05 - 0367

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ECOLOGICAL SERVICES

STAFF REPORT 37

Control of Rooted Aquatic Vegetation, Algae, Leeches, Swimmer's Itch, 2004

May 2005

A Summary of Permitted Control Work for Aquatic Vegetation, Algae, Leeches, Swimmer's Itch, 2004

By

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May 2005

Executive Summary 2004 Aquatic Plant Management Program

The number of public waters where permitted aquatic plant management work is done has increased steadily since the program began in 1953. However in 2004, the numbers of lakes remained essentially the same as in 2003. In 2004, there were 900 public waters statewide with permitted (APM) activity, in 2003 there were 899 lakes with permitted APM activity. There were 179 more permits issued statewide in 2004.

The Central Region which includes the seven county metropolitan area typically issues more permits for more properties than any other DNR regional office. In 2004, the Little Falls Office (Central Region 3B) at the northern part of the Central Region issued fifty fewer permits to 243 fewer properties than were issued in 2003. However, the St. Paul office (3A) of the Central Region issued 98 more permits and there were 720 more properties for a net increase of 477 properties.

The Grand Rapids office of the North East Region also had a decrease in the number of properties permitted for aquatic plant management. Although the number of permits issued from Grand Rapids (2A) increased by eleven permits, the number of properties permitted decreased by approximately 90 properties.

The numbers of aquatic plant management permits increased from all other locations that issue permits. The numbers of properties involved in the APM program statewide increased by 611 in 2004. Nearly 80% of this increase was in the Central Region. The spring of 2004 was cool and wet from May and into June, which could account for some of the regional decreases in the numbers of property owners obtaining APM permits.

A fee increase passed by the 2003 legislature was in effect for the entire 2004 season. This resulted in an increase in total permit revenue from approximately $129,028 in 2003 to nearly $262,000 in the year 2004. The average fee per property increased from approximately $13.00 in 2003 to nearly $25.00 in 2004.

In 2004, about 47% of the permits issued were issued for the use of automated aquatic plant control devices like the Crary WeedRoller, the Colman Beach Groomer or the Lake Restoration Lake Sweeper. The remaining 53% of the aquatic plant management permits allowed chemical and or other mechanical removal as the method of control. These numbers are nearly identical to the permit distribution among methods in 2003.

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 for these devices increased by 153 statewide in 2004. The number of three-year duration permits issued decreased by 71 permits in 2004. The three-year permit option is allowed for persons who limit the size of the area of AUAPCD operation to no more than 2,500 square feet. Persons who obtained a three-year permit in 2004 will not have to reapply again until the year 2007. Many individuals responded on their report form that they would prefer the three-year permit option. Some people (153 of those reporting) did not run their device in 2004.

Summary of APM permits issued, 2004.

Region	Harvest Chemical Channel	AUAPCD Issued 2004 1 year	AUAPCD Issued 2004 3 year	AUAPCD Issued 2003 3 year	AUAPCD Issued 2002 3 year	All Active Permits
Reg 1	423	595	215	278	*	1,511
Reg 2A	60	0	5	2	*	67
Reg 2B	486	177	175	223	*	1,061
Reg 3A	776	80	13	22	*	891
Reg 3B	290	87	93		*	532
Reg 4	115	15	22	7	*	159
All	2,150	954	523	594	414	4,635

* Region boundaries were realigned in 2002.
2A = Grand Rapids, NE Region
2B = Brainerd, NE Region
3A = St. Paul, Central Region
3B = Little Falls, Central Region

Summary of APM permits issued, fees collected, numbers of lakes and properties treated and harvested in 2004.

Region	All Permits Issued in 2004	All Lakes**	Fees**	Properties Permitted In 2004	Ave. Fee/ Property	All Reporting*** Harvest Work	All Reporting*** Chemical Treatment	All Reporting*** Both
Reg 1	1,233	256	$ 45,899.00	1,311	$35.01	97	151	12
Reg 2A	65	35		179		7	27	0
Reg 2B	838	152		1,391		46	215	6
Reg 2 total			$ 36,909.50	1,570	$23.51			
Reg 3A	869	266		5,405		40	602	7
Reg 3B	470	124		1,766		20	215	5
Reg 3 total			$169,366.88	7,171	$23.62			
Reg 4	152	67	$ 9,436.84	590	$15.99	18	64	8
2004 TOTAL	3,627	900	$261,612.32	10,642	$24.58	228	1,274	38
2003 TOTAL	3,448	899	$129,028.00	10,031	$12.86	203	1,327	51
CHANGE	179	1	$132,584.32	611	$11.72	25	-53	-13

* Includes all lakes, ponds, ditches and streams issued an APM permit for 2004.
** Fee totals provided by Carol Rushenberg.
*** Data tabulated from surveys and commercials reports on 1,658 permits used in 2004. Does not contain weedroller use. All Reg.'s determined from APM database, Status = 0 (permits issued)

2A = Grand Rapids, NE Region
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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 the aquatic and terrestrial community. 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, pan-fish 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 exotic 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

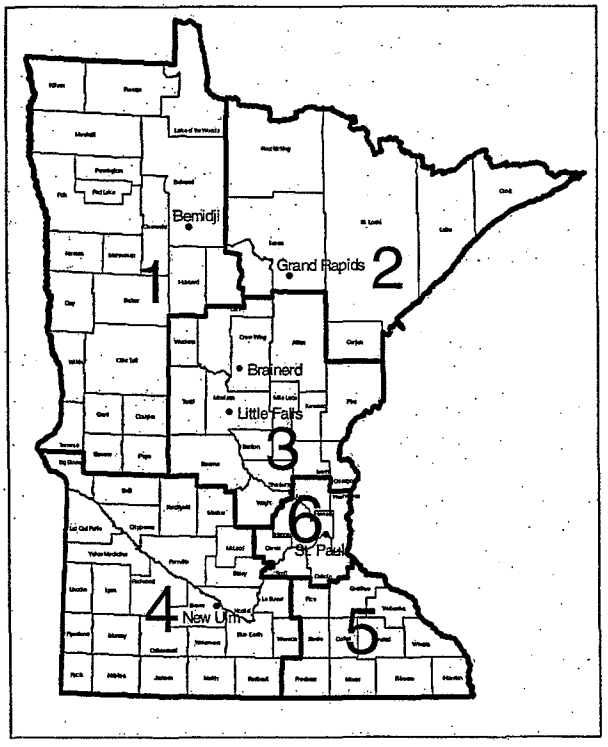
Riparian property owners (lake shore property owners) in Minnesota have a legal right to use and access the lake adjacent to their property. Aquatic vegetation may interfere with a lakeshore homeowner's ability to exercise that right. The purpose of the DNR's Aquatic Plant Management Program is to preserve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

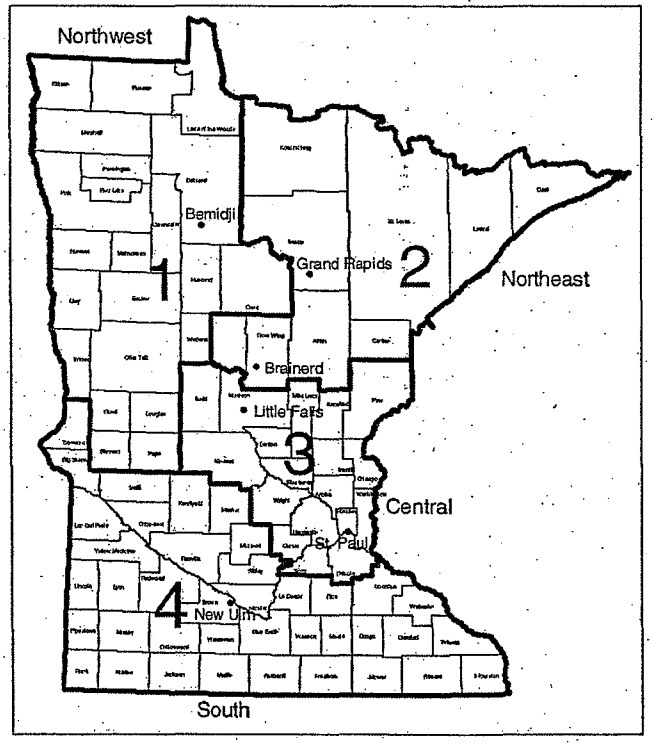
Administrative Regions

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.

