

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ECOLOGICAL RESOURCES

STAFF REPORT 45

**Management of Rooted Aquatic Vegetation,
Algae, Leeches, Swimmer's Itch, 2008**

May 2009

**A Summary of Permitted Management Work for Aquatic Vegetation,
Algae, Leeches, Swimmer's Itch, 2008**

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May 2009

Executive Summary 2008 Aquatic Plant Management Program

In Minnesota the state is the owner of wild rice and other aquatic vegetation growing in public waters (M.S. 84.091). The Minnesota Department of Natural Resources (DNR) regulates the harvest, transplanting, and destruction of aquatic plants in public waters through a permit program. The purpose of the Aquatic Plant Management (APM) permit program is to protect the beneficial functions of aquatic vegetation while allowing riparian property owners to obtain reasonable access to public waters.

Permits/Properties/Fees

The number of public waters where aquatic plant management is permitted has increased gradually from 1953 until 2000. However, from 2003 through 2005 the numbers of lakes with permitted APM activity have remained essentially the same. During this period, there was an average of 898 public waters with permitted APM activity annually. In 2006 the number of public waters with permitted APM activity rose to 953 but fell to 927 in 2007. In 2008 there were 925 public waters with permitted APM activity.

The increase in the numbers of permits issued from 2003-2007 averaged approximately 360 per year. The numbers of permits issued decreased in all regions in 2008. In 2008 there were 237 fewer permits issued than in 2007. The Central Region, which includes the seven county metropolitan area, typically issues more permits for more properties than any other DNR regional office. However, in 2008 the Central Region issued 49 fewer permits than they issued in 2007. The largest decreases in the numbers of permits issued were in Region 1 (down 126 permits from 2007) and Region 2 (down 158 permits from 2007).

The numbers of properties involved in the APM program statewide decreased for the second consecutive year. There were 712 fewer properties permitted in 2008 than in 2007. The number of properties with permitted aquatic plant management activities decreased in all regions with the exception of Region 4 which saw a small increase of 39 properties. The Central Region saw the largest decrease in the numbers of properties permitted, down 433 properties from 2007.

Permit revenue decreased from about \$315,000 in 2007 to about \$300,000 in 2008. The average fee per property was up \$3.37, from \$24.58 in 2007 to \$27.95 in 2008.

AUAPCD

The Department first began issuing permits for Automated Untended Aquatic Plant Control Device's (AUAPCD's) in 1997. Now, permits for AUAPCD make up nearly 40% of the active Aquatic Plant Management permits. The number of single season permits issued in 2008 increased by 11 statewide over 2007. The number of single year permits issued has increased annually since 1998. The 2005 total of 1081 is more than double the number of 1-year permits issued in 1998. After a decline in the number of three-year duration permits issued from 2003-2005, the number of 3-year permits increased in both 2006 and 2007. However, in 2008 there were 132 fewer three-year AUAPCD permits issued than in 2007. The three-year permit option is allowed for persons who limit the size of the area of AUAPCD operation to 50 feet alongshore or one-half their frontage whichever is less and no more than 2,500 square feet. Persons who obtained a three-year permit in 2008 will not have to reapply again until the year 2011. Some people (177 of those reporting) obtained a permit but did not run their device in 2008. In 2008, about 39% of the permits issued allowed the use of automated aquatic plant control devices like the Crary WeedRoller, the Colman Beach Groomer, the Lake Restoration Lake Sweeper and similar home made devices. The remaining 61% of the aquatic plant management permits

issued in 2008 allowed chemical or other mechanical removal as the method of control. These percentages were similar in 2007.

Most AUAPCD permits are issued to a single property owner. Although AUAPCD's make up 39% of the permits issued, they only accounted for about 16% of the total number of properties permitted in 2008, this was unchanged from 2007. The other 84% of properties were permitted to use other mechanical methods or herbicides for aquatic plant control.

Summary of Aquatic Plant Management permits issued in 2008.

Region	Harvest Chemical***	2008 Issued Channel*	<2008 Active Channel**	AUAPCD's with chemical control	AUAPCD				All Active Permits	Issued Restoration Permits
					Issued 2008		Issued 2007	Issued 2006		
					1 year	3 year	3 year	3 year		
Reg 1	481	46	-	64	682	197	248	294	1,902	15
Reg 2A	146	14	-	0	0	7	7	4	164	9
Reg 2B	616	9	-	54	199	211	220	227	1,473	4
Reg 3A	801	9	-	8	93	21	18	35	968	15
Reg 3B	468	6	-	18	165	61	102	71	867	15
Reg 4	181	7	-	2	49	23	52	7	312	7
All	2,693	91	711	146	1,188	520	647	638	6,397	65

* Channel permits are of unlimited duration issued to the property owner to mechanically maintain a channel to more than 16 shoreline feet wide of vegetation.

** All active permits as of 11/23/2008. Total by Region cannot be calculated because Region boundaries were changed in 2003. All Active Permits = Permits issued in 2007 and all active AUAPCD and channel permits excluding restoration permits.

*** Excludes permits for AUAPCD's

Summary of all APM permits issued, fees collected, numbers of lakes properties treated and harvested in 2008.

Region	Permits Issued in 2008*	Lakes**	Fees***	Properties Permitted in 2008	Ave. Fee/Property	All Reporting ****		
						Harvest Work	Chemical Treatment	Both
Reg 1	1,356	259	\$ 51,245.00	1,356	\$ 37.79	125	204	32
Reg 2A	153	52		206		10	75	8
Reg 2B	1,025	143		1,608		30	458	14
Reg 2 total			\$ 51,112.00	1,814	\$ 28.18			
Reg 3A	915	262		4,747		48	500	20
Reg 3B	694	131		2,035		10	347	13
Reg 3 total			\$ 183,151.00	6,782	\$ 27.01			
Reg 4	253	78	\$ 14,663.00	786	\$ 18.66	22	97	5
2008 TOTAL	4,396	925	\$ 300,171.00	10,738	\$ 27.95	245	1,681	92
2007 TOTAL	4,633	927	\$ 315,417.74	11,450	\$ 24.58	277	1,773	115
CHANGE	-237	-2	\$ 15,246.74	-712	\$ 3.37	-32	-92	-23

* Permits issued for restoration work are excluded.

** Includes all lakes, ponds, ditches and streams listed on APM permits for 2008.

*** Fee totals provided by Karen Sokola on 12/16/08.

**** Data tabulated from 2,159 surveys and commercial applicator reports returned as of 2/4/09.

INTRODUCTION

Value of Aquatic Plants

Aquatic plants are essential components of most freshwater ecosystems. In many lakes, plants are the base of the aquatic food chain. The habitat aquatic plants provide in the shallow near-shore areas is important to both aquatic and terrestrial animals. They also serve important functional roles in lakes by stabilizing the lake bottom, cycling nutrients, and preventing shoreline erosion.

Many of Minnesota's most sought-after fish species depend heavily on aquatic vegetation throughout their life histories. Yellow perch, northern pike, muskellunge, panfish, and bass all depend on aquatic vegetation to provide food, spawning habitat, and nursery areas. Juvenile fish of most species feed on small crustaceans and insects that are abundant in stands of aquatic vegetation. Even species that may not require vegetation for spawning depend on the cover and forage found in aquatic vegetation.

Many species of wildlife are dependent on aquatic plants for food and nesting sites. Ducks eat the seeds and tubers produced by various water plants. Other aquatic plants, which are not eaten directly by waterfowl, support many insects and other aquatic invertebrates that are important sources of food for migratory birds and their young. Ducks have been known to alter migration patterns in response to food availability. Emergent aquatic vegetation provides nesting cover for a variety of waterfowl, wading birds, shorebirds and songbirds. The reproductive success of ducks that nest near lakes is closely tied to available aquatic plants and the cover it provides to hide young birds from predators.

The muskrat, an important furbearer, is almost entirely dependent on aquatic vegetation for food and shelter. Minnesota's largest mammal, the moose, also relies heavily on aquatic vegetation for food.

The distribution of many amphibians and reptiles is directly linked to the vegetation structure of aquatic habitats. Species preference of particular habitat types is related to food availability, types of escape cover, and specific microclimates. Emergent and submerged vegetation support invertebrate populations that are an important food source for amphibians and reptiles. During the breeding season some species of frogs call from emergent vegetation at the water's edge and their egg masses are often attached to aquatic plants. Freshwater turtles often eat submerged vegetation, which is an important source of calcium.

Beyond providing food and shelter for fish and wildlife, aquatic vegetation is important in maintaining a stable lake environment. Aquatic vegetation helps maintain water clarity by limiting the availability of nutrients, and preventing suspension of bottom sediments. Aquatic plants limit erosion of shorelines by moderating the effects of wave and ice erosion. A healthy native plant community is also important in preventing the establishment of non-native invasive aquatic plants. In short, aquatic plants serve many important functions for lakes, fish, and wildlife. Many of the things that we enjoy most about lakes are directly linked to aquatic vegetation.

The Aquatic Plant Management Program

Riparian property owners (lakeshore property owners) in Minnesota have a legal right to use and access the lake adjacent to their property. Aquatic vegetation may interfere with a lakeshore homeowner's ability to exercise that right. The purpose of the DNR's Aquatic Plant

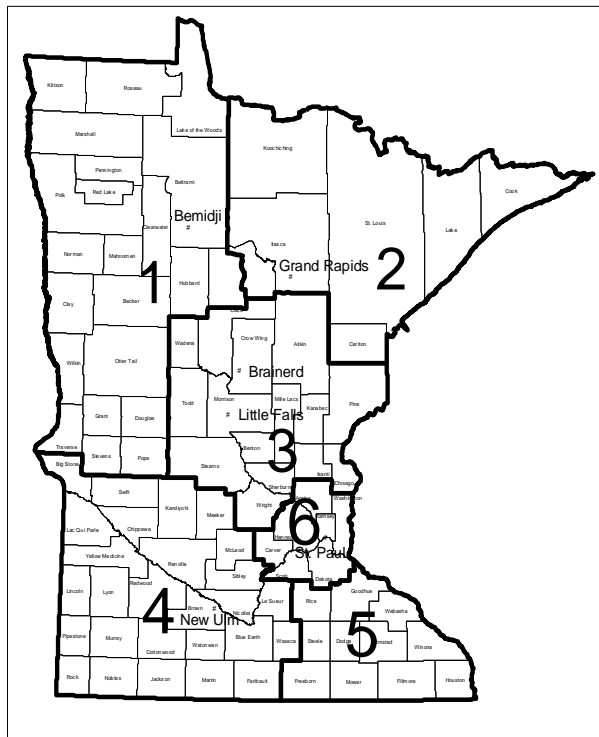
Management Program is to regulate how much aquatic vegetation lakeshore residents can control while preserving the beneficial functions of aquatic vegetation.

Other aquatic organisms can also interfere with the lakeshore property owner's enjoyment of the lake. Swimmer's itch, caused by the immature life stage of a parasite common in waterfowl, can cause significant and sometimes severe discomfort in humans depending upon a person's sensitivity to the organism. Algae (plankton and filamentous) can also create a nuisance and occasionally unhealthy conditions when they become overabundant. Relief from these nuisances may also be sought under an aquatic plant management permit.

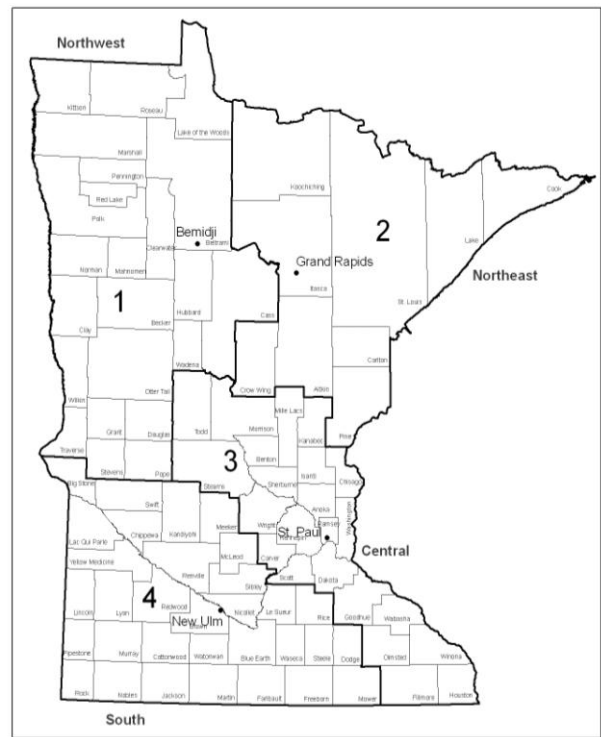
Administrative Regions

In July of 2002 the number of DNR administrative regions was reduced. The previous six-region structure was reduced to four administrative regions. The Brainerd Lakes Region, previously Region Three, was divided up between the Northeast Region (Region Two) and the Metro Region (Region Six), now the Central region. The southeastern part of the state, Region Five, was combined with the South Region or Region Four. Aquatic plant management permits were issued as they had been in the six-region structure through the remainder of the 2002 open-water season. In 2003 APM permits were issued according to the new regional boundaries. The new regional structure makes historical comparisons between regions more difficult. However, it is still possible to identify statewide trends and make comparisons between years.

DNR Administrative Regions
Pre-July 2002



DNR Administrative Regions as of
October 2006



The number of staff reviewing APM permit applications increased concurrent with the reduction of DNR regions. The reorganization moved some regional headquarters farther away from the major centers of APM permit activity (Appendix Table G). The Brainerd DNR Office, now in the Northeast Region, retained an Aquatic Plant Management specialist because the Brainerd Lakes Area is a center of APM permit activity. The Brainerd (2B) area office is responsible for application review for Aitkin, Crow Wing, and southern Cass counties. Grand Rapids, (2A) the location of the Northeast Regional DNR Headquarters, is responsible for application review for Carlton, St. Louis, Lake, Cook, Koochiching, and Itasca counties. The Central Region added an APM position to the Little Falls Fisheries office to accommodate the large number of permits previously issued from the Brainerd office. The Little Falls office (3B) is responsible for application review for Benton, Isanti, Kanabec, Pine, Mille Lacs, Morrison, Sherburne, Stearns, Todd and Wright counties. The Central Region DNR Headquarters in St. Paul (3A) is responsible for application review for the metropolitan area, Anoka, Carver, Chisago, Dakota, Hennepin, Ramsey, Scott, and Washington counties. In October of 2006 the Central Region boundaries were expanded to include Goodhue, Wabasha, Olmsted, Winona, Fillmore, and Houston counties along the Mississippi River in Southeastern Minnesota.

