

I. PROPOSED ACTION AND REVISED LIMING POLICY

The New York State Department of Environmental Conservation has prepared this Final Environmental Impact Statement (FEIS) to describe a proposed revision and improvement of the Division of Fish and Wildlife Liming Program. The Division has been involved in liming acidic waters since 1959 for the purpose of restoring or protecting fish communities. The program has evolved over the years and currently consists of treating a limited number of carefully selected lakes or ponds with agricultural limestone.

In response to increased public interest in liming projects the Division of Fish and Wildlife developed a Liming Policy in 1983 (Wich 1983). This policy has been in effect since that time. In recent years, however, a number of important surveys and research projects have been completed which relate directly to the Division's liming program. Several large university consortiums have conducted projects which demonstrate that no major adverse biological impacts of liming acidic waters are expected if these waters are not allowed to reacidify. Similarly, Scandinavian liming projects have been conducted on thousands of waters with minimal negative impacts. The Adirondack Lake Survey Corporation, over the last four years has gathered valuable fish, water quality, and flushing rate data which will facilitate identification of suitable liming candidate waters. Finally, new methodology for accurately determining appropriate dose rates for lime has recently been developed. This new information has been used to modify the Division's liming program so that only suitable waters are included and all environmental concerns are adequately addressed. The proposed revised liming policy presented below will guide the DEC liming program.

In accordance with the State Environmental Quality Review Act (SEQRA) this FEIS discusses the liming of acidic waters, environmental impacts, alternatives, and other areas of concern. The Department of Environmental Conservation proposes to maintain a limited liming program on carefully selected waters, and this program will be discussed in detail in the FEIS. The current liming program has been and is proposed to continue to be limited in size. The purpose of the program is to reestablish and maintain valuable fisheries and/or aquatic communities in waters which have been acidified due to acidic deposition. The Department however does not view liming as a solution to acidic deposition. The Department strongly supports the reduction of polluting emissions at their source as the single most effective strategy to mitigate the effects of acidic deposition.

A Draft Environmental Impact Statement (DEIS) was published in September 1988, and comments were accepted until December 1988. Two public hearings were held, and the comments received at the hearings or as written statements are included in Appendix C of this FEIS. Various interest groups expressed concerns regarding the Department's liming program, and this FEIS has been modified to address these concerns. Specific DEC responses to the public comments are presented in Appendix D and also in several new sections of this impact statement. This FEIS and the SEQRA process provide for a complete description of the DEC liming program and provide balanced information enabling wise decisions on the use of liming in the future.

PROPOSED REVISED

DIVISION OF FISH AND WILDLIFE

LIMING POLICY

BACKGROUND

Acid deposition continues to exert a negative impact on many surface waters in New York State where local geology makes these waters sensitive to atmospheric pollution. A limited number of these waters have been treated with neutralizing materials, primarily agricultural limestone, for the purpose of improving or establishing a sportfishery. These projects on carefully selected waters have been very successful to date.

In response to increased public interest in liming projects, Policy Memorandum 83-1 was prepared and was in effect for about four years. Since that time, several important research projects have been conducted which provided valuable data on the effects of liming and the ecology of acidic waters. Several large university consortiums have conducted projects which demonstrate that no major adverse biological impacts of liming acidic waters are expected if these waters are not allowed to reacidify. Similarly, Scandinavian liming projects have been conducted on thousands of waters with minimal negative impacts. The Adirondack Lake Survey Corporation, from 1984 to 1987 gathered valuable fisheries, water quality, and flushing rate data which will facilitate identification of suitable liming candidate waters. Finally, new methodology for accurately determining appropriate dose rates for lime has recently been developed.

Therefore, the Division of Fish and Wildlife liming policy has been revised to account for this new information.

PURPOSE

The purpose of this memorandum is to state new policies and procedures which Division staff will follow for all projects resulting in the addition of neutralizing materials to acid waters. It replaces Policy Memorandum 83-1.