Pre- July-2002



Post-July -2002



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. The Brainerd DNR Office, now in the Northeast Region, retained an Aquatic Plant Management specialist because the Brainerd Lakes Area is a center for 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 Regional 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. The new regional structure makes historical comparisons between regions much more difficult. However, it is still possible to identify statewide trends and make comparisons between years.

The DNR, Section of Fisheries, 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 (in the Division of Fisheries) to make site inspections and review applications for permit. In the South Region site inspections and application review are the responsibility of the Area Fisheries Supervisor. The recommendation for the disposition of the permit (approval, modification or denial) is determined during the review process. This decision often involves a discussion with the 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. Usually the cost of control work is borne by the individual (permittee) directly benefiting from the work.

The coordinator of the Aquatic Plant Management Program is in the Division of Ecological Services. 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 and material safety data sheets on products allowed for aquatic plant control 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 materials and forms provided to riparian property owners asking about aquatic management.

The APM program coordinator supervises staff in the Division of Ecological Services whose job responsibility includes enforcement of aquatic pesticide rules and pesticide label requirements. Aquatic Pesticide Enforcement Specialists conduct 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). Through June of 2003 there were two Aquatic Pesticide Enforcement Specialist positions, one for the southern half of the state located in the St. Paul Central Office and one for the northern half of the state located in the Brainerd Regional DNR Office. Beginning in July of 2003 the work activity of the Brainerd Aquatic Pesticide Enforcement specialist position was significantly curtailed due to budget reductions. 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 any pesticide 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, and to control emergent vegetation such as cattails, wild rice or bulrush. 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 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 lakes 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 must contain the following information: the treatment date, the name of the product used, expiration dates of any water use restrictions on swimming, fishing, household, and other uses, and they must be signed by the applicator. 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 is found in Appendix A.1 and A.2.

DISCUSSION

The following is a summary of Aquatic Plant Management Program (APMP) activities in 2004. The data for this report comes from four sources: permittee survey forms (2004 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.

Since 2000, survey forms are only mailed to permit holders that did their own aquatic plant control work. Prior to 2000, a survey form was mailed to all permit holders including those that hired commercial applicators to perform the control work for them. Those permit holders who

hired a commercial service 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, it was decided to eliminate permit holders who hire a commercial firm from the survey.

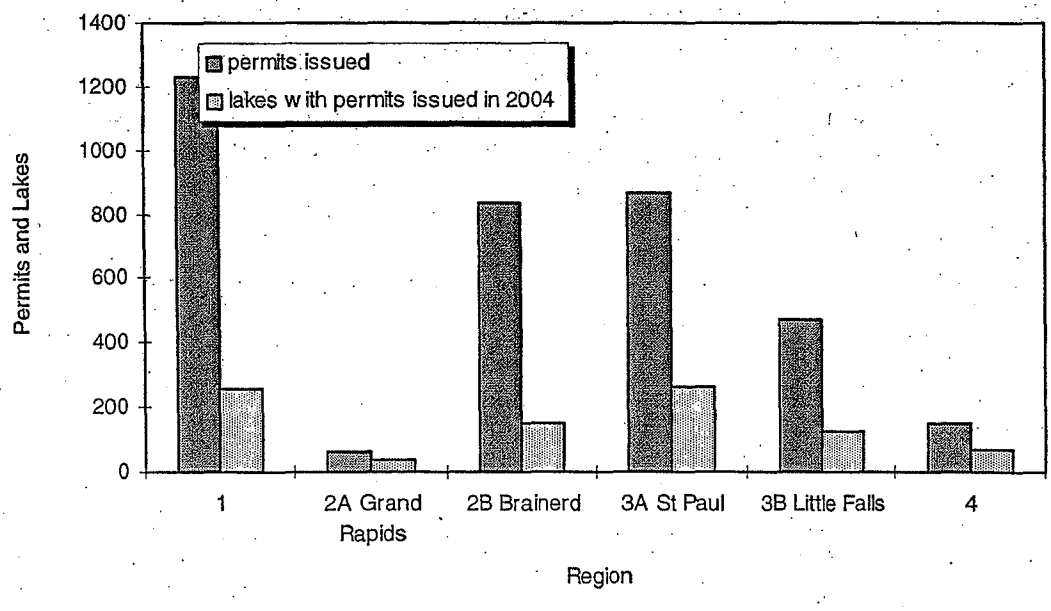
Survey forms were sent to all permittees that did their own chemical or mechanical control work. Of the 1,008 surveys mailed 860 (85%) were returned. A separate survey was sent to all 1,481 AUAPCD permit recipients, 1,349 (91%) were returned.

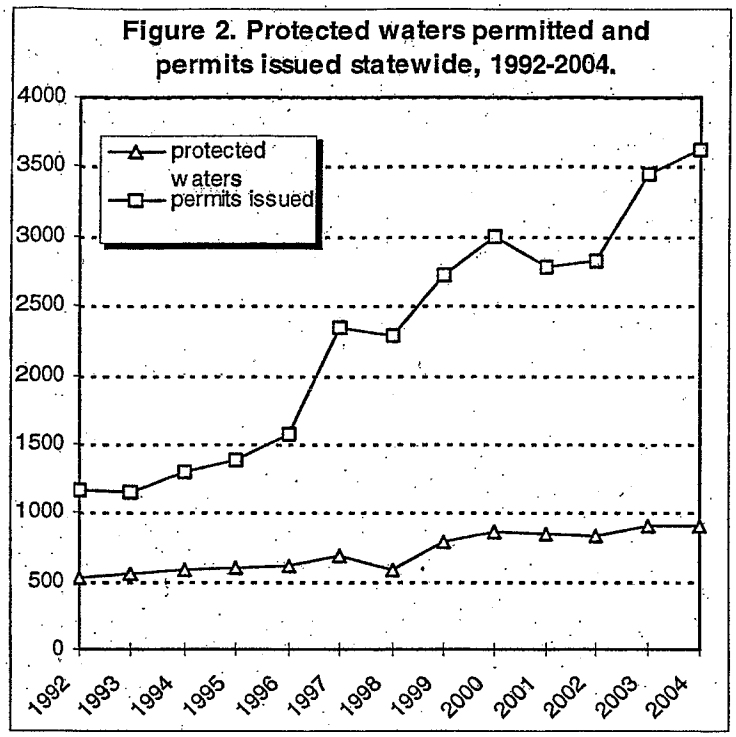
Permit Issuance

In 2004 a total of 3,627 permits were issued statewide for APM activities, 179 more than issued in 2003. These permits were issued for properties on 900 public waters (i.e. lakes, ponds, and streams) in 2004 (Figures 1 and 2). In 2004, there were 1,477 permits issued for the operation of Automated Unattended Aquatic Plant Control Devices (AUAPCD) such as the Crary WeedRoller® and others. The remaining 2,150 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.

