THE IMPACT OF AGRICULTURE ON NONPOINT SOURCE POLLUTION

Report to the 120th Maine Legislature
Joint Standing Committee on Agriculture, Conservation and Forestry
Prepared by:
Maine Department of Agriculture, Food and Rural Resources
In cooperation with
Maine Department of Environmental Protection

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EXECUTIVE SUMMARY

This report is being presented to the Maine Legislature, Committee on Agriculture, Conservation and Forestry in fulfillment of the requirement set out in legislation in 1998. It describes the status of nonpoint source pollution associated with agriculture and the activities that have been undertaken since 1998 to address this issue. It focuses on three aspects of nonpoint source pollution identified by the Legislature as being of particular concern. These are nutrients, livestock in water and erosion.

Much of the effort to address nonpoint source pollution from agriculture is based on the adoption of best management practices (BMPs) by farms. Overall, there is a general impression that the use of BMPs can be effective and that there has been an improvement in BMP adoption rates. Many new programs and activities have been undertaken since the 1998 report to encourage the adoption of BMPs and there are a number success stories to suggest that these efforts are working. There is, however, no current measurement of the level of adoption of BMPs industry wide and there has been only a limited correlation made between level of adoption of BMPs and measurements of water quality. The only data on the impact of agicultural practices on water quality in streams are for watersheds with known water quality impairments. Recommendations based on these findings include:

-A survey similar to one carried out in 1996-97 by the University of Maine Cooperative Extension should be conducted to determine the changes in BMP adoption rates since that time.

-Stream assessments should be undertaken in a variety of agricultural watersheds, not just those with known water quality impairment. They should include assessment of water quality, the amount and type of agriculture in the watershed and an assessment of the types of practices being implemented. The information should be used to support the goals of the State's Nonpoint Source Strategy.

-Funding for these projects should be from federal nonpoint source funds, if sufficient funding is available.

INTRODUCTION

In January, 1998 the Maine Department of Environmental Protection (DEP) presented a report to the Joint Standing Committee on Natural Resources of the 118th Legislature entitled "Nonpoint Source Pollution Existing Sources". In that report, they examined four existing source categories: developed areas, roads, forestry and agriculture. The agricultural section identified pesticide application, erosion, livestock in water and nutrients from concentrated animal feeding operations (CAFOs), livestock grazing and land application of manure as major concerns. Of

these areas of concern, only the pesticides issue was considered to be adequately addressed. Several measures were suggested for addressing the other agricultural areas of concern. (Many of these suggested measures have been implemented since the report by the Department of Agriculture, Food and Rural Resources (DAFRR) in cooperation with other organizations.)

After reviewing the above report, the Legislature identified areas of focus and charged the Departments (DAFRR and DEP) to report back on the progress made in the following agricultural NPS areas:
- Nutrients
- Livestock in Water
- Erosion

Specifically, the charge from the Legislature said,
"Sec. 10. Report; nonpoint source pollution. By January 15, 2001, the Department of Agriculture, Food and Rural Resources shall develop a report, in cooperation with the Department of Environmental Protection, on the impact of agriculture on nonpoint source pollution. The report must include the following: an evaluation of progress made by farmers in implementing best management practices to eliminate access by livestock to streams or lakes for drinking water; an evaluation of practices to reduce soil erosion from cropland; and an evaluation of best management practices to reduce the runoff of nutrients from farmland. The evaluations must be based on the best information available and research as funds allow. This report must be submitted to the joint standing committees of the Legislature having jurisdiction over natural resources matters and agriculture matters by the Land and Water Council after review by the council."

This report is being presented to fulfill that requirement.

Report content and preparation

This report was prepared jointly by DAFRR and DEP. DEP provided information on water quality studies and on the nonpoint source control program 15 year strategy. DAFRR provided information on the implementation activities that have taken place since the original 1998 report to the Legislature. The recommendations were developed cooperatively by the two agencies.

The report contains information on the long term NPS strategy for agriculture, documented impacts of agricultural activities on water quality, the adoption and effectiveness of best management practices (BMPs), efforts that are now being made to increase adoption of BMPs and recommendations for additional activities.

THE NPS STRATEGY RE: AGRICULTURE

Agriculture is addressed in the "Maine Nonpoint Source Control Program: Program Upgrade And 15 Year Strategy" which was prepared by the Maine Department of Environmental Protection and adopted by the Land and Water Resources Council on 9/23/99. In that strategy, a number of short term and long term goals were established and action steps were outlined. The goals were primarily directed at the adoption of site specific best management practices (BMPs) by farms and the implementation of the Nutrient Management Law. The goals for the adoption of specific BMPs were 50% adoption by 2005; 70% by 2010 and 90% by 2015, based on a survey of farm operations. The goals for implementation of the Nutrient Management Law were:

"By 2015, all "farms requiring a nutrient management plan will use practices described in a site-specific nutrient management plan for their farm to manage nutrients."

"By 2005, all "farms requiring a nutrient management plan" will be on schedule with the applicable compliance dates as specified in 7 M.R.S.A. § 4204; and all livestock operations subject to permit requirements will conduct operations in accordance with a Maine Livestock Operations Permit."

The Maine Department of Agriculture is working toward meeting these goals, but has no on-going method to accurately assess progress in adoption of additional BMPs. A survey of farm operations similar to one conducted in 1996 by the University of Maine Cooperative Extension and DAFRR will be needed periodically to determine how well these goals are being met.

IMPACT OF AGRICULTURE ON WATER QUALITY

Data on Agricultural NPS Impacts

Some knowledge of water quality impacts from agricultural activity in Maine has been gained from watershed assessments of impaired water bodies. The focus on most of these projects has been the water quality of a lake or pond (see Appendix 1 for a list of impaired lakes, including causes of impairment). A few have focused on water quality impact to small streams. While there has been some effort to document water quality impacts to larger streams, those efforts have largely focused on point source discharges.

A number of water bodies have been studied with the intent of remediating agriculture sources impacting water quality (see Table 1 for a list of projects designed to abate NPS pollution from agriculture). A number of these have included diagnostic studies to estimate the relative impact of agriculture.

