II. BACKGROUND OF THE LIMING PROGRAM IN NEW YORK STATE

A. Legal Considerations and Precedents

1. Legal Authority and Program Goals

The legal authority for DEC to lime acidified waters is found in Title 3, Section 11-0303 of the Environmental Conservation Law.

Key portions are quoted as follows:

> "1. The general purpose...is to vest in the department,to the extent of the powers so granted, the efficient management of the fish and wildlife resources of the state. Such resources shall be deemed to include all animal and vegetable life and the soil, water ... . Such management shall be deemed to include both the maintenance and improvement of such resources as natural resources and the development and administration of measures for making them accessible to the people of the state."
>
> "2. ... The department is directed...to develop and carry out programs and procedures which will in its judgment, (a) promote natural propagation and maintenance of desirable species in ecological balance, and (b) lead to the observance of sound management practices for such propagation and maintenance on lands and waters of the state, whether owned by the state or by a public corporation of the state or held in private ownership, having regard to (1) ecological factors, including the need for restoration and improvement of natural habitat and the importance of ecological balance in maintaining natural resources; (2) the compatibility of production and harvesting of fish and wildlife crops with other necessary or desirable land uses. (3) the importance of fish and wildlife resources for recreational purposes; ..."

Fish and wildlife programs designed to meet this legislative mandate, have the following goals (DEC 1977):

- to perpetuate fish and wildlife as a part of the various ecosystems of the state;
- to provide maximum beneficial utilization and opportunity for enjoyment of fish and wildlife resources; and
- to manage these resources so that their numbers and occurrences are compatible with the public interest.

Specific goals for DEC's management of fish and wildlife habitats in New York are as follows:

Environmental Protection: to maintain healthy environments to

provide habitat for fish and wildlife, to protect elements of habitat essential to the maintenance of fish and wildlife, and to preserve unique habitats.

Environmental Management: to restore, maintain, improve or create habitat for optimum production of desired fish and wildlife.

The use of lime to maintain or restore the quality of fish habitat is therefore consistent with the department's legal mandates and its goals for the management of New York's fish and wildlife resources. The basis for and environmental impacts of DEC's habitat management activities for fish and wildlife have been discussed in a final programmatic EIS (Odell et al. 1979).

2. Regulatory Considerations

a. Permit Requirements

The DEC has the responsibility for issuing wetlands permits in areas other than the Adirondack Park, and the APA has the responsibility for wetlands permits in the Park. Riexinger and Luciano (1989) determined that to apply lime to lakes under DEC's jurisdiction a wetlands permit is required, but that as a compatible activity, a permit should be issuable. Their interpretation was that lake liming in the context of the Division of Fish and Wildlife's liming program is a compatible activity because it meets the three-part test and is: 1.) consistent with preservation, protection and conservation of wetlands and their benefits; 2.) results in no more than insubstantial degradation to or loss of any part of the wetland; and 3.) is compatible with the public health and welfare. Hutchinson, (1986) in an informal legal opinion, concluded liming of waters did not require either a SPDES or aquatic pesticides permit.

The APA has not in the past required a wetlands permit for all liming projects. Discussions have been held between the DEC and the APA in order to determine which projects would be non-jurisdictional and would therefore not require a wetlands permit. The jurisdictional test is substantial impairment of benefits or functioning of wetlands NYCRR 587.3(n)(2)(ii). In some instances liming may not require a wetlands permit from the APA. For example, a permit would not be required in waters which have a history of liming to which plant communities have adapted to the water chemistry and where the proposed liming would not change the water chemistry more than 2 pH units.

In all cases liming proposals on state lands within the Adirondack Park will be incorporated into Unit Management Plans. If the appropriate Unit Management Plans are not yet complete, then discussions will be held between DEC and APA staff according to Memoranda of Understanding between the two agencies.

b. Adirondack Park State Land Master Plan

The Adirondack Park State Land Master Plan's (SLMP) legislative mandate was originally contained in Section 807 of the Adirondack Park

Agency Act. The Act (later renumbered section 816) required the Adirondack Park Agency to classify the State lands in the Park, according to "their characteristics and capacity to withstand use." The Park Agency developed nine basic classification categories for State lands within the Adirondack Park. Land classifications were then determined based upon the consideration of physical and biological characteristics, certain intangible social and philosophical considerations and the presence or absence of established facilities. Under the SLMP the DEC, in consultation with the Adirondack Park Agency is required to prepare Unit Management Plans for each parcel of public land. These Unit Management Plans (see Section II.D.7) and the SLMP guide the DEC's management of State land. The Adirondack Park Agency is responsible, as a policy matter, for general interpretations of the SLMP. Within the context of this FEIS there are four land classification categories of concern.

