 30 feet of any 100 feet may be clear cut. Beyond the 35 foot zone, cutting of trees and shrubbery is allowed if forestry and soil erosion control BMPs are followed.

-St. Louis County ordinance Number 46 defines a shore and bluff impact zone differently for the red clay areas in the Town of Midway and the St. Louis River and its other tributaries. The bluff impact zone for the red clay area is the vertical distance from the OHWL inland to a point where the slope levels to 6% over a 100 foot run. Measure the vertical height from the OHWL to the start of the 6% slope and multiply that height by 4. In the St. Louis River and its other tributaries, multiply the height by 3. Within the shore and bluff impact zone, vegetation removal is limited to 25% of the total vegetation. Removal in excess of 25% is allowed for forest management activities if State of Minnesota BMPs are used.

In addition, the St. Louis River Management Plan being developed by the counties and townships along the St. Louis River in Minnesota, will contain zoning restrictions for forestry and other land uses along a 1/4 to 1/2 mile wide riparian

corridor. At present, the plan proposes two forest management zones, with the most restrictive zone nearest the river. The plan will affect the St. Louis, Cloquet, and Whiteface Rivers from the headwaters down to the Fond du Lac Dam on the St. Louis River. The proposed zone requirements are consistent with or stricter than the zoning regulations of Carlton and St. Louis Counties. The plan is expected to be completed and in the implementation phase by 1995. This will require Carlton and St. Louis Counties to incorporate the forestry zones into the county ordinances.

Goal: To reduce erosion and sediment loading to water bodies from logging activities and vegetation cutting.

Recommended Actions:

1) Inform private riparian landowners, loggers, and the general public about existing shoreland ordinances for forestry practices and vegetation cutting.

-RAP staff should work with county zoning offices and forestry managers to develop a public service announcement and three brochures (one for each county) that educates people on the existing shoreland zoning ordinance requirements for vegetation management. The Minnesota PCA Public Information Office and the Wisconsin DNR Information and Education Office may be able to assist with the development of these materials. The public service announcement would have to be general enough to apply to Carlton, Douglas, and St. Louis counties. The brochures should be written specifically on each county's shoreland ordinances.

-In addition, Minnesota and Wisconsin DNR forestry managers should review the shoreland ordinances with loggers during the DNR BMP training workshops.

Timeframe: The public service announcement could be developed now. The brochure could be developed whenever money is available for printing.

Implementors: RAP staff, county zoning officials, county and state forest managers, Minnesota and Wisconsin Foresters Associations, private forestry consultants, Minnesota PCA Public Information Office, Wisconsin DNR Information and Education Office

Funding Sources: The Lake Superior Ad Club could be approached to develop the public service announcement. They developed a RAP television and radio ad in 1992. Carlton, Douglas, and St. Louis Counties could possibly contribute money to develop and print the brochures.

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Stage II RAP Recommendation
[19 - FOREST DIVERSITY]

Written by Koth (MPCA) with input from Gallagher (WDNR)

Approved by Pollution Prevention/Control Workgroup 12-15-93

Reviewed by Douglas County Zoning (Olson), St. Louis Co. Health Dept. (Johnson), Douglas Co. Forestry (Epperly), MDNR (Phillips), St. Louis Co. Land Dept. (Heikel), St. Louis River Board (Bartikowski), MPCA (W. Anderson), WDNR (Holaday), U.S. Forest Service (Verry)

Reviewed by IATAC with minor recommended changes. They suggested that in addition to the implementors already listed, the recommendation be mailed to the private forest consultants in the region. 6/9/94

Approved by Citizens Advisory Committee with minor changes 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediments

Recommendation: *Forest managers should manage forests in the St. Louis River and Nemadji River watersheds on a subwatershed basis and diversify age classes and species to reduce peak flows in streams and rivers.*

Problem: Due to unstable runoff characteristics in some watersheds, high stormflow peaks and snowmelt peaks are increasing erosion by scouring river and stream channels and undercutting banks.

Research by Verry et al. (1983) has shown that the age classes of forests affects peak runoff events from snowmelt in spring and rainfall in spring, summer, and fall. Based on research with aspen in northern Minnesota, it was found that snowmelt peak discharges increase dramatically when the percentage of land surface area in a watershed with an age class of 0-15 years (with 0 representing roads, fields, and recent harvests) exceeds 50%. When 50% of the watershed was clearcut, the snowmelt peak decreased below the predicted peak since two peaks occurred; one from the clearcut area and one later from the remaining forested area. When 71% of the aspen was clearcut, the peak snowmelt runoff increased dramatically and the peak occurred an average of five days earlier than the snowmelt runoff from the forested control watershed. Peak discharges from rainfall events increase dramatically when the percent of land with an age class of 0-5 years exceeds 35%.

When the streamflows increase dramatically due to the increased peak discharges, many stream and river channels experience severe channel scouring and streambank erosion. In the red clay area especially, frequent high-stage flooding causes the erosion of the toes of steep unstable clay slopes which causes massive slumping and sedimentation. The large sediment load carried by the streams degrades habitat for fish and wildlife and increases the need for dredging in the Duluth/Superior Harbor.

Goal: To reduce large peak rainfall and snowmelt runoff events that cause channel scouring and streambank erosion.

Recommended Actions:

1) Federal, state and county forest managers and large industrial forest landowners should determine critical subwatersheds and manage the forests in these watersheds to reduce peak flows in streams. This is especially critical in the red clay area where problems are exacerbated by the clay soils which are interbedded with layers of lighter textured soils.

-Critical subwatersheds are those watersheds that have a high potential for or already have a problem with channel scouring and bank undercutting in waterways due to high peak flows. Some of the factors that determine critical subwatersheds are the types of soil, steepness of slopes, cover type, and physical makeup of stream channels.

-Within these critical subwatersheds, forests should be managed to increase age class and species diversity. Over 50% of the land surface in the subwatershed should contain an age class over 15 years. This means that on subwatersheds that contain only mature trees, the manager will need to gradually cut and plant trees over time to diversify the age class for the future.

-Forest managers are encouraged to help private landowners in critical subwatersheds manage their cutting consistent with the age class diversity concept. They should be proactive and approach landowners within these subwatersheds to assist them by providing cutting plans. However, it is recognized that owners of small land parcels may need to cut their trees at specific times. This could disrupt the age class balance in the subwatershed and thwart efforts of foresters to manage for age class diversity. Because of this problem, foresters should take into account the percent of private land in a subwatershed when managing the public forest resource. They should also encourage private landowners to use environmentally sound logging practices such as retaining buffers of conifer trees along intermittent streams. These buffers can help reduce soil drying and cracking, thus minimizing erosion from runoff, especially in the red clay area.

2) In the long term, two different actions should be considered by forest managers.

-A system should be considered whereby professional forest managers develop or review cutting and/or management plans in Carlton, Douglas, and St. Louis counties.

-State, county, and private forest managers should pursue the development of a geographic information system to help manage forests on a subwatershed basis. Data such as age class, species type, soil type, and topography could be entered into data bases and updated regularly. This information could be used to pinpoint critical areas and to develop management strategies that maximize yield while protecting waterbodies.

Timeframe: The age class diversity management concept could be practiced immediately. The GIS system could be developed as funds become available in the future.

Implementors: Minnesota and Wisconsin state foresters; Carlton, Douglas, and St. Louis county foresters; large industrial forest landowners; private forest consultants (The list of consultants can be obtained from the American Association of Foresters, the local MN Soil and Water Conservation District staff, MN DNR foresters, WDNR foresters, and/or the Ashland-Bayfield-Douglas-Iron Counties Land Conservation Department in WI.)

Funding Sources: The age class diversity management concept could be implemented without additional funding. Several foresters who were contacted said that they are well aware of the age class and composition of the forests that they manage. Thus some of the information to do this type of management is already available. Costs for the GIS system development and maintenance could possibly by shared by the county and the large industrial forest landowners in the county.

Reference:

Verry, Elon S., et al. February 1983. Aspen Clearcutting Increases Snowmelt and Storm Flow Peaks in North Central Minnesota. Water Resources Bulletin, Volume 19, No. 1.

Stage II RAP Recommendation
[20 - MAILING LIST]

Written by Koth (MPCA) with input from Peterson (Fond du Lac Reservation)

Approved by Pollution Prevention/Control Workgroup 12/15/93

Reviewed by SCS-Madison (Paczwa), SCS-St. Paul (Kohler), Carlton Co. SWCD (Beck), Nemadji River Basin Project Steering Cmte Chair (Borgelt)

Reviewed by IATAC with no recommended changes 6/2/94

Approved by Citizens Advisory Committee 6/28/94

Impaired Use: All impaired uses

Recommendation: *Mailing lists should be developed for the Nemadji and St. Louis River watersheds.*

Problem: There is presently no way to contact landowners in the St. Louis and Nemadji River watersheds without conducting a major countywide mailing in Carlton, Douglas, Pine, and St. Louis counties.

Several of the RAP workgroups have suggested that a mailing list be developed for the St. Louis and Nemadji River watersheds so that landowners can be contacted on issues that may affect them. No group has expressed a willingness to undertake the development of such a mailing list due to the effort it would involve. However, several government and resource agencies have indicated they would use a mailing list of this type if it were available.

Goal: To get landowner input on Nemadji and St. Louis River projects, and to educate and inform landowners in the St. Louis and Nemadji River watersheds about environmentally sound riparian land use practices, RAP proposals that will affect landowners in the watersheds, and existing and proposed ordinances.

Recommended Actions:

1) Develop a mailing list for the Nemadji and St. Louis River watersheds.

Nemadji River:
-As a complement to the Nemadji River Basin Project, the project sponsors (the Carlton County Board, Carlton County Soil & Water Conservation District, Douglas County Board, and the Duluth/Superior Metropolitan Interstate Committee) or the Soil Conservation Service as the lead agency, should develop a mailing list for the Nemadji River watershed. (See Recommendation 8 - NEMADJI for a description of the Nemadji River Basin Project.)

A mailing list should first be developed for riparian owners along the main stem of the Nemadji River. As funds and time permit, the mailing list should be expanded to include riparian owners along major tributaries and state designated trout streams, and finally the landowners in the rest of the watershed. This list could be used to get landowner input on proposed Nemadji River projects and to send mailings to riparian owners informing them of shoreland ordinances, RAP proposals, and other information.

A list of riparian owners along the Nemadji River in Carlton County was developed in 1991 as a part of the Forest Stewardship Plans. This list may need to be updated. The list for Douglas, St. Louis, and Pine counties could be developed from computerized information at the Douglas County Data Processing Office and from information in the Carlton County and Pine County Auditor's Office.

St. Louis River:

-The mailing list for the Nemadji River could serve as a pilot effort that will help to determine the time and effort required to derive this information for the St. Louis River. A list should first be developed for the riparian owners and then expanded to include landowners on tributary waters and trout streams, and then all landowners in the watershed. The extent of the mailing list will depend on funding and staff availability.

A St. Louis River riparian list could be used by the RAP to send educational materials and RAP updates to landowners. It could be used by the St. Louis River Board to inform landowners about zoning changes and management strategies that will result from the St. Louis River Management Plan. It also could be used by resource management and local government agencies for educational mailings, surveys, etc.

Timeframe: The mailing list for the Nemadji River should be developed at the early stages of the two-year Nemadji River Basin Project (1993-1995). The mailing list for the St. Louis River could wait until late 1994, when the St. Louis River Management Plan nears completion. If the list were developed now, some addresses might be outdated by the time the list was vigorously used.

Implementors: Carlton County Board, Carlton County Soil & Water Conservation District, Douglas County Board, Duluth/Superior Metropolitan Interstate Committee, local governments

Funding: The mailing list for the Nemadji River will be developed through Nemadji River Project funding. Staff working on the project already have plans to develop a mailing list as one of their first activities. The St. Louis River mailing list may involve a joint funding effort of local governments involved in the St. Louis River Management Plan and resource agencies involved in the St. Louis River System RAP. It is also possible that a private foundation would fund the development and maintenance of a mailing list if the list were considered an environmental education tool. Hiring a student from a nearby university would be an inexpensive way to develop the St. Louis River mailing list.

Stage II RAP Recommendation
[21 - FOAM]

Written by Dan Conley and Koth (MPCA)

Approved by River Stewardship Workgroup 12/21/93

Reviewed by MPCA (Blaha & Stollenwerk), U.S. EPA Lab (Hedtke & McCormick)

Reviewed by IATAC. Suggested changes include stating that the MPCA would pursue the actions in this recommendation. 6/2/94

Approved by Citizens Advisory Committee with minor changes 6/28/94

Impaired Use: Aesthetics

Recommendation: *Determine the content and source of the accumulations of foam on the St. Louis River downstream of Cloquet.*

Problem: Accumulations of foam are found on the St. Louis River near the community of Fond du Lac and at other locations downstream of Cloquet, Minnesota.

Goal: To eliminate the concern over the accumulations of foam on the river.

Recommended Action:

1) The content of the foam on the river should be tested to determine its source and possible toxicity. Samples of foam should be taken from the St. Louis River from sites both upstream (control site) and downstream of Cloquet, Minnesota. The foam from the two sites should be analyzed on a gas chromatograph-mass spectrometer and the results should be compared. If the foams have the same chemical make-up, then the foam downstream of Cloquet is likely from a natural source such as humic or tannic acids. If the chemical make-ups are different, it is likely that the foam downstream of Cloquet is not from a naturally occurring source.

2) If the foam is from a naturally occurring source, the Minnesota PCA should issue a press release stating that the foam is from a natural source.

OR

If the foam is from a manmade source, determine the source(s). This would require more thorough analysis with a gas chromatograph-mass spectrometer. The specifics of the sampling and analysis techniques will be decided by the organization that analyzes the samples. Once the source of the foam is identified, the Minnesota PCA should take enforcement action to stop the source.

Reason for the Choice of this Recommended Action: The foam on the river is aesthetically unpleasant and there is a local public perception that the foam is the result of a pollution problem and may pose a health threat to area residents.

Timeframe: The foam samples should be taken at both high and low flows. During a low flow period detergent components will be more obvious in the sample. However, foam may not be as prevalent during low flow periods, ao samples should also be taken during spring or high flow times. Samples should be collected both upstream and downstream of Cloquet. Sampling should be done in 1994.

Implementors: Minnesota PCA has stated that they will sample the foam in the river.

Local lab facilities that can conduct the foam analysis include the Trace Organic Analytical Laboratory at UM-Duluth/NRRI and the U.S. EPA Laboratory. Commercial laboratories in Minneapolis/St. Paul such as Aspen Research Corporation, can also conduct the foam analysis.

Funding Sources: MPCA would collect the foam using their existing staff in Duluth. Donation of lab sampling and lab time has been examined as a funding option. It is possible that the U.S. EPA Lab in Duluth may be able to run some foam samples gratis. If no laboratory can do the sampling for free, then the sampling should be funded out of the Minnesota PCA routine monitoring fund.

Stage II RAP Recommendation
[22 - AGRICULTURE EROSION]

Written by Plass (WDNR)

Approved by Pollution Prevention/Control Workgroup 1/26/94

MPCA (Reetz), WDNR (Malischke), ABDI-LCD (Schultz)

Reviewed by IATAC with no recommended changes 6/2/94

Approved by Citizens Advisory Committee 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment.

Recommendation: *State and county land-management agencies and the state extension services should promote the use of agricultural best management practices (BMPs) through development of ordinances and continuation and expansion of educational efforts in order to reduce non-point source nutrient and sediment loading to the St. Louis River, harbor, and ultimately Lake Superior.*

Problem: Agricultural practices can cause erosion and sedimentation, thus contributing to high nutrient and sediment loading to the St. Louis River. Runoff from these practices can also degrade water quality by washing nutrients and pesticides into receiving waters.

The northeastern portion of Minnesota and northwestern Wisconsin are not considered to be an intensive agricultural area. Only three percent of the counties' total acreage, 186,756 acres, (Carlton Co. - 66,492 acres, Douglas Co. - 26,826 acres, and St. Louis Co. - 93,438 acres) is agricultural cropland. Only a small percentage of this acreage is devoted to row crops which usually are associated with high sediment runoff rates. However, agricultural practices can be a source of sediment, nutrients, and pesticides. Agricultural chemicals (fertilizers, pesticides, herbicides) are applied to approximately 42,250 acres in the three counties (Stage I Report, pps. V-36-37).

Numerous plans (discussed below) are being developed to address the problem of erosion and sedimentation. However, these plans are only as good as the extent to which they are implemented.

The Carlton County Water Management Plan's target outline calls for the county to adopt a soil erosion and sediment damage ordinance by 1995. The Carlton Co. SWCD's proposed model ordinance has a provision whereby anyone could file a soil erosion or sediment damage complaint. Complaints would be investigated by the SWCD and could result in a fine from Carlton County.

The U.S. Department of Agriculture Soil Conservation Service (SCS) and Forest Service are funding the Nemadji River Basin Project in Carlton Co., Minnesota, and Douglas Co., Wisconsin. This spin-off of the RAP will recommend remedial actions and BMPs to restore beneficial uses to the Nemadji River system.

In Minnesota, implementation of the St. Louis River Management Plan will help control erosion and sedimentation in the upper basin, largely above the AOC (i.e., on the St. Louis River above the Fond du Lac dam, plus the Cloquet and Whiteface rivers). If plan requirements meet or exceed the Minnesota Shoreland Standards and the county water plans, and apply to a management corridor that extends for up to one-half mile inland from the rivers. Carlton, Lake, and St. Louis counties are scheduled to implement the St. Louis River Management Plan by 1995, by incorporating its recommendations into their zoning ordinances. However, these requirements will apply only to the management corridor.

Wisconsin DNR's Lake Superior Basin Water Quality Management Plan was completed in 1991. The plan includes an examination of surface water quality of waterbodies in the Lake Superior Basin, a list of sources of pollution, and recommendations for basin-wide and watershed actions that need to be taken to improve water quality and restore beneficial uses.

Goal: To reduce the amount of erosion, sedimentation, and chemicals coming from farming operations, and thus reduce nutrient, sediment, and chemical loading to the St. Louis River. (See related recommendations concerning livestock management and erosion from construction sites and silvicultural activities).

Recommended Actions:

1) Resource management plans should be used as tools to help control erosion and sedimentation related to agriculture. Related county ordinances should be developed where needed to protect sensitive areas.

-In Minnesota, the Carlton County Soil and Water Conservation District (SWCD) should promote the prompt and complete implementation of the county comprehensive water management plans including the provision for the soil erosion/sediment damage complaint.

-The South St. Louis County SWCD should develop and promote a model ordinance to control erosion and sedimentation from general agricultural activities. The SWCD is presently promoting its model urban erosion control ordinance to the county and to several municipalities in the Duluth area. A similar effort could be undertaken for agricultural erosion. The agricultural erosion ordinance should be developed with the county government and should be incorporated into the St. Louis County Water Plan.

-The BMPs developed as part of the Nemadji River Basin Project should include recommendations for silviculture, agriculture, and road work. Project coordinators should consider the most effective ways to get farmers to use specialized BMPs for red clay soils. This could involve educational efforts (see Recommended Action 2) and/or efforts to encourage enactment of ordinances that would require the use of agricultural BMPs within the Nemadji River basin in Carlton and Douglas counties.