Table 1. Location of NPS Abatement Projects with Data on Agriculture

A. Lakes

Project Date	**Location**	**Waterbody**	**Agriculture in watershed**
2000	Newport	Sebasticook Lake	Crops/dairy
2000	Waldoboro	Duckpuddle Pond	Dairy
1998	Manchester	Carlton Pond	Dairy
1995	Aroostook Co.	Long and Cross Lakes	Crops
1984	Albion	Lovejoy Pond	Dairy
1984	Belgrade	Salmon Lake	Dairy

B. Streams

Project Date	**Location**	**Waterbody**	**Agriculture in watershed**
2000	Fairfield	Fish Brook	Cattle
1999	Aroostook Co.	Dudley Brook	Crops
	Levant,Garland	Kenduskeag St. (French St.)	Dairy
1997	Monmouth	Jock Stream	Dairy

Long and Cross Lakes in the St. John Valley of Aroostook County exhibited chronic algae blooms. Watershed survey data and modeling determined agricultural runoff to be the main source of phosphorus and sediments in the watersheds (Bouchard, Higgins & Rock, 1995).

Salmon Lake in the Belgrade Lakes region has impaired water quality due to high phosphorus concentrations. A study in that watershed determined that one large dairy farm that comprised 1% of the watershed contributed 25% of the phosphorus load (Nichols, Sowles & Lobao, 1984). Similary, Sebasticook Lake has high phosphorus levels, which led to a Total Maximum Daily Load study to determine estimated phosphorus export in the watershed by land use class. Historically, Sebasticook Lake has been significantly impacted by wastewater treatment plant discharges (point sources). However, with removal of the Corinna and Dexter treatment plant discharges, nonpoint source contributions, particularly from agriculture, are now the major concern. Agriculture (principally row crops and hay) makes up 19% of the watershed, but exports approximately 67% of total phosphorus to the lake based on phosphorus-export modeling (Halliwell, 2000).

Jock Stream is a tributary to Cobbossee Lake, a severely impaired lake in central Maine, suffering algal blooms due to high phosphorus concentrations. In 1977-1980, The Cobbossee Watershed District conducted extensive monitoring on Jock Stream, which has 29% of its 15 square mile watershed in agricultural use. Jock Stream was found to contribute up to 40% of Cobbossee Lake's annual phosphorus load (Dennis and Sage, 1981). Winter spreading of manure was assessed as a major contributor to the high loading of phosphorus.

During the period of the earlier study, a number of agricultural Best Management Practices were installed in the watershed. In addition, there had been changes in land use, herd sizes, farm management and ownership since the 1970's. To find out how these changes had affected phosphorus loading from agriculture, follow up studies of the Cobbossee Lake and Jock Stream watersheds were conducted in the 1990's. These studies showed that while declining, agriculture is still estimated to be the largest contributor of phosphorus. (Dennis, 1997). Farm surveys and water quality monitoring of Jock Stream in 1992 confirmed that agricultural activity was the major source of phosphorus (Dennis, McPhedran and Monagle, 1995). Contributors of agricultural NPS pollution, based on the surveys included:

- manure runoff from spreading corn land in early spring or hay land in late fall or early spring;
- manure runoff from winter spreading;
- manure runoff from inadequate storage facilities;
- livestock using streams; and
- barnyard and pasture runoff

Dudley Brook in Aroostook County was also selected for study. While designated Class B, Dudley Brook watershed is largely agricultural with 60-75% cropland in a potato and grain rotation. Management of these crops involves application of large amounts of herbicides and pesticides. Monitoring on Dudley Brook reveals that it does not meet standards for aquatic life. Pattee Brook, another stream of similar size and habitat structure in Aroostook County, has less agriculture in the watershed and is meeting Class B standards (Davies, Tsomides, DiFranco & Courtemanch, 1999).

On Kenduskeag Stream, the Penobscot County Soil and Water Conservation District conducted a livestock exclusion project in 1990-91. The project demonstrated the benefit of improved water quality from installation of fencing and restoration of stream banks. Sampling after rainfall runoff events at seven sites demonstrated significant reduction of fecal coliform bacteria levels from three sites with total livestock exclusion compared to three sites without exclusion practices (Penobscot County Soil & Water Conservation District, 1991).

Fish Brook in Fairfield is another small stream studied because of known water quality impairment. The stream receives runoff from a 500-head cattle feedlot and over-wintering area, uncontained hog manure storage and extensive pasture on one farm, as well as smaller impacts from several smaller farms. Cattle have access to approximately 1,000 feet of the stream. Monitoring of the stream has occurred above and below the cattle farm. Preliminary findings of impairments include low dissolved oxygen levels, higher water temperature, high nutrient and bacteria levels and loss of aquatic habitat (Dennis, 2000 unpublished).

Discussion

Generally, the impetus for doing an NPS study that includes an assessment of agricultural impacts has been to find and fix an existing water quality problem. On lakes, the problem has typically been documentation of blue-green algae blooms or measurements of an increasing trophic state. These assessments have generally looked at all contributing land uses and "natural" factors such as precipitation in order to place various sources in perspective and allow some understanding of where remediation efforts should be focused. Where water quality problems have been identified in watersheds with agricultural activity, farm surveys and water quality monitoring have provided evidence that agriculture has been a major contributor. However, while data shows that some agricultural practices have been major contributors of NPS pollution, information is lacking to allow a broad assessment of how agriculture in general impacts water quality in Maine. To make such a determination, further data is needed, based on agricultural activity in a number of watersheds, not just those with known water quality impairments.

USE OF BEST MANAGEMENT PRACTICES IN AGRICULTURE

The cornerstone of the effort to control nonpoint pollution from agriculture is the implementation of Best Management Practices (BMPs) on farms. To determine the effectiveness of this approach it is necessary to answer two questions. One is how effective are BMPs in reducing pollution or in protecting water resources. The other is how widely have the BMPs been adopted.
Case studies of watersheds with impaired water quality have demonstrated that the implementation of certain agricultural BMPs can be effective. The nonpoint source 15 year strategy report gave several examples of projects where the effectiveness of BMPs was documented. Three such case studies that address the three areas of concern are described below.