The DNR's Division of Fish and Wildlife is responsible for the administration of the Aquatic Plant Management Permit Program. Riparian property owners apply for a permit to their Regional Fisheries Manager. The Northwest, Northeast, and Central DNR Regions have Aquatic Plant Management Specialists who make site inspections and review applications for permit. In 2006, an Aquatic Plant Management Specialist was hired for the South Region. This person works out of the New Ulm Regional Fisheries office. Prior to 2006, site inspections and application review in the South Region were the responsibility of the Area Fisheries Supervisors.

The recommendation for the disposition of the permit application (approval, modification, or denial) is determined during the review process. This decision often involves a discussion with the lakeshore property owner. When applications for APM permits are received for shallow lakes where waterfowl management is the primary focus, the Aquatic Plant Management Specialist will seek the advice of the Area Wildlife Manager. When applications are modified or denied, the applicant may appeal to the Commissioner's Office for review. The purpose of this review is to determine if the permit decision was based upon rule standards. Finally, permit decisions can be appealed to an Administrative Law Judge through the contested case hearing process.

The coordinator of the Aquatic Plant Management Program is in the Division of Ecological Resources. This position is the department's contact with commercial mechanical control businesses, commercial aquatic herbicide applicators, and the Minnesota Department of Agriculture (MDA). The coordinator provides technical expertise on aquatic plant control methods and permitting requirements to lakeshore property owners and Department staff. The coordinator works to insure consistent interpretation of the APM rules throughout the Department. This position administers exams and issues operating permits to commercial aquatic plant harvesters. This person also reviews appeals of permit decisions for the Commissioner. The Program Coordinator maintains current labeling for aquatic plant control products and provides that information to field personnel. The Program Coordinator also prepares an annual report on program activities (this document) and coordinates the development of informational materials and forms provided to riparian property owners interested in aquatic plant management.

The APM program coordinator supervises staff in the Division of Ecological Resources whose job responsibility includes enforcement of aquatic pesticide rules and pesticide label requirements. An Aquatic Pesticide Enforcement Specialist conducts inspections of herbicide applications in public waters to monitor compliance with state and federal pesticide law and respond to reports of pesticide misuse (Appendix Tables E and F). The U.S. Environmental Protection Agency (EPA) partially funds DNR's aquatic pesticide enforcement activities through a grant administered by MDA.

Regulations

Authority for the DNR's aquatic plant management program is found in Minnesota Statutes M.S. 84.091 Subdivision 1, which designates ownership of wild rice and other aquatic vegetation in public waters to the State. M.S. 103G.615 authorizes the Commissioner of the DNR to issue permits to harvest or destroy aquatic plants, establish permit fees, and prescribe standards to issue or deny permits for aquatic plant control. The standards for the issuance of permits to control aquatic vegetation and the permit fee structure are found in MN Rules Chapter 6280. Minnesota Statutes and Rules can be reviewed at the Revisor of Statutes website <http://www.leg.state.mn.us/leg/statutes.asp>.

A permit from the DNR is required to use pesticides in public waters (generally any body of water 2.5 acres or larger within an incorporated city limit, or 10 acres or larger in rural areas), to use an automated aquatic plant control device, to control emergent vegetation such as cattails, wild rice, or bulrush, and to control submerged or floating-leaf vegetation above specified limits. A riparian property owner may, without a permit, physically remove (cut, pull, or harvest) *submerged* vegetation along one half the individual's lake frontage or 50 feet, whichever is less. The total area where submerged vegetation is removed may not exceed 2,500 square feet. In addition, a boat channel up to 15 feet wide, and as long as necessary to reach open water, may also be maintained by mechanical means without a permit. If floating-leaf vegetation is interfering with riparian owner's access, a channel, not more than fifteen feet wide, extending to open water, may be mechanically maintained without a permit. The vegetation that is cut or pulled must be removed from the lake and the managed area must remain in the same location each year.

The mechanical control of purple loosestrife, a plant on the Minnesota Department of Agriculture's noxious weed list, does not require a permit from the DNR. However, herbicide control of purple loosestrife below the ordinary high water level on public waters does require a permit. Because of the plant's status as a noxious weed, these permits are issued free of charge.

Beyond the permit requirement, any pesticide used in surface waters must be labeled for aquatic use and registered with the United States Environmental Protection Agency. When using an aquatic herbicide all label instructions and precautions must be followed. The permittee must post areas treated with herbicides so that anyone entering the area is informed of the herbicide application. The notification signs contain the following information: the name of the applicator, the treatment date, the name of the product used, expiration dates of any water use restrictions on swimming, fishing, household, and other uses. The DNR provides these signs to permittees and commercial applicators at no cost. A list of herbicides most commonly used for aquatic plant control and the amount used under permit in Minnesota in 1981-2008 is found in Appendix A and B.

Summary of Aquatic Plant Management Program Activities in 2008

The following summary of Aquatic Plant Management (APM) Program activities in 2008 comes from four sources: permittee survey forms (Appendix Table C and D), commercial aquatic applicator and commercial mechanical control reports, and Aquatic Plant Management (APM) permits.

Commercial applicators, harvesters, and riparian property owners who do control work in public waters are required to provide a yearly summary of their APM activity. With this information the past year's activities can be summarized, the control of aquatic vegetation in public waters is monitored, and trends in aquatic plant management are identified.

Survey forms are mailed to permit holders that did their own aquatic plant control work. Prior to 2000, permit holders that hired commercial applicators to perform the control work for them were included in the survey. They were asked to answer only those few questions pertinent to their situation. This often caused confusion and permittees would either not respond or would send the form to the commercial service for completion. In addition, when commercial applicators do the control work there are usually many customers on a single permit. However, only one of those customers is listed as the permittee. Hence, this approach relied on one individual to provide accurate information for up to 100 or more other people. Since commercial pesticide applicators are required by law to keep detailed records and their reporting is generally more precise, permit holders who hire a commercial firm are no longer asked to complete a survey form.

Survey forms were sent to all permittees that did their own chemical or mechanical control work. Of the 1,287 surveys mailed 1064 (83%) were returned. A separate survey was sent to 1,708 AUAPCD permit recipients, 1,502 (88%) were returned.

Permit Issuance

In 2008, a total of 4,396 permits were issued statewide for APM activities (this includes 65 shoreline habitat restoration permits), 237 fewer than in 2007 (Appendix Table G provides the county by county distribution of permits and permitted properties). These permits were issued for properties on 925 public waters (i.e. lakes, ponds, and streams) in 2008 (Figures 1, 2, and 3). In 2008, there were 1,708 permits issued for the operation of Automated Untended Aquatic Plant Control Devices (AUAPCD). The remaining 2,688 permits were issued to municipalities and lakeshore homeowners for pesticide use (includes algae and swimmer's itch control), mechanical control (cutting, pulling, or harvesting) of aquatic vegetation, or shoreline habitat restoration.

Over the last 15 years, the number of public waters where permits are issued has almost doubled. Little increase occurred until 1999 when the number of public waters with permitted APM activity increased sharply (Figures 2 & 3). The number of public waters with permitted APM activity in 2008 was 925, 2 fewer lakes than in 2007.

Figure 1. Permits issued, and the number of lakes with permitted aquatic plant control, by region, in 2008.

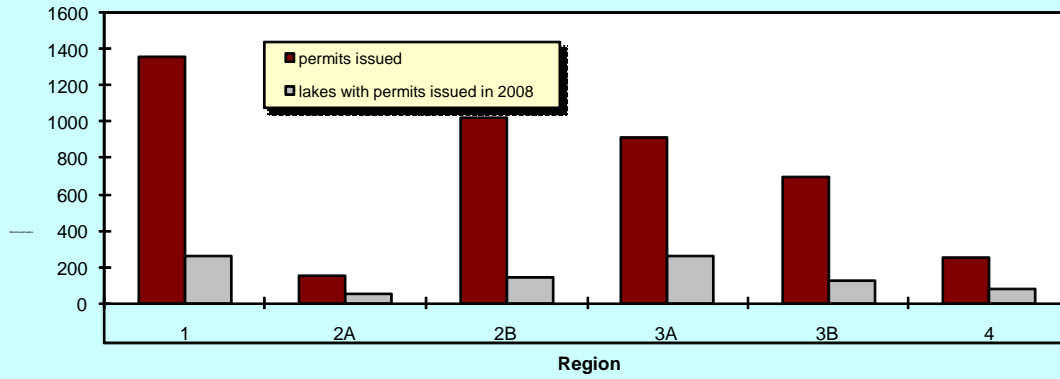


Figure 2. Numbers of permits issued for mechanical and chemical control (excluding AUAPCD) of aquatic vegetation, algae, and swimmer's itch, and numbers of lakes where permits were issued 1992-2008.

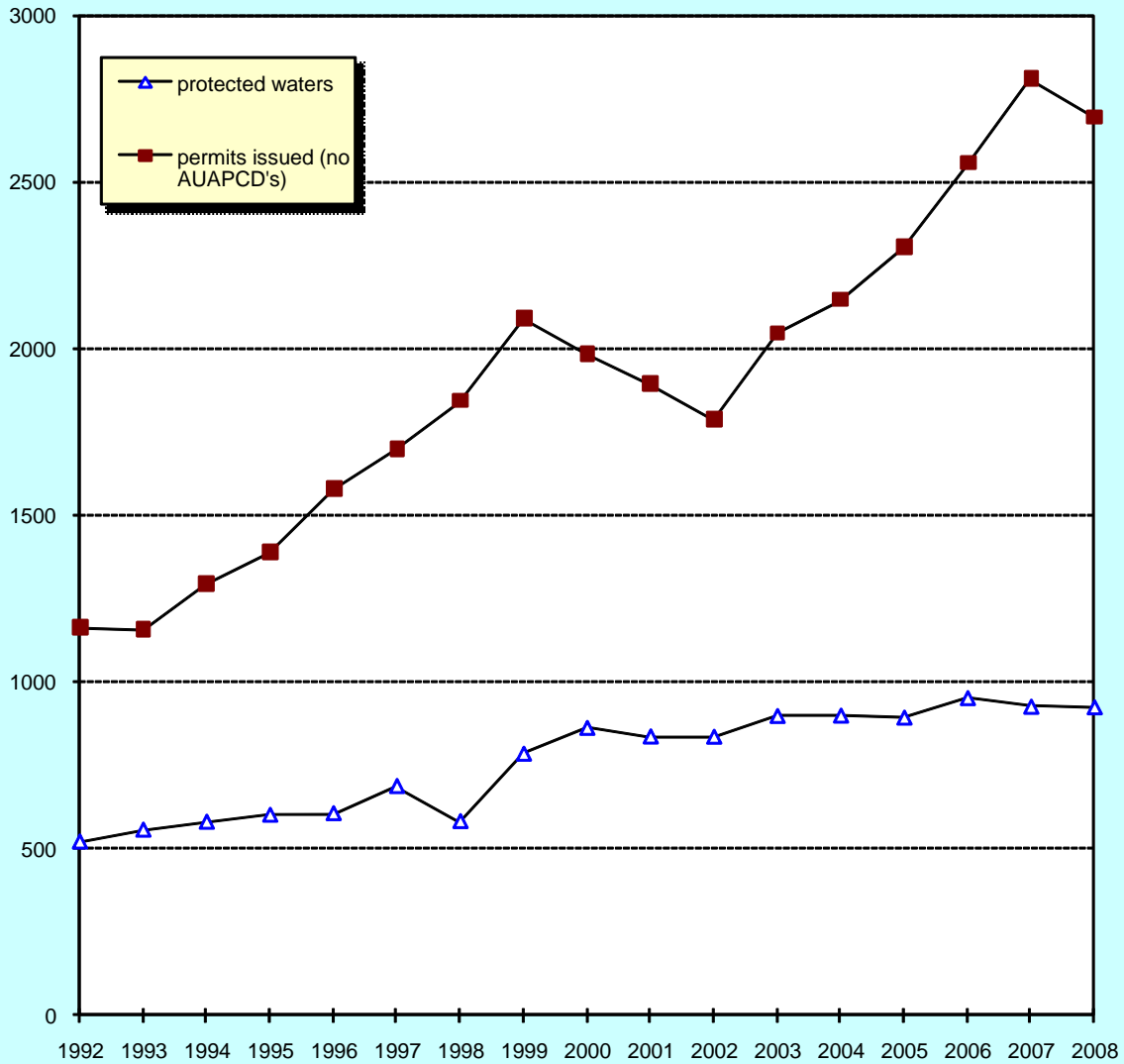
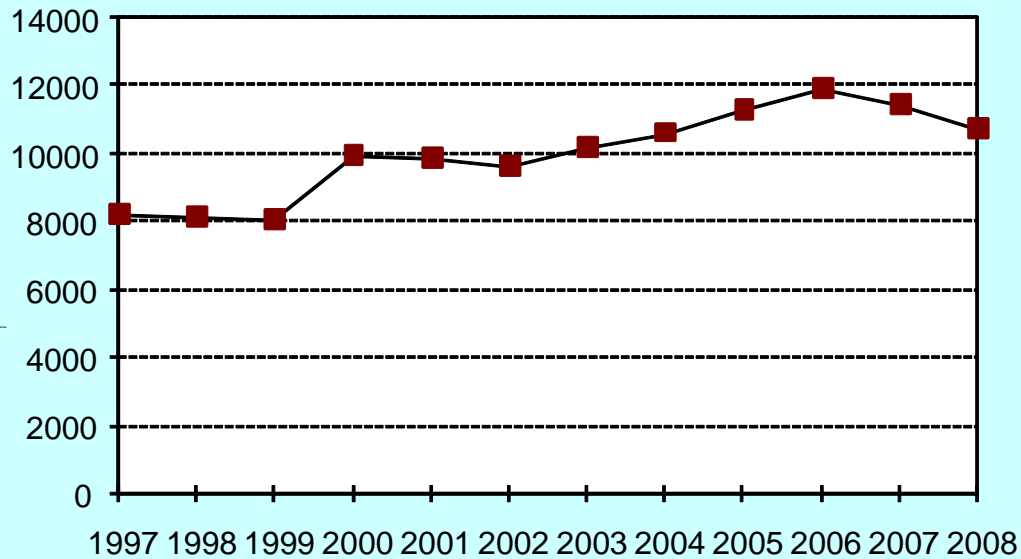


Figure 3. Numbers of properties permitted for APM statewide, 1997-2008.



Aquatic plant management permit issuance increased annually from 1992 until about 1999. Then in the early 2000's the numbers of permits issued decreased and there was a corresponding decrease in the numbers of participating properties. Permit numbers and properties began to increase again in 2003 through 2006. In 2008 the total number of properties declined for a second year in a row and the number of permits also declined. Spring of 2000 was the beginning of several years in a row that were cooler and wetter than normal in the Metro area. Cooler temperatures in the early part of the open water season may contribute to the decline in lakeshore property owners participating in the Aquatic Plant Management program.