-Enactment of ordinances by Carlton and St. Louis counties in response to the St. Louis River Management Plan should be supported by the RAP Citizens Advisory Committee.
-In Wisconsin, the scope of Wisconsin DNR's Lake Superior Basin Water Quality Management Plan should be expanded to address erosion and sedimentation control. This will be done through the development of Stage II RAP recommendations, which will become part of the plan.

2) Educational efforts that encourage the use of agricultural BMPs to reduce erosion, sedimentation, and contaminated runoff should be continued and expanded.

-Staff from the SCS, Minnesota's SWCDs and Ashland-Bayfield-Douglas-Iron Co. Land Conservation Department LCD help farmers plan resource management systems, which are designed to prevent erosion and protect water quality. These activities should be continued and, where possible, expanded.

-Both the University of Minnesota Extension Service and University of Wisconsin Extension Service, with various cooperators, offer workshops for farmers. Topics include BMPs, erosion control, and water quality protection. These should be continued, and programs should be advertised in both states.

-After completion of the Nemadji River Basin Project, the Carlton Co. SWCD and Wisconsin's LCD should disseminate its recommended BMPs and practices to farmers in red clay areas.

-Publications on the proper use and management of nutrients and pesticides should be widely disseminated among farmers. Following are some existing state extension service publications. (Other educational materials are available that discuss "alternative" techniques such as reduced tillage or "no till" agriculture).

Nutrients	"BMPs for Nitrogen Use"; "Clean Water--Nutrients--Management Makes a Difference"; "Fertilizer Recommendations for Agronomic Crops"; and "Understanding Nitrogen and Agricultural Chemicals in the Environment," from the Minnesota Extension Service. "A Step by Step Guide to Nutrient Management," (A3568) from the University of Wisconsin-Extension.
Pesticides	"Improving Pesticide Storage and Handling"; "Safe Use of Pesticides on the Farm"; "Clean Water--Pesticide Selection Can Make a Difference"; "Pesticides: Surface Runoff, Leaching, and Exposure"; and "Minnesota Rating for Potential Leaching and Surface Runoff of Pesticides" from the Minnesota Extension Service. Nutrient and Pest Best Management Practices for Wisconsin Farms (A3466), is a large volume available from the University of Wisconsin-Extension. Their "Summary and Implementation Framework" (A3467) is a smaller related publication.

Timeframe: The Nemadji River Basin Project is a two-year project that will be complete in 1995. Other efforts could be undertaken as staff time permits.

Implementors: Implementors include the SCS, Nemadji River Basin Project sponsors (Douglas County Board, Carlton County Board, Carlton County SWCD, Duluth/Superior Metropolitan Interstate Committee), Minnesota and Wisconsin State Extension Services, St. Louis County, South St. Louis County SWCD and the ABDI-LCD in Wisconsin.

Funding: Expanding the Farm Assist Program might require additional funds. For other activities, additional funding is probably not needed, as the work could be undertaken by existing agency staff as time allows.

Section 319 funds could be used for implementation of BMPs in the Nemadji River watershed. See recommendation 8 - NEMADJI for funding possibilities.

Stage II RAP Recommendation
[23 - CONSTRUCTION EROSION]

Written by Plass (WDNR) and Smith (South St. Louis SWCD)

Approved by Pollution Prevention/Control Workgroup 9/16/93 and on 2/24/94 after revisions were made to the recommendation to address changes in Wisconsin's handling of the NPDES stormwater permit program

Reviewed by Carlton County Zoning (Benson), MPCA (Sullivan), MN DOT (Ege), WI DILHR (Zentner), WDNR (Malischke, Plass, Schueller), ABDI-LCD (Schultz)

Reviewed by IATAC with no recommended changes 6/9/94

Approved by Citizens Advisory Committee with minor changes 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *Construction site best management practices (BMPs) should be used at all new development projects and redevelopment projects to control erosion and minimize sediment and nutrient loading to waterbodies.*

Problem: Acute erosion from construction sites contributes sediment to water bodies.

Erosion is a concern on both sides of the Area of Concern. While Minnesota has steeper topography, Wisconsin has highly erodible clay soils. Sediment loss from construction sites can commonly exceed 30 tons/acre/year, which far exceeds rates of loss from agricultural lands on a per acre basis (Paul Sandstrom, Soli Conservation Service, personal communication). In fact, runoff rates from construction sites can be as much as 100 times that of agricultural lands, and 1,000 to 2,000 times those of forest lands. In a short period of time, construction sites can contribute more sediment to surface waters than was previously deposited over several decades (MPCA, 1993).

While efforts are underway to mitigate sediment loading, significant problems still exist. During the 1989 Enger Golf Course expansion in Duluth, a storm caused soil losses that were believed to exceed 100 tons/acre (Stage I Report, p. V-41). Such erosion causes environmental damage and has an economic cost. To maintain the Duluth/Superior harbor shipping channels, the U.S. Army Corps of Engineers (ACOE) removes 80,000 to 150,000 cubic yards of sediment annually at a cost of $4-$8 per yard (John Safstrom, ACOE, personal communication).

The control of construction site erosion is a focus of concern in both Minnesota and Wisconsin. Both states recently began issuing stormwater permits under the National Pollution Discharge Elimination System (NPDES). Construction activity that disturbs five acres or more of land must have a NPDES stormwater permit.

In Minnesota, the NPDES stormwater permit is covered under the General Construction Storm Water Permit issued by the Minnesota Pollution Control Agency (PCA). Construction activity which requires a permit includes clearing, grading, excavation, road building, demolition activity, and construction of residential houses, office buildings, commercial facilities, and industrial buildings. The permit will require the permittees to install and maintain both an Erosion and Sediment Control Plan and a Storm Water Management Plan. Each plan requires the development of BMPs that will control pollutants in storm water runoff. These plans are not reviewed by MPCA staff. Highway projects disturbing less than five acres that are funded directly or indirectly by state funds must use state standard specifications for construction. The Hydraulics Manual which guides road construction activities is presently being rewritten by the Minnesota Department of Transportation (DOT) and will contain erosion control BMPs.

Wisconsin's NPDES permits are administered by the Wisconsin Department of Natural Resources (DNR). The permit program requires that a Notice of Intent be submitted to the Wisconsin DNR prior to earth moving activities. The notice

lists information such as type of project, project size, start and completion dates, and whether or not an erosion control plan has been prepared for the site. There is no site inspection.

The DNR and the Department of Industry, Labor and Human Relations (DILHR) developed a Memorandum of Understanding in September 1993 to clarify their respective responsibilities for controlling construction site erosion. The DNR handles all sites without dwellings (including road construction sites) that disturb five acres or more and smaller sites that are part of a planned development involving five acres or more of land disturbance. Under the Uniform Dwelling Code (pertains to one and two family dwellings) and the new Chapter 50 (pertains to commercial buildings), DILHR handles all construction sites with buildings, regardless of acreage.

The DNR has a Cooperative Agreement with the Wisconsin DOT, which requires the use of erosion control BMPs on all state highway construction projects. Wisconsin DOT is developing an administrative rule, TRANS 401, that will require erosion control measures on any projects with which the DOT is involved, regardless of size.

Under DILHR's Uniform Dwelling Code, an erosion control plan must be submitted with the building permit application to the local building inspector in cities with a population greater than 2500. The erosion control plan is reviewed and site inspections are made during other regular inspections (footing and foundation, rough construction, final, etc.). Violations must be corrected within 72 hours and "stop work" orders may be issued for noncompliance. Construction site erosion was recently added to Chapter 50, and consequently, DILHR is developing an erosion control program for commercial buildings.

Locally, some actions have been taken to reduce erosion from land disturbance activities. One of the initial RAP recommendations (September 1992) was this: "An erosion control ordinance should be adopted and implemented by the cities of Duluth, Superior, Cloquet, Hermantown, and Proctor. The ordinance would require an approved erosion and sediment control plan for land disturbance activities." Proctor enacted an erosion control ordinance and Hermantown is presently contemplating enacting such an ordinance. In addition, city councilors in Superior have just proposed that the city examine the feasibility of enacting an erosion control ordinance. Despite these activities, other actions still need to be taken to reduce the erosion and sedimentation problem.

Goal: To reduce nutrient and sediment loading from construction sites.

Recommended Actions:

1) Local governments should assume ultimate responsibility for controlling erosion from construction sites. Control could take the form of local ordinances or building permit requirements. Local governments and land use agencies should be involved in implementation and enforcement of state-controlled construction site erosion control.

Wisconsin:

-Douglas County should adopt the erosion control portion of the Uniform Dwelling Code. Douglas County should develop an agreement with the Ashland-Bayfield-Douglas-Iron Counties Land Conservation Department (ABDI-LCD) whereby the LCD would review erosion control plans, inspect sites, and conduct enforcement activities. The LCD staff would have to receive certification from DILHR in order to conduct these activities. The certification consists of a DILHR review of LCD staff experience and knowledge of the Uniform Dwelling Code provisions.

-In Wisconsin, the only land disturbance activities that are <u>not</u> covered under state ordinances are activities that disturb less than five acres and have no buildings. Activities not covered could include utility facilities and parking lots. If city or county residents and elected officials find that these activities cause erosion problems, Douglas County and the City of Superior should consider enacting a construction site erosion control ordinance that covers these activities.

Minnesota:

-The South St. Louis County Soil and Water Conservation District (SWCD) should follow through on its plans to propose the model erosion control ordinance to Duluth and St. Louis County. The SWCD is now working with Hermantown to develop an erosion control ordinance.

-Carlton County's Water Management Plan target outline calls for adoption of a soil erosion and sediment damage ordinance by 1995. The Carlton County SWCD has already developed a model ordinance that deals with both urban and rural erosion control. The SWCD and Carlton County should work together to adopt an erosion control ordinance. In addition, the SWCD should promote the model ordinance to the cities of Cloquet, Carlton, and Scanlon and in Thomson Township.

-The Carlton County and South St. Louis County SWCDs should develop an agreement with the Minnesota PCA whereby the SWCDs conduct erosion control plan review and site inspections in their respective jurisdictions. The Minnesota PCA is presently responsible for implementation and enforcement of the NPDES storm water permit program. We recommend that the local SWCDs be authorized to work with the Minnesota PCA to provide a local review, inspection and enforcement presence.

2) The Minnesota and Wisconsin Departments of Natural Resources and Departments of Transportation, the Carlton County and St. Louis County SWCDs, and the ABDI-LCD should inform people about the new construction erosion control procedures and requirements, and about construction site BMPs and criteria for their use. Audiences should include local government staff, engineers, developers, and contractors.

Some efforts are already being made, but additional opportunities exist.

-Area DNR, DOT, and SWCD/LCD staff should educate DOT and county employees and highway contractors about road construction BMPs and encourage their use.

-The Wisconsin DNR, with UW-Extension and the DILHR, offered training programs around the state for contractors and builders. The nearest session was in Spooner, Wisconsin, 70 miles south of the Twin Ports. No one from Duluth or Superior attended. The Wisconsin DNR should offer a similar program in Superior, possibly in cooperation with the ABDI-LCD.

-The SCS Technician in northern Wisconsin makes a brief erosion control presentation at Northern States Power's annual workshop for contractors. The ABDI-LCD should pursue plans that they have to develop a workshop on this topic.

-The SWCDs have educational materials and should be actively teaching people about construction-related BMPs.

-Key references for construction site BMPs include: Protecting Water Quality in Urban Areas - Best Management Practices for Minnesota (MPCA, 1989); Minnesota Construction Site Erosion and Sediment Control Planning Handbook (Minnesota Board of Water and Soil Resources, reprinted 1993); Wisconsin Construction Site Best Management Practice Handbook (WDNR, 1989); and Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices (U.S. EPA, doc. no. 832-R-92-4650). The University of Wisconsin-Extension has several useful pamphlets: "Erosion Control for Home Builders" (GWQ001) and "Standard Erosion Control Plan for 1 & 2 Family Dwelling Construction Sites" (GWQ001A). ABDI-LCD has a handout entitled "Construction Site Erosion Control Plan Development" that explains how to develop an erosion control plan.

Reasons for These Recommended Actions:

1) Since Superior has a population greater than 2500, it was required to adopt the Uniform Dwelling Code. The City does require erosion control plans as part of its building permit requirements. However, counties are not required to adopt the code. To minimize erosion from home construction we recommend that Douglas County adopt the erosion control part of the Uniform Dwelling Code.

Wisconsin Senate Bill 44 (1993) repealed the authority for counties, cities, and villages to adopt ordinances setting standards for construction sites that include the construction of a building. It thus appears that the City of Superior cannot adopt an ordinance to control erosion related to building construction. Therefore, we recommend that the City of Superior formalize its present system of controlling such erosion through building permit requirements, and that they consider adopting an erosion control ordinance for earth moving activities that do not involve a building.

Timeframe: These efforts could take place whenever staff time is available. The South St. Louis County SWCD's urban conservationist position, which includes specific responsibilities in this area, has been funded through September 1994. The ABDI-LCD likely needs additional staff to conduct these activities, and thus some of the recommended actions must wait until they have sufficient staff.

Implementors: In Minnesota, the SWCDs are the lead agencies for promoting erosion control ordinances and offering related educational programs. In Wisconsin, the lead agencies are the ABDI-LCD, UW-Extension, DILHR, and the Wisconsin DNR. In addition, the cities and counties on both sides of the AOC have responsibility for adopting ordinances, sending staff to educational programs, and seeking authority to implement state programs.

Funding: The South St. Louis County SWCD's urban conservationist position was funded by the U.S. EPA under Section 104(b)(3) of the Clean Water Act. The WDNR's EPA funding for a tri-state stormwater demonstration project could possibly be used in part to achieve these goals. The SWCDs and ABDI-LCD could apply for EPA funding under Section 319 or Section 104(b)(3) of the Clean Water Act in order to pursue these activities. The ABDI-LCD may want to ask the counties for funds in order to conduct the activities recommended in this recommendation and in 24 - Ditch Design and Maintenance recommendation.

In addition to these funds, an attempt should be made to get "hard" funds (e.g. service charge fees, permit fees, government appropriation) for these positions. At present, these positions are funded by "soft" money grants and thus there is no funding stability or staff security in these positions.

References:

Minnesota Pollution Control Agency (MPCA), The Storm Water Permit Program - Construction Activity, February 1993.

Stage II RAP Recommendation
[24 - DITCH DESIGN & MAINTENANCE]

Written by Taylor (South St. Louis SWCD), Sandstrom (SCS), & Koth (MPCA)

Approved by Pollution Prevention/Control Workgroup 2/24/94

Reviewed by MPCA (Sullivan), Carlton County Zoning (Benson), MDOT (Ege), ABDI-LCD (Schultz)

Reviewed by IATAC which recommends that recommendation be implemented as soon as possible 6/2/94

Approved by Citizens Advisory Committee 6/28/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *State, county, township, and municipal highway departments should minimize roadside ditch erosion by using BMPs for ditch design and maintenance.*

Problem: Roadside ditches, particularly those along county and township roads, are at times constructed in ways that erode, cause on-site and off-site sedimentation, and require frequent maintenance.

Roadside ditches along state, county and township roads are frequently built without the design capacity or a stable surface to convey runoff and prevent erosion. The ditches are often constructed to minimize the amount of land needed for road right-of-ways. In addition, steep sided "V" shaped ditches are the easiest shape to construct and maintain with the equipment typically available to local highway departments. However, the steep, bare soil banks erode rapidly. Some of this sediment is transported off-site during rainfalls, and part of the sediment remains on-site and fills in the ditch. For this reason, these ditches must be cleaned out frequently (usually by backhoe), and after cleaning, the whole erosion process begins over again. Much erosion would be eliminated if ditches were designed to ensure stability and to ensure that the ditch would be able to carry the expected volume of runoff.

Goal: To reduce erosion from ditch maintenance practices.

Recommended Actions:

1) **In Minnesota**:

-The South St. Louis Soil & Water Conservation District (SWCD) should offer to assist the Minnesota Department of Transportation (DOT) with their rewriting of the Hydraulics Manual. The Hydraulics Manual gives specifications and criteria for construction of ditches, roads, etc. The manual is being rewritten to incorporate erosion control construction and maintenance BMPs. This manual is used by county and municipal highway engineers for design of ditches, roads, etc.

-Once the manual is complete, staff from Minnesota DOT, South St. Louis SWCD, and Carlton County SWCD should develop a joint workshop/presentation to educate state, county, township, and city highway department staff on the importance and benefits of using BMPs for erosion control.

2) **In Wisconsin:**

-Unlike in Minnesota, the design specifications from the Wisconsin DOT are not used as the model for the county highway department. Because of this, the county relies on contractors to determine applicable WDNR water quality laws and erosion control measures that need to be taken when constructing ditches and roads. The Ashland-Bayfield-Douglas-Iron County Land Conservation Department (ABDI-LCD) and the Douglas County Highway Department should get together and attempt to develop a working relationship that encourages exchange of information on erosion control BMPs for ditch and road construction and maintenance.

-The ABDI-LCD should organize a workshop/presentation with the Douglas County Highway department to educate county and possibly city and township highway department staff on the importance and benefits of using BMPs for erosion control. The Douglas County elected officials should be invited to this presentation so that they become aware of the importance of good ditch maintenance and construction and the need for adequate funds to complete this work.

3) If BMPs are not used, St. Louis, Carlton, and Douglas counties and the municipalities in these counties, may need to consider enacting ordinances requiring that BMPs for erosion control be incorporated in ditch design and maintenance. Typically, BMPs would be initiated and erosion prevented by proper design the next time a given ditch requires maintenance.

Timeframe: The rewriting of the Minnesota DOT Hydraulics Book is already taking place, thus the South St. Louis SWCD should contact the Minnesota DOT as soon as possible. The ABDI-LCD and the Douglas County Highway Department could get together at any time.

Implementors: South St. Louis County SWCD; Carlton County SWCD, ABDI Land Conservation Department; county, township, and municipal highway departments.

Funding Sources: At present 50% cost-share moneys are available under the MN state SLR (Streambank, Lakeshore, and Roadside) program for roadside erosion. This program is available through the Soil and Water Conservation Districts. Counties and townships could expect to recoup some of the cost of BMP implementation by savings from less costly and less frequent ditch cleaning.

The recommended actions pertaining to the ABDI-LCD may require additional funding for a full or half time position. Funding for the ABDI-CD is presently obtained from the four counties which the LCD serves. A combination of a grant and increased county funding could possible fund a person to conduct these recommended actions and the actions recommended in the Construction Erosion recommendation.

Stage II RAP Recommendation
[25 - STOCKPILES]

Written by Koth (MPCA). Recommendation is approved by the workgroup with the deletion of the industry stockpile listing. Koth submits minority recommendation containing industry stockpile list.

Reviewed by WDNR (Malischke, Prey, Holy, Olson, Gothblad, Plass); MPCA (Wells, Soderbeck, Thomas)

Steering Cmte. reviews both majority and minority recommendations and believes they should go to IATAC for comment 10/13/93

Koth combines parts of the minority and majority recommendations; deleting industry stockpile list; correcting inaccurate information, and incorporating late comments of reviewers. 10/27/93

Reviewed by IATAC with no suggested revisions 6/29/94

Approved by Citizens Advisory Committee 7/26/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment

Recommendation: *The Minnesota Pollution Control Agency (PCA) and the Wisconsin Department of Natural Resources (DNR) should require NPDES stormwater permits for the material handling facilities in the Twin Ports and should encourage industries with stockpiles to use storage pile best management practices.*

Problem: Many local industry stockpiles of materials such as coal, taconite, limestone, and other materials are potential contributors of non-point pollution due to stormwater runoff to the St. Louis River and Duluth/Superior harbor.