Effectiveness of BMPs, Case Studies

Nutrient Management BMPs

Twenty-five Mile Stream (Unity Pond) Watershed Project: 1991-95. Unity Pond (Class GPA) and the Sebasticook River (Class C) at the confluence of 25 Mile Stream are both non-attainment waters. The NRCS, Waldo County Soil and Water Conservation District,

Cooperative Extension Service, and Unity College collaborated to reduce watershed sediment and phosphorus export to the Twenty-five Mile Stream watershed including Unity Pond. Section 319 funding supported the water quality monitoring and nutrient management planning. BMPs adopted included: 12 manure storage facilities; nutrient management plans prepared and implemented involving 10,000 acres of corn, grass and pasture land, including 5000 acres of corn cropland placed in rotations with grass and legumes; virtual elimination of winter manure spreading; 9000 feet of stream bank protection involving 7 livestock exclusion fencing sites; and private camp road and stream crossing BMPs. These improvements in land management were associated with a measured decrease in total phosphorus concentrations in streams based on pre- and post-implementation sampling conducted in 1988-89 and 1994-95.

Erosion Control BMPs

Silver Spring Brook Watershed. 1997 to 1999. The Limestone Water District and the Town of Limestone joined together to work with private landowners to reduce NPS pollution affecting the town water supply, Silver Spring Brook. Prior to the 319 project, the raw water had failed to meet EPA turbidity requirements. Although portions of the project were only just completed, the District has already seen reduction in source water turbidity levels. Installed BMPs include farm access road reshaping, ditching and stream crossings, and cropland water diversion ditches. In addition, highly erodable lands adjacent to the stream have been enrolled in the USDA's Cropland Reserve Program and riparian buffers have been protected or installed.

Livestock Exclusion BMPs

1990-91 Kenduskeag Stream. Livestock exclusion fencing BMPs demonstrated physical revegetation and restoration of stream banks. Four sampling events taken after rainfall runoff events at seven sites demonstrated significant reduction of fecal coliform bacteria levels from three sites with total livestock exclusion compared to three sites in Kenduskeag Stream without livestock exclusion.

The results reported in the above studies all suggest that the implementation of BMPs can be effective in controlling the transport of soil into water bodies, reducing the movement of nutrients from cropland to water and reducing the impact of livestock on stream quality. These studies, however, do not indicate which BMPs are most effective in what situations or the overall level of water quality changes that might be achieved by implementing them. A more comprehensive study of agricultural watersheds with varying levels of water quality and varying levels of BMP usage in different commodity production systems would be needed to document the overall impact of BMP use on water quality.

Adoption of BMPs, 1996 Survey of Potato and Dairy Farms

A survey of 80 dairy farms and 80 potato farms was conducted by the University of Maine Cooperative Extension (UMCE) in 1996 to determine the level of adoption of a list of specific best management practices. (Jemison, 1997) The surveys asked about BMPs in four general categories. These were sediment BMPs, pesticide BMPs, manure BMPs and nutrient BMPs. Of these, the sediment, manure and nutrient BMPs are relevant to this report. Appendix 2 contains summary tables of the adoption rates for a number of specific BMPs in each of these categories.

The overall impression from this data is that most farms (over 90%) in these two industries have adopted some BMPs that are designed to protect ground or surface water. A closer look at the

data shows that the adoption rate for specific BMPs by farms, where they apply, ranges from 13% to 99%. Both potato and dairy operations had high adoption rates for certain sediment control BMPs including planting across the slope, using buffer strips and stabilizing eroding ditches. (See Table A2.1.) They both had relatively low adoption rates for other sediment control BMPs including strip cropping and fall planted cover crops. Reduced tillage and crop rotations were sediment control BMPs that had been adopted widely by potato producers but not by dairy farms. Controlling livestock access to streams was only done by 39% of the dairy farms to which the practice would apply.

Manure management BMPs that have been used extensively by dairy farmers include reducing application rates in critical areas and incorporating manure. (See Table A2.2.) About 70% of the dairy farms reported no application of manure on frozen ground and using a manure management plan. This latter finding, however, was contradicted by the reports that only 23% calibrate their manure spreader and only 26% had ever had their manure tested. Both actions would be necessary to adequately implement a manure (nutrient) management plan by today's standards. Only 40% reported avoiding spreading manure over ledge outcrops.

Nutrient BMPs adopted widely by both farm types included using soil tests, basing application rates on realistic yield goals, avoiding fall application and using buffer strips. (See Table A2.3.) Those BMPs that have not been widely adopted by either group include using plant tissue testing and using cover crops. A surprisingly small proportion of dairy farms (23%) reported keeping records of fertilizer use.

From these examples, it is clear that at the time of the survey (which was prior to the passage of the Nutrient Management Law), many farms had adopted a number of practices to help protect ground and surface water. There were also a number of practices that would be required under today's standards but were not in widespread use at that time. A considerable amount of work has taken place since the survey in 1996 to increase the adoption of BMPs, but there is no recent data to indicate just what changes in the adoption rates have occurred. In addition, the 1996 survey only addressed two of the major industries due to a limitation on available funding for the study. The adoption of BMPs among other industries such as blueberries, apples, vegetables and the other livestock industries has not been studied.

Efforts to increase the adoption of BMPs:

The effort to increase the adoption of BMPs has been a multifaceted team approach. The Maine Department of Agriculture has worked in partnership with several other agencies and with the private sector to get BMPs put in place on farms. The partners include:

USDA Natural Resource Conservation Service
University of Maine Cooperative Extension
The 16 Soil and Water Conservation Districts
Maine Department of Environmental Protection
Finance Authority of Maine
Maine Bond Bank

Each of the partners has played a vital role in implementing various programs aimed at increasing the adoption of BMPs. The following sections describe some of the activities that have taken place or are ongoing with regard to getting BMPs adopted by farms.

Nutrient Management Program

The Nutrient Management Law establishing a comprehensive Nutrient Management Program in Maine was passed in 1998. The Law has two main components around which the different initiatives of the Nutrient Management Program gravitate. The first component is the ban on winter manure spreading effective December 1 of a calendar year to March 15 of the following calendar year. This prevents spreading when the ground is snow-covered or frozen, at which time the potential for nutrients to reach waterbodies is at its greatest.

In 1999, the first year the spreading ban was in place, the Department of Agriculture received fifty requests for variances on the December 1st deadline, of which thirty were approved by the Commissioner. In 2000, six of these operations requested another variance. All of these were granted, mostly because the farmers did not have time to complete their storage facilities on time. This drastic decrease in variance requests suggests that the farming community has acted to be in compliance with the Law.

To comply with the Law, producers will need to have either constructed a manure storage facility or identified suitable stacking sites where manure can be stored until it can be spread.. These requirements have placed a significant financial burden on some Maine farmers. For this reason, the Department of Agriculture helped develop a $2.5 million Nutrient Management Grant Program and a $6 million Nutrient Management Loan Program, intended to help farm operations comply with the Nutrient Management Law.