Lakeshore homeowners may apply for an aquatic plant management permit as a group. Group permits are more popular in the Twin Cities metropolitan area than in greater Minnesota (Table 1). Homeowner's on large group permits can benefit from the \$750 cap on permit fees. The individual permit fee (\$35.00 per property) begins to decrease for groups larger than 21. Some permits have more than 100 properties listed on a single permit. In 2008 there were 10,738 properties covered by the 4,396 permits issued.

The statewide average number of properties per permit in 2008 was 2.4, similar to 2007. The Central Region, which includes the Twin Cities metropolitan area, typically has larger group permits than other areas of the state. In 2008, the Central Region averaged 4.2 properties per permit issued down from 4.4 in 2007. The Northwest Region averaged one property per permit; the Northeast Region averaged nearly two properties per permit (1.5). The average number of properties per permit in the Southern Region in 2007 was 2.9, but increased to 3.1 properties per permit in 2008.

Table 1. Permits grouped by the number of properties listed (excluding AUAPCD) by Region, 2008.

Region		1	2A	2B	3A	3B	4
Properties/permits:	>100	0	0	1	2	0	1
	51-100	0	1	0	11	3	4
	21-50	0	0	8	50	19	2
	11-20	0	0	9	50	24	1
	2-10	0	0	19	165	42	14
	1	481	145	579	523	380	159

The rules regulating aquatic plant removal from public waters require an inspection of the treatment site the first time an application is received or when there are changes requested to previously issued permits. Aquatic plant management specialists and area fisheries staff visit these sites to determine if the permit application is consistent with the standards for permit issuance in APM rules. This is also an opportunity to determine what kinds of plants and habitat are present in the treatment area. During these inspections, the size of the area may be reduced to protect important habitat based on the observations and professional judgment of the specialist. The number of applications received for shoreline vegetation removal and the numbers of permits that are issued as requested is shown in Table 2.

Table 2. Percent of permits requesting near-shore control that are issued as requested by region in 2008.

	1	2A	2B	Region 3A	3B	4	Statewide
number of applications requesting near-shore control	1,315	149	988	796	568	200	4,016
permits issued as requested	1,099	97	635	613	411	158	3,013
% of permits issued as requested	83.6	65.1	64.3	77.0	72.4	79.0	75.0

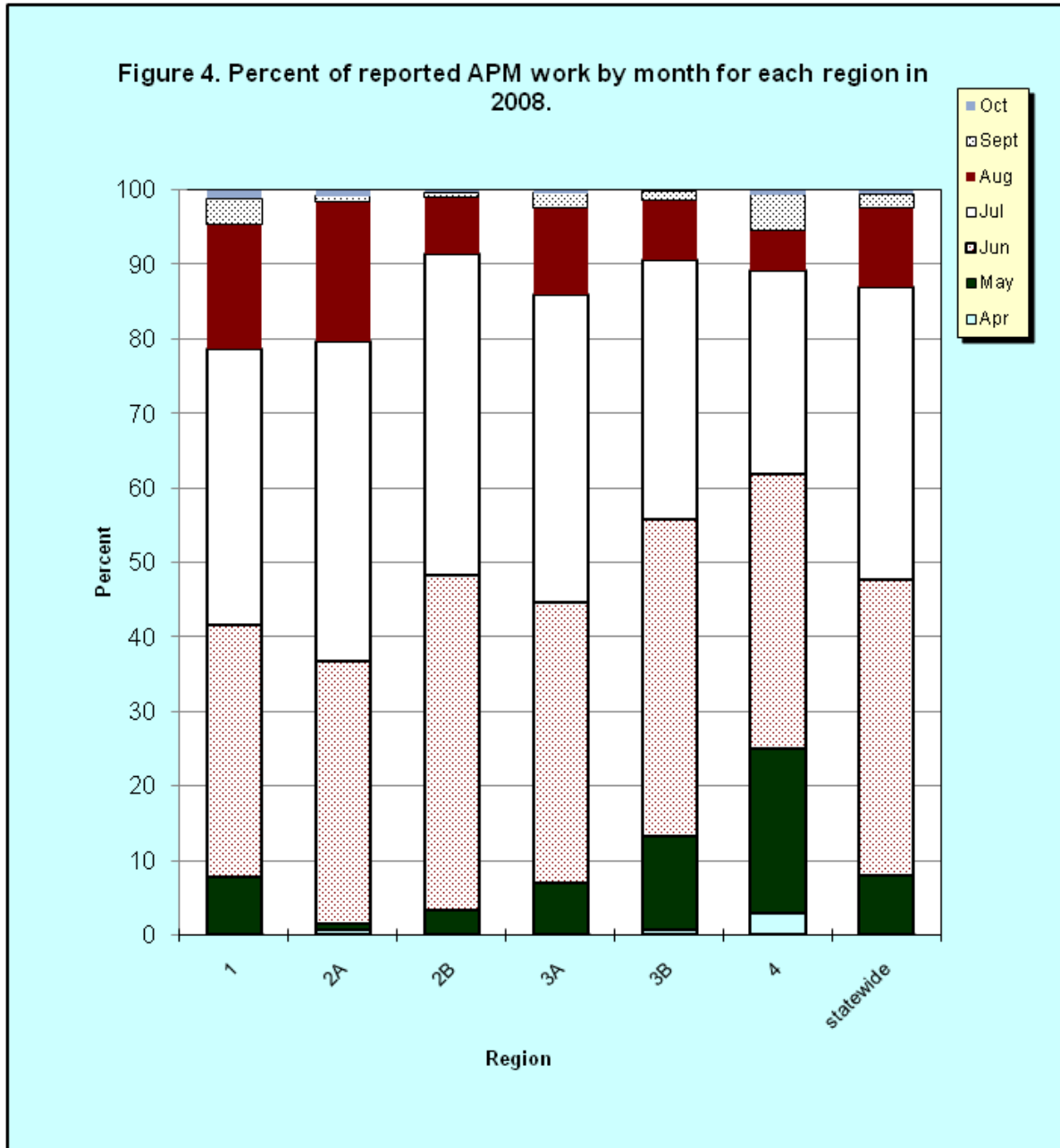
Permit Fees

Permit fees were increased during the 2003 legislative session. People applying for APM permits after August 1, 2003 were required to pay the higher fee. The new fee increased many types of APM permits from \$20.00 per property to \$35.00 per property. The cap on large group permits to control submersed vegetation was increased from \$200 to \$750.

Permit fee revenues in 2008 were \$300,171 about \$15,246 less than 2007. The average permit fee per property owner in 2007 was \$24.58. In 2008 the average fee per property was \$27.95. There is still an economy of scale for large group permits, hence the statewide average cost per property was a little above \$27.00 in 2006, and \$8.00 less than the cost of an individual permit under the new fee structure. The increase in the average permit fee in 2007 is likely due to a reduction in numbers and properties on multi-property permits and an increase in individual property permits.

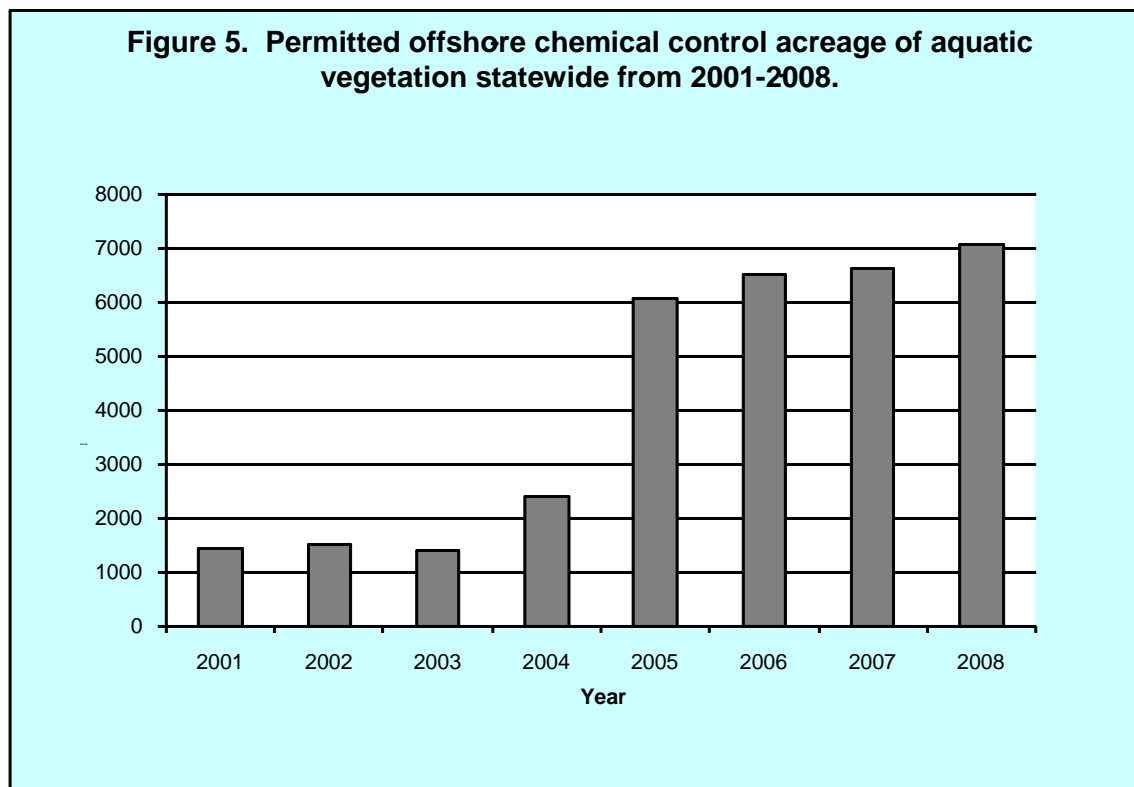
Timing of Treatment

Permits are issued for the open water season, generally from May through September 1. However, aquatic plant control can begin as early as January and extend through November. In 2008 about 87% of the permitted work, reported statewide, was completed in June, July, and August (Figure 4). Because most aquatic plant control in Minnesota is recreationally motivated this pattern has been consistent over time.



Acres of aquatic plant control permitted

The number of acres permitted for chemical control of submersed aquatic plants fluctuates annually and has increased sharply in recent years (Figure 5). This may mean that aquatic plant control is highly variable depending on the season. One contributing factor is the offshore control of aquatic vegetation focused primarily on non-native invasive species. A few large Eurasian watermilfoil and curly-leaf pondweed treatments can have a significant influence on the total number of acres permitted for treatment. This was evident in 2004 and 2005. In 2004, several lake-wide treatments of curly-leaf pondweed in the Central Region were responsible for the increase in treated acres. These lakes in addition to Lake Benton, a 3000-acre lake in Lincoln County, (South Region), were treated again in 2006, 2007, and 2008 with an aquatic herbicide to manage curly-leaf pondweed. As the interest in managing invasive species increases this trend is likely to continue.



Aquatic plant control methods

Again, in 2008, about 39% of all permits issued for aquatic plant control permitted the use of plant removal with AUAPCD's. Aquatic plant control using herbicides, plant harvesting, and plant removal by hand, and aquatic plant restoration accounted for the remaining 61% of the permits issued for aquatic plant management (Figure 6). It is important to remember that a limited amount of mechanical control of submerged and floating leaf vegetation can be done without a permit and a permit is always required when herbicides or automated devices are used for aquatic plant control. The total area permitted statewide for the various methods of near shore aquatic plant removal and the average area permitted per property in 2008 are found in Table 3. Permit holders were asked if they performed the control over the entire area allowed in their permit. Nearly 24% of those responding indicated that control work done was less than the area permitted.

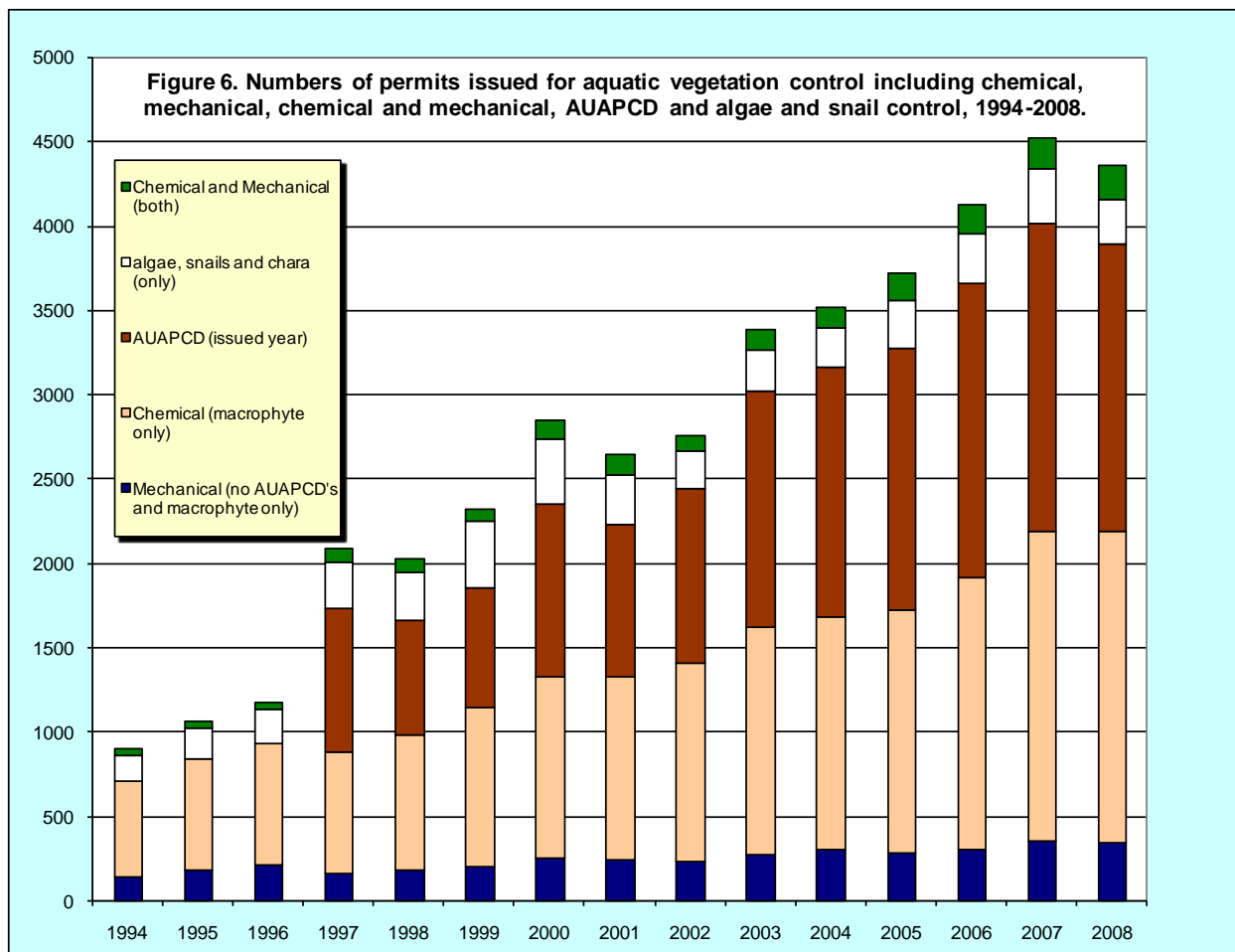


Table 3. Total near-shore area permitted, in acres, by region, for control of submerged vegetation, swimmer's itch and AUAPCD use in 2008.

