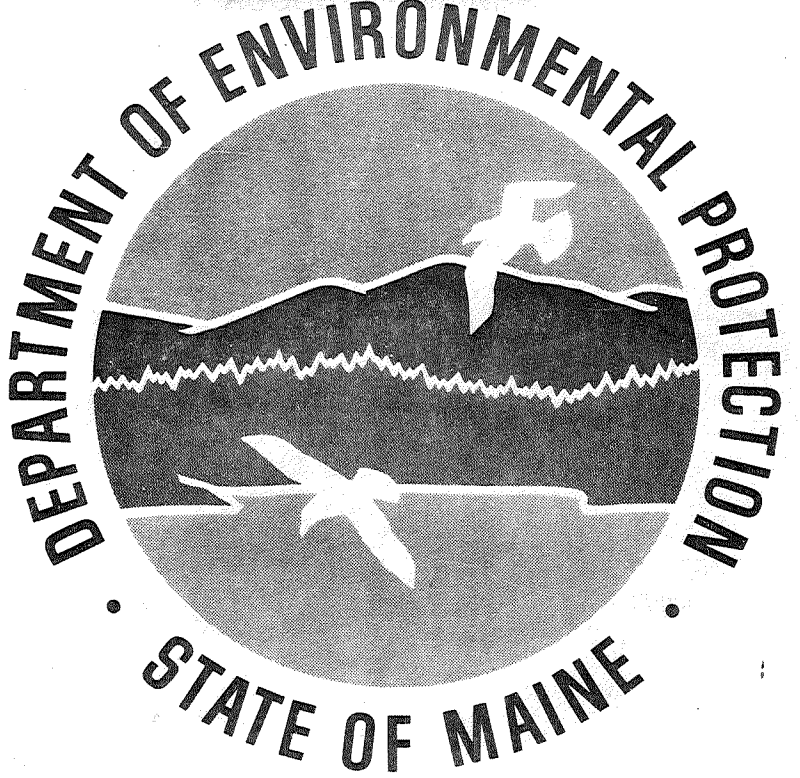

NON-POINT SOURCE POLLUTION AND WATER QUALITY IN MAINE

Bureau of Water Quality Control
Division of
Water Quality Evaluation and Planning

February 1975

STATE OF MAINE

Department of Environmental Protection

WILLIAM R. ADAMS, JR.
COMMISSIONER

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March 11, 1975

Mr. George C. Gormley, Director
Bureau of Water Quality Control
Dept. Environmental Protection
State House
Augusta, Maine 04333

Dear Mr. Gormley:

The Bureau of Water Quality Control made a commitment to the Environmental Protection Agency to produce a non-point source strategy by February 1, 1975. This commitment was indicated in the DEP Water Bureau's Fiscal Year 1975 Program Grant application to EPA.

This report titled "Non-Point Source Pollution and Water Quality in Maine", has been prepared by the staff of the Division of Water Quality Evaluation and Planning to satisfy the DEP commitment.

Very truly yours,

Charles H. King

Charles H. King, Chief
Division of Water Quality
Evaluation & Planning
Bureau of Water Quality Control

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Introduction

The majority of the recent legislation and work regarding water pollution abatement has dealt with wastes from fixed, restricted or point sources. Little time or effort has been spent on non-point or diffused source pollution because point sources are much easier to locate, analyze, and correct. Point sources can also make it difficult to detect and quantify non-point sources. Consequently, until recently non-point sources have not received much more than cursory attention.

Non-point source pollution is a natural occurrence in some cases, but negligent and improper land-use patterns expand the problem to unacceptable levels. Non-point sources usually affect water quality intermittently. A large portion of an annual non-point source load could originate from one or two storms. Therefore, treatment may not be desirable nor feasible in some cases. Prevention in the form of land use management may be the only answer.

Instances of non-point source pollution from agricultural lands and forestlands in Maine have been well documented but the impact from many other sources including urban areas, sewage sludge disposal areas, dump sites, construction sites, and spray irrigated lands should be examined also. According to the State - EPA Non-Point Source Pollution Task Force, the 1983 water quality goals will not be achieved unless sufficient funding and priority are given to this greatly underrated problem.

Before proceeding with this discussion it should be stressed that until more research is conducted in this area qualifications must be placed on any conclusions. More specifically, it has not been demonstrated in the State of Maine, except in isolated instances, that non-point source pollution causes violations of the water quality standards of classification.

Summary

Agricultural Land

Agricultural lands are known to contribute significantly to water quality degradation in Maine. Sediment is by far the most important pollutant from agricultural lands. Fields planted to row crops such as the extensive potato-growing region in Aroostook County are particularly susceptible. Although they have improved substantially during the last twenty years, the soil conservation practices are generally insufficient to keep the erosion to an allowable limit of 3 T/ac/yr. The primary reason that good conservation practices are not more widespread is probably financial. Farmers may find it difficult to spend more for good conservation practices when other costs have risen so drastically. Other reasons include harvesting efficiency, education, and an adverse climate.

Accompanying this extensive agriculture is the total use of chemical additives. Without crop rotation the soils require the continued addition of fertilizers. Pesticides are also used by almost every farmer. These chemicals can be carried to the waterways with the eroded soil. Container disposal has also been a problem associated with pesticides.

Education is the key. The farmer must be convinced that good soil conservation practices are advantageous to him. This point can be further strengthened by providing him with the financial and technical assistance necessary to carry out the proper measures. A regional disposal program for hazardous substances, along with a regional collection system to encourage participation, is a method that might insure safe and efficient disposal of surplus pesticides and containers.

Forest Land

The effects of forests and forest land use practices on water quality is particularly important in Maine because more than ninety (90) percent of the land area is forested. Of the major forest uses, harvesting seems to have the greatest potential impact on water quality. Various activities associated with harvesting and

management for harvesting may lead to serious water quality degradation. Sedimentation is the primary concern, but slash disposal, addition of pesticides, and temperature increases may all play significant roles.

The removal of vegetation increases surface runoff and subsequent erosion but the major sediment yields are from logging roads and skid trails. Guidelines are available for the proper design, construction, and maintenance of logging roads and skid trails. One such publication is the U.S. Forest Service bulletin "Permanent Logging Roads for Better Woodlot Management" which contains design criteria for slopes, filter strips, culverts, waterbars, and stream crossings.

Pesticides usage in Maine is mainly limited to Zectran which is licensed by the U.S. Department of Agriculture for use against the spruce budworm (Chloristoneura fumiferana Clem.). All studies indicate that Zectran has little impact on water quality. However, Zectran is no longer in production and the Maine Bureau of Forestry has proposed spray areas for 1975 totalling over three million acres. The substitute being considered is Fenitrothion which is not presently licensed in the U.S. but has been used in Canada for several years.

There is no evidence to that land-based recreation has a significant effect on water quality in Maine.

Urban Land

Consideration should be given to both quality and quantity control when dealing with runoff from urban areas. Contamination of urban runoff is primarily from sediments and chemicals to control snow, ice, and vegetation. Concentration of deicing chemicals by dumping snow in waterways is known to occur in Maine but no data is available to quantify the problem. This practice should be discouraged as concentrations far above recommended levels have been recorded in some states.

Quantity control can be divided into detention and retention, as is done in Urban Stormwater Management and Technology: An Assessment. Detention is slowing down the rate that the flow enters the collection system whereas retention is preventing the flow from entering the collection system. Techniques used with success

in other regions include regrading sites and storage lagoons for recreation and industrial water supplies. A practice that is seen in Maine, particularly along large highways is wide shallow, grass covered ditches that reduce flow rates as well as allow for maximum amount of on-site use.

Although Maine does not have many large urban areas, small clusters of development and shopping malls may have problems similar to urban areas and therefore deserve closer attention.

Ground Water

Ground water pollution is a serious consideration in Maine because less than fifteen (15) percent of the soils in the State are suitable for septic sewage disposal and fifty (50) percent of the households are not sewered. For these reasons an EPA sponsored ground water contamination study considered septic sewage disposal in Maine a priority problem.

A recent ground water supply study in York County furnished some interesting information:

- Sixty percent of the individual water supplies tested were found to be unsatisfactory at one time or another.
- State and local regulations to prevent contamination of ground water are inadequate or inadequately enforced.
- Individual water supply testing programs are inadequate.
- Water supply and well construction standards are lacking or are not being enforced.
- Public, medical, technical, and financial assistance is unavailable to users of unsafe supplies.
- The general level of knowledge regarding ground water quality and consumption is very low.

This study underlined the seriousness of the situation in Maine. Several methods are readily available to alleviate the problem. Better policing of existing septic disposal regulations is needed. This, combined with zoning against small lot sizes, might be a viable alternative to a wastewater treatment facility for some sprawling communities. Literature written specifically for the laymen such as "Cleaning Up the Water" will familiarize the public with the alternatives of treatment and

disposal. Testing programs must be initiated that are geared to individual water supplies. Incentives such as financial and technical assistance should be provided to individual users of inadequate, unsafe, or unsanitary water supplies. High well construction standards should be encouraged. Consolidation of responsibility for enforcement of ground water related regulations under one agency would remove some of the inefficiency in dealing with complaints.

Miscellaneous Sources

There is little doubt that construction sites in Maine can affect water quality although no quantitative data is available to substantiate the seriousness of the effects. The proper use of mulches, drainage ditches, sediment basins, etc. can reduce the sediment yields significantly. If the development is over sixty thousand square feet or the subdivision over twenty acres conditions for approval of the site application can include proper erosion control and waste discharges. Other water quality degradation can be covered under Section 413 (no discharge without a license).

The only mining-related activities that has a significant potential impact are gravel operations. Unfortunately, these are exempt from the mining and reclamation law and are not included under the site location law unless they exceed five acres. Provisions should be made to include these operations under the mining and rehabilatation law.

Despite widespread publicity to the contrary, recreational vehicles seem to have little impact, if any, on water quality in Maine. The only possible exception to this is motor boats. Although all boats with waste systems operating in inland waters must have a holding tank, it has been shown in other regions that a significant impact may occur from unburned fuel in the crankcase exhaust. Research should be conducted in Maine, especially on shallow ponds with considerable boating activity, to determine the effects of such things as the petroleum products on the bacterial-algal competition relationships, the build-up of tetraethyl lead in the plant and fish life, and the effects of stirring up bottom sediments.

The existing sludge disposal regulations seem adequate to prevent water quality degradation. However, towns without approved sludge disposal sites, either septic or treated municipal sludge, should be encouraged to remedy the situation.

The spray irrigation regulations also seem adequate. This form of disposal will probably be investigated more in the future as it seems particularly suited to operations such as ski resorts, which usually have large forested tracts of land with soils unsuitable for other methods of disposal.

The use of highway deicing compounds, primarily sodium chloride, has increased dramatically in recent years. The State of Maine reached a high of over 110 thousand tons during the 1967-68 winter season. The Maine Department of Transportation (MDOT) has made great strides in cutting down excessive applications and reducing the impact of highway deicers. MDOT has reduced salt use over 20 percent since 1968 for an annual savings of three quarters of a million dollars. This was accomplished by developing a tailgate restrictor, developing a calibration method for both tailgate and hopper type sanders, reducing moisture content in the salt to insure a continuous rate of application and conducting seminars for those involved with the deicing program. Potential impact on water quality was reduced further by installing buildings over salt piles and reducing sodium concentrations in soils adjacent to heavily salted highways by applying gypsum. More recently MDOT has sponsored research to determine levels of the anti-caking compounds in wells on storage lots. Additional studies will be made this winter to learn what levels exist in runoff adjacent to salt storage areas. Information that still needs to be gathered regarding anti-caking compounds includes tolerances and toxicities, the possibility of build up in bottom sediments, and long term sub-lethal effects on aquatic life.

Several points that occur repeatedly during the discussion are:

- The need to educate the public of the major role non-point sources play in regard to water quality.
- Many regulations exist that, if adequately enforced could reduce the problem.
- Research is needed in all phases of the problem.

Conclusions

Agricultural Land

1. Sediment is one of the, if not the, most important pollutant (s) affecting water quality in Maine.

2. Cropland is credited with being chief source of sediment. The major problem area in Maine is the agricultural land of eastern Aroostook County.

3. The soils, the intensive agriculture with a predominantly row crop, and little rotation combine to create a huge potential for erosion.

4. There is almost complete dependence on chemical additives. (Fertilizers and pesticides).

5. Reduction of the amount of soil lost would reduce the contamination of waters by chemical additives.

6. On the average better soil conservation practices are needed.

7. The larger and more financially secure farms tend to follow better conservation practices.

8. Poor agricultural practices have contributed to the advanced aging, or eutrophication of many Maine lakes.

Forest Land

1. The multiple use forest concept can lead to a large impact on water quality.

2. Of the forest practices considered, harvesting has the greatest potential impact on water quality.

3. Sediment, slash, chemicals, and temperature increases are all associated with harvesting.

4. The most serious problems regarding harvesting result in sedimentation from improper construction of logging roads and skid trails.

5. Sedimentation in forested areas has a large impact on fisheries.

6. Other effects include aesthetic degradation and reduced growth from soil loss.

7. Consciencious planning and management can drastically reduce detrimental effects.

Urban Lands

1. There is almost no information available on urban runoff pollution in Maine.

2. Small urban-like clusters of development and mall-type shopping centers may have urban type runnoff problems.

3. Quality contamination from urban runoff is generally from sediment and/or chemicals (herbicides and deicers).

4. Paved area pollutants can reach extraordinarily high concentrations from common maintenance practices.

5. Quantity reduction can be handled by detention methods and/or retention methods. Several techniques have been used with success.

Ground Water

1. Although ground water is usually prevalent, abundant, and pure, not all ground water is uncontaminated.

2. Ground water pollution comes from direct introduction of pollutants, percolation of surface pollutants, and/or salt water intrusion.

3. Inadequate operating or improperly operating septic systems are an important potential source of ground water pollution in Maine because of generally inadequate soil conditions.

4. Existing knowledge, testing, and regulations are not adequate to deal with the resource.

5. Enforcement could possibly be more efficient if the regulations were under the jurisdiction of one department.

Miscellaneous Sources

1. Pollution from construction sites in Maine tends to be more of a local problem than of regional or state-wide concern.

2. The only possible major mining related problem of concern in Maine is exempt under present laws (gravel pits under 5 acres).

3. Little data is available to support allegations of widespread environmental damage (including water quality degradation) from recreational vehicles. The only possible exception to this is motorboats.

4. Most investigators seem to feel that waste disposal by spray irrigation is a practical, economical, and environmentally sound alternative. However, there are numerous location and design factors to consider in each case.

5. Spray irrigation seems particularly suited to operations such as ski resorts.

6. The application of highway deicing compounds during winter months has become standard practice in New England in recent years. The use of abrasives will not be tolerated by our mobile society. The most common deicing compound used is sodium chloride(NaCl).

7. Chloride concentrations in wells and farm ponds adjacent to highways receiving salt applications were significantly increased. Soils adjacent to highways contained sodium levels known to affect growth and drainage. Ion concentrations in major rivers were not significantly increased.

8. Drinking water standards for chloride concentrations are based more on taste and palatability rather than adverse effects.

9. Animals are more tolerent of chloride concentrations than humans.

10. Little in known about the tolerances and toxicities of the anti-caking compounds used in highway deicers.

11. The State of Maine Department of Transportation has sponsored valuable research regarding highway deicing compounds and associated additives.

Overall Conclusions

1. Non-point source pollution is definitely affected by land use practices.

2. Sediment is the primary pollutant, at least from non-point sources.

3. There are many existing laws policies, guidelines, and regulations that can alleviate non-point source pollution, if adequately enforced.

4. More laws may be needed as well as a consolidation of effort under one department to fully quantify and control the problem.

5. Research and funding are needed in this area.

Recommendations

Agricultural Land

1. Promote education of the need and advantages of good soil conservation practices.

2. Continue to provide incentives, such as financial and technical assistance, for good soil conservation practices.

3. Encourage safe, scientific, and proper use of chemical nutrients and pesticides, as well as the proper methods of disposal.

4. Sponsor and promote incentive programs for hazardous substance disposal such as regional disposal systems (hopefully EPA inspired and one per region to handle surplus pesticides and pesticides containers). A regional collection system might provide the necessary incentive. An alternative might be community sanitary landfills with sections set aside for hazardous substances.