The Nutrient Management Grant Program funds were appropriated by the 119th Legislature. A total of $2.5 Million was placed in a dedicated non-lapsing account, to facilitate the construction of new or retrofitting of existing manure storage and handling facilities on Maine's farms. An estimated 600 applications were distributed with the help of NRCS, the SWCD offices and other agricultural organizations. Approximately 145 applications totalling close to $7.3 million were submitted by the December 15, 2000 deadline. These applications will be reviewed and prioritized by the Nutrient Management Review Board. The Department of Agriculture expects to have all $2.5 Million committed to projects in the Spring of 2001 and has requested that the Legislature authorize a bond issue for an additional $5 Million to help meet some of the estimated $32 million total cost of bringing all farm operations into compliance with the law.

A separate Nutrient Management Loan Program also makes available to the farmers a total of $6 million for financing the construction or improvement of manure and milk room waste containment and handling facilities and associated costs. The Department of Agriculture is working in collaboration with DEP, the Maine Bond Bank and the Finance Authority of Maine (FAME) to deliver this program to farmers. FAME administers the Loan Program using funds provided from the State Revolving Loan Fund, made available by DEP. The Program offers a low interest rate loan (3%) for a maximum loan of $350,000. There are currently five (5) closed applications for a total of $490,287. Five (5) other applications are currently in the works for a total of $583,492. About 18% of the total funds are or will soon be utilized, leaving about $4.9 million available for additional projects. Future increased awareness of the Loan Program will likely lead more farmers to take advantage of this opportunity.

The second key element of the Nutrient Management Law is mandatory Nutrient Management Plans. A Nutrient Management Plan is a management tool designed to evaluate the amount of nutrients needed compared to those available on a farm.. The Plan also includes setbacks from

sensitive resources and existing uses, erosion control BMPs and provisions for manure storage for a minimum of 180 days production of manure.

A farm operation is required by legislation to develop and implement a Nutrient Management Plan if:

- the farm confines and feeds 50 animal units or more at any one time;
- the farm utilizes more than 100 tons of manure per year, not generated on that farm;
- the farm is the subject of a verified complaint of improper manure handling (i.e. checked and confirmed by the Department of Agriculture) or
- the farm stores or utilizes regulated residuals

Nutrient Management Plans for most farms must be completed and approved by January 1, 2001, and the farmers have until October 1, 2007 to fully implement them. This time span between development of a plan and full implementation allows farmers to arrange financing, buy equipment and build or upgrade storage and handling systems that may be needed to implement the plan. It is expected that those parts of the plans that do not require structural changes or major investments will be implemented as soon as the plan is approved.

The development and implementation of nutrient management plans will result in more effective use of nutrients, including manure, on agricultural land, thus reducing nonpoint source pollution associated with agricultural operations and its impact on water quality.

Finally, in addition to the two core provisions outlined above, the Nutrient management Law also:

- Establishes a Nutrient Management Review Board whose duties include approving rule changes, hearing appeals on permit or certification decisions made by the Commissioner of agriculture and making recommendations to the Commissioner on issues pertaining to nutrient management. There are 7 Board members, representing different aspects of the agricultural community and the public.
- Requires that livestock operations obtain a Livestock Operation Permit from the Department of Agriculture if:
    - The operation is new with greater than 300 animal units or expanding to greater than 300 animal units
    - The operation meets the EPA definition of a Concentrated Animal Feeding Operation (CAFO) or is defined as one by the Department of Agriculture.
    - The operation plans on expanding beyond its land base or manure storage capacity.

Soil and Water Conservation Districts and NRCS Activities

While the Department of Agriculture has taken the primary role in addressing nutrient management on Maine farms, the activities relating to the control of erosion have been largely the result of work by the 16 Soil and Water Conservation Districts(SWCDs) and the associated staff of the USDA's Natural Resources Conservation Service (NRCS). These two entities have also taken on significant roles in providing technical assistance to farmers trying to comply with the Nutrient Management Law.

There are currently no ongoing statistics to show how many total acres are being treated or planned for treatment to control NPS pollution by the SWCD's. The last year such statistics were kept was 1995. There were 10,754 cooperators (includes non-agricultural and agricultural land owners) that year with 1,912,177 acres covered by conservation plans of which 126,200

acres were for highly erodable land. Statistics are available however, to show their activity for 1999 and 2000 (October 1 – September 30). For those two years, there were:

a. A total of 109,081 acres either had conservation measures applied on them or had plans drawn up for conservation measures.
b. Of the 109,081 acres shown above, a total of 40,820 were for Nutrient Management Systems. There was a 19 percent increase in the number of acres from 1999 to 2000, which reflects the acknowledgement of the Nutrient Management Law.
c. There were 32,675 feet (864 acres) of buffers. The fiscal year 2000 saw a 437 percent increase in this category.
d. A total of 18,973 acres were treated or planned for erosion control (about equal amounts each year). For the year 2000, this is estimated to prevent 158,049 tons of soil from eroding and becoming an off-site pollutant.
e. There were 25,174 acres treated or planned for pest management (integrated pest management) control.

It should be noted that these statistics do not reflect work done any other year but 1999 and 2000. It also does not reflect work done by private consultants, chemical nutrient suppliers or consultants working for biosolids producers.

Most of the cropland that does not fall into one of the categories requiring a nutrient management plan is in Aroostook County. Based upon conversations with NRCS personnel in Aroostook County, it is estimated that 90 – 95 percent of the farmers are following some sort of a conservation plan in order to stay competitive. They are required to follow a plan if they want to participate in any NRCS or Farm Service Agency benefit programs including EQIP, Cost Share, Loans, Commodity payments, or Disaster payments. Benefits may be denied or forfeited if they are found to be out of compliance.

Increased funding for Districts & Watershed Projects

A significant breakthrough was made in 2000 when the legislature approved an increase in funding for the Soil and Water Conservation Districts. The additional $10,000 per year appropriated for the Districts will allow them to build their capacity to act as the primary delivery system for nonpoint source control programs. In addition, an appropriation of $160,000 to be matched by $240,000 in federal funds gives the Districts the means to conduct some meaningful nonpoint source projects on a watershed basis. To date, two such projects have been approved for funding.