The 1987 Amendments to the Clean Water Act require that specific industries obtain a stormwater discharge permit under the National Pollutant Discharge Elimination System (NPDES). The facilities listed in this rule include material handling and storage sites. Material handling activities include the "storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, finished product, by-product, or waste product" (40 CFR Ch. 1 Sect. 122.26). However, this requirement is limited to facilities that fall under specific Standard Industrial Classification (SIC) codes. The SIC codes specified are primarily those for manufacturing facilities. A manufacturing facility must therefore have a stormwater permit for storage piles at the manufacturing plant or at an offsite location. Storage piles owned by an industry not listed in the federal regulations are exempt from the stormwater permit requirements unless the state specifically designates the industry as a permittee. Since many of the material handling facilities in the Area of Concern are storage and transfer facilities, and not manufacturing facilities, they are not required to have a permit.

Goal: To reduce the input of pollutants to the St. Louis River and Duluth/Superior harbor from stormwater runoff at industrial sites.

Recommended Actions:

1) The Minnesota PCA and the Wisconsin DNR should exercise their authority under Section 402.p.(2).(E) of the Clean Water Act and require permits for material handling facilities regardless of whether the material is used in a manufacturing process or whether it is simply stored and transferred. In order to require permits for presently exempted facilities, the states must show that the stormwater from these stockpile facilities is a source of pollution.

2) Once all material handling facilities are required to have a NPDES stormwater permit, the Minnesota PCA and the Wisconsin DNR should update their list of facilities that require a NPDES stormwater permit to assure that material handling facilities in the Area of Concern are included in the permit process. In addition, they should check their existing facility lists now to make sure that facilities in the Area of Concern that need a permit have been included in the permit process. RAP staff should assist the Minnesota PCA and Wisconsin DNR in determining the type and location of stockpile facilities in the Area of Concern.

3) The Minnesota PCA and the Wisconsin DNR should encourage industries with stockpiles to use storage pile best management practices (BMPs). The Wisconsin DNR has the lead on a three-state (MI, MN, WI) project to determine the quality of stormwater run-off from stockpiles and to develop a manual of best management practices (BMPs) to be used by stockpile facilities.

Reason For the Choice of This Recommended Action: Since the state agencies have a small number of staff working on the stormwater permits and thousands of facilities to permit, it is possible that some of the material handling facilities could be missed during the permit process. In addition, mistakes or incomplete information on the MPCA preliminary self-certification form submitted by industries in Minnesota, could result in some facilities not being included on the list of permitees. This recommendation will assure that all material handling facilities are included in the permit process regardless of whether the materials they handle are used in a manufacturing process or are simply stored or transferred.

Timeframe: Once a stockpile facility receives a NPDES permit, the company has a specified amount of time to develop a stormwater management plan. The Wisconsin DNR and the Minnesota PCA should encourage industries to use BMPs as soon as possible. However, the stormwater management plan deadlines should allow time for industries to review and incorporate practices outlined in the storage pile BMP manual, which will be available by June, 1995.

Implementors: Minnesota PCA and Wisconsin DNR

Funding Sources: This recommendation may require additional staff time to demonstrate that each type of additional stockpile (exempted under existing regulations) is truly a source of pollutants. However, some of this information may be collected as part of the three-state stormwater project.

Stage II RAP Recommendation
[26 - WATER BIRDS]

Written by Collins (MN DNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Approved (with revisions) by Citizens Advisory Committee (7/26/94)

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Wisconsin Department of Natural Resources (DNR) should coordinate information available on birds affected by toxic contaminants and assess the feasibility of using birds to identify toxic hot spots and monitor uptake of chemical contaminants in the food web of the Area of Concern (AOC).*

Problem: Over the last 10 years, die-offs of immature Ring-billed Gulls and adult Mallards have been noted in the harbor. Investigations by Minnesota DNR and the U.S. Fish and Wildlife Service found no conclusive reasons for the die-offs (MPCA and WDNR 1992 pp. IV-24.)

The number of Common Tern breeding pairs in the estuary has decreased from 200 from 1977-1981 to approximately 85 from 1987-1989. Numbers may now be increasing. In 1993 approximately 150 breeding pairs were observed in the estuary (Fred Strand, pers. com.) Occasional cross-billed chicks have been observed in the AOC at Interstate Island and near the AOC at Ashland Pier in Ashland, Wisconsin. A 1984 U. S. Fish and Wildlife Study found mercury, selenium, PCBs, DDE, and dieldrin in tern eggs (MPCA and WDNR 1992 pps.. IV-27 to IV-28). A 1986 study (Niemi et al.) of organochlorine residues in Ring-billed Gulls, Herring Gulls, and Common Terns found higher residues in pre- and post-fledge terns than in gulls (MPCA and WDNR 1992 pps.. IV-27 to IV-28.)

A Minnesota Pollution Control Agency study (Ensor et al. 1993) which placed wing-clipped mallard ducks at several Minnesota locations found higher levels of PCB's in tissue samples in St. Louis River estuary ducks than in other parts of the state.

Goal: Water birds should be free of chemical contaminants of human origin that inhibit survival and reproduction.

Recommended Actions:

1) The Wisconsin DNR's Great Lakes Wildlife Toxicologist should consolidate and assess current data available from birds affected by toxic contaminants in the western Lake Superior area. Data currently available from Minnesota DNR, Minnesota Pollution Control Agency (PCA), U.S. Fish & Wildlife Service, and other sources should be sent to the Great Lakes Wildlife Toxicologist.

2) The Wisconsin DNR, in cooperation with the appropriate Minnesota and federal agencies, should evaluate the potential for resampling gull and tern contaminant levels using the methodology of Niemi et al. (1986) to compare current and historical contaminant levels.

3) The Wisconsin DNR, in cooperation with the appropriate Minnesota and federal agencies, and based on the results of the recommended actions above, should develop and implement a monitoring program for periodic resampling and assessment of bird contaminant levels. The position paper concerning wildlife, prepared by the Habitat and Biota Technical Advisory Committee of the Stage I RAP process suggested that "analyses of eggs and chicks of one species over time can provide information concerning local uptake rates of contaminants by resident and migratory species whose eggs hatch in this AOC. These can be compared with uptake rates in other areas. The

Toxics Technical Advisory Committee of the Stage I RAP recommended that congener-specific analyses of some carefully chosen samples of birds and eggs from this AOC be performed for polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs), and polychlorinated dibenzo-p-dioxins (PCDDs), including 2,3,7,8-TCDD."

4) The Wisconsin DNR, in cooperation with the appropriate Minnesota and federal agencies, should evaluate the potential to initiate a monitoring program to assess uptake of chemical contaminants by birds. Investigations using Tree Swallows to identify hot spots for the uptake of toxics have been successful at other AOCs and could be initiated in the St. Louis River estuary. The position paper concerning wildlife, prepared by the Habitat and Biota Technical Advisory Committee of the Stage I RAP process said "Information concerning dose-response relationships has been developed for several species in the Great Lakes Basin. Although other data might be suggestive, dose response relationships might provide useful information concerning cause-effect relationships." Dose-response relationships should be investigated for species in the St. Louis River AOC.

Reason for the Choice of this Recommended Action: Several research projects, both in the AOC and in other Great Lakes areas have generated a substantial amount of toxicological data for birds. Assessment of this combined data and gathering appropriate new data from the AOC is needed. Techniques such as using Tree Swallows to identify toxic hot spots have been shown to be successful in other Great Lakes AOCs. These successful techniques should be applied in the St. Louis River estuary. Monitoring changes in bird contaminant levels by comparing new data with baseline information gathered in the AOC may be feasible. The feasibility of gathering new information that is comparable to historical data should be investigated where such historical data exist. These comparisons are likely to indicate important trends in uptake of contaminants by birds and other animals. Wisconsin DNR, through its Great Lakes Wildlife Toxicologist position, is the most appropriate agency to coordinate the consolidation and assessment of toxicology data that is currently scattered throughout many agencies and bureaus.

Timeframe: The consolidation and assessment of toxicological data could begin immediately. The Wisconsin DNR Great Lakes Wildlife Toxicologist could begin consolidating data by contacting the appropriate state/federal agencies and requesting published papers and unpublished reports or data. Proposals for research and bio-monitoring of contaminant uptake could be developed when the data consolidation has begun. Proposals should be submitted to the appropriate funding agencies. Proposals should be submitted to the Great Lakes Program Office of the U.S. EPA for funding in Fiscal Year 1995.

Implementors: Wisconsin DNR, Minnesota PCA, Minnesota DNR, U.S. Fish and Wildlife Service, U. S. EPA.

Funding Sources: Wisconsin DNR should allocate a portion of the Great Lakes Wildlife Toxicologist's time to research and assessment of bird contaminant data that applies to the western Lake Superior area. The U.S. EPA's Great Lakes National Program Office (GLNPO)-should provide funding in support of additional research on contaminant levels in birds. The GLNPO Contaminated Sediments program should provide funding to support monitoring of contaminant levels in gulls and terns, and using biological criteria to identify toxic hot spots.

References:

Ensor, K. L., W. C. Pitt, and D. D. Helwig. 1993. Contaminants in Minnesota Wildlife. Minnesota Pollution Control Agency, St. Paul, MN.

MPCA and WDNR. 1992. The St. Louis River System Remedial Action Plan, Stage One. Minnesota Pollution Control Agency, St. Paul, MN and Wisconsin Department of Natural Resources, Madison, WI.

Niemi, G. J., T. E. Davis, G. D. Vieth, and B. Vieux. 1986. Organochlorine chemical residues in Herring Gulls, Ring-billed Gulls, and Common Terns of Western Lake Superior. Archives of Environmental Contamination and Toxicology 15:313-320.

Stage II RAP Recommendation
[27 - RAPTORS]

Written by Collins (MDNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Approved (with revisions) by Citizens Advisory Committee 7/26/94

Potential Impaired Use: Bird or Animal Deformities or Reproductive Problems

Recommendation: *The Wisconsin and Minnesota Departments of Natural Resources (DNRs) should coordinate monitoring efforts and consolidate data to evaluate the factors that potentially limit the population growth of Bald Eagles and other raptors in and near the St. Louis River System Area of Concern.*

Problem: The viability of raptor populations, especially Bald Eagles, in and near the St. Louis River are at risk due to chemical contaminants of human origin that inhibit reproduction and survival.

The International Joint Commission has identified the Bald Eagle as a potential integrator and indicator of the environmental health of the Lake Superior ecosystem. Because Bald Eagles are at the top of the food chain, they may display the effects of environmental stressors before other species, lower on the food chain, show impacts. Data gathered from monitoring the health of Bald Eagle populations may indicate possible trends in the health of raptors or other wildlife species.

Bald Eagles nesting in the St. Louis River System Area of Concern (AOC) and at other Lake Superior locations are exposed to prey contaminated with persistent, bioaccumulative toxic chemicals. Recent blood plasma data showed PCB and DDE concentrations in nestling Bald Eagles in and near the St. Louis River AOC that are higher than those found for inland nestlings. Bald Eagles nesting near the shore of Lake Superior in Wisconsin have lower reproductive success and higher contaminant concentrations in blood plasma compared to Wisconsin's inland nesting Bald Eagles. Reproductive output (number of young produced per nest each year) of pairs nesting in and near the AOC is healthy at 1.3 to 2.0, but adult turnover rates (replacement of older individuals in a territory with younger birds) are unknown. Higher than expected turnover rates due to exposure to contaminants have been suggested for Bald Eagles nesting near Lakes Michigan and Huron. Turnover rates have a greater long-term impact on population growth than does nestling survival.

Herring Gulls, eaten as prey, have been suggested as the most important route of contaminant exposure for Bald Eagles at the Apostle Islands National Lakeshore (Kozie 1986.) Prey remains for eagles nesting in and near the AOC will be quantified during the winter of 1993-1994 by the Wisconsin DNR. Monitoring for contaminants and reproductive success is being done on Wisconsin Bald Eagles in the AOC by Dr. Michael Meyer, Bureau of Research, WI DNR.

The upper St. Louis River estuary is an important spring migration corridor for Bald Eagles. Ice out on this section of the river generally occurs before other areas are free from ice. Migrating Bald Eagles often concentrate around areas of open water in the early spring to take advantage of better prey availability. High levels of contaminants in prey items may have a significant impact on individuals already stressed from migration. Little is known about the importance of contaminated prey consumed during migration and over the winter.

Goal: Raptors and their prey should be free of chemical contaminants of human origin that inhibit their reproduction and survival or the reproduction and survival of their predators.

Recommended Actions:

1) Wisconsin DNR should include all Bald Eagles that nest in and near the AOC in ongoing research projects and monitoring of Bald Eagle blood contaminant levels.

2) Wisconsin DNR, in cooperation with appropriate Minnesota and federal agencies, should investigate routes of chemical contaminant uptake in Bald Eagles and their prey in the AOC.

-One route may be from pigeons and other birds that eat grain from rail tracks. They may be picking up PCB's in grain contaminated by the diesel engines. Raptors in the AOC may be then eating birds with PCB contamination. This should be investigated as part of a potential uptake route.

-Research should also include an assessment of contaminant uptake by adult eagles during migration and on the wintering grounds.

Based on the results of the investigations, Wisconsin DNR and Minnesota Pollution Control Agency (PCA) should assess strategies to minimize eagle exposure to contaminated prey and to reduce contaminant uptake by prey species. State agencies, including Wisconsin DNR, Minnesota DNR, and Minnesota PCA should actively participate in the implementation of the Great Lakes Bald Eagle Biosentinal Protocol upon acceptance by the International Joint Commission. The protocol is currently being developed by Great Lakes resource management agencies.

3) The U.S. EPA, Wisconsin DNR and Minnesota PCA should establish and enforce water quality regulations that eliminate the discharge of persistent, bioaccumulative toxic substances to Lake Superior.

4) The U. S. Fish and Wildlife Service should act as a coordinating body for assessing data concerning contaminant accumulation and raptor die-offs in the St. Louis River AOC.

5) State agencies and Great Lakes area universities should continue or initiate research related to the identification and assessment of potential indicators of ecosystem health.

Timeframe: Research proposals to investigate routes of exposure to contaminants, determine strategies to minimize exposure, or identify indicators of ecosystem health should be developed immediately and submitted to the U. S. EPA, National Science Foundation, or other appropriate funding sources. Other recommended actions are ongoing and expansion of enhancement of efforts could be done immediately.

Implementors: U.S. EPA Great Lakes Program Office, Minnesota PCA, Wisconsin DNR Water Quality Division and Bureau of Research, Minnesota DNR, U.S. Fish and Wildlife Service.

Funding Sources: Research projects should be funded by the U.S. EPA, the U.S. Fish and Wildlife Service, the Great Lakes Protection Fund, the National Science Foundation, the Wisconsin and Minnesota DNRs, and the Minnesota PCA.

Stage II RAP Recommendation
[28 - PIPING PLOVERS]

Written by Collins (MDNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Reviewed by WI DNR (Strand, Plass)

Approved by Citizens Advisory Committee 7/26/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *The Minnesota and Wisconsin Departments of Natural Resources should continue to monitor potential Piping Plover nest sites; no narrowly targeted management activity is recommended at this time.*

Problem: The Piping Plover, a federally endangered species, has not nested in the estuary since 1985 primarily due to loss of suitable breeding habitat.

Human development of historical nesting sites, natural succession of vegetation, rapid increases in competing colonial species (i.e., Ring-billed Gulls), and human disturbance have all contributed to the decline of the Piping Plover population in the St. Louis River Estuary (MPCA and WI DNR 1992., pp. IV-23.)

The Piping Plover Recovery Team, formed in response to Endangered Species Act requirements, has recommended that resources targeted at Piping Plover management be focused on currently occupied nesting sites. Historical use of the AOC was not high (Niemi and Davis 1979). Peak Piping Plover nesting activity was likely ≤ 15 pairs. During the decade of the 1970's, peak nest density in the Area of Concern (AOC) was approximately 5 pairs. Currently, Piping Plovers are infrequently observed during migration, and no attempts at nesting have been recorded since 1985 (Davis 1987). Reintroduction of Piping Plovers in the AOC is not recommended by the Recovery Team (Pfanmuller, pers. comm.)

Goal: To continue existing monitoring efforts.

Recommended Actions:

1) Monitoring of nesting colonial waterbirds in the AOC by the Minnesota and Wisconsin Departments of Natural Resources (DNRs) should continue to include monitoring for Piping Plovers.

2) Habitat management efforts for Common Terns currently provide a limited amount of the larger, more open habitats suitable for Piping Plover nesting. Future management by the Minnesota and Wisconsin DNRs should continue to provide Piping Plover nesting habitat when possible within the guidelines of Common Tern habitat management activities. Active management of substantial areas of potential Piping Plover nesting habitat is not recommended.

3) If Piping Plovers return to the AOC and attempt to nest, management alternatives should be reconsidered by the Piping Plover Recovery Team and the Minnesota and Wisconsin DNRs.

Timeframe: These recommended actions are either ongoing (actions 1 and 2) or should be initiated immediately if Piping Plovers attempt to nest in the St. Louis River estuary (action 3).

Implementors: Wisconsin and Minnesota Departments of Natural Resources, Piping Plover Recovery Team.

Funding Sources: No new funding is needed.

References:

Davis, T. E. 1987. St. Louis River Estuary Colonial Bird Program, 1987. Report to the Minnesota Department of Natural Resources.

MPCA and WI DNR. 1992. The St. Louis River System Remedial Action Plan, Stage One Report. Minnesota Pollution Control Agency and Wisconsin Department of Natural Resources.

Niemi, G.J., and T.E. Davis. 1979. Notes on the nesting ecology of the Piping Plover. Loon 51(Summer):74-79.

Stage II RAP Recommendation
[29 - COMMON TERNS]

Written by Collins (MDNR) and Mooty (MDNR)

Approved by Habitat Preservation, Reclamation & Management Workgroup 12/15/93

Reviewed by MN Power (Kopish, Bohm), Dept. of the Army-Detroit (Monteith), Duluth Port Authority (Skelton), MPCA (Helwig, Schubauer-Berigan, Zdon), USFWS (S. Smith), WI DNR (Strand, Plass)

Approved (with revisions) by Citizens Advisory Committee 7/26/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *The Minnesota and Wisconsin Departments of Natural Resources (DNRs) should continue to provide high quality nesting habitat for Common Terns (Sterna hirundo), and should enhance the quality and quantity of habitat for terns that breed in or migrate through the St. Louis River and Nemadji River watersheds.*

Problem: Numbers of Common Terns nesting in the St. Louis River estuary underwent a dramatic period of decline from 1981 through 1989.

