

**MINNESOTA DEPARTMENT OF NATURAL RESOURCES**

**DIVISION OF ECOLOGICAL RESOURCES**

**STAFF REPORT 43**

**Management of Rooted Aquatic Vegetation,  
Algae, Leeches, Swimmer's Itch, 2007**

**April 2008**

**A Summary of Permitted Management Work for Aquatic Vegetation,  
Algae, Leeches, Swimmer's Itch, 2007**

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**Division of Ecological Resources**

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## **Executive Summary 2007 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.

The increase in numbers of permits issued from 2003-2006 has averaged nearly 350 per year. In 2006, there were 438 more permits issued than in 2005. In 2007 there were 336 more permits issued than in 2006. The Central Region, which includes the seven county metropolitan area, typically issues more permits for more properties than any other DNR regional office. In 2007, the Little Falls Office (Central Region 3B) at the northern part of the Central Region issued 115 more permits to 142 more properties than were issued in 2006. Staff at the St. Paul office (3A) of the Central Region issued 124 more permits but there were 266 fewer properties in 2007.

The numbers of properties involved in the APM program statewide decreased by 442 in 2007 while the permits increased by 336. The numbers of aquatic plant management permits increased in all other DNR Regions with the exception of the Northwest Region. In the Northwest Region, there were nine fewer permits and 104 fewer properties in 2007 than in 2006. The Northeast Region issued 73 more permits in 2007 than in 2006 to 25 more properties. In the South Region, the number of permits increased by 33 and the number of permitted properties decreased by 286 properties.

Permit revenue increased from about \$288,600 in 2006 to about \$315,417 in 2007. The average fee per property was up \$3.00, from \$24.00 in 2006 to \$27.00 in 2007.

### 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 more than half of the active Aquatic Plant Management permits. The number of single season permits issued in 2007 is up by 73 statewide over 2006. 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. In 2007 it was only a slight increase over 2006 with 9 more permits. 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 there frontage whichever is less and no more than 2,500 square feet. Persons who obtained a three-year permit in 2007 will not have to reapply again until the year 2010. Some people (171 of those reporting) were permitted to, but did not run their device in 2007. In 2007, about 38% of the permits issued allowed the use of automated aquatic plant control devices like the Cray WeedRoller, the Colman Beach Groomer, Lake Restoration Lake Sweeper and similar home

made devices. The remaining 62% of the aquatic plant management permits allowed chemical or other mechanical removal as the method of control. These numbers show a slight decrease in percentage of AUAPCD control over 2006.

Most AUAPCD permits are issued to a single property owner. Although AUAPCD's make up 38% of the permits issued, they only account for about 16% of the total number of properties permitted in 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 2007.

Region	Harvest Chemical	2007 Issued Channel*	<2007 Active Channel**	AUAPCD's with chemical control	AUAPCD				All Active Permits	Issued Restoration Permits
					Issued 2007		Issued 2006	Issued 2005		
					1 year	3 year	3 year	3 year		
Reg 1	565	60	-	57	669	248	294	196	1972	6
Reg 2A	99	10	-	1	2	7	4	6	118	15
Reg 2B	698	22	-	47	220	220	227	166	1531	8
Reg 3A	868	20	-	7	103	18	35	27	1051	14
Reg 3B	422	4	-	12	145	102	71	74	814	8
Reg 4	157	8	-	1	38	52	7	6	260	13
All	2809	124	583	125	1177	647	638	475	6329	62

\* 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 11/14/2007. 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.

Summary of all APM permits issued, fees collected, numbers of lakes properties treated and harvested in 2007.

Region	All Permits Issued in 2007*	All Lakes**	Fees***	Properties Permitted in 2007	Ave. Fee/Property	All Reporting ****		
						Harvest Work	Chemical Treatment	Both
Reg 1	1482	250	\$ 54,967.00	1492	\$ 36.84	129	245	40
Reg 2A	108	46		260		14	26	7
Reg 2B	1138	149		1736		54	495	30
Reg 2 total			\$ 57,748.10	1996	\$ 28.93			
Reg 3A	989	272		5009		45	626	16
Reg 3B	669	132		2206		19	292	18
Reg 3 total			\$ 187,791.00	7215	\$ 26.03			
Reg 4	247	68	\$ 14,911.64	747	\$ 19.96	16	89	4
2007 TOTAL	4633	927	\$ 315,417.74	11450	\$ 27.55	277	1773	115
2006 TOTAL	4297	953	\$ 288,603.36	11939	\$ 24.58	213	1409	59
CHANGE	336	-26	\$ 26,814.38	-489	\$ 2.96	64	364	56

\* Permits issued for restoration work are excluded.

\*\* Includes all lakes, ponds, ditches and streams listed on APM permits for 2007.

\*\*\* Fee totals provided by Karen Sokola on 01/31/08.

\*\*\*\* Data tabulated from 1191 surveys and commercial applicator reports returned as of 01/08/2008.

## **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 provide 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. Aquatic 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**

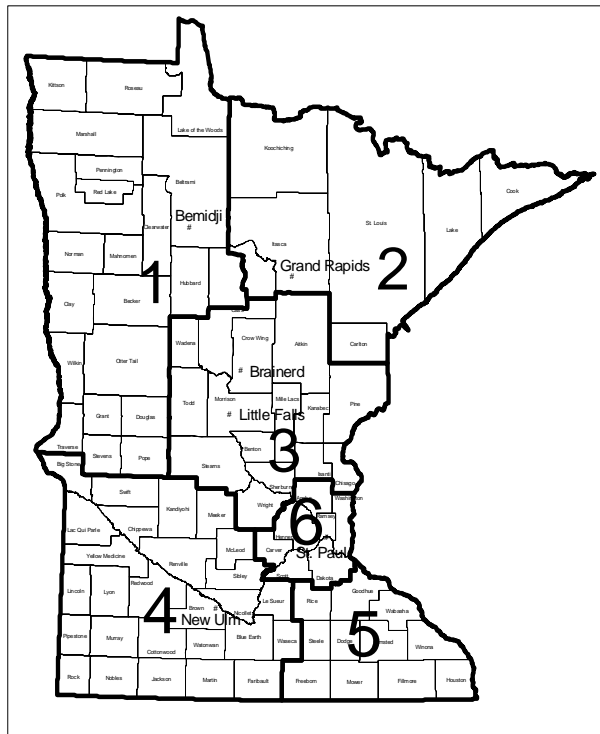
Riparian property owners (lake shore property owners) in Minnesota have a legal right to use and access the lake adjacent to their property. Aquatic vegetation may interfere with a lakeshore homeowner's ability to exercise that right. The purpose of the DNR's Aquatic Plant Management Program is to preserve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

homeowner the ability to use the lake. 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 over abundant. Relief from these nuisances may also be sought under an aquatic plant management permit.

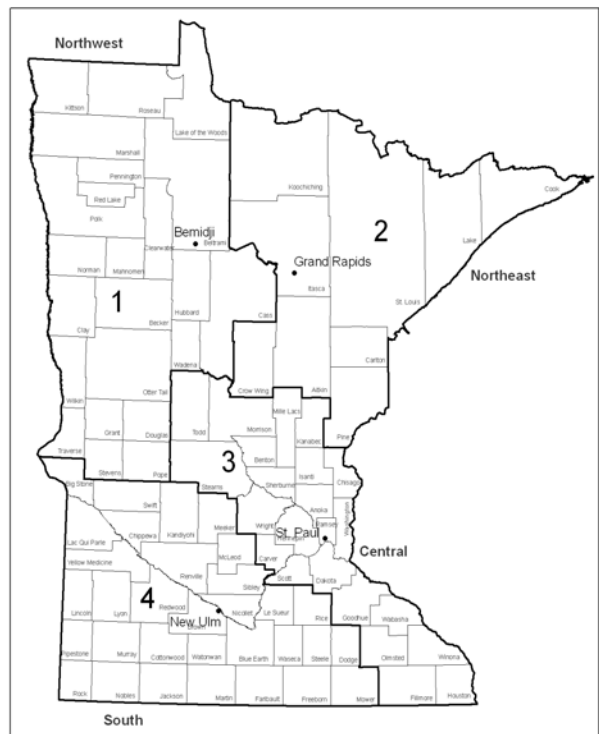
### Administrative Regions

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 Figure 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 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 aquatic plant harvesters, 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 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 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 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 2007 is found in Appendix A.1 and A.2.

### **Summary of Aquatic Plant Management Program Activities in 2006**

The following summary of Aquatic Plant Management Program (APMP) activities in 2007 comes from four sources: permittee survey forms (2007 Appendix Table C and D), commercial aquatic applicator and harvester 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 you must rely 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.

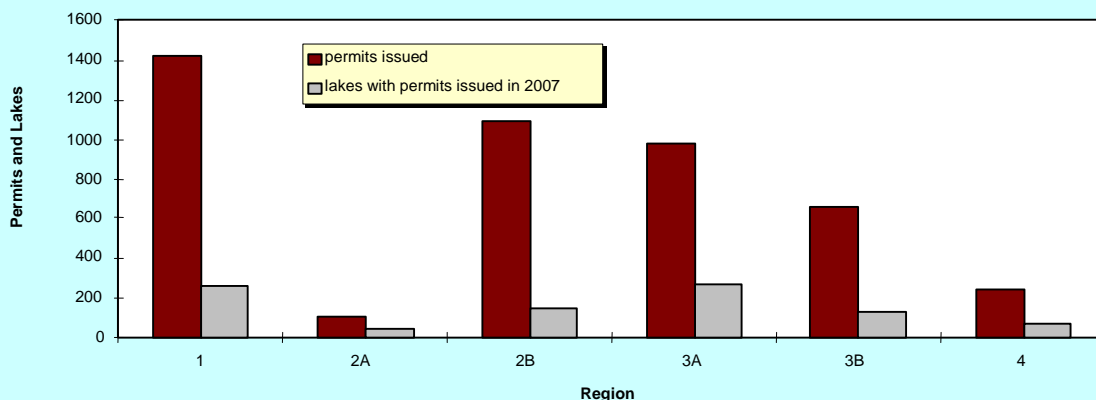
Survey forms were sent to all permittees that did their own chemical or mechanical control work. Of the 1,419 surveys mailed 961 (83.9%) were returned. A separate survey was sent to 1,813 AUAPCD permit recipients, 1,637 (90.3%) were returned.

