MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ECOLOGICAL AND WATER RESOURCES

STAFF REPORT 50

Management of Rooted Aquatic Vegetation, Algae, Leeches, Swimmer's Itch, 2010

May 2011

Management of Rooted Aquatic Vegetation, Algae, Leeches, Swimmer's Itch, 2010

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This report should be cited as follows:

Enger, S. M. and S. Hanson. 2011. Management of Rooted Aquatic Vegetation, Algae, Leeches, Swimmer's Itch, 2010. Unpublished Staff Report #50, by MN DNR, Division of Ecological and Water Resources, 500 Lafayette Road, Saint Paul, Minnesota, 55155.

May 2011

Executive Summary 2010 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.

Public Waters/Permits/Properties/Fees

In 2010 there were 873 public waters with permitted APM activity. The number of public waters where aquatic plant management is permitted increased gradually from 1953 until 2000. In recent years the number of lakes with permitted APM activity stabilized at around 900 per year. In 2010 there were 47 fewer lakes with permitted APM activity than in 2009.

In 2010 there were 677 fewer permits issued than in 2009. The annual increase in the numbers of permits issued from 2003-2007 was approximately 360 permits per year. Permits issued statewide in 2007 spiked at a high of 4,633 followed by decreased numbers in 2008, 2009 and 2010. The Central Region (3A), which includes the seven county metropolitan area, typically issues permits for more properties than any other DNR regional office. In 2010 the Central Region issued 13 more permits than in 2009. The largest decrease in the number of permits issued was in the Northwest Region, down 492 permits from 2009.

The numbers of property owners applying for APM permit statewide in 2010 decreased for the fourth consecutive year. There were 1252 fewer applications received in 2010 than in 2009. The number of properties with permitted aquatic plant management activities decreased in all regions with the exception of the Central Region 3A.

Permit revenue decreased as a result of the reduction in the numbers of applications for APM permit. In 2009 Permit fees generated $302,860 in revenue and in 2010 permit fees generated $268,436 a reduction of $34,424. The average fee per property in 2010 was $28.58, up slightly from the average fee per property in 2009.

Automated Aquatic Plant Control Devices

The Department first began issuing permits for Automated Aquatic Plant Control Device's (AAPCD's) in 1997. In 2010 permits for AAPCD's accounted for about 46% of the active Aquatic Plant Management permits. The remaining 54% of the aquatic plant management permits issued allowed chemical or other mechanical removal as the method of control.

The APM rules provide two permit options for AAPCD operation. A person applying for a permit to operate the device in an area greater than 2,500 square feet is required to obtain an annual permit. However, a three-year permit option is available for persons who limit the size of the area of AAPCD operation to 2,500 square feet or less

(*Minnesota Rules*, part 6280.0450, subp.3, item A). Revisions to the APM rules implemented in the 2009 permit season restrict submersed aquatic plant removal to 100 feet of shoreline or one-half the owner's frontage whichever is less (*Minnesota Rules*, part 6280.0350, subp. 1a). Due to this change many more permit holders became eligible for an AAPCD permit of three year duration in 2009.

In 2010 there were 629 fewer three-year AAPCD permits than were issued 2009. The number of single season permits issued in 2010 decreased by 55 from 2009. Persons who obtained a three-year permit in 2010 will not have to reapply again until the year 2013. Automated aquatic plant control device permit issuance for both types of permits was down 37% in 2010 over 2009.

Most AAPCD permits are issued to a single property owner. In 2010 AAPCD's made up 31% of the permits issued and accounted for 12% of the total number of properties permitted.

Summary of Aquatic Plant Management permits issued in 2010 and active permits.

					AAPCD					
					Issued 2010		Issued 2009	Issued 2008·		
Region	Mechanical Chemical***	2010 Issued Channel*	<2010 Active Channel**	AAPCD's with chemical control	1 year	3 year	3 year	3 year	All Active Permits	Restoration Permits Issued
Reg 1	435	53	-	57	212	294	764	197	1,955	6
Reg 2A	67	13	-	1	0	8	5	7	100	3
Reg 2B	637	17	-	41	89	191	308	211	1,453	5
Reg 3A	789	7	-	10	59	48	43	21	967	18
Reg 3B	373	13	-	20	61	127	180	61	815	23
Reg 4	182	9	-	2	11	58	55	23	338	6
All	2,483	112	923	131	432	726	1,355	520	6,551	61

* 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 01/02/2011. Total by Region cannot be calculated because Region boundaries were changed in 2003. *All Active Permits* = Permits issued in 2010 and all active AAPCD and channel permits excluding restoration permits.

*** Excludes permits for AAPCD's and channel permits.

It is important to note that the numbers of permits and applicants in a single year is only part of the story. In addition to AAPCD permits that can be issued for up to 3-years, a lakeshore property owner can obtain a permit of unlimited duration to mechanically maintain a channel 15 feet wide through emergent vegetation. These multi-year permits account for roughly 43% of the total number of active permits in a given year. In 2010 while there were 3,755 annual permits issued there were 2,796 active multi-year permits. The total number of active permits in 2010 was 6551.

Summary of all APM permits issued for control of aquatic plants and nuisances, fees collected, numbers of lakes and properties treated in 2010.

Region	All Permits Issued in 2010*	All Lakes**	Fees***	Properties Permitted in 2010	Ave. Fee/ Property	All Reporting ****		
						Mechanical Work	Chemical Treatment	Both
Reg 1	996	237	$ 36,913	1,142	$ 32.32	126	196	38
Reg 2A	88	39		88		9	45	6
Reg 2B	934	12		1,255		34	507	26
Reg 2 total			$ 44,960	1,343	$ 33.48			
Reg 3A	903	251		4,972		46	603	27
Reg 3B	574	134		1,695		26	271	15
Reg 3 total			$ 154,266	6,667	$ 23.14			
Reg 4	260	75	$ 18,836	757	$ 24.88	14	113	7
2010 TOTAL	3,755	873	$ 254.975	9,909	$ 25.73	255	1,735	119
2009 TOTAL	4,432	920	$ 302,860	10,644	$ 28.45	239	1,679	107
CHANGE	-677	-47	-$ 47,885	-735	-$ 2.72	16	56	12

* Permits issued for restoration work are excluded.
** Includes all lakes, ponds, ditches and streams listed on APM permits for 2010.
*** Revenue from the APM database as of 12/31/2010.
**** Data tabulated from the surveys and commercial applicator reports returned as of 1/25/2011.

Trends and Observations

Aquatic plant control in Minnesota is highly seasonal. Most aquatic plant control in Minnesota takes place in the months of June, July and August. This trend has been consistent for many years because much of the aquatic plant control is recreationally motivated.

In Minnesota lakeshore residents can hire commercial services to perform aquatic plant control. Statewide commercial services perform approximately 60% of permitted aquatic plant control. However, in the Central Region commercial services perform more than 80% of permitted aquatic plant control. Commercial services perform much less of the permitted control in Greater Minnesota.

Many APM permits are issued on an annual basis. Approximately 80% of 2010 permit holders responding to the survey indicated that they would reapply for permit in 2011. This was nearly a 10% increase from the previous year. In 2010, roughly 80% of APM permit holders that did their own control used their permit, and nearly 90% of the permit holders that hired a commercial service used their permit.

Lakeshore property owners may apply for a permit to control filamentous algae and chara (a form of macro-algae) with copper sulfate. Applications requesting filamentous and chara control have declined for the past two years in a row.

Blue green algae blooms are a common nuisance in eutrophic Minnesota lakes. Copper sulfate a common algaecide can provide temporary relief from nuisances caused by blue green algae. However, the control obtained by lake-wide application of copper sulfate is usually temporary and treatment is often required at least twice per season. In addition, there is the threat of fish kill from oxygen depletion caused by the decomposition of dead algae. The numbers of lakes where the residents seek a permit to control blue green algae with copper sulfate has been declining since 1997.

Swimmer's itch, an infection caused by an immature life stage of flukes common in waterfowl, is present in many Minnesota lakes. Lakeshore property owners can get a permit to use copper sulfate to control snails that harbor the immature life stage. The numbers of permits issued for swimmer's itch control has been increasing steadily since 1997.

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.

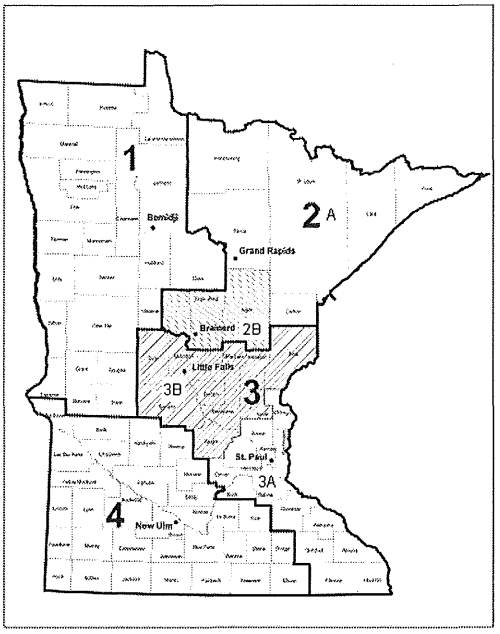
The Aquatic Plant Management Program

Riparian property owners (lakeshore property owners) in Minnesota have a 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 to ensure that the beneficial functions aquatic plants provide are preserved.

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

DNR Administrative Regions as of October 2006



NW Region 1

Bemidji
Kittson
Roseau
Lake of the Woods
Marshall
Polk
Pennington
Red Lake
Beltrami
Norman
Mahnomen
Clearwater
Hubbard
Cass
Clay
Becker
Wadena
Wilkin
Otter Tail
Traverse
Grant
Douglas
Stevens
Pope

NE Region 2

Grand Rapids (2A)
Koochiching
Itasca
St. Louis
Lake
Cook
Carlton

Brainerd (2B)
Crow Wing
Aitkin
Cass

Central Region 3

St. Paul (3A)
Anoka
Carver
Chisago
Dakota
Hennepin
Ramsey
Scott
Washington
Goodhue
Wabasha
Olmstead
Winona
Fillmore
Houston

Little Falls (3B)
Benton
Isanti
Kanabec
Pine
Mille Lacs
Morrison
Sherburne
Stearns
Todd
Wright

South Region 4

Big Stone
Swift
Kandiyohi
Meeker
McLeod
Renville
Chippewa
Lac Qui Parle
Yellow Medicine
Lincoln
Lyon
Redwood
Nobles
Jackson
Martin
Faribault
Freeborn
Mower

The DNR's Division of Fish and Wildlife is responsible for the administration of the Aquatic Plant Management (APM) Permit Program. Riparian property owners apply for an aquatic plant control permit, to the Regional Fisheries Manager, in the region where their lake property is located. APM specialists in each region conduct application review and make permit recommendations.

The recommendation for the decision on 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 of the permit decision. 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 and Water Resources. This position is the department's contact with commercial mechanical control businesses, commercial aquatic pesticide 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 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 and Water Resources whose job responsibilities include 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 responds 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 growing 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.

The rules governing aquatic plant management (M.R. chapter 6280) were recently revised. The revised rules went into effect on April 15, 2009. Significant changes to the APM rules include:

- The addition of specific criteria used to evaluate applications for permit. The decision to issue, modify or deny permits is based on these criteria;
- The revised rules specify conditions that can be placed on permits such as limits on amount of control, restrictions on method and timing of control, and restrictions on the species of plant targeted by the control.
- The revised rules reduce the amount of near shore vegetation that can be removed by individuals to 100 feet or one-half their frontage whichever is less.
- The revised rules specify that automated plant control devices may not be used in areas of soft sediment with an average sediment depth of 3 inches or greater.
- Under the revised rules a provision that allowed certain lakes to exceed the 15% littoral zone limit on plant control with herbicides will sunset in 5 yrs (2014). This provision also requires DNR to work with the affected lake associations to develop a lake vegetation management plan (LVMP).
- The revised rule clarifies conditions for "commercial harvest permits" that allow the harvest of aquatic plants, and plant parts from public waters for sale purposes.
- The revised rules specify when variances may be issued, the criteria to be considered, and allows for mitigation for adverse effects on aquatic habitat caused by an APM permit that includes a variance.
- The revised rules specify when an LVMP can be used and what the LVMP should contain.

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, *Minnesota Statutes* 103G.005, subd. 15 and 15a), 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. Aquatic plants that are 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 registered with the Department of Agriculture for sale and use in Minnesota. The product must also be registered for aquatic use by 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 commonly used for aquatic plant control and the amount used under permit in Minnesota in 1987-2010 is found in Appendix A and B.

Summary of Aquatic Plant Management Program Activities in 2010

The following summary of Aquatic Plant Management (APM) Program activities in 2010 comes from four sources: permittee survey forms (Appendix Table C and D), commercial aquatic applicator and commercial mechanical control reports, and the Aquatic Plant Management (APM) permit database. When a table or figure in the report describes information taken from permit holder or commercial company surveys, the term "*reported*" is used. When the report discusses data taken from the APM permit database the term "*permitted*" is used.

Commercial applicators, mechanical control companies, 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 1,305 surveys mailed 1,090 (83%) were returned. A separate survey was sent to 1,158 AAPCD permit recipients, with 1,035 (89%) returned.