The Common Tern is listed as Endangered in Wisconsin; it is a species of Special Concern in Minnesota. In the period from 1977 to 1981, numbers of adult terns ranged from 348 (in 1980) to 474 (in 1981), with an average of approximately 400. From the high population in 1981, tern numbers plummeted to a low of 136 adults in 1986. During this period of decline, reproductive productivity was very low or zero. Predation from mink, Great Horned Owls, red fox, and skunks was responsible for some nest failure during this time. Human disturbance at nesting areas was a contributing factor to the low reproductive success. Other factors that likely contributed to the decline included commercial and industrial development of nesting sites, decline of habitat quality due to growth of vegetation at nest sites, and toxic contaminants in the terns' food supply (Davis 1983, 1987, Niemi et al. 1986, Penning 1993). For a more complete discussion of the population trends and management of Common Tern habitat in the harbor see the references cited below.

Reproductive success has improved in recent years. In 1993, numbers of adult Common Terns in the estuary had increased to approximately 300, and at least 142 young terns reached the age where they could fly (fledged.) Despite this recent improvement, several pressing problems remain. Reproductive success remains below one fledged young per nest. Loss of high quality habitat that is free from predators, competing species (i.e., Ring-billed Gulls) and human disturbance continues to be important. Current breeding habitat occupied by Common Terns is restricted to one island in the lower estuary. Additional nesting and young rearing sites are required to avoid situations where a single, localized event could destroy all the nests or kill all of the young at once. Additional nesting sites could also reduce the potential impact of problems that could be caused by hot spots of toxic contaminants.

The Minnesota and Wisconsin DNR currently cooperate to manage habitat for Common Terns and other colonial water birds in the St. Louis River estuary. Management techniques used to reduce competition from Ring-billed Gulls, manage vegetation in nesting areas, and control predation are labor intensive and costly.

The need for continued management of habitat for Common Terns is addressed in this recommendation. Another RAP recommendation has addressed issues related to toxic contaminants and water birds.

Goal: Indigenous colonial waterbirds will have abundant, high quality habitat for nesting, feeding and rearing young, and will be free of disturbance caused or elevated by human activity.

Recommended Actions:

1) The Wisconsin and Minnesota DNRs should continue to cooperate to manage habitat for Common Terns in the St. Louis River estuary, with an emphasis on enhancing natural nesting sites.

2) Efforts to reduce competition for nest sites by Ring-billed Gulls should be continued and enhanced. Research on alternative methods and technologies for providing gull-free nesting areas for Common Terns should be encouraged and supported by the states and federal funding agencies.

3) The DNRs and other management agencies in the St. Louis River area should investigate and pursue alternatives to provide 1-3 additional nesting areas for Common Terns. Because the best nesting locations in the estuary have been newly created islands, habitat creation through island building should be investigated. The feasibility of building new islands using clean dredge material should be investigated by the DNRs, the Harbor Technical Advisory Committee of the Metropolitan Interstate Commission, the Seaway Port Authority of Duluth and the U.S. Army Corps of Engineers. High standards for material actually deposited (rather than predicted) should be used to ensure that only clean sediments are used for island creation and habitat enhancement[1]. Because contaminant uptake is a real concern for the Common Tern, an attempt should be made to site any newly created habitat away from 'hot spot' areas.

4) Control of vegetation in Common Tern nesting areas should be continued. Control of vegetation is a constant and intensive management practice. Better, more efficient, and longer-lasting methods to manage vegetation should be investigated by the DNRs in cooperation with regional research institutions. One potentially promising method is hydraulic disposal of uncontaminated dredge material on existing islands.

5) Common Tern nesting on islands in reservoir lakes in the St. Louis River watershed should be encouraged. Current management activity (control of vegetation) by Minnesota Power and Minnesota DNR to provide suitable nesting habitat on reservoir islands should be evaluated and continued if it is determined to provide suitable nesting and young rearing habitat for Common Terns. The feasibility of expanding this management activity to include more islands should be evaluated.

6) Exposure of Common Terns to contaminants via the food chain should be reduced. The U.S. EPA, Minnesota Pollution Control Agency, and the Wisconsin DNR in cooperation with other federal and state agencies, should continue to work toward the elimination of toxic contaminants in the Lake Superior watershed. Efforts to reduce contamination in the aquatic ecosystem will benefit terns and other wildlife.

Timeframe: Many of these recommended actions are ongoing and should continue. Increasing internal support for the enhancement of Common Tern habitat management could be done immediately. Research proposals could be developed immediately to identify better tools to reduce gull competition for nesting sites and to manage vegetation at nesting sites.

Implementors: The Wisconsin and Minnesota Departments of Natural Resources, Metropolitan Interstate Committee, U.S. Army Corps of Engineers, the Seaway Port Authority of Duluth, Minnesota Pollution Control Agency, U.S. EPA, Minnesota Power, and regional research institutions (i.e., University of Minnesota, University of Wisconsin.)

Funding Sources: Enhanced management efforts to control vegetation, predation and competition should be supported by the state DNRs with non-game wildlife funds. Investigating the feasibility of creating and enhancing

[1]Wisconsin experience with beach enhancement using clean dredged materials suggests that material actually deposited may be significantly more contaminated than predicted. Testing of sediment during dredging (rather than testing of sediment in the area to be dredged) may be required to ensure that only clean materials are used.

habitat through the use of uncontaminated dredge material should be funded by the U.S. Army Corps of Engineers, the Seaway Port Authority of Duluth, and the Metropolitan Interstate Commission. Research on better management tools should be supported by the Great Lakes Protection Fund, the U. S. Fish and Wildlife Service, the National Biological Survey, the U.S. EPA, the states, and regional research institutions.

References:

Davis, T. E. 1983. St. Louis River Estuary Colonial Bird Program, 1983. Report to the Minnesota Department of Natural Resources, St. Paul, MN.

Davis, T. E. 1987. St. Louis River Estuary Colonial Bird Program, 1987. Report to the Minnesota Department of Natural Resources, St. Paul, MN.

Niemi, G. J., T. E. Davis, G. D. Vieth, and B. Vieux. 1986. Organochlorine chemical residues in Herring Gulls, Ring-billed Gulls and Common Terns of western Lake Superior. Arch. Environ. Contam. Toxicol. 15:313-320.

Penning, W. L. 1993. The Common Tern (*Sterna hirindo)* in western Lake Superior: History, management, and population modeling. MS Thesis, University of Minnesota.

Stage II RAP Recommendation
[30 - SEPTIC]

Written by Koth (MPCA), Liukkonen (MNBWSR), and Ezell (WLSSD)

Approved by River Stewardship Workgroup 2/1/94

Reviewed by WDNR (Olson), MPCA (Reetz)

Reviewed by IATAC with no changes 6/29/94

Approved by Citizens Advisory Committee with changes 7/26/94

Impaired Use: Beach Closings/Body Contact

Recommendation: *Reduce the amount of inadequately treated wastewater reaching the St. Louis River and other waterbodies through adoption and enforcement of county point-of-sale ordinances for individual on-site wastewater systems.*

Problem: Improperly operating septic systems and leaky holding tanks can cause eutrophication of the St. Louis River through excessive nutrient loading and can pose a potential human health risk from bacterial contamination at swimming beaches and along the shoreline of the St. Louis River and its tributaries.

Many residences along the St. Louis River have on-site septic systems to treat household wastewater. Statewide estimates indicate that approximately 70% of on-site systems are providing inadequate treatment because the system was not built to code or because household water use exceeds construction specifications. In St. Louis County, over 20% of septic systems inspected by mortgage companies, have problems that need to be corrected. (Most of the banks inspect septic systems prior to awarding mortgages. However, the inspections by the banks are often of a cursory nature.) Along the St. Louis River, some households have no septic tank or drain field; wastewater is disposed of through a straight pipe into the river, ditches, or nearby wetlands. As long as there are no backups into the house, most residents do not feel they have a problem.

When properly constructed, used, and maintained, septic systems can provide adequate wastewater treatment. However, when wastewater is not adequately treated, excess nutrients can reach the St. Louis River or tributaries. Increased nutrient loading can lead to algal blooms and excessive macrophyte growth. In addition to nutrients, bacteria, viruses, and parasites may be introduced through inadequate treatment. These pathogens may present threats to human health for individuals coming in contact with the waters of the St. Louis River.

Carlton County has had a shoreland septic system point-of-sale ordinance since 1992. The ordinance requires a septic system inspection prior to transfer of property within 1,000 feet of the original high water mark of a lake and within 300 feet of a stream listed in the ordinance. Septic systems must be evaluated and upgraded if necessary before a property can be transferred or before a permit or variance can be issued for improvements on, or use of, the property.

The St. Louis County Water Plan (page 15) requires that the existing limited point-of-sale program (bank inspection) for septic systems "be expanded to cover all sales or transfers of title of property by conveyance or contract for deed, including any dwelling, or non-licensed commercial property or other property containing on-site sewage disposal." The seller of the property would request that the County inspect the property prior to sale. If a problem is found, a timetable would be worked out to correct deficiencies.

Douglas County has no provision requiring inspection of individual on-site systems prior to property transfers or permit issuance. Due to the clay soils in Douglas County, many of the homeowners utilize holding tanks. There has been some concern that tanks are being drained into the ground to minimize pump-out costs.

Goal: To reduce the input of inadequately treated wastewater from individual on-site systems into the St. Louis River

Recommended Actions:

1) Carlton, St. Louis, and Douglas Counties should adopt a point-of-sale ordinance that requires inspections of individual on-site wastewater systems and upgrading, if necessary, prior to property transfers or permit issuance.

-Carlton County should expand their existing ordinance to include individual on-site systems throughout the county, not just in the shoreland zone.

-St. Louis County should implement the recommendation in the county water plan by adopting a point-of-sale ordinance. The recommendation has not been adopted to date since the Health Department has not found a way to implement this requirement due to the large amount of staff time required to conduct septic system inspections. Carlton County has got around the manpower problem by allowing the homeowner to hire an inspector to conduct the septic inspection. St. Louis County should consider this option so that the point-of-sale recommendation can be implemented. Plus, we recommend that the inspectors are bonded to cover liability cases.

-Douglas County should adopt a point-of-sale ordinance for individual treatment systems. In addition, it is recommended that the county conduct an inventory of holding tanks and their maintenance contract schedules. If a homeowner does not have the holding tank pumped out on a regular basis, the tank is likely draining into the ground. The county should require homeowners with leaking holding tanks to replace or repair the tanks.

2) The Citizens Advisory Committee should send a letter and make a presentation to the Douglas, Carlton, and St. Louis County Boards encouraging them to enact/enforce an ordinance requiring upgrades, if necessary, of on-site systems before building permits are issued or before property transactions occur. Carlton County's ordinance (Ordinance #19, Section 6.3) could be expanded and used as a model for Douglas and St. Louis Counties.

Timeframe: Review of existing ordinances in the counties and development of practical point-of-sale ordinances that could be adopted and implemented locally could be done by 1995.

Implementors: St. Louis County Environmental Services, Douglas County Zoning Office and Health Department, Carlton County Zoning Office, St. Louis River RAP Citizens Advisory Committee

Funding: Development and adoption of point-of-sale ordinances will not require additional funds. However, repair or replacement of septic systems in response to the new ordinances will require funds. Following is a list of potential funding sources:

Douglas County has money available through the Rural Housing Fund for well and septic replacement. Funds are awarded based on income. State funds for septic replacement are not available in Douglas County since the county chose not to participate in the state program.

Residents of the City of Duluth can apply for grants and loans for housing rehabilitation through the Duluth Housing and Redevelopment Authority. These funds can be used for septic repair and replacement. The loans and grants are based on income level.

Stage II RAP Recommendation
[31 - SILVICULTURAL BMPs]

Written by Plass (WDNR)

Approved by Pollution Prevention/Control Workgroup 12/21/93

Reviewed by Douglas County Zoning (Olson), St. Louis Co. Health Dept. (Johnson), Douglas Co. Forestry (Epperly), MDNR (Phillips), St. Louis Co. Land Dept. (Heikel), St. Louis River Board (Bartikowski), MPCA (W. Anderson), WDNR (Holaday)

Reviewed by IATAC with no recommended changes 6/2/94

Reviewed by Citizens Advisory Committee which requests that the recommendation be revised to include forestry BMP requirements from the St. Louis River Management Plan. 7/26/94

Approved by the Citizens Advisory Committee 9/27/94

Impaired Use: Excessive Loading - Loadings of Nutrients and Sediment.

Recommendation: *State and county land-management agencies and the state extension services should promote the use of silvicultural best management practices (BMPs) and audit BMP compliance in order to reduce non-point source nutrient and sediment loading to the St. Louis River, harbor, and ultimately Lake Superior.*

Problem: Silvicultural practices can cause erosion and sedimentation, thus contributing to high nutrient and sediment loading to the St. Louis River.

State forestry BMPs have been produced in response to federal legislation. Water quality concerns related to forestry were first addressed in the 1972 Federal Water Pollution Control Act. Later, the 1977 Clean Water Act required states to develop plans and procedures to control "silviculturally related nonpoint sources of pollution...to the extent feasible." Subsequently, the 1987 Clean Water Act required each state to develop and implement a program to reduce nonpoint source pollution to the "maximum extent practicable."

Some such practices are described in currently available publications such as the following:

> "Water Quality in Forest Management: Best Management Practices in Minnesota", Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Natural Resources (MDNR, 1990).
>
> "Managing Your Shoreland Wood Lot" (#10 in the series "Protecting Minnesota Waters"), Minnesota Extension Service, Duluth (1993).
>
> "Forest Practice Guides for Wisconsin", Wisconsin Paper Council and Wisconsin Department of Natural Resources (WDNR, 1990).

In addition, new forestry BMPs and BMP publications are now being developed by both states, and will be released in 1994. These are:

Water Quality and Forest Management; Best Management Practices in Minnesota, 2nd Edition (in prep., MPCA and MDNR).

Wisconsin's Forestry Best Management Practices for Water Quality (in prep., WDNR). Both technical and popular versions will be published.

Goal: To reduce nutrient and sediment loading to the St. Louis River by improving forestry and logging practices. (See related recommendations concerning erosion from construction sites, road work, livestock management and general farming activities).

Recommended Actions:

1) Silvicultural BMPs should be used in any silvicultural activities occurring within the St. Louis and Nemadji River watersheds. However, in designated zones along the St. Louis, Cloquet, and Whiteface Rivers defined in the St. Louis River Management Plan, water quality BMPs are mandatory and forest management practices are required that are stricter than state BMPs.

-The Nemadji River Basin Project will recommend remedial actions and silvicultural BMPs to restore beneficial uses to the Nemadji River system which is characterized by highly erodible, red clay soils.

-The St. Louis River Management Plan designates use zones (Primitive, Remote, Rural/agriculture, Recreational, and Urban) and tiers of forest management along the St. Louis, Cloquet, and Whiteface Rivers. Tier One extends from the top of the river bank inland: 200' (Primitive & Remote designation), 100' (Rural & Recreational designation), and 75' (Urban designation). Tier Two extends from the following distances from the river bank: 200 -2640'(Primitive and Remote designation), 100 - 1320' (Rural and Recreational designation), and 75 - 300' (Urban designation).

Tier One is a no-cut, minimal impact zone. All forestry management projects in Tier One require a Forestry Management Plan which must be approved by the Forest Plan Review Committee. Tier Two is designated as a commodity production zone. All vegetation removal for commodity production must be done according to a Forest Management Plan prepared by a professional forester. (See pages 44 - 49 in the St. Louis River Management Plan for more information.)

2) Educational efforts that encourage the use of silvicultural BMPs should be continued and future educational programs should highlight the new BMPs as they are developed.

-The DNRs, SWCDs, educators, forest industries, and workshop organizers should continue to teach loggers about silvicultural BMPs and urge loggers to use them. Several programs of this type have been offered, including the following:

- Minnesota's county-based Private Woodlands Committees, made of up of the Soil Conservation Service (SCS), SWCDs, MDNR and citizens, organized day-long loggers' workshops (ca. 1990) that promoted the use of logging BMPs and the development of cutting plans.

- The Minnesota Extension Service offers workshops for loggers. Topics include BMPs, erosion control, and water quality protection. Minnesota has a list of loggers who have been trained in the use of BMPs.

- Wisconsin has offered training on the best methods of building logging roads. Programs offered by the Northwest Regional Planning Commission, WDNR, and other cooperators have been held in conjunction with an annual loggers' conference and in the field. The audience has included loggers, DNR foresters, and non-state agency foresters (i.e., consultants, industrial foresters, and county foresters).

-The new state BMPs are due from both states in 1994 and the red clay soil BMPs are due from the Nemadji River Basin Project by 1995. BMPs in the two states should be compatible because a MDNR forester is working with the WDNR to help develop Wisconsin's new silvicultural BMPs.

3) The Wisconsin and Minnesota DNRs should continue and expand efforts to audit BMP compliance.

-Both states have chosen to make the use of silvicultural BMPs voluntary. Compliance success will be evaluated by interdisciplinary audit teams. Minnesota has three years worth of data, covering the potential use of 96 BMPs on 261 sites; a report summarizing the results will be published in January 1994. Compliance was about 88% on professional lands (owned by the Forest Service, state, county, private and industry) and 71-75% on nonindustrial private forest lands and Native American lands (Mike Phillips, MDNR, pers. comm.). The results of the audits will be used to target cost-share programs and educational and technical assistance. Wisconsin will similarly conduct an audit to evaluate compliance with its new BMPs.

-After the new BMPs have been in effect for several years, the state DNRs should begin a more intensive audit of silvicultural practices in the watershed (including the Nemadji River basin) to assess compliance. These audits should be done on a regular or continuing basis, and the results should be shared with land owners, educators and county officials. If the audits reveal lagging compliance, educational efforts should be increased. If subsequent audits reveal unacceptable compliance, county governments should consider enacting ordinances that require the use of silvicultural BMPs in the AOC.

-After completion of the intensive watershed audit proposed above, BMP compliance rates in the two states should be compared. If Minnesota has better compliance, the WDNR should consider using Minnesota's approach, which uses storm water permits as leverage. Minnesota requires loggers to have a MPCA general storm water permit, but waives the requirement for loggers who use silvicultural BMPs. This saves the logger an $85 application fee, $270 annual fee and substantial planning and record keeping and gives them an incentive to use BMPs.

Timeframe: New BMPs will be out in 1994 and 1995, as described above. More intensive audits should be conducted after several years of education about the new BMPs.

Implementors: Implementors in both states include the SCS, U.S. Forest Service, the state DNRs, and state extension services. It includes the SWCDs in Minnesota, and county foresters in Wisconsin. Many groups are interested in forestry practices, so there are numerous cooperators. In Minnesota, these include the Private Woodlands Committees. In Wisconsin, they include the Northwest Regional Planning Commission, Forest Products Council, the Paper Council, the Governor's Council on Forest Products, the PRI-RU-TA and Lumberjack Rural Conservation and Development Groups, and the Timber Producers' Association.

Funding: External funding may not be needed. The development of additional silvicultural BMPs is underway in both states, and as part of the Nemadji River Basin Project, which is funded by the Soil Conservation Service. Educational efforts are on-going. Cost-share funds for technical management assistance on nonindustrial private forest lands are available under the Forest Stewardship Incentive Program in each state. While there is definitely a labor cost in auditing BMP compliance, the DNRs are involved in this activity anyway, and they might be persuaded to focus more intensively on the AOC without additional funding.