POLICY GUIDELINES

- ° The DEC strongly supports the reduction of polluting emissions at their source as the single most effective strategy to mitigate the effects of acidic deposition. New York State has passed the State Acid Deposition Control Act of 1984 to reduce state emissions and advocates passage of strong national legislation to further reduce air pollution entering New York from other states. The addition of alkaline products to acidified waters treats the symptoms and not the cause of the problem.
- ° Water neutralization projects will utilize agricultural lime unless a research project is developed according to guidelines discussed under Exceptions.
- ° The number of waters treated will be limited for the following reasons:
 - Many waters have high flushing rates, particularly those in the Adirondack region. The benefits from treatment of these waters may be short-lived, and the costs of maintaining good water quality may be very high.
 - A decision to neutralize an acidified water will include a commitment to intensively manage, monitor, and retreat the water on a regular basis to prevent the water from reacidifying. This requires a long-term commitment of funds and personnel to manage these waters until air pollution controls become effective and the acidic deposition levels decrease. Such high cost intensive management can only be justified on waters of unique natural values or high public use.
- ° The Division of Fish and Wildlife will not embark on a large scale treatment program, but will apply neutralization techniques to carefully selected candidate waters meeting the criteria listed below. Treatment of the waters will be an integral part of Forest Preserve Unit Management Planning and will be reflected in the management strategies of each plan.
- ° The DEC recognizes that the restoration of natural aquatic ecosystems is an acceptable reason for conducting a liming project. In wilderness, primitive, and canoe area ponds which are limed as part of the DEC liming program the objective will be to perpetuate natural aquatic ecosystems, including perpetuation of indigenous fish species on a self-sustaining basis.
- ° Candidate liming waters under jurisdiction of NYS Department of Environmental Conservation will be

selected in compliance with the criteria specified below. These criteria apply whether the water is to be treated by DEC staff or volunteer personnel. The guidelines for monitoring, treatment, and retreatment will be followed, and full records will be maintained in Central Office by the Bureau of Fisheries.

- ° All liming projects in the Adirondacks will be carried out according to the guidelines of the Adirondack Park State Land Master Plan and any adopted Unit Management Plan. Projects conducted in wilderness, primitive, or canoe areas will be conducted in accordance with specific DEC guidelines for fisheries management in these areas. If the candidate water is located in an area within the Adirondack Park that is not covered by a completed UMP, the DEC will coordinate with the APA as described in Memoranda of Understanding between the two agencies.
- ° Waters which are already a part of the Division liming program will be required to meet these criteria in order to remain in the program. Waters which do not meet the criteria will require approval through the exceptions process as described below.
- ° All liming projects proposed outside of the Adirondack Park will require a wetlands permit from the DEC. Within the Adirondack Park a jurisdictional determination is required by the APA regarding whether a wetlands permit is needed.
- ° In order to identify potential fish and wildlife program conflicts, regional fisheries staff will consult available habitat inventories, the listing of rare, threatened or endangered plants, and with regional wildlife staff during the project proposal process. Such conflicts shall be resolved at the regional level if possible or elevated for decision by the Director of the Division of Fish and Wildlife.
- ° All waters in the Division liming program must be treated in accordance with the Operational Guidelines (Appendix).

CRITERIA FOR SELECTION OF CANDIDATE LIMING WATERS

Lakes and ponds under jurisdiction of NYS Department of Environmental Conservation must meet certain qualifying criteria in order to be considered for liming, regardless of whether the waters are treated by Division or volunteer personnel. All of the following criteria must be met to qualify for mitigation treatment involving the addition of any alkaline products.

- (1) Summer surface pH must be less than 5.7 or the acid neutralizing capacity (ANC) must be 20 ueq/l or less.

With current levels of acidic deposition, lakes and ponds with water chemistry below these thresholds commonly experience episodic conditions which are toxic to fish and other organisms.

- (2) Sphagnum moss must not occupy more than 50% of the shoreline, and summer surface water color must not exceed 75 platinum cobalt units. This criterion is intended to prevent liming of naturally acidic bog or marginal bog waters which should remain untreated to preserve valuable bog communities.
- (3) Flushing rate as calculated according to Operational Guidelines must not exceed two times a year. Waters with flushing rates of greater than two times a year are more susceptible to episodic events of low pH and would require either continuous liming or very frequent monitoring and liming.
- (4) Dissolved oxygen and temperature levels during critical times of the year (late summer, late winter) must be presently suitable for survival of the fish species considered for management or will become suitable as a result of the treatment. Waters with poor oxygen levels or high temperatures may be poor fish habitat regardless of the pH of the water. For brook trout dissolved oxygen levels should generally be greater than 5 ppm throughout the year, and summer bottom temperatures should generally not be over 70°F. The presence of refugia (springs, cold tributary streams) may also allow a brook trout population to survive. Evidence of previous year around brook trout survival in the pond will therefore satisfy this criterion. Fish species other than brook trout may require different dissolved oxygen and temperature criteria.
- (5) The candidate water must either:
 - (a) have shown a serious decline in a unique fishery or in an historically excellent fishery as a result of acidic deposition.