Permit Issuance

In 2010, a total of 3,755 permits were issued statewide for APM activities (this includes 61 shoreline habitat restoration permits), 677 fewer than in 2009 (Appendix Table G provides the county by county distribution of permits and permitted properties). In 2010, there were 1,158 permits issued for the operation of Automated Untended Aquatic Plant Control Devices (AAPCD). The remaining 2,596 aquatic plant control permits were issued to municipalities and lakeshore homeowners for pesticide use (includes algae and swimmer's itch control), and mechanical control (cutting, pulling, or harvesting) of aquatic vegetation.

Over the last 16 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 1 through 3). The number of public waters with permitted APM activity in 2010 was 873, 47 fewer lakes than in 2009.

Figure 1. All permits issued, and the number of lakes with permitted aquatic plant control, by region, in 2010.

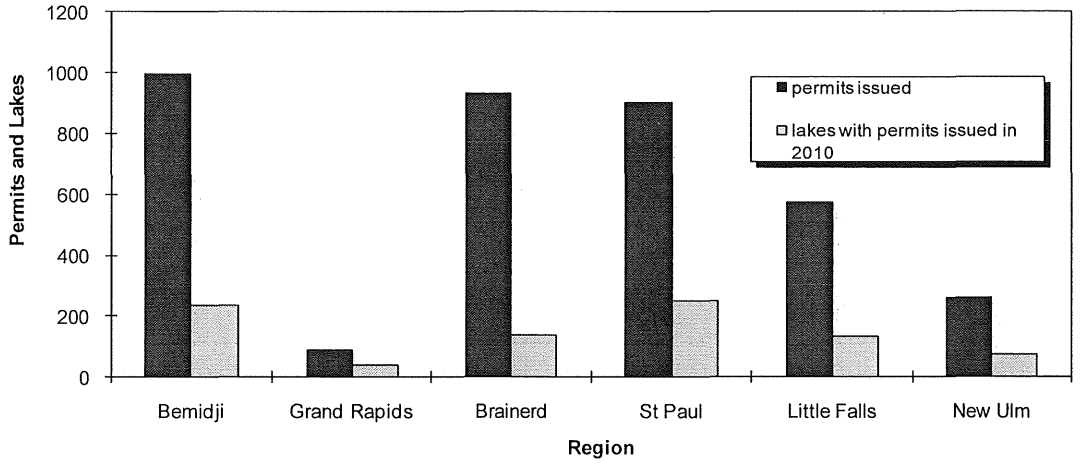


Figure 2. Numbers of permits issued for mechanical and chemical control (excluding AAPCD) of aquatic vegetation, algae, and swimmer's itch, and numbers of lakes where permits were issued 1992-2010.

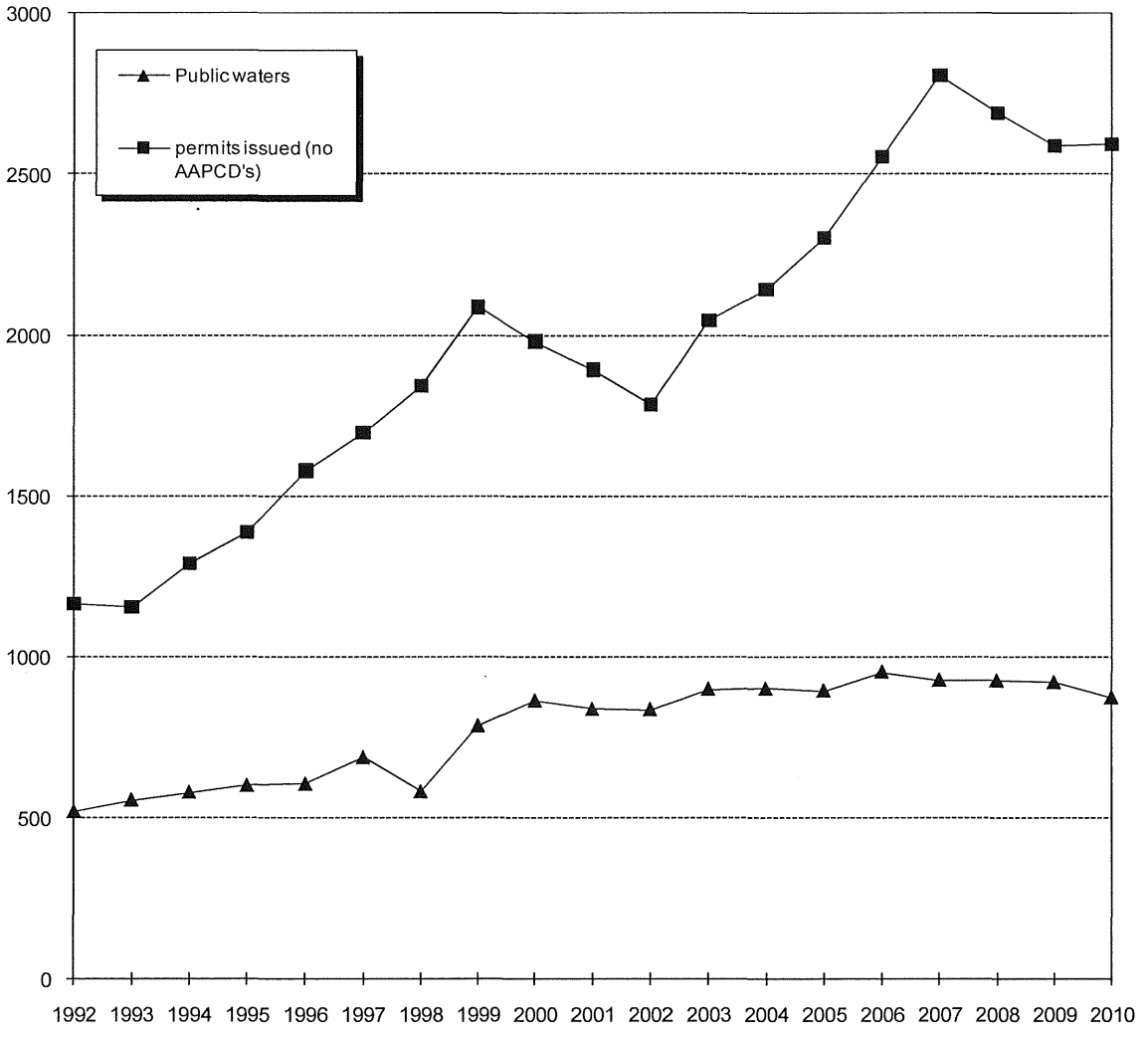
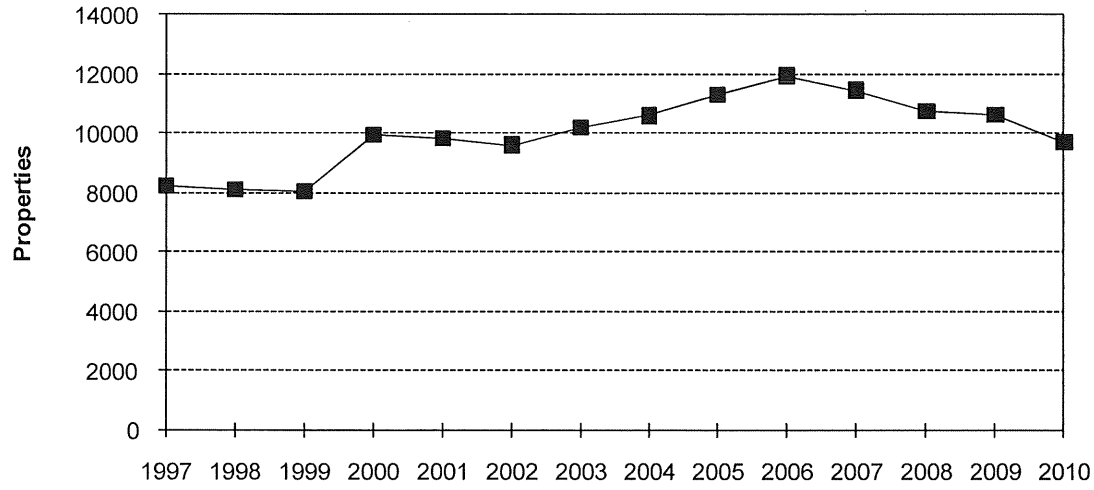


Figure 3. Numbers of properties issued permits for aquatic plant control statewide, 1997-2010.



Aquatic plant management permits increased annually from 1992 until about 1999. 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 2010 the total number of property owners obtaining permits for aquatic plant control declined for a fourth year in a row. Cooler temperatures in the early part of the open water season resulting in slower plant growth, colder water for swimming, and a downturn in the economy may have contributed to the decline in lakeshore property owners participating in the APM program.

Lakeshore homeowners may apply for an aquatic plant management permit as a group. The average number of properties per permit statewide in 2010 was 2.5, essentially unchanged from 2009. 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. A few permits have more than 100 properties listed on a single permit. In 2010 there were 9,392 properties covered by the 3,755 permits issued. This number excludes the 61 permits issued to lake shore property owners for restoration of aquatic habitat.

The Central Region, which includes the Twin Cities metropolitan area, typically has larger group permits than other areas of the state. In 2010, the Central Region averaged 4.5 properties per permit, up a fraction from 2009. The Northwest and Northeast Regions averaged one property per permit. The average number of

properties per permit in the Southern Region in 2009 was 3.3, but decreased to 2.9 properties per permit in 2010.

Table 1. Permits grouped by the number of properties listed (excluding AAPCD) by Region, 2010.

Region		1	2A	2B	3A	3B	4
Permits/property	>100	0	0	1	4	1	0
	51-100	1	0	1	13	2	4
	21-50	0	0	0	45	14	3
	11-20	4	0	5	55	15	4
	2-10	2	0	10	146	35	17
	1	474	80	636	520	318	163

The rules regulating aquatic plant removal from public waters require an inspection of the treatment site for applications for properties with no previous permit history, or when there are changes in the size of the treatment area, methods used, or the target plant species requested from the previously issued permit. Aquatic plant management specialists and area fisheries staff visit these sites to determine if the permit application is consistent with the criteria for permit issuance in APM rules. In 2010 there were 723 site inspections conducted. 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. Approximately 76% of all near-shore control permit requests were issued unchanged (Table 2).

Table 2. Percent of permits requesting near-shore control that are issued as requested by region in 2010.

	Region						
	1	2A	2B	3A	3B	4	Statewide
number of applications requesting near-shore control	979	81	913	770	452	217	3,412
permits issued as requested*	764	64	739	552	332	164	2,615
% of permits issued as requested	78.0	79.0	80.9	71.7	73.5	75.6	76.6

1 = Bemidji, 2A = Grand Rapids, 2B = Brainerd, 3A = St. Paul, 3B = Little Falls, 4 = New Ulm
*Includes permits that allowed more shoreline than requested

Permit Duration

Until 1997 aquatic plant management permits were issued for a one year term. However, in 1997 the APM rules were revised allowing two types of permits to be issued for longer than a single season. Emergent vegetation control permits can be issued for a period of unlimited duration if the control is limited to a channel not more than 15 feet wide, that remains in the same location each year, and is maintained mechanically after the first year. A person requesting a permit to use an automated aquatic plant control device can obtain a permit of three years duration if they agree to operate the device in an area not to exceed 2,500 square feet and the device remains in the same location each year. The permit fee for the longer term permits is the same as the permit fee for annual permits.

These longer term permits are intended to offer an incentive to the property owner to remove less aquatic vegetation. In exchange for the smaller area of control the property owner does not have to make an application for a permit on an annual basis and they receive a permit of extended duration at the same cost as a permit issued for a single year. The extended duration permit also benefits the DNR by reducing the annual permit work load for program staff.

As shown in Figure 3a the number of permits of more than annual duration (active permits) is slightly greater than the number of annual permits issued in 2010. Permits issued for more than one year are most often issued to individuals. The number of emergent vegetation permits of continuous duration and the number of three year duration AAPCD permits represents an additional estimated 3,500 properties under DNR APM permit in 2010. Figure 3b shows the number of emergent vegetation channel permits issued annually since 1997. The difference in the total number of permits between years is the number of permit issued that year. For example the total number of active emergent vegetation permits in 2010 was 1,035. The total number of active permits in 2009 was 919, therefore 116, the difference between the two totals, is the number of emergent vegetation unlimited duration permits issued in 2010.