Some lake shore homeowners may choose to apply for an aquatic plant management permit as a group. Group permits are more popular in the metropolitan area than in greater Minnesota. Homeowner's on large group permits can benefit from the $750 cap on permit fees. The permit fee per individual begins to go down after 21 properties. Some permits have more than 100 properties listed on a single permit. In 2004 there were 10,642 properties covered by the 3,627 permits issued.

Figure 1. Permits issued, and the number of lakes with permitted aquatic plant control, by region, in 2004.

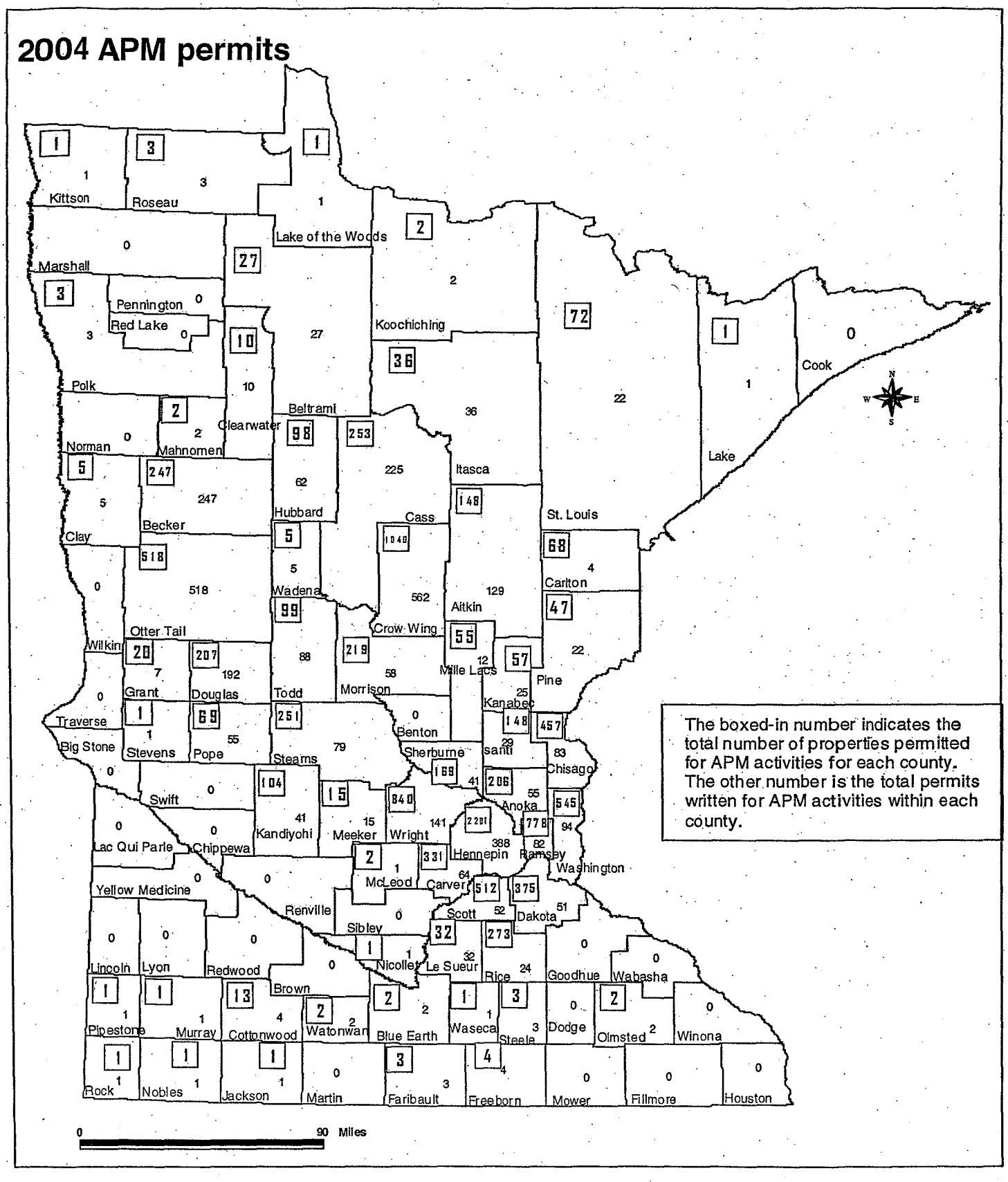




The statewide average number of properties per permit in 2004 remains at 2.9, unchanged from 2003. The Central Region, which includes the metropolitan area, typically has more large group permits than other areas of the state. In 2004, in the Central Region there were 5.3 properties per permit issued. The Northwest Region averaged just over one property per permit (1.06), the Northeast Region averaged nearly 2 properties per permit (1.7) and the Southern Region averaged about 4 properties per permit (3.9).

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 of the 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 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 1. Table 1 includes both new and previously issued permits.

2004 APM permits



The boxed-in number indicates the total number of properties permitted for APM activities for each county. The other number is the total permits written for APM activities within each county.

Table 1. Total number of APM applications requesting control along shore and APM permits issued as requested by region in 2004.

	Region						Statewide
	1	2A	2B	3A	3B	4	
Number of applications requesting control along shore	1,149	55	748	729	349	103	3,133
Permits issued as requested	932	40	651	703	291	97	2,714
% of permits issued as requested	81.1	72.7	87.0	96.4	83.4	94.2	86.6

The number of public waters where permits were issued remained nearly constant until 1999 when the number of public waters with permitted APM activity increased by 204 to 785 (Figure 2 & 3). The number of public waters with permitted APM activity in 2004 was 900, essentially unchanged from 2003.