Forest Land

1. Support forest management practices including harvesting, that have minimal impact on water quality.

2. Ratify existing guidelines for construction of log roads, skid trails, and filter strips.

Urban Land

1. Discourage concentration of paved area pollutants by practices such as dumping of snow in watercourses.

2. Endorse multiple use projects such as stormwater runoff - recreation lagoons.

3. Promote techniques for maximum utilization of water on site such as grass filled channels, etc.

Ground Water

1. Enforce existing septic disposal regulations.

2. Enforce existing pollutant discharge laws that extend to ground water.

3. Promote literature such as "Cleaning Up the Water" to make the public aware of the alternatives for treatment and disposal.

4. Provide incentives such as financial and technical assistance for testing if individual water supplies.

5. Encourage proper(high)well construction standards.

6. Endorse policies for distribution of manpower, effort, and funds commensurate with the importance ground water has as a resource.

7. Push for an inventory and monitoring system to replace the present U.S.G.S. low intensity well monitoring program. More detailed and additional analyses are needed, at least those included in the U.S. Public Health Service Standards.

8. Mapping of known contaminated acquifers, as well as the extent and movement of the contaminated zone should be encouraged.

9. Consolidate responsibility for enforcement of regulations into one department.

Miscellaneous Sources

1. Support amendment or draft legislation to include gravel pits under the "Site Location of Development" law.

2. Encourage municipalities without approved wastewater treatment facility sludge sites to actively seek them.

3. Continue to support efforts to minimize the impact of highway deicing salts by reducing the amount used and carefully monitoring the use.

4. Re-evaluate drinking water standards regarding chloride concentrations (both rejection levels and desirable levels).

5. Investigate tolerances and toxicities of the anti-caking compounds used in highway deicers. Endorse research to determine sub-lethal or long term effects of these compounds also.

Overall Recommendations

1. Educate the public to the major role that non-point sources play in regard to water quality.

2. Research is definitely needed on all phases of the problem as very little data is available.

3. Enforce existing regulations and adopt existing guidelines that can alleviate the pollution from non-point sources.

4. Endorse programs to consolidate non-point source related regulations under one agency.

Agricultural Land

Pollutants known to be contributed by agricultural land are sediment, nutrients, pesticides, and organic loads. In Maine, most concern is aimed at sediment, nutrients, and biocides. However, this does not exclude other pollutants from being major problems locally. In Maine, sediment is generally considered to be the most important pollutant affecting water quality. Cropland is the chief source of sediment on a total mass basis, supplying fifty (50) percent of the total sediment yield to inland waterways. Maine seems to follow this trend.

Soils and Soil Conservation Practices

Eastern Aroostook County (St. John River Basin) is the most intensively cultivated portion of Maine. Approximately one-third of the total agricultural land in the State is situated there (Table 1), consequently most of the available information is related to this area. However, there are many other parts of Maine with water quality problems stemming from agriculture, such as certain localized areas in the lower Kennebec River Basin. Several lakes are also being significantly affected by agricultural practices. The application and piling of chicken manure is the most widespread concern but fertilizers and poor soil conservation practices also contribute heavily to the lakes problem.

Approximately seventeen (17) percent or 72,729 of the 426,131 acres of cultivated land in Aroostook County (Table 2) has very severe limitations that restrict the choice of crops and/or require very careful management, according to Soil Conservation Service Capability Classification System (Appendix I). The unique nature of the soils in this agricultural region has been well established. The predominant soil types are the lime-influenced glacial tills listed in Table 3. These fine soils, along with a row crop leaving large amounts of exposed soil, and intensive agriculture with little crop rotation, combine to create a tremendous potential for erosion. The soil conservation practices used on the agricultural land in Aroostook County vary widely. Even simple practices such as crop rotation and

contour planting are nonexistent in some areas. Usually the larger and more financially solvent the farming unit, the better the practices.

Table 1*

Comparison of Land-Use Patterns

Land-Use	Aroostook County Acres	Aroostook County %	Total State Acres	Total State %	% of State total in Aroostook County
Cropland	426,131	9.9	1,283,371	6.7	33.2
Pasture	23,750	0.5	150,374	0.7	5.5
Forest	3,828,300	89.1	17,219,610	90.5	22.2
Other	18,074	0.4	373,184	1.9	4.8
Total	4,296,255	99.9+	19,026,539	99.8+	22.5

* Compiles from Maine Soil and Water Conservation Needs Inventory (June, 1970)

\+ Does not equal 100.0% due to rounding

The Soil Conservation Service (SCS) of the U.S. Department of Agriculture has set an arbitrary allowable limit of erosion at three tons per acre per year (3T/ac/yr) with good conservation practices. SCS feels that there will always be erosion but on the average better practices are needed. Some farms have lost as much as twenty to sixty tons per acre per year (20-60 T/ac/yr) and some fields have lost between twenty and thirty inches of topsoil since 1930.

There are several possible reasons why better practices are not more widespread.. The primary reason is probably financial, the simple fact that good conservation practices cost more. Farmers find it difficult to think of spending more to prevent erosion when normal costs have risen so drastically. Potatoes used to cost approximately $450.00 per acre from field to storage, but in recent years planting cost alone have approached $500.00 per acre. Efficiency is another reason. Good practices require more time, make it harder to move equipment, and necessitate more complex harvesting procedures. Old practices must be redone, as what was

Table 2*

Land Capability Classes for Aroostook County

Land Capability Class	Land Capability Subclass	Total Acres Cropland	%of Total Acres Cropland	Acres Land Capability Class IV or below	Acres Land Capability Class III or above
II	e	173,903	40.8		173,903
III	e	72,729	17.0		72,729
IV	e	27,506	6.4	27,506	
VI	e	414	0.1	414	
VII	e	200	0.0	200	
II	w	79,071	18.5		79,071
III	w	12,224	2.8		12,224
IV	w	31,304	7.3	31,304	
VI	w	1,031	0.2	1,031	
II	s	6,206	1.4		6,206
III	s	8,800	2.0		8,800
IV	s	7,446	1.7	7,446	
VI	s	2,762	0.6	2,762	
VII	s	1,223	0.2	1,223	
II	e	1,312	0.3		1,312
Total		426,131	99.3**	71,886	354,245

* compiled
taken from the Maine Soil and Water Conservation Needs Inventory (June 1970)

** does not equal 100.0% due to rounding

Table 3

The Predominant Soil Types of the Agricultural Region of Aroostook County*

Type of parent material	Texture	Shallow to bedrock usually less than 20"	Deep well-drained	Deep moderately well-drained	Deep poorly drained low humic gley	Deep very poorly drained humic gley
Great Soil Group						
Lime Influenced Glacial Till Podzol	Loam and silt loam		Perham	Daigle		
Brown Forest	Loam and silt loam		Linneus			
Podzol	Loam and sil loam	Thorndike	Bangor	Dixmont	Monarda	Burnham

* Soil Conservation Service

practical for farming with horses is not practical for mechanized farming. Education has always been a major point but mass media has all but eliminated this stumbling block. Although Aroostook County is the prime agricultural area, the weather acts as a strong adversary. Early autumns and winters often make it difficult to establish winter cover crops. However, with technical help from the Soil Conservation Service and financial assistance from the Agricultural Stabilization and Conservation Service (ASCS) great progress has been made in the last twenty (20) years. Most of the farmers are now practicing some type of soil conservation but, the SCS feels that on the average the practices are not sufficient.

Strip cropping, diversion ditches, contour plowing, and rotation are just some of the measures being applied. The recent success of winter rye as a winter cover crop is reassuring but wider acceptance of this practice is needed. Some of the older practices such as terracing are being replaced and surprisingly, some relatively new ones are being discouraged. One of these is rock removal. With the recent surge in mechanized farming this practice is becoming widespread. Recent studies from the University of Maine and the Agricultural Research Service shows that the practice will accelerate erosion, increase runoff, and decrease infiltration, resulting in less soil and lower soil moisture content. There are two alternatives that can be used to counteract the harmful effects of rock removal. One is to crush the larger rocks so that they will not interfere with harvesting operations and the second is to use a rotation system. At lease one study has indicated that a three-year rotation of potatoes, oats and sod reduced erosion by 83 percent.

Chemical Additives

Accompanying the translocation of soil is the movement of the chemical additives that were placed on the soil to increase yield, such as fertilizers, insecticides, fungicides, and herbicides.

When dealing with an area that is intensively managed for agriculture, such as the potato-growing region, it is important to remember the total use of plant nutrients. They are usually applied at planting time with the planters.

The application rate varies somewhat but on the average growers will apply 150 pounds of nitrogen, and 225 pounds each of phosphorous ($P_2 O_5$) and potash ($K_2 O$) per acre. There is a large amount of clay in the soil in the eastern Aroostook County region and the clay-sized particles adsorb fertilizers so well that often much more fertilizer is added then is actually needed for growth because of the amount adsorbed to the soil.

Elimination, or even reduction of the amount of the soil that is reaching the waterways would in turn reduce the contamination of these waters by the additives. However, adsorption to soil particles is not the only way these chemicals are affecting the waters. Another of the major problems is the improper disposal of the used containers.

Pesticides (Appendix I) including insecticides, fungicides, and herbicides are also used by generally every farmer. Normally, growers will use a systemic insecticide in the fertilizer at planting time, followed by two or three applications of foliar insecticides later in the season. Fungicides are applied on the average of eight applications per season; starting early in July and continuing until the tops are dead in the first part of September. Herbicides are usually applied once. This is after the potatoes are planted in May but before they emerge in the first part of June. Most pesticides are applied by the individual farmers at the rate of 30-50 gallons per acre. However, approximately twenty to twenty-five thousand acres are sprayed annually by commercial aerial methods.

The State Board of Pesticides Control, of which the Department of Environmental Protection is a member, licenses commercial applicators and issues regulations that apply to all users (Appendix III). Compliance, especially with disposal, has increased substantially since arrests started being made last year. Several pilot or research projects are presently being carried out that deal with pesticides control.

Forest Land

Maine is the most forested State in the United States with over ninety (90) percent of the total land area covered by forests (Table 1). Although more than

ninety-five (95) percent of this is classified as commercial the forests are much more than a source of industrial wood fiber. They serve as wildlife habitat, an outdoor recreation resource and as watershed protection. This multiple-use concept results in a greater impact on the forest and in turn, the water.

Harvesting

Certain operations associated with forest management for harvesting such as cutting, transportation, erection of structures, and the use of chemicals have a large potential impact on the water quality of the State. The major water quality problems of any forested area stem from sedimentation of surface waters, disposal of slash and other wastes in surface waters, accidential addition of pesticides to the waters during spray operations, and increases in surface water temperatures. However, even an undisturbed forest ecosystem has certain amounts of nutrients and sediments present in its waters consequently the degree of cultural degradation should be measured against these levels.

The amount of sedimentation is determined by the detachability of the soil, the force applied to the soil, and the surface cover of the soil. Studies indicate that runoff increases as vegetation is removed, and that the major sediment contributions from forestlands are the result of improper design, construction, and maintenance of logging roads. Generally, the only place in forests where erosion occurs is on skid trails and roads or steep slopes. Removal of plant cover and compaction of the soil encourages accelerated runoff on the pathways used by logging equipment. Removal of vegetation from the particularly fragile steep slopes produces the same result.

The effects of sedimentation on inland waters have a direct bearing on fisheries. The deposits may cover spawning grounds, smother eggs and fry, inhibit or stop migration, and reduce overall fishing quality. Effects unrelated to fisheries include reduced aesthetic values and reduced ability to support timber growth. A bibliography of sedimentation, logging, and related effects is contained in Appendix

IV. Consciencious planning, such as is illustrated in the USDA Forest Service bulletin "Permanent Logging Roads for Better Woodlot Management" by Haussman and Pruett (1973), is necessary to prevent excessive erosion from logging roads. Suggested guidelines for construction of filter strips, culverts, slopes, maintenance, and location are dealt with in this report. The Land Use Regulation Commission (LURC of the Maine Department of Conservation), the agency responsible for comprehensive planning, land-use guidelines, and subdivision control in the unorganized townships, considers the guidelines outlined in this bulletin during timber project reviews.

Operation of mechanical equipment in or near waterways increases the chance of contamination by petroleum products as well as the likelihood of sedimentation and alteration of the bed. Stream crossing criteria is also contained in the Haussman and Pruett publication, as well as in the LURC standards.

Water temperature increases are often noted when substantial amounts of vegetation are removed from the banks bordering watercourses. Appendix V contains the section on thermal pollution effects taken from the U.S. Department of the Interior publication, "Industrial Waste Guide on Logging Practices." LURC demands that harvesters leave sufficient vegetation along watercourses to prevent substantial increases in water temperature which would be damaging to the existing aquatic community. The standards for harvesting within two hundred and fifty (250) feet of lakes and streams call for leaving "a well distributed stand of trees" and not removing more than forty (40) percent of the volume of trees six inches or larger in diameter during a ten year period. Most harvesters in the organized townships are now following these practices.

Large amounts of slash increase the organic load of the watercourse. Sproul and Sharpe (1968) have shown that significant water quality degradation results from wood bark. Stockpiles on land and in the water, and benthal deposits cause BOD, color, odor, COD, alkalinity, acidity, and an increase in solids. Slash disposal is also covered in the LURC standards.

Pest Control

Spraying to control insects has been carried out in Maine for over three decades. In the late 30's and early 40's a parasite wasp was introduced to combat the European spruce sawfly. In 1954 the Department of Forestry absorbed the insect control projects of the Department of Agriculture. These were primarily town-oriented non-aerial applications centered on the gypsy moth. Since 1954 efforts have been principally aimed at the spruce budworm (Choristoneura fumiferana Clem), although gypsy moth spray operations continued until 1962. The first large area spraying in 1954 covered 20,000 acres near Madawaska Lake in the Aroostook subbasin (Table 4). The insecticide used was DDT. The concern that surfaced in the mid-60's over long-term effects on the environment of the use of DDT led to the discontinuation of its use in 1967. Since that time the spruce budworm situation in Maine has reached epidemic proportions. Zectran (C_{12} H_{18} N_2 O_2) a carbamate insecticide was applied at the rate of 0.15 lbs. (2.4 oz.) in one gallon of deodorized kerosene per acre through 1973. Test results in 1973 indicated that comparable results were obtained with a rate of 0.15 lbs. in one quart per acre, consequently that mixture was used in 1974. This reduced kerosene use by three quarters. The formulation used in Maine, Zectran FS-15 has only a limited registration for aerial application at a specified rate and can be used only under the supervision of the U.S. Forest Service against spruce budworm, western spruce budworm, and the jackpine budworm. An environmental impact statement must be filed with the U.S. Forest Service and all interested State departments prior to operations. Zectran and Malthion are the only two insecticides licensed for use against the spruce budworm in the U.S. All studies indicate that Zectran, as it is applied in Maine, has little impact on water quality but causes consistent budworm mortality of at least 85 percent.

In Maine, Malthion has not demonstrated consistent satisfactory control at the registered dosage. This creates a problem as the production of Zectran has been discontinued. The Bureau of Forestry (formerly the Department of Forestry)

Table 4*

Spray Projects

YEAR	MATERIAL	ACREAGE TREATED
1954	DDT	21,000
1958	DDT	302,000
1960	DDT	217,000
1961	DDT	53,000
1963	Bacillus thuringiensis 1/	750
1963	DDT	479,000
1964	DDT	58,100
1964	Malathion 1/	1,108
1967	Zectran 1/	500
1967	DDT	92,162
1968	Sumithion 1/	10,560
1970	Accothion	210,000
1971	Zectran 1/	8,736
1972	Zectran	500,000
1972	Bacillus thuringiensis 1/	200
1973	Zectran	430,000
1973	Fenitrothion 1/	20,000
1973	Bacillus thuringiensis 1/	20,000
1974	Zectran	420,000
1974	Bacillus thuringiensis 1/	< 500

* Taken from 1973 Bureau of Forestry Environmental Impact Statement

1/ Test

is presently negotiating to keep Zectran on the market because spray areas totalling over three million (3,000,000) acres have been proposed for next year (Appendix VI). Fenitrothion is also a possible alternative as it has been used extensively in Canada. However, it is not presently licensed for use. In the past biological controls have not been shown to exert sufficient pressure to control budworm populations. The only promising excention is Bacillurs thuringiensis, but even this is not sufficient to suppress epidemic populations.

No other insecticides nor fungicides are presently used. Herbicides (silvicides) are not used on a large scale although some are used on the ground in timber stand improvement (TSI) work.