Control	Region						Total number of acres	Props	Ave. Acres/Prop.
	1	2A	2B	3A	3B	4			
Herbicide control excluding off shore treatment	40.9	7.9	74.8	683.7	239.1	140.2	1,186.6	6,183	0.192
Mechanical control excluding off shore removal	19.2	1.2	19.6	28.0	0.9	7.3	74.2	406	0.183
Swimmer's itch control *	31.7	7.1	102.0	865.3	191.8	75.4	1,273.3	5,587	0.228
AUAPCD 2008 issued	69.8	0.3	31.1	9.5	15.0	4.3	130.0	1,703	0.076

* includes all permits with swimmers itch control

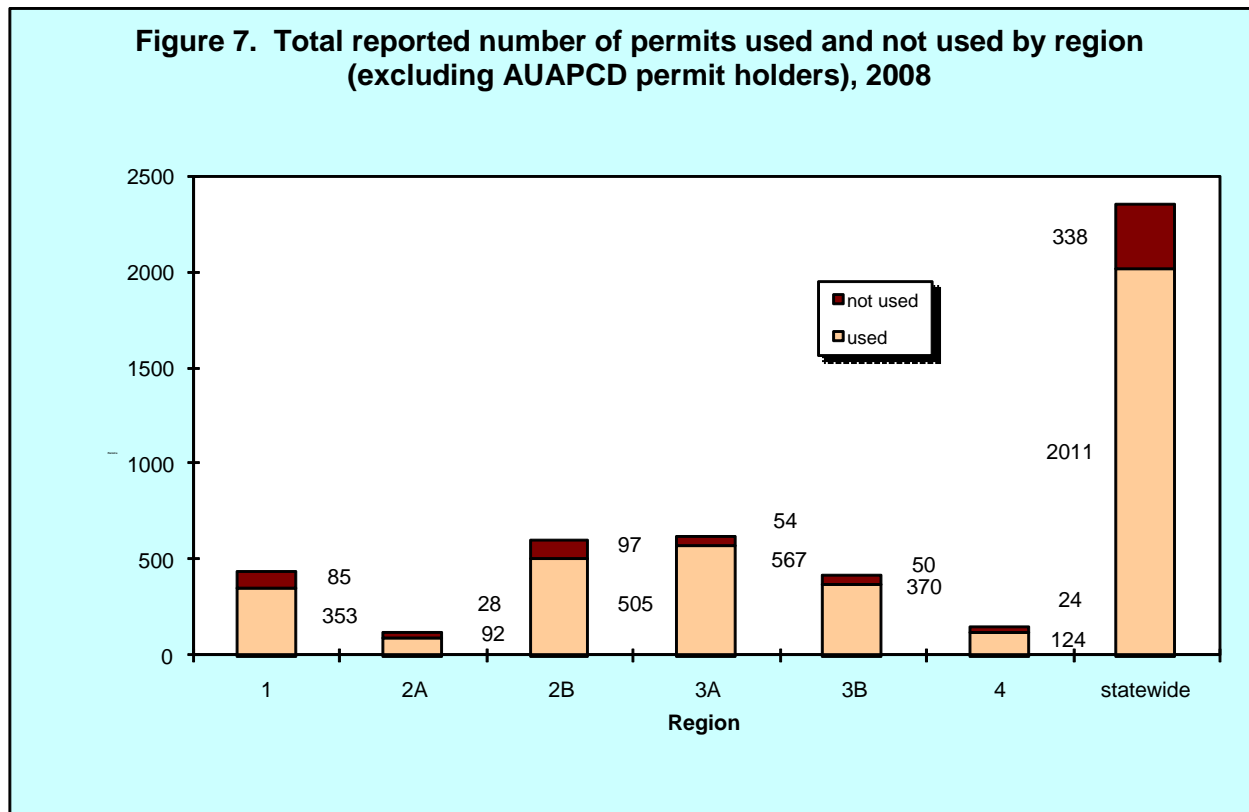
Percent of Aquatic Plant Removal Permits Used

Each year some permits issued for aquatic plant management activities are not used (Figure 7). Statewide, 85% of permits issued were reported used by the permittees or commercial applicators/operators doing the work, this is down slightly from 2007. Permittees indicating that their permit was not used were asked to indicate why by responding to one or more choices provided on the survey. The results are summarized in Table 4, below. In 2008, the reason most frequently given (46%) for not using an APM permit was that the property owner was unable to do the permitted work; 4% reported not doing the work because of getting their permit too late, down from 20% in 2007.

Table 4. Response by permit holders to choices indicating that their APM permit was not used, expressed as a percent by region in 2008.

Region	1	2A	2B	3A	3B	4	Statewide
nuisance condition did not devel.	20	4	18	39	25	33	21
got permit too late	4	22	2	0	19	22	8
unable to do the work	48	44	49	57	36	28	46
other	28	30	31	4	19	17	25
total	100	100	100	100	100	100	100

2A = Grand Rapids, NE Region; 2B = Brainerd, NE Region; 3A = St. Paul, Central Region; 3B = Little Falls, Central Region



Who does control

Lakeshore homeowners perform about 40% of the permitted mechanical and herbicide plant control. Commercial applicators and mechanical control companies performed about 60% of the control work statewide in 2008. This represents a slight increase over the percent of the work done by commercial applicator and aquatic plant harvesting companies in 2007. Permit holders in the Central Region hire commercial services more frequently than any other region (Figure 8). Commercial aquatic plant control companies perform about 74% of the control in the Central Region. In 2008, 60% of the control in the Northeast Region was performed by commercial service. However, most of the commercial treatment was done in the Brainerd Lakes Area (2B), most permitted control in the Grand Rapids area (2A) is still done by the homeowner. Permit holders perform about 78% of the control in the Northwest Region and 50% in the South Region. Figure 8a shows the trend in the percent of permitted aquatic plant control performed by commercial service over the last eight years.

Satisfaction

Permittees who personally undertook aquatic plant control activities were asked to indicate their satisfaction with the results of the aquatic plant control. Generally, permit holders were satisfied with the results of the control. About 72% of the respondents were satisfied with the results of the herbicide control. About 68% of those responding were satisfied with the results of treatments to control swimmer's itch and 51% of respondents were satisfied with results of mechanical control. It is important to remember that permit holders hiring commercial services were not included in the survey.

Reapply for permit

Permit holders, excluding AUAPCD permittees, were asked if they would apply for a permit in 2008. Of the 1002 responses, 779 (78%) said they would reapply next year, a 6% increase from 2007. Approximately 19% (190) of the permit holders responding indicated that they were unsure if they would reapply for permit in 2008. The number of permittees reporting that they would not apply (33 or 3.3%) was slightly higher than in 2007. Regardless of their response, all 2008 permit holders, whose permits expire, will receive permit application materials prior to the start of the 2009 open water season.

Figure 8. Percent of reported permitted APM work done by permittee and by commercial service for each region in 2008.

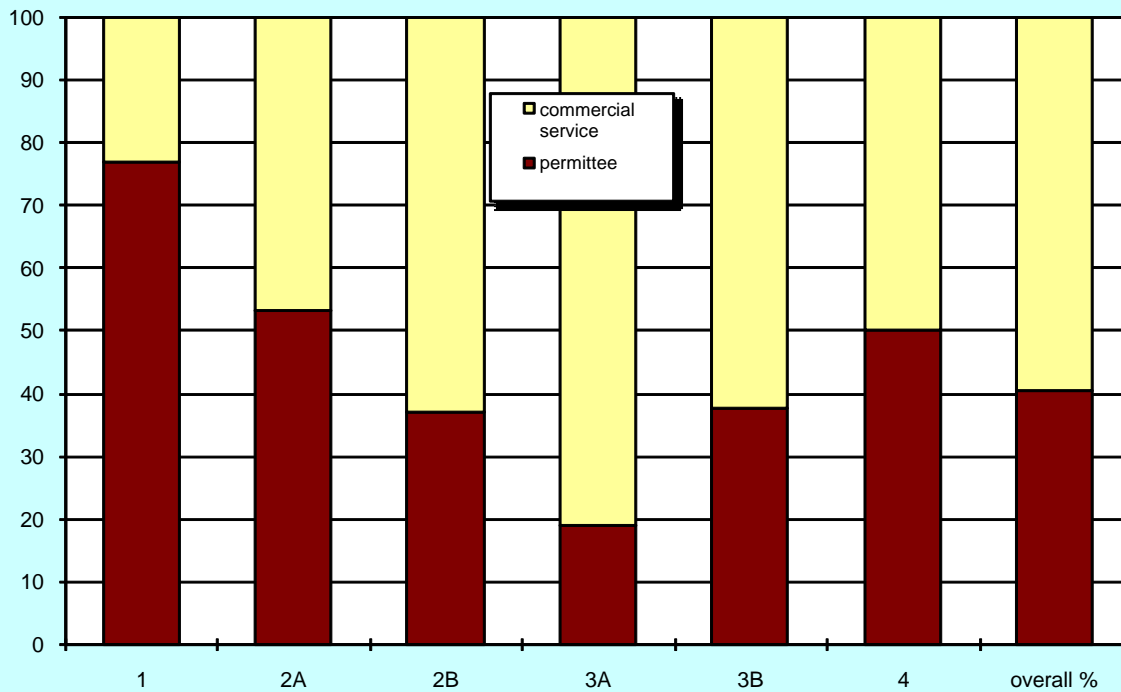
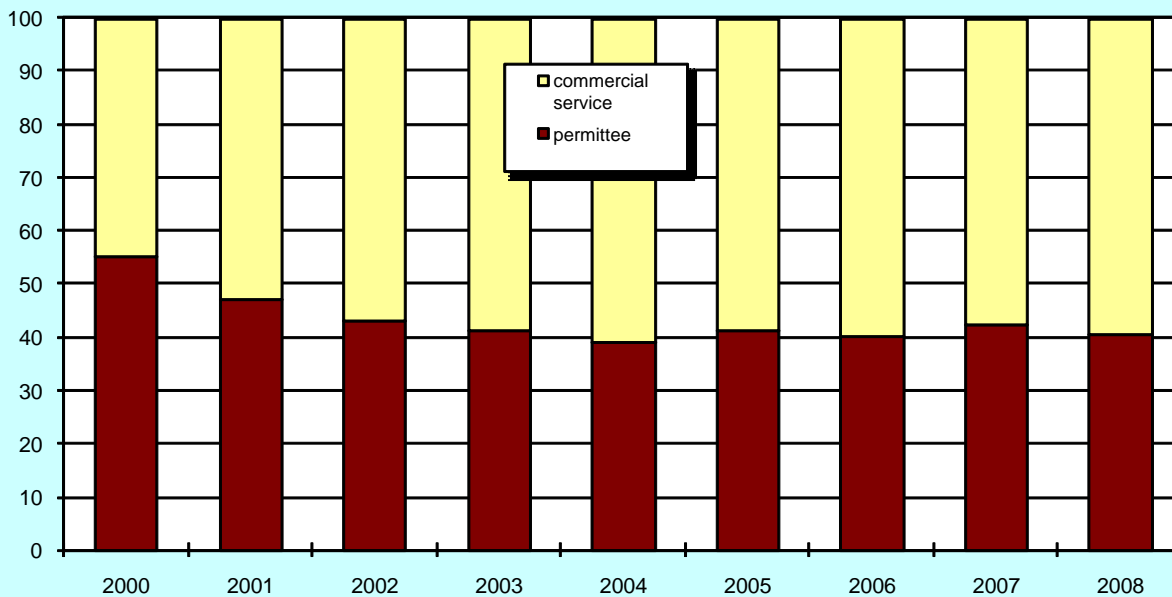


Figure 8a. Percent of reported permitted APM work done by permittee and by commercial service statewide from 2000-2008.



Automated Untended Aquatic Plant Control Devices (AUAPCD)

Before 1997 the operation of an automated mechanical aquatic plant control device did not automatically require an APM permit, and few AUAPCD permits were issued. The Aquatic Plant Management Rules were revised in 1997 to require a permit for the operation of these devices because of their potential to excavate bottom sediments, and impact spawning habitat. In 2008 there were 1,708 permits issued for these devices statewide. Of those permits 1,188 were issued for a one-year term and 520 were issued for a three-year permit term. Permits are issued for three years if the applicant agrees to a reduced area of operation and qualifies for a three-year permit based on the vegetation types present. More than 76 percent of the AUAPCD permits were issued in the Northwest and Northeast Regions; this is one percent higher than 2007. In addition to the permits issued in 2008, there are active three-year permits issued in 2006 and 2007 (638 and 647 respectively). Of the 1,701 surveys mailed 1,610 (88%) of the AUAPCD permit holders statewide responded to the questionnaire. Three-year AUAPCD permit holders issued permits in 2006 and 2007 were not surveyed.

There are at least three different companies producing AUAPCD's that are used in Minnesota, the Crary Company WeedRoller®, the Colman Beach Groomer® and the Lake Restoration Lake Maid®. Thirteen permit holders that responded reported they used homemade devices in 2008. Based on survey results, two-thirds of AUAPCD owners in Minnesota have owned their device for more than three years. In contrast, 22% have owned their device from 1 to 3 years and 12% have responded that they have owned their device for less than one year.

Most of the people responding to our questionnaire (83%) were the sole owner of an AUAPCD. Nine permit holders stated that they rented their device in 2008. This was a small decrease from those reporting renting in 2007. Some homeowners opt to purchase the device cooperatively and share it during the summer months. Approximately 17% of the people who used an AUAPCD in 2008 either, rented, borrowed, owned and shared, or jointly owned their AUAPCD, a 6% decrease from 2007.

Lakeshore homeowners have two AUAPCD permit options, provided the location is suitable for the operation of these devices. The annual renewal option is used when the lakeshore homeowner operates in an area greater than 2,500 square feet or more than 50 feet alongshore. The one-year permit option showed a moderate increase in 2008 (Figure 9). Applicants choosing the three-year permit option decreased significantly from 2007 (Figure 9).

The manufacturer of the WeedRoller® has stated that with time people will need to use the WeedRoller® less frequently to achieve acceptable control. The company explained that once the plants were gone there would be little need to use the machine. We have asked the question, how often do you operate your AUAPCD? and sorted the responses by the length of time people had indicated they had owned the machine. Recent AUAPCD owners are more likely to operate the device longer than those people who have owned the device for several years (Figure 10). About 180 persons permitted to operate an AUAPCD stated that, for various reasons, they did not operate the device in 2008, similar to 2007.