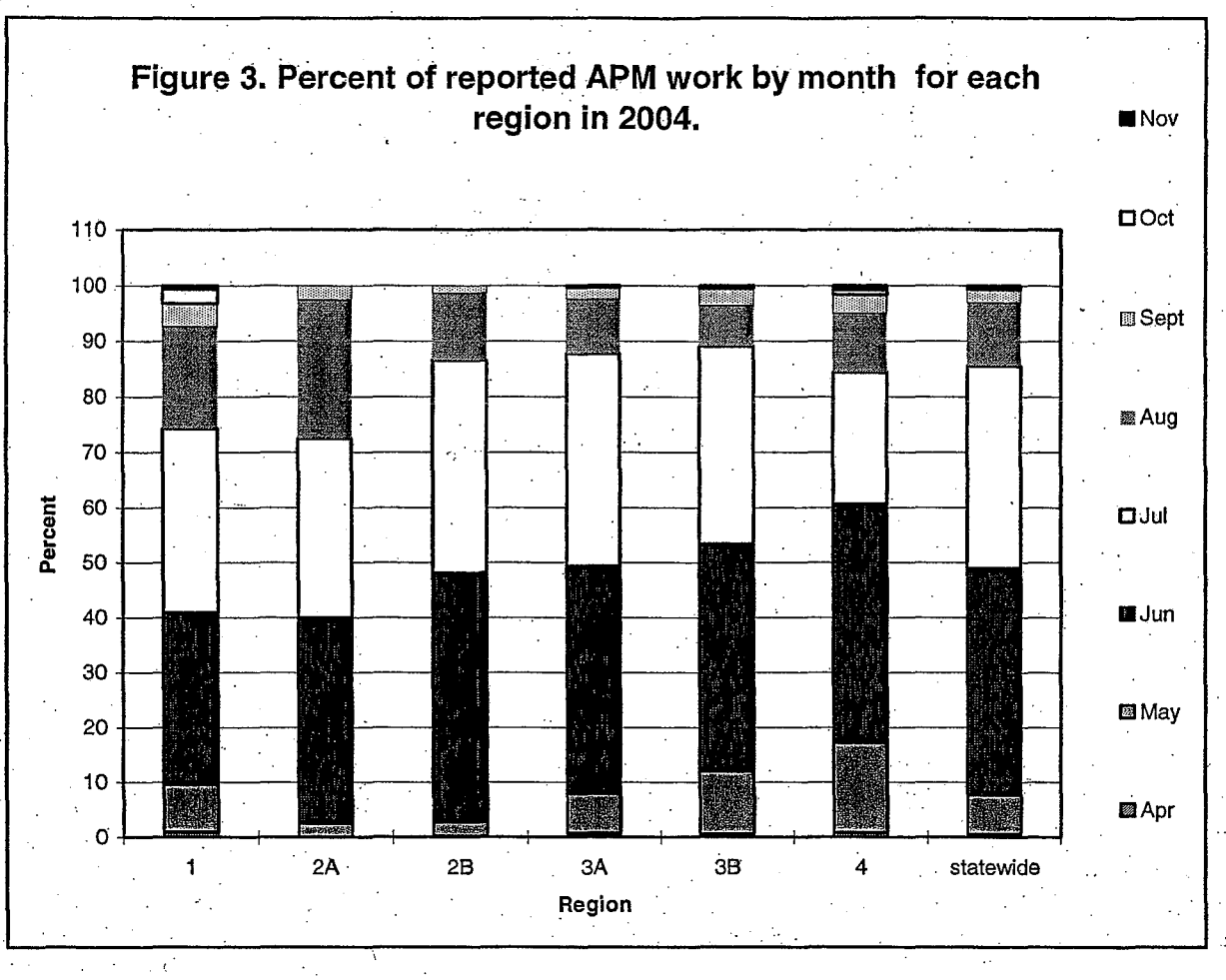
Permit Fees

The 2003 legislature passed a $15.00 permit fee increase. 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 2004 were issued under the new fee structure.

Revenues in 2004 were $261,612 about $132,584 more than 2003. The average permit fee per property owner in 2003 was $12.86, in 2004 the average fee per property was $24.58. The increase in the average cost of a permit is largely due to the new fee structure. However, because a cap on permit fees was retained in the fee structure there is still economy of scale for large group permits, hence the statewide average cost per property was about $24.50 in 2004, $10.00 less than the cost of an individual permit under the new fee structure.

Timing of Treatment

Permits are issued for the open water season, generally from May through September 1st. However, aquatic plant control can begin as early as January and extend through November. In 2004, about 92% of the permitted work, reported statewide, was completed in June, July, and August (Figure 3). Because most aquatic plant control in Minnesota is recreationally motivated this pattern has been consistent over time.

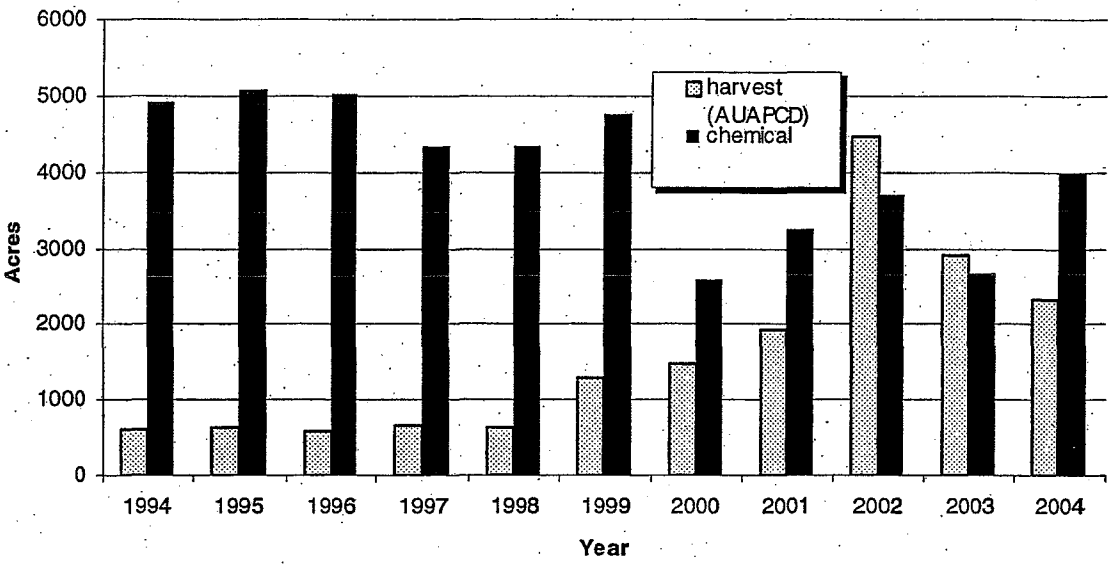


2A = Grand Rapids, NE Region
2B = Brainerd, NE Region
3A = St. Paul, Central Region
3B = Little Falls, Central Region

Permit Acreage

The number of acres permitted for submerged aquatic plant control (both chemical and mechanical methods) has fluctuated annually since 1994 (Figure 4). There appears to be no discernable pattern, which may mean that aquatic plant control is highly variable depending on the season. Central Region has many lakes where exotic plants are the focus of APM efforts. A few large Eurasian watermilfoil and curly-leaf pondweed treatments more or less could have a significant influence on the total number of permitted acres. The permitted acreage in 2004 is greater than the permitted acreage in 2003. However, it appears as though harvesting of aquatic vegetation, as a method of aquatic plant control, has gained in popularity over the last five or six years.

Figure 4. Permitted control acreage for submerged vegetation harvest* and chemical statewide from 1994-2004.



*Includes AUAPCD acreage for submerged vegetation control

Table 2. Total near shore area permitted, in acres, by region, for control of submerged vegetation, swimmer's itch and AUAPCD use 2004.