Recreation

Since World War II expanded highway complexes, increased leisure time, and higher disposable incomes have led to a tremendous surge in outdoor recreation. A significant portion of this is wildland (non-instensively managed land) recreation, which in Maine is synonomous with forest recreation. It takes only a short drive on Interstate 95 during the July 4th weekend to show that Maine plays its part in the rising national trend. Table 5 shows peak season outdoor recreation participation rates for Maine, however not all of these uses are of primary concern regarding water quality. Unfortunately, there is no data available to quantify the effects of these uses in Maine. Motorized recreation, including motorized water sports, will be discussed later in the report.

The uses that will be discussed here are hiking and non-motorized camping. That these uses have seen substantial increases with the State is shown by the sales of the Appalachian Mountain Club Maine Mountain Guide. In 1963, 550 copies were sold, whereas 8,000 copies of the 1971 edition were published. Although almost no data is available, it is thought that these uses have the highest potential deleterious effects because they lead individuals to repeatedly traverse or occupy the same areas. This continued assault on relatively restricted areas of land has only recently received attention.

Table 5*

Peak Season Outdoor Recreation Participation Rates (Percentage)*

1971

Activity	Maine Resident	Out of State Visitor		
		Seasonal	Vacations	Trips
Swimming	66	67	59	66
Camping	16	5	5	10
Picnicking	68	43	60	68
Boating	41	52	24	34
Sailing	5	16	5	6
Canoeing	6	13	3	3
Nature Trails	10	19	8	9
Hiking	15	22	7	9
Horseback Riding	11	13	6	6
Snowmobiling	10	1	1	4
Snow Skiing	15	5	7	9
Ice Skating	20	6	20	20

* Taken from Maine Comprehensive Recreation Plan, Volume II, 1972 Maine Dept. of Parks and Recreation

Studies have been conducted on the high Adirondack country of New York by Ketchledge and Leonard of the New York State University of Forestry at Syracuse and the Sierra Club is presently sponsoring research on the impact of Sierra Club outings in the Sierra Nevada Mountains. This relatively scanty data seems to support the almost indisputable theory that there is a significant impact from hiking and that most deterioration occurs on hiking trails which tend to follow natural drainage patterns. This creates a large potential for soil loss and subsequent stream siltation. Extrapolation of data from developed campsites leads one to believe that compaction stemming from repeated use of choice tenting sites can also encourage accelerated erosion. There are conflicting reports on the re-vegetation possibilities of over-used campsites. Cordell and Talhelm (1969) report that it appears impractical but Beardsley, Herrington, and Wagar (1974) refuted this.

With these recent large scale increases in hiking, the old practices of placing trails on gradual slopes and diverting runoff with water bars can no longer keep pace with the deterioration. Further studies by Ketchledge and Leonard on badly over-used summits in the Adirondacks leads one to believe that rehabilitation and restoration of eroded mountain trails and degraded summits is possible, although it may only be an alternative to restricted use.

Problems accompanying hiking and non-motorized camping are human waste and garbage disposal. Again, preliminary data from Sierra Club sponsored research leads one to suppose that seldom is enough care used when selecting latrine sites. Guide-lines are contradictory and often latrines are low on the setting up camp priority list meaning they tend to be dug after dusk. Frequently they are placed where the soil is relatively deep and free of rocks. Unfortunately these same areas are often damp. This could be a disease-spreading problem when there is a large amount of use such as during the summer vacation months. The solution has to be one of in-dividual discretion. Garbage disposal seems to be less of a problem and one that can be alleviated by careful pre-trip planning to reduce undue wastes, and/or by adhering to the "pack out what you pack in" policy.

Other recreational uses thought to be of less impact in Maine, but possibly of serious nature locally include hunting, fishing, horseback riding, and skiing.

Urban Land

Almost every urban-type area in the United States has a stormwater problem, whether serviced by a combined wastewater collection system or a separated system. Maine has few major cities, consequently, little information is available on urban stormwater or urban runoff pollution within the State. Stormwater runoff problems are usually considered only a large urban area phenomena. However, even smaller communities may have related problems stemming from sprawling shopping malls with accompanying parking lots and other areas of concentrated or "cluster" development. This, along with the fact that malls are often located on land that was previously an undesirable location for one reason or another, creates a potential problem situation. These developments with large areas of impervious materials could seriously affect a poorly drained area and/or could change the runoff patterns of the surrounding area. This discussion will be limited to reducing quantity and improving quality of urban type stormwater runoff and will not consider runoff after it enters a collection system, whether combined or separated.

Quality Control

Contamination of urban stormwater runoff is mainly from sediments and/or chemicals. The two most important groups of chemicals are those used for control of snow and ice and those used for control of vegetation. Paved area pollutants, primarily salt, cyanide and chromium (the later two being additives to deicing compounds) can reach watercourses through the avenues listed below:

(1) Local treatment facilities that have combined or separate collection systems,

(2) Collection systems with no treatment facilities

(3) Storm sewers

(4) Direct dumping of snow and ice removed from paved areas

(5) Directly by following natural or man-made runoff patterms during thaws.

Chemicals used to control vegetation can also reach watercourses by these means. The indiscriminate, careless, or unsupervised use of these herbicides also provides another direct route to watercourses.

Field et al (1973) found that at least one of the means that many communities allow pollutants to reach watercourses can have serious results. Waters receiving accumulated snow and ice removed from paved areas were shown to contain up to 10,000 mg/l sodium chloride, 100 mg/l oils, and 100 mg/l lead, the last two stemming from auto exhausts. Another Field project, A Search: New Technology for Pavement Snow and Ice Control, itemized several alternatives to the use of certain chemicals. These are contained in Appendix VII. Highway deicing compounds will be dealt with in a subsequent section.

Thermal effects are also noted in urban areas. The effects are identical to those experienced in logged over areas, covered in the section on Forest Lands.

Quantity Control

Urban Stormwater Management and Technology: An Assessment published by the EPA listed two methods of source control:

- Prohibit the use of certain chemicals
- Use less of them

Reducing the quantity was also considered in the same study. Quantity methods were divided into:

Detention Methods - Methods used for slowing or dampening the rate at which flows enter the collection by temporarily holding runoff on an area.

Retention Methods - Methods used to prevent runoff from entering the collection system at all.

Techniques used with success include regrading sites, using storage lagoons for

recreation, and using collected stormwater as an industrial water supply.

One EPA sponsored project investigated the feasibility of using porous pavements. It is reported that pavement destruction by freezing and thawing can be overcome by using a gravel storage layer underneath the pavement of sufficient depth to serve as a reservoir for the amount of water percolating through. The study also observed that roads designed this way were more economical than those with storm sewers.

An alternative to this was the method used on federally-funded highways. This includes wide, shallow, grass-covered channels that allow maximum utilization of water on site as well as providing for the reduction of the flow rate.

Ground Water

Although U. S. Geological Survey data has shown that while ninety-seven (97) percent of our fresh water resources are located underground, only about twenty (20) percent of the nation's water requirements are filled by ground water. Although difficult and expensive to locate and inventory, groundwater promises to be the most abundant, the most dependable, the purest and, therefore, the most valuable of our water resources.

However, not all groundwater is pure and free from contamination. Conditions that threaten to degrade this resource comes from:

(1) Direct introduction of pollutants

(2) Percolation of surface or near-surface pollutants

(3) Intrusion of salt water into fresh water acquifers

The first category includes, but it not limited to septic tanks and cesspools, buried pipelines and storage tanks, underground storage and artificial recharge of waste waters. This category is of particular interest to Maine because some fifty (50) percent of Maine households are not sewered. This creates a problem because less than fifteen (15) percent of the total land area in the State is suitable (rated good or fair) for septic sewage disposal according to the 1970 Maine Soil and Water Conservation Needs Inventory. This means some alternative means of disposal such as a self-contained system or discharge into the water must be used.

Category (2) relates to the application and storage of highway deicing compounds, landfills, surface impoundments, spills, mining and agricultural activities. This category is particularly important due to salt application. River infiltration could be covered by either of the above categories. Salt water intrusions occur due to some change in the hydrostatic relationship between fresh water acquifers and salt water acquifers or water bodies. The

primary man-induced reasons for salt water intrusions are pumping wells and the dredging of impermeable soils from the bottom of a salt water body.

A recent individual water supply study in York County conducted by the EPA, Southern Maine Regional Planning Commission, and Maine Department of Health and Welfare yielded some interesting results:

(1) Approximately sixty (60) percent of the individual water supplies tested were found to be, to some degree and at one time or another, in unsatisfactory condition.

(2) State and local regulations are not adequate, nor adequately enforced, to prevent the contamination of groundwater from residential, agricultural and industrial land uses.

(3) Existing individual water supply testing programs are not adequate to protect the health and safety of users of individual water supplies.

(4) Water supply and well construction standards are either lacking or are not being enforced.

(5) Public, medical, technical, and financial assistance are not available to users of unsafe or unsanitary individual water supplies.

(6) The general level of public knowledge about groundwater supply quality and consumption is very low.

An EPA sponsored study Ground Water Contamination in the Northeast States evaluated the principal sources of ground water contamination (Table 6), described the natural ground water quality, predicted future needs and research, and made recommendations to protect against further degradation of ground water quality. Specific reference to Maine was made regarding septic tanks and cesspools and application and storage of deicing compounds.

The report listed the two (2) basic methods of dealing with ground water contamination; handle existing cases and prevent new ones. Remedial action with present financial assistance and technical expertise and knowledge is almost impossible. Once the pollutant is removed time will flush the acquifer but the time could range up to two decades. Some pollutants must be removed by pumping wells and others may not. Prevention is the only answer for groundwater pollution problems according to the study.

Table 6. PRINCIPAL SOURCES OF GROUND-WATER CONTAMINATION AND THEIR RELATIVE IMPACT IN THE NORTHEAST*

Sources	Relative importance to region[a]	Typical size of area affected[b]	Estimated future trend in rate of new occurrences[c]
Septic tanks and cesspools	1	11	1
Buried pipelines and atorage	1	11	11
Application and storage of highway deicing salts	1	11	11
Landfills	1	111	1
Surface impoundments	1	111	111
Spills and surface discharge	1	111	11
Mining activity	11	11	11
Petroleum exploration and development	11	11	11
Salt-water intrusion	111	1	111
River infiltration	111	IV	1
Underground storage and artificial recharge of waste water	111	111	1
Water wells	111	IV	11
Agricultural activities	111	11	111

a) 1 - High
11 - Moderate
111 - Low

b) 1 - Regional
11 - Point source but can be regional in nature due to high density of individual occurrences
111 - Can affect adjacent properties
IV - Effects usually contained within the boundaries of one property

c) 1 - Increase
11 - No significant change
111 - Decrease

*The eleven (11) states included in the report Ground Water Contamination in the Northeast States were Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

ANALYSES PRESENTLY CARRIED OUT ON U.S.G.S. GROUND WATER SAMPLES FROM THE WELL MONITORING PROGRAM

Table 7

The U. S. Geological Survey, Department of the Interior keeps ground water records for various dug wells throughout Maine. They monitor the water table elevation and analyze samples for the parameters shown below:

Parameters	Units
Specific conductance	Micromhos
pH	Units
Temperature	Degrees Celsius
Dissolved Silica	$Si\ O_2$
Dissolved Calcium	Ca
Dissolved Magnesium	Mg
Dissolved Sodium	Na
Dissolved Potassium	K
Bicarbonate	HCO_3
Carbonate	CO_3
Dissolved Sulfate	SO_4
Dissolved chloride	Cl
Dissolved Fluoride	F
Dissolved Nitrate	NO_3 Micro
Total Iron	FE MG/l
Total Magnesium	Mu
Dissolved Solids	Sum
Hardness	Ca Mg $CaCO_3$
Non-carbonate Hardness	
Dissolved Nitrate	N
Carbon Dioxide	CO_2
Dissolved Organic Carbon	C
Dissolved Inorganic Carbon	C

All eleven (11) states, including Maine, in the northeast groundwater study have legislation that would allow formulation of regulations to prevent degradation of groundwater quality. Some of the states even have statutes that deal with specific practices that lead to groundwater contamination. Maine is one of these, but, unfortunately, the laws are divided between the DEP and the Maine State Department of Health and Welfare. This points to a reapportionment of the laws relating to groundwater.

MISCELLANEOUS SOURCES

Construction Sites

Construction sites are often a major source of water pollutants. Pollutants generally associated with construction operations are sediment, slash, metals, petroleum products, chemicals, and pathogens. Sediment is the primary cause for degradation of water quality from construction sites. One study in Virginia concerned with highway construction occupying from less than one (1) to more than ten (10) percent of the basin at a given time, contributed eighty-five (85) percent of the sediment. The sediment yield of the highway construction area was found to be ten (10) times that from cultivated land, two hundred (200) times that from grassland, and two thousand (2,000) times that from forestland. In Maine sedimentation from construction sites has been observed but little quantitative data is available.

Site applications for development are required for structures occupying sixty thousand (60,000) square feet or subdivisions over twenty (20) acres. Developers are required to make provisions for erosion control and legal waste discharges. Other cases of degradation by development are covered by M.R.S.A., Title 38, Chapter 3, Section 413 (no discharge without a license), Section 414-A (license issued only if discharge will not lower existing water quality), and/or Section 417 (no deposits of refuse). State highways and State aid highways are excluded from the Site Location of Development law.

There are many methods of reducing sediment yields from construction sites. Several mentioned in the EPA publication Guidelines for Erosion and Sediment Control Planning and Implementation are:

(1) proper selection of building and highway sites
(2) maintenance of natural vegetation
(3) use of mulches,
(4) drainage channel protection modification
(5) careful backfilling after laying pipes
(6) protection of stockpiles of removed earth
(7) sediment retention basins
(8) timing of clearing and grading during season when erosion is less
(9) traffic control
(10) use of fences to protect trees

Technical information regarding erosion control practices and erosion control products is also contained in this report. Very little information is available in Maine on the contributions of other construction site pollutants.

Mining

In Maine there is little in the way of mining. Mining or mining-type activities in this state are primarily limited to metals, quarries, peat, marl, and sand or gravel. Gravel and sand pit operations are exempt from the mining and reclamation law (M.R.S.A. Title 10 Chapter 451) however, if the operations cover over five (5) acres they are subject to the site location for development law (M.R.S.A. Title 38 Chapter 3). Therefore conditions may be placed on the development that restrict it as well as making reclamation a condition for acceptance.

The largest potential water quality problem is probably from the sand or gravel pits. There are estimated to be over three thousand (3,000) of these within the state and over one-half are thought to be inactive. There is no inventory of pits, active or inactive, so no data is available on how many are causing water quality problems. The only information relates to specific complaints (Appendix VIII). The DEP with one exception, does not license the discharge of sediment therefore discharges from these operations have to be prevented. The only exception is the licensing of gravel washing operations for sediment. Generally the operations recycle their water so the only discharges are during wet spells when the sedimentation tanks are full leaving no storage space.

The only metals operation in the state is an underground operation for zinc (Zn) and copper (Cu). To remove dissolved metals from the effluent there is a two-stage chemical precipitation sedimentation treatment system.

Quarries in the state include slate, granite, cement, and the aggregate or asphalt operations. The granite quarries are very small operations that cut only to order (custom). There is little chance of water quality degradation. There is only one (1) slate quarry in the state and it is also very small. The operator removes well under the one thousand (1000) cubic yard limit of product in a year so he is not covered by the mining law. The main problems from asphalt operations are solids and oils and grease. The use of kerosene to coat truck bodies and for the cutback of the asphalt create possible problems. Cement operations are mainly concerned with solids and possible lime leaching. The only information on this relates to specific complaints.

Motorized Recreational Vehicles

The motorized recreational vehicles considered in this discussion are listed below:

four-wheel drive vehicles
snowmobiles
ATV's (all terrain vehicles)
motorcycles
dune buggies
hovercraft
motorboats

Recently there has been a steady upward tread in ownership of off-the-road recreational vehicles. Motorcycles and four-wheel drive vehicles have been around for some time, but even these have gained in popularity. Snowmobiles,and ATV's however, are quite popular recent additions (Table 8A and 8B).

Much has been written about the possible harmful effects of off-the-road recreational vehicles on the environment. However, very little data is available to support these claims. There have been allegations regarding impact on fish and wildlife, vegetation, and therefore water. Specific effects that have been considered are seedling damage, stream bank erosion, stream bed alteration, deposition of tetraethyl lead on snow and land, deposition of petroleum products on ice, snow, and in the water, compaction of soil and snow and ice on tote roads, and subsequent increases in run-off.