The AUAPCD had higher satisfaction ratings than other methods of aquatic plant control. When asked, were you satisfied with your AUAPCD, 96% of those responding indicated that they were satisfied with these devices. This percentage is 2% lower than 2007.

Figure 9. Numbers of permits issued allowing the use of AUAPCD's in Minnesota public waters

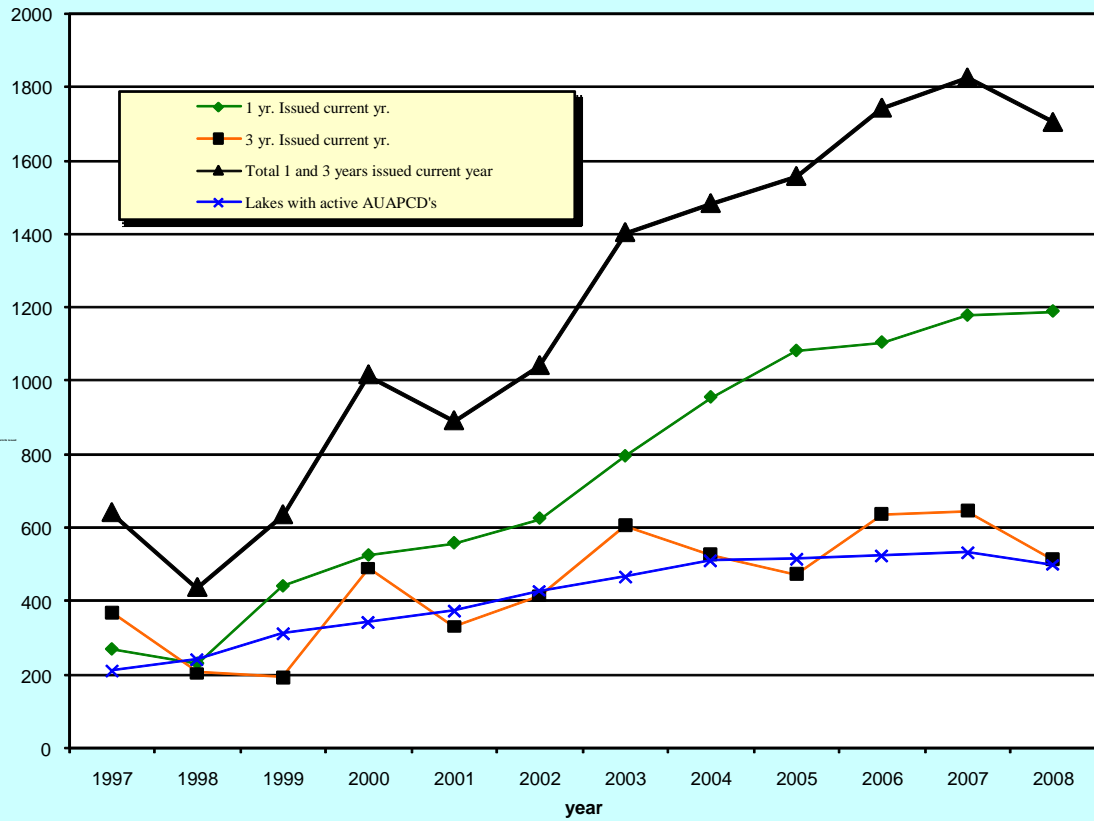
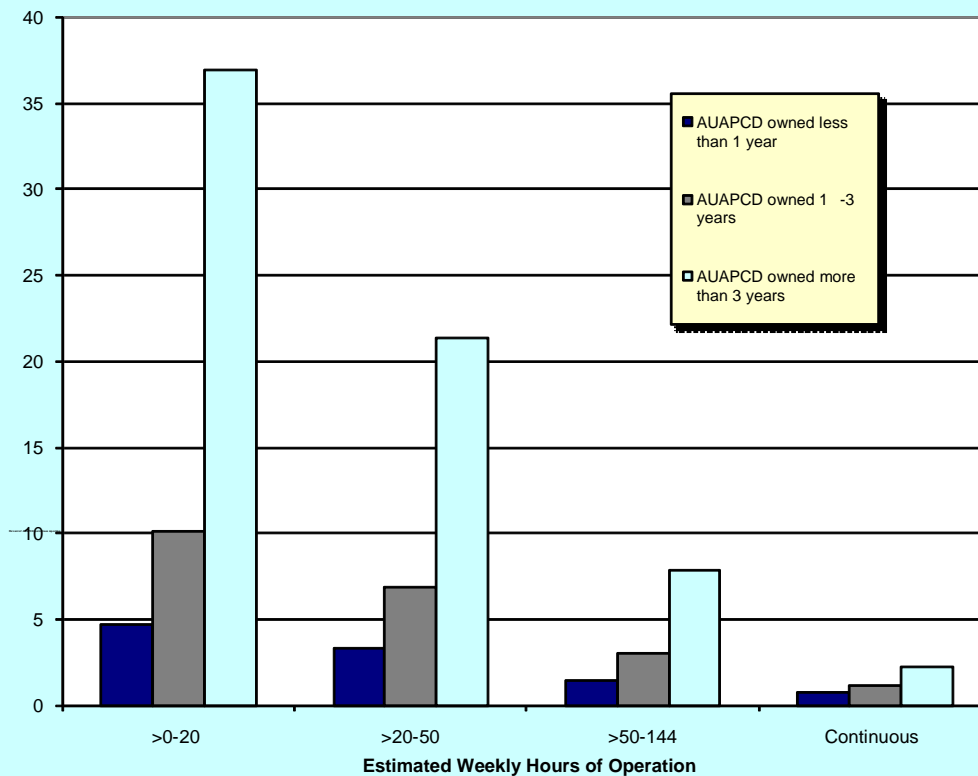


Figure 10. AUAPCD use from May through August, 2008 categorized by length of ownership expressed as a percent of all AUAPCD permittees reporting.



The DNR sends AUAPCD permit holders a sticker that must be displayed on or near the unit to help Conservation Officers and APM staff identify permitted units. Beginning in 2000 use of the sticker became a mandatory condition of the permit. For the last 5 years about 98% of the permit holders responding to this question had no difficulties displaying the sticker. For this reason 2008 permit holders were not asked if they had any difficulties displaying the sticker.

Filamentous algae control

The aquatic plant management rules allow the control of filamentous algae with copper sulfate. Filamentous algae can become a nuisance by interfering with swimming and wading. Permit issuance for filamentous algae control has increased at about the same rate as permits for submerged vegetation control (Figure 11). Filamentous algae control is commonly requested on applications for control performed by commercial services.

Chara control

The aquatic plant management rules allow the control of chara with copper sulfate. Chara is a macro-algae that can interfere with recreation in some lakes. Since 1997 there have been approximately 300 hundred lakes each year where permits have been issued for chara control (Figure 12).

Figure 11. Numbers of permits issued for filamentous algae control, and numbers of lakes where permits were issued 1997-2008.

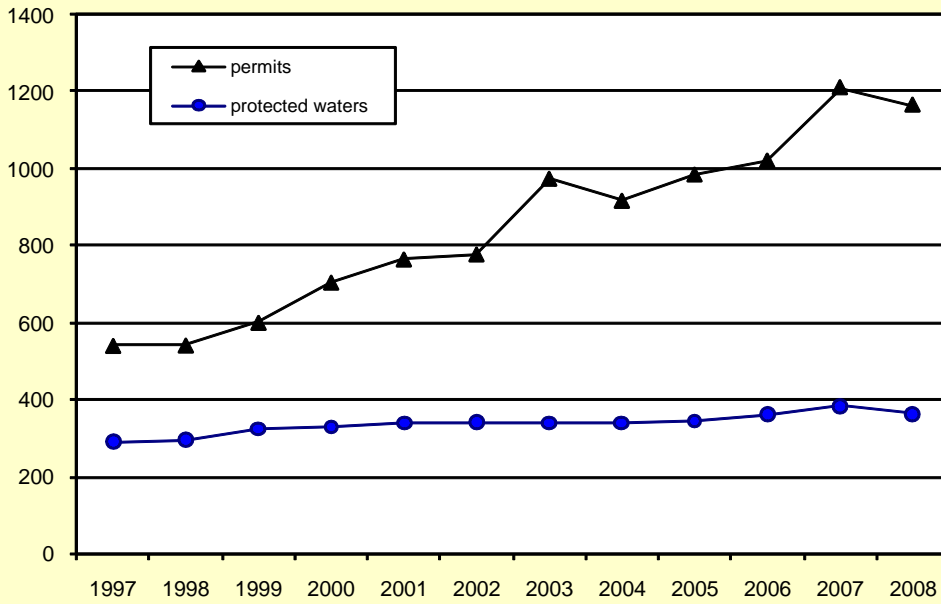
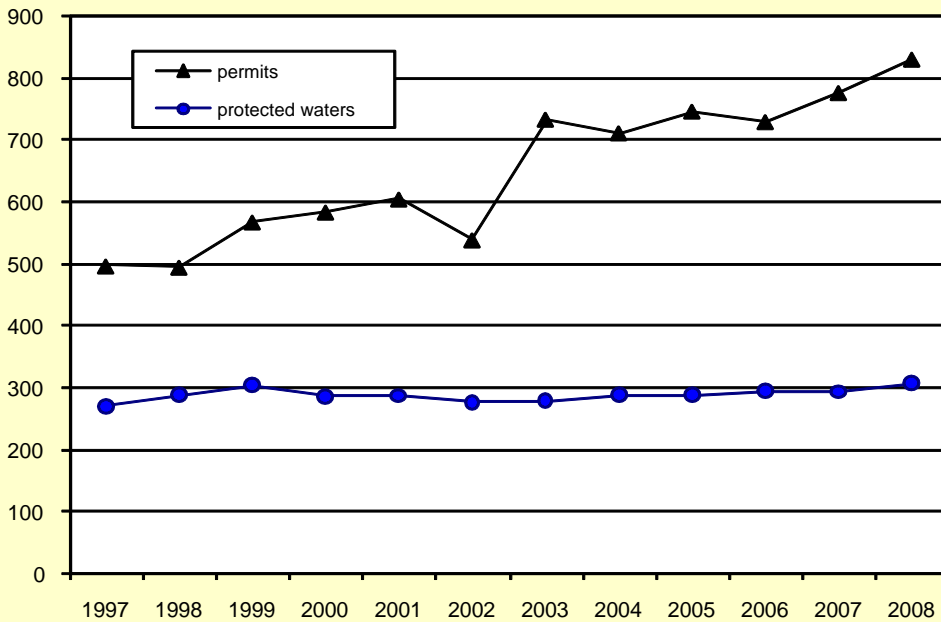


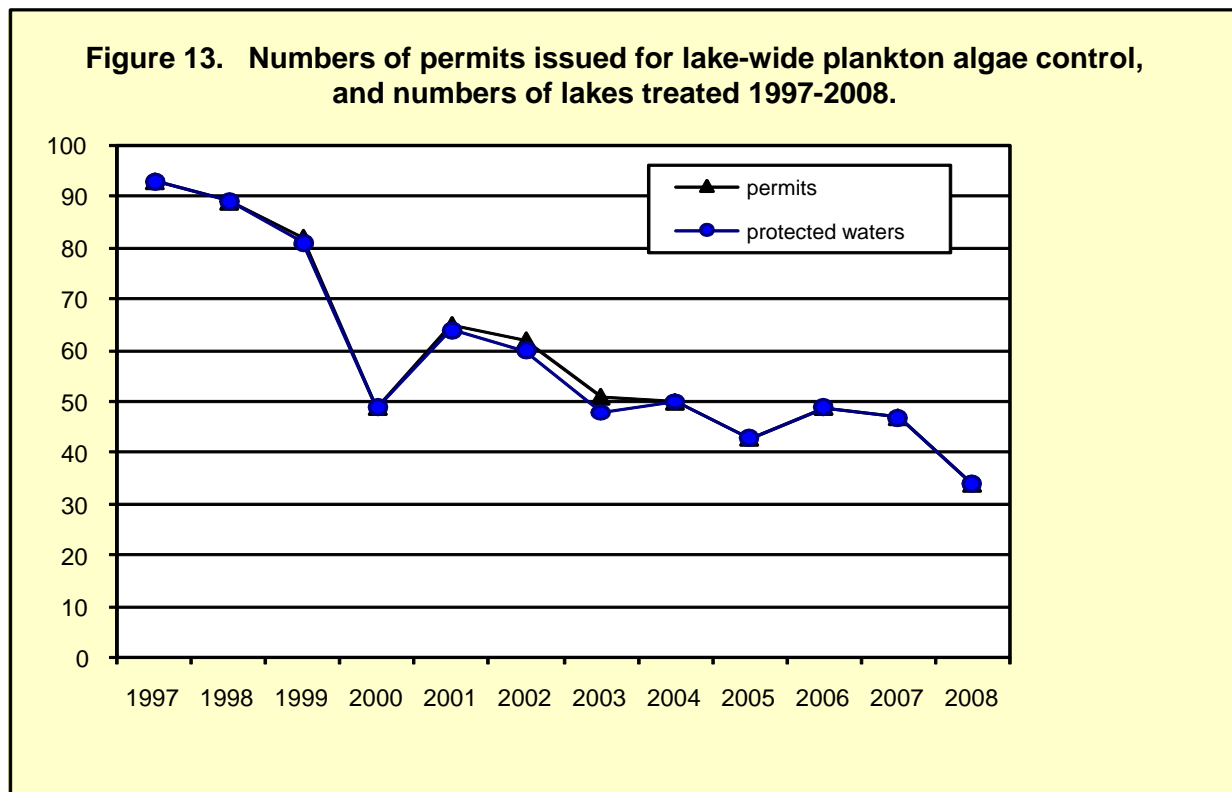
Figure 12. Numbers of permits issued for chara control, and numbers of lakes where permits were issued 1997-2008.



Plankton algae control

The aquatic plant management rules allow the control of plankton algae when there is an “excessive algae bloom.” The characteristics of an “excessive algae bloom” as defined by the rules are: an algae population dominated by blue green algae, a Secchi disc reading typically 2 feet or less, floating mats or scums of algae have accumulated on the downwind shore, or decomposition of accumulated algae has occurred releasing a blue-green pigment and causing an offensive odor.

The numbers of lakes treated with algaecides to control plankton algae has been decreasing over the last ten years (Figure 13). Copper sulfate treatments can cause an increase in water clarity when the turbidity is due to algae, but the increased water clarity is usually temporary and the treatment may need to be repeated. Due to the temporary nature of control, the possibility of a fish kill caused by a dissolved oxygen sag from decomposing algae, the buildup of copper in lake sediments, and the potential for algae to become resistant to copper, lake-wide plankton algae treatments are discouraged.