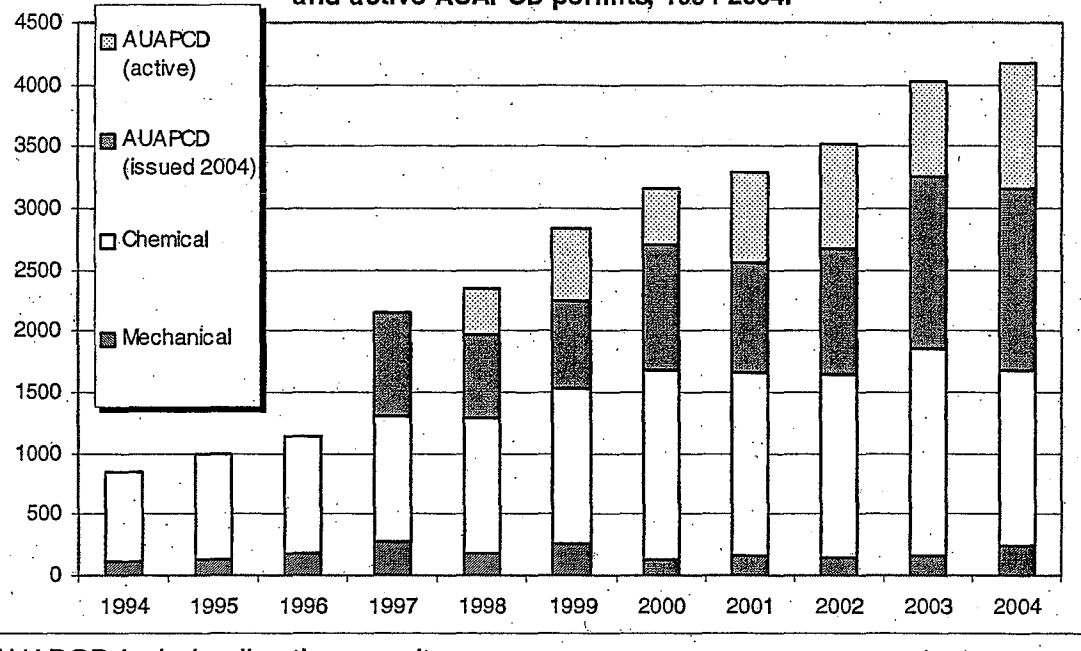
Control	Region						Total number of acres	Props	Ave. Acres/ Prop.
	1	2A	2B	3A	3B	4			
Herbicide control excluding open water treatment	47.44	1.36	82.06	845.49	256.87	58.04	1,291.26	5,592	0.23
Mechanical control excluding open water removal	5.70	.17	26.62	15.73	4.05	21.40	73.57	454	0.16
Swimmer's Itch control	37.23	3.00	79.68	1,093.66	256.89	188.45	1,659.19	5,800	0.29
AUAPCD use	62.49	0.27	28.51	51.40	19.57	1.26	163.50	1,493	0.11

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

In 2004, about 47% of all permits issued for aquatic plant control permitted the use of plant removal with AUAPCD's. Herbicide treatments and harvesting, including hand removal, accounted for the remaining 53% of the permitted aquatic plant management activity (Figure 5). 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 2004 are found above in Table 2.

Figure 5. Numbers of permits issued for submerged vegetation control and active AUAPCD permits, 1994-2004.



*AUAPCD include all active permits

Who Does the Permitted Aquatic Plant Removal

Each year some permits issued for aquatic plant management activities are not used (Figure 6). Statewide, 83% of permittees reported that they used their permits, compared to 74% in 2003. 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 3, below. In 2004, the reason most frequently given (45%) for not using an APM permit was that the property owner was unable to do the permitted work; 17% reported not doing the work because of getting their permit too late.

Lakeshore homeowners perform about 39% of mechanical and herbicide control permitted statewide. About 61% of the control work in 2004 was done by commercial applicator and aquatic plant harvesting companies. In 2003, commercial services performed about 59% of all permitted control work. Permit holders in the Central Region hire commercial services more frequently than any other region (Figure 7). About 82% of the control work performed in the Central Region is done by aquatic control companies. In 2004, over half of the control work was done by commercial service in the Northeast Region. However, most of the commercial treatment was done in the Brainerd Lakes Area, most permitted control in the Grand Rapids area is still done by the homeowner. In the Northwest 92% of the permitted APM work is done by the permit holder and 76% in the South Region.

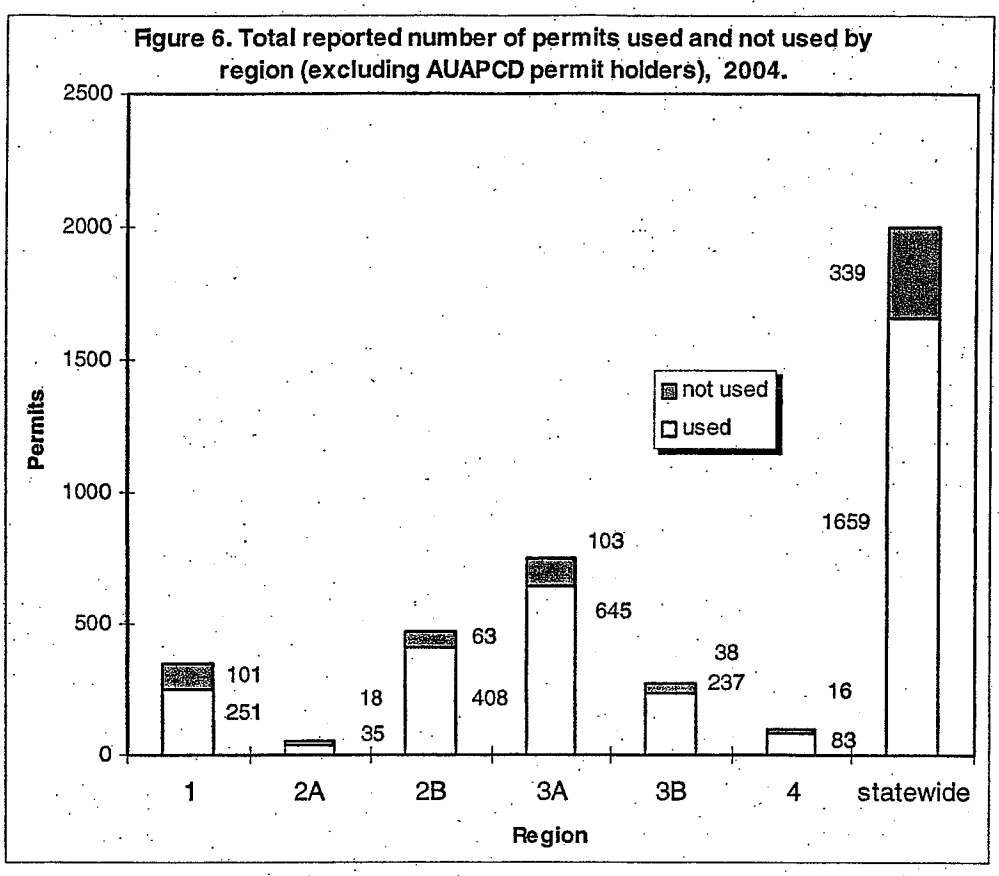


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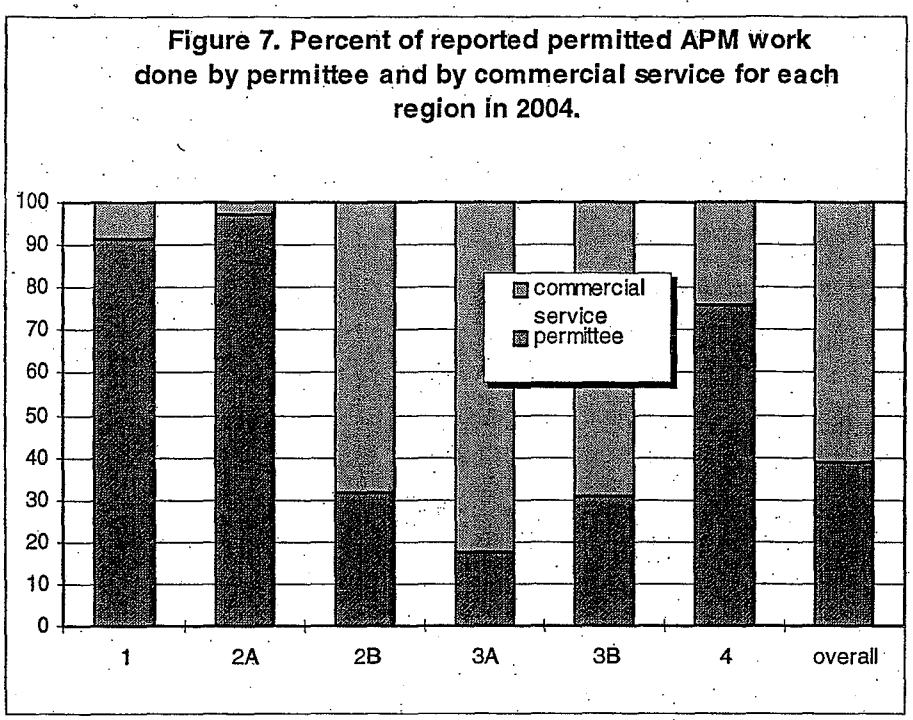
Table 3. Response to choices provided to indicate that the permit was not used and why, expressed as a percent, by region in 2004.