### Permit Issuance

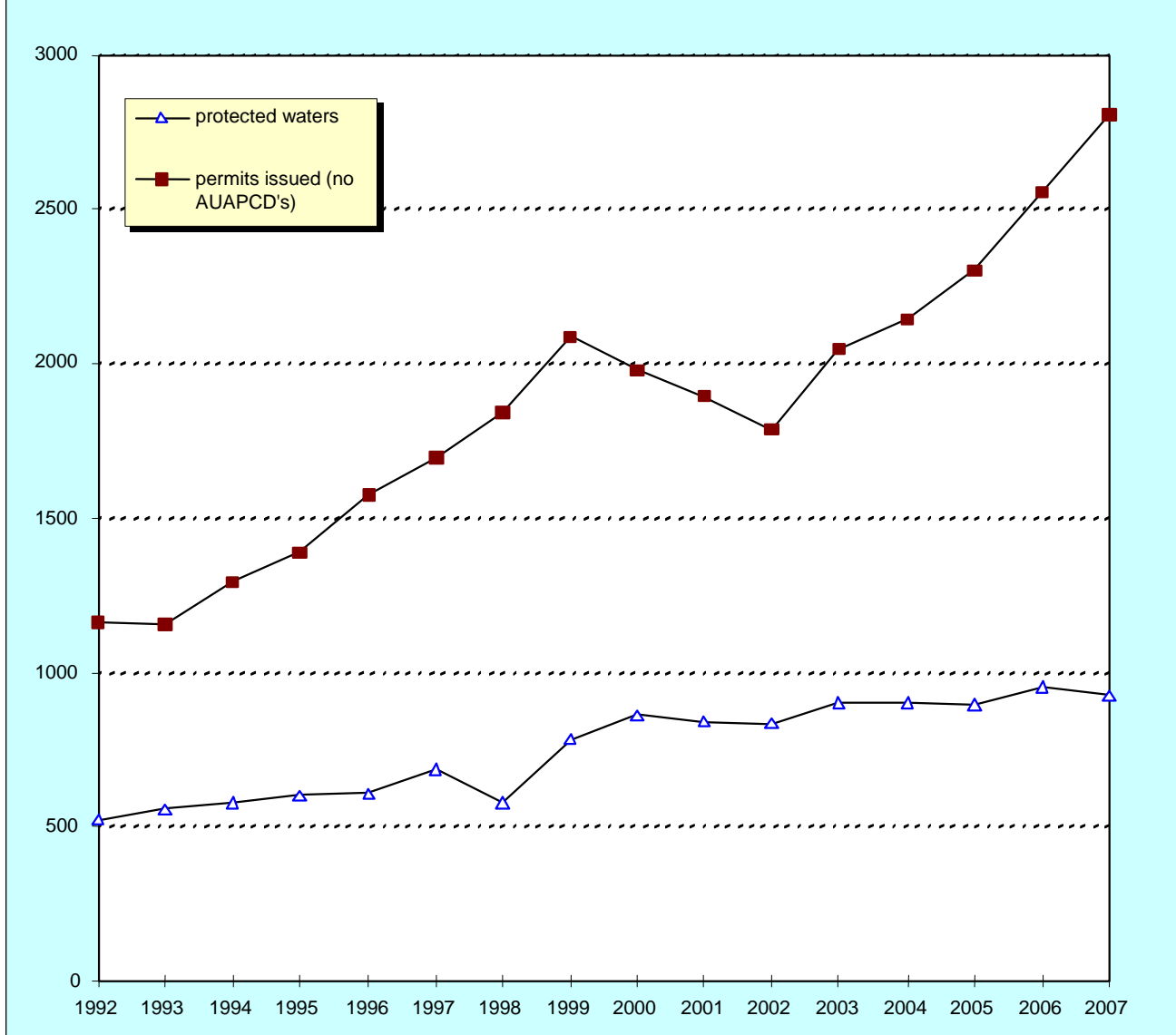
In 2007, a total of 4,695 permits were issued statewide for APM activities (includes 62 shoreline habitat restoration permits), 343 more than in 2006 (Appendix G provides a map of the county by county distribution of permits and permitted properties). These permits were issued for properties on 927 public waters (i.e. lakes, ponds, and streams) in 2007 (Figures 1, 2, and 3). In 2007, there were 1,824 permits issued for the operation of Automated Untended Aquatic Plant Control Devices (AUAPCD). The remaining 2,871 permits were issued to municipalities and lakeshore homeowners for either pesticide use (includes algae and swimmer's itch control) or mechanical control (cutting, pulling, or harvesting) of aquatic vegetation.

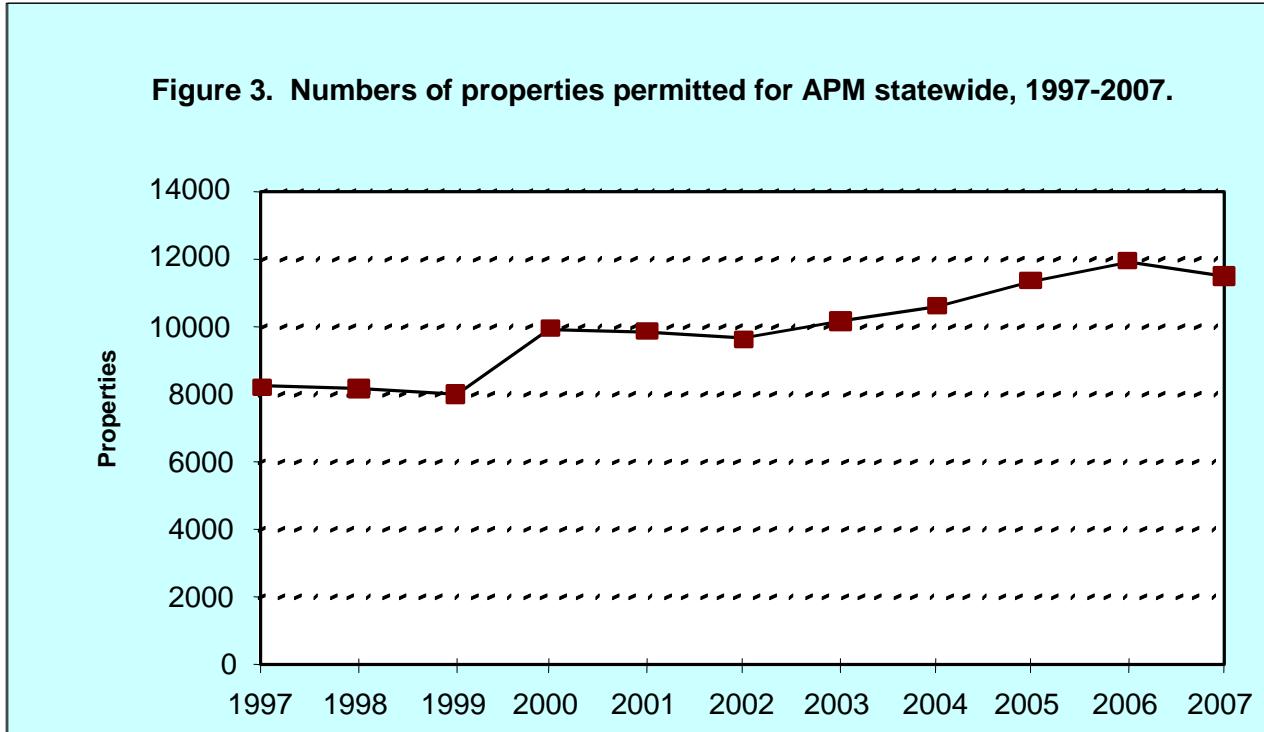
Over the last 15 years, the number of public waters where permits are issued has almost doubled. Little increase occurred until 1999 when the number of public waters with permitted APM activity increased sharply (Figures 2 & 3). The number of public waters with permitted APM activity in 2007 was 927, 26 fewer lakes than in 2006.

**Figure 1. Permits issued, and the number of lakes with permitted aquatic plant control, by region, in 2007.**



**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 1992-2007.**





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 2007 the total number of properties declined for the first time since 2002 while the number of permits continued to increase. 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 may have contributed 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 20. Some permits have more than 100 properties listed on a single permit. In 2007 there were 11,512 properties covered by the 4,695 permits issued.

The statewide average number of properties per permit in 2007 was 2.5, slightly lower than in 2006. The Central Region, which includes the Twin Cities metropolitan area, typically has larger group permits than other areas of the state. In 2007, the Central Region averaged 4.4 properties per permit issued down from 6.1 in 2006. The Northwest Region averaged one property per permit; the Northeast Region averaged nearly two properties per permit (1.6). The average number of properties per permit in the Southern Region in 2006 was 4.8, but decreased to 2.9 properties per permit in 2007.

Table 1. Permits grouped by the number of properties listed (excluding AUAPCD) by Region, 2007.

Region		1	2A	2B	3A	3B	4
Property/permits:	>100	0	0	2	2	1	1
	51-100	0	2	0	12	6	2
	21-50	0	1	7	49	17	3
	11-20	0	1	7	53	22	0
	2-10	2	0	14	183	57	14
	1	563	95	668	569	319	138

The rules regulating aquatic plant removal from public waters allow for 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 standards for permit issuance in APM rules are met prior to issuing a permit for plant removal. 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 2007.

	1	2A	2B	Region			Statewide
				3A	3B	4	
number of applications requesting near shore control	1489	99	1112	901	599	215	4415
permits issued as requested	1300	69	944	676	451	161	3501
% of permits issued as requested	87.3	69.7	84.9	75.0	75.3	74.9	81.6

### Permit Fees

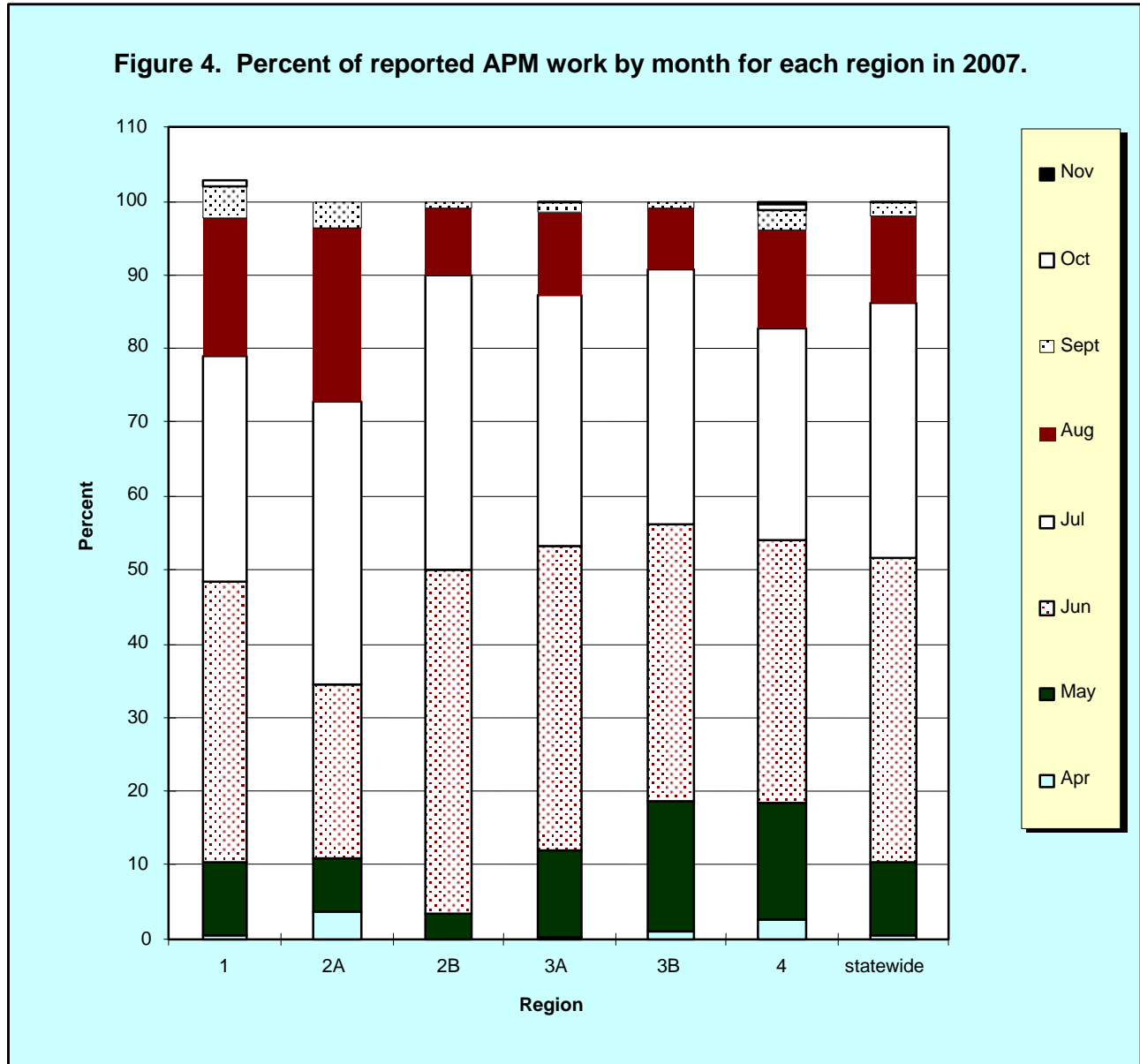
Permit fees were increased during the 2003 legislative session. People applying for APM permits after August 1, 2003 were required to pay the higher fee. The new fee increased many types of APM permit from \$20.00 per property to \$35.00 per property. The cap on large group permits was increased from \$200 to \$750. All permits in 2007 were issued under the new fee structure.