In the northeast as a whole and definitely in Maine, the snowmobile is the most popular and probably the most controversial of the terrestrial recreational vehicles considered. Motorcycles and dune buggies are often considered a major problem in the west, particularly California, but are of little significance to water quality in Maine.

Table 8A

SNOWMOBILE REGISTRATIONS

Maine Counties, 1970-1972 10.7

County	Number of Snowmobiles[a]			Percent Change 70-72
	1970	1971	1972	
Penobscot	4,990	7,064	8,726	74.9
Aroostook	4,323	5,772	6,830	58.0
Kennebec	2,827	4,553	5,796	94.4
Cumberland	2,458	4,034	5,223	124.9
York	1,766	2,821	3,696	109.3
Androscoggin	1,689	2,721	3,562	110.9
Somerset	1,890	2,706	3,533	86.9
Oxford	1,862	2,613	3,450	85.3
Hancock	1,220	1,820	2,142	75.6
Franklin	1,102	1,570	1,992	80.8
Washington	1,353	1,583	1,918	41.8
Piscataquis	1,019	1,360	1,767	73.4
Waldo	696	1,069	1,242	78.4
Lincoln	435	710	881	102.5
Knox	329	553	827	151.4
Sagadahoc	310	476	637	105.5
Maine Total	28,269	41,630	52,222	84.7

a. Total registration during fiscal year.

Score: Unpublished data; Maine Department of Inland Fisheries and Game

Table 8B

SNOWMOBILE CONCENTRATION
Maine Counties, 1970-1972 10.8

County	Population per Snowmobile[a] 1970	1971	1972
Piscataquis	16.0	12.0	9.2
Franklin	20.4	14.3	11.3
Somerset	21.5	15.0	11.5
Oxford	23.3	16.6	12.6
Aroostook	21.8	16.3	13.5
Penobscot	25.1	17.8	14.4
Washington	22.1	16.8	15.6
Hancock	28.4	19.0	16.1
Kennebec	33.7	20.9	16.4
Waldo	33.5	21.8	18.8
Lincoln	47.2	28.9	23.3
Andorscoggin	54.0	33.6	25.6
York	63.2	39.6	30.2
Knox	88.2	52.5	35.1
Sagadahoc	75.6	49.3	36.8
Cumberland	78.3	47.7	36.9
Maine Total	35.2	23.9	19.0

a. Based on U.S. census, 1970 total snowmobile registrations during fiscal year.

Score: Unpublished data; Maine Department of Inland Fisheries and Game.

Whittaker and Wentworth (1971) investigated the possibility that snowmobiles left significant quantities of lead or other residues on the snowpack. The research, although superficial did not support the theory. Widespread damage to seedlings has been reported in Christmas tree farms in northern New Hampshire and golf courses also seem particularly susceptible to damage from snowmobiles. In general however, this seems to have a minor effect, if any, on water quality. Most paper companies in Maine allow four-wheel drives and snowmobiles to gravel on their logging road while prohibiting trail bikes and ATV's. The differentiation seems to stem from the fact that trail bikes and ATV's are quite able to travel off the road whereas snowmobiles usually are not.

The air-cushion vehicle (ACV or hovercraft) is the newest off the road vehicle. It is designed to travel over everything but very rough ground and water. Very little is known about this vehicle because it is so uncommon but presently Maine has legislation passed in 1973, prohibiting use of hovercraft except those registered prior to April 4, 1973.

The Committee to Study Airmobiles was formed to determine whether prohibition should be continued or regulations for their use drafted. The Committee, in it's report to the legislature recommended:

1) Legislation prohibiting the use of airmobiles in the state be continued until an advocate demonstrates that the vehicle is environmentally sound.

2) The two (2) or three (3) presently, as of April 4, 1973, airmobiles registered as watercraft be allowed to operate in the state.

3) The Committee to Study Airmobiles be disbanded.

4) The 107th Legislature undertake a study to evaluate one need for comprehensive off-the-road vehicle registration and regulation this study should include airmobile, as well a other types of vehicles.

According to the 1972 Maine Statewide Comprehensive Outdoor Recreation Plan (SCORP) boating is the second most popular outdoor recreation activity in the state. SCORP defined boating as the recreational use of any boat other than canoes, kayaks, and houseboats. Maine is in the top three states in the nation regarding outboard motor concentration (Table 9) and in the top seven regarding registered boat concentration (Table 10). The effects fo boating on water quality come mainly from three sources: waste disposal systems, engine exhaust, and the dumping of trash overboard.

All discharges from waste disposal systems must be licensed under M.R.S.A. Title 38, Chapter 3, Section 413. This section included discharges from watercraft. Section 423 specifically states that no discharges will be made from boats into inland waters. Holding tanks are mandatory on boats with sanitary waste systems. Federal and Coast Guard regulations also restrict discharges. Exhaust from watercraft engines and unburned fuel can drastically affect the quality of a watercourse. Muratori (1968) discovered that crankcase exhaust from two-cycle engines (the most popular motorized watercraft propulsion) can discharge as much as forty (40) percent of the fuel to the water in an uncombusted state. English et al (1963) found the levels at which tainting of fish flesh occurs, that the amount of lead emitted is dependent upon the size of the engine and speed of operation, and the BOD of outboard engine exhaust water. Using the results of this study and having data for (or assuming an constant for)the number of engines, engine size, length of time used, speed of operation or rate of fuel consumption, and fuel mixture. The approximate BOD load could be calculated for each watercourse. The results would only be as realistic as the data.

Table 9

OUTBOARD MOTOR CONCENTRATION 10.4
Ten Highest States 1970-71

State	Thousands of motors[a]	1970 Population Per Motor[b]	1970 Rank	Thousands of Motors[a]	1971 Population Per Motor[b]	1971 Rank
Alaska	27	11.2	1	27	11.2	1
Minnesota	325	11.7	3	333	11.4	2
Maine	86	11.6	2	86	11.6	3
Wisconsin	312	14.6	4	322	13.7	4
Florida	430	15.8	5	440	15.4	5
Louisiana	209	17.4	9	226	16.1	6
Washington	214	15.9	6	209	16.7	7
New Hampshire	43	17.2	8	44	16.8	8
Oregon	122	17.1	7	122	17.1	9
Michigan	476	18.9	10	478	18.6	10
New England	481	24.6	--	481	24.6	--
United States	7,215	28.2	--	7,300	27.8	--

a. Estimated outboard motors in use at year-end.

b. Based on U.S. Census, 1970.

Source: "Boating 1971," Boating Industry Associations, 1972.

Table 10

REGISTERED BOAT CONCENTRATION

Ten Highest States, 1970-71 10.5

State	1970 Thousands of Boats[a]	1970 Population Per Boat[b]	1970 Rank	1971 Thousands of Boats[a]	1971 Population Per Boat[b]	1971 Rank
Minnesota	284	13.37	1	304	12.49	1
Wisconsin	312	14.15	2	341	12.94	2
Idaho	48	14.75	3	52	13.71	3
Michigan	435	20.41	6	487	18.22	4
Alaska	15	20.09	5	16	18.44	5
Vermont	22	19.88	4	22	19.82	6
Maine	44	22.46	7	47	21.25	7
Oaklahoma	99	25.90	9	114	22.35	8
Oregon	84	24.79	8	88	23.65	9
Alabama	119	28.93	10	133	25.88	10
New England	260	45.55	--	270	43.99	--
United States	5,128	34.97	--	5,510	36.88	--

a. Based on state registration data supplied to U.S. Coast Guard.

b. Based on U,S. Census, 1970

Source: "Boating Industry Associations, 1972.

Sludge, Septic, and Manure Disposal Areas and Solid Waste Disposal Facilities

Statutes relating to Waste Disposal and Water Quality

Regulation of waste disposal as it affects water quality in Maine may come under one of several statutes (M.R.S.A. Title 38, Chapter 3 Sections 413, 417, 421, Chapter 13 Sections 1301-1308, and/or Title 30 Section 4104-4105). Section 413 states that no person may discharge a pollutant without a license from the DEP. Section 417 limits certain deposits such as forest products refuse, potatoes, and refuse to be directly or indirectly discharged into State waters. Appendix IX-A, B lists the towns that have gone to a public hearing under Section 421, which basically states that there will be no solid waste disposal area or part thereof within three hundred (300) feet of any classified body of water. Sections 1301-1308 compose the Maine Solid the Maine Solid Waste Management Act, a policy to encourage programs that reduce the volume, reuse or recover resources, and will not degrade the environment.

Responsibilities

Under the Solid Waste Management Act each municipality is obligated to provide a solid waste disposal facility for domestic and commercial solid waste generated within the municipality. Under Title 30 each municipality is also obligated to provide for the disposal af all waste from septic tanks and cesspools within the municipality. Appendix X contains the present list of DEP approved septic sludge disposal sites. It is unlawful to discharge these wastes at a site other than one approved by the DEP, except a individual may deposit septage from his residence on his own land in a suitable manner. Legislation has been introduced this session to allow private parties to have sites approved for common disposal. Sludge disposal for municipal wastewater treatment facilities is covered under the DEP reviewing process.

Before the facility plans are accepted for funding a sludge disposal site must be located and approved. This criterion has come about quite recently, therefore a backlog exists of facilities without approved sites.

Manure, Manure Sludge, and Septic Disposal

The Board of Environmental Protection (BEP) has adopted Maine Guidelines for Manure and Manure Sludge Disposal on Land published by the University of Maine Life Services and Agriculture Experiment Station, Cooperative Extension Service, and the Maine Soil and Water Conservation Commission as guidelines for review of site applications for disposal of animal wastes on land. The BEP also uses Maine Guidelines for Septic Tank Sludge Disposal on the Land published by the same agencies when reviewing applications for septic tank and cesspool waste disposal sites.

Spray Irrigated Land

The use of wastes, both human and animal as fertilizer, has been a common practice for centuries in many parts of the world. Several reports have been written regarding the suitability of dairy, food processing, industrial, and municipal wastes for forest and agricultural irrigation and nutrient removal.

The first large scale sewage irrigation operation in the United States was conducted in Augusta, Maine in 1872. C.B. Laken, Treasurer of what was then called the State Insane Asylum is credited with inititating the project. The sewage, about seven thousand (7,000) gallons per day (gpd) was collected into large tanks and mixed with absorbents such as straw, leaves, etc. The solids were removed and spread on the land while the liquid portion was was gravity-removed to the fields. During the summer of 1875 the land irrigated with this sewage yielded three (3) crops of hay. Some of the sewage was also used to irrigate a vegetable garden. The project is believed to have been abandoned soon after Laken's death. The New Hampshire State Asylum at Concord also used sewage for irrigation at about the same time as the Augusta project. In that instance the sewage had to be pumped to the area being irrigated. Around 1890 several town in New England, particularly Massachusetts, were using sewage for irrigation purposes after some form of treatment. The Eighth Annual Report of the State Board of Health of Massachusetts states that "although the crops were very much increased in value the sewage has not been disposed of a Concord in the systematic way which would be necessary in dealing with larger quantities".

From recent work, most investigators seem to be of the opinion that waste disposed by irrigation is a practical and economical method of disposal if reasonable care and responsible planning is exercised. Locational factors to consider include soils, topography, type of cover crop, water table level, etc. Design criteria should pay particular reference to capacity, shape of lagoons, depth, etc.

The Maine Department of Health and Welfare reviews all plans for spray irrigation in the State. The Department is presently in the process of up-dating their guidelines for project review. Appendix XI shows the Department criteria now used to judge a spray irrigation project. The general policy in the past has been that spray irrigation will be considered only when it has been shown that conventional methods of disposal, such as subsurface absorption trenches, or licenses discharge to a watercourse, are impractical. Table 11 contains a list of present spray irrigation operations in Maine.
R.T. French and Taterstate, two Aroostook County potato processing companies, are investigating the possibility of surface disposal in the town of Washburn.

It has been recently shown that this form of disposal is particularly suited to operations such as ski resorts. These operations are primarily seasonal and usually there is large tract ownerships on soils unsuited for other types of disposal.

Table 11

Lagoons and Spray Areas*

Town	Operation	Date of Operation
Bar Harbor	Mt. Desert Regional High School	2-17-69
Big Squaw Twp.	Squaw Mountain Ski Area	7-30-70
Brewer	Ernest Hitchins Mobile Court	before 5- -69
Bridgton	Lakeside Pines Campground--Gerald Doucette	after 12-23-68
Bridgton	Sunrise Land Corporation	1-30-70
Carmel	Grandeur Mobile Home Estates--Berley Leavitt	12-2-71
Carrabassett Valley	Sugarloaf Ski Areas	
**Gorham	Friendly Village Trailer Park	
Kittery	Rest Area & Information Center	2-23-72
Little Squaw Twp.	Squaw Mountain Village Condominium	9-25-72
Mt. Desert	Mt. Desert Campground--Arnold Allen	11-8-67
Poland	Poland Spring Job Corps	approx. 11-21-66
Presque Isle	Golden Gate Trailer Park--Harold Glidden	before 7-24-69
+Rangeley	Saddleback Ski Area	7-3-73
Rome	Pine Tree Camp for Crippled Children	after 11-24-66
++Saco	Wildwood Development--Nicholas Scontras	11-27-72
Sandy River Plt.	Saddleback Ski Area--20 Condominium Units	12-20-73
Waterville	Countryside Mobile Homes Park--Russell Legare	1-4-73
++West Bath	Pettengill Apartments (now Green Acres Apt.)	

* List from Maine State Department of Health & Welfare ** Seasonal * Seasonal with winter experimental plot
++ Saco and West Bath are not presently using this form of disposal

Highway Deicing Compounds

The application of deicing chemicals to highways during the winter months has become standard practice in New England during recent years. Until the 1960's highway maintenance departments relied primarily on the use of abrasives for snow and ice control. However, abrasives are less efficient then chemical deicers and therefore do not coincide with "June conditions in January" or "bare-pavement" policy of our increasingly mobile society. This has led to the expanded, and almost complete, use of chemical deicing compounds. Accompanying this surge in use has been the increasingly vocal opposition of environmentalists from all of the snow belt states.

Hutchinson reported that most New England states apply between twenty (20) and twenty-five (25) tons of salt per mile of two land road each winter, although the amount varies with grade and amount of snowfall. The State of Maine purchased eighty-seven thousand (87,000) tons of chloride salts during fiscal year 1964-65. Additional purchases by municipalities raised the State total to one hundred thousand (100,000) tons. During the 1967-68 winter season the State of Maine purchases alone reached a high point of one hundred ten thousand, six hundred and seventy-one (110,671) tons. Due to the low comparative cost and high degree of effectiveness, the majority of this was sodium chloride (NaCl).

In Maine, Hutchinson found that wells and farm ponds adjacent to highways that receive heavy salt applications were seriously contaminated by chloride ions. About one-fifth of the wells sampled in the two year period 1966-68 exceeded the U.S. Public Health Service standard for potable water and many of the other wells approached the limit. The average distance from the road for the wells sampled was forty (40) feet whereas the average for those exceeding the standard was twenty-four (24) feet.

It is reported that the State of New Hampshire up until 1965 had replaced more than two hundred (200) roadside wells, due to contamination by road salts. Storage piles of highway deicing salts have also been credited with contaminating wells. Although the chloride concentrations in the farm ponds were well under the latest limits suggested for livestock and wildlife, the influence of highway deicers was clearly shown. Soils adjacent to the highways contained sodium levels that are known to affect vegetation and drainage. However, sampling of major rivers indicated that ion concentrations are not significantly raised by highway deicing practices. It is believed that high sodium and chloride oin levels coincide with, and are offset by, the maximum flows due to spring run-off.

The U.S. PUblic Health Service Drinking Water Standards (Appendix XII) and the U.S. EPA Water Quality Criteria 1972 recommend rejection of water for domestic uses that has a chloride concentration of two hundred and fifty (250) milligrams per liter (mg/l). However, a desired water quality level has been set at twenty-five (25) mg/l by the National Technical Advisory Committee to the Secretary of the Interior. This level was based primarily on taste and palatability although water containing two thousand (2,000) mg/l chloride has been used for human consumption without adverse effects. Harmful effects from salts have been noted in people with heart or kidney diseases and pregnant women but no evidence is available linking this to highway deicing salts.

Animals seem to be more tolerant of high salt in concentrations than humans but little is known about actual tolerance levels. Fish also seem to tolerate high salt concentrations but according to Highway Research Program Report 91, fifty (50) percent of the U.S. waters that support a good mixed fish fauna have less than nine (9) mg/l chloride.