Agricultural Compliance Program.

The Agricultural Compliance Program investigates and addresses all agriculturally based complaints including odors, insects, improper manure handling, water contamination, improper disposal of farm wastes, cull potatoes and animal carcasses. The Department of Agriculture also cooperates with other agencies when complaints are associated with other regulated materials and activities on the farm.

In connection with the Compliance Program, the Department of Agriculture assists new operations in developing Best Management Practices (BMPs) upon request and works with towns and the agricultural community to address issues associated with the Right to Farm Law, new developments and municipal ordinances.

Typically, a complaint response is initiated with a citizen or agency filing a complaint with the Department of Agriculture. The Compliance Officer evaluates the farm practices and determines whether they are following Best Management Practices (BMPs). If BMPs are being followed, all who have been concerned will be notified of that fact. If BMPs are not being used, the Compliance Officer will outline the appropriate BMPs needed to correct the problem. He will also encourage the farmer to seek technical expertise for the development and implementation of the prescribed BMPs.

The Compliance Officer will prepare a written set of BMPs for that farm and will schedule one or more follow-up visits to ensure that BMPs are being implemented and keep in contact with any SWCD/NRCS or UMCE staff involved.

This process is extremely efficient at correcting improper manure handling problems on farms where a problem has been reported and verified. The suggestion to seek outside assistance to develop the prescribed BMPs also ensures that the structures put in place will be effective and certified by standards recognized by the Department of Agriculture.

In recent years, the Department of Agriculture has resolved over 80 ground and surface water related complaints. (See Table 2.) Of these, 15 involved livestock in water. One additional situation is currently being addressed and should be resolved in the coming months. It is evident from Table 2, that there has been a dramatic increase in complaints associated with surface water. This is probably the result of a greater awareness of manure management activities by the public.

Table 2. Water Related Complaints Resolved by the Agricultural Compliance Program

Resource	1998	1999	2000
Surface Water*	14	12	25
Ground Water	4	7	6
Livestock in Water	5	3	7**
Totals	23	22	38**

*Other than livestock in water.

**plus one situation that is currently being resolved, but work has not been completed at the time of the report.

Two important changes to the Agricultural Compliance Program since the 1998 report. The Agricultural Compliance Program has recently added a second Compliance Officer, which should increase its effectiveness in addressing the increasing number of complaints received, as well as improve the implementation of the Nutrient Management Law. In addition, penalty provisions in the Right to Farm Law and Nutrient Management Law provide the Department of Agriculture a method for addressing water quality problems when all voluntary approaches have failed.

Carcass and Cull Potato Disposal Rules

The Department of Agriculture has developed "Rules for the Disposal of Animal Carcasses" and "Rules Regarding the Disposal of Cull Potato Piles" to address potential pollutants from those sources. The Department of Agriculture has also developed Guidelines for Manure Spreading and Field Stacking for small producers or hobby farmers who may not be required to develop a Nutrient Management Plan. The Agricultural Compliance Officers and other Department of Agriculture staff use these rules and guidance document to ensure that these agricultural wastes are disposed of in a manner that will not threaten ground or surface water or present a disease hazard.

Other

Every municipality has a mandatory shoreland zoning ordinance, which regulates activities within the shoreland zone (including agriculture). The ordinance is enforced by a Code Enforcement Officer. Municipalities may have other ordinances, which regulate agriculture outside the shoreland zone.

CONCLUSION AND RECOMMENDATIONS

The conclusion drawn from the preparation of this report is that there is a considerable amount of activity (in the form of adoption of BMPs) being undertaken by agriculture to address nonpoint source pollution problems and the activity levels have increased recently as a result of the Nutrient Management Law. There is, however, a need to better document those activities and to correlate them with water quality conditions. This conclusion leads to the following recommendations:

-A survey similar to the one carried out in 1996-97 by UMCE should be conducted to determine the changes in BMP adoption rates since that time and to serve as baseline data prior to the full implementation of the Nutrient Management Program. The survey should be expanded to include other commodities.

-Stream assessments should be undertaken in a variety of agricultural watersheds, not just those with known water quality impairment. They should include assessment of water quality, the amount and type of agriculture in the watershed and an assessment of the types of practices being implemented. The information should be used to support the goals of the State's Nonpoint Source Strategy.

-Funding for these assessments should be from federal nonpoint source funds, if sufficient funding is available.

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APPENDICES

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Joint Standing Committee on Agriculture, Conservation and Forestry
Prepared by:
Maine Department of Agriculture, Food and Rural Resources
In cooperation with
Maine Department of Environmental Protection

APPENDIX 1. PARTIALLY SUPPORTING AND THREATENED LAKE DESIGNATIONS
Partially Supporting Lakes in the State of Maine - 2000 Assessment

Partially Supporting Maine Lakes are listed below by lake name, town and acreage. The 'Designated Uses' column indicates which designated uses are partially supported in the lake: AL = Aquatic Life Support, PC = Primary Contact (swimming), and TS = Trophic Stability. Nonattainment causes, sources, related codes and their respective relative magnitudes), are indicated in the four rightmost columns (Mag: S = slight, M = moderate and H = high). All lakes are considered Partially Supporting the designated use of fish consumption. Note: this list includes all lakes; the one lake not considered "Significant" according to the Section 314 definition is indicated with an *.

Lakes that staff has assessed that agriculture is or was a significant factor are in *italics*
Lakes for which a diagnostic study estimated the impact from agriculture are in **bold**