Revenues in 2007 were \$315,417.74 about \$26,800 more than 2006. The average permit fee per property owner in 2006 was \$24.58 in 2007 the average fee per property was \$27.55. There is still 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

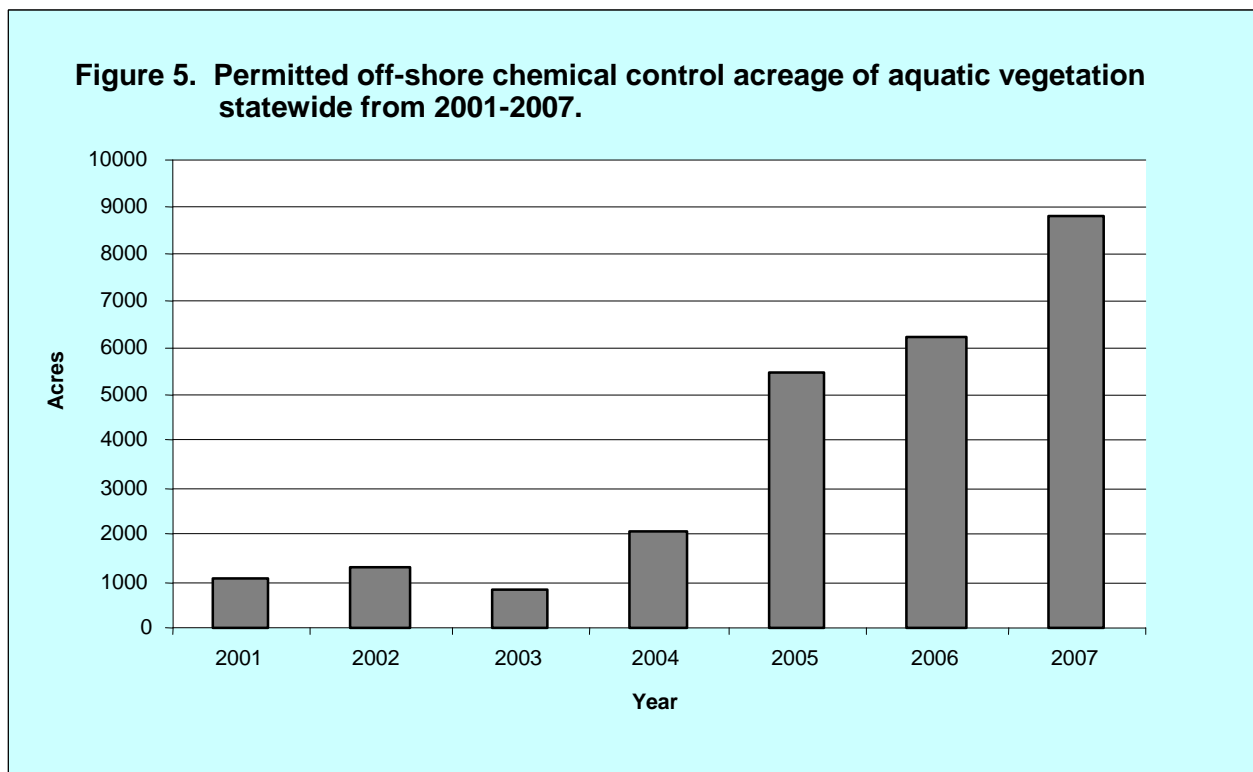
Permits are issued for the open water season, generally from May through September 1. However, aquatic plant control can begin as early as January and extend through November. In 2007, about 87% of the permitted work, reported statewide, was completed in June, July, and August (Figure 4). Because most aquatic plant control in Minnesota is recreationally motivated this pattern has been consistent over time.

**Figure 4. Percent of reported APM work by month for each region in 2007.**



### Acres of aquatic plant control permitted

The number of acres permitted for submerged aquatic plant control (both chemical and mechanical methods) 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 and 2007 with an aquatic herbicide to manage curly-leaf pondweed. As the interest in managing invasive species increases this trend is likely to continue.



Again, in 2007, about 38% 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, accounted for the remaining 62% 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 2007 are found in Table 3. Permit holders were asked if the control work they did was fully what they were allowed. Nearly 20% of those responding indicated that control work done was less than the allowed area.

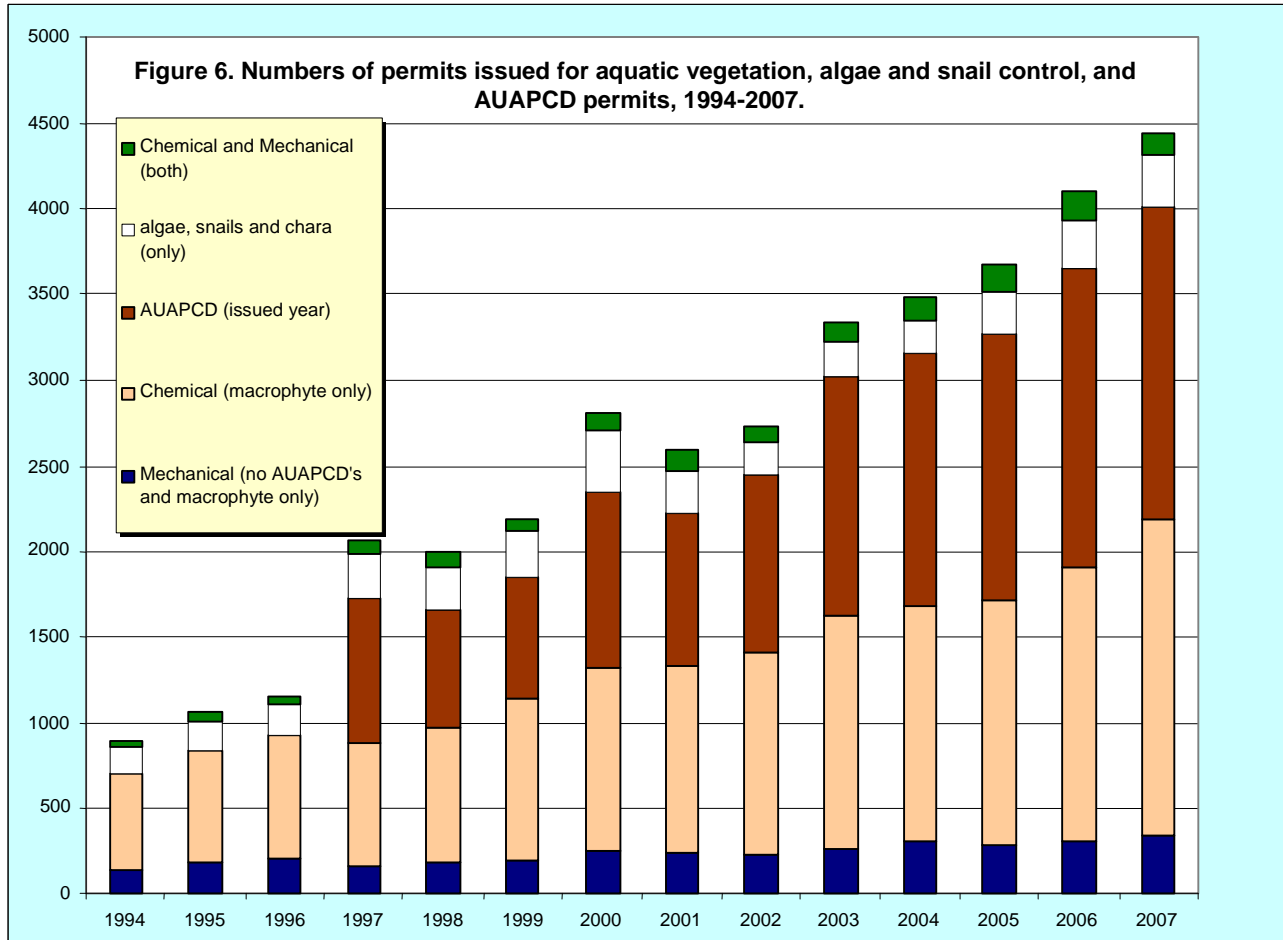


Table 3. Total near shore area permitted, in acres, by region, for control of submerged vegetation, swimmer's itch and AUAPCD use in 2007.

Control	Region						Total number of acres	Props	Ave. Acres/Prop.
	1	2A	2B	3A	3B	4			
Herbicide control excluding off shore treatment	68.1	10.7	122.2	779.4	315.1	143.4	1438.9	6984	0.206
Mechanical control excluding off shore removal	19.7	2.2	21.2	23.5	11.2	10.7	88.6	783	0.113
Swimmer's itch control *	37.3	8.8	74.5	644.6	174.0	40.7	979.9	4708	0.208
AUAPCD 2007 issued	71.2	0.4	33.4	9.9	16.0	7.5	138.4	1825	0.076

\* includes all permits with swimmers itch control

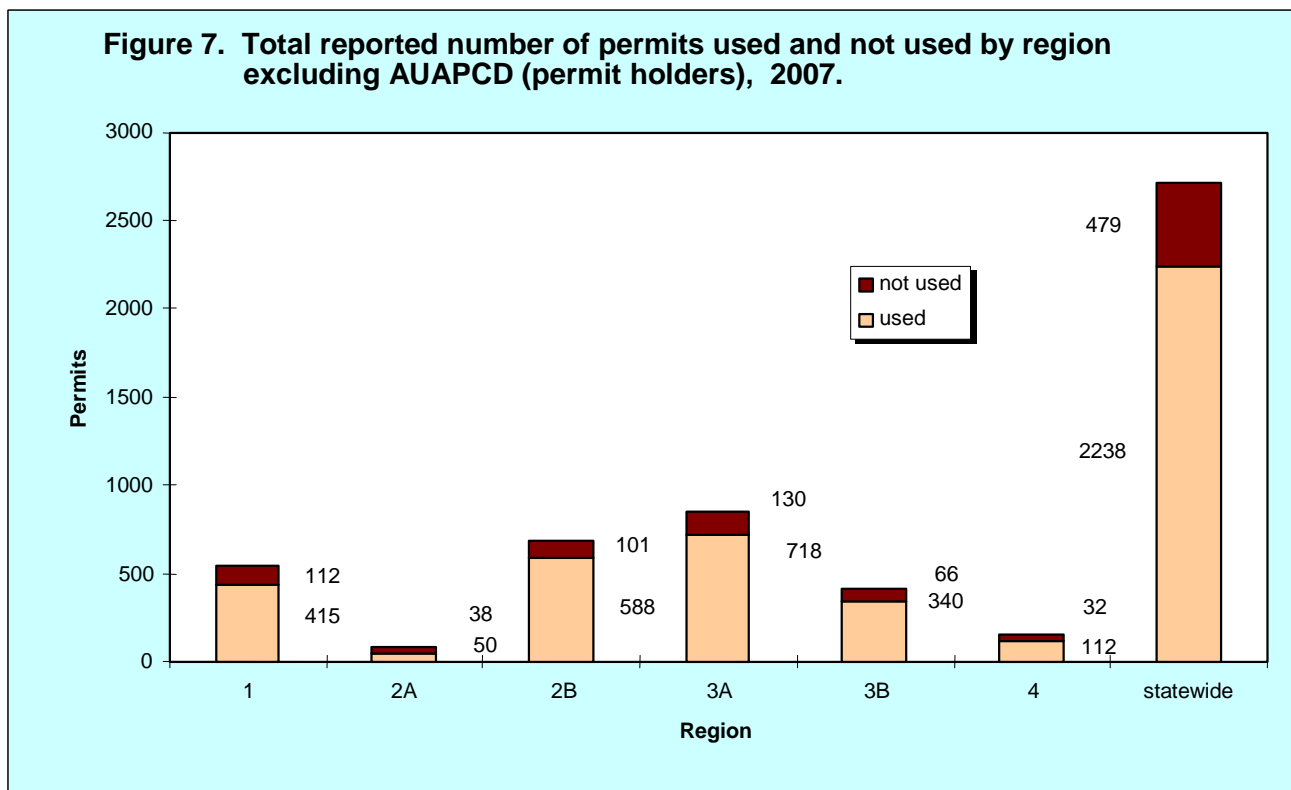
### Numbers of Aquatic Plant Removal Permits Used

Each year some permits issued for aquatic plant management activities are not used (Figure 7). Statewide, 82% of permits issued were reported used by the permittees or commercial applicators/operators doing the work, this is down slightly from 2006. 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 2007, the reason most frequently given (47%) for not using an APM permit was that the property owner was unable to do the permitted work; 20% reported not doing the work because of getting their permit too late.

Table 4. Response by permit holders to choices indicating that their APM permit was not used, expressed as a percent by region in 2007.