Compounding the potential chloride and sodium problem is the fact that additives are used with highway salts to prevent caking and to inhibit rust and corrosion. The anti-caking agents, ferric ferrocyanide, (Prussian Blue) and sodium ferrocyanide (YellowPrussiate of Soda) are the two most common additives in highway deicing compounds. Prussian blue is insoluble in water and does not release cyanide when acidified, but yellow prussiate of sode (YPS) is the agent most commonly used in Maine (at the rate of .2 lbs/per ton of salt). It is soluble in water and decomposes in the presence of sunlight forming hydrogen cyanide (HCN). Most of the literature dealing with the toxicity of cyanides and hydrogen cyanides expresses toxicity in terms of the cyanide ion but safe HCN concentrations and acceptable LC_{50} figures (lethal concentrations for 50% of the population) have not been shown. For this reason the EPA Proposed Criteria for Water Quality and Water Quality Criteria,1972 recommend no concentration greater than 0.005 mg/l for aquatic life. Presently deicing compounds in Maine contain no rust and corrosion inhibitors.

The State of Maine, through its Department of Transportation (DOT), has played a major role regarding the impact of highway deicing compounds. DOT sponsored research has led to modification of many practices and implementation of others. Reduction of salt use from a high in 1968 of over 110 thousand tons to a 1972 level of 80 thousand tons has eliminated excessive salt applications and saved the State an estimated three-quarters of a million dollars annually.

This was made possible by:

Developing a restrictor for tailgate-type sanders.

Developing a method of calibrating both tailgate and hopper type sanders.

Reducing allowable salt moisture content to insure a continuous rate of application.

Conducting seminars for supervisors, truck drivers, and others involved with application.

Other methods DOT is using to reduce impact include installing maintenance buildings over salt storage piles, experimenting with various types of asphalts to spray on uncovered piles to reduce leaching, and experimenting with gypsum to reduce sodium concentration in soils adjacent to highways that have received heavy salt applications.

Recently DOT has supported research dealing with the anti-caking compounds. Preliminary results of concentrations from wells on salt storage lots indicate that, in these instances, contamination is not a problem. However, runoff from sand-salt piles, left uncovered, and from other maintenance lots, is to be monitored and analyzed this winter.

APPENDICES

Appendix I .

THE CAPABILITY CLASSIFICATION SYSTEM

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used, and the way they respond to treatment when used for the common field crops and pasture plants. The classification does not apply to most horticultural crops or to rice and other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation but without consideration of major and generally expensive land-forming that would change the slope, depth, and other characteristics of the soils, and without consideration of possible but unlikely major reclamation projects.

In the capability system, all the kinds of soil are grouped at three levels: the capability class, the subclass, and the unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, so shallow, or otherwise so limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be as many as four subclasses. The subclass is indicated by adding a small letter, e, w, s, or c, to the class numeral, for example, IIe. The letter e shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; w means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artifical drainage);

s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used only in some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses w, s, and c, because the soils in it are subject to little or no erosion but have other limitations that restrict their use.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to be similar in productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about the management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for e ample IIe-5 or IIIw-3. Thus, in one symbol, the R man numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs. The Arabic numeral identifies the capability unit within the subclass.

Appendix II A .

INSECTICIDE - FUNGICIDE SCHEDULE FOR POTATOES - 1974

PRINCIPAL PEST	MATERIAL- RATE PER ACRE	REMARKS
	AT PLANTING- SYSTEMIC INSECTICIDE IN FERTILIZER BAND	
Aphids Leaf Hopper Some control of flea beetles and Colorado Potato Beetles	disulfoton (DiSyston 15% granules) 10 to 20# or Phorate (Thimet 10% granules) 20 to 30#	Both materials should be applied uniformly in fertilizer band. Phorate may be more effective on flea beetles or Colorado Potato Beetles, at the highest recommended rate. Disulfoton should not be used within 75 days of harvest and Phorate 90 days. Seed growers may want to use higher rates; other growers as well if aphids have been a problem in their area.
	AT OR JUST AFTER EMERGENCE - REPEAT AS NECESSARY	
Flea Beetles Colorado Potato Beetles - some aphid control	Azinphosmethyl (Guthion) 6 to 8 oz. of active or 1½ pts. of 2# per gallons material or Carbaryl (Sevin or Sevimol-4) ½ to 1 lb. active or Endosulfan (Thiodan) 2# EC 1 to 2 quarts or Imidan* 50WP 2# per acre	Guthion is the best material for Colorado Potato Beetles, good on Flea Beetles, and some other insects, but not effective on aphids. Lowest rate of Carbaryl will only control larvae early in the season. More effective if applied when weather is hot with calm conditions as it needs fumigation action to be most effective. Follow Label Directions

SEASONAL PROGRAM - AT WEEKLY INTERVALS STARTING WHEN PLANTS ARE 8 TO 10" HIGH

Late Blight & Early Blight	Manebs - (Dithane M-22 Manzate, Maneb) Zinc Iron-Maneb Complex - (Dithane M-45, Manzate 200) 1 to 1½ lbs. Difolatan (4#/gal. Flowable) 1½ to 3pts. Polyram - 1-2 lbs.	Where early blight has been a problem in the past - start the weekly sprays early - not later than July 10 in Aroostook or late June in So. Maine. Band spraying over the row when cultivating would save material.
	Bravo* 6F ½ to 1½ pts. (For Trial Use)	Use the higher rates late in the season and/or when blight conditions are serious. Do not use surfactants with Bravo.
	Duter 4 oz. plus Maneb 0.75#	Late in the season for tuber rot control.

SEASONAL FOR INSECTS - COMBINE WITH FUNGICIDE PROGRAM AS NEEDED

Aphids - will also control other insects	Endosulfan (Thiodan 2# EC) 1 to 2 quarts	Works best if applied when weather is warm and air is calm. For seasonal control use weekly starting the first part of July.
	Demeton (Systox 6#/gal. EC) ¼ to 2/3 pts.	Apply to foliage not closer than 21 days to harvest. Seed growers should apply 10 to 14 day intervals.
	Oxydemeton methyl (Meta Systox R) 2#/gal. LC 1½ to 2 pts.	Suggested for aphid control in Central and So. Maine or in Aroostook where aphids are hard to kill. Apply at intervals not over 10 to 14 days- not closer than 7 days to harvest.
	Monitor 1½ to 2 pts.	Suggested if aphids become a problem in mid-August. Do not apply later than 14 days before harvest.

Other materials that may be effective include: Parathion, Lannate Malathion, Phosdrin, Phosphamidon, Azondrin, and Dimethoate (Cygon EC 2.67%/gal.). Follow label directions for their use.

*Trade Names

*Obtained from the University of Maine Cooperative Extension Service

Appendix II B .*

CHEMICAL WEED CONTROL IN POTATOES

WEED PROBLEM AND WHEN TO APPLY	MATERIAL - RATE PER ACRE	COMMENT
ANNUAL BROADLEAF WEEDS		
1. Pre-emergence to potatoes	Premerge or Sinox PE (DNBP Amine) 2 to 6 quarts in 30 to 100 gallons of water	Best results will be obtained when soil is moist. If temperature is 90 or above or is forecast within 2 to 3 days and soil wet, limit to 3 quarts; 2 to 3 quarts ample for broadleaf weeds ½-inch or less. Use the higher rate if weeds are larger and weather cool, or when residual weed control is desired.
ANNUAL BROADLEAF WEEDS AND ANNUAL GRASSES		
1. Pre-emergence to potatoes	Premerge or Sinox PE (DNBP Amine) 5 to 6 quarts in 30 to 100 gallons of water	If possible, delay until 1 to 3 days before potatoes emerge but apply before grasses are ½-inch high. See precautions above.
2. Pre-emergence to potatoes	Premerge or Sinox PE 2 to 6 quarts plus Dalapon (Dowpon) 3 to 5 lbs. in 40 to 50 gallons of water	Apply when annual grass is not more than ½-inch high. Use the higher rate of Premerge or Sinox PE if broadleaf weeds have more than 3 true leaves or where residual weed control is desired. DO NOT USE Dowpon on White Rose or red-skinned varieties.
3. At planting or within 5 days thereafter	Linuron (Lorox 50W) 2 to 4 lbs. in 40 to 100 gallons of water. (Do not exceed above rate)	Constant tank agitation required. Seed should be covered with at least 2 inches of soil or crop injury may result. Heavy rain after application may cause injury to potatoes. Do not apply after potatoes come up. Do not repeat application or plant other crops within 4 months of treatment. Do not overlap. Apply as soon after planting as possible. Needs moist soil to activate.

4.	At or before ground crack	Paraquat EC 1 to 2 pints or ¼ to ½# Active	Apply at or before ground crack on round white and before ground crack on Russet Burbanks. Keep material off skin and out of eyes, nose and mouth. FOLLOW PRECAUTIONS LISTED ON THE LABEL.
5.	Pre-emergence	Chlorbromuron Maloran or Bromex (50 WP 4.0 to 6.0 lbs. per acre)	Use the lower rate on lighter soil type. Do not use on sandy soil as crop injury may result.
6.	Late-postemergence to potatoes (Lay-by treatment) For weeds that come up after last hilling, apply chemical at next to last hilling. Will not control mustard or kale.	Eptam 5 granular 60 to 80 lbs. or Eptam 6E 4 quarts in 20 to 100 gallons or Eptam 10G - 30 to 40 lbs.	Apply to loose mellow-moist or drier soil. Till soil if crusted. Apply when foilage is dry; use cloth drag to shake granules to the ground. Cultivate or hill within 20 minutes. DO NOT APPLY WITHIN 45 DAYS OF HARVEST. If soil surface is not dry and loose, pre-cultivate. Direct spray with nozzles in front of cultivators or hillers for soil incorporation while cultivating and/or hilling. Adjust 80° nozzles, one each side of row, to cover soil uniformly. For best results use vine lifters to part vines. DO NOT APPLY WITHIN 45 DAYS OF HARVEST.

NUTSEDGE (Nutgrass)

1.	Before planting (Will also control broadleaf weeds and annual grasses)	Eptam 6E 4 quarts in 20 to 100 gallons of water or Eptam 5G (granular) 100 to 120 lbs.	Apply only on well-tilled, loose mellow-moist or drier soil, when dry surface -- not in wet soil. Spray when there is little or no air movement. Mix throughly (within 20 minutes) to 6-inch depth; rototill, or disk twice with tandem disk with trailing spike harrow or plant to seal.
2.	Pre-emergence to nutsedge after planting	Same as above	Apply before nutsedge spikes show, about 1-2 weeks after planting. "Drag-off" first to level and loosen soil surface. Apply when little or no air movement and only if soil is loose mellow-moist or drier, not when soil is wet. Permit soil surface to dry before application. Double cultivate within 20 minutes.

WEED PROBLEM AND WHEN TO APPLY	MATERIAL - RATE PER ACRE	COMMENT
QUACKGRASS (Couchgrass, Witchgrass)		
1. Preplowing application. Late summer or early fall of the year before potatoes.	Dalapon (Dowpon) 85% salt 10 to 20 lbs.	Plow either in the fall or in early spring. Grass should be growing vigorously when treated.
2. Preplowing application early spring of crop year	Dalapon 7 to 10 pounds per acre in 30 to 50 gallons of water - add wetting agent as per label	In spring apply when grass is 4 to 6 inches high. Plow under after 4 to 7 days. DO NOT USE on red-skinned or White Rose varieties. Potatoes may be planted immediately after plowing.
3. Pre-emergence to potatoes	Same as above	Spray before any potato plants are showing. DO NOT USE on red-skinned or White Rose varieties. Quackgrass shoots should have emerged before Dowpon is applied. Do not combine Dowpon with Premerge or Sinox PE for quackgrass control.
4. Before planting	Eptam - 4 quarts of 6E or 100 to 120 lbs. of 5%	Quackgrass roots must be cut up throughly by disking, before application. Work thoroughly into soil after application.

* obtained from the University of Maine Cooperative Extension Service

Appendix III A .

STATE OF MAINE REVISED STATUTES
TITLE 22, CHAPTER 258
BOARD OF PESTICIDES CONTROL

S. 1451. PURPOSE AND POLICY

For the purpose of assuring to the public the benefits to be derived from the safe, scientific and proper use of chemical pesticides while safeguarding the public health, safety and welfare, and for the further purpose of protecting the public interest in the soils, water, forests, wildlife, agricultural and other natural resources of the State, it is declared to be the policy of the State of Maine to regulate the sale and application of chemical insecticides, fungicides, herbicides and other chemical pesticides.

S. 1452. BOARD OF PESTICIDES CONTROL

There is established a Board of Pesticides Control to be composed of the Commissioner of Agriculture, the Commissioner of Health and Welfare, the Director of the Bureau of Forestry, the Commissioner of Inland Fisheries and Game, the Commissioner of Marine Resources, the Chairman of the Public Utilities Commission, the Commissioner of Transportation and the Commissioner of the Environmental Protection. The Commissioners of the state departments may appoint agents to serve in their absence. The board shall elect annually a chairman from its own membership and be authorized to employ necessary personnel.

S. 1453. DEFINITIONS

The listed terms as used in this chapter are defined as follows unless a different meaning is plainly required by the context:

1. Aircraft. "Aircraft" means any machine or device used or designed for navigation of, or flight in, the air.

2. Board. "Board" means the State Board of Pesticides Control as established in section 1452.

3. Custom application of pesticides. "Custom application of pesticides" means any application of pesticides by aircraft or ground equipment for hire.

4. Fungi. "Fungi" means all nonchlorophyll-bearing thallophytes, that is all nonchlorophyll-bearing plants, of a lower order than mosses and liverworts, including but not limited to rusts, smuts, mildews and molds.

5. Fungicide. "Fungicide" means any substance or mixture of substances intended for destroying or repelling any fungi or mitigating or preventing damage by any fungi.

6. Ground equipment. "Ground equipment" means any machine or device, other than aircraft, for use on land or water, designed for, or adaptable to , use in applying pesticides as sprays, dusts, aerosols, or fogs, or in other forms.

7. Herbicides. "Herbicides" means any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any weed.

8. Insect. "Insect" means any of the numberous small invertebrate animals generally having the body more or less obviously segmented, for the most part belonging to the class Insecta, comprising 6-legged, usually winged forms, including but not limited to beetles, bugs, bees, flies and to other allied classes or arthropods whose members are wingless and usually have more than six legs, including but not limited to mites, ticks, centipedes and wood lice.

9. Insecticide. "Insecticide" means any substance or mixture of substances intended for destroying or repelling any insect, or mitigating or preventing damage by any insects.

10. Pesticide. "Pesticide" means any substance or mixture of substances:

A. Intended for destroying or repelling, mitigating or

preventing damage by any insect, fungus, weed, snail, slug, rodent, nematode, or other form of plant or animal life; or
B. Intended for use as a plant regulator, defoliant or desiccant.

11. Weed. "Weed" means any plant which grows where not wanted.

S. 1454. LICENSES

1. Application. No person shall engage in custom application of pesticides, as defined in section 1453, within this State at any time without a license issued by the Board. An annual fee of $10.00 shall be collected by the Board for each license. Application for a license shall be made to the Board. Each application for a license shall contain such information regarding the applicant's qualifications and proposed operations and other relevant matters as required by the Board. The Board shall maintain a complete and up-to-date list of licensed applicators and shall annually publish all regulations in effect.

2. Examination. The Board may require the applicant to show, upon examination that he possesses adequate knowledge concerning the proper use and application of pesticides, and the dangers involved and precau ions to be taken in connection with their application. If the applicant is other than an individual, the applicant shall designate an officer, member or technician of the organization to take the examination, such designee to be subject to the approval of the Board. If the extent of the applicant's operations warrants it, the Board may require more than one officer, member or technician to take the examination.

3. Restrictions. If the Board finds the applicant qualified and if the applicant meets the requirements under

S. 1454-A. AQUATIC APPLICATION: PERMITS

No person, firm, corporation or other legal entity shall apply pesticides to or in any river or stream or tributary thereof, or any great pond, without a permit from the Board.

Applications for such permits shall be made, on such forms and containing such information as the Board may require.

If, on the basis of the application for the permit, the Board finds that the proposed application of pesticides will conform to applicable laws and regulations and is unlikely to adversely affect any plant or animal life, other than that sought to be controlled, it may grant the permit.