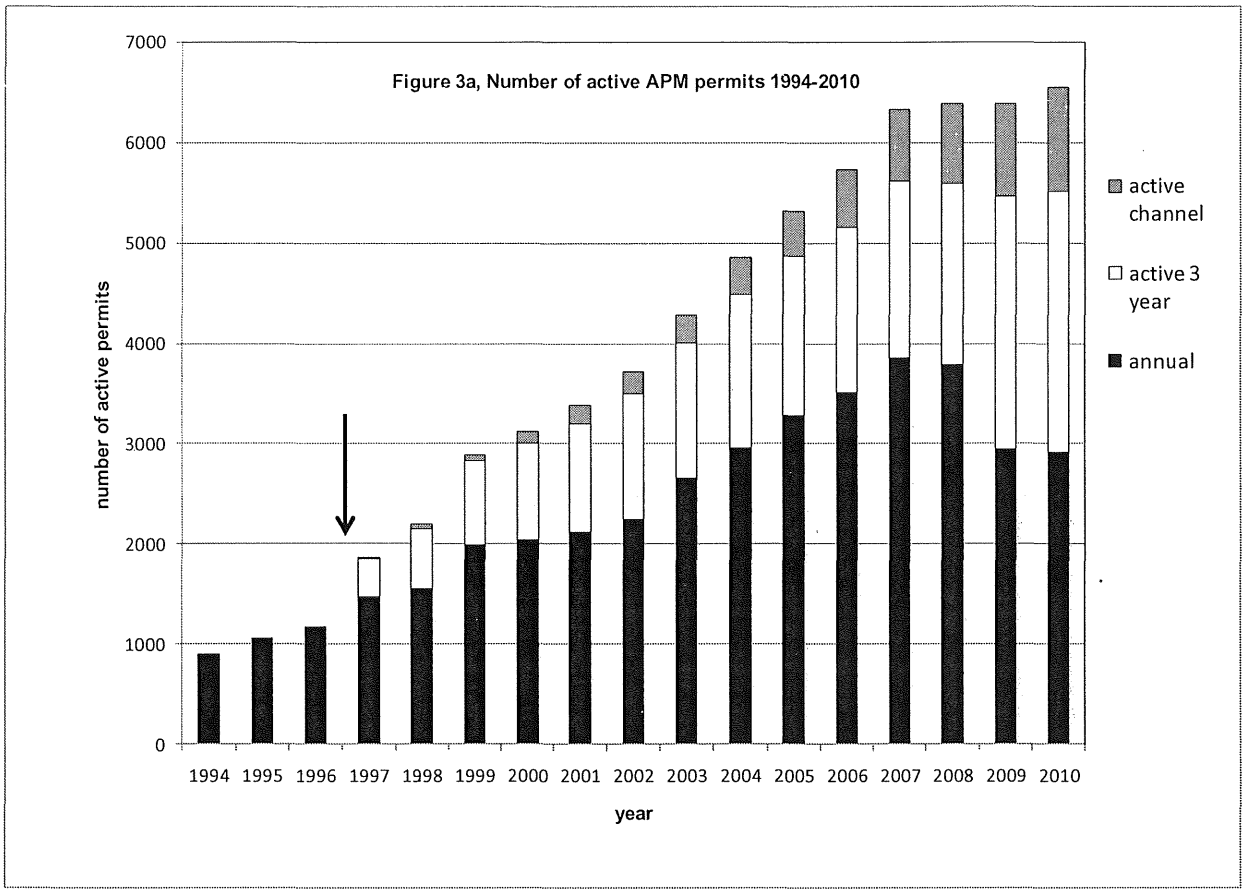


Figure 3a, Number of active APM permits 1994-2010
number of active permits
7000
6000
5000
4000
3000
2000
1000
0
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
year
active channel
active 3 year
annual

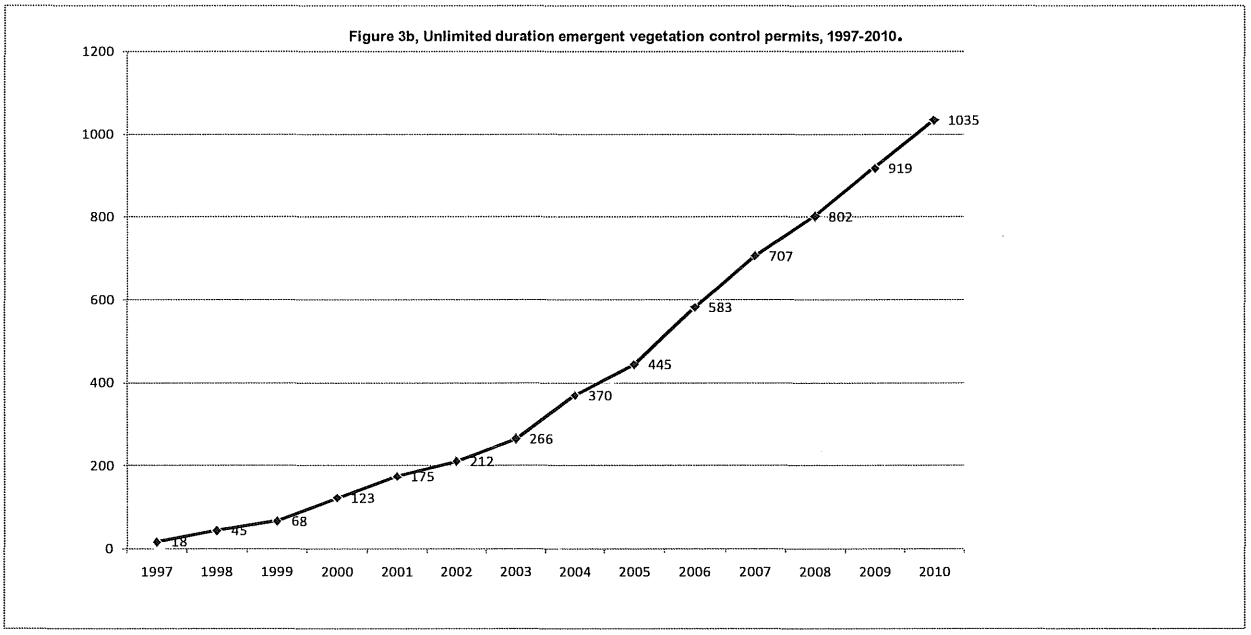


Figure 3b, Unlimited duration emergent vegetation control permits, 1997-2010.
1200
1000
800
600
400
200
0
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
18
45
68
123
175
212
266
370
445
583
707
802
919
1035

Permit Fees

Permit fees for aquatic plant management permit were last increased during the 2003 legislative session. The fee increased many types of APM permits from $20.00 per property to $35.00 per property. The cap on group permits to control submersed vegetation was increased from $200 to $750.

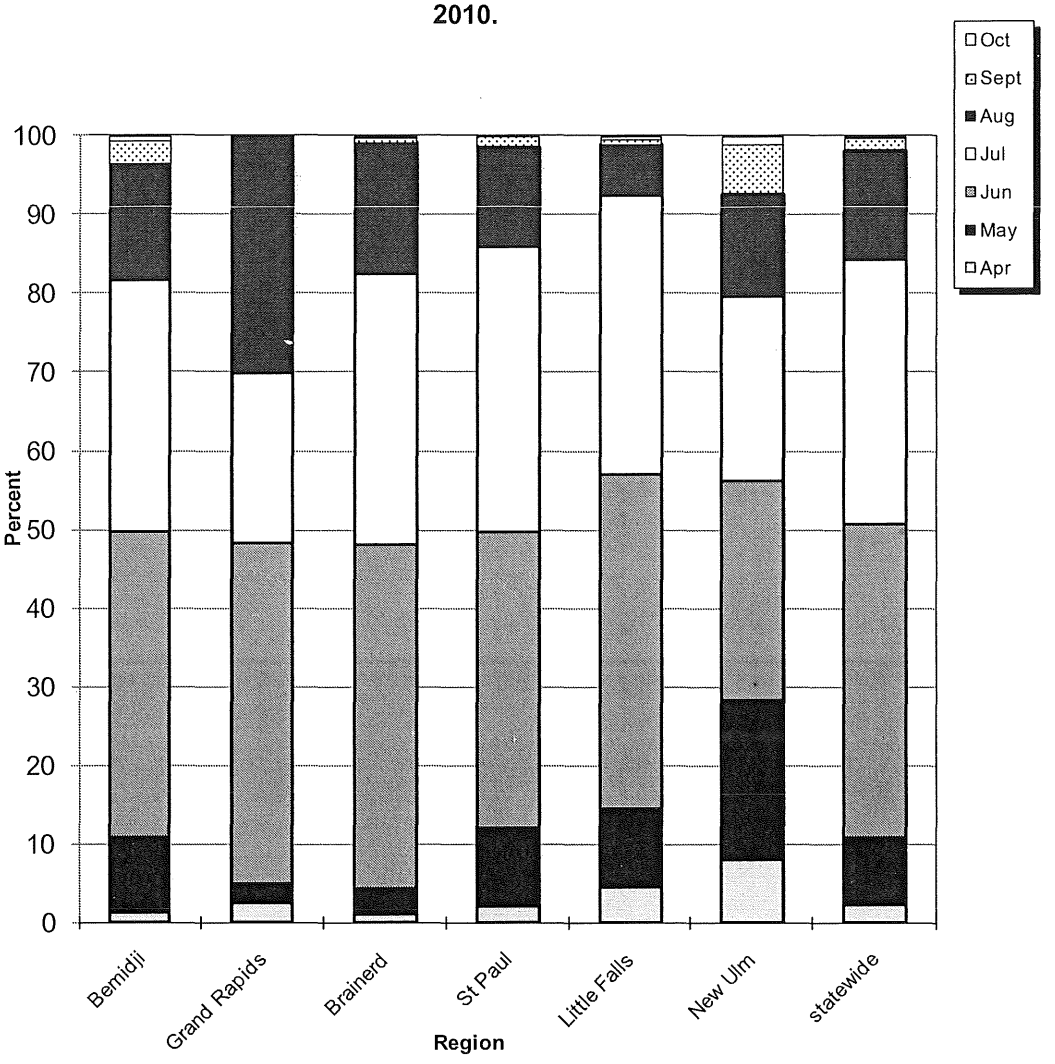
During the 2010 legislative session some permit fees were reduced. The fee for aquatic plant control on water bodies 20 acres or less was reduced to half of the permit fee for larger lakes. The fee for aquatic plant control on water bodies 20 acres or less in size for an individual is $17.50 and the cap on permit fees for group permits is $350.00. The reduction went into effect after most permits had been issued for 2010, therefore the reduction will not be evident until 2011.

Permit fee revenues in 2010 were significantly lower than 2009. In 2010 permit fees were approximately $270,000 about $34,000 less than 2009. The average permit fee per property owner in 2009 was $24.45. In 2009 the average fee per property was $28.58. The slight increase in the average permit fee is likely due to a reduction in the numbers of properties on multi-property permits and an increase in permits issued to individual property owners in 2010.

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 2010 about 88% 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.

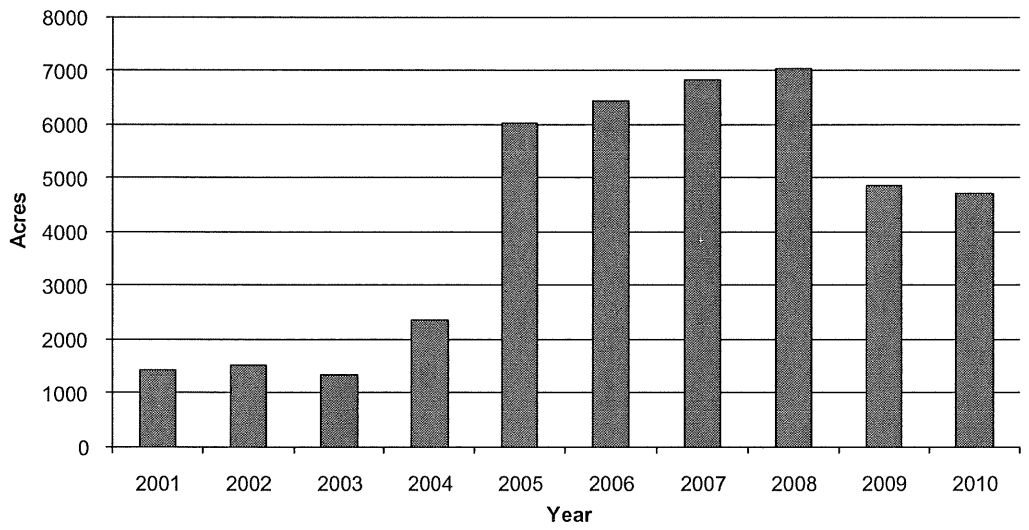
Figure 4. Percent of reported APM work by month for each region in 2010.



Acres of off-shore aquatic plant control permitted

The number of acres permitted for chemical control of submersed aquatic plants has fluctuated annually until 2005 when a sharp increase was recorded followed by continued modest annual increases (Figure 5). 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 between 2004 and 2005. In 2005, 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. In 2009, the curly leaf-pondweed treatment in Lake Benton was reduced to 254 acres. In 2010 approximately 120 acres of curly-leaf pondweed was treated in Lake Benton, resulting in a 2,630 acre decrease from Lake Benton alone.

Figure 5. Permitted off-shore chemical control acreage of aquatic vegetation statewide from 2001-2010.



Aquatic plant control methods

In 2010, about 30% of all permits issued for aquatic plant control permitted the use of plant removal with AAPCD's, down 11% from 2009. Aquatic plant control using herbicides, plant harvesting, and plant removal by hand, accounted for the remaining 70% 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 2010 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, an 8% decrease from 2009.