Wilderness - The guidelines for management of lands classified as wilderness are the most restrictive. The SLMP states, "A wilderness area, in contrast with those areas where man and his own works dominate the landscape, is an area where the earth and its community of life are untrammeled by man - where man himself is a visitor who does not remain." It also defines wilderness as areas which are "protected and managed so as to preserve, enhance, and restore, where necessary, its natural conditions..."

With respect to fish and wildlife management activities, the guidelines for wilderness management allow for:

- "Existing or new fish barrier dams, constructed of natural materials whenever possible."

- "Wildlife management structures on a temporary basis where essential to the preservation of wilderness wildlife values and resources.

- Use of motorized equipment or aircraft, but not motor vehicles, by administrative personnel for specific major administrative, maintenance, rehabilitation, or construction projects, if that project involves conforming structures or improvements, and only allowed during off-peak periods and at intervals of 3-5 years, unless extraordinary conditions (fire, major blow-down, or flood) mandate otherwise.

- Introduction of species of flora or fauna which are:

    - Historically associated with the Adirondack environment,

    - Already established in the Adirondack environment, or

    - Necessary to protect the integrity of established native flora and fauna.

- Hunting, fishing and trapping.

Primitive - The management guidelines for classified primitive areas are to achieve and maintain a condition as close to wilderness as possible.

In this classification, all fish and wildlife management activities that are allowed in wilderness areas are also allowed in primitive areas. Additional fish and wildlife management activities allowed are:

- Use of motor vehicles, motorized equipment and aircraft by administrative personnel to reach and maintain existing structures, improvements, or ranger stations:

(a) whose eventual removal is anticipated but cannot be removed by a fixed deadline; or,

(b) in primitive areas not destined to become wilderness whose presence is of a permanent character.

Canoe - The basic management guideline for canoe areas is "to protect the quality of the water and fishery resources while preserving a wilderness character on the adjacent lands."

All fish and wildlife management activities that are permitted in wilderness and primitive areas, are also permitted in canoe areas.

Wild Forest - The primary management guideline for these areas is "to protect the natural wild forest setting and to provide those types of outdoor recreation that will afford public enjoyment without impairing the wild forest atmosphere." Additional fish and wildlife management activities allowed are:

- Stream improvement structures for fishery management purposes.

- Construction of fishing access sites.

- Wildlife management structures.

- Use of motor vehicles, motorized equipment, and aircraft is permitted by administrative personnel for appropriate purposes to preserve and enhance the fish and wildlife or other natural resources of the area.

- Species of flora and fauna may be introduced by the Department of Environmental Conservation in accordance with sound biological management practices, particularly where the introductions will improve wildlife resources.

In summary, it can be said that the Adirondack Park State Land Master Plan guidelines for Forest Preserve lands allow for fish and wildlife management activities. Specific activities, such as liming of acidified waters are not mentioned; but guidelines are established for the manner and purposes by which management is carried out.

3. Discussion in Previous DEC Documents

The use of lime in fisheries management has been explicitly recognized in a number of DEC documents. The Final Programmatic EIS on Habitat Management Activities states that liming is used to increase the pH of selected waters supporting unique fish populations or fisheries, or with the potential for providing a high use fishery, that are threatened by acidification (NYSDEC 1979). Liming of acidified ponds improves water quality and thus the habitat for fishes and other aquatic organisms. It is one of a group of fisheries management techniques that are broadly characterized as habitat management. The Final Programmatic EIS on Habitat Management Activities considered liming as well as 27 other fish and wildlife management techniques. It provided an abbreviated analysis of DEC's liming activities based on experience up to 1979. The discussions of benefits, adverse impacts, mitigation measures, etc. were relatively brief, general and often generic as would be expected when so many habitat management techniques were considered in one document. This Generic EIS on liming expands and updates liming information in the 1979 document while providing an exhaustive analysis of the environmental impacts of only one rather than 28 habitat management techniques. This FEIS also incorporates the massive amount of information on acidification, liming and related subjects that has been generated since 1979 as well as Division of Fish and Wildlife liming policies that were developed following release of the Final Programmatic EIS on habitat management activities.