Swimmer’s itch control in Minnesota lakes

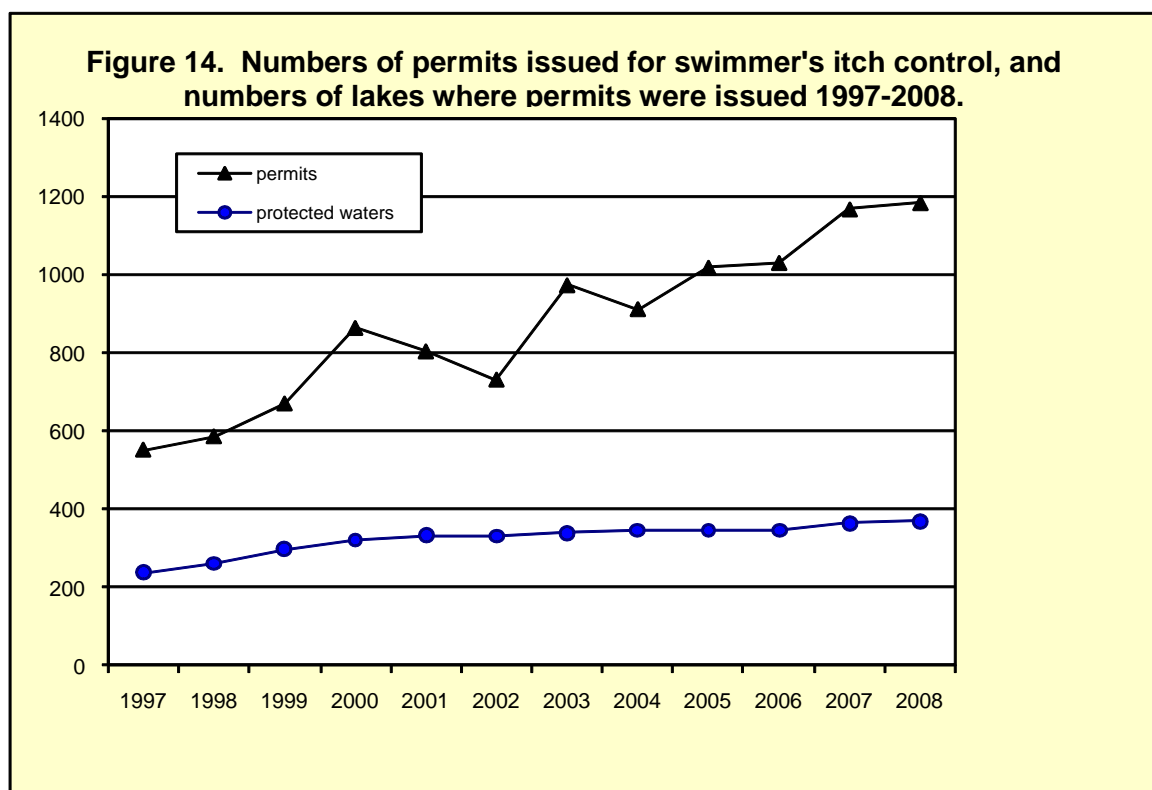
A condition known as Swimmer’s itch (a.k.a. lake itch, wader’s itch) has garnered complaints from swimmers in Minnesota lakes since at least the 1800’s and has likely been around for much longer. The cause of this irritating skin condition was discovered by W.W. Cort in 1928 at the University of Michigan Biological Station (Blankespoor and Reimink, 1991). Cort discovered that swimmer’s itch (cercarial schistosome dermatitis) is caused by the immature life stage of common non-human schistosome trematodes called the cercaria.

These parasites have a complex life history. The adult fluke lives in the blood vessels lining the intestine of its definitive host where it reproduces and releases eggs. The eggs enter the gut and leave the animal in the feces. The eggs hatch when they enter the water becoming a larvae called a miracidia. The miracidia then infects a snail where it develops into a life stage called the cercaria. The cercaria, upon release from the snail, seeks its definitive host, usually some sort of waterfowl. The cercaria does not feed and will only live for about 24 hours unless they find a proper host. When a proper host is located the cercaria penetrates the skin, finds its way to the blood vessels lining the gut, and becomes an adult completing its life history.

The problem for humans occurs when the cercaria mistakes us for its proper host. When a cercaria penetrates a human's skin it is attacked and killed by the person's immune system. Although the organism cannot complete its life history in humans, individuals sensitive to the infection can suffer from an allergic reaction. The symptoms will appear on areas of the body submersed in the lake and are typified by areas of redness and swelling, similar to a mosquito bite, and are accompanied by a severe itching sensation. These symptoms can last up to two weeks.

Not everyone is bothered by swimmer's itch; about 30 to 40% of the population is sensitive to swimmer's itch infection. This explains why some people swimming in a lake at the same time and place as a person severely affected experience no symptoms. Like other allergic reactions, a person's degree of sensitivity increases with each exposure.

The numbers of permits issued for swimmer's itch has increased steadily since 1997. The Brainerd Lakes Region, has had more lakes per year with permitted swimmer's itch control than any other area. In 2008 there were nearly 370 lakes statewide with requests for permit to control swimmer's itch (Figure 14, Appendix Table H). About 70% of those responding were satisfied with the results of treatments to control swimmer's itch.



Lakeshore property owners may get a permit from the DNR that allows the application of copper sulfate to the lake for the control of swimmer's itch. The intent of the copper sulfate application is to kill snails that harbor the immature life stage of the fluke that causes swimmer's itch. Individuals receiving a permit to control swimmer's itch with copper sulfate are generally allowed to treat the permitted area 3 times per summer.

Invasive species control

In addition to oversight (permitting) responsibilities for aquatic plant management efforts conducted by individuals to improve access or recreational use, the DNR has statewide control programs for three, non-native invasive aquatic plants: curly-leaf pondweed, purple loosestrife, and Eurasian watermilfoil. The DNR has recently initiated a pilot project to learn if ecological benefits can be attained from lake-wide control of curly-leaf pondweed or Eurasian watermilfoil or both.

Curly-leaf pondweed

Curly-leaf pondweed (*Potamogeton crispus*) is a non-native invasive, submersed aquatic plant species introduced to Minnesota at the turn of the 20th Century. Curly-leaf pondweed is known to occur in 752 Minnesota lakes in 70 of the 87 counties in Minnesota. In many lakes this plant causes severe recreational nuisances.

Curly-leaf pondweed's life cycle is considerably different than native aquatic plants. When native aquatic plants are just beginning to grow (mid to late May) curly-leaf pondweed is forming dense mats on the lakes surface that can interfere with recreation and the growth of native aquatic plants. By mid-summer, (early to mid July) curly-leaf plants begin to die back, which results in rafts of dying plants piling up on shorelines. But before the plants die they form vegetative propagules called turions (hardened stem tips). New plants sprout from turions in the fall (Catling and Dobson, 1985). The die back is often followed by an increase in phosphorus (Bolduan et al., 1994) and undesirable algal blooms. These algae blooms interfere with light penetration and can also reduce native plant abundance.

Standard control methods provide relief to lakeshore property owners from the recreational nuisances caused by surface mats of curly-leaf pondweed, but have no long-term effect on the abundance of the plant. Recent research conducted by the U.S. Army Corps of Engineers (ACE) has revealed promising control strategies that may help to reduce the abundance of this plant. The key to the new strategies for the control of curly-leaf pondweed is treating the plant early in the season (when water temperatures are between 50 and 60 degrees F). If this early season treatment strategy is repeated in successive years the turion bank should become depleted, resulting in the reduction of overall abundance of the plant, the severity of algae blooms, and give native vegetation a competitive advantage.

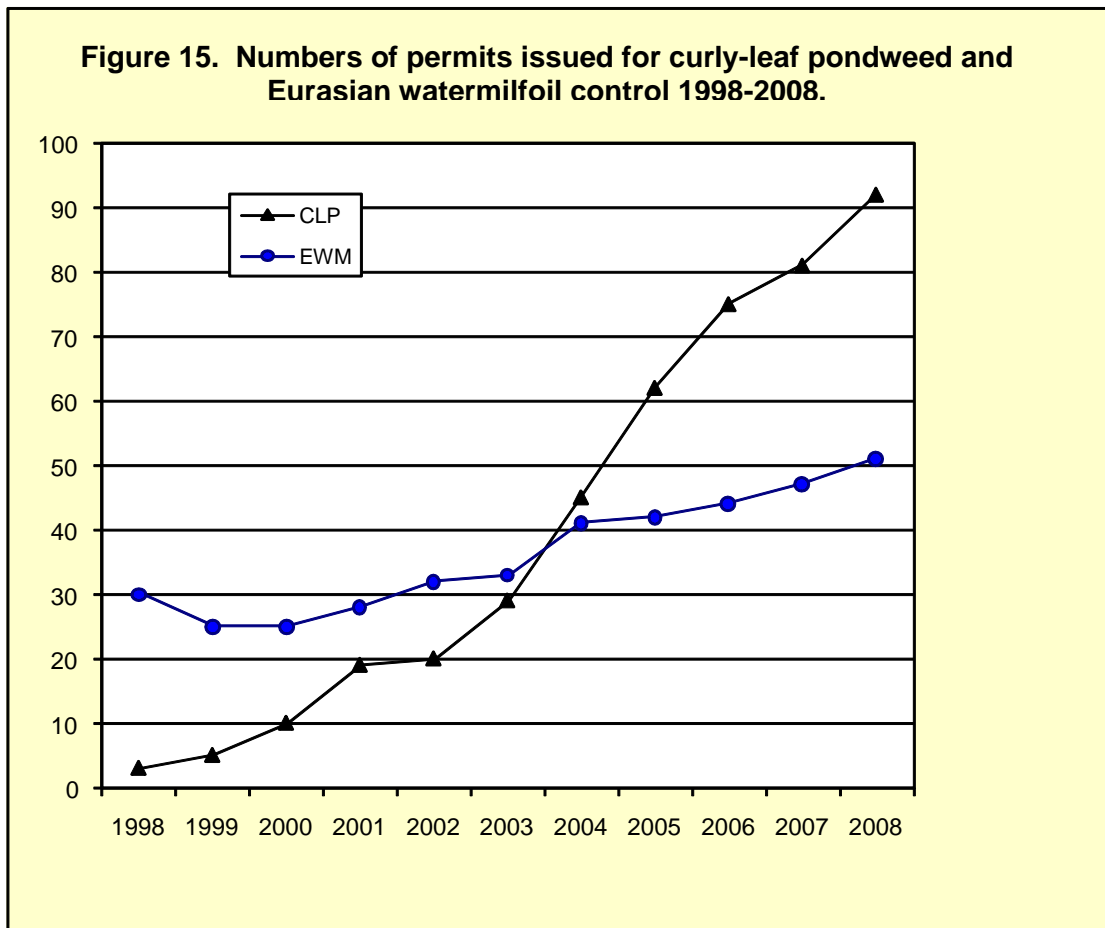
Figure 15 shows how interest, reflected by the numbers of permits issued, in curly-leaf pondweed control has increased since the completion of the Army Corp of Engineers research on early season cold-water control.

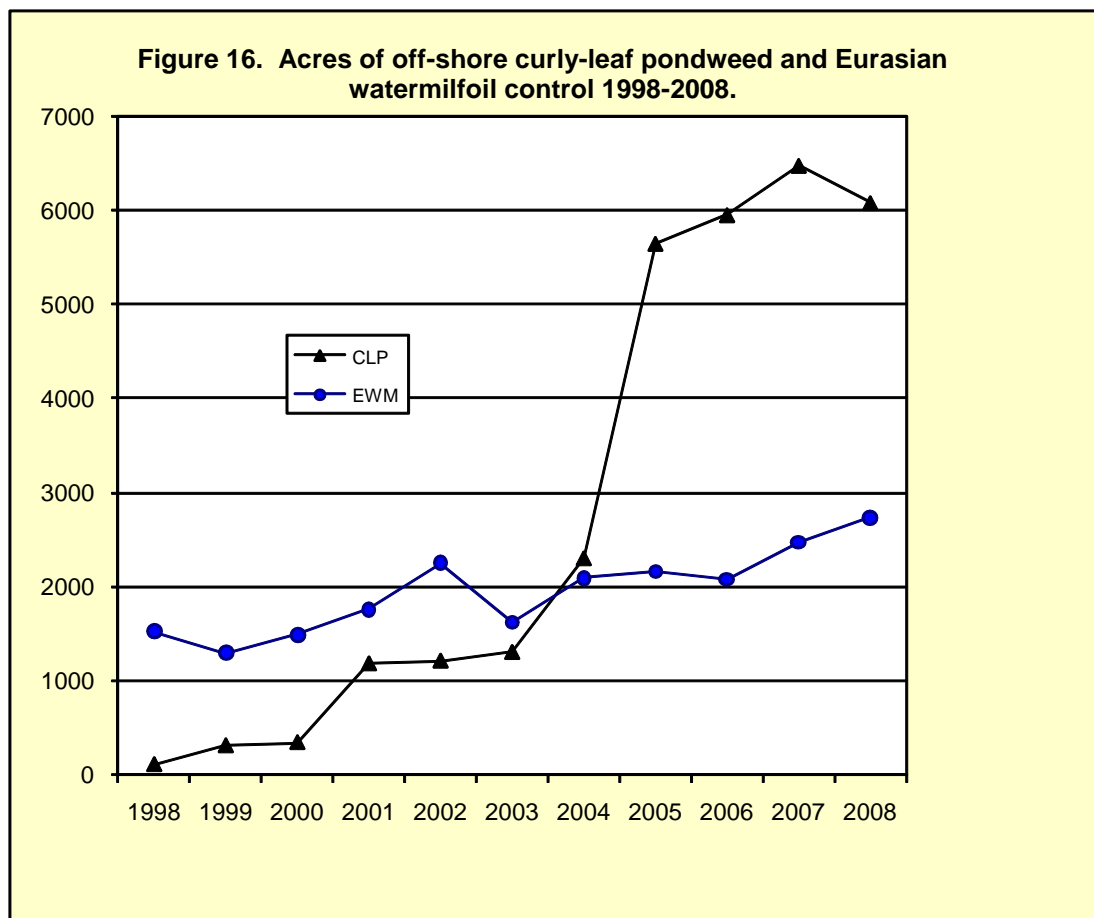
The Department of Natural Resources is conducting early season curly-leaf pondweed treatments in cooperation with several lake associations on a trial basis to determine the effectiveness of this strategy. In 2008, one lake was treated with the aquatic herbicide fluridone and 13 others were treated with Aquathol K. These lakes will be treated and monitored for at least three successive years to determine if it is possible to produce ecological benefits such as:

1. Reduce peaks in concentrations of phosphorous and associated algal blooms.
2. Reduce the abundance of curly-leaf pondweed for long periods of time.
3. Increase the abundance of native, submersed aquatic plants.
4. Reduce the interference with use of the lake caused by curly-leaf pondweed.