Any permit to apply pesticides granted by the Board under this section may contain such reasonable terms and conditions with respect to such application as in the Board's determination may be necessary to insure compliance with applicable laws and regulations and to protect plant and animal life other than that sought to be controlled.

S. 1455. INSPECTION

The Board may provide for inspection of any pesticide materials and any equipment, device or apparatus used for application of pesticides and may require proper repairs or other changes before its further use for application.

The Board may provide, in any permit granted pursuant to section 1454-A, that the permittee submit to reasonable periodic inspections, by authorized employees of the Board or of agencies represented on the Board, of its pesticide application procedures conducted under such permit, the reasonable cost of such inspection to be borne by the permittee.

S. 1456. REGULATIONS

The Board may regulate and control all use of pesticides in this State through regulations promulgated by it pursuant

to Title 5, chapter 303, Such regulation may concern, but not be limited to: Areas of application; chemical content and labeling; methods of application and unsafe practices; critical areas where use of pesticides should be restricted; limitations on use; disposal, transportation and storage; qualifications and training of pesticide users; and sale and distribution.

In promulgating such regulations, the Board shall consider pertinent research findings and the recommendations of other agencies.

S. 1457. EMERGENCY SITUATIONS

The Board may without public hearing suspend for a period not to exceed ten days, any existing regulations relative to the use of pesticides in specific land and water areas in which an emergency situation has developed, appears to be developing or should not be allowed to develop.

S. 1458. REPORTS

The Board may, by regulation, require licensees and permittees to maintain such records and furnish reports giving such information with respect to particular applications of pesticides as it may deem necessary.

S. 1459. REGULATIONS

Regulations made pursuant to this chapter shall not be inconsistent with regulations issued by this State or by the Federal Government respecting safety in air navigation or operation of aircraft. Before issuing regulations directly related to any matter within the jurisdiction of any other official of this State, the Board shall consult with that official with reference thereto.

S. 1459-A. APPEAL

Any person aggrieved by any action of the Board may obtain a review thereof by filing in the Superior Court within 30 days of notice of the action, a written petition praying that the action of the Board be set aside. A copy of such petition shall forthwith be delivered to the Board, and within 30 days thereafter the Board shall certify and file in the court a transcript of any record pertaining thereto, including

a transcript of evidence received, whereupon the court shall have jurisdiction to affirm, set aside or modify the action of the Board, except that the findings of the Board as to the facts, if supported by substantial evidence, shall be conclusive.

S. 1460. INFORMATION

The Board, on its own or in cooperation with others may publish information regarding injury which may result from improper application or handling of pesticides and methods and precautions designed to prevent such injury.

S. 1461. PENALTIES

Any person who violates this chapter, or the regulations issued hereunder, shall be guilty of a misdemeanor and, upon conviction, shall be punished by a fine of not more than $100.00 for the first offense and not more than $500.00 for each subsequent offense. Each day that any person operates without a license or permit required by this chapter shall be considered a separate offense.

The Board may bring an action to enjoin the violation or threatened violation of any provision of this chapter or any regulation made pursuant to this chapter in the Superior Court of the county in which such violation occurs or is to occur.

No state court shall allow recovery of damages against any member, employee or representative of the Board for any administrative or enforcement action taken if the court determines that there was probable cause for such action.

S. 1462. EXEMPTIONS

1. Building and vehicles. This Chapter shall not apply to application of pesticides within or under buildings or within vehicles, ships, aircraft or other means of transporting persons or property by land, water or

air. The use of pesticides in or under farm buildings other than dwellings shall continue to conform to existing State and Federal regulations.

2. Forestry. The Board may be regulation exempt from the licensing provisions of section 1454 any applications made by the Bureau of Forestry under the emergency authority contained in Title 12, chapter 213.

3. Agriculture. The Board may be regulation exempt from the licensing provisions of section 1454 casual agricultural applications by bona fide farmers.

4. Arborists. Persons licensed under Title 32, chapter 29, subchapter II, may be licensed by the Board without fee or examination to spray or treat shade, ornamental or forest trees in Maine for control of any diseases, injuries or insects.

Persons who apply herbicide shall be required to license under this chapter.

S. 1463. RIGHT OF ENTRY

The Board or its agents may enter upon any public or private premises, owned or utilized by any licensee, at reasonable times in order to have access for the purposes of inspecting any aircraft or ground equipment or pesticide materials subject to this chapter.

Enforcement personnel as designated by the Board under section 1465 are authorized to apply for and execute such search warrants as they may deem necessary to enforce this chapter. The manner of application and execution shall be that provided for by the statutes and rules of court of this State.

S. 1464. COOPERATION

The Board may cooperate with any other agency of this State or its subdivisions or with any agency of any other State or of the Federal Government for the purpose of administering this chapter and of securing uniformity to regulations.

S. 1465. ENFORCEMENT

This chapter and the rules and regulations promulgated thereunder shall be enforced by such personnel of the State agencies listed in section 1452 as the Board may designate.

subsection 5, and if the applicant applying for a license to engage in aerial application of pesticides has met all of the requirements of the Federal Aviation Agency, the Maine Department of Transportation and any other applicable federal or state laws or regulations to operate the equipment required, the Board shall issue a license for the calendar year to perform application of pesticides within this State. The license may restrict the applicant to the use of a certain type or types of equipment or materials if the Board finds that the applicant is qualified to use only such type or types. If a license is not issued as applied for, the Board shall inform the applicant in writing of the reasons therefor. Such license may be issued with such terms and conditions as the Board deems necessary for the enforcement and administration of this chapter and the rules and regulations promulgated under this chapter.

4. Suspension. The Board may suspend, pending inquiry, for not longer than ten days, and, after opportunity for a hearing, may revoke or modify the provisions of any license issued under this section, if it finds that the licensee is no longer qualified, has engaged in fraudulent business practices in the application of pesticides, or has made any application in a faulty, careless or negligent manner, or has violated this chapter or regulations made thereunder.

5. Proof of financial responsibility. The Board shall require from each applicant proof of financial responsibility in amounts to be determined under such rules and regulations as made by the Board.

6. Nonresidents. The Board may issue a license, without examination, to a nonresident who is licensed in another state substantially in accordance with this chapter.

S. 1466. SUBPOENAS

The Board may issue subpoenas to compel the attendance of witnesses and production of books, documents and records anywhere in the State in any hearing affecting the authority or privilege granted by a license or permit issued under this chapter.

If any person refuses to obey a subpoena issued by the Board under this section, the Board may apply to any Justice of the Superior Court for an order compelling such person to comply with the requirements of the subpoena. Such justice may issue such order and may punish failure to obey the same as a contempt thereof.

Appendix III-B .

STATE BOARD OF PESTICIDES CONTROL
VICKERY-HILL BUILDING
AUGUSTA, MAINE 04330

Part 1

GENERAL REGULATIONS

1. Prior to the issuance of a license the applicant shall demonstrate to the Board proof of financial reponsibility. Financial responsibility shall consist of minimum insurance coverage as follows:

1. Ground applicators:

Public liability	$20,000 each person
Public liability	$40,000 each occurrence
Property damage including chemical liability	$10,000 each occurrence $25,000 aggregate

2. Aircraft applicators:

Public liability	$50,000 each person
Public liability	$100,000 each occurrence
Property damage	$50,000 aggregate
Property damage	$25,000 each occurrence

Companies issuing policies are to send proof of or certificates of insurance to the Board. Policies or certificates of proof of such shall include a provision that 10 days' notice must be given to the Board prior to cancellation. Policies issued pursuant to this section shall cover all activities of the applicant and his employees related to the use and application of any pesticide.

2. The Board shall issue licenses for the calendar year which may be renewed upon payment of the $10.00 fee provided that the licensee has complied with all applicable regulations and statutes during the prior year. No license shall be renewed by the Board until all the licensee's reports of the prior year's pesticide applications have been

received, or until the Board has received written notification from the licensee that he did not engage in custom application of pesticides in Maine during the prior year.

3. Any municipality applying pesticides by municipal crews or employees shall have at least one licensed employee, but the Board shall charge no fee for licensing said employee. Said licensed employee shall supervise all pesticide applications by municipal crews or employees of said municipality. The Board may require as many other municipal employees to be licensed as it seems necessary. Municipalities shall file reports of all pesticide applications by municipal crews or employees, in the manner specified in Section 8.

4. Pesticide demonstrators shall either be licensed or shall make all demonstration pesticide applications through licensed applicators.

5. All licensees, their employees or persons operating under their direction, shall cooperate with all representatives and enforcement personnel of the Board, and shall permit representatives or enforcement personnel of the Board to take a sample of any pesticide being applied at any time, or to inspect any equipment used for application.

6. Any person, licensed by the Board to apply pesticides, shall acquaint his employees and those working under his direction with the hazards involved in the handling of the pesticides to be employed as set forth on the pesticide label, and shall instruct such persons as to the proper steps to be taken to avoid such hazards. Individual users of pesticides shall also become familiar with these hazards and precautions before using pesticides.

7. All persons, including licensees, applying pesticides shall provide, for the protection of their employees and persons working under their direction the necessary safety equipment as set forth on the label of the pesticide to be used. Individual users shall employ the necessary safety equipment.

8. Every custom application of pesticides shall be reported to the Board within 15 days of the start of such application on a form prepared and furnished by the Board. Continuing projects shall be reported at 15-day intervals until completed. A duplicate copy of the report shall be kept by the licensee. The following information shall be reported by the licensee.

Application Date(s), Town, Company, Operator's Name, Contracting Party, Exact Location, Size of Area (Acres, road mileage, number of shade trees, etc.), Pesticide, Dilution applied, Dosage applied, Method of application, Target organism, Disposition of unused material, empty containers, etc., Difficulties Encountered (equipment trouble, spillage, spray stream problem, leaks, weather).

9. The use of any pesticide not registered by the Maine Department of Agriculture in accordance with guidelines of the U.S. Environmental Protection Agency is prohibited except as otherwise provided in Section 10, whether such use is by a custom applicator, an individual user or any other person.

10. The use of registered pesticides for other than registered uses, or at greater than registered dosages, or at more frequent that registered intervals is prohibited. Application or use of unregistered pesticides and unregistered applications or uses of registered pesticides may be made for experimental purposes only after prior approval of the Board, except that such use by research personnel of state and federal agencies and the University of Maine shall be allowed without prior approval, provided that the Board is furnished a listing of the names, purposed uses, use locations and any anticipated amounts of such chemical compounds prior to their use. All persons making experimental applications pursuant to this section shall file reports with the Board by the end of each calendar year. Reports shall include name of chemical, dosage applied, location of application, size of area treated (e.g., acres, square feet, number of trees, etc.) method of application, target

organism, and any other information which the Board may require for assessment of the environmental impact of these uses.

11. Deciduous growth over six feet in height and evergreen growth over three feet in height shall not be sprayed with a herbicide within the right-of-way of any public way except that deciduous growth which has been cut to the ground and which has grown more than six feet during the growing season following the cutting, may be sprayed that following season.

12. No person, firm, corporation or other legal entity shall apply any pesticide to or in any river, stream, brook, creek or other waterway; any marsh, pond, lake or body of water that drains into such waterway; any body of water used for public or private water supply; any great pond; any coastal wetland as defined in Title 12 M.R.S.A. 4701 or any tidal waters without approval of the Board.

Applications for approval shall be made to the Board in writing and shall include a complete description of the area of application, the pesticide to be employed, the necessity of such application, the likelihood of harm to human health or the environment, the qualifications of the applicant, and such further data as the Board may subsequently require.

Any pesticide application made under the provisions of this regulation must be reported to the Board on forms furnished by the Board within ten calendar days of such application.

13. Except as otherwise permitted by the Board pursuant to Section 12, no spraying machines, tank vehicles, or trailers carrying pesticides or other equipment used for the application or transportation of pesticides shall be placed in any body of water specified in Section 12, nor shall the overflow, leakage, or residue from any such equipment, vehicles, trailers, or pesticide containers carried thereon be permitted to flow into any such body of water or any well or open spring.

14. Empty pesticide containers which the manufacturer specifies are returnable to the manufacturer shall be returned to such manufacturer and may not be disposed of in any other manner within the State of Maine, except that empty pesticide containers may be sold to reconditioning companies that decontaminate such containers in accordance' with Federal regulations. All other pesticide containers shall be disposed of in accordance with Section 15.

15. Empty pesticide containers shall be (1) stored in a safe place pending development of a satisfactory disposal method, or (2) perforated or crushed, and buried under at least 18 inches of compacted dirt, gravel or similar cover material. Burial shall be on (1) the land of the applicator or on (2) the land of and with the approval of a person other than the applicator. No such container be buried or disposed in such a manner that any pesticides may drain into any waters specified in Section 12, or any well or open spring.

16. Surplus or unused pesticides shall be (1) stored in a safe place pending further use or the development of a satisfactory disposal method, (2) buried according to the directions given for empty containers in Section 15, or (3) returned to the manufacturer provided the manufacturer has specified that such materials are returnable. For purposes of this section and Section 15, "safe place" means a place that is secure from unauthorized persons, that is under the control of the owner or user of such material and presents no hazard to human health or to any form of plant or animal life. No such material shall be buried or disposed of in such a manner that is may drain into any waters specified in Section 12, or any well or open spring. The Board considers storage in a safe place or authorized return to the manufacturer to be preferable to burial.

PLEASE NOTE: The licensing provisions of these regulations pertain only to custom applicators, i.e., those who apply pesticides for hire. All other provisions apply to all other pesticide users.

Appendix IV.

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JFRBC - Jounral of the Fisheries Research Board of Canada

APPENDIX V
SECTION ON THERMAL EFFECTS FROM
INDUSTRIAL WASTE GUIDE ON LOGGING PRACTICES

Thermal Effects

Logging of all trees to the water's edge exposes the stream to the full impact of heating by the sun with increases of water temperatures to levels damaging to the cold water fisheries. Water temperature increases are particularly damaging in small spawning streams in the summer months when the sun is highest in the sky, cloudless days more frequent, and stream flows lowest.

Measurements of summer temperatures in small streams flowing through logged and unlogged forest areas show water temperature increases of 14 - 16 degrees Fahrenheit in the unprotected stream. Temperature increases of this magnitude produce stream temperatures which are far in excess of optimum and are even in the range of temperatures known to be damaging to resident and anadromous fish which spawn, grow, and migrate in the small forest streams.

APPENDIX VI

MONDAY, OCTOBER 21, 1974

Officials to plan war on spruce budworm

By JEAN BRAUCHER
Associated Press Writer

State and federal officials will meet here Monday with representatives of Maine's forest products industry to work on a battle plan to take on what Robley W. Nash, state entomologist, calls "the most serious problem ever facing Maine's forest."

The enemy is the spruce budworm, which in its damaging stage is no more than three-quarters of an inch long. In the massive intensity expected next year, the budworm could cause extensive defoliation and the death of forests, Maine's greatest resource, unless checked by spraying.

Based on field surveys, Nash estimates that 3 million to 3.8 million acres will have to be sprayed in June, 1975, at a cost of more than $6 million.

Last June, the state sprayed less than one-sixth that area, 420,000 acres. The most acres ever sprayed in one year is 500,000.

If the spraying is not done, it could mean the loss of 30 million cords of balsam fir and white and red spruce.

Adding to the complexity of the problem are the lack of a firm source of the necessary insecticide and the question of who will pay for the spraying. The insecticide is scarce because it is petroleum-based and made by only one company in this country.

This year, the more than $1 million cost of spraying was split by the federal government and the state. Landowners paid a state tree-growth tax based on productivity.

Previously, the cost was split three ways between the state, the federal government and the landowners, according to the Maine Paper Industry Information Office.

Elizabeth Lorusso of the information office said there is some sentiment that this coming year the landowners should kick in more than they are paying under the tree-growth tax.

The legislature will have to decide this question in the next session, she said.

The only firm that makes zectran, the insecticide used now, is Dow Chemical, which has stopped producing it. Nash said the state is negotiating with Dow to resume production.

In case that fails, Maine is looking into the use of the insecticide used in Canada, fenitrothion, which is produced in Japan. This chemical has not yet been approved by the federal Environmental Protection Agency, but Nash said EPA is reviewing it and clearance may come by next June.

This year the spraying was done in northwest and northeast Aroostook County, at the junction of Penobscot, Piscataquis and Aroostook counties and in the eastern part of Washington County.

Nash said field reports indicate that next year the spraying will have to be done in the general area north of Moosehead Lake, with a good portion of that section of the state needing treatment.