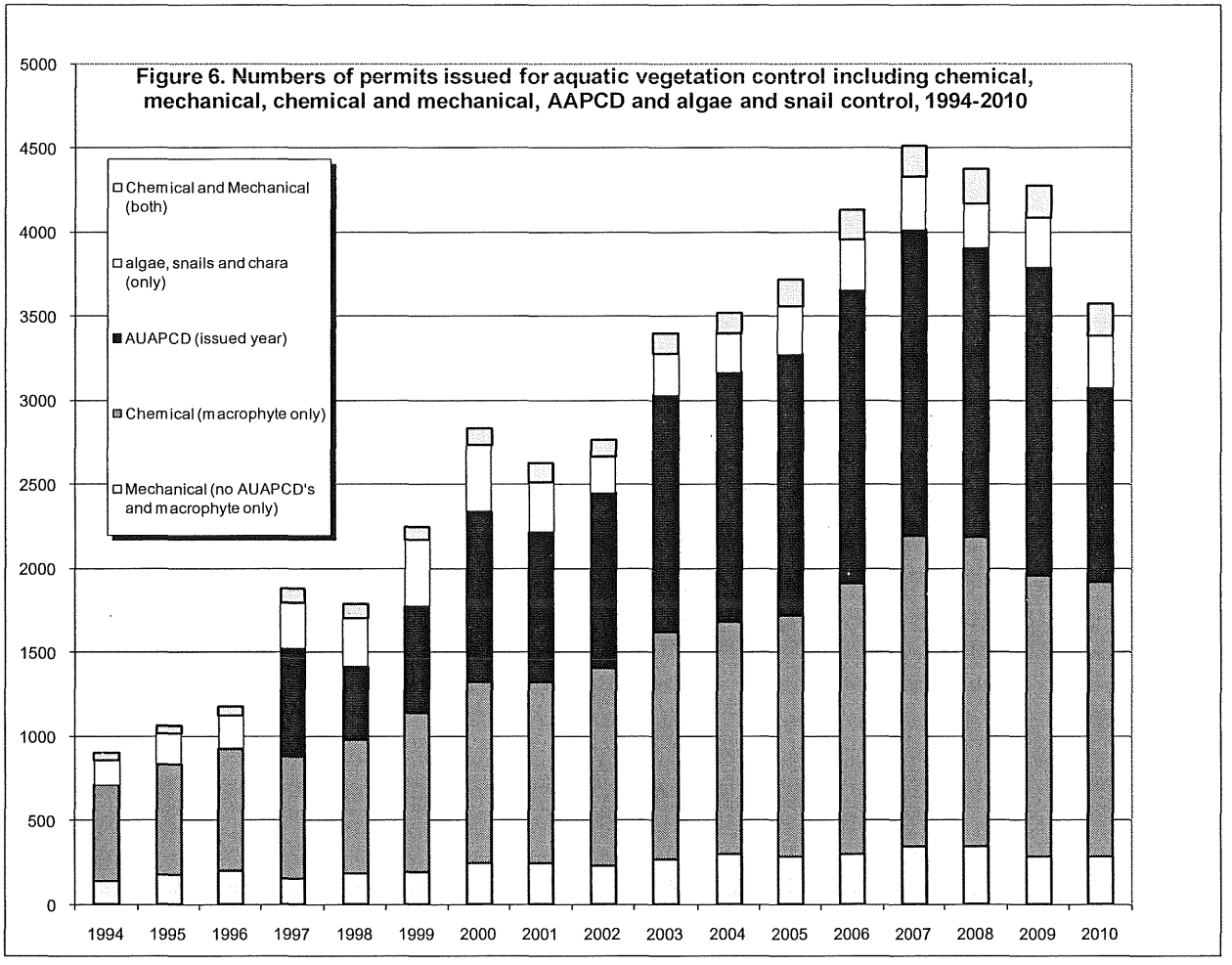


Table 3. Total near-shore area permitted, in acres, by region, for control of submerged vegetation, swimmer's itch and AAPCD use in 2010.

Control	Region						Total number of acres	Props	Ave. Prop. (sq. ft.).
	1	2A	2B	3A	3B	4			
Herbicide control excluding open water treatment	88.9	4	72	464.5	120.0	128.5	877.9	4,766	7,167
Mechanical control excluding open water removal	64.7	1.0	25.6	30.3	12.6	15.9	150.1	1,648	3.876
Swimmer's itch control *	26.8	3.9	30.9	6.9	17.3	4.9	90.7	481	8,025
AUAPCD 2010 issued	40.5	0.3	18.5	9.4	11.0	3.8	83.5	1,169	3,111

* includes all permits with swimmers itch control
1 = Bemidji, 2A = Grand Rapids, 2B = Brainerd, 3A = St. Paul, 3B = Little Falls, 4 = New Ulm

Percent of Aquatic Plant Removal Permits Used

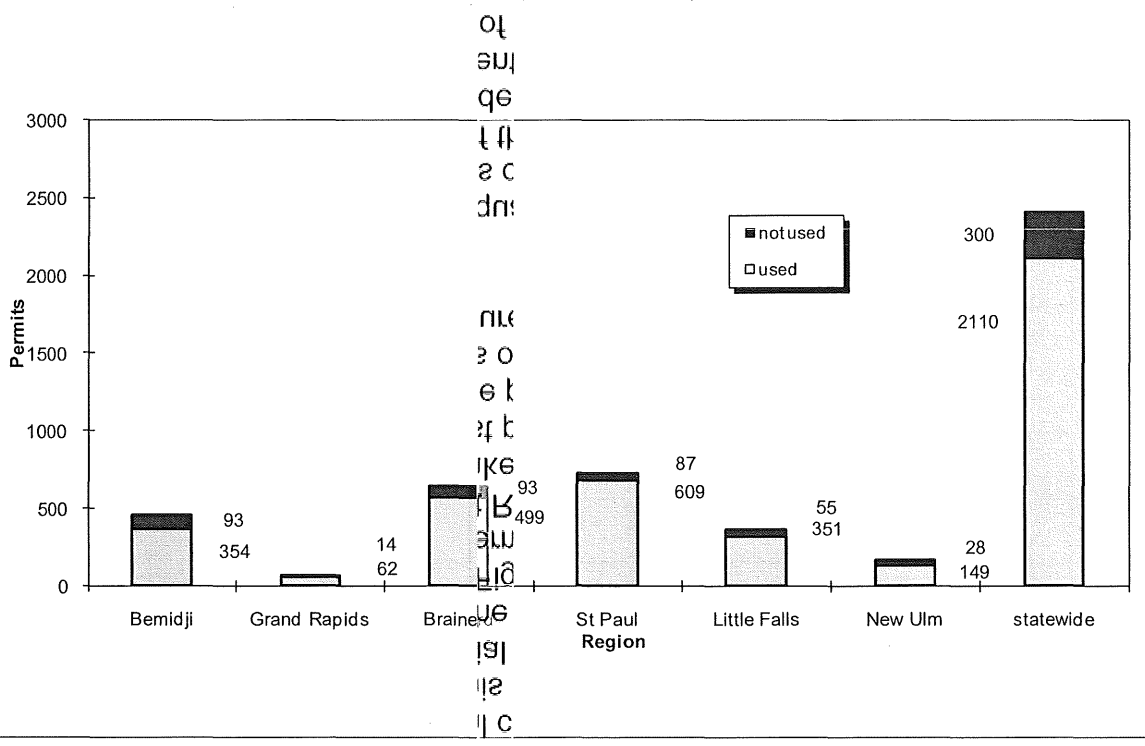
Each year some permits issued for aquatic plant management activities are not used (Figure 7). Statewide, 79% of permits issued were reported used by the permittees who did their own control. Commercial applicators/operators reported using 88% of the permits issued for work they did. Permittees indicating 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 2010, the reason most frequently given (43%) for not using an APM permit was for unidentified reasons.

Table 4. Response by permit holders to choices indicating that their APM permit was not used, expressed as a percent by region in 2010.

Region	1	2A	2B	3A	3B	4	Statewide
nuisance condition did not develop	11	25	15	4	15	16	12
got permit too late	14	13	8	6	11	6	10
unable to do the work	42	63	36	25	23	32	34
other	33	0	41	65	51	45	43
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

Figure 7. Total reported number of permits used and not used by region (excluding AAPCD permit holders), 2010.



Who does control

Commercial applicators and mechanical control companies performed about 59% of the permitted control statewide in 2010. This represents a 2% decrease from the percent of the permitted control done by commercial applicator and aquatic plant harvesting companies in 2009. Permit holders in the Central Region hire commercial services more frequently than any other region (Figure 8). Commercial aquatic plant control companies perform about 82% of the permitted control in the Metro Area. In 2010, 64% of the permitted control in the Northeast Region was performed by commercial service. Most of this control is in the Brainerd Lakes Area of the NE Region. In the Grand Rapids area (2A) of the NE Region most permitted control is done by the homeowner. Permit holders perform about 60% of the permitted control in the Northwest Region and 62% in the South Region. The amounts of homeowner conducted control has increased slightly over that of 2009 (Figure 8a).

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 65% of the respondents were satisfied with the results of herbicide control. About 75% of those responding were satisfied with the results of treatments to control swimmer's itch and 59% of respondents were satisfied with results of mechanical control. It is important to

Figure 8. Percent of reported permitted APM work done by permittee and by commercial service for each region in 2010.

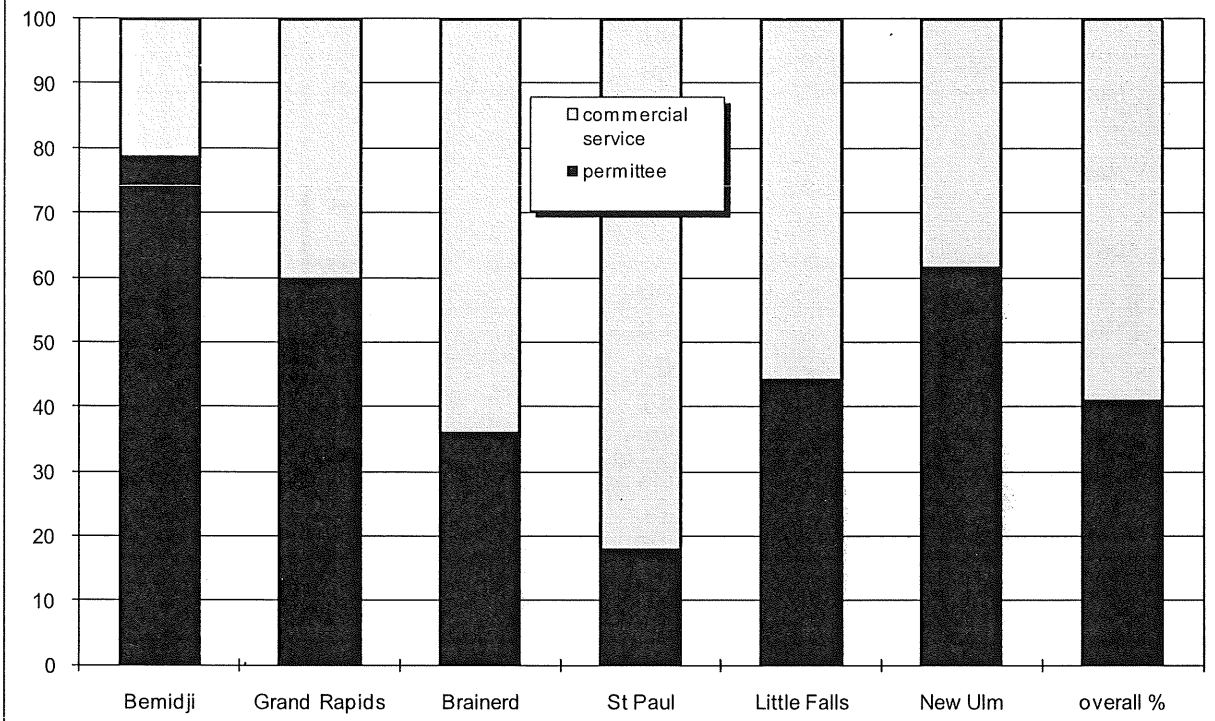
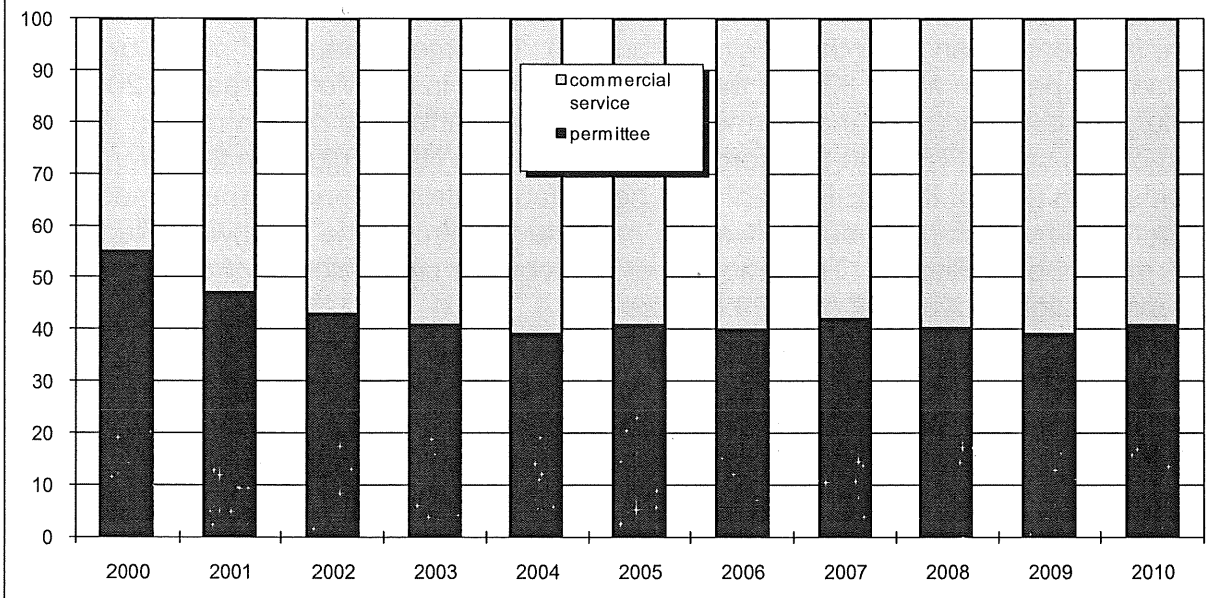


Figure 8a. Percent of reported permitted APM work done by permittee and by commercial service statewide from 2000-2010.



remember that permit holders hiring commercial services were not included in the survey.