Stage II RAP Recommendation
[32 - BALLAST WATER]

Written by Busiahn (U.S. FWS) and Collins (MN DNR)

Approved by Habitat Preservation, Reclamation and Management Work Group 2/28/94

Reviewed by MN DNR (Rendall), WI DNR (Pratt, Schram, Plass)

Approved (with revisions) by Citizens Advisory Committee 9/27/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Research to assess potential technologies for preventing introduction and spread of undesirable exotic species in the Lake Superior watershed via ballast water should be accelerated. Results of this research should be used to establish regulations for ballast water management.*

Problem: Many undesirable exotic species (e.g., ruffe, zebra mussel, spiny water flea) have recently been introduced to the Duluth-Superior harbor via the discharge of ballast water.

These include repeated introductions of species from the lower Great Lakes, and recent introductions of Eurasian species. Lacking natural predators, newly introduced, nonindigenous species can occasionally quickly adapt and thrive in the new environment. This rapid population growth can be detrimental to indigenous species and the ecosystem as a whole.

Duluth-Superior is primarily a loading port, so many ships enter the port in ballast (i.e., they contain no cargo; instead they carry water pumped from another body of water into their large ballast tanks to provide weight and stability). These ships then discharge this water into Lake Superior or the Duluth-Superior Harbor so that they can take on cargo. If the ballast water discharged is from the open ocean, it likely contains relatively few organisms, few or none of which can survive in a freshwater environment. If the ballast water discharged is from foreign freshwater or nearshore ports, however, it may contain many organisms that can survive in the Lake Superior watershed. Lake vessels that load bulk cargo in Duluth-Superior discharge large quantities of ballast water from the lower Great Lakes to the waters of the St. Louis River system.

The U. S. Coast Guard has issued regulations to require ballast water management practices for each vessel entering the Great Lakes after operating on waters beyond the Exclusive Economic Zone (200 miles from the United States - Canada coast.) These management practices are designed to help prevent additional introduction of nonindigenous aquatic nuisance species in the ballast water of vessels entering the Great Lakes. The regulations require that mariners carry out ballast water exchanges such that at the conclusion of exchanges, tanks from which ballast water will be discharged into the Great Lakes contain water with a minimum salinity level of 30 parts per thousand. Retention of ballast water for the duration of the voyage within the Great Lakes is an alternative method of ballast water management under extraordinary circumstances (Federal Register / Vol. 58, No. 66 / Thursday, April 8, 1993/ Rules and Regulations.)

The Great Lakes Maritime Industry has instituted a voluntary ballast water management plan to control the spread of the ruffe. This plan restricts discharges of ballast water taken from ports in western Lake Superior. Operators of vessels pumping ballast water onboard in the Port of Duluth-Superior, with ballast line intakes equipped with screens fitted with holes larger than 1/2" in diameter are required to exchange ballast water in Lake Superior west of a line from Ontanagon, MI to Grand Portage, MN. Ballast water must not be pumped out within five miles of the South Shore of Lake Superior or in waters less than 120' deep. Vessels with intake lines equipped with screens fitted with holes 1/2" in diameter or less are to follow these requirements from May 15 to September 15.

Goal: To eliminate the introduction and spread of undesirable exotic species of plants and animals in the St. Louis River and, ultimately, in the Lake Superior watershed via ballast water by inducing total mortality of organisms entrained in ballast water.

Recommended Actions:

1) The Great Lakes Maritime industry (including, but not limited to, Lake Carrier's Association, Canadian Shipowners Association, Seaway Port Authority of Duluth), Great Lakes Sea Grant programs, U.S. Fish and Wildlife Service, Canadian and U. S. Coast Guards, and the federal Aquatic Nuisance Species Task Force should investigate technologies that show potential to induce total mortality of organisms entrained in ballast water. Promising new technologies should be developed and tested.

2) The Bill H.R. 3360 (Ballast Water Management Act) calls for demonstrating ballast water management technologies and practices that prevent aquatic nonindigenous species from being introduced and spread in the United States waters. This bill should be passed and funds should be appropriated to ensure the rapid implementation of the recommendations of the National Ballast Water Management Demonstration Program called for in H.R. 3360.

3) Regulations requiring "Best Available Technology" to prevent the introduction and spread of aquatic nuisance species should be authorized by Congress, then written and enforced by the U. S. Coast Guard. Technologies and practices evaluated through the National Ballast Water Management Demonstration Program or developed independently to prevent the introduction or spread of aquatic nuisance species should be implemented and continuously reassessed.

Reason for Selecting These Recommended Actions: Recent, interdisciplinary discussions have identified several technological options that have potential to achieve total mortality of organisms in ballast water tanks or of organisms that are being drawn into the tanks. For example, an electrical grid could be placed over the ballast intake screen to electrocute all organisms that pass through the grid. Other potential methods for inducing complete mortality include physical pulverization or treatment of ballast water in tanks with other chemical or physical toxicants such as heat or biocides. While many potential technologies are being discussed, none are currently available for use. This problem requires an interdisciplinary, industry/government cooperative approach to develop and test the technology.

Other alternatives examined included: a) eliminating the use of ballast water, b) using only ballast water that contains no organisms, c) exchanging ballast water on the high seas or open lake, and d) inducing partial mortality of organisms entrained in ballast water. These alternatives were rejected as currently infeasible because they may be unsafe (alternative a), prohibitively expensive (alternative b), or not wholly effective (alternatives c and d). Alternative b for example would require massive investment in shore-side tanks, pipes, pumps, etc., along with changes in the ships' ballast handling procedures. Sources of ballast such as city water or treated sewage would have to be provided at every dock at every port on the Great Lakes.

Time Frame: Research related to potential technologies for killing organisms in ballast water should be started immediately. Ballast water management practices are ongoing and should continue to be improved and strengthened as new information becomes available. Promising techniques for inducing mortality of entrained organisms should be thoroughly tested as soon as they are developed.

Implementors: Marine Board of the National Research Council, National Oceanographic and Atmospheric Administration, U.S. Coast Guard, Canadian Coast Guard, Great Lakes Sea Grant programs, U.S. Fish and Wildlife Service, the maritime industry, Aquatic Nuisance Species Task Force (established when congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 as part of Public Law 101-646), public and private research institutions.

Funding Sources: Congressional appropriation of funds to assess potential technologies to prevent the introduction and spread of aquatic nuisance species and to establish demonstration projects would be possible through the Ballast Water Management Act. The Great Lakes Protection Fund should solicit proposals to investigate technologies for

improving ballast water management practices. The Great Lakes maritime industry should cooperate to help fund, plan and apply research, encourage Congress to fund research, and request research assistance to improve ballast water management practices.

Stage II RAP Recommendation
[33 - EXOTICS TRANSPORT]

Written by Collins (MN DNR)

Approved by Habitat Preservation, Reclamation and Management Work Group 2/28/94

Reviewed by MN DNR (Rendall), WI DNR (Pratt, Schram, Plass)

Approved (with revisions) by Citizens Advisory Committee 9/27/94

Impaired Use: Degraded Fish and Wildlife Populations
Loss of Fish and Wildlife Habitat

Recommendation: *Efforts to educate users of the St. Louis River System about the importance of preventing the spread of ecologically harmful exotic species should be enhanced and coordinated between the states of Minnesota and Wisconsin. Additional regulatory measures to restrict the transport of these species into uninfested areas should be evaluated and enacted if feasible.*

Problem: Exotic species in the St. Louis River could be transported to other areas that presently do not have these exotics.

The St. Louis River System is inhabited by ecologically harmful exotic species including purple loosestrife, white perch, ruffe, rusty crayfish, zebra mussel, mute swan, spiny water flea, sea lamprey. Because the Duluth-Superior harbor is the site of an economically important, international shipping industry, unintentional introductions of additional aquatic nuisance species are likely to occur.

Minnesota has statutes and rules intended to prevent the establishment and spread of undesirable exotic aquatic plant and animal species.

a) It is a misdemeanor in Minnesota to transport Eurasian watermilfoil, zebra mussels, and other designated undesirable exotic species on a public road or to launch a boat with them attached.

b) Conservation Officers, and other trained peace officers, also have the option of issuing civil penalties from $50 to $1000 for transporting or launching boats with exotic species like zebra mussels or ruffe.

c) Broader permanent rules and statutes are being proposed by MN DNR that addresses the transfer of commercial and sport fish nets and all aquatic plants on public roads. Permanent rules will also address water appropriation from infested waters.

d) A surcharge is placed on each watercraft license in Minnesota for control, public awareness, law enforcement, monitoring, and research of nuisance aquatic species.

Goal: Ecologically harmful exotic species already established in the St. Louis River System will not be transported to other, uninfested areas.

Recommended Actions:

1) The Wisconsin Legislature should enact regulations prohibiting the transportation, possession, sale, or release of ecologically harmful exotic species.

2) The Departments of Natural Resources (DNRs) in Minnesota and Wisconsin should coordinate activities to accomplish the following tasks:

- Implement appropriate parts of the Information and Education plan developed by The Great Lakes Panel on Aquatic Nuisance Species to help prevent the spread of exotic species. This plan includes actions such as posting billboards on key travel routes to and from the St. Louis River estuary.

- Distribute information about ecologically harmful exotic species to permit holders for water appropriations from the St. Louis River estuary. Information should enable permit holders to identify species they are likely to encounter and to comply with appropriate regulations.

- Restrict the number of permits granted for appropriation of water from the St. Louis River estuary for purposes that hold the potential for facilitating the spread of aquatic nuisance species from the estuary to uninfested areas.

- Distribute information about ecologically harmful exotic species when fishing licenses and watercraft licenses are purchased. A Field Guide to Aquatic Exotic Plants and Animals could be distributed at point-of-sale for these licenses, or could be available in association with fishing and boating regulation booklets.

- Assess the effectiveness and adequacy of signage at boat launches and water access points. Signs developed by Minnesota DNR, Wisconsin DNR, and the Great Lakes Panel on Aquatic Nuisance Species for informing access site users about exotic species they may encounter should be used to provide full and effective coverage of the water access points in the St. Louis River estuary area.

3) Boat launch monitoring programs aimed at informing recreational users of public waters about exotic species should be intensified in the St. Louis River estuary area. Volunteer efforts have been most effective when targeted at educating boaters arriving at a lake as opposed to monitoring boats leaving a water body. Education and monitoring efforts should be enhanced by coordination and cooperation with local interest groups, including but not limited to, sporting groups, lake associations, marina owners and operators, River Quest, and River Watch. The feasibility of a high-profile public education event at all boat launches and water access points on the St. Louis River estuary should be evaluated by the Departments of Natural Resources and the interest groups as a complement to water craft inspection and monitoring activities.

4) The feasibility of new regulations prohibiting the transportation of ecologically harmful exotic species between harbors on Lake Superior in livewells or other visible portions of recreational vessels should be investigated by the Departments of Natural Resources. Transportation (intentional and unintentional) of exotic species via recreational water travel should be prohibited. Voluntary guidelines for boaters to follow, such as exchanging livewell water or emptying bilge water in certain areas should be emphasized in the meanwhile. The effectiveness of voluntary procedures and rates of compliance should be assessed.

5) Transporting undesirable exotic species between Great Lakes ports should be prevented by using the best available technology to eliminate the introduction and spread of aquatic species through commercial ballast water. The Ballast Water Management Act (H.R. 3360) should be passed and funds appropriated to demonstrate technologies and processes that will prevent nonindigenous species from being introduced into uninfested waters of the Great Lakes.

Reasons for Selecting these Recommended Actions:

Ecologically harmful exotic species are now present in the St. Louis River estuary. Control measures to completely eradicate these species are not feasible with current technology. Recommended actions for preventing the spread of these species via commercial ship traffic have been made in 32 - Ballast Water. This recommendation addresses other commercial and recreational vectors for the spread of exotic species from the Area of Concern to uninfested areas. Because potential routes of transport are many and varied, a coordinated approach of education and regulation is likely to be the most effective means of slowing the spread of these exotic species.

Coordination of efforts between the states of Minnesota and Wisconsin is essential for successful control of exotic species. Jurisdictional boundaries have no ecological reality to the spread of plants and wildlife. Similarly, many recreational users of the St. Louis River estuary frequently cross state lines when boating or fishing.

Educational efforts targeted at commercial and recreational users of public waters are likely to have the greatest impact for the smallest investment. Currently available information such as A Field Guide to Aquatic Exotic Plants and Animals, and water access signs would be easy to use and readily available.

Enhanced regulations (e.g., prohibiting Lake Superior inter-harbor transportation, prohibition of transportation in Wisconsin) are needed to close regulatory gaps.

Time Frame: Materials needed to begin the public awareness components of these recommended actions are currently available. They could be distributed immediately with other informational materials to purchasers of watercraft and fishing licenses. Assessment of the adequacy of signage in the St. Louis River area could be done immediately. Planning for an educational/media event to raise awareness of exotic species could begin immediately. Priority should be placed on selection of a very high use period such as Memorial Day weekend for the event. Assessment of the feasibility of enacting or enhancing regulations at the state level could begin immediately within the respective DNRs.

Implementors: Great Lakes Panel on Aquatic Nuisance Species, Minnesota DNR, State of Minnesota, Wisconsin DNR, State of Wisconsin.

Funding Sources: Educational efforts, law enforcement, and monitoring for aquatic nuisance species are funded in Minnesota by a surcharge placed on watercraft licenses. A similar surcharge should be placed on watercraft licenses in Wisconsin for the same purpose.

Stage II RAP Recommendation
[34 - PURPLE LOOSESTRIFE]

Written by Zakis (BIA) and Collins (MN DNR)

Approved by Habitat Preservation, Reclamation and Management Workgroup 4/19/94

Reviewed by MN DOT (Holm), MN DNR (Skinner, Rendall), GLIFWC (Vermillion), MN DOA (Dale), WI DNR (Strand, Plass, Koshere)

Approved (with revisions) by Citizens Advisory Committee 9/27/94

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Populations of purple loosestrife in the St. Louis River Area of Concern should be reduced primarily by using biological control organisms currently approved for use by the U.S. Department of Agriculture.*

Problem: Purple loosestrife, an exotic plant from Europe, has infested the estuary and has the potential to degrade native plant and animal populations and communities.

Purple loosestrife was accidentally and/or purposefully introduced in North America from Europe in the early 1800's. The port of entry appears to have been in New England. There may have been several introductions because all three of the European genotypes (short, medium and long-style flower) are present in North America. The plant has no wildlife or forage value and its high density reduces the habitat value to waterfowl in areas it has invaded. Thick stands of loosestrife may reduce fish and other wildlife species access to potential spawning or reproductive habitats. The plant also occupies space that would otherwise be occupied by plants native to the estuary.

The plant seems to do best in moist soils that are slightly acidic or neutral. However, it will also grow on wet organic substrate, along edges of ditches and even in upland areas that periodically are inundated by water. The plant is highly adaptive, and will increase the root to stem ratio if nutrient (particularly nitrogen and phosphorus) deficiency occurs. If the site where the plant grows is flooded, it will modify its stem structure in response.

Purple loosestrife is one of the earliest plants to start growing in the spring. Under normal conditions it is capable of growing over a centimeter in a 24 hour period. This phenomenal growth is the single most important factor by which this plant can escape being shaded. If the plant receives less than 50% of the available sunlight it loses its vigor. Further reduction in the amount of direct sunlight the plant receives may kill it.

Purple loosestrife begins to flower in late June and continues until early September. The bisexual flowers are cross-pollinated by insects but self-pollination is possible. A mature plant may produce over two million seeds during a growing season. Seed longevity is not known but appears to be fairly long. Over 80% of the seed germinated after three years (Skinner and Hollenhorts, 1989).

The light seeds can be transported long distances by water currents, in ship ballast waters, and in the mud on the feet of water birds, other animals, and by various commercial, personal and recreational vehicles.

The control measures used in the past have had limited success. Use of broad spectrum herbicides has resulted in local control or eradication of plants. However, the broad spectrum herbicides such as Rodeo (Glyphosate) also affect non-target native species of plants if applied in a broadcast application. Selective herbicides such as 2,4-D and Garlon 3A are dicot specific. 2, 4-D is inconsistent in killing purple loosestrife, and is seldom used in Minnesota. Garlon 3A has been effective in controlling some populations of purple loosestrife in Minnesota. It is not yet labeled for aquatic use, but Minnesota Department of Natural Resources (DNR) receives an exemption from the Environmental Protection Agency to use it for the control of purple loosestrife in MN. Garlon 3A is the most

effective herbicide currently used for loosestrife control by the State of Minnesota. Spot application of Rodeo is the method recommended to the public for purple loosestrife control.

Manual removal of purple loosestrife plants has been attempted in several places. It is a labor intensive and costly means of control. The success rate appears to be rather low after a seed bank has become established. Pulling up the plants results in disturbed substrate in which seeds readily germinate to produce new plants. Cutting or breaking of plant stems does not have a significant impact on the plant's vigor because purple loosestrife responds by developing root buds or new stem growth at the site of the break.

Several states have passed laws that make it illegal to possess or grow purple loosestrife. These laws will help reduce the seed source to some extent if a significant effort is made to educate the public and if this effort is followed-up by strict law enforcement. This public awareness effort started several years ago and it continues. However, the difficulty of controlling the plant makes enforcement actions problematic.

The U. S. Fish and Wildlife Service's New York Cooperative Fish and Wildlife Research Unit at Cornell University in cooperation with European scientists identified several species of insects that are potential biological control agents for purple loosestrife. From these insects three species of beetles were selected for further evaluation and eventual clearance for importation into the United States. The three species are *Hylobius transversovittatus*, a root-mining weevil, and *Galerucella pusilla* and *G. calmariensis*, beetles that feed on the foliage of the plants. The *Galerucella* spp. larvae feed on buds and foliage.

Experimental releases in selected sites across the United States were made in the late summer of 1992. In all cases the insects were able to survive the winter in good condition. However, flooding in Minnesota did cause some problems.

This method of control appears to be the most effective and environmentally the safest. Extensive precautions have been taken to avoid negative affects on native plants or communities. This method is also one of the least costly.

Goal: To eliminate or reduce to ecological insignificance the populations of the invasive, exotic plant purple loosestrife (*Lythrum salicaria, L. virgatum* and combinations) in a way that does not endanger desired ecosystem functioning in the St. Louis River estuary.

Recommended Actions:

1) The U. S. Department of Agriculture (USDA) has approved three insect species as biological control agents for purple loosestrife. The insects have been thoroughly screened to ensure host specificity and the case for using them is compelling (see Malecki et al., 1993). While there are risks involved with biological control programs using non-native species, the USDA screening process has an impressive record of reducing such risks. Biocontrol insects have been approved for use in Wisconsin and Minnesota. Minnesota is increasing the number of release sites for these organisms. The St. Louis River estuary is recommended as a high priority site for release of approved biological control organisms. The Minnesota and Wisconsin DNRs should initiate a release and monitoring program as soon as possible.