Lake Name	Town	Acres	Designated Use(s)	Non-attainment Causes			Non-attainment Sources		
				Cause	Code	Mag	Source	Code	Mag
DAIGLE P	*NEW CANADA*	*36*	*PC*	*Nutrients*	*910*	*M*	*Non Irrigated Crops*	*1100*	*H*
				Organic Enrich/DO	*1200*	*S*	*Confined Animal Feeding*	*1640*	*M*
				Siltation	*1100*	*S*			
CROSS L	**T17 R05 WELS**	**2515**	**AL, PC**	**Nutrients**	**910**	**M**	**Crop Related**	**1050**	**M**
				Organic Enrich/DO	**1200**	**S**	**Shoreline Develop.**	**4701**	**S**
				Siltation	**1100**	**S**	**Silviculture**	**2000**	**S**
SQUAPAN L	SQUAPAN TWP	5120	AL	Flow Alteration	1500	H	Hydromodification	7000	H
ARNOLD BROOK L	*PRESQUE ISLE*	*395*	*PC*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Organic Enrich/DO	*1200*	*S*	*Shoreline Develop.*	*4701*	*S*
				Siltation	*1100*	*S*			
ECHO L	*PRESQUE ISLE*	*90*	*PC*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Organic Enrich/DO	*1200*	*S*	*Shoreline Develop.*	*4701*	*S*
				Siltation	*1100*	*S*			
FISCHER L	*FORT FAIRFIELD*	*10*	*PC*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Siltation	*1100*	*S*	*Shoreline Develop.*	*4701*	*S*
MONSON P	*FORT FAIRFIELD*	*160*	*PC*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Siltation	*1100*	*S*	*Shoreline Develop.*	*4701*	*S*
MADAWASKA L	T16 R04 WELS	1526	PC, TS	Nutrients	910	M	Non Irrigated Crops	1100	S
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	S
				Siltation	1100	S	Silviculture	2000	M
TRAFTON L	*LIMESTONE*	*85*	*AL, PC*	*Nutrients*	*910*	*H*	*Crop Related*	*1050*	*S*
							Shoreline Develop.	*4701*	*M*
CHRISTINA RES.	FORT FAIRFIELD	400	PC	Nutrients	910	H	Industrial Land Treatment	6400	H
				Organic Enrich/DO	1200	M			
DREWS(MEDUX.) L	LINNEUS	1057	TS	Organic Enrich/DO	1200	H	Unknown	9000	H

Appendix 1. Partially Supporting Lakes in the State of Maine - 2000 Assessment (continued)

Lake Name	Town	Acres	Designated Use(s)	Nonattainment Causes			Nonattainment Sources		
				Cause	Code	Mag	Source	Code	Mag
COCHRANE L	NEW LIMERICK	79	TS	Nutrients	910	M	Unknown	9000	H
				Organic Enrich/DO	1200	M			
CANADA FALLS L	PITTSTON A.G.	2627	AL	Flow Alteration	1500	H	Hydromodification	7000	H
RAGGED L	T02 R13 WELS	2712	AL	Flow Alteration	1500	H	Hydromodification	7000	H
CAUCOMGOMOC L	T06 R14 WELS	5081	AL	Flow Alteration	1500	H	Hydromodification	7000	H
SEBOOMOOK L	SEBOOMOOK TWP	6448	AL	Flow Alteration	1500	H	Hydromodification	7000	H
MATTAWAMKEAG L	ISLAND FALLS	3330	TS	Nutrients	910	M	Unknown	9000	H
				Organic Enrich/DO	1200	M			
PLEASANT&MUD L	T06 R06 WELS	498	PC	Nutrients	910	M	Shoreline Develop.	4701	S
				Organic Enrich/DO	1200	M	Unknown	9000	H
HERMON P	HERMON	461	PC	Nutrients	910	M	Crop Related	1050	M
				Organic Enrich/DO	1200	S	Shoreline Develop.	4701	S
							Grazing-Related	1350	M
HAMMOND P	HAMPDEN	83	PC	Nutrients	910	M	Crop Related	1050	H
				Organic Enrich/DO	1200	S	Grazing-Related	1350	M
				Siltation	1100	S			
HOLBROOK P	HOLDEN	280	TS	Nutrients	910	M	Unknown	9000	H
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	S
SPENCER P	E MIDDLESEX C.G	980	PC	Nutrients	910	H	Unknown	9000	H
NOTCH P (BIG)	L. SQUAW TWP	12	PC	Nutrients	910	M	Silviculture	2000	S
				Organic Enrich/DO	1200	H	Unknown	9000	H
BRASSUA L	ROCKWOOD ST.E.	8979	AL	Flow Alteration	1500	H	Hydromodification	7000	H
FLAGSTAFF L	FLAGSTAFF TWP	20300	AL	Flow Alteration	1500	H	Hydromodification	7000	H
LONG P	BELGRADE	2714	TS	Nutrients	910	M	Silviculture	2000	M
				Organic Enrich/DO	1200	M	Residential Development	4702	M
							Shoreline Develop.	4701	M
GREAT P	BELGRADE	8239	TS	Organic Enrich/DO	1200	H	Crop Related	1050	S
							Shoreline Develop.	4701	M
							Silviculture	2000	S
							Grazing-Related	1350	S

Appendix 1. Partially Supporting Lakes in the State of Maine - 2000 Assessment (continued)

Lake Name	Town	Acres	Designated Use(s)	Nonattainment Causes: Cause	Code	Mag	Nonattainment Sources: Source	Code	Mag
MESSALONSKEE L	*BELGRADE*	*3510*	*TS*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*S*
				Organic Enrich/DO	*1200*	*M*	*Residential Development*	*4702*	*M*
							Shoreline Develop.	*4701*	*M*
							Silviculture	*2000*	*S*
							Grazing-Related	*1350*	*S*
NORTH & LITTLE P.	*ROME*	*2873*	*TS*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Organic Enrich/DO	*1200*	*H*	*Shoreline Develop.*	*4701*	*M*
							Grazing-Related	*1350*	*M*
EAST P	*SMITHFIELD*	*1823*	*PC, TS*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Organic Enrich/DO	*1200*	*M*	*Natural*	*8600*	*M*
							Residential Development	*4702*	*M*
							Shoreline Develop.	*4701*	*M*
							Grazing-Related	*1350*	*M*
HUTCHINS L (Messalonskee Str. Impound.)	OAKLAND	76	PC	Nutrients	910	M	Minor Municipal Point Source	0220	H
				Organic Enrich/DO	1200	M			
SEBASTICOOK L	**NEWPORT**	**4288**	**PC**	**Nutrients**	**910**	**M**	**Non Irrigated Crops**	**1100**	**M**
				Organic Enrich/DO	**1200**	**S**	**Internal Nutrient Cycling**	**8530**	**M**
				Siltation	**1100**	**S**	**Major Municipal Point Source**	**0210**	**S**
							Shoreline Develop.	**4701**	**S**
							Irrigated Crops	**1200**	**S**
UNITY P	*UNITY*	*2528*	*AL, PC, TS*	*Nutrients*	*910*	*M*	*Grazing-Related*	*1350*	*M*
				Siltation	*1100*	*S*	*Shoreline Develop.*	*4701*	*S*
							Crop Related	*1050*	*M*
LOVEJOY P	**ALBION**	**324**	**PC**	**Nutrients**	**910**	**M**	**Grazing-Related**	**1350**	**M**
				Organic Enrich/DO	**1200**	**S**	**Shoreline Develop.**	**4701**	**S**
				Siltation	**1100**	**S**	**Crop Related**	**1050**	**M**
CHINA L	**CHINA**	**3845**	**AL, PC, TS**	**Nutrients**	**910**	**M**	**Non Irrigated Crops**	**1100**	**S**
				Organic Enrich/DO	**1200**	**M**	**Internal Nutrient Cycling**	**8530**	**M**
				Siltation	**1100**	**S**	**Shoreline Develop.**	**4701**	**S**
				Taste & Odor	**2000**	**S**	**Silviculture**	**2000**	**S**
							Grazing-Related	**1350**	**S**
WEBBER P	**VASSALBORO**	**1201**	**PC**	**Nutrients**	**910**	**M**	**Non Irrigated Crops**	**1100**	**S**
				Organic Enrich/DO	**1200**	**S**	**Internal Nutrient Cycling**	**8530**	**S**
				Siltation	**1100**	**M**	**Shoreline Develop.**	**4701**	**M**