Reapply for permit

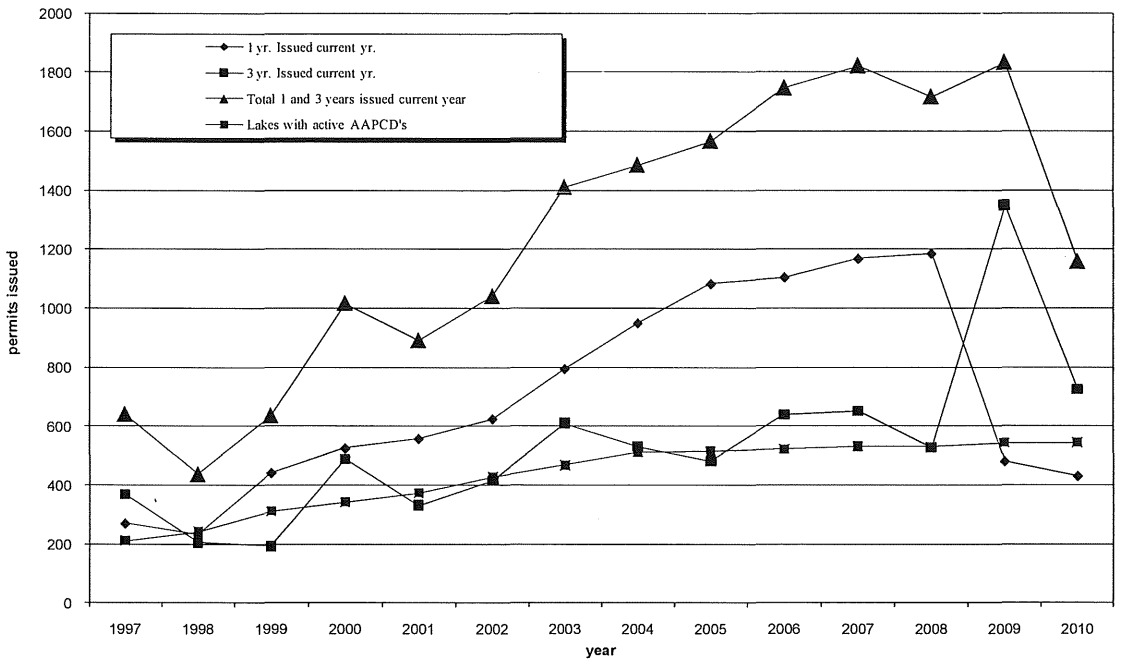
Permit holders, excluding AAPCD permittees, were asked if they would apply for a permit in 2010. Of the 1,010 responses, 817 (81%) said they would reapply for an APM permit next year, a 9% increase from 2009. Approximately 17% (172) of the permit holders responding indicated that they were unsure if they would reapply for permit in 2011. The number of permittees reporting that they would not apply (21 or 2%) was slightly higher than in 2009. Regardless of their response, all 2010 permit holders whose permits expire will receive permit application materials prior to the start of the 2011 open water season.

Automated Aquatic Plant Control Devices (AAPCD)

Before 1997 the operation of an automated aquatic plant control device did not automatically require an APM permit, and few AAPCD 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 2010 there were 1,158 permits issued for these devices statewide. Of those permits 432 were issued for a one-year term and 726 were issued for a three-year permit term. About 70 percent of the AAPCD permits were issued in the Northwest and Northeast Regions; down about 6% from 2009. In addition to the permits issued in 2010, there are active three-year permits issued in 2008 and 2009 (520 and 1355 respectively). Of the 1,159 surveys mailed 1,035 (89%) of the AAPCD permit holders statewide responded to the questionnaire. Only three-year AAPCD permit holders issued permits in 2010 were surveyed.

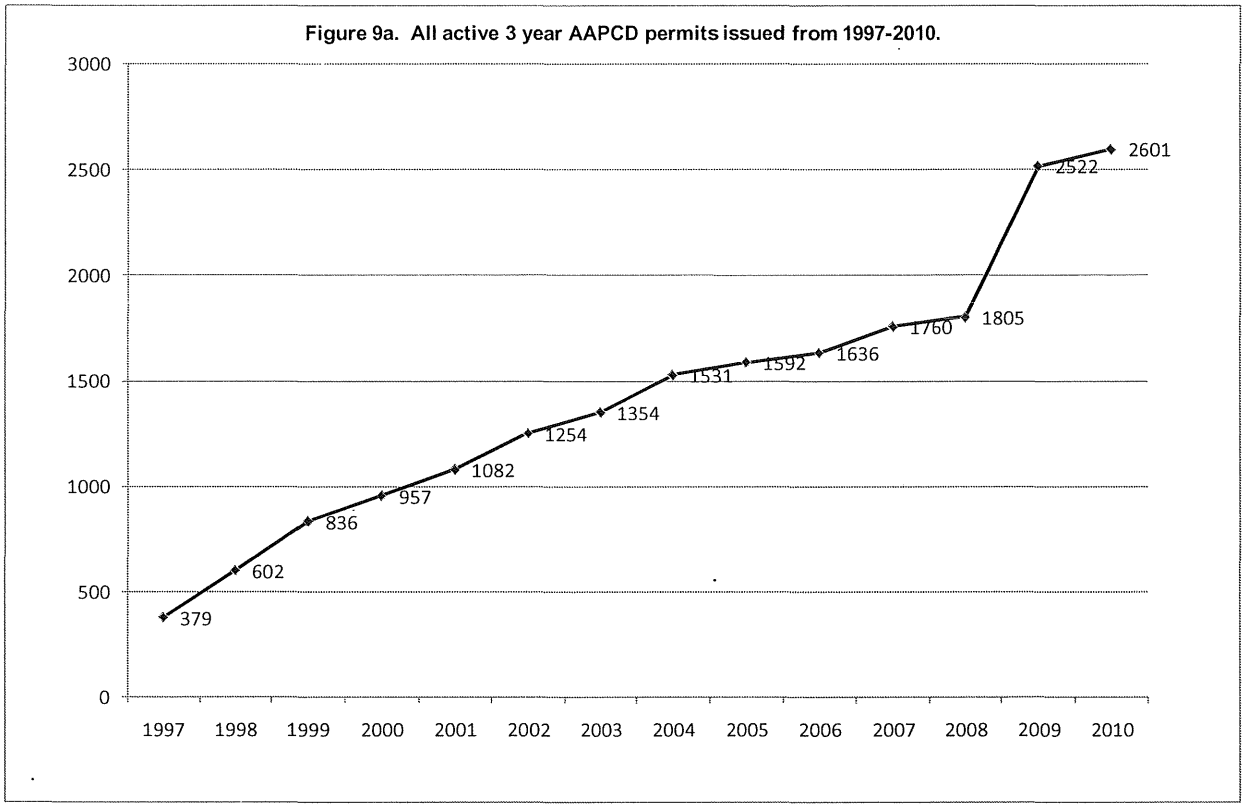
The APM rules provide two permit options for AAPCD operation. A person applying for a permit to operate the device in an area greater than 2,500 square feet is required to obtain an annual permit. However, a three-year permit option is available for persons who limit the size of the area of AAPCD operation to 2,500 square feet or less (*Minnesota Rules*, part 6280.0450, subp.3, item A). In addition, revisions to the APM rules implemented in the 2009 permit season restrict submersed aquatic plant removal to 100 feet of shoreline or one-half the owner's frontage whichever is less (*Minnesota Rules*, part 6280.0350, subp. 1a). Due to this change many more permit holders became eligible for an AAPCD permit of three year duration in 2009.

Figure 9. Numbers of permits issued allowing the use of AAPCD's in Minnesota public waters, 1997-2010



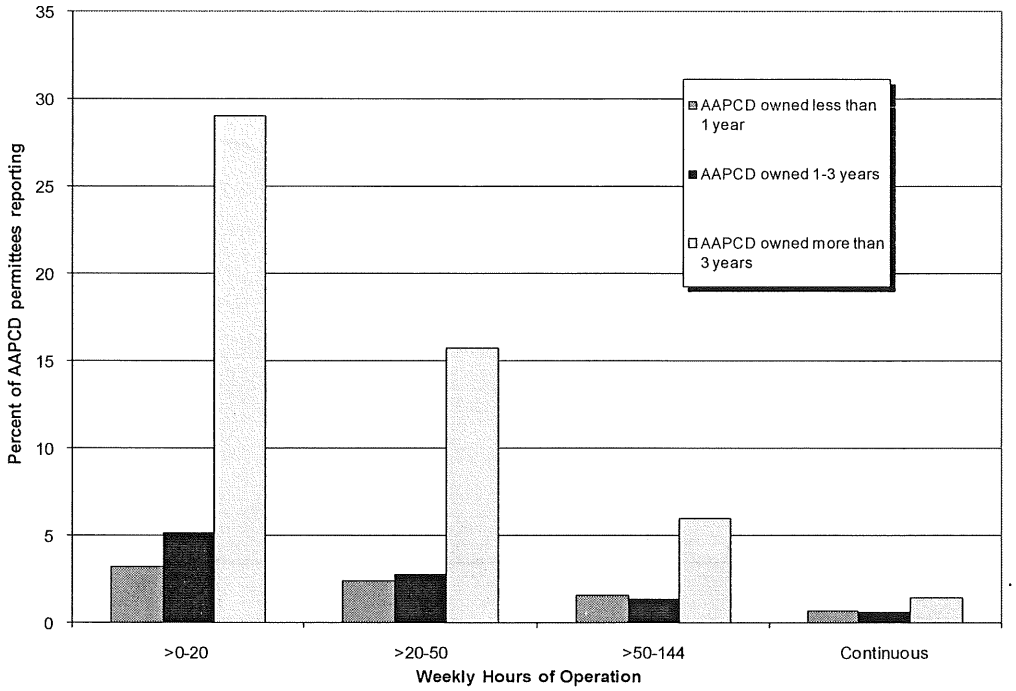
In 2010 there were 629 fewer three-year AAPCD permits than were issued 2009. One year permits show a substantial decrease between 2008 and 2010, more than can be explained by the change in rule. In 2008 there were 1,188 one year permits issued, 756 more than in 2010. There were 1,158 total AAPCD permits issued in 2010, 684 fewer than in 2009. The number of single season permits issued in 2010 decreased by 55 over 2009 (Figure 9). There was a significant decrease in the total number of permits issued for AAPCD use over the previous two years.

Even though the numbers of permits issued for AAPCD use was down in 2010 the total number of devices in Minnesota lakes continues to increase. Figure 9a shows all active 3-year AAPCD permits in 2010. If you include the 432 one-year permits issued in 2010 there are approximately 2,500 AAPCDs authorized to operate in Minnesota public waters. About 1,300 more AAPCDs than permitted in 2010.



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. AAPCD permit holders were asked, how frequently do you operate your AAPCD? These responses were sorted by the length of time people had indicated they had owned the machine. Recent AAPCD owners are more likely to operate the device longer than those people who have owned the device for several years (Figure 10). About 114 persons permitted to operate an AAPCD stated that, for various reasons, they did not operate the device in 2010, down slightly from 2009.

Figure 10. AAPCD use from May through August, 2010 catagorized by length of ownership expressed as a percent of all AAPCD permittees reporting.



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. Requests for filamentous algae control declined slightly in 2010.

Chara control

The aquatic plant management rules allow the control of chara with copper sulfate. As a result of revisions to the aquatic plant management rule in 2009 the limits on submersed aquatic plant control (lake shore property owners may receive a permit to control submersed aquatic plants on up to 100 ft, or one-half their frontage whichever less) now apply to the management of Chara. Chara is a macro-algae that can interfere with recreation in some lakes. In 2010 there were approximately 260 lakes where permits were issued for chara control (Figure 12). Applications for chara control decreased in 2010 for the second year in a row.

Figure 11. Numbers of permits issued for filamentous control, and numbers of lakes where permits were issued 1997-2010.