The group of fisheries management activities which deal with regulation and/or manipulation of fishes or fish populations are classified as species management. The Final Programmatic EIS on Fish Species Management notes that native brook trout have been stocked in Adirondack ponds, which is consistent with the objectives of perpetuating existing species of fish and producing diverse and satisfactory fishing opportunities also present in that document. The tie-in between the Generic EIS on liming and the Programmatic EIS on fish species management is that once habitat for fishes is improved, the desired fish species management activities can then proceed with a strong assurance of success. The Fish Species Management EIS clearly states that any work within the Adirondack Park will be conducted in accordance with policies outlined in the State Land Master Plan.

The Adirondack Park State Land Master Plan does not disallow the use of certain fishery management techniques in state waters within the park as long as these techniques meet SLMP guidelines. Unit Management Plans (UMPs) developed by the DEC and approved by the APA for specific areas within the Adirondack Park include provisions for liming ponds. Liming is discussed as a management tool in the Five Ponds Wilderness UMP, the Independence River Wild Forest UMP, and the Cranberry Lake UMP, and certain waters within these units have been limed and are in the current DEC liming program. Liming is also mentioned as a possible management tool in other Unit Management Plans. Thus it is clear that liming is accepted as a legitimate and useful fisheries management activity when applied to carefully selected waters.

B. Current Program

1. Need

It is important to have a liming program on selected waters to protect fish populations or important fisheries in lakes or ponds threatened by acidification. While the air pollution responsible for increasing acidity in surface waters is not confined to New York's Adirondack Mountain region, impacts in that area are serious and support a programmatic response. Pfeiffer (1979) described the historical use, resource capabilities, problems and fishery management objectives for Adirondack Waters. He reported that the Adirondack Zone formerly contained 817 brook trout ponds, but 124 had become acidified and no longer provided viable brook trout habitat. Considering only those Adirondack Zone brook trout ponds open to public fishing, Pfeiffer stated that 100 out of an original 507 ponds can no longer support brook trout due to acidification and that losses will increase unless present trends are reversed.

The Adirondack Lakes Survey Corporation (ALSC) was created in 1984 to gather physical, chemical and biological data from at least 1,450 ponded waters in the Adirondack region. The goal of this work was to provide an accurate, current database that provided a foundation for making fisheries management decisions and for assessing environmental impacts and trends. A total of 1,469 Adirondack ponds was surveyed by the ALSC from 1984-1987. Of these waters 346 contained no fish and about 75% of the fishless waters had a pH less than 5.0 (Kretser et al. 1989).

At the present time, waters that have experienced impairment or elimination of fish populations due to excess acidity cannot be restored to a more productive state without intervention. The most significant strategy for minimizing the adverse impacts of atmospheric acidification would be a nationwide reduction of polluting emissions and DEC strongly endorses that strategy. However, until such time as national air pollution standards are strengthened, a limited capability to mitigate impacts on selected waters is needed. This capability, which can be achieved by liming, will be directed at high priority waters where it is important to maintain or restore water quality in order to provide major resource or fishing related benefits.

2. General Program Description

a. Goal and Objectives

The goal of the current DFW liming program is to mitigate the effects of acidification resulting from anthropogenic sources by the addition of acid neutralizing products in selected waters to maintain and/or restore fish populations. Specific objectives of the program include:

- Maintain the pH of selected ponded waters at a value greater than 6.0 in order to preserve or restore fish populations and viable aquatic ecosystems.

- Insure the survival of heritage strains of native brook trout

in their home waters, i.e., Horn Lake, Tamarack Pond.

