# APPENDIX D

Responses to Adirondack Park Agency Comments (pp.167-184):

A. Many additions, changes, and clarifications have been made in the EIS in response to the specific APA comments. These responses were made to answer the APA concerns and to clarify the document so that it is in full compliance with SEQR and Part 617. The intention of this generic EIS is to evaluate the state liming program on a level which applies to all potential waters considered for treatment. It is anticipated that supplemental site specific impact statements will be required only in rare cases where situations or conditions occur which are not discussed in the generic EIS. The specific criteria used to select candidate waters for liming are listed in the Division of Fish and Wildlife Liming Policy (Section I) and are discussed in detail in Section II.D.4 of this EIS.

B. A new section (II.D.2) has been added to this Final EIS which deals with the issue of liming in wilderness areas. This section discusses in detail, the objectives of the liming program as it relates to wilderness, and methods which will be used to conduct the program in compliance with the State Land Master Plan. The mutually agreed upon guidelines for fisheries management in wilderness, primitive, and canoe areas are included in the FEIS as Appendix B. The DEC fully recognizes the values of wilderness and works with the APA to ensure that this invaluable resource is protected. The new section on liming in wilderness areas answers the concerns raised by the APA and others.

C. It is not the intention nor the desire of DEC to neutralize any naturally acidic waters. The intent of the program is to use aglime to help neutralize the anthropogenically caused acidity in a selected number of acidic waters. There exists in the Adirondacks a full range of lake types from Sphagnum dominated bogs to shallow-soil, fast flushing drainage systems. Liming candidate selection criterion #2 in the Liming Policy (Section I.) excludes all bog waters and marginal bog waters as classified by the Adirondack Lakes Survey and also excludes highly colored waters. This criterion ensures that these naturally acidic and unique communities will not become a part of the liming program.

D. The purpose of this generic EIS was to evaluate the Department's program of using agricultural limestone to neutralize acidified waters in New York State. As part of this evaluation, the potential adverse and beneficial impacts of liming were identified and discussed, ways to mitigate potential adverse impacts were identified, criteria for identifying candidate waters were described, and alternatives to liming were evaluated. At the conclusion of the EIS process, the Department will adopt a revised policy that will guide all future liming activities by DEC. The scope of the DEC liming program in the Adirondacks is expected to increase from the current 32 up to 50 waters, and these numbers are not expected to change over the next decade. At that time the

Department may find it necessary to re-visit this EIS if there is a need to expand the program. Since the Department is committed to make every reasonable effort to prevent limed waters from reacidifying, it is anticipated that the number of waters in the program will remain small.

E. The goal and objectives (Section II.B.2.a) have been reworded and corrected. The goal of the DFW liming program is to maintain and/or reestablish fish populations in a small number of selected acidified waters. It is not the intent of the liming program to lime naturally acidic waters nor to attempt to create fisheries where fish have never been present. Naturally acidic bog waters are excluded from possible treatment under Criterion #2 of the Liming Policy (Section I.), and Criterion #5 requires that there must be a historical record of a previous fishery being present in the liming candidate water. The other criteria in the policy similarly limit the number of potential candidates. Criterion #3 requires that the candidate water have a flushing rate of not more than two times per year and eliminates approximately 75% of the acidic Adirondack waters from possible inclusion in the liming program. The criteria as listed in the policy do indeed refine, narrow, and clarify the goal of the program.

F.& G. The word "create" has been removed from paragraph one of page 8 and the word "creating" in paragraph one on page 35 has been changed to "restoring." It is not the Department's intention to create new fisheries, only to maintain or restore. Similarly, the Department does not intend to treat naturally acidic waters, and the first sentence of page 8 has been corrected.

H. The revised liming policy as presented in this FEIS will expand the program to a limited degree and the document has been revised to accurately present this. This small increase is not however, viewed as a major expansion of the program. The original Table 7 was intended as a working list of some of the Adirondack waters which meet several of the liming criteria, not as a list of waters scheduled for treatment. This table was presented merely to show the limited number of waters (out of the 1483 which the ALSC surveyed) which meet three of the five criteria. Because of misinterpretations and confusion regarding this table it has been removed from the FEIS. The size of the DEC liming program is expected to increase to 50 waters and remain at this level over the next decade. Available resources, logistical limitations, and other factors limit the size of the program. All liming treatments conducted as part of the DEC program will be consistent with the State Land Master Plan, Unit Management Plans, and the guidelines outlined in this FEIS.

I. Guideline 3 of the 1983 policy has been added to the new policy, see Section I. of the FEIS.

J. Meeting the estimated recreational demand is not the primary objective of the program and is not even listed under "Goal and Objectives". Managing, maintaining and/or restoring fisheries in

waters impacted by acidic deposition are the primary objectives of the liming program. Increased recreational opportunities are of course results of these management activities and are not viewed as undesirable.