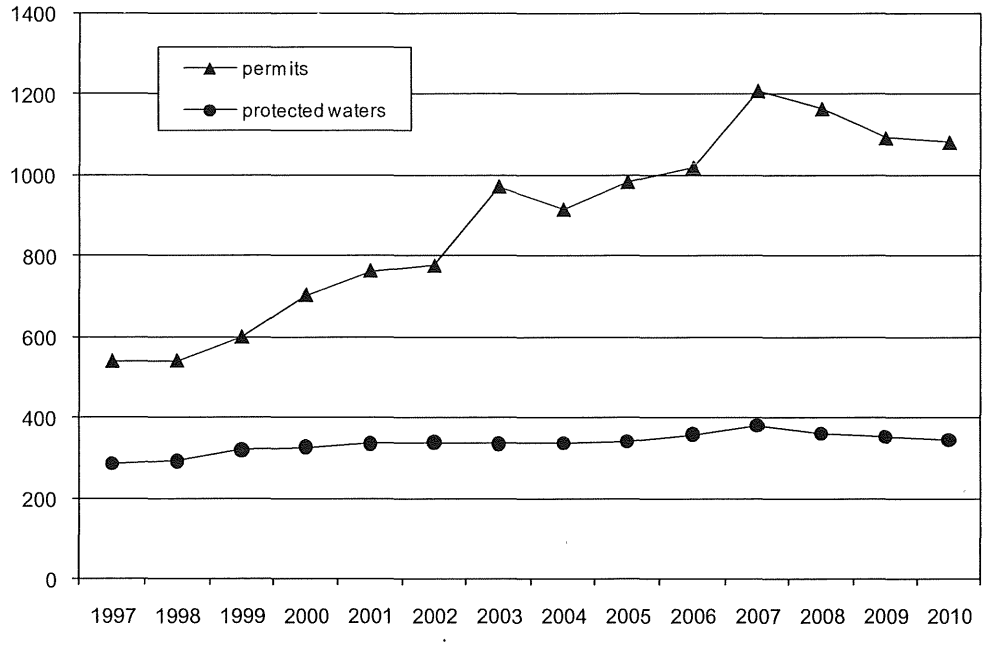
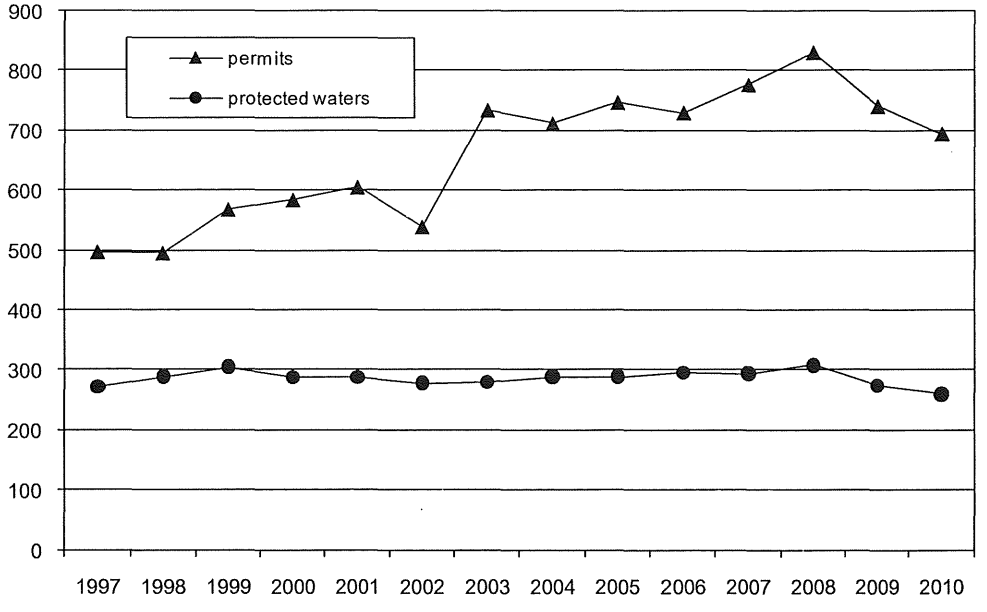


Figure 12. Numbers of permits issued for chara control, and numbers of lakes where permits were issued 1997-2010.

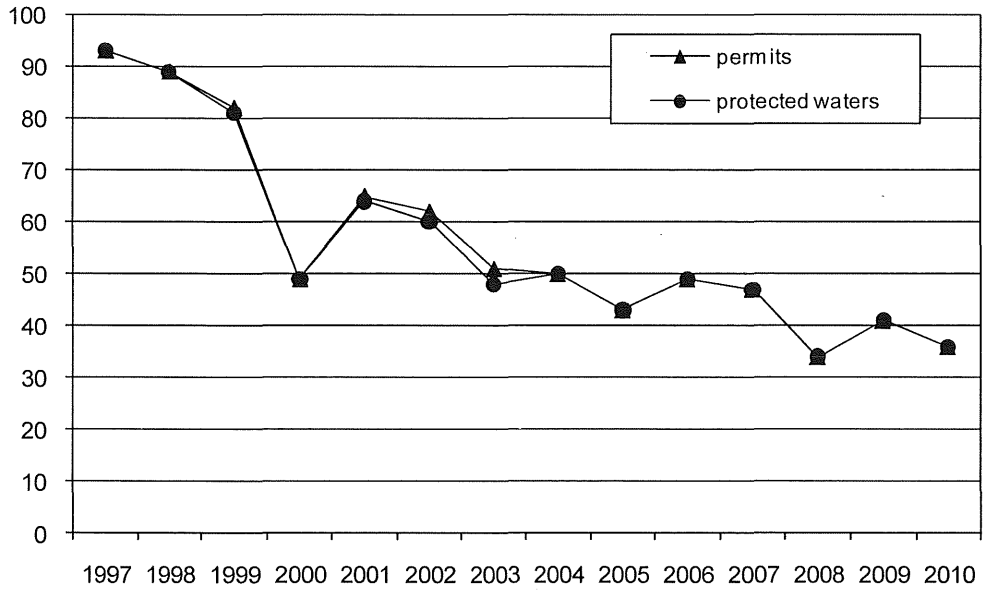


Plankton algae control

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 on offensive odor.

The numbers of lakes treated with algaecides to control plankton algae has been decreasing over the last ten years. The overall downward trend in permits issued for plankton algae control continued in 2010 (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 decline 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.

Figure 13. Numbers of permits issued for lake-wide plankton algae control, and numbers of lakes treated 1997-2010.



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.

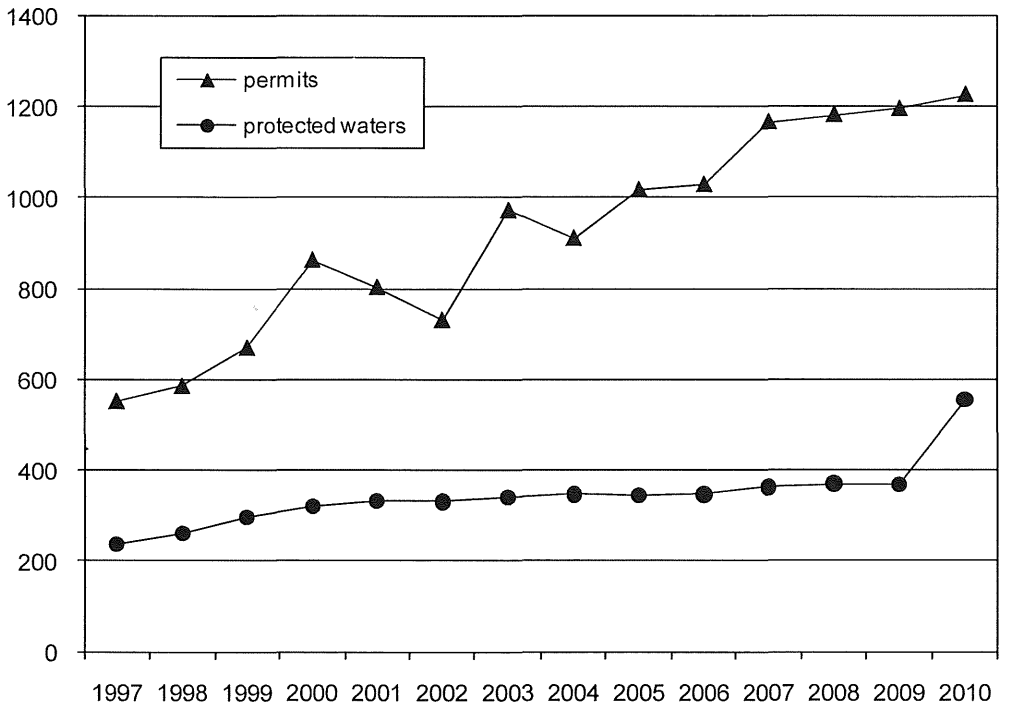
The problem for humans occurs when the cercaria mistakes us for its proper host. When a cercaria penetrates a human's skin it is attacked and killed by the person's immune system. Although the organism cannot complete its life history in humans, individuals sensitive to the infection can suffer from 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.

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.

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 of the state. In 2010 there were nearly 600 lakes statewide where permits were issued for swimmer's itch control (Figure 14, Appendix Table H). About 75% of those responding were satisfied with the results of treatments to control swimmer's itch, up slightly from 2009.

Figure 14. Numbers of permits issued for swimmer's itch control, and numbers of lakes where permits were issued 1997-2010.



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 four, non-native invasive aquatic plants: curly-leaf pondweed, purple loosestrife, flowering rush, and Eurasian watermilfoil. In 2006, the DNR initiated a grant program to support pilot projects 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.

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. Research conducted by the U.S. Army Corps of Engineers (ACE) described control strategies that may 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 2010, 22 pilot project lakes were treated with Endothall to control curly-leaf pondweed. One lake and three bays of Lake Minnetonka were treated with herbicide to control both curly-leaf pondweed and Eurasian watermilfoil. These lakes will be treated and monitored for at least five 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.

The development of the pilot project program has significantly influenced the numbers of acres of curly-leaf pondweed and Eurasian watermilfoil treated since the programs beginning in 2005 (Fig. 16). The large decrease in curly-leaf pondweed treated in 2009 is due to the change in treatment strategy for 3,000 acre lake Benton. Prior to 2009, Lake Benton was subjected to whole lake treatments with fluridone herbicide. In 2010, no control of curly-leaf pondweed in Lake Benton was done.

More detailed information on this project can be found in the 2010 Invasive Species Program Annual report for
(http://files.dnr.state.mn.us/ecological_services/invasives/annualreport.pdf)

Figure 15. Numbers of permit issued for curly-leaf pondweed and Eurasian watermilfoil control 1998-2010.

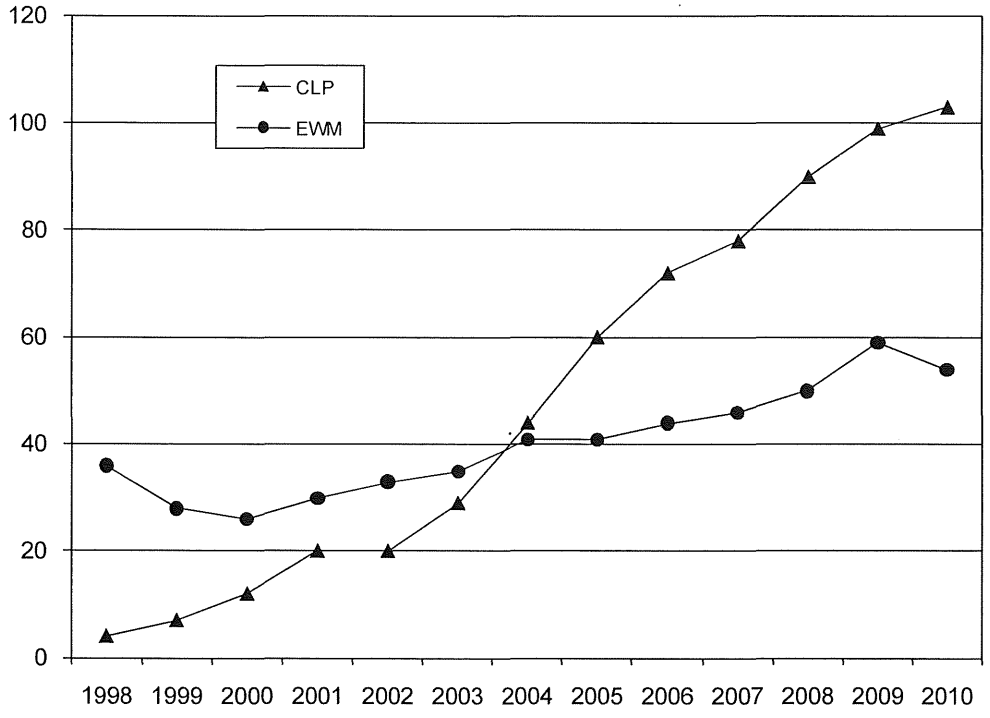
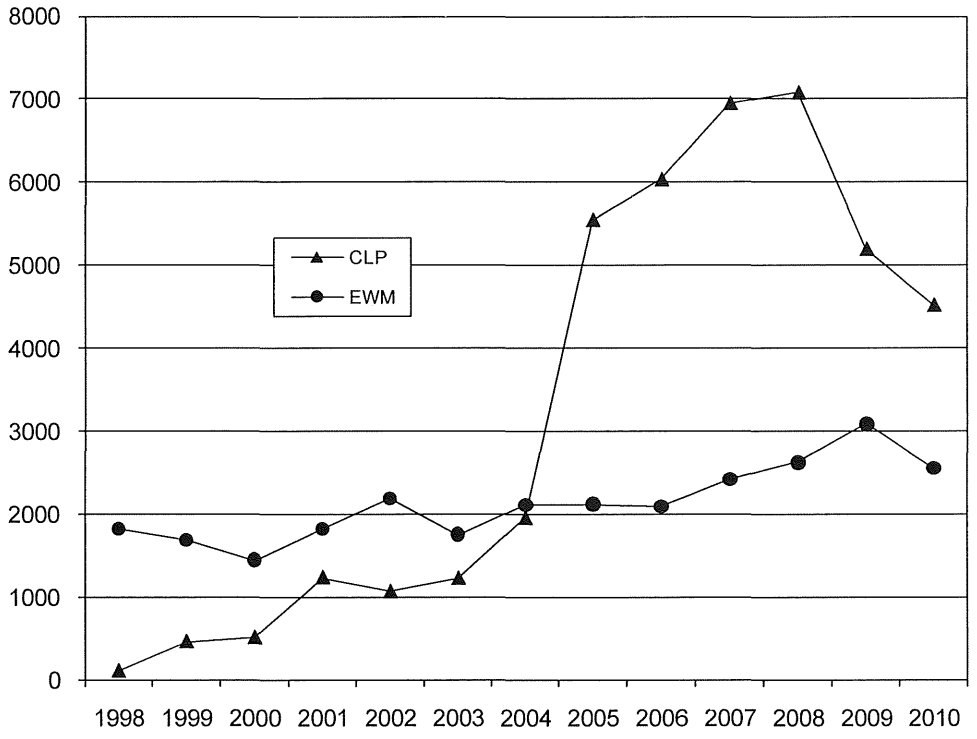


Figure 16. Acres of off-shore curly-leaf pondweed and Eurasian watermilfoil control 1998-2010.