2) It is illegal to sell any species of *Lythrum* in Minnesota and Wisconsin. Agricultural inspectors have visited nurseries and horticultural outlets for education and inspections. However, unconfirmed reports of *Lythrum* spp. being sold recently are troubling. If someone (including mail order outlets) is selling purple loosestrife, that information should be reported to the county agricultural inspector or state staff for follow up inspection and enforcement. Minnesota and Wisconsin DNRs and Departments of Agriculture should distribute information to horticultural outlets aimed at the retailer as well as the consumers of horticultural products about purple loosestrife. The feasibility of additional visits to horticultural product outlets should be assessed by the Departments of Agriculture. The information piece "Purple Loosestrife Alert" which provides information about identification, potential impacts and control methods should be made available to gardeners wherever live plant materials are sold. If loosestrife is still being sold, the feasibility of enforcement actions under noxious weed programs should be assessed.

3) The Departments of Natural Resources in Wisconsin and Minnesota, in cooperation with the Great Lakes Indian Fish and Wildlife Commission, should use the best available technology (BAT) for spot control and removal of small, pioneer populations of purple loosestrife in the St. Louis River estuary. Currently, the BAT appears to be applications of the herbicides Garlon 3A (by the state) or Rodeo (by the public) on small populations before they get fully established.

4) The Departments of Transportation in Minnesota and Wisconsin should use the best available technology to identify, control and remove small populations of purple loosestrife from road margins in the area of concern. The departments should also develop procedures to reduce the survival of populations of purple loosestrife at roadside sites disturbed by maintenance and construction activities.

5) Interstate transport of purple loosestrife through mail order nurseries and seed catalogs should be investigated. The U.S. Fish and Wildlife Service, with participation by Wisconsin and Minnesota state agencies, should determine the feasibility of pursuing federal legislation to ensure that interstate transport of purple loosestrife is effectively prohibited.

Reasons for the Choice of These Recommended Actions: While purple loosestrife has been declared a noxious weed in Minnesota and Wisconsin, nurseries and garden centers have, until very recently, continued to sell species of loosestrife (*Lythrum* spp.) Additionally, gardeners that have purchased purple loosestrife should be made aware of the problems associated with plants they may still have in their gardens. If nurseries are continuing to sell loosestrife, enforcement action may be required to assure that adequate attention is focused on preventing the spread of the species. If it is encountered in flower gardens, the plants must be destroyed.

Control of small, pioneer populations with the application of herbicide has been successful at sites in the St. Louis River area. Because few currently available control methods have any significant effect on large, well-established populations, activities to prevent the spread of small populations should continue despite the cost and potential negative impacts of herbicide use.

It is unlikely that conventional weed control methods can have a significant impact in reducing purple loosestrife populations without unacceptable economic or environmental costs. Biological control agents have the potential to not only reduce the rate of population increases, but may be able to significantly reduce the extent of existing populations of *Lythrum*. Malecki et al. (1993) predict "a reduction of purple loosestrife abundance to approximately 10% of its current level over 90% of its range" using insects for biological control. An international scientific advisory committee has developed, and is overseeing the selection, screening and introduction of biological control agents for purple loosestrife. They are also developing a research and evaluation program to enhance the control program in the future. The complex wetland communities in the St. Louis River are likely to be a highly suitable site for a successful biological control program.

Time Frame: These recommended actions could be implemented immediately. The Departments of Agriculture could begin to develop a database of nurseries and other horticultural outlets immediately if it is not already available.

Implementors: Minnesota and Wisconsin Departments of Agriculture, Natural Resources, and Transportation, Great Lakes Indian Fish and Wildlife Commission, U. S. Fish and Wildlife Service.

Funding Sources: For a biological control program in the St. Louis River area, the cost involved could be shared by both Minnesota and Wisconsin, since both states would benefit. The cost involved would be obtaining the beetles, release site preparation, and periodic monitoring of the release sites. It is estimated that it would cost less than $5000 to start this biological control program. The cost of follow-up monitoring in subsequent years would depend on the intensity of the monitoring program.

References:

Skinner, L. C., and T. P. Hollenhorst II. 1989. Incidence, spread, and control studies of purple loosestrife (*Lythrum salicaria* L.) in Hennepin parks. Report to the Metropolitan Council, Suburban Hennepin Regional Parks District, Maple Plain, MN. 75p.

Malecki, R. A., B. Blossey, S. D. Hight, D. Schroeder, L. T. Kok, and J. R. Coulson. 1993. Biological Control of Purple Loosestrife. BioScience 43:680-686.

Stage II RAP Recommendation
[35 - GRAIN]

Written by Koth (MPCA) and D. Brooke (LSRI)

Approved by Stewardship Workgroup 10/8/93

Recommendation reviewed by MPCA (Beresford), WDNR (Rosenthall, Ross, Larson, Walz, Redman, Chun)

Steering Committee requests that workgroup talk to grain elevator staff before finalizing recommendations

Recommendation revised after discussions, reviewed by WDNR (Plass) 9/9/94 and rewritten after review

Approved by Stewardship Workgroup 9/21/94

Approved by Citizens Advisory Committee 10/25/94

Impaired Use: Aesthetics

Recommendation: *Determine the extent of remnant grain near the elevators and educate the grain elevator personnel on potential effects to air and water quality.*

Problem: Grain dust on the water and remnant grain in the sediments and along the shoreline due to ship-loading operations is an aesthetic and environmental problem.

As part of the ship loading operations at the grain elevators, grain and grain dust are blowing into the water of the St. Louis and Superior Bays. This has been noted most specifically at the Harvest States Cooperative facility in Superior. During loading operations on windy days, grain has covered the top of the water. Grain has also been found in a layer of decomposing black, anaerobic sediment on the bottom of the bay in the vicinity of elevators (M. Balcer, personal communication). This can affect local air quality (due to dust) and water quality (as the grain decomposes on the bottom of the bay). The remnant grain along the shoreline poses an aesthetic problem. The extent and severity of these effects are unknown.

Goal: To determine the extent and degree of the effects caused by the grain and, if necessary, reduce or eliminate the grain and grain dust that is blown into and on the water during ship loading operations. Education about the need to reduce grain and dust will eliminate the aesthetic surface water problem and ultimately the problem of anaerobic bottom sediments caused by decomposing grain.

Recommended Actions:

1) Staff from Wisconsin DNR's air quality program should continue making regular inspections at the Wisconsin grain elevators during ship loading and unloading operations and should use appropriate enforcement tools to stop grain/grain dust from entering the water. If the elevators exceed their air quality permits, DNR conservation officers can issue citations.

2) Determine if the new WDNR air quality permits reduce grain in the water at Peavey and Harvest States Coop by taking sediment samples at these sites after the new air quality permits are complete and implemented. If nondecomposed grain is found in abundance in the top layer of sediment, this likely indicates grain has been blowing into the water during recent ship loading operations. Data should be shared with elevator operators.

3) MPCA, the WDNR or the UW-Superior Lake Superior Research Institute (possibly as part of their environmental education cruises) should collect sediment samples in local grain slips and at a control site to compare the presence of grain, levels of dissolved oxygen and makeup of benthic invertebrate communities. The results of this sampling study should be shared with elevator operators.

Reason for the Choice of this Recommended Action: The remnant grain problem cannot be approached as a purely aesthetic issue, but must involve enforcement of state pollution control laws. In addition, the RAP supports documenting the problem and will share the results with local elevator operators, to convince them that it is a problem and encourage them to take an active role in solving it. The Wisconsin grain elevators are targeted in this recommendation since 1) they are known to have a grain dust problem and 2) the busiest Minnesota grain elevator, Cargill, has recently installed millions of dollars worth of equipment to alleviate the problems with grain dust.

Implementors: Wisconsin DNR, UW-Superior LSRI, Minnesota PCA

Timeframe: Applications for the new air quality permits were submitted by summer 1994. The sampling of the Minnesota grain elevator boat slips would have to be done during the shipping season after the ice is out. The sampling at the Wisconsin grain elevators should wait until the new air quality permits are implemented.

Funding Sources: No extra funding is necessary unless the sediment sampling at the grain elevators cannot be conductedunder existing programs or with existing resources. A grant application to the Duluth-Superior Area Community Foundation could be submitted, if additional moneys are needed for boat operating costs as part of the UW-Superior environmental education cruises. The installation of new equipment at the grain elevators would entail a cost for these companies.

Stage II Recommendation
[36 - FOND DU LAC SEPTIC]

Written by Koth (MPCA) with input from K. Larson (City of Duluth)

Approved by Point Sources Subgroup 5/4/94

Reviewed by Fond du Lac community, Army Corps of Engineers (Peterson), MDNR (Peloquin), MPCA (Cook, Wespetal), WDNR (Olson, Plass)

Public information meeting with Fond du Lac community called by Councilor Downs 6/22/94

Approved by Citizens Advisory Committee with addition of recommendation for a field survey 10/25/94

Impaired Use: Beach Closings/Body Contact

Recommendation: *Reduce the amount of inadequately treated wastewater reaching the St. Louis River by correcting the failing septic system problems in the Fond du Lac, Minnesota community and in Oliver, Wisconsin.*

Problem: Some on-site septic systems at the Fond du Lac, Minnesota community and in the Oliver, Wisconsin area inadequately treat waste. This can pose a potential human health risk to river users due to bacterial contamination.

Fond du Lac: There are 126 improved properties west of Perch Lake in the Fond du Lac community. None of these homes are connected to a public wastewater treatment system. It is believed that most homes have an on-site septic system for treatment of waste, however, there are questions about the quality of treatment from some systems.

The 17 homes and seasonal cabins on Cass and Water Street likely have septic systems that inadequately treat waste. These septic systems are located within the floodway of the St. Louis River and are operating at or below the water table. Thus, it is very likely that the wastewater is being discharged with little or no treatment into the ground water and ultimately into the St. Louis River. Since these homes are within the 100 Year Floodway, it is possible that the septic systems do not meet the minimum statewide standards for shoreland development: a 100 foot setback from the ordinary high water level for on-site sewage treatment systems and a 3 foot separation between the 100 year flood and sewage treatment systems.

Another concern involves the homes along the banks of Mission Creek and the St. Louis River. Some of the homes on Mission Creek are thought to have sanitary pipes discharging directly to the creek or its tributaries. Septic systems along the banks of Mission Creek or the St. Louis River may also be inadequately treating the wastewater due to the high water table by these waterbodies. Wastewater may simply be discharging into the ground water with minimal treatment.

A final concern is the possibility that the sanitary waste from some homes in this area may be discharging to the storm sewers. Hook-ups to the storm sewer have been found in older neighborhoods of Duluth. Since the Fond du Lac community is the oldest neighborhood in the city, improper hook-ups to the storm sewers may exist.

Due to small lot sizes and shoreland restrictions, many of the homeowners in the Fond du Lac community cannot install a new septic system without variances to the rules. The following minimum statewide standards for shoreline development (Sect. 6120.3400, Subp. 3) apply to much of the Fond du Lac area:

A. Publicly-owned sewer systems must be used where available.

B. All private sewage treatment systems must meet or exceed applicable rules of the Minnesota Department of Health, the Minnesota PCA, specifically chapter 7080 for individual sewage treatment systems, and any applicable local government standards.

C. Local governments must develop and implement programs to identify and upgrade sewage treatment systems that are inconsistent with the sewage treatment system design criteria identified in item B above.

Oliver: Homes in the community of Oliver have on-site septic systems. Due to the large clay component in the soil, in-ground drainfields often do not treat the wastewater properly. Improperly treated wastewater can enter the St. Louis River and other waterbodies.

Goal: To reduce the amount of inadequately treated wastewater reaching the St. Louis River.

Recommended Actions:

Fond du Lac, MN Area: The St. Louis County Health Department is responsible for on-site sewage systems within St. Louis County, including Duluth. However, a cooperative effort between county, city, regional, and state agencies and organizations will likely be necessary to solve this problem.

1) The St. Louis County Health Department should be the lead agency on a cooperative effort with the City of Duluth and the Western Lake Superior Sanitary District to conduct a field survey of individual treatment systems in the Fond du Lac area. This survey should build upon the information collected by the Fond du Lac residents in a door-to-door survey they undertook this summer. The survey information should include realistic cost estimates for the options described in the following so that a determination can be made on which corrective option(s) is feasible and necessary.

2) The following options were developed by a RAP work group consisting of representatives from the City of Duluth Engineering office, St. Louis County Health Department, Western Lake Superior Sanitary District (WLSSD), Minnesota Pollution Control Agency (MPCA), City of Superior Engineering, and the Wisconsin DNR. These options should be examined to determine the best method(s) to remediate the problem of improperly treated wastewater.

-Remediation efforts that focus on the Cass and Water Street homes:

1. The City of Duluth could issue Special Use Permits to allow for construction of approved on-site sewage treatment systems including mound systems or septic systems of experimental design. However, this action may not meet the requirements of many state regulations such as shoreland development standards or Chapter 7080 (Individual Sewage Treatment Systems Standards) and may not be acceptable to regulatory agencies or environmental groups. In addition, due to the wetlands in this area (Types 2, 6 and 7) the U.S. Army Corps of Engineers in Grand Rapids, MN would need to be contacted to determine if a permit needs to be issued and mitigation needs to be undertaken since creation of the mound systems may require placement of fill in a wetland. Also, the City of Duluth would need to examine the area to make sure that wetlands are not affected under the Minnesota Wetlands Conservation Act.

Lead Implementor: St. Louis County Health Dept. would need to request that the City look at installing mound systems in the floodway

Other Implementors: The City of Duluth Planning staff would make a recommendation to the Planning Commission to place fill in the floodway. Building Inspection and Engineering offices would need to provide input. Minnesota DNR would review and provide comments to the city with respect to state and local standards. The U.S. Army Corps of Engineers may need to be contacted to determine possible effects on wetlands.

Estimated Cost: $5,000 - $10,000 per mound system

2. Have the homeowners on Cass and Water Streets install holding tanks. This would be an expensive option requiring pump-out of the tanks on a regular basis. Due to the high water table on Cass and Water Streets, the pumped-out holding tanks may float to the surface if not properly secured. Tanks may need to be anchored in the ground. The holding tanks may be a viable option in terms of compliance with regulations and standards.

Lead Implementor: St. Louis County Health Dept.

Other Implementors: City of Duluth Planning staff would provide a courtesy review of plans to install holding tanks.

Estimated Cost: $1000 - $2000 per holding tank installation and $1000 -$5000/year for year round pump-out and maintenance of tanks (dependent on water usage)

3. Install a collector system for the 17 homes on Cass and Water Streets. This system would require installation of collector pipes that take the waste from each home and deposit it at a central treatment site such as a drainfield or mound system. Cost-share funds are available through the MPCA On-Site Grant Program for design and construction of systems that discharge up to 5000 gallons/day (approximately 8-12 homes). This does not include costs of land acquisition or hook-up to the homes. Community Development Block Grant funds could possibly be used to assist homeowners with hook-up costs. However, it is questionable whether these funds can be used for homes within a floodway. In addition, the Fond du Lac community is not presently a "target area" (where ≥ 70% of homeowners have low or moderate income) for HUD funds and thus wouldn't be eligible for funding. However, if the homeowners who are hooking up to the collector system meet the target area criteria, it may be possible to make just these homeowners a target area.

Lead Implementor: St. Louis County Health Dept.

Other Implementors: The City of Duluth Planning, Building Inspection, and Engineering offices would need to work on the design aspects of the collector system and possible financial assistance. Minnesota DNR would review and provide comments to the city with respect to state and local standards.

Estimated Cost: Minimum of $100,000 for installation of piping ($25/ft)

4. Buy the homes on Cass and Water Streets from the homeowners, relocate the homeowners, and demolish the homes to eliminate the septic problem. Funds are available for purchase of homes within a floodway since the homes are prone to flooding. The Flood Damage Reduction Grant administered by the Minnesota DNR is a 50/50 cost share program between the state and a local government unit. Project costs totaling <$150,000 are funded directly from the Minnesota DNR. Projects with total costs >$150,000 must be funded through the state legislature. Projects are submitted by the Minnesota DNR Area Hydrologist and are prioritized by the Minnesota Long Term Grant Recovery Group. Applications are accepted annually in May or June.

Lead Implementors: The City of Duluth Department of Planning and Development would have to initiate the effort and the Minnesota DNR would need to assist with the funding for this effort under the Flood Damage Reduction Grant program.

Estimated Cost: $1,275,000 to purchase the 17 homes (average cost of $75,000/home) and additional funds for relocation of homeowners

-Remediation efforts that deal with other homes in the Fond du Lac community in addition to those on Cass and Water Streets:

5. Construct a package treatment system for the Fond du Lac community. A package treatment system is a small scale public treatment facility that requires a NPDES permit issued by the Minnesota PCA. The system would have to be maintained and operated in accordance with permit requirements.

Lead Implementors: City of Duluth Engineering office for design of the treatment plant and the collection system and WLSSD to operate the plant

Estimated Cost: >$500,000 for construction of the treatment plant and the collection system and additional maintenance and operating costs

6. Connect Fond du Lac homes to WLSSD. This would require an extension of the sewage line from Gary-New Duluth out to Fond du Lac and construction of a sewage collection system within Fond du Lac. This would likely need to be preceded by a development plan for the area from Gary - New Duluth to Fond du Lac. Connection to WLSSD is very expensive and may not be viewed favorably by the residents or the city since it is expensive and will open this area to large scale development.

Lead Implementors: City of Duluth Planning office to develop a land use/development plan for the Fond du Lac area and WLSSD for extension of their service

Other Implementor: Minnesota PCA would need to issue a permit for the sewer extension

Estimated Cost: >$500,000 for extension of the sewer line and construction of the collection system

7. Continue the moratorium on any development which expands the size of a dwelling within the Fond du Lac community until the septic problem is corrected. This includes a moratorium on the issuance of building permits for any existing homes within the floodway.

Lead Implementors: This moratorium already exists.

Oliver, and Riverview, WI Area: A proposal to connect homes in the Oliver area to WLSSD is under serious consideration at the present. A sewer line would be run from Oliver across the Oliver Bridge or under the St. Louis River to the WLSSD line in Gary-New Duluth. This action may take place within the next several years and thus no actions are necessary from the RAP.

However, if the Oliver hook-up does not take place in several years, an educational campaign should be undertaken for property owners along the St. Louis River (including the Riverview area). The education campaign should deal with proper septic system maintenance and alternatives to septic systems. The acceptability of certain alternative systems should be examined before recommending them to residents. Appropriate publications are available and could be stuffed in mailboxes or delivered door-to-door by a youth group, sentence-to-serve, etc.

Timeframe: Determining the appropriate solution(s) to the Fond du Lac problem will likely take some time, therefore, these efforts should be initiated as soon as possible. The Oliver septic system issue is already being discussed and consultants have been hired by the Oliver residents.

Implementors: St. Louis County Health Department, City of Duluth, Western Lake Superior Sanitary District, Fond du Lac and Oliver residents, Minnesota DNR, Minnesota PCA, Wisconsin DNR

Funding Sources: Discussed in the Recommended Actions section

Stage II RAP Recommendation
[37 - CHLORINATION]

Written by S. Smith (South St. Louis SWCD) with input from Stepun (WLSSD)

Approved by Point Sources Subgroup of Pollution Prevention/Control Workgroup 6/1/94

Reviewed by WDNR (Schuettpelz, C. Olson, Plass) and MPCA (Gillen)

Approved by Citizens Advisory Committee with an addition to the recommended actions 10/25/94

Impaired Use: Restrictions on Dredging
Fish Consumption Advisories

Recommendation 1: *The Western Lake Superior Sanitary District (WLSSD) should proceed with plans to discontinue chlorination for a period of time to conduct studies of the alternatives to the use of free chlorine for disinfection.*

Recommendation 2: *The City of Superior should examine alternatives to chlorination at their wastewater treatment plant.*

Problem: WLSSD is known to be discharging chlorinated organic chemicals to the St. Louis River in their effluent.