OR

- (b) represent a broodstock water which contains heritage strains of fish or populations of threatened or endangered fish species which require liming for maintenance.

OR

- (c) represent a seriously degraded aquatic ecosystem which has had a demonstrable loss of a number of different taxa and where restoration of the ecosystem would be the primary objective of the proposed liming.

EXCEPTIONS

Several ponds which were limed in the past have flushing rates of greater than two times per year, and the water quality has remained favorable with an associated viable fishery. These ponds do not follow typical predictions of reacidification rates, possibly due to groundwater influence in the pond. Little Otter Pond (04-664) is the only pond in the current DEC program which is in this category and will be retained as long as it continues to respond favorably to periodic liming treatments. Two additional waters with flushing rates greater than two (Livingston Pond (05-705) and Little Ampersand Pond (02-109)) were successfully limed in the past but are not part of the current liming program. One or both of these ponds may be added to the DEC liming program if they are found to meet the other candidate selection criteria.

In special cases, other waters may be considered for treatment even though they do not meet all of the above criteria. These candidates must be approved on a case-by-case basis, first by the Regional Fisheries Manager, then by the Chief of the Bureau of Fisheries. Proposed candidate waters require detailed justification for approval and may require the preparation of a supplemental environmental impact statement. This justification will include the following:

- (1) Description of the project
- (2) Explanation and justification for waiver of criteria
- (3) Management objective for the candidate water
- (4) Regional or statewide importance of the resource
- (5) Relative abundance of similar resources in the local area
- (6) Benefit/cost analysis
- (7) Completed environmental assessment and comparison of anticipated impacts with the generic EIS to determine the need for a supplement to the EIS
- (8) If a supplement is not prepared, a notice will be published in the ENB and a 30 day public comment period provided prior to conduct of project

An exception proposed for research purposes will require submission of a detailed research protocol.

RETREATMENT

- When a water has been included in the Division liming

program every reasonable effort shall be made to prevent its reacidification to toxic levels as soon as logistically possible after the acidic threshold level is reached. In order to accomplish this, post-treatment water samples will be secured and analyzed at least once each year during the summer.

- Retreatment of previously limed waters will occur after summer surface (1 meter depth) water chemistry reaches a pH of 6.0 or an ANC of 25 ueq/l. These thresholds are intended to protect brook trout from exposure to toxic water quality. Other fish species being managed e.g. brown trout, rainbow trout) may require higher pH levels because of their greater sensitivity.
- Post-liming water chemistry data may, in rare instances, indicate that the pond or lake proved to be a poor liming candidate (higher than reported flushing rate or poor post-treatment temperature /D.O. regime). Although the program objective is to avoid such cases, it may be necessary to remove such waters from the liming program. Approval to remove such a water from the program must be obtained on a case-by-case basis from the Regional Fisheries Manager, and the Chief of the Bureau of Fisheries. Adequate explanation of the problem must accompany any such request.

FUTURE

These policies and procedures for the addition of neutralizing materials to acid waters become effective immediately. These policies may be modified in the future as additional research and monitoring results become available. The primary thrust, however, for improving the quality of acidified waters will be to continue promoting the reduction of polluting emissions at their source.

Director
Division of Fish and Wildlife

POLICY
APPENDIX

Operational Guidelines for
New York State Liming Policy

The following discussion consists of guidelines which must be followed in all Division projects involved in the addition of neutralizing materials to acid waters. These guidelines are intended to explain several important steps in the implementation of the policy. The guidelines are not intended to be a complete manual of methods for liming acidic waters. This information is available in recent publications, several of which are listed in the references section.