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. 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:

- Inventory purple loosestrife sites to prioritize control efforts.
- Carry out management activities including chemical and biological control.
- Support research to evaluate and improve 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. 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 2010, DNR staff treated a total of 74 purple loosestrife sites with 0.38 gallons of 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 2010 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 invasive, 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 14 additional water bodies in 2010. There are now 246 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 2010 for milfoil was 39,932 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 2010 Invasive Species Program Annual Report. The report may be reviewed on line at http://www.dnr.state.mn.us/ecological_services/invasives/index.html.

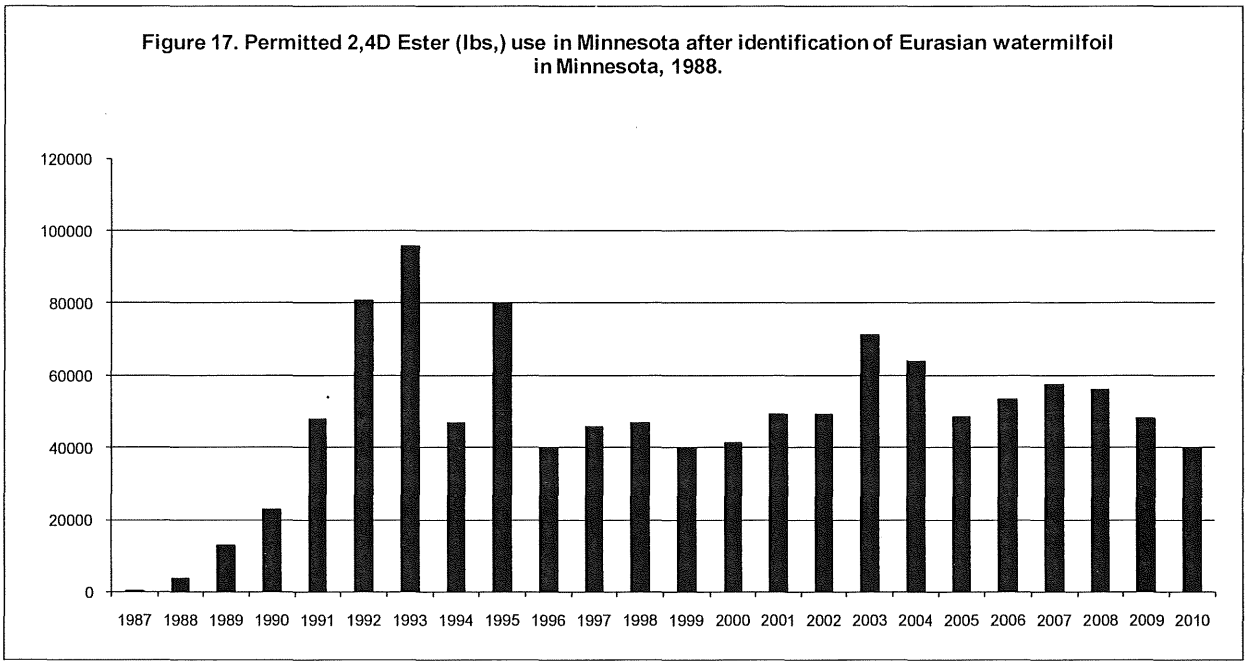


Figure 17. Permitted 2,4D Ester (lbs,) use in Minnesota after identification of Eurasian watermilfoil in Minnesota, 1988.

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APPENDIX

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)
Part 1. Aquatically labeled systemic herbicides.			
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
Renovate		X	Triclopyr
Kraken		X	Triclopyr
Part 2. Contact Herbicides.			
Aquathol (Liquid or Granular)		X	Dipotassium salt of endothall
Hydrothol 191 (Liquid or Granular)		X	Mono-amine salt of endothall *(liquid by licensed applicator only)*
Reward (Liquid)		X	Diquat dibromide *(licensed applicator only)*
Part 3. Copper Compounds (Algaecides and Herbicides).			
Cutrine Plus (Liquid or Granular)	X (A)		Copper-Ethonalamine complex
Komeen (Liquid)	X (H)		Copper-Ethylenediamine complex
Symmetry	X (A)		Copper-Triethanolamine complex
Part 4. Other.			
Copper sulfate	X (A)		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 various aquatic herbicide use statewide, 1981-2010.

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.	Triclopyr lbs.	Triclopyr gal.
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	400	0	830	1,000	1,600	5,000	240	34,600	*	*
1994	45,000	700	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	2,189	28
2007	57,700	971	85	1,320	9,838	3,665	10,105	782	46,000	1,400	46
2008	56,000	655	74	2,462	13,208	2,643	10,693	550	32,290	17,025	1,882
2009	48,250	655	939	725	13,801	1,791	7,963	1,758	25,234	63,896	662
2010	39,932	731	1,070	737	10,238	1,501	7,973	90	23,200	47,379	1,371

* Data not available

Table C.

2010 AQUATIC PLANT MANAGEMENT SURVEY

Please check the appropriate circle.

1. Was your 2010 permit used? ○ Yes, permitted work was done.
   - ○ No, because: The nuisance conditions did not develop.
   - ○ No, because: I got the permit too late.
   - ○ No, because: I was unable to get the work done.
   - ○ No, because: Thanks! Please use the back for comments

2. When my permit expires: ○ I will reapply for a permit. ○ I have a permanent and non-transferable permit.
   ○ I will not apply for a permit.
   ○ I am undecided at this time.

3. The method of control was: ○ cutting or pulling.
   ○ chemical treatment.
   ○ cutting or pulling and chemical treatment.

4. A. Were you satisfied with the aquatic plant control work done (for Swimmers Itch control only skip to 4.B)?
   ○ YES ○ NO ○ wasn't as good as expected

   B. If you treated for Swimmers Itch were you satisfied with the control?
   ○ YES ○ NO ○ wasn't as good as expected

5. When was the work done?
   ○ April ○ May ○ June ○ July ○ August ○ September ○ October ○ November ○ 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.
   ○ Yes, control work was done on the entire area permitted
   ○ No, less control work was done than the permit allowed

7. If you used herbicide, please indicate what you used and how much?

What Did You Use?	How much concentrated product did you use before mixing? circle the measure
Copper sulphate _____ lbs.	Aquakleen/Navigate _____ lbs.
gran.Hydrothol 191 _____ lbs.	Aquacide _____ lbs.
liq. Aquathol K _____ gal., qts., oz.	liq. Cutrine Plus _____ gal., qts., oz.
gran.Aquathol _____ lbs.	gran. Cutrine Plus _____ lbs.
liq. Hydrothol 191 _____ gal., qts., oz.	Rodeo _____ gal., qts., oz.
Reward _____ gal., qts., oz.	other: _____ lbs., gal., qts., oz.
Renovate OTF _____ lbs.	
	other: _____ lbs., gal., qts., oz.

We value your comments. Please use the back. Thanks!

Note: Please return this survey as soon as possible.

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Table D.

2010 AQUATIC PLANT MANAGEMENT SURVEY

Automated Aquatic Plant Control Device (AAPCD)

Please check the appropriate circle.

1. The type of AAPCD device I have a permit for is a:

- ○ WeedRoller
- ○ Beach Groomer
- ○ Lake Maid
- ○ other

2. I used an AAPCD this year.

- ○ Yes
- ○ No, I did not use an AAPCD this year.
  - ○ I'll explain on the back.

3. The AAPCD I used in 2010-

I have owned for:	Is jointly owned and shared with the other co-owners and has been for:	
○ **less than 1 year**	○ **less than 1 year**	○ **was rented.**
○ **1 - 3 years**	○ **1 - 3 years**	○ **was borrowed.**
○ **more than 3 years**	○ **more than 3 years**	

4. How long each month (in hours) did you operate your AAPCD ?

	not used	few hours >0-20	several hours >20-50	many hours >50-144	continuous
In May:	○	○	○	○	○
In June:	○	○	○	○	○
In July:	○	○	○	○	○
In August:	○	○	○	○	○

We value your comments. Please use the back. Thanks!

Note: Please return this survey as soon as possible.

09F-5556

Table E. Aquatic Pesticide Enforcement Use Inspections, 2010.

Treatment Date	County	Lake Name	Applicator	Permit
4/20/10	Anoka	Coon	Lake Restoration	10F-3A024
4/21/10	Anoka	Coon	Professional Lake Management	10F-3A024
4/23/10	Sherburne	Rush	Lake Management	10F-3B199
4/23/10	Sherburne	Julia	Lake Management	10F-3B197
4/26/10	LeSueur	Tetonka	Culbert Nursery	10F-4142
4/26/10	Crow Wing	Lower South Long	Lake Restoration	10F-2B00267
4/27/10	Crow Wing	Lower Mission	Professional Lake Management	10F-2B417
4/27/10	Crow Wing	Lower Cullen	Professional Lake Management	10F-2B033
4/27/10	Crow Wing	Long	Professional Lake Management	10F-3B307
5/6/10	Chisago	Rush	Lake Restoration	10F-3A293
5/12/10	Ramsey	Keller	Lake Management	10F-3A116
5/17/10	Chisago	Green	Green Lake Association	10F-3A313
517/10	Washington	Forest 1	Lake Management	10F-3A357
5/19/10	Wright	Sylvia	Greater Lake Sylvia Property Owners	10F-3B109
5/20/10	LeSueur	Tetonka	Culbert Nursery	10F-4085
5/25/10	Carver	Lotus	Lake Restoration	10F-3A146
5/26/10	Dakota	Crystal	Lake Restoration	10F-3A161
5/27/10	Hennepin	Bass	Lake Management	10F-3A504
6/1/10	Chisago	Rush	Lake Restoration	10F-3A261
6/3/10	Scott	Lower Prior	Lake Management	10F-3A477
6/3/10	Carver	Lotus	Midwest Aquacare	10F-3A669
6/7/10	Hennepin	Medina	Jacobson Environmental	10F-3A417
6/9/10	Ramsey	Gervais	Lake Improvement Consulting	10F-3A625
6/14/10	Wright	Clearwater	Clearwater Lake Property Owners	10F-3B116
6/16/10	Anoka	Coon	Lake Restoration	10F-3A259
6/16/10	Todd	Little Birch	Professional Lake Management	10F-3B187
6/21/10	Isanti	Paul	Lake Restoration	10F-3B319
6/22/10	Todd	Mound	Minnesota Shoreline Restoration	10F-3B482
6/24/10	Todd	Osakis	Professional Lake Management	10F-10709
6/25/10	Dakota	Rosenberger	Midwest Aquacare	10F-3A785
6/29/10	Hennepin	Normandale	Jacobson Environmental	10F-3A236
6/30/10	Hennepin	Weaver	Lake Restoration	10F-3A254
7/6/10	Scott	Fish	Lake Restoration	10F-3A143
7/7/10	Anoka	Coon	Professional Lake Management	10F-3A025
7/8/10	Scott	Upper Prior	Professional Lake Management	10F-3A121
7/13/10	Hennepin	Mtka. Carsons	Lake Management	10F-3A661
7/15/10	Hennepin	Medina	Jacobson Environmental	10F-3A417
7/19/10	Wright	Sugar	Sugar Lake Assoc	10F-3B546
7/20/10	Washington	Forest	Lake Management	10F-3A339
7/22/10	Hennepin	Normandale	Jacobson Environmental	10F-3A236
7/23/10	Washington	Big Marine	Lake Management	10F-3A836
7/28/10	Mille Lacs	Mille Lacs	Midwest Aquacare	10F-200939
8/13/10	Kandiyohi	Florida	Lake Florida Improvement	10F-4067
9/22/10	Chisago	Hwy 83 to Green	Critical Connections Ecological Services Inc.	10F-3A880

Table F. Statewide numbers of permits and properties by county, 2010.

County	Permits	Properties
Aitkin	150	156
Anoka	45	281
Becker	191	201
Beltrami	18	18
Big Stone	1	1
Blue Earth	3	3
Carlton	21	21
Carver	88	328
Cass	219	233
Chisago	74	245
Clay	4	4
Clearwater	5	5
Cottonwood	1	1
Crow Wing	635	920
Dakota	64	380
Douglas	151	151
Faribault	2	59
Freeborn	7	7
Grant	10	10
Hennepin	374	1,930
Hubbard	59	59
Isanti	33	76
Itasca	37	37
Jackson	4	4
Kanabec	7	200
Kandiyohi	88	137
Kittson	1	1
Koochiching	1	1
Lake of the Woods	1	1
LeSueur	52	181
Lincoln	2	2
Mahnomen	1	1
Martin	4	4
McLeod	1	20
Meeker	27	159
Mille Lacs	23	44
Morrison	73	181

Table F. (Continued)

County	Permits	Properties
Murray	5	5
Nicollet	1	1
Nobles	3	3
Olmsted	1	1
Ottertail	378	378
Pennington	1	1
Pine	32	102
Pipestone	1	1
Polk	5	5
Pope	49	49
Ramsey	77	961
Rice	23	123
Rock	3	3
Scott	65	323
Sherburne	60	186
St. Louis	27	27
Stearns	100	191
Steele	2	2
Todd	106	122
Wabasha	1	1
Wadena	5	5
Waseca	7	11
Washington	98	484
Watonwan	1	1
Winona	2	2
Wright	195	637
Yellow Medicine	2	4

Table G. Lakes with nine or more total permits issued for swimmer's itch from 1997 through 2010.