A 1982 U.S. Environmental Protection Agency study of the WLSSD waste stream found a total of 190 organic chemicals in the effluent, 70% of which were not found in the influent. These chemicals include substances such as phenols, chlorinated hydrocarbons, halogenated hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). The chlorination process is a significant generator of AOX compounds in the WLSSD effluent. AOX is a measurement of the amount of chlorine in the compounds being discharged.

Approximately 60% of the influent loadings to the wastewater treatment plant are from industrial sources, with the majority coming from pulp, paper and hardboard industries. The high organic content in this influent causes a high chlorine demand at WLSSD. To consistently meet the fecal coliform standard required by the Minnesota Pollution Control Agency (MPCA) additional chlorination facilities and higher dosing would be required.

WLSSD has requested a Fecal Coliform Limit Variance from the MPCA so that it may discontinue chlorination and still comply with discharge limits of NPDES permit number MN 0049786. The WLSSD proposes to discontinue chlorination in the belief that reasonable water quality standards are being met in the high quality effluent currently generated by advanced secondary treatment. In addition, WLSSD intends to conduct sampling of the harbor and of intakes and receiver locations per a monitoring plan developed in consultation with MPCA and the Minnesota Department of Health (MDH). If fecal coliform levels exceed the health standards for swimming beaches, chlorination would have to be resumed.

There is no information on the amount of chlorinated organic compounds that are discharged from the Superior wastewater treatment plant. Since they chlorinate their wastewater it is possible that chlorinated organic compounds are being created during the treatment process.

Goal: To reduce the amount of chlorinated compounds in the WLSSD effluent and to eliminate chlorine from the Superior treatment plant effluent.

Recommended Actions:

Recommendation 1: *The Western Lake Superior Sanitary District (WLSSD) should proceed with plans to discontinue chlorination for a period of time to conduct studies of the alternatives to the use of free chlorine for disinfection.*

1) WLSSD has applied for and received approval of an NPDES/SDS permit variance request from the MPCA. WLSSD should proceed with plans to discontinue chlorination and to implement the proposed monitoring plan. During the variance, the generation of chlorinated compounds is expected to be reduced by approximately 75%.

2) WLSSD should continue to seek improved wastewater treatment technologies that will be required to meet the future GLI standards. WLSSD should work with industrial clients to reduce the organic content in their effluent.

3) The Minnesota PCA should ensure compliance with the terms of the variance granted under NPDES/SDS Permit number MN 0049786.

Recommendation 2: *The City of Superior should examine alternatives to chlorination at their wastewater treatment plant.*

1) Since the Superior treatment plant does not have to deal with the organic waste and dark color of the water related to pulp processing, alternatives to chlorination such as ultraviolet light may be feasible at this plant.

Implementors: WLSSD, Minnesota PCA, City of Superior

Timeframe: Variance from disinfection has been granted at WLSSD from June 15, 1994, through the term of the permit (June 30, 1995). The City of Superior is in the process of upgrading and enlarging their sanitary and storm sewer systems. Alternatives to chlorination could be examined as part of this process.

Stage II RAP Recommendation
[38 - HABITAT PLAN]

Written by Powers and Collins (MDNR)

Approved by Habitat Work Group 7/28/94

Reviewed by MDNR (Peloquin, Staffon), National Biological Survey (Selgeby), USFWS (Busiahn), MPCA (Helwig, Koth), WDNR (Moss, Pratt, Strand, Plass)

Approved by Citizens Advisory Committee with minor changes 10/25/94

Impaired Use: Loss of Fish and Wildlife Habitat

Recommendation: *Design and implement a coordinated comprehensive plan for the protection and furtherance of biodiversity and ecological diversity within the Area of Concern, without seeking to restore the estuary to its presettlement condition, through the creation, restoration, reclamation, enhancement and management of a desired mix of ecosystems and habitat.*

Problem: Since the time of settlement, the estuary has lost approximately 7,700 (of 12,000) acres of wetlands and open water habitat. In addition, most of the upland areas associated with the area of concern have undergone dramatic change including conversion to urban development, logging, filling, and other forms of disturbance. Although there have been actions taken to reduce further habitat loss, losses still occur. There have been actions to reclaim or restore some forms of habitat, for example the Hearding and Interstate Islands management areas, but most of the historic losses remain in effect. The historic loss of habitat continues to threaten the biodiversity of the area of concern and the ability of the area to sustain desired communities of plants and animals. In addition, without a plan to remediate past losses and protect the resource for the future, additional losses of habitat will continue and will further endanger biodiversity and the viability of the remaining fish and wildlife habitat.

The Stage I RAP report documented the extent of historic losses of habitat, especially wetlands, within the AOC. In response to these losses, the report stated "[t]he remaining parcels of these historic wetlands are included in the list of important natural resource parcels and critical habitats; their preservation is important to the ecosystem integrity of the estuary system. One of the RAP goals is to safeguard remaining wetlands in the estuary."

In 1985 the Metropolitan Interstate Committee published the "Superior-Duluth Harbor Natural Resources Management Program" in which twenty key habitat parcels or natural resource sites were identified. This report also presented the concept of a comprehensive management plan based upon protection and enhancement of ecological functions within the estuary and the management of parcels key to those functions. These concepts and parcels are starting points for this recommendation.

Since the completion of the Stage I document, the Minnesota DNR, City of Duluth and Duluth Port Authority devised a Port Plan intended to preserve critical wetlands and open water areas from further development while designating specific sites acceptable for future harbor and waterfront development. This plan was a vital step toward balanced management within the estuary. It also is one indicator of the opportunity for improving current natural resource management within the area.

The RAP process has identified the lack of a comprehensive structure for natural resource management as a critical issue for remediation and preventative actions. Barriers to effective management are: multiple state jurisdiction over a single natural resource and lack of private organizations with missions or resources to undertake this task.

The St. Louis River system AOC is divided by the Minnesota-Wisconsin state border and although both states have undertaken numerous cooperative efforts, including the current RAP process, the state line effectively delimits each state's jurisdiction. Each new project, problem or opportunity requires extensive effort to overcome the institutional, legal and perceptive barriers posed by the border. For every RAP process that works around this barrier, there are many more that fail or do not even make the attempt. The Port Plan is an example of an excellent piece of planning and negotiation that ended at the state line.

The St. Louis River AOC has not received the attention of private organizations whose mission it is to protect natural resources because the resource does not meet their priority criteria. For instance, The Nature Conservancy, which is undertaking a planning process for nearby Kakagon Sloughs, has not become similarly involved in the St. Louis estuary because of the extensive historic disturbance and the intermingling of development with natural areas.

Beyond this, there are no other institutional resources. Local environmental groups are small chapters of national organizations and lack the staff and fiscal resources to undertake such a program. Thus, the choices are to work awkwardly and inefficiently with state agencies to surmount the problems posed by the border or seek a new citizen-based approach geared specifically to the resource issues in a developed Great Lake estuary.

Given the impetus provided by the RAP's citizen-oriented process (Citizens Advisory Committee, Technical Advisory Committees, Work Groups, outreach projects, and the River Watch spin-off project), the citizen-based solution seems most apt, workable and desirable.

Goal: To encourage the creation, adoption and vigorous implementation of a plan that defines a coordinated, holistic system for maintaining, restoring, enhancing, managing and monitoring natural resources within the Area of Concern, the goal of which plan is to retain, enhance and sustain local biodiversity.

Recommended Actions:

1. The St. Louis River RAP Citizens Advisory Committee should support and participate in a citizen-based process to develop a biodiversity plan for the AOC and to identify an institutional structure, based upon citizen participation, to work for the implementation of the plan. As a point of departure for this effort, the concepts outlined in Attachment I to this recommendation should be considered by the participants in the planning process. Further, the concept of sustainable development for the estuary should be incorporated into the plan.

2. The Wisconsin and Minnesota Departments of Natural Resources, federal and local units of government including the cities of Duluth and Superior and Douglas County, should actively participate in the development and implementation of the biodiversity plan for the St. Louis River Area of Concern. The plan should include an examination of habitat management needs for the 20 critical habitat areas identified in the Stage I Report.

3. A Port Plan should be developed for the Superior side of the harbor by the City of Superior, Wisconsin DNR, and the Northwest Regional Planning Commission.

H13 HABITAT PLAN
Attachment I: Preliminary Management Concepts

Guiding Principles

Among the principles that should be adopted to guide the development and implementation of the proposed management plan are:

- Recognize that what is to be managed is not the environment but the actions of humans operating within the environment.
- Promote stewardship of the resource by local residents, users of the resource, and those concerned with it.
- Protect and enhance ecological functions and maximize biodiversity without seeking to restore the estuary to its pre-settlement condition.
- Conduct the planning process within the context of similar planning efforts for the St. Louis watershed (and including the Nemadji River watershed), the Lake Superior basin, and the Great Lakes.

Sub-Area Geographic Variability

Within the Area of Concern there is significant variation in the quality of existing habitat, the level of development, and the potential for future activities to restore, reclaim or create habitat. The following statements summarize a recognition of this variation as well as the need to pursue different strategies within these areas. See Map A for approximate outlines of the management areas.

Area I: Wisconsin Point and Allouez Bay

Description:

All of Wisconsin Point and the immediate open waters of Lake Superior, the open water and wetland areas of Allouez Bay up to and including Bluff Creek, the drainage basin of Bluff Creek, and upland areas lying east of Highway 2/53 and within a mile of Allouez Bay.

Ecological values:

Fish spawning; waterbird habitat; bird migration; unique geomorphic processes and vegetative communities.

Primary goals:

Protect water quality; protect geomorphic processes; restore and enhance vegetative communities.

Management concepts:

Management of human activity; education; focused research; designate sites for appropriate protection; low impact recreation; dune protection; coordinated management with Minnesota Point.

Area II: Minnesota Point

Description:

All of Minnesota (Park) Point; the immediate open waters of Lake Superior; Hearding Island and that portion of the harbor lying between the point and shipping channel.

Ecological values:

Fish spawning; waterbird habitat; bird migration; unique geomorphic processes and vegetative communities.

Primary goals:

Protect geomorphic processes; protect and restore vegetative communities.

Management concepts:

Private landowner education; restoration activities (public and private lands); management of human use of area; trail maintenance and development; restoration of open water/wetland/upland habitats; low impact recreation; dune protection; coordinated management with Wisconsin Point.

Area III: Developed Waterfront

Description:

All the immediate land areas and open water of Duluth, Superior and St. Louis Bays; the Duluth shoreline and open water areas upstream to Stryker Bay; the Superior shoreline and open water areas upstream to Billings Park; and the watersheds of all tributary streams feeding the river along this stretch.

Ecological values:

Maintenance of estuary ecological functions and provision of small areas of high quality habitat (term "high quality" is loosely defined as habitat supporting key species, biotic communities or ecological functions of the estuary or portion of the estuary); Maintain and enhance hydrologic and biologic functions and values of tributary streams.

Primary goals:

Creation, restoration and reclamation of habitat.

Management concepts:

Work on small discrete sites; retain stream corridors for wildlife; retain/restore full functions of streams from headwater wetlands to mouths (ideal, but settle for where feasible); Implement aggressive urban erosion control activities to reduce sedimentation; Create wetlands along tributary streams designed to enhance sediment trapping; self-regulate stream flow dynamics; provide wildlife habitat; and enhance fisheries habitat; Lands adjacent to developed harbor area should be dedicated for use by water dependent or oriented uses.

Area IV: Duluth Side of Upper Estuary and Tributary Streams

Description:

Duluth shoreline and adjacent open water areas from Stryker Bay to base of Fond du Lac dam and the watersheds of all tributary streams feeding the river along this stretch.

Ecological values:

High quality shore wetlands and open water areas; Maintain and enhance hydrologic and biologic functions and values of tributary streams.

Primary goals:

Protection, restoration and reclamation of habitat.

Management concepts:

Retain/create lengthy unified stretches of restored shoreland; reclaim/restore areas impaired by past use; retain full functions of streams from headwater wetlands to mouths; provide for orderly development consistent with objectives for specific areas in concert with City plans insuring no adverse impacts on the river resource.

Area V: Superior/Douglas County Side of Upper Estuary (including some Minnesota lands)

Description:

Shoreline and adjacent open water areas from Billings Park to base of Fond du Lac dam including all islands within the river and the watersheds of all tributary streams feeding the river along this stretch.

Ecological values:

High quality shorelands; wetlands; open water and upland habitats; natural regulation of runoff and erosion/sedimentation.

Primary goals:

Protection, enhancement and acquisition of habitat.

Management concepts:

Work in large tracts unifying several types of habitat; protect tributary streams from adverse development; restrict development to existing areas or logical extensions thereof.

Area VI: Nemadji River Basin

Description:

The entire Nemadji River watershed.

Ecological values:

Stream habitat; upland areas; regulation of runoff and erosion/sedimentation.

Primary goals:

Acquisition; protection; enhancement; erosion control.

Management concepts:

[To be developed by the Nemadji River Basin Project]

Area VII: Lower St. Louis River from Cloquet to Fond du Lac

Description:

That portion of the watershed of the St. Louis River lying between Fond du Lac dam and the northern corporate boundary of Cloquet.

Ecological values:

Fish spawning; fast water aquatic habitat; upland habitat; aesthetic and recreational values.

Primary goals:

Protect and enhance fish spawning habitat; stream flow regulation; improved access; lessen point specific recreational impacts.

Management concepts:

Maintain existing wetlands; insure adequate stream flow; regulate human activity (e.g.; fishing); improve recreational use areas in terms of impacts on resources.

Area VIII: St. Louis River System Upstream of Cloquet

Description:

That portion of the St. Louis and Cloquet River watersheds lying upstream of Cloquet.

Ecological values:

Varied; refer to St. Louis River Management Plan for overview of values along the corridor.

Primary goals:

[Reference St. Louis River Management Plan for initial listing.]

Management concepts:

[Reference St. Louis River Management Plan for initial listing.]

Stage II RAP Recommendation
[39 - SUPERIOR INFILTRATION/INFLOW]

Written by Denton (City of Superior)

Approved by Point Sources Subgroup 7/1/94

Reviewed by WDNR (C. Olson, Plass)

Approved by Citizens Advisory Committee 11/22/94

Impaired Use: Beach Closings/Body Contact

Problem: High flows during storm events cause sewage bypasses into the Duluth/Superior Harbor and Lake Superior

The City of Superior has a problem with infiltration and inflow (I & I). Infiltration is the leakage of ground water into the sanitary sewers through old or defective pipes. Inflow occurs when rainwater is channeled into the sanitary sewer rather then the stormwater system. Connections of roof drains, foundations drains, and sump pumps to the sanitary system causes an overload of water which cannot always be handled by the sanitary sewer system.

(The following information defines the I & I problem in Superior. The information has been compiled as part of the draft Superior Facility Plan being prepared by Consoer Townsend and Associates, December 1993. The City of Superior has submitted this Facility Plan to the Wisconsin Department of Natural Resources for their review and approval, which is expected by mid-1994.)

About half of the City of Superior's sewers were constructed in the 1890's. The sewers are generally unreinforced concrete (some tile for small pipes and some brick for large pipes), and were constructed with thousands of plugged taps (wyes) for later service connections. Manholes were generally constructed of brick with "18 hole" manhole covers. Crossings of ravines were on timber piles, rock cradles or specially built bridges/walkways.

In the late 1930's interceptors were constructed under the WPA program. These pipes are generally concrete.

When the main lift stations and the main Wastewater Treatment Plant (WWTP) were constructed in 1956, 23 overflow locations remained in the sewer system.

The sewer separation project in 1975 provided additional sanitary sewers and retained the old pipes for storm water conveyance. In addition, some new storm sewers were constructed in the eastern portion of the District serving the North End of Superior and the northwest portion of the district serving South Superior. The 4.1 mg Butler Pond, designed for a 100-year storm, was constructed in the northwest part of this district.

A rain in the spring of 1977 caused severe basement flooding and three overflow locations in the collection system were reopened. The last overflow location (near Lincoln School) was sealed following the Sanitary Sewer Evaluation Study (SSES)/Rehab project of 1982.

The sanitary pipes constructed in 1975, have proven to be too small, possibly due to a combination of factors: inefficient private separation by property owners (roof drains, sump pumps, yard drains), missed cross-connections with storm sewers, new cross-connections with storm sewers, infiltration to new pipes or inadequate design values. Many manholes are located in areas that are inundated during spring snow-melt or following moderately sized rains. Building foundation drains exist throughout the city. At times, they can be a major source of inflow, but it is expensive to redirect the flow.

Sewer extensions have progressed with city growth. However, because of excessive amounts of water in the collection system, the system is often over its capacity which results in water rising in manholes and flooding in the service area. Basement flooding and some bypassing on East 2nd Street has occurred. Basement flooding has not been a major problem in recent years since the city provided approximately 450 backflow valves on existing service connections at a cost of almost $1/2 million (years 1979 - 1992). Due to the East 2nd Street bypassing, since 1992, the Wisconsin Department of Natural Resources (DNR) has limited new connections in districts that feed into this collector. This has the effect of limiting development in Superior.

Based on this history, the sewer system layout, flow measurements, and field data, the following comments summarize the I & I situation in Superior:

-Rainfall induced infiltration is substantial. Winter infiltration is not substantial.

-Pipe capacity is limited by debris and roots.

-Convenience drainage (surface drainage directed to nearest pipe) is a problem.

-Some inflow exists in the "separate" sewer system.

-Plumbing code violations exist and cause problems.

-Wet weather surcharging is substantial.

-Backflow valves work, but they are: 1) expensive, 2) not adequately maintained, and 3) not a long term solution. (Further, plumbing use can still cause in-home problems if there is prolonged sewer surcharging.)

-I & I causes some bypassing along East 2nd Street.

Further, quantification of I & I is difficult due to the following:

-Historically inadequate operating data (levels in the combined sewer overflow [CSO] ponds, CSO #2 influent flow, CSO #5 & #6 submersible pump operating hours, CSO #5 & #6 treatment plant operating records, hourly rainfall in area, lift station operating hours and undefined lift station capacities).

-Complexity of system (4 treatment plants, 3 equalization ponds, 13 lift stations, combined and "separate" sewer systems).

-Known and unknown cross-connections between interceptors.

-Due to the flat topography of Superior, actual boundaries for combined sewer service areas are difficult to delineate.

-Surcharged pipes and slow velocities which reduce accuracy of flow metering.

-No actual flow metering of any bypasses.

-No flow metering for flow diversion to the CSO #2 pond.

-Long hydrograph tails which make isolation of a single rain event difficult. Rainfall induced infiltration and/or slow inflow from large standing water areas results in long receding legs (tails) to the hydrographs (i.e. high flows can be experienced for days following a rainfall).

-Substantial number of force mains from industrial sources which convey cyclic flow from wet wells.

-Sewer system unknowns (i.e. restrictors, actual underground piping, partial collapses, clogs, etc.)