Region	1	2A	2B	3A	3B	4	Statewide
Nuisance condition did not develop	13	12	10	41	14	15	16
Got permit too late	20	12	15	17	14	15	17
Unable to do the work	44	59	54	28	52	23	45
Other	23	18	21	14	19	46	22
Total	100	100	100	100	100	100	100

214 permit holders who would do their own work reported not using their permit.



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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 (Table 4). About 67% of the respondents were satisfied with the results of the herbicide control. About 72% of those responding were satisfied with the results of treatments to control swimmer's itch and 71% of respondents were satisfied with results of mechanical control. It is important to remember that permit holders hiring commercial services were excluded from the survey.

Permit holders, excluding AUAPCD permittees, were asked if they would apply for a permit in 2005. Of the 863 responses, 505 (59%) said they would reapply next year an 11% decrease from 2003. The number of permittees reporting that they would not apply (31 or 3.6%) was similar to 2003. The percent of undecided permittees was up from 2003, 314 (36%) a 10 percent increase in 2004. Regardless of their response, all 2004 permit holders whose permits expire will receive reapplication materials in 2005.

Table 4. Reported satisfaction with various aquatic vegetation control options statewide, 2004.

	Yes	Not as good As expected	No
Satisfied with chemical control-			
Overall*	244	98	20
Submerged Vegetation	147	76	20
Emergent Vegetation	19	22	18
Floating Leaf Vegetation	16	22	24
Exotics	20	11	16
Swimmers Itch	86	22	12
Bog Removal	-	-	-
Satisfied with mechanical or hand control-			
Overall*	122	34	16
Submerged Vegetation	50	16	9
Emergent Vegetation	54	15	12
Floating Leaf Vegetation	17	8	6
Exotics	17	5	5
Swimmer's Itch	-	-	-
Bog Removal	13	5	6

* Surveys asked for overall control satisfaction and for individual vegetation types
Tabulated from 644 permittees who reported doing their own control work.
Includes both mechanical and chemical control and no AUAPCD's

Automated Untended Aquatic Plant Control Devices (AUAPCD)

Before 1997 the operation of an *automated untended aquatic plant control device* (like the Crary WeedRoller®) in public waters 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 2004, there were 1,477 permits issued for these devices statewide. Of those permits 954 were issued for a one-year term and 523 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 79 percent of the AUAPCD permits were issued in the Northwest and Northeast Regions. In addition to the permits issued in 2004, there are active three-year permits issued in 2002 and 2003 (414 and 594 respectively). Of the 1,481 surveys mailed 1,349 (91%) of the AUAPCD permit holders statewide responded to the questionnaire. Three year AUAPCD permit holders issued permits in 2002 and 2003 were not surveyed.

There are at least three different companies producing AUAPCD's that are used in Minnesota, the Crary Company WeedRoller®, the Colman Beach Groomer and the Lake Restoration Lake Sweeper. Nearly half of AUAPCD owners in Minnesota have owned their device for more than 3 years (445 or 45% of the respondents). Only 273 have owned their device from 1 to 3 years and 281 people responded that they have owned their device for less than one year.

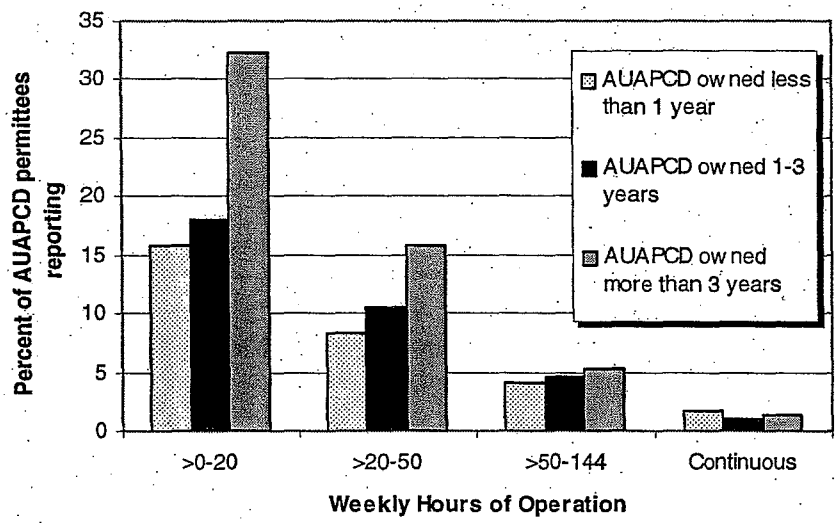
Most of the people responding to our questionnaire (83%) own their AUAPCD. In 2004, seven claimed to have rented the device (eight in 2003). Some homeowners opt to purchase the device cooperatively and share it during the summer months. Approximately 16% of the people who used an AUAPCD in 2004 either, borrowed, own and share, or jointly own their AUAPCD, the same as in 2003.

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 8). About 150 persons permitted to operate an AUAPCD stated that, for various reasons, they did not operate the device in 2004. It will remain to be seen if this trend continues as other types of automated plant control devices become more popular.

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 was nearly the same as reported in 2003.

The DNR sends AUAPCD permit holders a sticker to help identify permitted units. Beginning in 2000 use of the sticker became a mandatory condition of the permit. About 97% of the permit holders responding to this question had no difficulties displaying the sticker.

Figure 8. AUAPCD use from May through September, 2004 catagorized by length of ownership expressed as a percent of all AUAPCD permittees reporting.*



* Only permittees issued permits in 2004 were surveyed

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 two, non-native invasive aquatic plants: purple loosestrife and Eurasian watermilfoil. These programs activities are summarized below:

Purple Loosestrife Program

Purple loosestrife, an exotic 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 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 exotic. 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 prioritized for control.
- Carry out management activities including chemical and biological control.
- Support research to evaluate and expand biocontrol 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 2004 DNR staff treated a total of 39 purple loosestrife sites with Rodeo herbicide. Most of these sites were very small with the majority having fewer than 100 plants. In 2004, 0.58 gallons of Rodeo was used to control small infestations of purple loosestrife. The total cost for the herbicide control effort was $9,400.00. For more detailed information on Minnesota's purple loosestrife program see the 2004 Invasive Species Annual Program report.