- Maintain threatened or endangered fishes where acidification of critical habitats for these species is recognized.

b. Scope

The present liming program is very limited in scope due to the combined effects of policy constraints, commitments to higher priority fisheries management activities, and limited staff. Table 1 lists the 32 waters currently in the DEC liming program. From 1980-1985 a total of 29 liming treatments were conducted by DEC, for an average of approximately 5 per year. From 1986 to 1988, only 4 liming treatments were conducted, primarily because other major fisheries programs in Regions 5 and 6 such as fisheries management in Lake Champlain and Lake Ontario and environmental protection programs were judged to be higher priority. While the 1980-1985 treatment rate describes the intended scope of liming activity more accurately than data for 1986 to 1988, it is clear that this level of program will not significantly address the problem of acidification. As is discussed in Section IV.B.2 the majority of acidified waters are not suitable candidates for liming projects. DEC's Division of Fish and Wildlife believes that the major goal of supporting a reduction in the causes of acid deposition at their sources is not compromised by mitigating impacts in a small number of ponded waters with high fishery or resource values.

The future scope of DEC's liming program will be somewhat larger than that conducted in the past. Policy guidelines specific to pond liming (Section I.) will continue to focus this mitigation on a limited number of waters. Waters will be carefully selected based on morphologic, hydrologic, water chemistry and biological characteristics that will identify waters best suited to and in need of liming. DEC does not intend to lime all acidified waters adversely impacted by anthropogenic sources of acid deposition products. However, DEC will continue liming to restore and maintain water quality parameters conducive to the maintenance of healthy fish populations in a small number of waters until there is no longer need for such mitigation.

3. Adirondack Brook Trout Restoration and Enhancement Program

Two factors have caused major losses in the quality and quantity of brook trout pond fishing during the last 50 years. The first was the widespread introduction of warmwater game, pan and bait fishes which eventually supplanted brook trout through predation and competition. More recently, acidification of brook trout ponds has accelerated these losses. In 1979, Pfeiffer (1979) estimated that at least 100 former brook trout ponds or 4,000 acres had lost their capacity to support brook trout due to acidification. He also estimated that brook trout abundance levels were low in about 30 percent of the Adirondack brook trout ponds. Recent surveys by the Adirondack Lakes Survey Corporation revealed that among 1,469 Adirondack ponds surveyed (represents 59,000 acres) the acid neutralizing capacity (ANC) of nearly 700 waters representing more than 17,000 acres was equal to or lower than 40 microequivalents per liter.

Table 1. Waters currently in the DEC liming program.

Water Name	P#	County	Year Last Limed	Land Classification
Region 5				
Black Pond	02-130	Franklin	1980	State - Wild Forest
Cooler Pond	03-205	Franklin	1980	Private - not posted
Deuel Pond	02-195	Franklin	1976	State - Wild Forest
Echo Pond	02-136	Franklin	1984	State - Wild Forest
Federation Pond	02-148	Franklin	1986	State - Wild Forest
Little Black Pond	02-130a	Franklin	1980	State - Wild Forest
Long Pond	03-170	Franklin	1985	State - Wild Forest
Sunrise Pond	02-117	Franklin	1984	State - Wild Forest
HOlmes Lake	05-169	Fulton	1983	State - Wild Forest
Region 6				
Brewer Lake	04-967	Herkimer	1988	State - Wild Forest
Buck Pond	04-578	Herkimer	1977	Private - FWMA*
Horn Lake	04-854	Herkimer	1989	State - Wilderness
Quiver Pond	04-795	Herkimer	1985	State - Wild Forest
Clear Pond	04-230	Lewis	1982	Private - FWMA
Cleveland Lake	04-619	Lewis	1982	State - Wild Forest
Evies Pond	04-608	Lewis	1986	State - Wild Forest
Little Otter Lake	04-664	Lewis	1984	State - Wild Forest
Long Lake	04-610	Lewis	1990	State - Wild Forest
Payne Lake	04-620	Lewis	1982	State - Wild Forest
Pitcher Pond	04-662a	Lewis	1984	State - Wild Forest
Round Pond	04-907	Oneida	1988	State - Wild Forest
Boottree Pond	03-374	St. Lawr.	1980	Private - FWMA
Deer Pond	03-372	St. Lawr.	1980	Private - FWMA
Dillon Pond	04-308	St. Lawr.	1984	Private - FWMA
Horseshoe Pond	03-373	St. Lawr.	--	Private - FWMA
Long Lake	04-162	St. Lawr.	1987	State - Wild Forest
Long Pond	03-370b	St. Lawr.	1985	Private - FWMA
Nicks Pond	04-292	St. Lawr.	1983	State - Wild Forest
Pine Pond	03-368	St. Lawr.	1980	Private - FWMA
Round Pond	03-370a	St. Lawr.	1985	Private - FWMA
Tamarack Pond	06-171	St. Lawr.	1980	State - Wilderness
Townline Pond	03-371	St. Lawr.	1980	Private - FWMA