Region	1	2A	2B	3A	3B	4	Statewide
nuisance condition did not devel.	12	15	17	14	6	33	14
got permit too late	15	10	17	30	27	27	20
unable to do the work	57	50	47	27	48	27	47
other	15	25	19	30	18	13	19
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



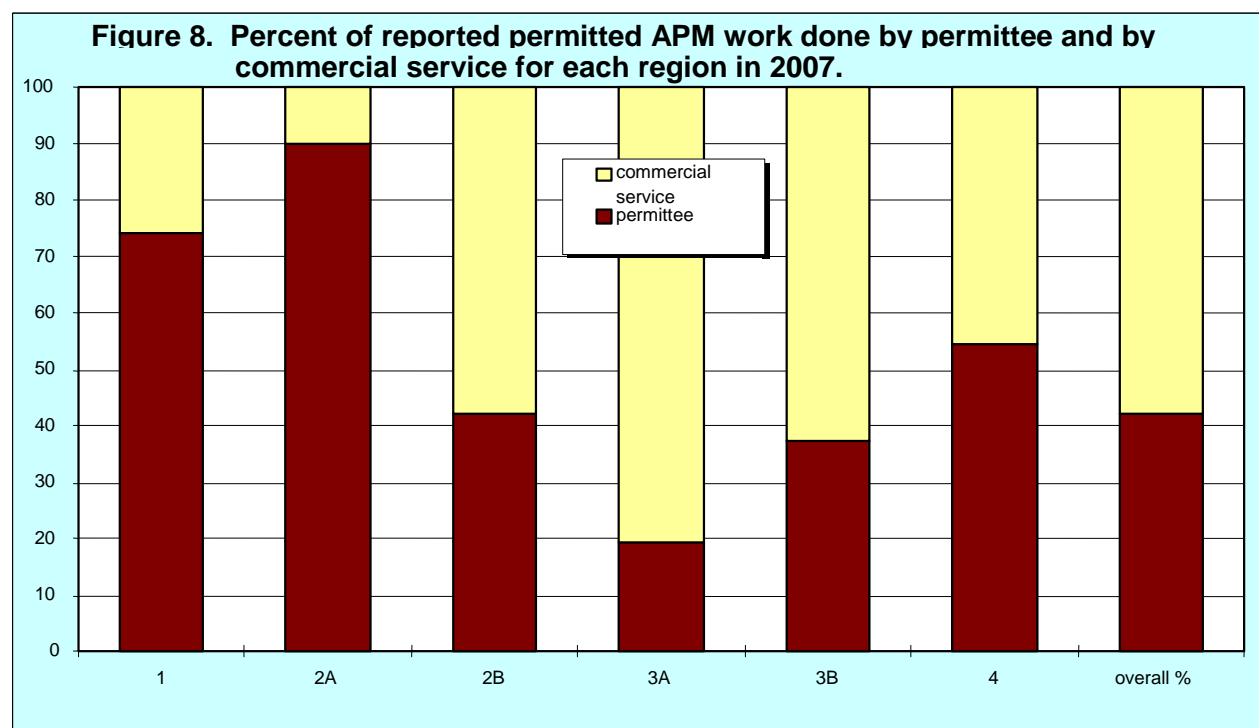


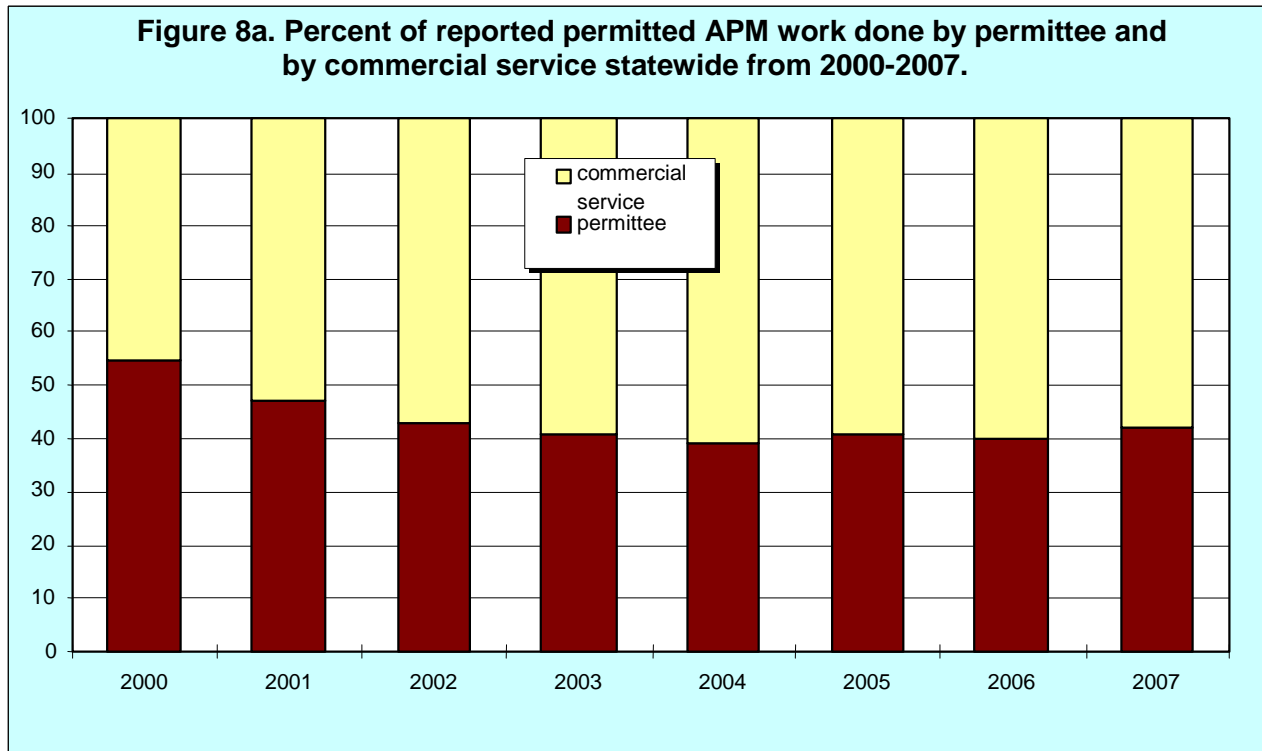
Lakeshore homeowners perform about 42% of mechanical and herbicide control permitted statewide. About 58% of the control work in 2007 was done by commercial applicator and aquatic plant harvesting companies. This represents a slight decrease over the percent of the work done by commercial applicator and aquatic plant harvesting companies in 2006. Permit holders in the Central Region hire commercial services more frequently than any other region (Figure 8). Commercial aquatic plant control companies perform about 75% of the control in the Central Region. In 2007, 54% of the control in the Northeast Region was done 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 74% of the control in the Northwest Region and 54% in the South Region. Figure 8a shows the trend in 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 59% of the respondents were satisfied with the results of the herbicide control. About 76% of those responding were satisfied with the results of treatments to control swimmer's itch and 56% 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.

Permit holders, excluding AUAPCD permittees, were asked if they would apply for a permit in 2008. Of the 1203 responses, 872 (72%) said they would reapply next year a 5% decrease from 2006. Approximately 24% (291) 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 (28 or 2.3%) was slightly less than in 2006. Regardless of their response, all 2007-permit holders whose permit expires will receive permit application materials prior to the start of the 2008 open water season.





### **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 to require a permit for the operation of these devices because of their potential to excavate bottom sediments, and impact spawning habitat. In 2007, there were 1,824 permits issued for these devices statewide. Of those permits 1,177 were issued for a one-year term and 647 were issued for a 3-year permit term. Permits are issued for 3 years if the applicant agrees to a reduced area of operation and qualifies for a 3-year permit based on the vegetation types present. More than 75 percent of the AUAPCD permits were issued in the Northwest and Northeast Regions; this percentage is slightly lower than 2006. In addition to the permits issued in 2007, there are active three-year permits issued in 2005 and 2006 (475 and 638 respectively). Of the 1,813 surveys mailed 1,637 (90%) of the AUAPCD permit holders statewide responded to the questionnaire. Three year AUAPCD permit holders issued permits in 2005 and 2006 were not surveyed.

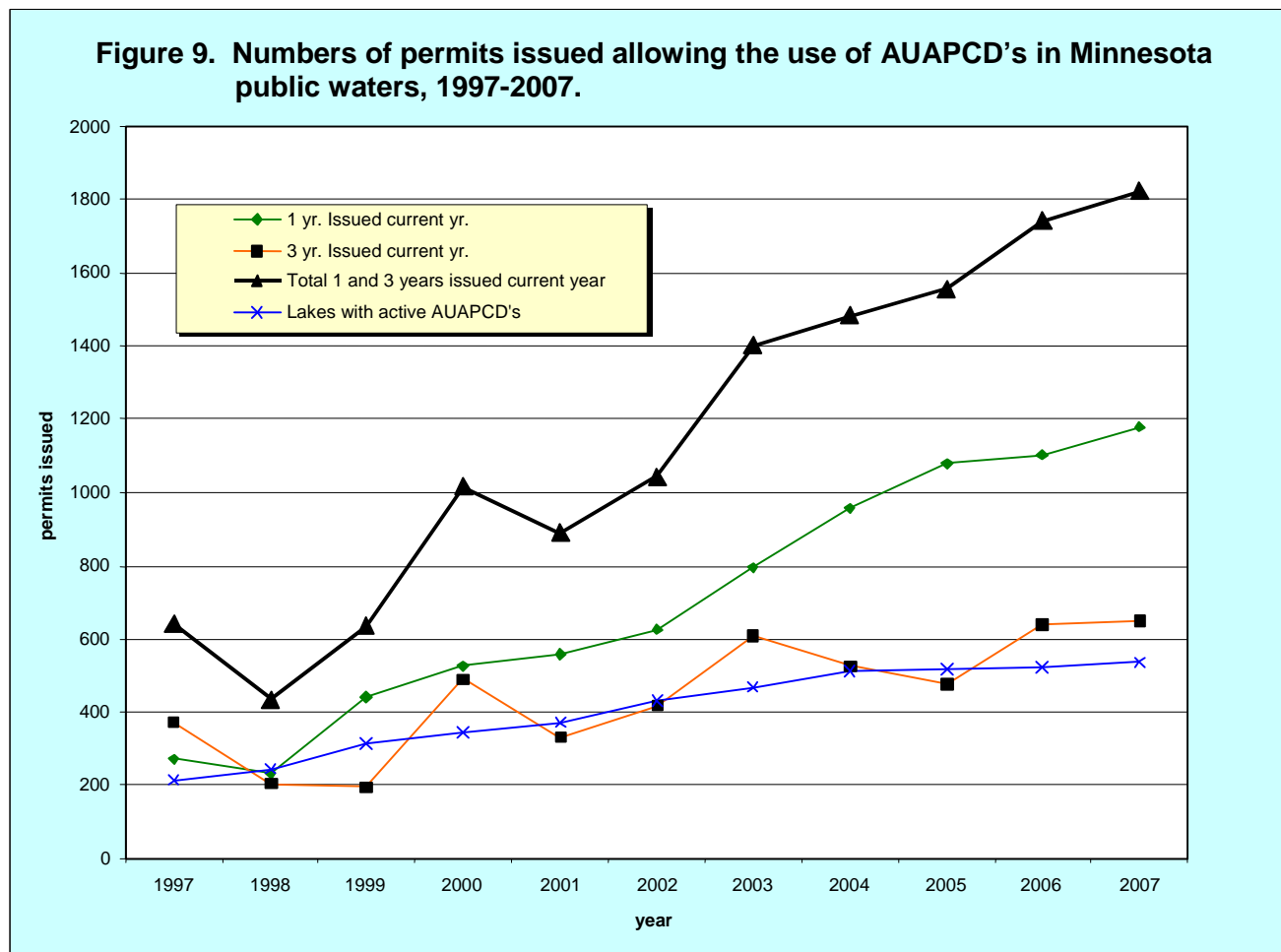
There are at least three different companies producing AUAPCD's that are used in Minnesota, the Cray Company WeedRoller®, the Colman Beach Groomer and the Lake Restoration Lake Maid. Permits for 22 homemade devices were also issued in 2007. Based on survey results, a little over half of AUAPCD owners in Minnesota have owned their device for more than three years (57% of the respondents). In contrast, 24% have owned their device from 1 to 3 years and 18% have responded that they have owned their device for less than one year.

Most of the people responding to our questionnaire (75%) were the sole owner of an AUAPCD. Fourteen permit holders stated that they rented their device in 2007. This was a sizable increase over only the two that reported renting in 2006. Some homeowners opt to purchase the device cooperatively and share it during the summer months. Approximately 25% of the people who used an AUAPCD in 2007 either, rented, borrowed, owned and shared, or jointly owned their AUAPCD, a 7% increase from 2006.