Eurasian Watermilfoil Program

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 lake associations and local units of government to manage problems caused by milfoil.
- Maintain an accurate inventory of populations.
- Investigate new methods for control and the biology of the 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

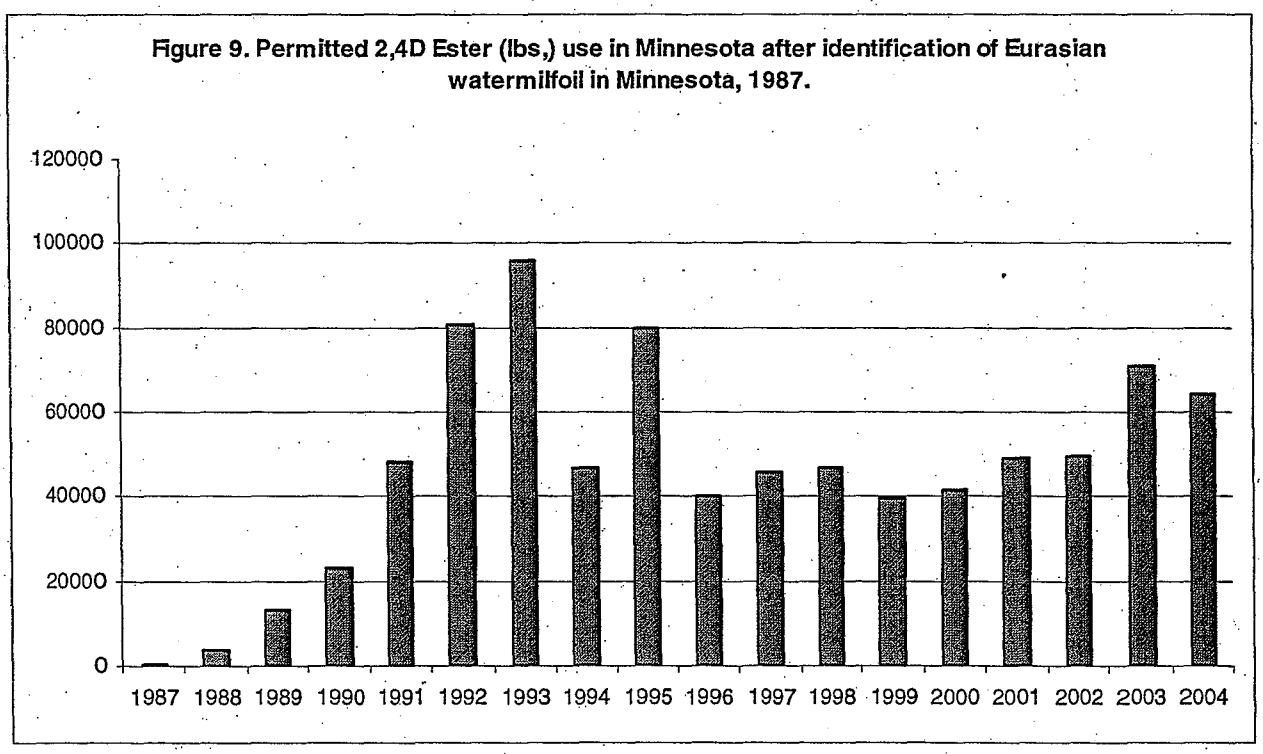
salt, triclopyr product, was registered for aquatic use and is available for control of milfoil in Minnesota. These systematic herbicides are preferred because they are the most selective products available.

Eurasian watermilfoil was discovered in eight additional water bodies in 2004, including Leech Lake in Cass County. There are now 160 Minnesota known to have populations of this invasive submersed aquatic plant.

In 2004, the DNR provided $106,000 in state funds to cooperators on 18 lakes for management of milfoil. The DNR spent an additional $12,000 on control work at public water accesses to control Eurasian watermilfoil to help minimize its spread between lakes.

The use of 2,4-D ester products increased steadily from 1988 through 1993 to a high of more than 95,000 pounds. The total reported for 2004 was 64,100 pounds. The total reported annual use of 2,4-D ester products since 1987 is provided in Figure 9. For more detailed information on the management of invasive species see the 2004 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 9. Permitted 2,4D Ester (lbs,) use in Minnesota after identification of Eurasian watermilfoil in Minnesota, 1987.



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)
Riverdale™ (Granular)	X		2,4 Dichlorophenoxyacetic (Isooctyl Ester)
SEE 2,4-D (Liquid)	X		2,4 Dichlorophenoxyacetic (Isooctyl Ester)
Weedtrine II (Granular)	X		2,4 Dichlorophenoxyacetic (Isooctyl Ester)
Sonar™ (Liquid or Granular)		X	Fluridone
Rodeo (Liquid)		X	Isopropylamine salt of Glyphosate
Pondmaster (Liquid)		X	Isopropylamine salt of Glyphosate
Garlon-3A		X	Triclopyr
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
K-Tea	X (A)		Copper-Triethanolamine complex
Part 4. Other.			
Copper sulfate	X (A)		CuSO4 (wide variety of registered brands)
Aquashade (Liquid)		X	Acid Blue 9 / Acid Yellow 23 (Filters light in wavelengths required for plant growth)

Table B. Reported various aquatic herbicide use statewide, 1981-2004.

Year	2,4-D Ester lbs.	2,4-D Salt lbs.	Aquathol lbs.	Aquathol gal.	Diquat (Reward) gal.	Hydrothol 191 lbs.	Hydrothol 191 gal.	Copper Sulfate lbs.
1981	150	370	1,900	1,300	730	3,200	390	*
1982	120	320	1,700	1,500	550	4,200	44	*
1983	-	350	1,400	1,500	560	11,900	31	*
1984	110	130	730	980	780	7,300	80	*
1985	25	270	740	1,200	870	14,000	100	*
1986	25	370	1,100	1,400	1,200	6,900	170	*
1987	100	1,400	1,100	1,400	1,400	13,000	62	*
1988	3,700	600	950	1,300	1,300	11,000	100	*
1989	13,000	470	910	1,300	1,700	12,000	200	*
1990	23,000	290	680	1,100	1,500	9,500	130	*
1991	48,000	1,300	1,400	850	1,400	9,600	210	55,400
1992	81,000	320	870	1,600	1,700	9,000	67	64,000
1993	96,000	400	830	1,000	1,600	5,000	240	34,600
1994	45,000	700	710	940	1,800	10,000	510	59,800
1995	80,000	87	930	700	2,300	8,300	420	55,000
1996	39,000	400	1,000	730	1,900	8,900	830	32,500
1997	46,000	290	1,200	700	2,400	7,800	820	39,700
1998	47,000	440	790	1,280	2,580	4,460	670	50,000
1999	39,800	650	1,050	740	2,280	4,190	740	31,600
2000	41,500	700	1,380	1,850	2,970	5,820	530	41,900
2001	49,300	1,000	700	2,600	2,700	3,900	950	58,200
2002	49,400	700	540	2,660	2,530	4,220	760	42,200
2003	71,100	634	339	2,515	2,370	7,610	429	47,100
2004	64,100	1,068	366	5,200	2,856	8,040	643	53,700

* Data not available.

860 responded **1008** mailed requests **6** returned undel **85.32% returned**

Please check the appropriate circle.

1. Was your 2004 permit used?

644 Yes, permitted work was done.

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

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

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

46 No, because: Thanks! Please use the back for comments

2. When my permit expires:

505 I will reapply for a perr **31** I will not apply for a permit. **314** I am undecided at this time.

3. The method of nuisance control was:

196 mechanical or hand removal. **438** chemical treatment. **33** mechanical and chemical treatment.