WATER SAMPLE COLLECTION AND ANALYSIS

- A minimum of two summer surface (1 meter depth) water samples must be taken to determine whether a candidate water meets the water chemistry criteria. These samples must be collected on different dates from the center of the pond or a representative site (such as at the pond outlet). Samples must be collected in clean plastic bottles triple-rinsed in the water being sampled. All air should be excluded from the sample bottle. Samples should not include any sediment or debris. The Standard Operating Procedures for the Adirondack Lakes Survey Corporation contains a valuable discussion on proper water sample collection (ALSC 1985).
- Care must be taken in the collection and prompt analysis of water samples used to screen candidate waters. Once a water is judged to meet the criteria, the Division begins a long term commitment to intensively manage that water. It is therefore imperative that the initial water samples be accurate and representative of the existing water conditions.
- Waters which have been limed and are part of the Division liming program must be monitored at least once a year during the summer. Where feasible and practical a sample during spring overturn should also be collected. Once a water is part of the liming program, the Division is committed to prevent that water from becoming reacidified. Bureau of Fisheries must therefore assign adequate personnel and funding to accomplish the appropriate monitoring and retreatment to prevent reacidification.
- Water samples are to be stored at 4 degrees C and analyzed within one week of collection. This time schedule necessitates coordination with the laboratory conducting the water analyses. Analysis of all water samples is to be carried out according to standard laboratory procedures for the analysis of dilute waters (Schofield 1978). Parameters which will be measured include air equilibrated pH (using a

pH meter with glass electrodes), alkalinity (using Gran's plot titration methods), conductivity, (using a conductivity bridge) and color (using a Hach or comparable color comparator).

FLUSHING RATE CALCULATIONS

- Flushing rate (times per year) should be calculated using the following formula:

$$\text{Flushing Rate} = \frac{\text{Watershed Area (acres)} \times \text{Mean Annual Runoff (feet)}}{\text{Total Lake Volume (acre - feet)}}$$

Watershed Area = the area calculated from USGS topographic maps using a planimeter or comparable method.

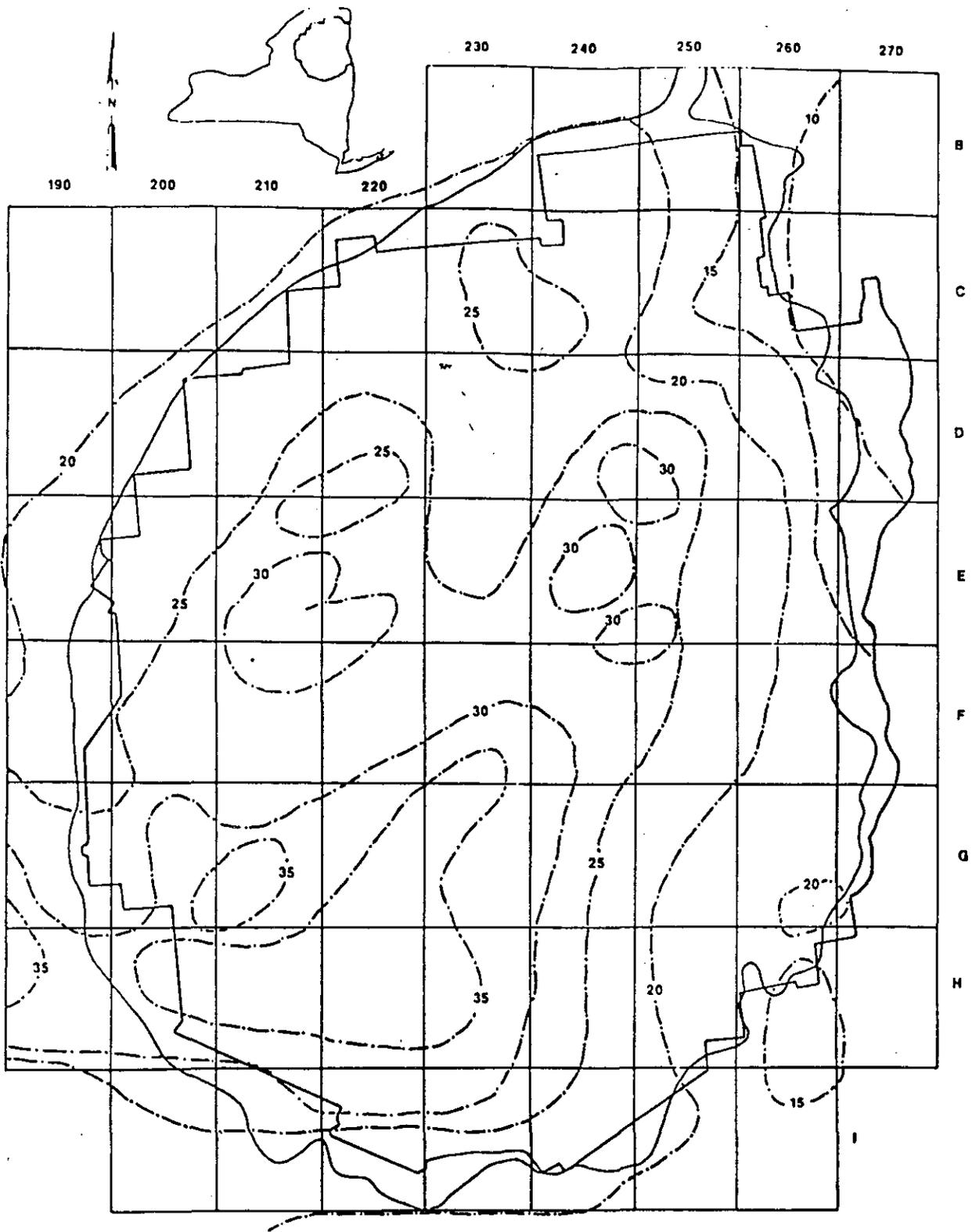
Mean Annual Runoff = amount of runoff for the specific area, obtained from the map in Figure 1.