Appendix 1. Partially Supporting Lakes in the State of Maine - 2000 Assessment (continued)

Lake Name	Town	Acres	Designated Use(s)	Nonattainment Causes			Nonattainment Sources		
				Cause	Code	Mag	Source	Code	Mag
THREEMILE P	**CHINA**	**1162**	**PC**	**Nutrients**	**910**	**M**	**Non Irrigated Crops**	**1100**	**S**
				Organic Enrich/DO	**1200**	**M**	**Shoreline Develop.**	**4701**	**M**
				Siltation	**1100**	**S**	**Silviculture**	**2000**	**S**
THREECORNERED P	AUGUSTA	182	PC	Nutrients	910	M	Shoreline Develop.	4701	M
				Organic Enrich/DO	1200	S	Silviculture	2000	S
WILSON P	WAYNE	582	TS	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
COBBOSSEE L	**WINTHROP**	**5543**	**AL, PC**	**Nutrients**	**910**	**M**	**Grazing-Related**	**1350**	**S**
				Organic Enrich/DO	**1200**	**S**	**Shoreline Develop.**	**4701**	**M**
							Crop Related	**1050**	**S**
WOODBURY P	LITCHFIELD	436	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
PLEASANT (MUD) P	*GARDINER*	*746*	*PC, TS*	*Nutrients*	*910*	*M*	*Grazing-Related*	*1350*	*M*
				Organic Enrich/DO	*1200*	*S*	*Shoreline Develop.*	*4701*	*M*
				Siltation	*1100*	*S*	*Crop Related*	*1050*	*M*
LITTLE COBBOSSEE	WINTHROP	75	PC	Nutrients	910	M	Grazing-Related	1350	S
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
				Siltation	1100	S	Crop Related	1050	S
ANNABESSACOOK L	**MONMOUTH**	**1420**	**PC**	**Nutrients**	**910**	**M**	**Grazing-Related**	**1350**	**S**
				Organic Enrich/DO	**1200**	**M**	**Hazardous Waste**	**6600**	**S**
				Siltation	**1100**	**S**	**Internal Nutrient Cycling**	**8530**	**M**
							Shoreline Develop.	**4701**	**S**
							Urban Runoff	**4300**	**S**
							Crop Related	**1050**	**S**
LOWER TOGUS	CHELSEA	230	PC	Nutrients	910	M	Shoreline Develop.	4701	M
				Organic Enrich/DO	1200	M	Silviculture	2000	M
							Natural	8600	M
TOGUS P	AUGUSTA	660	PC	Nutrients	910	M	Internal Nutrient Cycling	8530	M
				Organic Enrich/DO	1200	S	Shoreline Develop.	4701	S
							Silviculture	2000	S
AZISCOHOS L	LINCOLN PLT	6700	AL	Flow Alteration	1500	H	Hydromodification	7000	H
KENNEBAGO L (BIG)	DAVIS TWP	1700	TS	Nutrients	910	M	Unknown	9000	H
				Organic Enrich/DO	1200	M			
RICHARDSON LAKES	RICHARDSON-TOWN TWP	7100	AL	Flow Alteration	1500	H	Hydromodification	7000	H

Appendix 1. Partially Supporting Lakes in the State of Maine - 2000 Assessment (continued)

Lake Name	Town	Acres	Designated Use(s)	Nonattatinment Causes			Nonattainment Sources		
				Cause	Code	Mag	Source	Code	Mag
BEAR P (BIG)	HARTFORD	432	TS	Nutrients	910	H	Unknown	9000	H
ALLEN P	GREEN	183	TS	Nutrients	910	M	Urban Runoff	4300	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
							Residential Development	4702	M
NORTH P	NORWAY	175	PC	Nutrients	910	M	Sediment Resuspen.	8540	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
							Natural	8600	M
TRIPP P	POLAND	768	AL	Nutrients	910	M	Intensive Animal Feeding	1600	M
				Organic Enrich/DO	1200	M	Urban Runoff	4300	M
							Residential Development	4702	M
							Shoreline Develop.	4701	M
TAYLOR P	AUBURN	625	AL	Organic Enrich/DO	1200	H	Unknown	9000	H
SABATTUS P	*GREENE*	*1962*	*PC*	*Nutrients*	*910*	*M*	*Crop Related*	*1050*	*M*
				Siltation	*1100*	*S*	*Shoreline Develop.*	*4701*	*S*
							Grazing-Related	*1350*	*M*
							Intensive Animal Feeding	*1600*	*M*
GRAHAM L	MARIAVILLE	7865	AL, PC	Turbidity	2500	M	Hydromodification	7000	S
				Siltation	1100	M	Natural	8600	M
LILLY P	ROCKPORT	29	PC	Nutrients	910	M	Landfill	6300	H
				Organic Enrich/DO	1200	S	Shoreline Develop.	4701	S
NORTON P	LINCOLNVILLE	133	AL	Organic Enrich/DO	1200	H	Unknown	9000	H
HOBBS P	HOPE	264	TS	Nutrients	910	M	Unknown	9000	H
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	S
WASHINGTON P	WASHINGTON	551	TS	Nutrients	910	M	Residential Development	4702	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
							Unknown	9000	M
CLARK COVE P	SOUTH BRISTOL	35	PC	Nutrients	910	M	Residential Development	4702	M
				Organic Enrich/DO	1200	M	Natural	8600	M
							Unknown	9000	M
DUCKPUDDLE P	*NOBLEBORO*	*293*	*PC*	*Nutrients*	*910*	*M*	*Grazing-Related*	*1350*	*H*
				Organic Enrich/DO	*1200*	*S*	*Crop Related*	*1050*	*M*
				Siltation	*1100*	*S*			