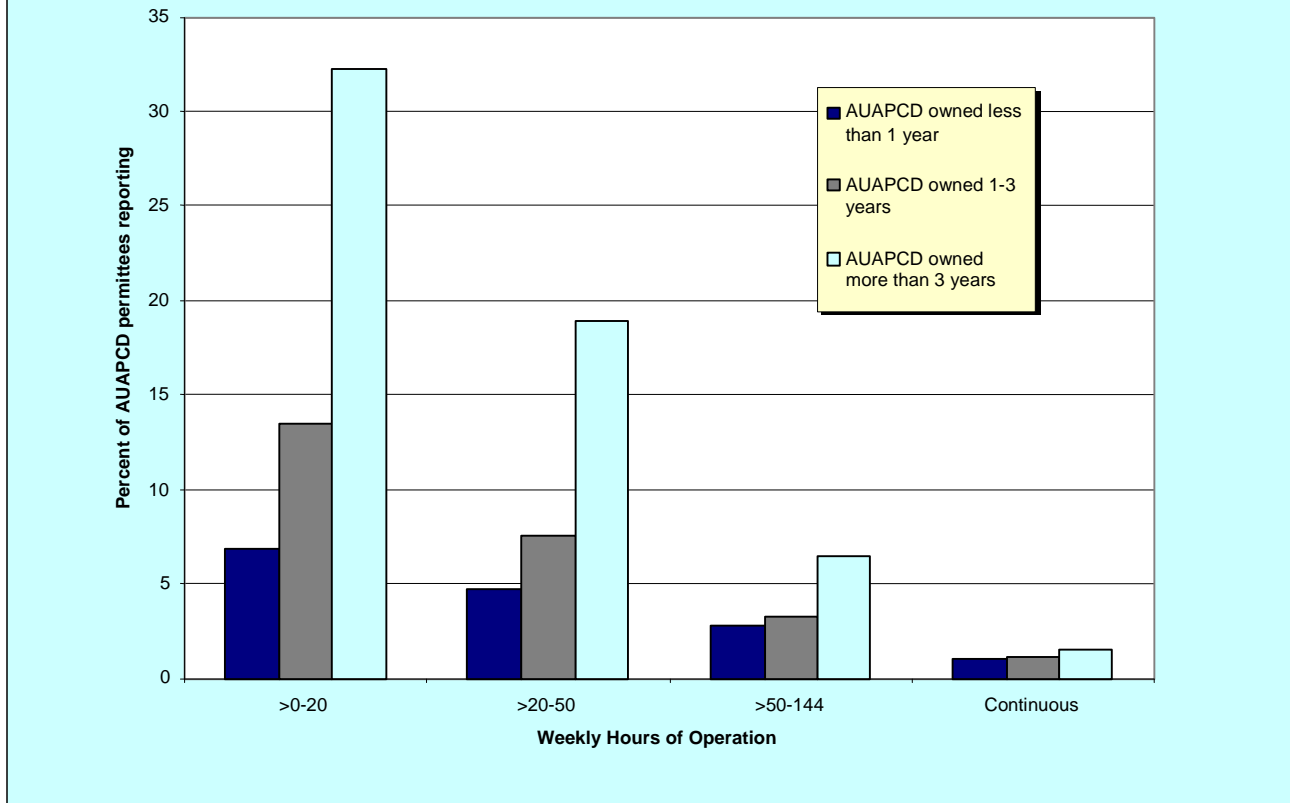
Lakeshore homeowners have two AUAPCD permit options, provided the location is suitable for the operation of these devices. The annual renewal option is used when the lakeshore homeowner operates in an area greater than 2,500 square feet or more than 50 feet alongshore. The one year permit option showed a moderate increase in 2007 (Figure 9). The three-year permit option was similar to 2006 (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 171 persons permitted to operate an AUAPCD stated that, for various reasons, they did not operate the device in 2007, up from 164 in 2006.

The AUAPCD had higher satisfaction ratings than other methods of aquatic plant control. When asked, were you satisfied with your AUAPCD, 98% of those responding indicated that they were satisfied with these devices. This percentage is unchanged from 2006.



**Figure 10. AUAPCD use from May through August, 2007 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. About 98% of the permit holders responding to this question had no difficulties displaying the sticker.

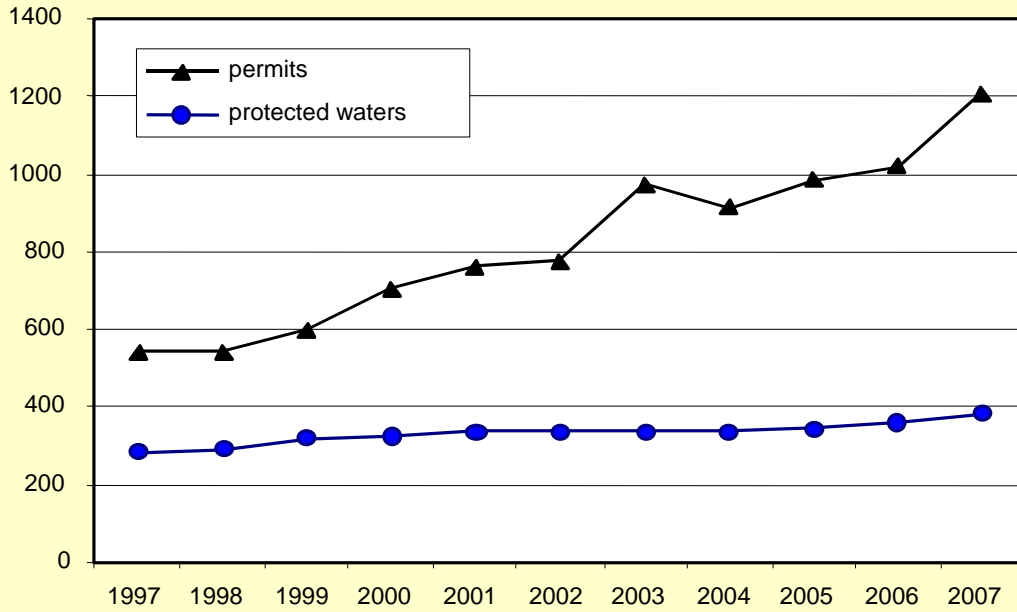
**Filamentous algae control**

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.

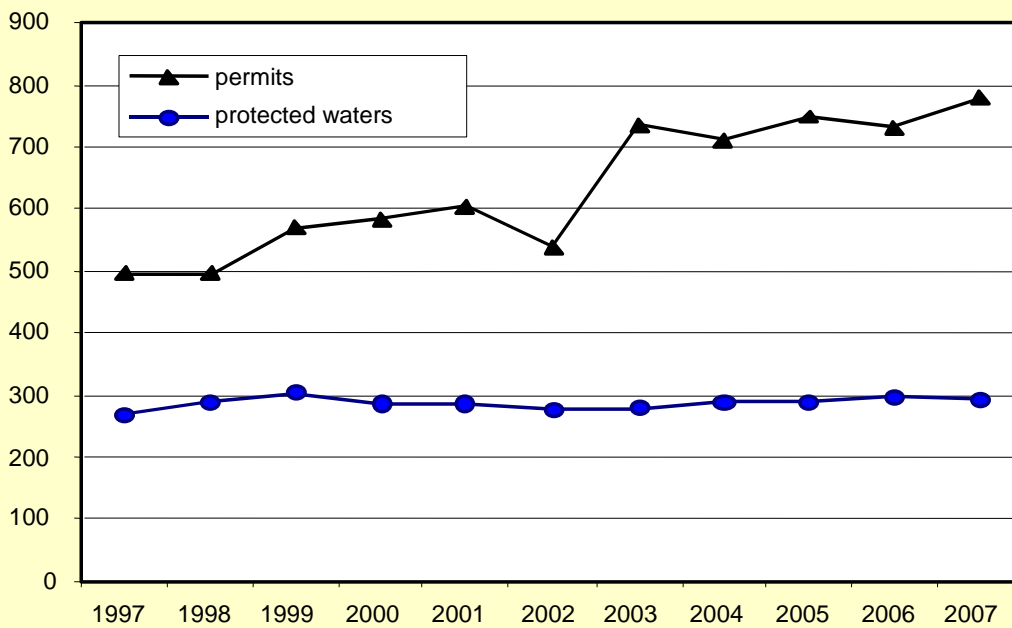
**Chara control**

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 control, and numbers of lakes where permits were issued 1997-2007.**



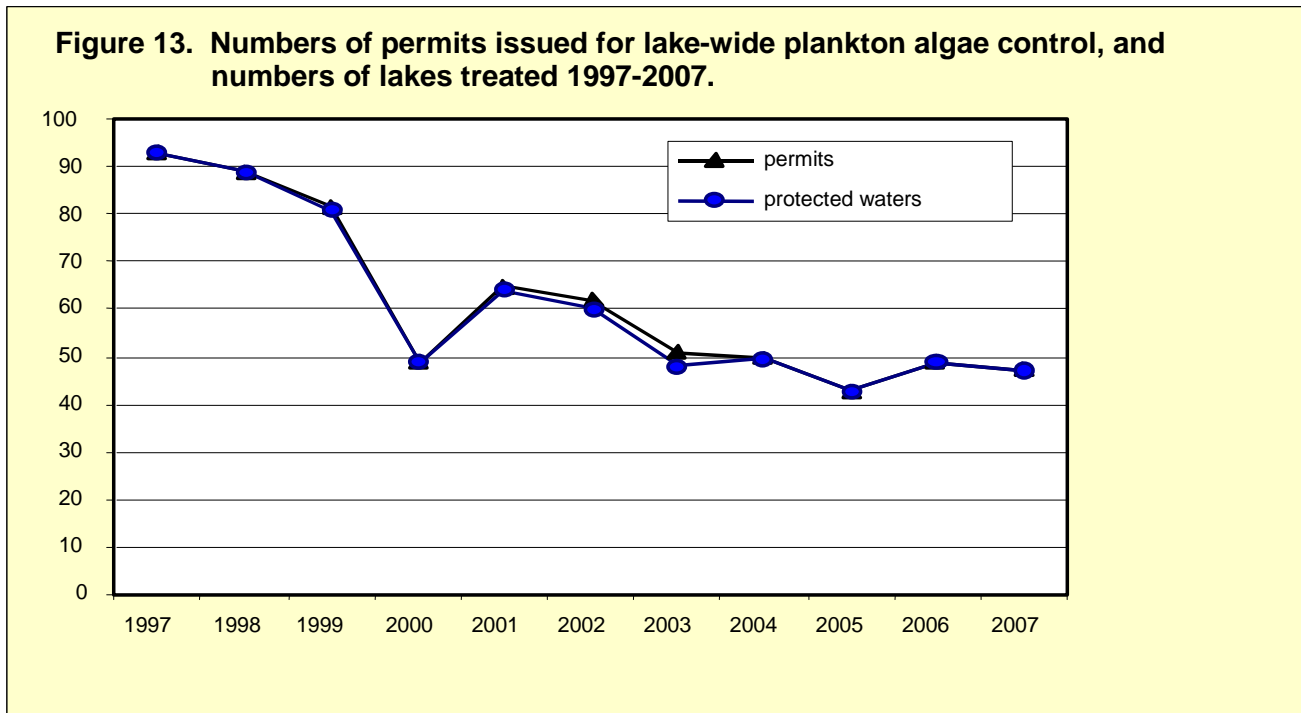
**Figure 12. Numbers of permits issued for chara control, and numbers of lakes where permits were issued 1997-2007.**



### 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 copper sulfate 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 (Blankespoor, 1991). The cause of this irritating skin condition was discovered by W.W. Cort in 1928 at the University of Michigan Biological Station (Blankespoor, 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.