Figure 16 shows how the development of the pilot project program has influenced the numbers of acres of curly-leaf pondweed and Eurasian watermilfoil treated since the programs beginning in 2005.

See the 2008 Invasive Species Program Annual report for more detailed information on this project (http://files.dnr.state.mn.us/ecological_services/invasives/annualreport.pdf).





Purple Loosestrife

Purple loosestrife, a non-native invasive plant that can out compete native wetland vegetation, was introduced to North America from Europe in the 1800's and until 1987 was a common ornamental sold by nurseries and landscape companies. Natural resource managers became aware of the plant's invasive nature and disruptive effects on native wetland vegetation in the early 1980's. The DNR, concerned about the plant's impact on native species and wildlife habitat, conducted preliminary surveys to determine the status of the plant in Minnesota. The survey revealed that 77 of Minnesota's 87 counties had populations of purple loosestrife in wetlands, lakeshore, stream banks and ditches. In 1987 Minnesota became one of the first states in the nation to develop a program to control this invasive plant. Minnesota has designated purple loosestrife as a noxious weed, which makes it illegal to import, buy, sell, propagate and transport.

The main components of the purple loosestrife program are:

- An inventory of purple loosestrife sites is maintained and used to prioritize control efforts.
- To carry out management activities including chemical and biological control.
- To support research to evaluate and expand control efforts.
- To monitor and evaluate the success of biological control and other management efforts.
- Public education/awareness efforts to involve the public in the management of this plant.

Large stands of purple loosestrife are extremely difficult to control because of their enormous seed bank; therefore, it is necessary to prioritize purple loosestrife control efforts. The highest priority stands for herbicide treatment are small, recently established stands, located near the top of the watershed. Because of their small size these newly established sites are poor candidates for biocontrol. Rodeo, a broad-spectrum glyphosate herbicide, is used to spot treat high priority purple loosestrife sites with a backpack sprayer.

Minnesota's herbicide control effort has been reduced dramatically since the introduction of bio-control agents began in 1992. In 2008, DNR staff treated a total of 47 purple loosestrife sites with 0.2 gallons of Rodeo herbicide. Most of these sites were very small with the majority having fewer than 100 plants. For more detailed information on Minnesota's purple loosestrife program, see the 2008 Invasive Species Annual Program report.

http://files.dnr.state.mn.us/ecological_services/invasives/annualreport.pdf

Eurasian Watermilfoil

Eurasian watermilfoil, hereafter called milfoil, is an exotic aquatic plant introduced to North America in the mid-1900's. It was first identified in Minnesota in 1987 in Lake Minnetonka. Milfoil is a submerged aquatic plant that can displace native vegetation. The plant reproduces by fragmentation, establishes itself readily in disturbed areas, and has the potential to become a nuisance in Minnesota lakes. The main strategies of the Eurasian watermilfoil program are:

- Slow the spread of the plant through public education and awareness activities.
- Support management by lake associations and local units of government of problems caused by milfoil.
- Maintain an accurate inventory of populations.
- Investigate new control methods and the biology of the plant.

Eurasian watermilfoil was discovered in 12 additional water bodies in 2008. There are now 215 Minnesota lakes known to have populations of this invasive submersed aquatic plant.

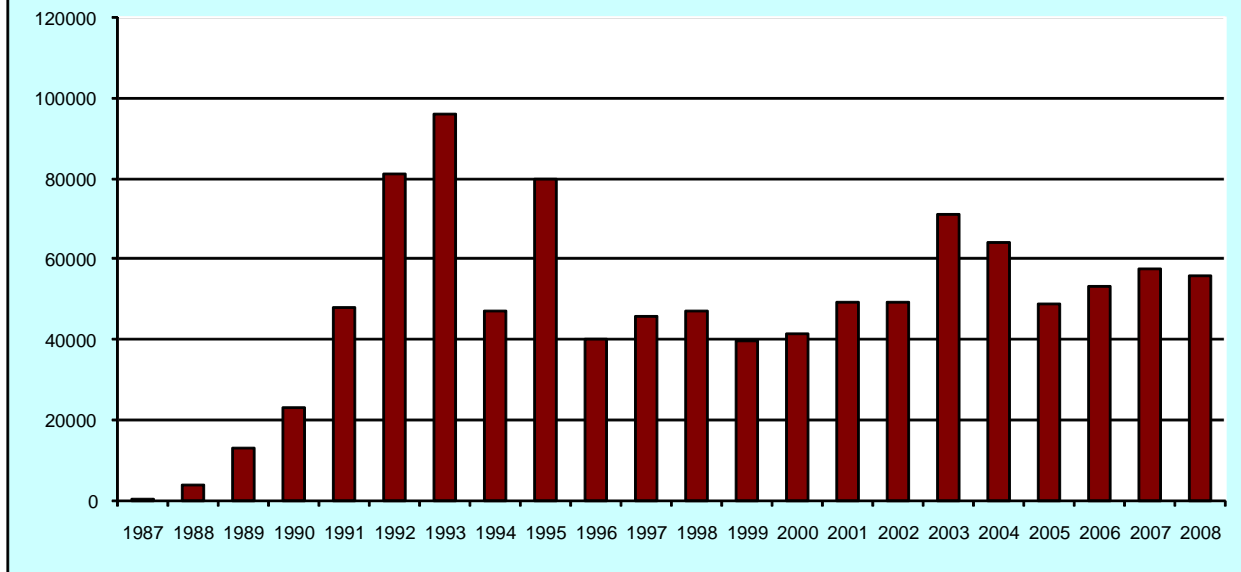
The most commonly used herbicide for control of milfoil is a granular 2,4-D ester product labeled for aquatic use. In 2001, a liquid dimethylamine salt 2,4-D product was registered for aquatic use and has been applied to milfoil in Minnesota. Late in 2002, a liquid trimethylamine salt, triclopyr product, was registered for aquatic use and is available for control of milfoil in Minnesota. These systematic herbicides are preferred because they are the most selective products available.

The total reported 2,4-D use in 2008 for milfoil was 56,000 pounds. The total reported annual use of 2,4-D ester products since 1987 is provided in Figure 17. For more detailed information on the management of invasive species see the 2008 Invasive Species Program Annual Report. The report may be reviewed on line at

http://www.dnr.state.mn.us/ecological_services/invasives/index.html.

In 2008, the DNR provided \$105,000 in state funds to cooperators on 22 lakes for management of milfoil. The DNR spent an additional \$17,000 on control work at public water accesses to control Eurasian watermilfoil to help minimize its spread between lakes.

Figure 17. Permitted 2,4-D Ester (lbs.) use in Minnesota after identification of Eurasian watermilfoil in Minnesota, 1987-2008



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APPENDIX

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Table A. A list of commonly used herbicides registered by the EPA for aquatic use and approved by the MN DNR.

Product Name	Selective	Broad Spectrum	Active Ingredient (Formulation)
<u>Part 1. Aquatically labeled systemic herbicides.</u>			
Aquacide (Pellet)	X		2,4 Dichlorophenoxyacetic Acid (Sodium Salt)
Navigate® (Granular)	X		2,4 Dichlorophenoxyacetic (Butoxyethyl Ester)
Riverdaletm (Granular)	X		2,4 Dichlorophenoxyacetic (Isooctyl Ester)
SEE 2,4-D (Liquid)	X		2,4 Dichlorophenoxyacetic (Isooctyl Ester)
Weedtrine II (Granular)	X		2,4 Dichlorophenoxyacetic (Isooctyl Ester)
Sonar™ (Liquid or Granular)		X	Fluridone
Rodeo (Liquid)		X	Isopropylamine salt of Glyphosate
Pondmaster (Liquid)		X	Isopropylamine salt of Glyphosate
Garlon-3A		X	Triclopyr (<i>Experimental use permit, full aquatic label pending</i>)
<u>Part 2. Contact Herbicides.</u>			
Aquathol (Liquid or Granular)		X	Dipotassium salt of endothall
Hydrothol 191 (Liquid or Granular)		X	Mono-amine salt of endothall (<i>liquid by licensed applicator only</i>)
Reward (Liquid)		X	Diquat dibromide (<i>licensed applicator only</i>)
<u>Part 3. Copper Compounds (Algaecides and Herbicides).</u>			
Citrine Plus (Liquid or Granular)	X (A)		Copper-Ethanolamine complex
Komeen (Liquid)	X (H)		Copper-Ethylenediamine complex
K-Tea	X (A)		Copper-Triethanolamine complex
<u>Part 4. Other.</u>			
Copper sulfate	X (A)	X	CuSO4 (wide variety of registered brands)
Aquashade (Liquid)			Acid Blue 9 / Acid Yellow 23 (Filters light in wavelengths required for plant growth)

Table B. Reported aquatic herbicide use under DNR permit, 1981-2008.

Year	2,4-D ester lbs.	2,4-D salt lbs.	2,4-D amine/acid gal.	Aquathol lbs.	Aquathol gal.	Diquat (Reward) gal.	Hydrothol 191 lbs.	Hydrothol 191 gal.	Copper sulfate lbs.
1981	150	370	0	1,900	1,300	730	3,200	390	*
1982	120	320	0	1,700	1,500	550	4,200	44	*
1983	-	350	0	1,400	1,500	560	11,900	31	*
1984	110	130	0	730	980	780	7,300	80	*
1985	25	270	0	740	1,200	870	14,000	100	*
1986	25	370	0	1,100	1,400	1,200	6,900	170	*
1987	100	1,400	0	1,100	1,400	1,400	13,000	62	*
1988	3,700	600	0	950	1,300	1,300	11,000	100	*
1989	13,000	470	0	910	1,300	1,700	12,000	200	*
1990	23,000	290	0	680	1,100	1,500	9,500	130	*
1991	48,000	1,300	0	1,400	850	1,400	9,600	210	55,400
1992	81,000	320	0	870	1,600	1,700	9,000	67	64,000
1993	96,000	40	0	830	1,000	1,600	5,000	240	34,600
1994	45,000	70	0	710	940	1,800	10,000	510	59,800
1995	80,000	87	0	930	700	2,300	8,300	420	55,000
1996	39,000	400	0	1,000	730	1,900	8,900	830	32,500
1997	46,000	290	0	1,200	700	2,400	7,800	820	39,700
1998	47,000	440	0	790	1,280	2,580	4,460	670	50,800
1999	39,800	650	0	1,050	740	2,280	4,190	740	31,600
2000	41,500	700	0	1,380	1,850	2,970	5,820	530	41,900
2001	49,300	1,000	0	700	2,600	2,700	3,900	950	58,200
2002	49,400	700	20	540	2,660	2,530	4,220	760	42,200
2003	71,100	634	336	339	2,515	2,370	7,610	429	47,100
2004	64,100	1,068	216	366	5,200	2,856	8,040	643	53,700
2005	48,800	1,154	533	1,077	7,054	2,773	6,744	715	63,500
2006	53,400	805	215	1,530	8,757	2,953	11,653	126	47,000
2007	57,700	971	85	1,320	9,838	3,685	10,105	782	46,000
2008	56,000	655	7.4	2,462	13,208	2,643	10,693	550	32,290

* Data not available

Table C. Aquatic Plant Management Report Survey Results, Chemical-Mechanical, 2008.

1. Was your 2008 permit used?
 813 Yes, permitted work was done.
 53 No, because: The nuisance conditions did not develop.
 21 No, because: I got the permit too late.
 113 No, because: I was unable to get the work done.
 61 No, because: Thanks! Please use the back for comments
 1061
2. When my permit expires:
 779 I will reapply for a permit. 33 I will not apply for a permit. 190 I am undecided at this time.
 44 Permanent and Non-transferable
3. The method of control was:
 149 mechanical or hand removal. 579 chemical treatment. 87 mechanical and chemical treatment
 24 blank
4. A. Were you satisfied with the aquatic plant control work done (for Swimmers Itch control only skip to 4.B) ?
 416 YES 44 NO 156 wasn't as good as expected
 B. If you treated for Swimmers Itch were you satisfied with the control ? 75 blank
 134 YES 14 NO 41 wasn't as good as expected
5. When was the work done?
 11 April 115 May 402 June 365 July 171 August 37 September 9 October 0 Nov.
 25 uncertain
6. To provide us with some idea of how much control actually took place we would like to know if the control work done was the entire area allowed by the permit or less than the allowed area.
 598 Yes, control work was done on the entire area permitted
 187 No, less control work was done than the permit allowed
 13 blank
7. If you used herbicide, please indicate what you used and how much?

<u>What Did You Use?</u>	<u>How Much Did You Use?</u> (concentrated product before mixing)
Copper sulphate	4,877.0 lbs.
gran.Hydrothol 191	10,052.5 lbs.
liq. Aquathol K	265.3 gal., qts., oz.
gran.Aquathol	2275.8 lbs.
liq. Hydrothol 191	20.33 gal., qts., oz.
Reward	3.0 gal., qts., oz.
Aquasklee/Navigate	13,808.0 lbs.
Renovate	600.9 gal.
AQUATHOL super K	37.0 lbs.
Aquacide	654.5 lbs.
liq Cutrine Plus	5.1 gal., qts., oz.
Rodeo	52.4 gal., qts., oz.
gran Cutrine Plus	88.0 lbs.
DMA	0.0 gal.
Nautique	1.0 gal.
Komeen	1.0 gal.
Aquapro	0.03 gal.
Weedtrine D	7.3 gal.

Table D. Aquatic Plant Management Report Survey Results, AUAPCD, 2008.

Please check the appropriate circle.

1. The type of AUAPCD device I use is a:
- 1303 Crary WeedRoller®
 - 30 Lake Restoration Lake Maid
 - 147 Colman Beach Groomer
 - 13 home made
 - 9 unknown
2. I used an AUAPCD this year.
- 1325 Yes
 - 177 No, I did not use an AUAPCD this year.
- 1502
3. The AUAPCD I used in 2005-
I have owned for:
- 132 less than 1 year
 - 239 1 - 3 years
 - 727 more than 3 years
- Is jointly owned and shared
with the other co-owners and
has been for:
- 19 less than 1 year
 - 39 1 - 3 years
 - 139 more than 3 years
- 9 was rented.
15 was borrowed.
4. How often monthly did you operate the AUAPCD you used ?
- | | not
used | few
hours
>0-20 | several
hours
>20-50 | many
hours
>50-144 | continuous |
|-------------------|-------------|-----------------------|----------------------------|--------------------------|------------|
| In May: | 800 | 318 | 134 | 62 | 12 |
| In June: | 213 | 556 | 366 | 146 | 45 |
| In July: | 113 | 555 | 434 | 170 | 54 |
| In August: | 244 | 627 | 301 | 110 | 44 |
5. Were you satisfied with the AUAPCD you used?
- 1268 Yes
 - 47 No

Table E. Aquatic Pesticide Enforcement Citizen Complaint Investigations, 2008.