What has caused the tremendous boom in budworm population is the favorable weather conditions which prevailed particularly this year and for several years before that during the larval stage of the insects. The larval stage is in late May and June.

State forests face disaster

By BOB CUMMINGS
Press Herald writer

Maine's forest lands are facing a disaster 10 times greater than the forest fires of 1947 — a disaster which possibly only DDT can avert.

This was the contention Wednesday as the legislature's Natural Resources Committee held a public hearing on what is shaping up to be the worst spruce budworm infestation in history.

"We really have a crisis," said Fred Holt, director of the Bureau of Forestry. He predicted 3.5 million cords of wood would die if spraying is not carried out next year.

And he said that in future years "the death of trees would accelerate rapidly," until eventually the bulk of this state's spruce-fir forests are wiped out. "The forest industry is too important. This state can't afford such a loss," Holt said.

In prepared remarks, Holt did not mention DDT. But he said there is a critical national shortage of both Zectran and Sumathion — the two chemicals Maine has used in the past. DDT came up in response to questions from State Rep. Neil Rolde—D–York. "We only have been able to find enough Zectran and Sumathion to spray 500,000 acres," Holt said. "We need to spray 3.5 million acres. My department has been on the phone hourly seeking alternative chemicals."

"Does this mean DDT?" Rolde asked.

"We are looking into all possibilities; DDT is definitely a possibility," Holt declared.

Holt said he has been hesitant to recommend DDT because of the widespread opposition its use would generate. But he said the state may have no other alternative.

He blamed the scarcity of conventional pesticides on the oil shortage. Zectran is manufactured only by Dow Chemical Co. and that company has ceased production and doesn't plan to make any more.

Both Zectran and Sumathion — which is made only in Japan — are manufactured from petroleum products.

Environmental groups agreed that Maine's forests face a disaster if a solution isn't found to the budworm problem.

But they insisted that a return to DDT would be an even greater disaster.

"It seems absurd," said Clifford H. Goodall, executive director of the Natural Resources Council of Maine, "to again consider DDT when the whole world is worried about its food supply and DDT poses a grave threat to the food cycles of the oceans."

Raymond Bond, head of the fisheries division of the Maine Department of Inland Fisheries and Game said his agency would oppose the use of DDT anywhere in the state.

Richard B. Anderson, executive director of the Maine Audubon Society said his group also opposes any return of DDT.

"Three and a half million pounds of DDT would be required," Anderson said in a statement read on his behalf. Anderson attended the hearing briefly, but had to leave to take part in a meeting of the board of the Department of Environmental Protection.

"This is 1,500 tons of pure technical grade DDT. This is enough to fill 375 railroad cars," Anderson said.

DDT has not been used in Maine for several years and has been banned nationally. It cannot be used without special permission from the Environmental Protection Agency.

Goodall added that because of the persistent life of DDT,

(See: NRC, P. 16)

NRC fold

(Continued from Page 1)

half of that proposed to be sprayed in Maine next spring would still exist in the environment 20 years from now. Most would be washed into the Saint John and Penobscot Rivers, he said.

It is the persistence of DDT which led to its ban both in Maine and nationally several years ago. Scientists have found it in living organisms throughout the world. It is blamed for upsetting the balance of life in the oceans, killing fish and hampering the

Maine's forests face

ability of birds to lay eggs.

DDT is generally blamed for the decline and what many people believe will be the eventual extinction of the American bald eagle.

Though there was sharp disagreement over DDT, no one disputed the serious danger facing Maine vast spruce-fir forests.

Such forests cover eight million acres, nearly half the land mass of the state, Holt said. The budworm epidemic has now spread to five million of these acres and most of this acreage has to be sprayed next year "just to keep the trees alive."

Bradford Wellman of the Seven Islands Land Co. said that regardless of the spray programs Maine is going to have to live with budworm and its killing of trees.

He urged the legislature to approve a "disaster master plan" to salvage the wood that will die in the next 15 years.

Seven Islands is particularly susceptible to budworm infestations because it owns no manufacturing facilities to use its wood.

The company provides pul wood to the paper industry an grows saw logs fo manufacture into lumber. Thi market could dry up i budworm is not controlled.

Robert Shinners, a vic president of Great Norther Paper Co., explained th dilemma.

He said 60 per cent of th wood Great Northern uses i purchased from independen

disaster

landowners. "But if we have wood on our own lands that is dead and needs to be salvaged, we won't be buying from other people."

Committee member Ezra J. Briggs, R-Caribou, questioned the wisdom of the state paying for any spraying. "We don't spray the crops of the blueberry growers, the potato farmers or the apple orchardists. Why should we spray your crop?" Briggs asked Shinner.

"I make no apologies for being here," Shinner said. "Consider the economic affects of not spraying on the Maine economy. Fifteen thousand people are employed in the mills alone."

Maine isn't alone in its budworm dilemma. Spokesmen for the Province of Quebec said 60 million acres there are affected.

"We want to spray 10 million acres next year. We only have insecticides for half that amount," the committee was told.

Canada is also considering DDT if it can't find sufficient less toxic pesticides.

John Dimond, a spruce budworm researcher at the University of Maine--Orono, said he has mixed feelings about the DDT proposal.

"I only learned about it two days ago. I haven't decided yet, he said. "I believe DDT is a very serious environmental hazard. I'm not sure yet, however, whether it might be better to accept these hazards for one year to control the budworm while we find something else."

Goodall, however, said to rely on being able to use DDT would be a mistake. He questioned whether the needed state and federal permits could be gained or whether the Maine legislature could muster the two-thirds majority needed to pass emergency legislation.

And he said even if the permits are granted, a court fight would ensue.

Spraying has to occur in a three week period next June. Thus any court delays "could mean Maine will be left with no control at all," Goodall said.

APPENDIX VII

The following alternatives are investigated in a Field, et al project, A Search: New Technology for Pavement Snow and Ice Control.

external in-slab
stationary/mobile melters
substitute de-icing compounds
compressed air type snowplows
adhesion reducing pavement materials
solar energy storing pavement substances
electromagnetic ice shatterers
improved drainage
salt retrieval/treatment
improved tire/vehicular design

Other possibilities that have been suggested or studied are de-icer user manuals and the use of abrasives instead of de-icing compounds.

APPENDIX VIII

EXAMPLES OF TYPICAL WATER QUALITY RELATED COMPLAINTS

Several specific instances of various non-point source pollution problems incountered in the State are shown below.

Township:	Warren
Problem:	Siltation during rainstorms from a gravel pit operation
Watercourse:	Fuller Brook (Central Coastal Basin)
Comments:	Corrective action presently being taken
Township:	Brewer
Problem:	Gully erosion causing siltation of lake
Watercourse:	Brewer Lake (Penobscot River Basin)
Comments:	Several 3-4 foot wide gullies, 50-60 feet long on a slope that is devoid of vegetation
Township:	Rumford
Problem:	Paper waste disposal landfill area in a swamp
Watercourse:	Groundwater (Androscoggin River Basin)
Comments:	Also a possible point source to Burnham Brook in the spring
Township:	Winthrop
Problem:	Nutrient difference from grazing and spreading area
Watercourse:	Lower Narrows Pond (Kennebec River Basin)
Comments:	High NO3 levels below area, quite significantly less above the area
Township:	Albion
Problem:	Agricultural practices causing eutrophication of pond
Watercourse:	Lovejoy Pond (Kennebec River Basin)
Comments:	Point source from tributaries to the pond but non-point source into the tributaries
Township:	Damariscotta
Problem:	Domestic sewage from surrounding dwellings appears to be leaching through blue marine clay into marsh
Watercourse:	Unnamed marsh (frogpond with little open water) (Central Coastal Basin)
Comments:	
Township:	Liberty
Problem:	Several camplots with outhouses 30-50' from lake
Watercourse:	St. George Lake (Central Coastal Basin)
Comments:	High water and snow melt causing contaminants to the pond
Township:	Farmington
Problem:	Stream sedimentation from construction of a hospital and accompanying treatment facility
Watercourse:	Wilson Stream (Kennebec River Basin
Comments:	Almost seems counterproductive and/or futile to prosecute a hospital and its treatment facility

Township:	Sabattus
Problem:	Town salt pile leaching to town water supply
Watercourse:	Town wells (Androscoggin River Basin)
Comments:	Presently relocating pile with DEP supervision, Dept. of Transportation also carrying our research on snow removal substitutes and on salt without additives
Township:	Scarborough
Problem:	One-half mile section of town road near Higgins Beach has potholes that the town fills with sand and every year it washes out
Watercourse:	Atlantic Ocean (Western Coastal Basin
Comments:	Recently DEP advised town to stop adding sand and to rip-rap
Township:	Oxford
Problem:	Campsite beach sand washing into lake
Watercourse:	Thompson Lake (Androscoggin River Basin)
Comments:	Forced by DEP to put in retaining wall
Township:	Brewer
Problem:	Siltation from Brewer Industrial Park
Watercourse:	Into a ditch, then a small brook, then to Penobscot River (Penobscot River Basin)
Comments:	Presently being controlled as a condition of DEP site approval
Township:	Tenants Harbor
Problem:	Bulldozed a section of salt marsh for a house lot
Watercourse:	Atlantic Ocean (salt marsh) (Central Coastal Basin)
Comments:	Presently in court
Township:	Brooks
Problem:	Leachate and runoff from raw material and tailings stockpiles
Watercourse:	Swamp and Sandtail Brook (Central Coastal Basin)
Comment:	A diversion - collection and retaining system is presently under construction
Township:	East Vassalboro
Problem:	Gasoline station underground tank leak
Watercourse:	Outlet of China Lake (Kennebec River Basin)
Comment:	Owner required to seal off tank
Township:	Vassalboro
Problem:	Runoff from chicken wastes
Watercourse:	Unnamed tributary of Kennebec River (Kennebec River Basin)
Comments:	Owner required to build a retaining device
Township:	Moose River Plantation
Problem:	Logging operation in Bald Mountain Township causing siltation of pond in Moose River Plantation
Watercourse:	Heald Pond (Kennebec River Basin)
Comment:	Agency agreed to drop action if operated followed foresters suggestions (waterbars, culverts, seeding, etc.)

Appendix IX A

List of Towns Taken to 300 Foot Hearings

February 5 - Machias

Baileyville

Baring

Calais

Eastport

Grandlake Stream

Harrington

Milbridge

Pembroke

Topsfield

February 7 - Houlton

Ashland

Danforth

Fort Fairfield

Island Falls

Masawaska

Patten

Presque Isle(potatoe dump
Cone burner)

Westfield

Reed Plt.

February 12 - So. Paris

Bethel

Bridgton

Buckfield

Byron

Carthage

Dixfield

Greenwood

Hebron

February 12 - So Paris contd:

Hebron Academy

Lewiston

Lovell

Naples

Peru(West Peru)

Sumner

Temple

Woodstock

New Vineyard

February 14 - Bangor

Blue Hill

Franklin

Greenfield

Greenville

Lakeville Plt.

Lincoln

Medway

Millinocket

Milo

Newburgh

Orono

Passadumkeag

Springfield

Stonington

Tremont

Veazie

Willimantic

Ben Worcester

February 19 - Skowhegan

Everett Barry

Canaan

China

Clinton

Harmony

Madison

Newportland

New Sharon

Plymouth

Richmond

Rockwood

Unity

The Forks Plt.

February 21 - Wiscasset

Bath

Bodoinham

Bristol

Brunswick

Georgetowne

Harpswell

Liberty

Montville

Northport

Waldoboro

February 28 - Portland

Berwick

Eliot

Falmouth

New Gloucester

Portland

Scarborough

So. Portland

Westbrook

September 24 - Augusta

Enfield

Frenchville

Gorham

Grand Isle

East Machias

Lubec

Newport

Rangeley Plantation

Robinhood Marina

Shirley

Whitefield

Bucksport

Cutler

Norway

Dover Foxcroft

Appendix IX B .

Towns Taken to 300Foot Hearings

Town	Watercourse	Situation
Ashland	Aroostook River	Stop dumping w/in 300' by 5/1/75 No dumping on floodplain after 7/1/74 prelim plans for new site by 10/15/74
Baileyville	unclassified body of water	not in violation
Baring Plt.	St. Croix River	2 year variance, renewal applic. must incl. evidence applic. is seeking a new site.
Everett C. Berry, Pittston (serves Gardiner, W. Gardiner, Pittston, Dresden Randolph)	Givins Br. trib. to Kennebec	no dumping w/in 100' by 8/1/74 all refuse with 100' packed & covered closing plan for site submitted by 11/15/74
Bath	Whiskey Creek	variance until 7/1/74 no deposits w/in 100' all refuse w/in 100' packed & covered plans for after 7/1/75 by 10/1/74
Berwick	Worster Brook	disposal w/in 300' stop by 5/1/75 no refuse w/in 125' after 7/1/74 plans for after 7/1/75 by 10/15/74
Bethel	trib to Androscoggin R	no dumping w/in 300' after 7/1/75 plans for alternate disposal after 7/1/75 by 10/15/74
Blue Hill	trib to Peter's Brook	no dumping w/in 300' after 7/1/75 dumping ltd. to areas used prior to 5/1/74 p plans for new site by 7/1/74
Bowdoinham	Sedgeley Brook	no dumping w/in 500' after 11/15/74 no dumping w/in 50' prelim plans for new site by 7/1/74 plans for after 7/1/75 by 10/15/74
Bridgton	Willett Brook	no disposal w/in 300' after 5/1/75 no dumping w/in 75' of any surface waters no dumping w/in 200' of Willet Br final plans for disposal after 7/1/75 by 10/15/74

Town	Watercourse	Situation
Bristol	trib to Pemaquid River	no dumping w/in 200' of stream fence erected to prevent blowing of refuse into Stream
Brunswick	trib to Bunganuc Brook	no disposal w/in 300' of stream after 5/1/75 refuse ltd. to prevent volumes prelim plan for new site by 7/1/74 plans for oper. after 7/1/75 by 10/15/74
Buckfield	Nezinscot River	all oper. cease by 11/15/74 Prelim for alternate dis. after 11/15/74 by 7/1/74 final plans by 10/15/74
Bucksport	trib to Silver Lake	variance if: barrier is built disposal after 7/1/75 is in accord. w/S W M Regulation variance is for two years
Byron	Taylor Brook	all oper. cease by 11/15/74 final plans by 10/15/75 prelim plans by 7/1/74
Calais	trib to Middle Land Br	all oper cease by 5/1/75 prelim plans for dis. by 7/1/74 final plans by 10/15/74
Canaan	Carrabassett Stream	barrier to prevent dis. w/in 300' by 8/1/74
Carthage	Durgin Brook	all oper. w/in 300' cease by 11/15/74 prelim dis. plans by 7/1/74 final plans by 10/15/74
China	trib to an unnamed St.	variance if: use restricted to current vol. dumping is away from wet areas variance is for two years
Clinton	Sebasticook River	variance if: no dis. w/in 270' of River, all refuse w/in 270' packed and covered, wall of pit reconstructed w/suitable soil, variance is for two years plan for disposal after 7/1/75 by 10/15/74

Town	Watercourse	Situation
Cutler	unnamed stream	not in violation
Danforth	trib to Baskhegan St.	disposal w/in 300' cease by 5/1/75 physical restriction to dumping in swampy area prelim plans by 7/1/74 plans for dis. after 7/1/75 by 10/15/74
Dixfield	Newton Br (Trib to Androscoggin)	operations cease by 4/30/75 final plans for alternate disposal by 10/15/74, prelim plans by 7/1/74
Dover-Foxcroft	seasonal standing water	not in violation
Eastport	Cobscook Bay	all oper. cease by 5/1/75 prelim dis. plan by 7/1/74 final plans by 10/15/74
East Machias	Saltmarsh on E. Machias River	disposal w/in 300' cease by 7/1/75 physical restriction to dumping in the marsh by 12/15/74 prelim plans by 1/15/75
Eliot	trib to Sturgeon Cr.	variance if: no dis. in standing water is w/in 100' of swamp variance is for 2 years plans for disposal after 7/1/75 by 10/15/74
Enfield	Cold Stream	can use present site if: water diverted over 300 from dump abandoned section closed according to S W M Regulations by 7/1/75
Falmouth	trib to Meader Br	dis. w/in 300' cease by 9/15/74 facility closed according to S W M Regulations by 11/15/74 closing plan by 8/15/74
Fort Fairfield	Aroostook River	disposal w/in 300' cease by 5/1/75 physical restrictions to prevent du dumping in gully prelim plans for new site by 7/1/74 plans for dis. after 7/1/75 by 10/15/74
Franklin	Mill Stream	cease dis. w/in 300' by 7/1/75 physical restrictions so dumping in SE only prelim plans for new site by 7/1/74