* FWMA - Fish and Wildlife Management Act Agreement (open to public fishing)

Totals: 32 waters, 588 acres

More than half of this group had ANC values below zero. Together, these data indicate that a high proportion of the sampled waters had very little buffering capacity left. Nearly one-quarter of the waters sampled were devoid of fish life. Many ponds in some wilderness areas have been severely impacted by acidification (see Figure 1a).

Today, populations and fisheries for brook trout are found in about 400 Adirondack ponds comprising 15,000 acres of water open to public fishing. Nearly 90 percent of these populations and fisheries are maintained by DEC's annual stocking program. Only about 40 ponds or 2100 acres would provide significant brook trout angling without special management. Expansion of wild brook trout populations in ponds through natural reproduction is restricted by the scarcity of suitable spawning and nursery habitat which has been exacerbated by acidification and beaver activity.

Early in 1989, Bureau of Fisheries developed a federal-aid funding request for a program to restore and enhance brook trout populations in a number of Adirondack ponds. The program which has now been approved will reclaim a number of waters and lime 18 new waters in an effort to improve the quality and quantity of brook trout fishing in the Adirondacks. If this plan is fully implemented it will represent an increase in the number of waters in the DEC liming program from the current 32 to a total of 50. The additional waters which are candidates for liming and funded as part of the Adirondack Brook Trout Restoration and Enhancement Program are listed in Table 1a. All ponds in wilderness, primitive and canoe areas will be managed for brook trout and other indigenous fish species.

All ponds listed in Tables 1 and 1a must meet the selection criteria specified in the proposed pond liming policy. Additional summer water chemistry surveys will be conducted before any of the new waters are limed. The initial liming of these new waters would occur over a three year period. Once included in the liming program they will be treated the same as other waters already in the program.

This group of 50 waters represents the level of DEC's core liming program in the Adirondacks and the numbers are not expected to change by more than a few waters during the next decade. Any additions to the program will be consistent with the State Land Master Plan as implemented by the unit management planning process and will comply with the final liming-policy criteria which are adopted as a result of this EIS process.

C. History of Liming Activities and Research

1. Liming in Agriculture and Aquaculture

The addition of lime to improve the soil acidity has been a common practice in agriculture for many years. In many cases where soils are too acidic to produce a good crop the addition of agricultural limestone is the most cost effective means of increasing productivity. Factors which are influenced by the acidity of the soil include nutrient availability, cation exchange capacity, mobilization of toxic