Appendix 1. Partially Supporting Lakes in the State of Maine - 2000 Assessment (continued)

Lake Name	Town	Acres	Designated Use(s)	Nonattatinment Causes			Nonattainment Sources		
				Cause	Code	Mag	Source	Code	Mag
BISCAY P	DAMARISCOTTA	377	TS	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
SEWALL P	ARROWSIC	46	PC	Nutrients	910	M	Natural	8600	M
				Organic Enrich/DO	1200	S			
PAPOOSE P	WATERFORD	64	PC	Nutrients	910	M	Residential Development	4702	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
							Unknown	9000	M
HIGHLAND L	BRIDGTON	1401	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
LONG L	BRIDGTON	4867	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
BAY OF NAPLES	NAPLES	762	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
THOMAS P	CASCO	442	AL	Nutrients	910	M	Urban Runoff	4301	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
CRESCENT L	RAYMOND	716	TS	Organic Enrich/DO	1200	H	Unknown	9000	H
SEBAGO L (LITTLE)	WINDHAM	1898	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
HIGHLAND (DUCK) L	FALMOUTH	634	AL, TS	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
WATCHIC P	STANDISH	448	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
KENNEBUNK P	LYMAN	224	AL	Nutrients	910	M	Residential Development	4702	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
MOUSAM L	ACTON	900	TS	Nutrients	910	M	Residential Development	4702	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
				Siltation	1100	M			
SQUARE P	ACTON	910	AL	Organic Enrich/DO	1200	H	Shoreline Develop.	4701	H
ELL (L) P	WELLS	32	AL, PC	Organic Enrich/DO	1200	H	Construction	3000	H
LEIGH'S MILL P	SOUTH BERWICK	37	PC	Nutrients	910	M	Urban Runoff	4301	M
				Organic Enrich/DO	1200	M	Shoreline Develop.	4701	M
							Residential Development	4702	M
NORTHEAST P	LEBANON	778	AL	Nutrients	910	M	Shoreline Develop.	4701	H
				Organic Enrich/DO	1200	M			

Appendix 2. Adoption of Best Management Practices by Maine Farms

Table A2.1 . Number of Farmers Using Particular Sediment Control BMPs*

Individual BMPs	Potato Farms			Dairy Farms		
	BMP Applies	Using BMP	% Using	BMP Applies	Using BMP	% Using
Plant across slope	70	66	94	39	37	95
Strip crop	64	30	47	48	24	50
Use buffer strips near streams	43	42	98	57	48	84
Use reduced tillage	80	49	63	72	22	31
Plant erodible land to grass	65	58	89	79	76	96
Fall plant cover crops	80	32	40	54	10	19
Stabilize eroding ditches	72	70	97	39	32	82
Use nutrient settling basins	30	18	60	na	na	na
Control livestock access to streams	6	5	83	54	21	39
Practice crop rotation	80	79	99	51	25	49

*Jemison,John M. et.al. July, 1997

Table A2.2. Number of Farmers Using Particular Manure BMPs*

Individual BMPs	BMP Applies	Using BMP	% Using
Base rates on realistic yield goals	80	61	76
Analyze manure	80	21	26
Calibrate spreader	80	18	23
Reduce application in critical areas	54	50	93
Incorporate manure if possible	70	69	99
No application on frozen ground	80	59	74
Avoid spreading on ledge outcrops	35	14	40
Use grass buffers to minimize runoff	54	41	76
Have and use a manure management plan	79	53	67

*Jemison,John M. et.al. July, 1997

Table A2.3. Number of Farmers Using Particular Nutrient BMPs*						
Individual BMPs	Potato Farms			Dairy Farms		
	BMP Applies	Using BMP	% Using	BMP Applies	Using BMP	% Using
Use soil tests for nutrient application	80	79	99	80	66	83
Base nutrient applic on realistic yield goal	80	78	98	73	70	96
Avoid spreading over ledge outcrop	61	51	84	34	17	50
Calibrate fertilizer spreader	79	78	99	73	54	74
Keep records of fertilizer use	80	59	74	73	17	23
Rotate crops to utilize nutrients	80	67	84	49	23	47
Use plant tissue testing	80	22	28	50	21	42
Use cover crops to catch N	79	46	58	52	7	13
Avoid fall nutrient application	80	77	96	73	70	96
Use buffer strips	44	42	95	57	47	82

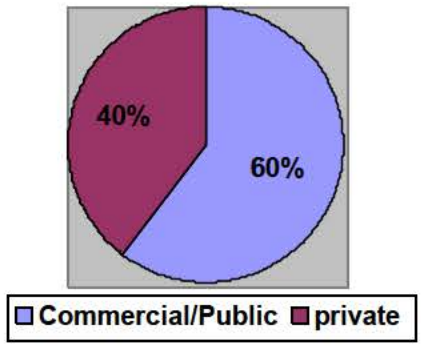
*Jemison,John M. et.al. July, 1997

Appendix 3.
SIDEBAR: Certification of nutrient Management Planning Specialists.

An important component of the Nutrient Management Program is the availability of Certified Nutrient Management Planning (NMP) Specialists who can prepare and certify Nutrient Management Plans for Maine's farming community.

Certification as a NMP Specialist requires an individual to pass a certification exam. The University of Maine Cooperative Extension has made a major commitment to develop and deliver training sessions to prepare farmers, consultants and agency people for this certification. There are two categories of certification, a private one for farmers who want to prepare and certify their own plan and a commercial/public one for people who want to be able to prepare and certify plans for anyone requesting it. As more people from the agricultural community become educated about nutrient management issues, this is likely to be reflected by an increase of Best Management Practices on Maine's farms and an overall reduction of non-point source pollution

Figure 1: Number of Certified NMP Specialists in Maine (as of 12/11/00)



50 Private
76 Commercial/Public
126 Total NMP Specialists

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