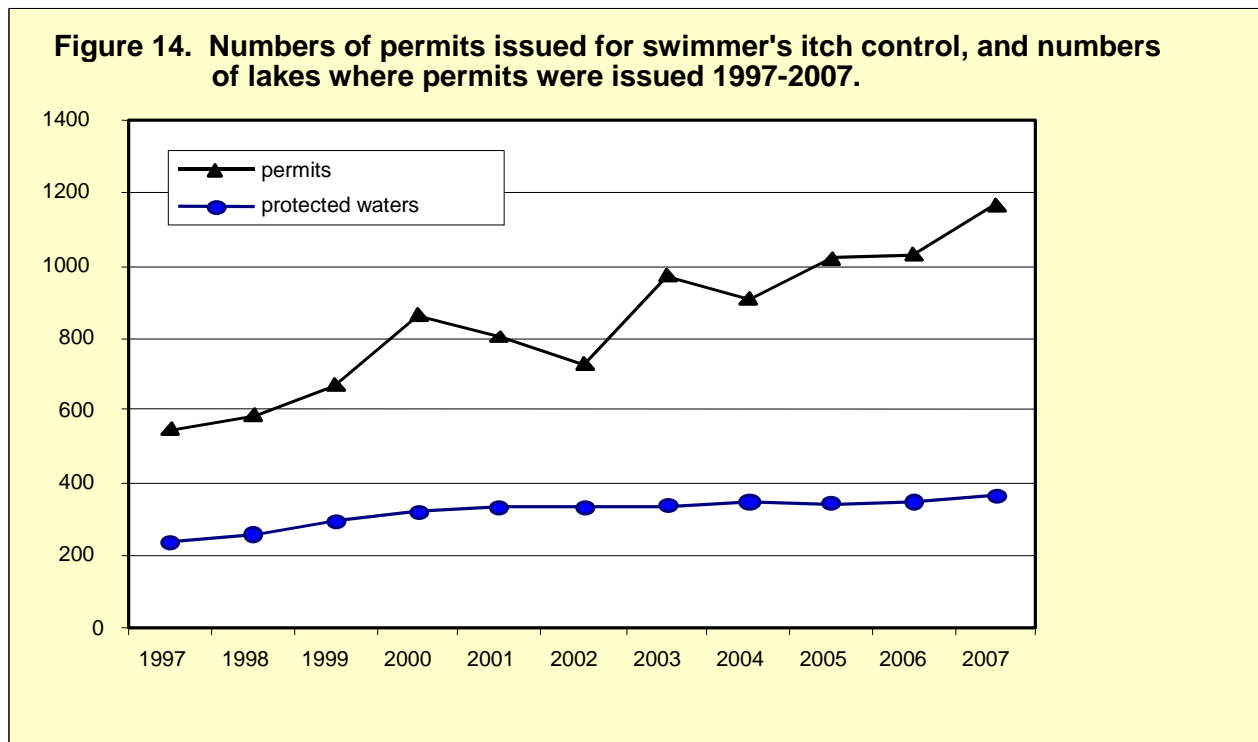
These parasites have a complex life history. The adult fluke lives in the blood vessels lining the intestine of its definitive host where it reproduces and releases eggs. The eggs enter the gut and leave the animal in the feces. The eggs hatch when they enter the water becoming a larvae called a miracidia. 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. Cercaria do 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 submerged 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 will show 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 2007 there were nearly 363 lakes statewide with requests for permit to control swimmer's itch (Figure 14). About 76% 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 20<sup>th</sup> 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 when they germinate 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 provided relief to lakeshore property owners from the recreational nuisances caused by surface mats of curly-leaf pondweed, but had 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 2007, two lakes were treated with the aquatic herbicide fluridone and several 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:



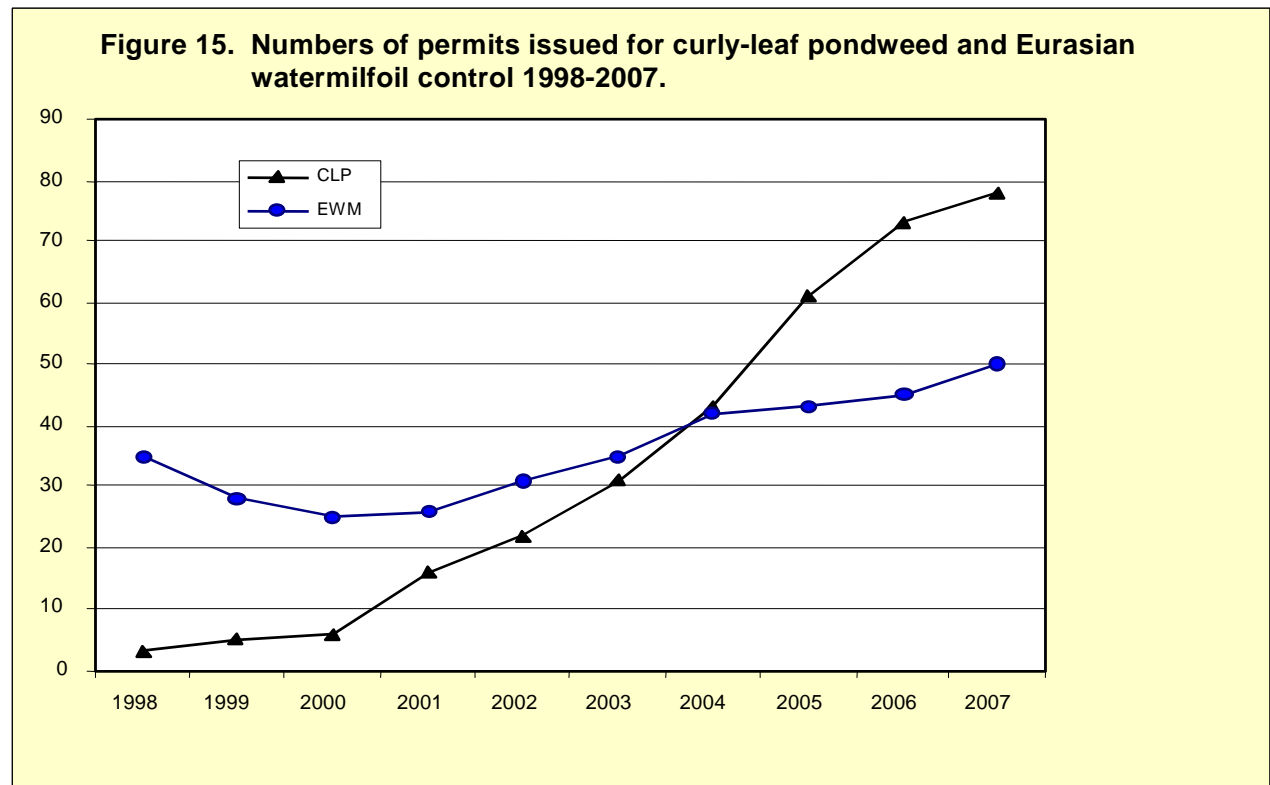
1. Reduce peaks in concentrations of phosphorous and associated algal blooms.
2. Reduce the abundance of curly-leaf pondweed for long periods of time.
3. Increase the abundance of native, submersed aquatic plants.
4. Reduce the interference with use of the lake caused by curly-leaf pondweed.

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.

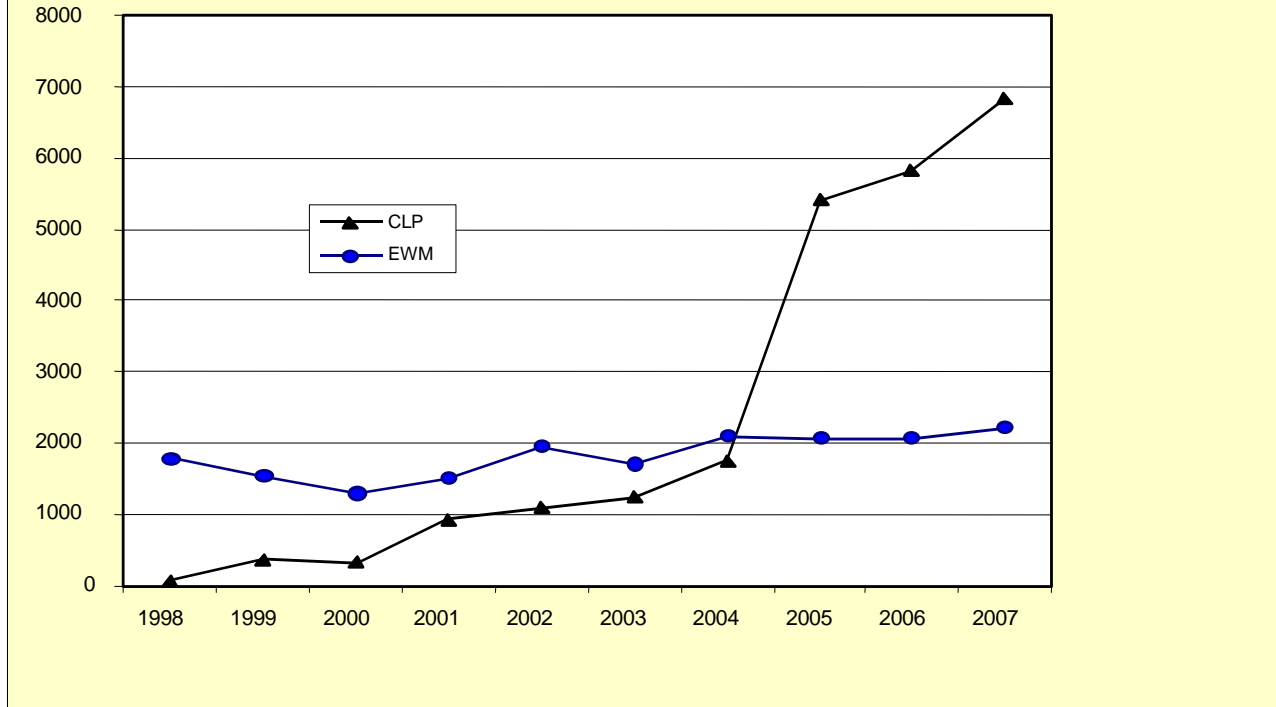
See the 2007 Invasive Species Program Annual report for more detailed information on this project ([http://files.dnr.state.mn.us/ecological\\_services/invasives/annualreport.pdf](http://files.dnr.state.mn.us/ecological_services/invasives/annualreport.pdf)).

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**Figure 16. Acres of off-shore curly-leaf pondweed and Eurasian watermilfoil control 1998-2007.**



### 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 plants 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. Purple loosestrife was designated 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.
- Carry out management activities including chemical and biological control.
- Support research to evaluate and expand control efforts.
- 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. Highest priority stands are those located in watersheds with little purple loosestrife. Those stands that do exist are small and newly established (e.g., they consist of a few plants covering a small

area) and are found near the headwaters 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 2007, DNR staff treated a total of 53 purple loosestrife sites with 1.1 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 2007 Invasive Species Annual Program report. ([http://files.dnr.state.mn.us/ecological\\_services/invasives/annualreport.pdf](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.

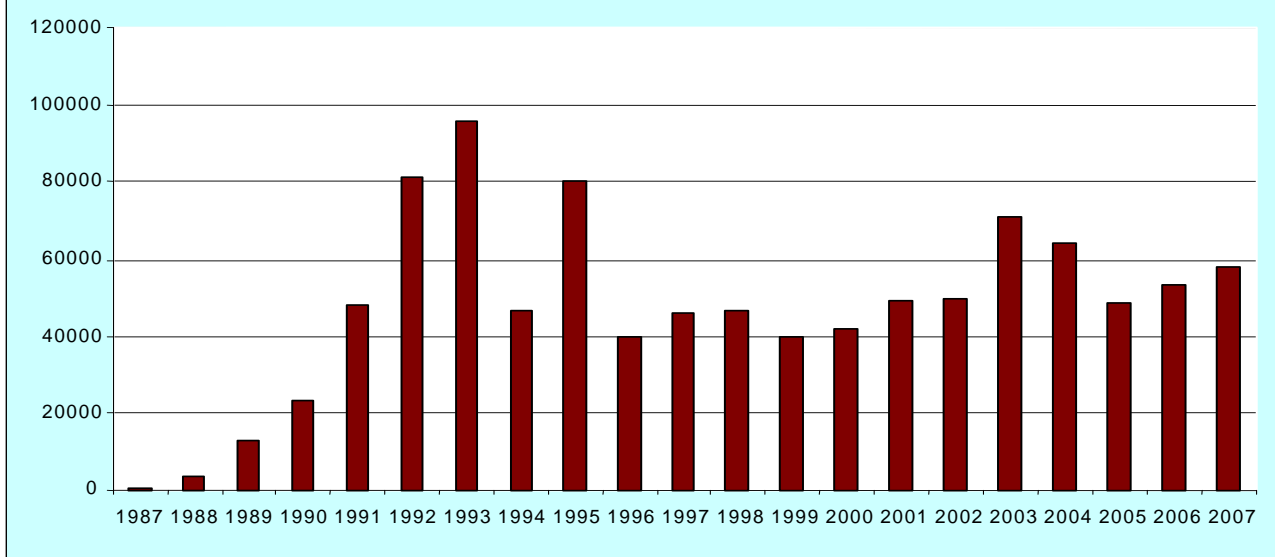
Eurasian watermilfoil was discovered in 10 additional water bodies in 2007. There are now 203 Minnesota lakes known to have populations of this invasive submersed aquatic plant.