Total Lake Volume = the sum of the interval volumes between two contours. An accurate bathymetric map with depth contours is necessary to make necessary calculations. The formula for total lake volume is described in the Standard Operating Procedures of the Adirondack Lakes Survey Corporation (ALSC 1985).

- Flushing rate is the single most important factor in determining the reacidification rate of a lake. However, there are situations where other hydrologic factors may also be important. A large inlet stream in close proximity to the lake outlet, or large amounts of groundwater inflow or outflow from the system may also influence the rate of lake reacidification.

LIMING OBJECTIVE AND DOSE CALCULATIONS

- The treatment of a water with neutralizing materials should be designed to produce an increase in pH to at least one full pH unit above the threshold for adverse effect in the subject water. For brook trout the management objective should be to achieve a target pH of 6.5 or above. Other fish species may require a higher pH level because of their greater sensitivity to acidic conditions.
- Agricultural limestone will be the neutralizing material used for Division liming projects. Other materials are available and have been used with varying degrees of success and may be used for specific research projects. However, agricultural limestone has been proven to be easy to handle, non-caustic, readily available, and intermediate in solubility (Fraser and Britt 1982). It has been used by DEC for over twenty years and was used in an extensive lake



Legend:
 — Adirondack Park boundary — Adirondack Ecological Zone boundary - - - Annual runoff isopleths (inches)

Appendix
 Figure 1

Map of the Adirondack Park and Adirondack Ecological Zone showing mean annual runoff isopleths (inches). (taken from ALSC (1985))

neutralization research project recently completed by Cornell University (Schofield et al. 1986).

- The chemical composition of the lime used should meet the acceptable limits set up for the U.S. Fish and Wildlife Service liming projects (Fraser et al. 1985). These limits include maximum allowable levels of aluminum, phosphorus, and other chemicals of concern. Once an agricultural limestone manufacturer has been found to meet these chemical constituent limits, it will not be necessary to reanalyze the material before each use.
- The dose of the neutralizing material used will be calculated using state of the art computer methods and software, such as Deacid (Fraser et al. 1985). These calculations will take into account the target objectives of the liming project, the pre-neutralization water chemistry, the volume of the candidate water, the chemical characteristics of the neutralizing material used, and other pertinent information. Retreatment doses will also be based on the water chemistry prior to retreatment and will usually be less than the initial treatment. These same computer programs can be used to predict the costs of mitigation project.
- The actual application of the neutralizing materials will occur during fall, winter or spring between the months of September and May. No treatment will occur while a lake is thermally stratified in the summer months. Such treatments often result in neutralization of the epilimnion but not the hypolimnion.

MAINTENANCE OF MANAGEMENT RECORDS

- Stocking of brook trout into the waters of the DEC liming program will be determined by standard DEC procedures for developing stocking rates. These procedures incorporate the following factors: productivity of the water, mean depth, dissolved solids or conductivity, fishing pressure, competing species, trout growth rate, trout natural reproduction, and angling regulations.
- A record of all waters included in the DEC liming program will be maintained in Albany by the Bureau of Fisheries. All relevant data will be retained to include at least the following: all water chemistry data, lake history, dates of treatment, dosage rates, fish stocking records and costs of the program. This record should be updated at least every six months to provide a current record of the status of the Division liming program.

REFERENCES

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