Goal: The ultimate goal is to reduce excessive I & I into the sanitary sewers so sewage bypasses into the Duluth/Superior Harbor and Lake Superior will no longer occur during storm events.

Recommendation 1: *The City of Superior should continue its efforts to eliminate Category I bypasses by developing an approved facilities plan.*

Recommendation 2: *In the long term, the City of Superior should develop solutions to minimize Category II bypasses resulting from inflow and infiltration.*

Recommendation 1: *The City of Superior should continue its efforts to eliminate Category I bypasses by developing an approved facilities plan.*

Recommended Actions:

Category I bypasses are bypasses that occur from normal, regularly occurring rainfalls (i.e. ≤ 5-year storm event). To eliminate these bypasses, the facility plan should list actions such as the following to alleviate this problem:

1) To alleviate the East 2nd Street bypasses, the design and construction of a relief sewer should be implemented as a high priority.

2) Bypassed flow storage should be included in capital improvements to the lift stations along the East 2nd Street interceptor.

3) A sewer replacement allowance, a pilot program to remove foundation drains, and the reduction of I & I in three of the districts should be undertaken with capital funds.

Recommendation 2: *In the long term, the City of Superior should develop solutions to minimize Category II bypasses resulting from inflow and infiltration.*

Recommended Actions:

Category II bypasses are bypasses that occur from a heavy rainfall (i.e. > 5-year storm event). Long term plans for sanitary/combined sewers, stormwater drainage, I & I removal and public education must be established. Capital funds should be dedicated to accomplish this goal.

1) The Facility Plan, as described in Recommendation 1, should again be used to direct needed improvements in the City's operation and maintenance (O & M) of its system.

2) Specifically, the City of Superior should, in addition to other on-going O & M, continue defining the existing sewer system, enforce the plumbing codes, clean and TV additional sewers, measure flows in sewers and include additional funds in its O & M budget for replacing isolated short sections of failing sewers.

3) Additional personnel (one additional crew or equivalent summer help) should be provided for the collection system to address routine maintenance.

4) All personnel and equipment should be centrally located at the main WWTP to improve efficiency.

Reasons for the Choice of these Recommended Actions:

Without making the capital improvements, the following conditions would still exits:

- sewer surcharging

- basement flooding
- bypassing
- substantial and excessive inflow
- possibility for inefficient sewer extensions
- inadequate (and/or insufficient) monitoring and control
- excessive O & M costs for aged or inefficient facilities
- sewer pipe restrictions from roots and broken pipes
- falling further behind in sewer maintenance
- missed revenue from undocumented waste sources
- moratorium on connections to the East 2nd Street collector

The proposed projects and recommended preparation of long range sanitary and storm sewer plans should not have adverse primary or secondary environmental impacts. Rather the projects will reduce existing problems and provide for orderly planned growth. Net improvements in water quality and quality of life will occur.

Over the last two years, the city has increased its efforts and improved O & M procedures have been implemented. These recent activities have already reduced I & I and/or bypassing. The identified actions build upon the efforts and success of the already improved O & M of the City's system.

Implementors: City of Superior

Time Frame: The proposed construction projects identified in the Facility Plan and as recommended herein will occur over the next three years. The design of the high priority East 2nd Street relief sewer is nearly complete and will be constructed yet in 1994. The long range storm sewer planning process has begun, with Consoer Townsend and Associates under contract with the city to provide Phase I of the Stormwater Management Plan. This phase should be complete in mid-1995, with the long range sanitary sewer plan being initiated at that time for completion in 1996. O & M improvements have begun and will continue per the Facility Plan.

Funding Sources:

The City of Superior has already secured a $5.5 million bond to fund projects outlined in the Facility Plan. Increased O & M budgets are pledged to accomplish the recommended actions. Sewer use charges were increased for each of the past three years in anticipation of the costs. Funding for Phase I of the Stormwater Management Plan has been secured through a $60,000 grant from the EPA (and administered by the DNR). Mapping, in conjunction with the Stormwater Management Plan, is funded through the city's O & M budget. The long-range sanitary plan could be funded through the bond, but it is hoped that further grants will be obtained through the EPA and/or DNR.

Stage II RAP Recommendation
[40 - ERIE PIER CAPACITY]

Written by Schubauer-Berigan and Koth (MPCA)
Reviewed by work group members and revised by Wisconsin DNR.
Approved by Sediment Contamination Work Group 12/15/94
Approved by Citizens Advisory Committee 2/22/95

Impaired Use: Restrictions on Dredging

Recommendation: *Indefinitely extend the life of the Erie Pier Dredged Materials Processing Facility by processing and reusing as much dredged material as possible and, if necessary, relocating non-reusable dredged materials to an inland disposal facility.*

Problem: Lack of adequate confined storage and/or disposal capacity for dredged materials will restrict dredging and will potentially restrict commercial navigation in the Duluth-Superior Harbor.

Approximately 150,000 cubic yards of sediment are dredged annually from the Duluth-Superior Harbor to maintain and improve shipping channels. Dredged materials are placed in the Erie Pier facility, the only approved confined disposal facility (CDF) in the Twin Ports.

Construction of a new CDF will be excessively expensive in terms of total costs, local share of the construction and operation costs, and environmental impacts including loss of rare high value fish, wildlife and plant habitat.

Goal: To provide long term processing and storage of dredged materials, maximum beneficial reuse of dredged materials, and appropriate disposal of non-reusable dredged materials.

Recommended Actions: The U.S. Army Corps of Engineers and the Seaway Port Authority of Duluth should develop and implement a long term operations plan for the Erie Pier Facility that will assure maximum beneficial reuse of dredge materials and will provide continuing adequate disposal of non-reusable dredged materials. New sorting and washing technologies and methods should be evaluated and applied to maximize the reuse of dredged materials. Relocation of the non-reusable fraction of dredged materials to an inland disposal facility may be necessary to assure adequate space for holding and processing dredged materials at Erie Pier.

Reason for the Choice of this Recommended Action: This action will extend the effective life of the Erie Pier Dredged Materials Processing Facility into the distant future at a cost that will be much less than the multi-million dollar costs of constructing new confined disposal facilities with limited life spans. The environmental impacts of this action will be significantly less than the environmental impacts of constructing additional confined disposal facilities.

Time Frame: This recommendation should be implemented immediately.

Implementors: U.S. Army Corps of Engineers and the Seaway Port Authority of Duluth with assistance and advice from the Harbor Technical Advisory Committee (HTAC) of the Metropolitan Interstate Committee (MIC).

Funding Sources: U.S. Army Corps of Engineers.

Stage II RAP Recommendation
[41 - HABITAT ENHANCEMENT]

Written by Schubauer-Berigan and Koth (MPCA)
Reviewed by work group and revised by Wisconsin DNR.
Approved by Sediment Contamination Work Group 12/15/94
Approved by Citizens Advisory Committee 2/22/95

Impaired Uses: Restrictions on Dredging
Loss of Fish and Wildlife Habitat

Recommendation: *Reduce the need for dredged materials processing and disposal capacity by utilizing suitable dredged materials to restore, enhance, and recreate fish and wildlife habitat.*

Problem: Limited dredged materials processing and disposal capacity will restrict dredging and will potentially restrict commercial navigation in the Duluth-Superior Harbor. Loss of important fish and wildlife habitat has likely resulted in negative impacts on fish and wildlife populations.

Goal: Reduce the need for dredged materials processing and disposal capacity and effectively use suitable dredged materials to establish good quality fish and wildlife habitat.

Recommended Actions: The U.S. Army Corps of Engineers should continue to work with the Habitat Creation Subcommittee of the Harbor Technical Advisory Committee (HTAC) to develop habitat restoration, enhancement, and re-creation projects. Utilization of dredged materials that are acceptable under environmental regulations, and suitable for the intended use, should be encouraged. However, implementation of these projects should not be limited by availability of appropriate dredged materials; these important projects should proceed in a timely fashion using other appropriate materials, if suitable dredged materials are not available. Project objectives should include the following:

1. Restore lost habitat, enhance degraded areas, or re-create fish and wildlife habitat types that have been lost or reduced. (These objectives are listed in order of priority. All objectives should be accomplished without adverse environmental impacts).

2. Increase shallow water habitat while minimizing net aquatic habitat losses.

3. Increase emergent and submergent vegetation for nesting, spawning, nursery, and forage for fish and wildlife.

4. Provide island upland sites for bird habitat, especially for Common Terns and Piping Plovers.

5. Increase spawning and nursery habitat for fish and invertebrates.

6. Find ecologically beneficial uses for dredged materials.

Reason for the Choice of these Recommended Actions: These actions will demonstrate beneficial uses of dredged materials that will reduce the costs of environmental restoration projects. These actions will reduce costs associated with processing, storage, and disposal of dredged materials. These actions will restore and replace valuable wetland and shallow water habitats that have been lost.

Time Frame: Planning has started on one potential project (Hearding Island) that could be implemented as soon as 1995. Other projects could be developed for implementation within the next five years.

Implementors: U.S. Army Corps of Engineers with assistance from the Seaway Port Authority of Duluth, the Harbor Technical Advisory Committee, Metropolitan Interstate Committee (MIC) and RAP committees. Standards and criteria for Minnesota projects will be developed by Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Natural Resources (MDNR) with assistance from Wisconsin Department of Natural Resources (WDNR). Standards and criteria for Wisconsin projects will be developed by WDNR with assistance from MPCA and MDNR.

Funding Sources: The U.S. Army Corps of Engineers "1135" Program. Grants for the local share may be available from various State or Federal Great Lakes or habitat restoration funds.

Stage II RAP Recommendation
[42 - EXOTIC MUSSELS (ZEBRA) IMPORTATION]

Written by Zakis (BIA), Collins (MN DNR)

Circulated to Habitat Preservation, Reclamation and Management Work Group, no dissent 11/14/94

Reviewed by Swenson (UW-Extension), Rendall (MDNR), Skelton (Seaway Port Authority of Duluth), Baker (UM Sea Grant), Martin (WDNR)

Approved by Citizens Advisory Committee 2/22/95

Impaired Use: Degraded Fish and Wildlife Populations

Recommendation: *Continue to work with the shipping industry on finding ways to eliminate importation of zebra mussels into the Area of Concern (AOC) and continue to educate the boating public about the preventive measures that should be practiced to avoid further introductions of this serious pest. Ongoing research and monitoring related to zebra mussels should determine conditions controlling population growth in the AOC.*

Problem: Zebra mussels have the potential to eliminate native mussel species, clog water intake systems, and alter water quality.

"Zebra mussels are small, fingernail-sized mussels native to the Caspian Sea region of Asia. Tolerant of a wide range of environmental conditions, zebra mussels have now spread to parts of all the Great Lakes and the Mississippi River and are showing up in inland lakes. Zebra mussels clog water-intake systems of power plants and water treatment facilities, and the cooling systems of boat engines. They have severely reduced, and may eliminate native mussel species" (from A field Guide to Exotic Plants and Animal, 1993, MN DNR).

It is believed that the zebra mussel was inadvertently introduced into the Duluth-Superior Harbor through the discharge of ballast water from ships. Recent surveys have found some large, isolated populations of adult mussels. Adult mussels have been found on and near coal docks and coal transfer facilities and on native mollusks (M. Balcer, pers. comm., J. H. McCormick, pers. comm.) However, the zebra mussel may not be successfully reproducing in the AOC. Very few immature mussels (called veligers) have been found. The veligers that are present in the estuary may be newly released from ballast water discharges. Transport of veligers from the lower Great Lakes is very likely to continue until ways are found to kill organisms in ballast water tanks (see recommendation 32 - Ballast Water). Continued releases of this organism into the Duluth/Superior harbor appear to be maintaining the population of adult mussels found in the AOC in the absence of significant reproductive success.

Various physical characteristics such as substrate availability or water current, and chemical parameters such as low levels of dissolved oxygen in the water, temperature, pH, or calcium levels can limit the spread of the mussels. Zebra mussels are generally found attached to rocks or other hard surfaces in 6 to 30 feet of water, but actual colonization depths vary depending on light intensity, water temperature, and the availability of food. They prefer water temperatures between 68 - 77 degrees F and water currents slower than 6 feet/second. Zebra mussels require calcium for shell development and calcium concentrations greater than 15 parts per million are needed for proper growth. Recent data show that pH levels are very important in zebra mussel physiology. Mussels have difficulty growing and reproducing in waters with pH levels below 6.5.

Given these sets of factors, it is difficult to conceive that zebra mussels would be present within the AOC at levels that would pose a problem to either industry or the aquatic environment. Water temperature, calcium levels, and low food availability may all be factors that could limit zebra mussel growth and reproduction in the AOC. Certainly

repeated introductions can maintain the zebra mussel populations in the Duluth/Superior harbor. However, the population of the mussels will likely be at low concentrations, as observed in recent years, given that the AOC is not their preferred habitat (Ron Martin, WDNR, per. comm.).

Goal: Determine the factors controlling zebra mussel growth and reproduction in the AOC and find ways to limit the introduction of more zebra mussels into the Area of Concern.

Recommended Actions:

1) Continue to work with the shipping industry to find ways of ballast water management that will result in the elimination of any future introductions of the zebra mussel into the St. Louis River embayment (see recommendation 32 - Ballast Water).

2) Continue to educate the public, with particular focus on boaters, about what they can do to prevent the spread of zebra mussels into inland waters and that the same procedures should be followed to prevent the reintroduction of the zebra mussels from infested inland waters into the St. Louis River embayment (see recommendation 33 - Exotics Transport).

3) Continue monitoring and research to learn whether veligers discharged in the AOC can survive, grow and reproduce, and to learn whether the adult zebra mussels living in the estuary have an adaptation that allows them to live in this environment. Monitoring should also determine the impacts zebra mussels are having on native mollusks in the AOC.

4) Continue research to find environmentally and economically acceptable ways by which the organism could be controlled if it should become necessary.

Reasons for Selecting these Recommended Actions: Zebra mussels are recognized as an aquatic nuisance species with very high economic costs associated with their rapid population growth rate and impacts on water intakes. Significant costs to industry have already occurred in the lower Great Lakes. Research and monitoring has been identified as important throughout the Great Lakes and other U.S. waterways. Limiting the spread of zebra mussels has also been recognized as key in reducing the economic costs of this animal. Because of these factors, much has been done, and is being done to address the zebra mussel problem in the Great Lakes system. In the St. Louis River System AOC, monitoring, research and education related to zebra mussel management is ongoing and appears to be sufficient to deal with the conditions that exist in the AOC. If monitoring and research find that mussel populations are growing significantly faster than currently believed, or if environmental and economic impacts increase, additional recommended actions may need to be considered.

Time Frame: These recommended actions are ongoing and should be continued as needed.

Implementors: Minnesota DNR, Wisconsin DNR, Minnesota Sea Grant, Wisconsin Sea Grant, UW-Extension, UM-Extension, boating clubs, marinas, Great Lakes Panel on Aquatic Nuisance Species, Marine Board of the National Research Council.

Funding Sources: Current efforts are funded by a variety of sources. Industrial users of water in the AOC should assist in funding ongoing activities. Passage of the Ballast Water Management Act (H. R. 3360), and appropriation of funds as outlined in the bill, will allow the initiation of projects to demonstrate management technologies and practices that will reduce or eliminate transport of exotic species in ballast water.

Stage II RAP Recommendation
[43 - RIVERWATCH]

Written by Jacoby and Koth (MPCA)
Approved by River Stewardship Work Group 1/18/95
Reviewed by Powers
Approved by Citizens Advisory Committee with minor changes 2/22/95

Impaired Use: All use impairments

Recommendation: *Student and citizen activities that inform the public about the St. Louis River System Remedial Action Plan (RAP) and garner support for the RAP should be continued and expanded in the St. Louis River watershed.*

Problem: Funding for the River Watch program, which has been a major education and outreach program on the St. Louis River, encouraging stewardship of the river and increasing awareness of the St. Louis River System RAP, is scheduled to end September 30, 1995.

The St. Louis River Watch is a citizen monitoring, education, and outreach program developed for the St. Louis River. The RAP Citizens Advisory Committee members wrote the original grant proposal to the Legislative Commission on Minnesota Resources (LCMR) which gave life to the River Watch program. CAC members saw the need for an education and outreach component of the RAP process and understood the value of experiential education activities as a way to build stewardship for the river and to teach youth and adults about the Area of Concern.

The St. Louis River Watch program began with nine schools in May of 1992 and has been expanded to include 16 schools. Students conduct water chemistry tests and survey the benthic macroinvertebrate community to gain information on water quality conditions. They monitor for 9 chemical and physical water quality parameters and survey the benthic communities from the Duluth/Superior harbor upstream to Forbes, Minnesota.

Other River Watch public outreach and educational activities include:

- The River Watch Coordinator attends numerous speaking engagements on a local, state, national, and international level to inform people about the St. Louis River System Area of Concern designation, the Remedial Action Plan process and citizen involvement, the International Joint Commission's Great Lakes Water Quality Agreement, and River Watch activities.

- Curriculum materials have been developed to specifically address Areas of Concern and Remedial Action Plans, the Great Lakes Water Quality Agreement, water-based recreation activities, wetlands, habitat, and other related topics. The curriculum educates youth about tributaries of Lake Superior with an emphasis on Areas of Concern.

- A Frog Watch program has been organized that involves citizens in the collection of information about frog populations through a breeding call survey.

- The Keepers of the Waters project has been developed which brings together artists and scientists in the Duluth/Superior area in an effort to create art that reflects community water quality concerns.

- Offshoot projects of the River Watch include a student produced radio series on environmental issues of the St. Louis River, a survey of the incidence of tumors in bullheads in the Duluth/Superior harbor, and sediment toxicity testing and production of two educational videos by the Ojibwe School students.

River Watch is currently housed in the Duluth office of the Minnesota PCA and is operated by a PCA employee. This arrangement has worked well up to this point and was essential in getting the program off the ground. However, it has created some problems in securing funding from a wider variety of sources than the current U.S. EPA support.

Goal: To continue existing programs and develop new educational activities that support the education and outreach component of the RAP through experiential education activities.

Recommended Action: A more diverse and permanent funding source should be secured for the coordination of River Watch activities. This action should include identification and evaluation of alternate organizational structures that best allow for the procurement and sustainability of this desired funding arrangement. Funding should be identified and secured before September 30, 1995, so there is no lapse in River Watch activities.

Time Frame: January - September, 1995

Implementors: MN Pollution Control Agency, Wisconsin Department of Natural Resources

Funding: The LCMR funding for the St. Louis River Watch ended on June 30, 1993. Since then the Environmental Protection Agency (Great Lakes National Program Office and Region V) have provided funds for a tri-state, Lake Superior River Watch program, modeled after our St. Louis River Watch. This funding allowed for River Watch expansion along the North Shore of Lake Superior in Minnesota (involving the communities of Two Harbors, Silver Bay, Tofte and Grand Marais) as well as similar program development in Michigan and Wisconsin. River Watch monitoring activities are now conducted by 22 schools and youth organizations on Minnesota tributaries of Lake Superior (including 16 on the St. Louis River). Current EPA funding terminates on September 30, 1995.

Funding sources that should be examined include the Minnesota and Wisconsin Legislature; federal, state and local funds; foundations; and grant making organizations.