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 2007 for milfoil was 57,700 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 2007 Invasive Species Program Annual Report. The report may be reviewed on line at [http://www.dnr.state.mn.us/ecological\\_services/invasives/index.html](http://www.dnr.state.mn.us/ecological_services/invasives/index.html).

In 2007, the DNR provided \$119,000 in state funds to cooperators on 28 lakes for management of milfoil. The DNR spent an additional \$14,000 on control work at public water accesses to control Eurasian watermilfoil to help minimize its spread between lakes.

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



# 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)
Aqua-Kleen (Granular)	X		2,4 Dichlorophenoxyacetic (Butoxyethyl Ester)
Sonar™ (Liquid or Granular)	X		Fluridone
Rodeo (Liquid)		X	Isopropylamine salt of Glyphosate
Aqua Master (Liquid)		X	Isopropylamine salt of Glyphosate
Aqua Neat		X	Isopropylamine salt of Glyphosate
Aqua Pro		X	Isopropylamine salt of Glyphosate
Renovate		X	Triclopyr
Habitat		X	Isopropylamine salt of Imazapyr <i>(licensed applicator only)</i>
<u>Part 2. Contact Herbicides.</u>			
Aquathol (Liquid or Granular)		X	Dipotassium salt of endosulfar
Hydrothol 191 (Liquid or Granular)		X	Mono-amine salt of endosulfar <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>			
Cutrine 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 (at least 2 aquatic labeled products)
Aquashade (Liquid)			Acid Blue 9 / Acid Yellow 23 (Filters light in wavelengths required for plant growth)
Green Clean	X (A)		Sodium carbonate peroxyhydrate

Table B. Reported various aquatic herbicide use statewide, 1981-2007.

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

\* Data not available

Table C. Aquatic Plant Management Report Survey Results, Chemical-Mechanical, 2007.

Was your 2007 permit used?

932 Yes, permitted work was done.

35 No, because: The nuisance conditions did not develop.

49 No, because: I got the permit too late.

116 No, because: I was unable to get the work done.

59 No, because:

Thanks! Please use the back for comments

1191

When my permit expires:

872 I will reapply for a permit. 28 I will not apply for a permit.

291 I am undecided at this time.

12 Permanent and Non-transferable

The method of control was:

209 mechanical or hand removal.

609 chemical treatment.

114 mechanical and chemical treatment.

A. Were you satisfied with the aquatic plant control work done (for Swimmers Itch control only skip to 4.B) ?

452 YES

65 NO

266 wasn't as good as expected

B. If you treated for Swimmers Itch were you satisfied with the control ?

168 YES

17 NO

36 wasn't as good as expected

When was the work done?

11 April 150 May 456 June 365 July 224 August 49 September 6 October 1 Nov.

27 uncertain

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.

730 Yes, control work was done on the entire area permitted

187 No, less control work was done than the permit allowed

What Did You Use?

How Much Did You Use?

(concentrated product before mixing)

Copper sulphate	<u>13,043.00</u> lbs.	Navigate	<u>3,025.0</u> lbs.	other: gran Cutrine Plus	<u>124.0</u> lbs.
ran.Hydrothol 191	<u>9302.0</u> lbs.	Aquakleen	<u>4,516.0</u> lbs.	DMA	<u>75.0</u> gal.
liq. Aquathol K	<u>213.3</u> gal., qts., oz.	2,4-d total	<u>7,541.0</u>	SHORECLEAR	<u>0.18</u> gal.
gran.Aquathol	<u>746.0</u> lbs.	Aquacide	<u>961.0</u> lbs.	SONAR GRAN	<u>1.5</u> lbs.
liq. Hydrothol 191	<u>0</u> gal., qts., oz.	liq Cutrine Plus	<u>4.5</u> gal., qts., oz.	Habitat	<u>32.8</u> gal.
Reward	<u>5.4</u> gal., qts., oz.	Rodeo	<u>1.7</u> gal., qts., oz.	Weedtrine D	<u>7.3</u> gal.



Table D. Aquatic Plant Management Report Survey Results, AUAPCD, 2007.

1. The type of AUAPCD device I use is a:
- 1363 Crary WeedRoller®
  - 43 Lake Restoration Lake Maid
  - 200 Colman Beach Groomer
  - 22 home made
  - 9 unknown
2. I used an AUAPCD this year.
- 1466 Yes
  - 171 No, I did not use an AUAPCD this year.
3. The AUAPCD I used in 2005-  
I have owned for:
- |                       |  |                  |
|-----------------------|--|------------------|
| 222 less than 1 year  | Is jointly owned and shared<br>with the other co-owners and<br>has been for: | 12 was rented.   |
| 299 1 - 3 years       | 27 less than 1 year  | 14 was borrowed. |
| 700 more than 3 years | 51 1 - 3 years   |                  |
|                       | 140 more than 3 years  |                  |
4. How often monthly did you operate the AUAPCD you used ?
- |                   | not<br>used | few<br>hours<br>>0-20 | several<br>hours<br>>20-50 | many<br>hours<br>>50-144 | continuous |
|-------------------|-------------|-----------------------|----------------------------|--------------------------|------------|
| <b>In May:</b>    | 818         | 427                   | 158                        | 48                       | 14         |
| <b>In June:</b>   | 217         | 588                   | 430                        | 179                      | 61         |
| <b>In July:</b>   | 134         | 591                   | 469                        | 214                      | 57         |
| <b>In August:</b> | 285         | 702                   | 318                        | 123                      | 37         |
5. Were you satisfied with the AUAPCD you used?
- 1436 Yes
  - 29 No
6. Did you have any problems displaying the sticker you got with your permit ?
- 28 Yes, please explain: \_\_\_\_\_
  - 1437 No \_\_\_\_\_

Table E. Aquatic Pesticide Enforcement Citizen Complaint Investigations, 2007.

Date	Complaint	Lake Name	County	Observation	Action	Result
July 17	Unauthorized herbicide treatment	Gideons Bay Mtka	Hennepin	Careless applicator and possible fraudulent action by the property owner	Conversation with Margy Pennings of Lake Management	Verbal warning that any further unauthorized activity would be turned over to enforcement
July 17	Unauthorized herbicide treatment	Little Birch	Todd	Waterlily chemical damage observed	Referred to area APM Specialist	Unknown
July 18	Unauthorized herbicide treatment	Forest Lake	Washington	Careless applicator	Conversation with Margy Pennings of Lake Management	Jason Jenson the area CO issued a written warning.
August 17	Unauthorized chemical application	Stella	Meeker	During AUAPCD inspection	Referred to area APM Specialist	Area CO notified. Restoration order issued.

Table F. Aquatic Pesticide Enforcement Use Inspections, 2007.

Treatment Date	County	Lake	Applicator	Number of Treatments Inspected
24-Apr	Wright	Limestone	Lake Restoration	2
27-Apr	Washington	Long	Lake Restoration	2
1-May	Dakota	Schwanz	Lake Management	1
7-May	Isanti	Blue	Lake Management	1
8-May	Ramsey	Silver (nsp)	Aquatic Engineering Inc	2
16-May	Hennepin	Eagle	private individual	1
25-May	Chisago	South Center	Lake Restoration	2
30-May	Hennepin	Mtka. Carmans	Lake Management	2
31-May	Wright	Clearwater	Clearwater Lake Property Owners	2
5-June	Hennepin	Independence	Professional Lake Management	1
5-June	Hennepin	Independence	Professional Lake Management	1
11-Jun	Washington	Forest	Lake Restoration	2
12-Jun	Ramsey	Gervais	Lake Improvement	2
13-Jun	Carver	Lotus	Midwest AquaCare	2
13-Jun	Carver	Lotus	Lake Restoration	2
15-Jun	Washington	Sunnybrook	Lake Management	2
25-Jun	Todd	Mound	Minnesota Shoreline Restoration	1
5-Jul	Hennepin	Mtka., Crystal	Lake Restoration	2
5-Jul	Chisago	Green	Lake Green Lake Association Restoration	1
11-Jul	Washington	Forest	Lake Management	2
13-Jul	Washington	Forest	Lake Restoration	2
20-Jul	Scott	O'Dowd	Midwest AquaCare	2
20-Jul	Hennepin	Mtka/Carmans	Lake Restoration	2
26-Jul	Sherburne	Long	Professional Lake Management	1

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

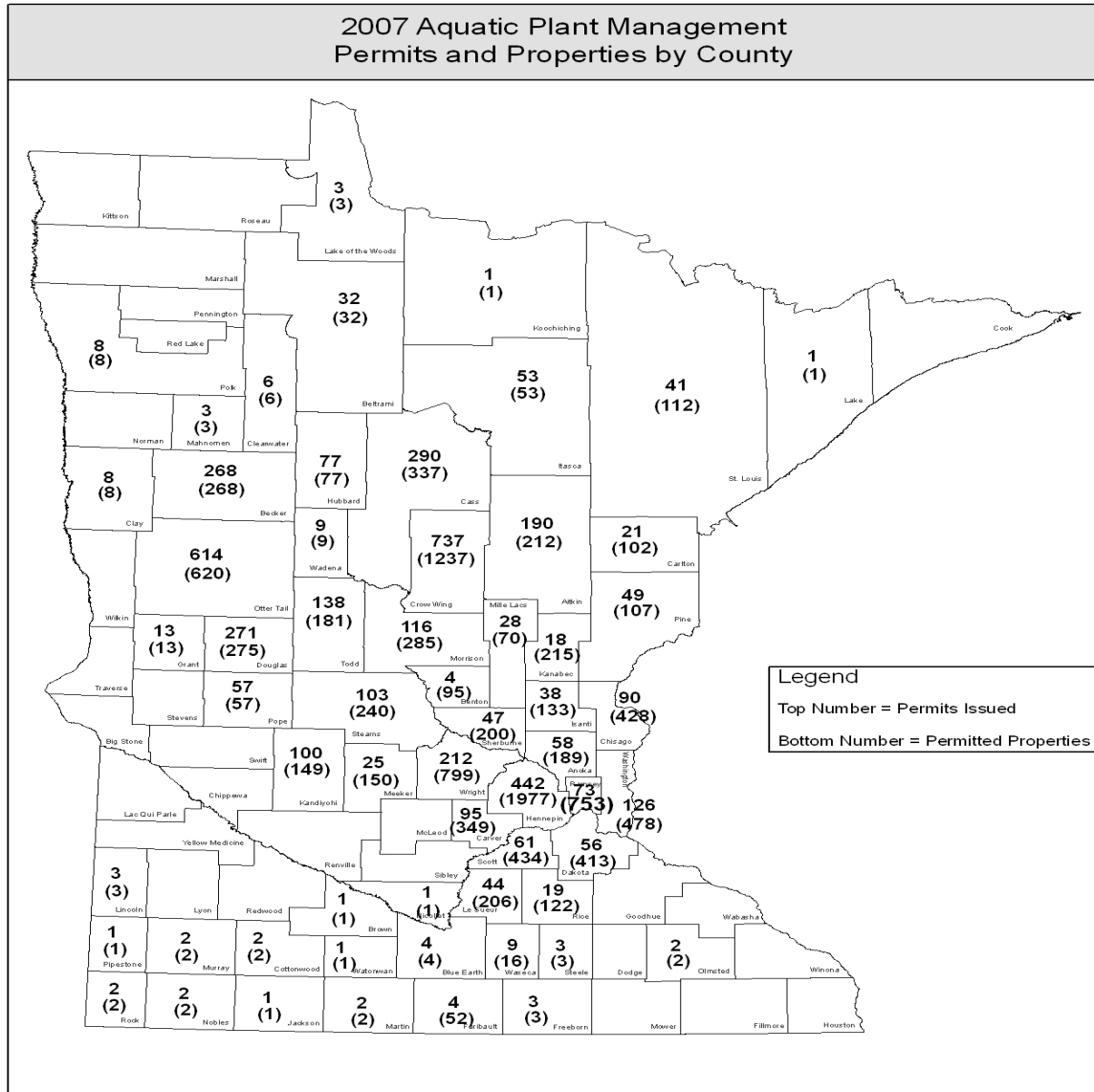


Table H. Lakes with ten or more total permits issued for swimmer's itch from 1997 through 2007.