Region	County	Lake	Total permits issued
1	Becker	Detroit	45
1	Becker	Height of Land	11
1	Becker	Sallie	15
1	Beltrami	Julia	12
1	Cass	Birch	17
1	Cass	Ten Mile	9
1	Clay	Blue Eagle	14
1	Clearwater	Lamont	11
1	Douglas	Carlos	27
1	Douglas	Darling	30
1	Douglas	Geneva	15
1	Douglas	Henry	9
1	Douglas	Ida	49
1	Douglas	Irene	85
1	Douglas	Le Homme Dieu	54
1	Douglas	Miltona	49
1	Grant	Pelican	18
1	Grant	Pomme De Terre	13
1	Hubbard	Alice	12
1	Hubbard	Bad Axe	9
1	Hubbard	Big Sand	23
1	Hubbard	Fishhook	11
1	Hubbard	Portage	13
1	Otter Tail	East Battle	19
1	Otter Tail	East Leaf	9
1	Otter Tail	Jewett	25
1	Otter Tail	Marion	30
1	Otter Tail	Rush	25
1	Otter Tail	Stalker	14
1	Otter Tail	Wall	25
1	Pope	Amelia	26
1	Pope	Linka	52
1	Pope	Minnewaska	32
1	Pope	Scandinavian	12
1	Pope	Villard	10
1	Todd	Osakis	111
2	Aitkin	Big Sandy	39
2	Aitkin	Cedar	16
2	Aitkin	Farm Island	137

Table G. Continued.

Region	County	Lake	Total permits issued
2	Aitkin	Gun	46
2	Aitkin	Hanging Kettle	10
2	Aitkin	Minnewawa	32
2	Aitkin	Pine	17
2	Aitkin	Round	25
2	Aitkin	South Big Pine	24
2	Aitkin	Spirit	22
2	Carlton	Eagle	66
2	Carlton	Tamarack	15
2	Cass	Hardy	10
2	Cass	Margaret	14
2	Cass	Norway	9
2	Cass	Roosevelt	63
2	Cass	Sylvan	37
2	Cass	Upper Gull	25
2	Chisago	Chisago	37
2	Chisago	Fish	18
2	Chisago	Green	78
2	Chisago	Horseshoe	11
2	Chisago	Kroon	16
2	Chisago	Little Comfort	12
2	Chisago	North Center	70
2	Chisago	North Lindstrom	12
2	Chisago	Rush	73
2	Chisago	S. Lindstrom	34
2	Chisago	South Center	92
2	Crow Wing	Bay	82
2	Crow Wing	Bertha	93
2	Crow Wing	Big Pine	21
2	Crow Wing	Big Trout	99
2	Crow Wing	Blackhoof	12
2	Crow Wing	Clamshell	20
2	Crow Wing	Clark	16
2	Crow Wing	Crooked	18
2	Crow Wing	Crosslake	98
2	Crow Wing	Crow Wing	72
2	Crow Wing	Daggett	63
2	Crow Wing	Eagle	11
2	Crow Wing	Edward	15
2	Crow Wing	Gilbert	81

Table G. Continued.

Region	County	Lake	Total permits issued
2	Crow Wing	Gladstone	17
2	Crow Wing	Gull	344
2	Crow Wing	Hubert	20
2	Crow Wing	Island	19
2	Crow Wing	Little Pine	50
2	Crow Wing	Love	24
2	Crow Wing	Lower Cullen	41
2	Crow Wing	Lower Hay	38
2	Crow Wing	Lower Mission	30
2	Crow Wing	Lower South Long	122
2	Crow Wing	Lower Whitefish	160
2	Crow Wing	Middle Cullen	22
2	Crow Wing	Nisswa	32
2	Crow Wing	North Long	111
2	Crow Wing	O'Brien	42
2	Crow Wing	Ossawinnamakee	46
2	Crow Wing	Pelican	52
2	Crow Wing	Perch	21
2	Crow Wing	Perch	58
2	Crow Wing	Pig	19
2	Crow Wing	Portage	20
2	Crow Wing	Red Sand	20
2	Crow Wing	Rice	29
2	Crow Wing	Round	144
2	Crow Wing	Roy	62
2	Crow Wing	Rush	100
2	Crow Wing	Serpent	121
2	Crow Wing	Sibley	24
2	Crow Wing	Upper Cullen	19
2	Crow Wing	Upper Hay	71
2	Crow Wing	Upper Mission	28
2	Crow Wing	Upper South Long	62
2	Crow Wing	West Fox	17
2	Crow Wing	White Sand	51
2	Crow Wing / Morrison	Platte	130
2	Isanti	Blue	35
2	Isanti	Long	15
2	Isanti	Skogman	9
2	Isanti	Spectacle	16

Table G. Continued.

Region	County	Lake	Total permits issued
2	Itasca	Bass	11
2	Itasca	Bowstring	12
2	Itasca	Jessie	17
2	Itasca	Sand	16
2	Itasca	Swan	86
2	Itasca	Fish	27
2	Itasca	Mud	13
2	Mille Lacs	Mille Lacs	48
2	Morrison	Alexander	72
2	Morrison	Croockneck	62
2	Morrison	Fishtrap	37
2	Morrison	Shamineau	17
2	Pine	Cross	38
2	Pine	North Big Pine	69
2	Pine	Upper Pine	15
2	Sherburne	Big	44
2	Sherburne	Fremont	17
2	Sherburne	Julia	21
2	Sherburne	Mitchell	25
2	Sherburne	Rush	14
2	St. Louis	Big Sturgeon	17
2	St. Louis	Long	24
2	Stearns	Big Fish	17
2	Stearns	Grand	28
2	Sherburne	Pearl	28
2	Sherburne	Pelican	38
2	Stearns	Upper Spunk	23
2	Todd	Big Birch	22
2	Wright	Augusta	11
2	Wright	Bass	33
2	Wright	Beebe	10
2	Wright	Cedar	43
2	Wright	Charlotte	25
2	Wright	Crawford	12
2	Wright	Deer	18
2	Wright	Eagle	12
2	Wright	French	27
2	Wright	Granite	9
2	Wright	Maple	56
2	Wright	Pleasant	42

Table G. Continued.

Region	County	Lake	Total permits issued
2	Wright	Pulaski	45
2	Wright	Rock	20
2	Wright	Somers	13
2	Wright	Sugar	83
2	Wright	Sylvia	57
2	Wright	Waverly	39
3	Anoka	Centerville	13
3	Anoka	Coon	79
3	Anoka	George	22
3	Anoka	Golden	28
3	Anoka	Ham	22
3	Anoka	Labelle Pond	11
3	Anoka	Linwood	31
3	Anoka	Otter	28
3	Carver	Bavaria	18
3	Carver	Burandt	27
3	Carver	Eagle	11
3	Carver	Firearms	13
3	Carver	Grace	12
3	Carver	Lotus	88
3	Carver	Lucy	12
3	Carver	Minnewashta	97
3	Carver	Pierson	54
3	Carver	Riley	55
3	Carver	Virginia	35
3	Carver	Waconia	35
3	Carver	Wassermann	10
3	Carver	Zumbra	17
3	Chisago	Goose	20
3	Dakota	Crystal	89
3	Dakota	Lee	11
3	Dakota	Marion	34
3	Dakota	Orchard	25
3	Dakota	Roseberger	10
3	Dakota	Salem	15
3	Dakota	Sunfish	11
3	Dakota	Warrior Pond	10
3	Hennepin	Arowhead	11
3	Hennepin	Bass	14
3	Hennepin	Bryant	35

Table G. Continued.

Region	County	Lake	Total permits issued
3	Hennepin	Bush	14
3	Hennepin	Castle Ridge	14
3	Hennepin	Christmas	33
3	Hennepin	Duck	23
3	Hennepin	Dutch	17
3	Hennepin	Eagle	52
3	Hennepin	Fish	48
3	Hennepin	Forest	24
3	Hennepin	Gleason	26
3	Hennepin	Greentree Pond	13
3	Hennepin	Hadley	16
3	Hennepin	Independence	62
3	Hennepin	Indianhead	9
3	Hennepin	Long	13
3	Hennepin	Lower Twin	18
3	Hennepin	Medicine	79
3	Hennepin	Melody	14
3	Hennepin	Minnetonka Cooks	80
3	Hennepin	Mtka Black	51
3	Hennepin	Mtka Browns	31
3	Hennepin	Mtka Carmans	69
3	Hennepin	Mtka Carsons	53
3	Hennepin	Mtka Crystal	65
3	Hennepin	Mtka E. Upper Lake	28
3	Hennepin	Mtka Emerald	34
3	Hennepin	Mtka Excelsior	43
3	Hennepin	Mtka Gideons	79
3	Hennepin	Mtka Grays Bay	33
3	Hennepin	Mtka Halsteds	81
3	Hennepin	Mtka Harrisons Bay	40
3	Hennepin	Mtka Jennings	47
3	Hennepin	Mtka Lafayette	78
3	Hennepin	Mtka Lower Lake N.	29
3	Hennepin	Mtka Lower Lake N.	54
3	Hennepin	Mtka Maxwell	55
3	Hennepin	Mtka North Arm	84
3	Hennepin	Mtka Phelps	69
3	Hennepin	Mtka Priests	58
3	Hennepin	Mtka Robinsons	30
3	Hennepin	Mtka S. Upper Lake	68

Table G. Continued.

Region	County	Lake	Total permits issued
3	Hennepin	Mtka Seton	18
3	Hennepin	Mtka Smiths	16
3	Hennepin	Mtka Smithtown	55
3	Hennepin	Mtka Spring Park	42
3	Hennepin	Mtka St. Albans	72
3	Hennepin	Mtka St. Louis	22
3	Hennepin	Mtka Stubbs	35
3	Hennepin	Mtka W. Upper Lake	62
3	Hennepin	Mtka Wayzata	54
3	Hennepin	Mtka West Arm	49
3	Hennepin	Parkers	32
3	Hennepin	Rebecca	13
3	Hennepin	Red Rock	49
3	Hennepin	Rose	9
3	Hennepin	Round	12
3	Hennepin	Sarah	84
3	Hennepin	Schmidt (Smith)	18
3	Hennepin	Shady Oak	13
3	Hennepin	Stauder Pond	10
3	Hennepin	Weaver	29
3	Hennepin	Wrestling (Unnamed)	12
3	Isanti	Fannie	29
3	Isanti	Paul	23
3	Morrison	Big Swan	50
3	Morrison	Green Prairie Fish	10
3	Morrison	Sullivan	19
3	Pine	Pokegama	14
3	Pine	Sand	14
3	Ramsey	Bald Eagle	71
3	Ramsey	Gervais	34
3	Ramsey	Gilfillan	19
3	Ramsey	Island	13
3	Ramsey	Johanna	30
3	Ramsey	Josephine	37
3	Ramsey	Keller	14
3	Ramsey	Kerry Pond	14
3	Ramsey	Kohlman	22
3	Ramsey	McCarrons	38
3	Ramsey	Owasso	30
3	Ramsey	Peppertree Pond	15

Table G. Continued.

Region	County	Lake	Total permits issued
3	Ramsey	Pleasant	11
3	Ramsey	Silver (NSP)	18
3	Ramsey	Snail	41
3	Ramsey	Turtle	35
3	Ramsey	Wabasso	23
3	Ramsey	White Bear	110
3	Scott	Cedar	45
3	Scott	Fish	21
3	Scott	Lower Prior	157
3	Scott	O'Dowd	35
3	Scott	Spring	36
3	Scott	Thole	30
3	Scott	Upper Prior	76
3	Sherburne	Briggs	22
3	Sherburne	Eagle	14
3	Sherburne	Elk	10
3	Stearns	North Browns	14
3	Todd	Mons	15
3	Todd	Mound	33
3	Washington	Big Carnelian	62
3	Washington	Big Marine	38
3	Washington	Demontreville	14
3	Washington	Forest	187
3	Washington	Jane	19
3	Washington	Lily	14
3	Washington	Mary	11
3	Washington	Olson	14
3	Washington	Pine Tree	10
3	Washington	Sylvan	9
3	Washington	Tanners	20
3	Wright	Clearwater	139
3	Wright	Fish	15
3	Wright	Howard	10
3	Wright	Martha	10
3	Wright	Mink/Somers	13
4	Faribault	Bass	17
4	Kandiyohi	Eagle	39
4	Kandiyohi	Elk Horn	14
4	LeSueur	Sakatah	14
4	LeSueur	Tetonka	39

Table G. Continued.

Region	County	Lake	Total permits issued
4	LeSueur	Washington	54
4	Meeker	Long	9
4	Rice	Cedar	10
4	Rice	Mazaska	10
4	Rice	Roberds	16
4	Stearns	Koronis	18
4	Stearns	Rice	40
4	Waseca	Clear	14

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