Town	Watercourse	Situation
Georgetown	Robinhood Cove	disposal w/in 300/ by 5/1/75 prelim plans for new site by 7/1/74 plans for alternate dis. after 7/1/75 by 10/15/74
Gorham	old channel of Gulley Brook	dis. w/in 300' cease by 7/1/75 no further encroachment into Gulley Brook final plans for dis. after 7/1/75 by 1/15/75
Grand Isle	trib. to St. John R.	oper. closed by 7/1/75 no dumping in swamp barrier erected to keep refuse out of swamp
Grand Lake Str.	Bonney Brook	variance if: current volume of refuse variance is for 2 years, any app. for renewal must incl. evidence of seeking new site
Greenfield	unnamed brook	moved dump back beyond 300' so presently not in violation
Greenville	Sawyer Pond	variance for 2 years any application must contain evidence that applicant is seeking a new site
Greenwood	Round Pond	variance if: disposal ltd to current volumes variance is for 2 years, applic. for renewal must contain evidence that applic is seeking a new site
Harpswell	Long Reach	dis. w/in 300' cease by 5/1/75 prelim plans for new site by 7/1/74 plans for dis after 7/1/75 by 10/15/74
Harmony	Higgins Brook	dis. w/in 300' cease by 5/1/75 dis. w/in 100' of Higgins Br cease by June 7 diversion of spring runoff by 7/15/75 prelim plans for new site by 7/1/75 plans for dis. after 7/1/75 by 10/15/74

Town	Watercourse	Situation
Harrington	Harrington River	all oper. w/in 300' cease by 5/1/75 final plans for dis. by 10/15/74 working face of dump moved back 50' physical barriers to prevent dis. in swamp by 7/1/74 prelim plans by 7/1/74
Hebron	Bicknell Brook	variance if: physical changes made so refuse is not placed w/in 150' of tub. fenced constructed to keep blowing refuse out of stream variance is for 2 years plans for dis. after 7/1/75 by 1015/74
Hebron Academy	unnamed stream	variance if: dis. ltd. to prevent volumes, no dis. w/in 300' of stream variance is for 2 years, applic. for renewal must have evidence of applic. seeking a new site
Island Falls	Mattawamkeag River	variance if: disposal ltd. to prevent volumes, refuse is not placed close than 280' from river variance is for 2 years.
Lakeville Plt.	Lower Dobset Stream	all oper. w/in 300' cease as of 11/15/74 final plans by 10/15/74 prelim plans by 7/1/74
Lewiston	unnamed stream	variance if: physical changes will be made by 1/1/75 so refuse is not placed w/in 150' of inlet or 300' of the outlet used to separate the dump and the stream. water quality monitoring is performed variance is for 2 years plans for carrying out this provision are sent by 1/1/74 plans for dis. after 1/1/75 by 10/15/74

Town	Watercourse	Situation
Liberty	trib. to Sheepscot R.	physical changes by made by 7/1/74 so the direction of operation be paralleled to end at least 50' from the above mentioned stream prelim plans for a new site by 7/1/74 plans for dis. after 7/1/75 by 10/15/74
Lincoln	Penobscot River	variance if: disposal ltd. to current volumes, disposal is on top of the bluff, no dis. is made in the marshy area variance is for 2 years, applic. fo renewal must incl. evidence that applic. is seeking an alternate sit
Lovell	Alder Brook	dis. w/in 300' cease by 5/1/75 prelim plans by 7/1/74 plans for dis. after 7/1/75 by 10/15/74
Lubec	trib to Wallace Cove	variance if: stream diversion is done by 5/5/75 no refuse dumped w/in 250' of new stream channel after 5/15/75 existing stream channel is filled up, soil by 5/15/75 variance is for two years
Madawaska	Factory Brook	disposal w/in 300' cease by 5/1/75 prelim plans for a new site by 10/15/74
Madison	trib to Kennebec River	all oper. cease by 5/1/75 a physical restriction be constructed to prevent the dumping of refuse into the drainage area adjacent to the dump final plans for alternate dis. by 10/15/74
Medway	trib to Penobscot R.	dis. be ltd. to area presently used and will not extend further toward the swamp or stream oper. cease as of 5/1/75 final plans submitted by 10/15/74 prelim plans by 7/1/74
Milbridge	trib to Narraguagus Bay	all oper. w/in 300' cease as of 5/1/75 alternate plans for dis. by 10/15/7 prelim plans by 7/1/74

Town	Watercourse	Situation
Millinocket	Little Smith Brook	variance if: no refuse is placed in the wet area variance is for two years
Milo	Pleasant Stream	variance if: the small pond at the base of the dump is eliminated variance is for 2 years
Montville	True's Pond	all operations w/in 300' of True's Pond cease by 11/15/74 final plans submitted 10/15/74
Naples	trib of Long Lake	variance if: upland drainage diverted so surface water will not flow w/in 150' of dump face. all seasonal standing bodies of water except are five pond closer than 100' be removed by 8/1/74 variance is until 7/1/75 plans for drainage and grading by 7/1/74 plans for disposal after 7/1/75 by 10/15/74
Newburg	trib to Sonadabscook St	all oper. cease by 5/1/75 final plans for alternate dis. by 10/15/74 prelim plans by 7/1/74 no refuse is placed w/in 100' of any water after 7/1/74
New Gloucester	Royal River	dis. w/in 300' of Royal River will cease by 5/1/75 prelim plans for new site by 8/1/74 plans for dis. after 7/1/75 by 10/15/74
Newport	Martin Str. Sebasticook River	all oper. cease by 7/1/75 physical restrictions are constructed by 12/15/74 to prevent refuse from being dumped into standing waters or areas subject to flooding final plans for disposal after 7/1/75 by 4/1/75
New Portland	Newell Brook	variance if: deposits are ltd. to present volumes, a physical barrier is erected to prevent deposit of refuse closer than 200' of Newell Brook variance is for two years

Town	Watercourse	Situation
New Sharon	Harding Brook	disposal w/in 300/ of Harding Br cease by 5/1/75 disposal w/in 250' of Harding Br will cease as of 6/7/74 prelim plans for new site by 7/1/74 plans for dis. after 7/1/75 by 10/15/74
New Vineyard	trib to Carrabassett R	all oper. w/in 300! cease as of 5/1/75 physical barrier erected 50' from dump face to prevent refuse from entering stream final plans for alternate disposal by 10/15/74
Northport	unnamed streams	all oper. w/in 300' cease by 11/1/7 final plans for alternate dis. by 10/15/74 prelim plans by 7/1/74
Norway	Little Androscoggin R.	dis. w/in 300' cease by 7/1/75 barrier erected so refuse does not enroach upon river but is held between present boundaries plans for dis. after 7/1/75 by 1/15/75
Orono	trib to Pushaw Pond	all oper. cease as of 5/1/75' final plans for alternate dis. methods by 10/15/74
Passadumkeag	One Mile Brook	all dis. w/in 300' cease by 5/1/75 final plans for alternate dis. by 10/15/74 prelim plan by 7/1/74
Patten	trib to Fish Stream	variance if: dis. ltd. to current volumes refuse not deposited into swamp, fill is added to fill the springs by 9/1/74 variance is for 2 years.
Pembroke	Pennamaquan River	all dis. w/in 300/ will cease as of 5/1/75 final plans for alternate disposal by 10/15/74 prelim plans by 7/1/74

Town	Watercourse	Situation
Peru	Worthley Stream	variance if: disposal is ltd. to area used by 5/1/74 a barrier is constructed to prevent dumping in the wet area by 7/15/74 variance is until 7/1/75 applic. for renewal must show that applic. is looking for a new site
West Peru	trib to Androscoggin R	oper. w/in 300' cease as of 5/1/75 final plans for alternate disposal by 10/15/74 perlim plans by 8/1/74
Plymouth	Plymouth Pond	all oper. w/in 300' by 12/1/74 final plans for alternate dis. by 10/15/74
Portland	tribs to the Presumpscott River Estuary	dis. w/in 300' of trib must cease by 5/1/75 a closing plan for the present site according to SWM Regulations by 8/15/74 plans for disposal after 7/1/75 by 10/15/74
Presque Isle	trib to Presque Isle St	variance if: disposal ltd. to curre current volume, no dis. w/in 275' of stream variance is for 2 yrs. applic. for renewal must contain evidence that applicant has been seeking an alternate site
Presque Isle (McBurnie Rd. Potato Waste Dump)	trib to Aroostook R.	oper. w/in 300' cease as of 11/15/7 final plans for alternate waste disposal by 10/15/74 prelim plans by 7/1/74
Rangeley Plt.	trib to Rangeley Lake	variance if: a physical barrier is erected to prevent disposal w/in 200' of the trib. variance in effect until 9/15/75
Reed Plt.	unnamed brook	variance if: deposits are ltd to current volumes variance is for 2 yrs. applic. for renewal shall incl. evidence that applic. is seeking an alternate site

Town	Watercourse	Situation
Richmond	pond which is a trib of Mill Brook	variance if: no disposal w/in 100' of pond, elevation of discharg and overflow pipe are adjusted they discharge from the overflow pipe, does not flow w/in 50' of any refuse after 8/15/74 variance is until 7/1/75
Robinhood Marina (Ralph Becker) Georgetown	salt marsh trib to Knubble Bay	variance if: only deniolition, lumber, and stumpage wastes disposal here, no sawdust, paper, bottles, cans, other metals, plastics, or food wastes w/in 300' of the trib variance is for two years
Rockwood Strip	trib to Moosehead Lake	all operations cease by 5/1/75 no disposal beyond present limits beginning 6/1/74 final plans for alternate disposal by 10/15/74
Scarborough	bog	not in violation
Shirley	trib to Denning Brook	oper. at the site cease by 7/1/75 dumping area is moved back by 12/15/74 a barrier is erected by 12/15/74 to keep refuse from the edge of the dump
South Portland	trib to Spurwink R.	variance if: no refuse deposited closer than 100' from the swamp variance is until 7/1/75 plans for dis. after 7/1/75 by 10/15/74
Springfield	Mattagodus River	dis. shall be ltd. to the dry area after 7/1/74 all oper. cease as of 5/1/75 final plans for alternate disposal by 10/15/74 prelim plans by 7/1/74
Stonington	trib to swamp Hold Pond	all oper. w/in 300' of swamp cease as of 5/1/75 final plans for alternate disposal by 10/15/74 prelim plans by 7/1/74

Town	Watercourse	Situation
Sumner	Twenty Mile Stream	all oper. w/in 300' cease as of 7/1/75 final plans for alternate disposal by 10/15/74 prelim plans by 7/1/74
Temple	trib bog of Temple St.	variance if: the bog is filled to assure it remains dry all surface water is diverted aroun the site disposal is ltd. to current volumes variance is for two years
Forks Plt.	Moxie Brook Kennebec River	not in violation
Topsfield	Burbec Brook	all oper. w/in 300' as of 5/1/75 final plans for alternate disposal by 10/15/74 prelim plans by 7/1/74
Tremont	trib to Bass Harbor	all oper. w/in 300' of the marsh cease as of 7/15/74 refuse w/in 300' must be packed and covered with salt
Unity	Sandy Stream	all operations w/in 300' cease as of 11/15/74 final plans for alternate disposal by 10/15/74
Veazie	Penobscot River trib to Penobscot R.	all oper. w/in 300' cease as of 5/1/75 no disposal w/in 175' of the Penobscot River or 150' of the trib after 6/1/74 final plans for alternate disposal by 10/15/74
Waldoboro	Demuth Brook	all dis. w/in 300' cease by 5/1/75 no dis. w/in 50' of Demuth Brook after 5/24/74 prelim plans by 7/1/74 plans for dis. after 7/1/75 by 10/15/74
Westbrook	Dark Brook	variance if: no refuse is placed in the groundwater, areas where refuse has been placed in groundwater are sealed and seeded by 8/15/74

Town	Watercourse	Situation
		monthly water quality monitoring is made to determine BOD, DO, pH, coliform bacteria, iron, specific conductance variance is for 2 years any applic. for renewal shall incl. the results of the monitoring plans for disposal operations after 7/1/75 by 10/15/74
Westfield	trib to Prestile St. Day Brook	all dis. w/in 300' cease by 5/1/75 no refuse deposited in the wet area surrounding the dump face prelim plans for a new site by 7/1/74
Whitefield	west branch of Sheepscot River	variance if: no dumping w/in 280' of the river dump area w/in 280' of river is covered and seeded variance is for 2 years use of site after 7/1/75 is subject to compliance with SWM Regulations
Williamantic	trib to Wilson Brook	all oper. cease as of 11/15/74 final plans for alternate disposal by 10/15/74 prelim plans by 7/1/74
Woodstock	Barker Brook	all oper. w/in 300' cease as of 5/1/75 final plans for alternate dis. by 10/15/74 prelim plans by 7/1/74
Ben C. Worcester (Southwest Harbor)	trib to surface water runoff to Marshall Brook	variance if: final plans for surface water diversion by 7/1/74 all diversion of surface water by 11/15/74 variance is for two years
York	trib to Cape Neddick River	all disposal w/in 300' cease by 11/15/74 no disposal w/in 200' of stream a closing plan for the site according to SWM Regulations by 8/15/74 plans for disposal oper. by 10/15/7

Appendix X

DEP Approved Septic Sludge Sites

Percy Harris -- New Sharon

Edward Harris -- Rome

Paul Harris -- Thomaston

Town of Fort Fairfield

Jackson & Cassey Plumbing & Heating -- Peak's Island

Charles Albertson -- Skowhegan

Town of Gorham

Abbott Brothers -- York

Town of Casco

Mondelle Boutilier -- Dallas Plantation

Town of Raymond

Pete Tardic -- Eagle Lake

Dennis Winslow -- Scarborough

Alvin C. Wagner -- Rangeley Lake State Park

Towns of Boothbay and Boothbay Harbor

George Frederick Scarborough

Town of Boothbay

City of Waterville

Town of Stonington

Town of Brownfield

Mr. Jerry Hunter -- Kingfield site

Mr. Jerry Hunter -- New Portland site

Bucksport

David W. Dutton -- Vassalboro

H. Leigh Pushaid -- Freeport

Kingfield

Wiscasset

Mr. Richard Cutard -- Belfast

Appendix XI .*

OTHER SYSTEMS

SEC.10.1 LAGOON TREATMENT AND SPRAY DISPOSAL SYSTEMS

The use of lagoons for sewage treatment and spray techniques for disposal may be permitted by the Department upon submission of adequate information for review. Adequate information shall include sufficient information to indicate site suitability and the system's adequacy. Site suitability shall be determined by an on-site soils investigation and supported by a report from a certified Soils Scientist, Geologist or Registered Professional Engineer. Plans and specifications for lagoons and/or spray disposal systems shall be designed by a Registered Professioanl Engineer. Requirements for these systems can be obtained by contacting the Department.

Lagoon treatment and spray disposal systems are to be considered community systems for permit fee purposes. Local Plumbing Inspectors shall not issue permits, or approve these systems until written approval is given by the Department.

* Taken from the State of Maine Plumbing Code, Part II Private Sewerage Disposal Regulations, July 1974.

U.S. Public Health Service Drinking Water Standards, 1962

Characteristic	Suggested Limit That Should Not Be Exceeded	Cause for Rejection
Physical		
Color	15 units	
Taste	Unobjectionable	
Threshold Odor Number	3	
Turbidity	5 units	
Chemical	mg/l	mg/l
Alkyl benzene sulfonate	0.5	
Arsenic	0.01	0.05
Barium		1.0
Cadmium		0.01
Chloride	250	
Chromium (hexavalent)		0.05
Copper	1	
Carbon Chloroform extract*	0.2	
Cyanide	0.01	0.2
Fluoride +	0.7-1.2	1.4-2.4
Iron	0.3	
Lead		0.05
Manganese	0.05	
Nitrate	45	
Phenols	0.001	
Selenium		0.01
Silver		0.05
Sulfate	250	
Total dissolved solids	500	
Zinc	5	

*Organic contaminants.

+The concentration of fluoride may be between 0.6 and 1.7 mg/l, depending on the listed annual average maximum daily air temperatures.

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