Region	County	Lake	Total permits issued
1	Becker	Detroit	18
1	Becker	Height of Land	11
1	Becker	Sallie	10
1	Clay	Blue Eagle	11
1	Douglas	Irene	61
1	Douglas	Le Homme Dieu	46
1	Douglas	Ida	40
1	Douglas	Miltona	39
1	Douglas	Darling	22
1	Douglas	Carlos	18
1	Douglas	Geneva	13
1	Grant	Pelican	13
1	Grant	Pomme De Terre	10
1	Hubbard	Big Sand	22
1	Hubbard	Fishhook	11
1	Otter Tail	Wall	23
1	Otter Tail	Marion	22
1	Otter Tail	East Battle	19
1	Otter Tail	Rush	16
1	Pope	Linka	42
1	Pope	Amelia	25
1	Pope	Minnewaska	20
1	Pope	Scandinavian	12
1	Todd	Big Birch	30
1	Todd	Mound	18
1	Todd	Mons	11
2a	Carlton	Eagle	19
2a	Itasca	Swan	81
2a	Itasca	Sand	14
2a	Itasca	Bowstring	10
2a	Itasca	Jessie	10
2b	Cass	Gull	346
2b	Cass	Roosevelt	42
2b	Cass	Sylvan	24
2b	Cass	Upper Gull	21
2b	Cass	Birch	11
2b	Cass	Margaret	10
2b	Cass	Thunder	10
2b	Crow Wing	North Long	161
2b	Crow Wing	Whitefish	148
2b	Crow Wing	Round	143
2b	Crow Wing	Serpent	125
2b	Crow Wing	Bay	108
2b	Crow Wing	Crow Wing	108
2b	Crow Wing	Cross	95
2b	Crow Wing	Gilbert	92

Table H. Continued.

Region	County	Lake	Total permits issued
2b	Crow Wing	Upper Hay	87
2b	Crow Wing	South Long	82
2b	Crow Wing	Crow Wing	108
2b	Crow Wing	Cross	95
2b	Crow Wing	Gilbert	92
2b	Crow Wing	Upper Hay	87
2b	Crow Wing	South Long	82
2b	Crow Wing	Rush	81
2b	Crow Wing	Bertha	80
2b	Crow Wing	Roy	78
2b	Crow Wing	Big Trout	76
2b	Crow Wing	Upper South Long	67
2b	Crow Wing	Daggett	56
2b	Crow Wing	Lower Cullen	54
2b	Crow Wing	O'Brien	51
2b	Crow Wing	Perch	50
2b	Crow Wing	Lower Mission	45
2b	Crow Wing	Pelican	44
2b	Crow Wing	Rice	37
2b	Crow Wing	Nisswa	35
2b	Crow Wing	Ossawinnamakee	35
2b	Crow Wing	Little Pine	34
2b	Crow Wing	White Sand	34
2b	Crow Wing	Hubert	28
2b	Crow Wing	Pine	25
2b	Crow Wing	Upper Mission	24
2b	Crow Wing	Gladstone	22
2b	Crow Wing	Island	22
2b	Crow Wing	West Fox	22
2b	Crow Wing	Edward	20
2b	Crow Wing	Little Hubert	20
2b	Crow Wing	Lower Hay	20
2b	Crow Wing	Red Sand	20
2b	Crow Wing	Clark	19
2b	Crow Wing	Portage	19
2b	Crow Wing	Crooked	17
2b	Crow Wing	Pig	16
2b	Crow Wing	Sibley	15
2b	Crow Wing	Upper Cullen	15
2b	Crow Wing	Blackhoof	13
2b	Crow Wing	Clearwater	12
2b	Crow Wing	White Sand	12
2b	Crow Wing	Horseshoe	11
2b	Mille Lacs	Mille Lacs	25
3a	Aitkin	Farm Island	110
3a	Aitkin	Spirit	54
3a	Aitkin	Gun	42

Table H. Continued.

Region	County	Lake	Total permits issued
3a	Aitkin	Big Sandy	41
3a	Aitkin	Minnewawa	32
3a	Aitkin	Pine	19
3a	Aitkin	Cedar	15
3a	Aitkin	Pine	15
3a	Aitkin	Hanging Kettle	14
3a	Aitkin	Pine	10
3a	Anoka	Coon	67
3a	Anoka	Linwood	34
3a	Anoka	Otter	27
3a	Anoka	Golden	22
3a	Anoka	George	20
3a	Anoka	Ham	20
3a	Anoka	Moore	13
3a	Anoka	Centerville	10
3a	Anoka	Spring	10
3a	Carver	Minnewashta	78
3a	Carver	Lotus	68
3a	Carver	Pierson	43
3a	Carver	Riley	41
3a	Carver	Virginia	32
3a	Carver	Waconia	27
3a	Carver	Burandt	19
3a	Carver	Eagle	16
3a	Carver	Grace	15
3a	Carver	Zumbra	15
3a	Carver	Bavaria	11
3a	Carver	Firemans	10
3a	Chisago	South Center	84
3a	Chisago	Green	71
3a	Chisago	Rush	64
3a	Chisago	North Center	53
3a	Chisago	South Lindstrom	35
3a	Chisago	Chisago	34
3a	Chisago	Fish	23
3a	Chisago	Kroon	15
3a	Chisago	Goose	13
3a	Chisago	Little Comfort	12
3a	Chisago	North Lindstrom	12
3a	Dakota	Crystal	82
3a	Dakota	Marion	29
3a	Dakota	Orchard	25
3a	Dakota	Salem	11
3a	Dakota	Lac Lavon	10
3a	Hennepin	Mtka Lafayette	79
3a	Hennepin	Medicine	76
3a	Hennepin	Mtka Carmans	71

Table H. Continued.

Region	County	Lake	Total permits issued
3a	Hennepin	Mtka Halsteds	70
3a	Hennepin	Sarah	69
3a	Hennepin	Mtka North Arm	66
3a	Hennepin	Mtka Phelps	66
3a	Hennepin	Minnetonka Cooks	65
3a	Hennepin	Mtka E. Upper Lake	64
3a	Hennepin	Mtka Gideons	64
3a	Hennepin	Mtka Priests	59
3a	Hennepin	Independence	58
3a	Hennepin	Mtka Crystal	58
3a	Hennepin	Mtka St. Albans	58
3a	Hennepin	Mtka S. Upper Lake	54
3a	Hennepin	Eagle	52
3a	Hennepin	Mtka Wayzata	49
3a	Hennepin	Mtka Carsons	48
3a	Hennepin	Mtka Maxwell	48
3a	Hennepin	Mtka Smithtown	48
3a	Hennepin	Red Rock	48
3a	Hennepin	Mtka West Arm	46
3a	Hennepin	Mtka Lower Lake S.	44
3a	Hennepin	Mtka Black	43
3a	Hennepin	Mtka Jennings	42
3a	Hennepin	Fish	39
3a	Hennepin	Mtka Spring Park	35
3a	Hennepin	Bryant	34
3a	Hennepin	Mtka Excelsior	34
3a	Hennepin	Christmas	33
3a	Hennepin	Mtka Lower Lake N.	33
3a	Hennepin	Mtka Grays Bay	31
3a	Hennepin	Mtka Harrisons Bay	31
3a	Hennepin	Mtka Stubbs	31
3a	Hennepin	Mtka Emerald	30
3a	Hennepin	Mtka Browns	29
3a	Hennepin	Gleason	28
3a	Hennepin	Parkers	26
3a	Hennepin	Weaver	26
3a	Hennepin	Mtka Robinsons	24
3a	Hennepin	Forest	23
3a	Hennepin	Mtka E. Upper Lake	23
3a	Hennepin	Duck	22
3a	Hennepin	Mtka St. Louis	22
3a	Hennepin	Schmidt (Smith)	22
3a	Hennepin	Mtka Seton	17
3a	Hennepin	Mtka Smiths	17
3a	Hennepin	Bush	15
3a	Hennepin	Castle Ridge	15
3a	Hennepin	Long	15

Table H. Continued.

Region	County	Lake	Total permits issued
3a	Hennepin	Melody	15
3a	Hennepin	Rebecca	15
3a	Hennepin	Rose	15
3a	Hennepin	Lower Twin	14
3a	Hennepin	Shady Oak	14
3a	Hennepin	Dutch	13
3a	Hennepin	Round	13
3a	Hennepin	Greentree Pond	12
3a	Hennepin	Westling (Unnamed)	12
3a	Hennepin	Hadley	11
3a	Hennepin	Bass	10
3a	Ramsey	Bald Eagle	63
3a	Ramsey	McCarrons	34
3a	Ramsey	Snail	33
3a	Ramsey	Turtle	32
3a	Ramsey	Gervais	31
3a	Ramsey	Josephine	29
3a	Ramsey	Owasso	29
3a	Ramsey	Johanna	27
3a	Ramsey	Kohlman	26
3a	Ramsey	Gilfillan	23
3a	Ramsey	Silver (NSP)	23
3a	Ramsey	Wabasso	19
3a	Ramsey	Peppertree Pond	16
3a	Ramsey	Island	15
3a	Ramsey	Kerry Pond	15
3a	Scott	Prior	131
3a	Scott	Upper Prior	59
3a	Scott	Cedar	40
3a	Scott	Spring	31
3a	Scott	O'Dowd	30
3a	Scott	Thole	25
3a	Scott	Fish	12
3a	Washington	Forest	160
3a	Washington	White Bear	99
3a	Washington	Big Carnelian	46
3a	Washington	Big Marine	39
3a	Washington	Jane	19
3a	Washington	Demontreville	14
3a	Washington	Olson	14
3a	Washington	Square	12
3a	Washington	Lily	11
3a	Washington	Long (82-130)	11
3a	Washington	Mary	10
3a	Washington	Pine Tree	10
3b	Isanti	Blue	38
3b	Isanti	Fannie	31



Table H. Continued.

Region	County	Lake	Total permits issued
3b	Isanti	Paul	26
3b	Isanti	Spectacle	18
3b	Isanti	Long	16
3b	Isanti	Elin	11
3b	Kanabec	Fish	21
3b	Kanabec	Mud	15
3b	Morrison	Platte	174
3b	Morrison	Alexander	111
3b	Morrison	Fish Trap	69
3b	Morrison	Crookneck	46
3b	Morrison	Shamineau	38
3b	Morrison	Sullivan	28
3b	Morrison	Pierz Fish	12
3b	Pine	Cross	31
3b	Pine	Upper Pine	21
3b	Pine/Aitkin	Big Pine	54
3b	Sherburne	Big	35
3b	Sherburne	Mitchell	22
3b	Sherburne	Fremont	18
3b	Sherburne	Rush	12
3b	Stearns	Rice	34
3b	Stearns	Pearl	30
3b	Stearns	Big Spunk	29
3b	Stearns	Pelican	27
3b	Stearns	Big Fish	25
3b	Stearns	Grand	19
3b	Stearns	North Browns	19
3b	Stearns	Carnelian	16
3b	Stearns	Koronis	16
3b	Stearns	Pleasant	12
3b	Wright	Clearwater	177
3b	Wright	Sylvia	95
3b	Wright	Sugar	78
3b	Wright	Maple	52
3b	Wright	Pulaski	49
3b	Wright	Cedar	48
3b	Wright	Pleasant	44
3b	Wright	Bass	35
3b	Wright	Charlotte	34
3b	Wright	Waverly	34
3b	Wright	Rock	23
3b	Wright	Augusta	17
3b	Wright	Beebe	17
3b	Wright	French	17
3b	Wright	Granite	16
3b	Wright	Deer	15
3b	Wright	Constance	12

Table H. Continued.

Region	County	Lake	Total permits issued
3b	Wright	Crawford	12
3b	Wright	Somers	11
3b	Wright	John	10
4	Faribault	Bass	14
4	LeSueur	Washington	42
4	LeSueur	Tetonka	21
4	Rice	Roberds	15
4	Waseca	Clear	12

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