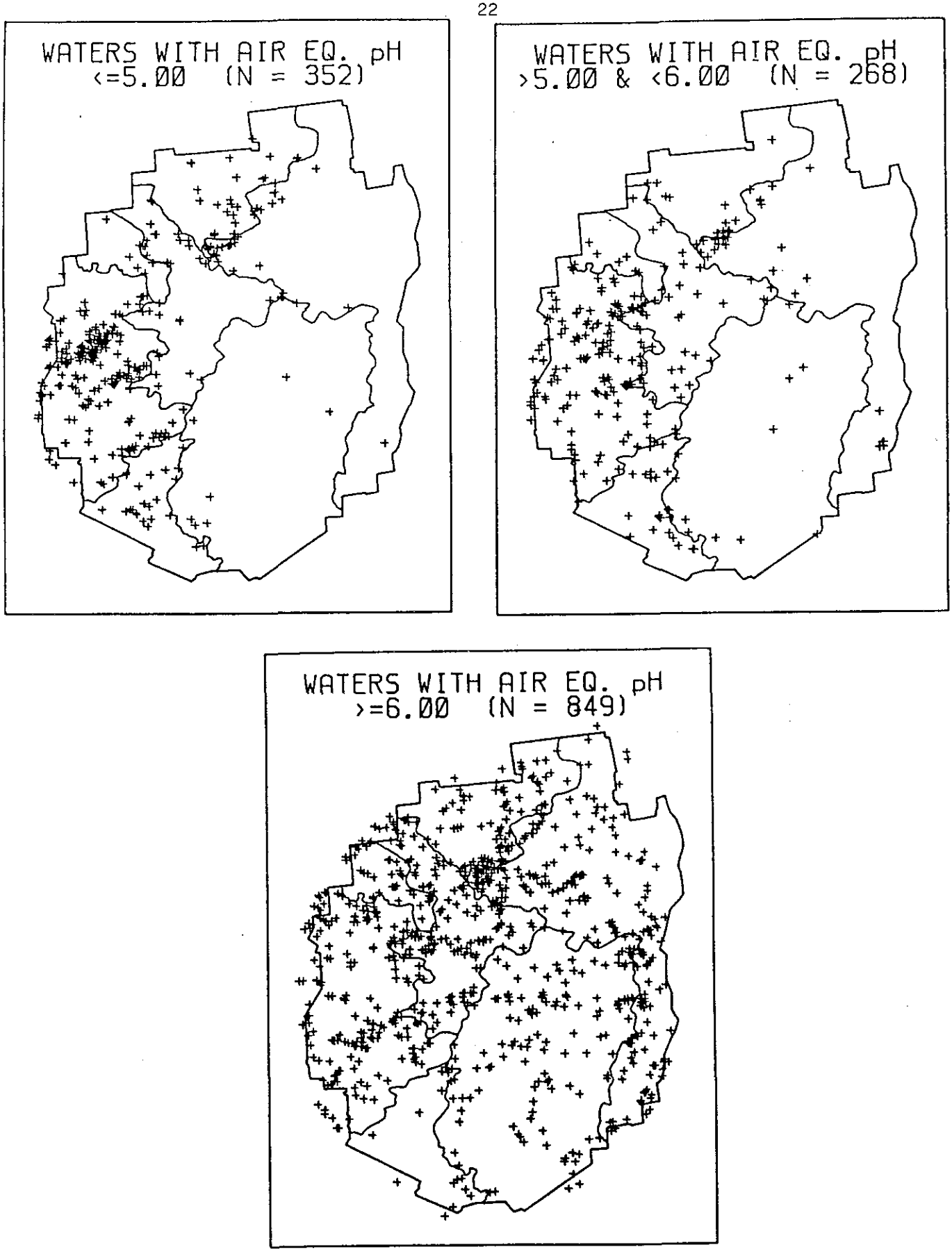

Figure 1a. Geographic distribution of waters surveyed by the Adirondack Lakes Survey Corporation by air equillibrated pH class (figure taken from Kretser et al. 1989).

Table 1-a. Additional liming candidates included in the proposed Adirondack Brook Trout Restoration and Enhancement Program.

Water Name	P#	County	Land Classification
Kitfox Pond	03-142	Franklin	State-Canoe Area
Little Long Pond	03-141	Franklin	State-Canoe Area
E. Beechridge	04-203	Herkimer	State-Wilderness
Willys Lake	04-210	Herkimer	State-Wilderness
Spectacle P. (S)	04-335	St Lawrence	State-Wilderness
Simmons Pond	04-336	St lawrence	State-Wilderness
Streeter Fish P.	04-353	Herkimer	State-Wilderness
Hawk Pond	04-504	Herkimer	State-Wilderness
Summit Pond	04-527	Herkimer	State-Wilderness
Little Rock Pond	04-534	Herkimer	State-Wilderness
Sunshine Pond	04-487	Herkimer	State-Wilderness
Ike's Pond	04-438	Herkimer	State-Wilderness
Lyon Pond	04-498	Herkimer	State-Primitive
Evergreen Pond	04-500	Herkimer	State-Primitive
Peaked Mountain	04-502	Herkimer	State-Primitive
Hidden Lake	04-505	Herkimer	State-Primitive
Soda Pond	04-511	Herkimer	State-Primitive
Clear Pond	04-312	St Lawrence	State-Wild Forest

Totals: 18 waters, 594 acres