Date	Complaint	Lake Name	County	Observation	Action	Result
June 10	Fish die off.	Prior Lake	Scott	Not observed	Small sunfish-crappie die off reported several days after the fact.	Fish decomposition too far advanced for analysis.
June 8	No posting following herbicide treatment.	Jennings Bay, Mtka.	Hennepin	Inspected 6/9/2008. One sign posted near access to marina. Posting was inadequate.	Referred to area APM Specialist.	Pending
July 9	Unauthorized herbicide treatment.	Forest Lake	Washington	Aquatic Pesticide Enforcement staff.	Observation reported to conversation Jason Jenson.	Jason Jenson was unable to determine the person's involved.
August 20	Unauthorized herbicide treatment.	Blue Lake	Isanti	Aquatic Pesticide Enforcement staff.	Referred to area APM Specialist.	Over treatment of a permitted area. Referred to area CO.

Table F. Aquatic Pesticide Enforcement Use Inspections, 2008.

Treatment Date	County	Lake	Applicator	Number of Treatments Inspected
23-Apr	Ramsey	Kohlman	Lake Restoration	1
5-May	Ramsey	Bald Eagle	Lake Restoration	1
8-May	Crow Wing	Lower Mission	Professional Lake Management	1
8-May	Isanti	Long	Lake Restoration	2
13-May	Chisago	Green	Green Lake Association	2
14-May	Hennepin	Sarah	Lake Restoration	2
14-May	Sherburne	Rush	Lake Management	1
15-May	Morrison	Crookneck	Professional Lake Management	1
16-May	Ramsey	Silver (nsp)	Aquatic Engineering, Inc.	2
19-May	Douglas	Smith	Professional Lake Management	1
19-May	Stearns	Grand	Lake Management	1
21-May	Cass	Margaret	Professional Lake Management	1
22-May	Morrison	Long	Professional Lake Management	1
23-May	Stearns	Kings	Professional Lake Management	1
28-May	Cass	Norway	Professional Lake Management	1
28-May	Crow Wing	Sibley	Professional Lake Management	1
30-May	Hennepin	Bass	Lake Management	2

Table F. Continued

Treatment Date	County	Lake	Applicator	Number of Treatments Inspected
2-Jun	Chisago	Rush (west)	Lake Restoration	2
4-Jun	Washington	White Bear	Professional Lake Management	1
10-Jun	Ramsey	Gervais	Lake Improvement Consulting	2
16-Jun	Todd	Little Birch	Professional Lake Management	2
17-Jun	Wright	Clearwater	Clearwater Lake Property Owners	2
18-Jun	Hennepin	Mtka Priest	Lake Management	2
19-Jun	Wright	Augusta	Lake Augusta Property Owners	2
20-Jun	Morrison	Alexander	Professional Lake Management	1
23-Jun	Sherburne	Long	Professional Lake Management	2
24-Jun	Todd	Mound	Minnesota Shoreline Restoration	2
26-Jun	Carver	Mound	Midwest Aquacare	2
9-Jul	Washington	Forest	Lake Management	2
10-Jul	Dakota	Crystal	Lake Restoration	2
17-Jul	Anoka	Coon	Lake Restoration	2
21-Jul	Hennepin	Mtka Gideons	Lake Management	2
23-Jul	Carver	Lotus	Midwest Aquacare	2
30-Jul	Crow Wing	Upper Mission	Professional Lake Management	1
31-Jul	Mille Lacs	Mille Lacs	Midwest Aquacare	1

Table G. Statewide numbers of permits and properties by county, 2008.

County	Properties	Permits
Aitkin	197	156
Anoka	156	56
Becker	255	255
Beltrami	23	23
Benton	24	4
Big Stone	1	1
Blue Earth	3	3
Carlton	52	52
Carver	329	80
Cass	368	261
Chisago	380	86
Clay	8	8
Clearwater	3	3
Cottonwood	2	2
Crow Wing	1,086	678
Dakota	329	59
Douglas	228	228
Faribault	55	2
Freeborn	6	6
Grant	11	11
Hennepin	1,860	375
Hubbard	55	55
Isanti	134	40
Itasca	47	47
Jackson	6	6
Kanabec	34	8
Kandiyohi	100	86
Koochiching	1	1
Lake of the Woods	1	1
LeSueur	197	42
Lincoln	2	2
McLeod	40	4
Mahnomen	5	5
Martin	8	8
Meeker	159	29
Mille Lacs	60	21

Table G. (Continued)

County	Properties	Permits
Morrison	209	101
Murray	2	2
Nicollet	1	1
Nobles	1	1
Olmsted	2	2
Ottertail	571	571
Pennington	1	1
Pine	214	54
Pipestone	1	1
Polk	8	8
Pope	59	59
Ramsey	807	78
Rice	156	24
Rock	2	2
St. Louis	106	53
Scott	400	65
Sherburne	210	52
Stearns	254	120
Steele	2	2
Todd	175	131
Wadena	10	10
Waseca	13	6
Washington	485	115
Watonwan	1	1
Wright	826	235

Table H. Lakes with nine or more total permits issued for swimmer's itch from 1997 through 2008.

Region	County	Lake	Total permits issued
1	Becker	Detroit	22
1	Becker	Height of Land	11
1	Becker	Sallie	10
1	Beltrami	Julia	10
1	Clay	Blue Eagle	12
1	Douglas	Carlos	20
1	Douglas	Darling	24
1	Douglas	Geneva	13
1	Douglas	Ida	44
1	Douglas	Irene	69
1	Douglas	Le Homme Dieu	50
1	Douglas	Miltona	43
1	Grant	Pelican	15
1	Grant	Pomme De Terre	11
1	Hubbard	Alice	10
1	Hubbard	Big Sand	21
1	Hubbard	Fishhook	11
1	Otter Tail	East Battle	19
1	Otter Tail	Rush	20
1	Otter Tail	Stalker	10
1	Otter Tail	Wall	24
1	Pope	Amelia	24
1	Pope	Linka	46
1	Pope	Minnewaska	22
1	Pope	Scandinavian	12
2a	Carlton	Eagle	39
2a	Carlton	Tamarack	11
2a	Itasca	Bowstring	10
2a	Itasca	Jessie	12
2a	Itasca	Sand	14
2a	Itasca	Swan	91
2a	St. Louis	Big Sturgeon	13
2a	St. Louis	Long	16
2b	Aitkin	Big Sandy	27
2b	Aitkin	Cedar	11
2b	Aitkin	Farm Island	94
2b	Aitkin	Gun	35
2b	Aitkin	Hanging Kettle	10
2b	Aitkin	Minnewawa	27

Table H. Continued.

Region	County	Lake	Total permits issued
2b	Aitkin	Pine	15
2b	Aitkin	Pine	18
2b	Aitkin	Round	20
2b	Aitkin	Spirit	22
2b	Cass	Birch	13
2b	Cass	Gull	280
2b	Cass	Margaret	12
2b	Cass	Roosevelt	50
2b	Crow Wing	Clark	13
2b	Crow Wing	Crooked	15
2b	Crow Wing	Cross	76
2b	Crow Wing	Crow Wing	67
2b	Crow Wing	Daggett	46
2b	Crow Wing	Edward	14
2b	Crow Wing	Gilbert	71
2b	Crow Wing	Gladstone	15
2b	Crow Wing	Hubert	19
2b	Crow Wing	Island	17
2b	Crow Wing	Little Hubert	19
2b	Crow Wing	Little Pine	35
2b	Crow Wing	Love	18
2b	Crow Wing	Lower Cullen	35
2b	Crow Wing	Lower Hay	26
2b	Crow Wing	Lower Mission	28
2b	Crow Wing	Middle Cullen	11
2b	Crow Wing	Nisswa	27
2b	Crow Wing	North Long	92
2b	Crow Wing	O'Brien	39
2b	Crow Wing	Ossawinnamakee	34
2b	Crow Wing	Pelican	36
2b	Crow Wing	Perch	49
2b	Crow Wing	Pig	17
2b	Crow Wing	Pine	19
2b	Crow Wing	Portage	16
2b	Crow Wing	Red Sand	18
2b	Crow Wing	Rice	27
2b	Crow Wing	Round	129
2b	Crow Wing	Roy	52
2b	Crow Wing	Rush	68

Table H. Continued.

Region	County	Lake	Total permits issued
2b	Crow Wing	Serpent	104
2b	Crow Wing	Sibley	18
2b	Crow Wing	South Long	89
2b	Crow Wing	Upper Cullen	14
2b	Crow Wing	Upper Hay	65
2b	Crow Wing	Upper Mission	25
2b	Crow Wing	Upper South Long	51
2b	Crow Wing	West Fox	15
2b	Crow Wing	White Sand	41
2b	Crow Wing	Whitefish	130
2b	Mille Lacs	Mille Lacs	32
3a	Anoka	Centerville	11
3a	Anoka	Coon	66
3a	Carver	Minnewashta	73
3a	Carver	Pierson	47
3a	Carver	Riley	38
3a	Carver	Virginia	30
3a	Carver	Waconia	31
3a	Carver	Wassermann	10
3a	Carver	Zumbra	15
3a	Chisago	Chisago	35
3a	Chisago	Fish	18
3a	Chisago	Goose	16
3a	Chisago	Green	64
3a	Chisago	Horseshoe	10
3a	Chisago	Kroon	16
3a	Chisago	Little Comfort	12
3a	Chisago	North Lindstrom	12
3a	Chisago	Rush	64
3a	Chisago	South Center	75
3a	Chisago	South Lindstrom	33
3a	Dakota	Marion	28
3a	Dakota	Orchard	23
3a	Dakota	Salem	13
3a	Hennepin	Bass	11
3a	Hennepin	Bryant	31
3a	Hennepin	Bush	12
3a	Hennepin	Castle Ridge	11
3a	Hennepin	Christmas	29

Table H. Continued.

Region	County	Lake	Total permits issued
3a	Hennepin	Duck	21
3a	Hennepin	Dutch	14
3a	Hennepin	Eagle	47
3a	Hennepin	Fish	36
3a	Hennepin	Forest	20
3a	Hennepin	Gleason	28
3a	Hennepin	Greentree Pond	11
3a	Hennepin	Hadley	13
3a	Hennepin	Independence	52
3a	Hennepin	Long	17
3a	Hennepin	Lower Twin	14
3a	Hennepin	Medicine	68
3a	Hennepin	Melody	12
3a	Hennepin	Minnetonka Cooks	65
3a	Hennepin	Mtka Jennings	43
3a	Hennepin	Mtka Lafayette	69
3a	Hennepin	Mtka Lower Lake N	27
3a	Hennepin	Mtka Lower Lake S	44
3a	Hennepin	Mtka Maxwell	46
3a	Hennepin	Mtka North Arm	68
3a	Hennepin	Mtka Phelps	59
3a	Hennepin	Mtka Priests	55
3a	Hennepin	Mtka Robinsons	26
3a	Hennepin	Mtka Upper Lake	56
3a	Hennepin	Mtka Seton	17
3a	Hennepin	Mtka Smiths	14
3a	Hennepin	Mtka Smithtown	48
3a	Hennepin	Mtka Spring Park	35
3a	Hennepin	Mtka St. Albans	59
3a	Hennepin	Mtka St. Louis	19
3a	Hennepin	Mtka Stubbs	28
3a	Hennepin	Mtka Wayzata	44
3a	Hennepin	Mtka West Arm	44
3a	Hennepin	Parkers	27
3a	Hennepin	Rebecca	12
3a	Hennepin	Red Rock	45
3a	Hennepin	Round	10
3a	Hennepin	Sarah	62
3a	Hennepin	Schmidt (Smith)	18

Table H. Continued.

Region	County	Lake	Total permits issued
3a	Hennepin	Shady Oak	11
3a	Hennepin	Weaver	22
3a	Hennepin	Wrestling (Unnamed)	12
3a	Ramsey	Bald Eagle	58
3a	Ramsey	Gervais	29
3a	Ramsey	Gilfillan	19
3a	Ramsey	Island	12
3a	Ramsey	Johanna	25
3a	Ramsey	Josephine	28
3a	Ramsey	Keller	11
3a	Ramsey	Kerry Pond	12
3a	Scott	Fish	16
3a	Scott	O'Dowd	31
3a	Scott	Prior	128
3a	Scott	Spring	29
3a	Scott	Thole	28
3a	Scott	Upper Prior	65
3a	Washington	Big Carnelian	51
3a	Washington	Big Marine	34
3a	Washington	Demontreville	12
3a	Washington	Forest	161
3a	Washington	Jane	17
3a	Washington	Lily	12
3a	Washington	Mary	11
3a	Washington	Olson	12
3a	Washington	Pine Tree	10
3a	Washington	Tanners	17
3a	Washington	White Bear	94
3b	Isanti	Blue	30
3b	Isanti	Fannie	25
3b	Isanti	Long	16
3b	Isanti	Paul	21
3b	Isanti	Spectacle	13
3b	Kanabec	Fish	22
3b	Kanabec	Mud	14
3b	LeSueur	Tetonka	24
3b	LeSueur	Washington	45
3b	Morrison	Alexander	64
3b	Morrison	Crookneck	51

Table H. Continued.

Region	County	Lake	Total permits issued
3b	Morrison	Fish Trap	33
3b	Morrison	Platte	122
3b	Morrison	Shamineau	17
3b	Morrison	Sullivan	17
3b	Pine	Cross	34
3b	Pine	Sand	10
3b	Pine	Upper Pine	13
3b	Pine/Aitkin	Big Pine	49
3b	Sherburne	Big	34
3b	Sherburne	Briggs	15
3b	Sherburne	Fremont	18
3b	Sherburne	Julia	14
3b	Wright	Charlotte	25
3b	Wright	Clearwater	114
3b	Wright	Crawford	11
3b	Wright	Deer	16
3b	Wright	French	24
3b	Wright	Maple	45
3b	Wright	Mink	10
3b	Wright	North Center	48
3b	Wright	Pleasant	35
3b	Wright	Pulaski	39
3b	Wright	Rock	19
3b	Wright	Somers	12
3b	Wright	Sugar	71
3b	Wright	Sylvia	49
3b	Wright	Waverly	31
4	Benton	Little Rock	12
4	Faribault	Bass	15
4	Kandiyohi	Elkhorn	11
4	LeSueur	Tetonka	24
4	LeSueur	Washington	45
4	Rice	Mazaska	11
4	Rice	Roberds	16
4	Stearns	Big Fish	15
4	Stearns	Big Spunk	23
4	Stearns	Grand	22
4	Stearns	Koronis	19
4	Stearns	North Browns	14

Table H. Continued.

Region	County	Lake	Total permits issued
4	Stearns	Pearl	24
4	Stearns	Pelican	30
4	Stearns	Rice	37
4	Waseca	Clear	14

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