4. Were you satisfied with the control work done (check the appropriate circles)

all control allowed on the permit	all	**389** YES	**40** NO	**140**	wasn't as good as expected
	chem	**244** YES	**20** NO	**98**	wasn't as good as expected
	mech	**122** YES	**16** NO	**34**	wasn't as good as expected
	both	**17** YES	**3** NO	**8**	wasn't as good as expected
	total*	**383**	**39**	**140**	* not all that answered #4 answered #3
Or more specifically if you know.					
Submerged Vegetation		**210** YES	**30** NO	**92**	wasn't as good as expected
example pondweed, milfoil, algae, chara					
Emergent Vegetation		**79** YES	**30** NO	**37**	wasn't as good as expected
example cattails, bulrushes, wildrice					
Floating Leaf Vegetation		**36** YES	**30** NO	**30**	wasn't as good as expected
example water lilies, duckweed					
Exotics		**38** YES	**21** NO	**16**	wasn't as good as expected
example Purple Loosestrife, Eurasian Watermilfoil					
Swimmers Itch		**94** YES	**18** NO	**24**	wasn't as good as expected
example snail or leech control					
Bog Removal		**16** YES	**18** NO	**9**	wasn't as good as expected

5. When was the work done?

uncertain 33

April	May	June	July	August	Septembe	Octobe	November
9	**94**	**289**	**246**	**144**	**28**	**9**	**2**

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.

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

162 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 Did You Use? (concentrated product before mixing)		
liq. Aquathol K	**84**	**gal.**, qts., oz.	
gran.Aquathol	**350**	lbs.	
liq. Hydrothol 191		gal., qts., oz.	
gran.Hydrothol 191	**8030**	lbs.	
Reward		gal., qts., oz.	
Copper sulphate	**22407**	lbs.	
Aquacide	**1068**	lbs.	
Aquakleen/Navigate	**17000**	lbs.	
Riverdale		lbs.	
Cutrine Plus	**38**	**gal.**, qts., oz.	
SEE 2,4 D		lbs.	
Rodeo	**55**	**gal.**, qts., oz.	
other:		lbs., gal., qts., oz.	
other:		lbs., gal., qts., oz.	

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

O I have comments on the back. Please return survey by **DECEMBER 1, 2004.**

1349 responded **1481** mailed requests **12** returned undelivered

1. The type of AUAPCD device I use is a:

1100 Crary WeedRoller®
48 Lake Restoration Lake Sweeper
142 Colman Beach Groomer
5 home made
34 no check

2. I used an AUAPCD this year.

1196 Yes
153 No, I did not use an AUAPCD this year.
I'll explain on the back of this form.

3. The AUAPCD I used in 2004-
I have owned for:

281 less than 1 year
273 1 - 3 years
445 more than 3 years

is jointly owned and shared with the other co-owners and has been for:

39 less than 1 year
32 1 - 3 years
90 more than 3 years
7 was rented.
30 was borrowed.

AUAPCD survey 2004

4. How often monthly did you operate the AUAPCD you used ?

	not used	few hours >0-20	several hours >20-50	many hours >50-144	continuous
In May:	**801**	**269**	**81**	**34**	**12**
In June:	**269**	**489**	**294**	**113**	**32**
In July:	**121**	**504**	**366**	**164**	**42**
In August:	**204**	**569**	**280**	**107**	**37**
In September:	**858**	**242**	**66**	**22**	**9**

5. Were you satisfied with the AUAPCD you used?

1170 Yes
27 No

6. Did you have any problems displaying the sticker you got with your permit ? **25** Yes, please explain:

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

O I have comments on the back.

Please return survey by **DECEMBER 1, 2004.**

Table E. Aquatic Pesticide Enforcement Citizen Complaint Investigations, **2004**.

Date	Complaint	Lake Name	County	Observation	Action	Result
June 9	Possible unauthorized herbicide treatment	Prior	Scott	No field inspection	Contacted commercial applicator for spray records	No violation. Neighbors needed to be notified of application.
June 10	Fish kill due to pesticide application	Spring	Scott	on site inspection found dead crappie, sunfish and bullhead in small numbers	No fish analyzed due to state of decomposition	Fish disease likely cause of fish kill
June 17	Unauthorized herbicide treatment	Clearwater	Wright	No field inspection	Contacted commercial applicator and got a statement	Commercial applicator provided acceptable explanation
June 17	Concern over posting swimming beach following application	Mtka Excelsior Bay	Hennepin	The site was found to be properly posted.	Contacted commercial applicator for spray records	Complain tent notified of status
July 27	Unauthorized herbicide treatment	Owasso	Ramsey	field inspection found reduced plant growth, turbid water	Plant samples analyzed for fluridone	Tests negative turbid water likely reduced light to plants
June 1	Loss of emergent plants	Hammal	Aitkin	A field inspection in fall of 2003 found no emergent plants around new dock.	Advised CO to issue a cease in desist in 2003.	Cease and desist rescinded in 2004 due to lack of evidence.
July 13	Fish kill following a pesticide application	Horseshoe	Aitkin	Contacted area fisheries personnel who inspected site the day of the reported kill.	No evidence of pesticide misuse. Fish kill related to columnaris disease.	Case closed.

Table F. Aquatic Pesticide Enforcement Use Inspections, 2004.

Treatment Date	County	Lake	Applicator	Number of Treatments Inspected
May 8	Hennepin	Medicine	Lake Restoration	1
May 10	Hennepin	Medicine	Lake Restoration	1
May 18	Hennepin	Bass	Lake Management	2
May 24	Hennepin	Sarah	Lake Restoration	2
May 27	Ramsey	Bald Eagle	Midwest Aquacare	2
May 27	Ramsey	Silver (nsp)	Lake Management	2
June 6	Hennepin	Eagle	Lake Restoration	2
June 6	Washington	Forest	Lake Management	2
June 4	Ramsey	Owasso	Lake Management	2
June 8	Ramsey	Gervais	Lake Improvement	2
June 14	Chisago	Green	Lake Restoration	2
June 15	Washington	Long	Permit holder	1
June 16	Hennepin	Mtka Grays	Midwest AquaCare	2
June 17	Washington	Bone	Lake Management	1
June 17	Washington	Big Marine	Lake Management	2
June 23	Washington	White Bear	Lake Restoration	1
June 23	Washington	Sunnybrook	Lake Management	2
July 7	Ramsey	Bald Eagle	Lake Restoration	2
July 7	Chisago	South Center	Lake Restoration	2
July 8	Carver	Riley	Lake Restoration	2
July 12	Hennepin	Mike Gideons	Lake Management	2
July 13	Ramsey	Silver (nsp)	Aquatic Engineering, Inc.	2
July 14	Scott	Prior	Lake Management	2
July 15	Ramsey	Silver (nsp)	Lake Management	2
July 19	Todd	Big Birch	Professional Lake Management	2
July 22	Washington	Big Marine	Lake Management	2
July 23	Washington	Sunnybrook	Lake Management	2
July 26	Washington	White Bear	Lake Restoration	2
July 27	Carver	Pierson	Lake Management	2

Table F. (Continued)

Treatment Date	County	Lake	Applicator	Number of Treatments Inspected
August 3	Hubbard	Portage	Professional Lake Management	2
August 5	Washington	Big Marine	Lake Management	2
August 3	Hubbard	Portage	Professional Lake Management	2
August 5	Washington	Big Marine	Lake Management	2
May 17	Crow Wing	Mayo	Permit holder	1
June 2	Big Toad	Becker	Professional Lake Management	1
June 14	Ossawinamakkee	Crow Wing	Lake Restoration	1
July 28	Leech	Cass	Lake Management	5
August 5	Mille Lacs	Mille Lacs	Lake Restoration	8

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