K. Criterion #4 in the revised liming policy has been modified and several sentences have been added to the temperature and dissolved oxygen discussion in Section II.D.4.b. The criterion now includes the statements, "For brook trout waters dissolved oxygen levels should be greater than 5 ppm throughout the year, and summer bottom temperatures should not be over 70°F. Refugia may be present which provide suitable dissolved oxygen and temperature levels." The ALSC collected dissolved oxygen and temperature data but only at one time during the summer and did not evaluate whether refugia were present which could sustain brook trout. The ALSC data provide an excellent starting point and preliminary screening of approximately half the Adirondack ponded waters, but more intensive water sampling is necessary to determine whether a specific water meets all of the criteria. As is mentioned above the original Table 7 has been removed from the FEIS.

L. The terms referred to are admittedly subjective and are left to the interpretation and justification of the fisheries manager. This criterion (#5) does require that there be an evaluation and evidence of a historic fishery being present in the candidate water which has been impacted by acidification. Fisheries management is not an exact science, and whether a candidate water meets this criterion is in part left to the judgement of the fisheries manager. Again, it is not the intent of this EIS to publish a listing of all waters which meet all of the liming candidate criteria.

M. & N. Table 8 has been corrected, renumbered as Table 7, and revised in response to APA comments. The data presented in the revised table are discussed in greater detail below under response XX. 6NYCRR 617.14(f)(1) requires a "concise description of the proposed action, its purpose, public need and benefits, including social and economic considerations". The per acre cost of liming and the economic benefits of liming were provided to satisfy this requirement. It is beyond the intent of this requirement that the mechanism for assuring long-term funding of the program or the exact costs of the program in any given year be provided. However Table 9 has been added which provides projected costs thru the year 2000. DEC is aware of and has discussed the adverse environmental impacts that are associated with reacidification (see Section V.A.1.g.). The Department is committed to monitor all treated waters on a yearly basis to allow for timely retreatment, and every effort will be made to prevent reacidification to toxic levels.

O. The "Exceptions" section of the revised liming policy (Section I.) is not intended nor will it be used as an open-ended provision for treating any lake in the state. It is in the best interest of the DEC, the public, and the environment to only allow treatment of those waters which meet the liming candidate criteria. It is

expected that this "Exceptions" section would be used only rarely, primarily for research purposes, and as stated in the policy would "require detailed justification for approval."

P. The generic EIS discusses the factors which will be used to identify candidate waters for liming in Section II.D.4. These factors will be adopted in the Findings and included in the final liming policy as criteria. Waters that are under consideration for liming will have to demonstrate consistency with this policy. Consistency will be determined for each individual candidate by an environmental assessment where each candidate water will be carefully surveyed and evaluated to insure they meet the selection criteria. Following the completion of the environmental assessment the Department will either (1) proceed with the action, incorporating the necessary mitigation, because the action is in conformance with the generic EIS and Findings, or (2) revise the Findings Statement to address the issues not adequately covered by the original Findings and proceed with the action incorporating the necessary mitigation, or (3) require the preparation of a supplement to discuss impacts that were not addressed or were inadequately addressed in the generic EIS, or (4) prepare a negative declaration because the action is not covered by the generic EIS but it will not result in any significant impacts.

It is anticipated that for most actions, it will not be necessary to prepare a supplement to the generic EIS, but were a supplement to be required it would be subject to the full procedures under SEQR.

For projects located in areas covered by a Unit Management Plan (UMP) consistency with the liming policy will be demonstrated within the plan. If the candidate water is located in an area within the Adirondack Park that is not covered by a completed UMP, the Department will coordinate with the Adirondack Park Agency (APA) as described in Memoranda of Understanding between the APA and DEC.

Q. This error has been corrected. The policy (Section I.) has been revised to read as follows:

**(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.**

R. Section II.A.3. has been expanded to include a more detailed discussion of how the liming program conforms to the Final Environmental Impact Statement on Habitat Management Activities and the Final Environmental Impact Statement on Fish Species Management.

S. This paragraph has been modified and expanded to clarify these important points.

T. The wilderness definition from the SLMP has been added to this paragraph to more clearly define this land classification.

U. The guideline for use of motorized equipment or aircraft has been expanded in accordance with the SLMP.

V. Similarly, the guideline for use of motor vehicles, motorized equipment and aircraft in primitive areas has been corrected.

W. This error has been corrected.

X. The statement in question in Section II.A.3. has been modified to read, "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." Fishery management techniques are important means of managing, maintaining, and restoring the fish resources of the Adirondacks, even though these specific methods are not discussed in the SLMP. These techniques must of course be consistent with the SLMP guidelines for the particular land classification involved and must be included in any approved unit management plans. A detailed discussion and policy guidelines for fisheries management in *wilderness, primitive and canoe areas are included as Appendix B of* this FEIS. These guidelines have been recently refined and discussed in meetings between the DEC and the APA.

Y. The statement in question stands as a valid although general conclusion to this discussion. The previous paragraphs have been substantially revised and expanded to provide more information leading to this conclusion. The APA is incorrect in stating that the completed unit management plans for wilderness areas "do not call for liming any waters." In fact the Five Ponds Wilderness Unit Management Plan states on page 37 that one of the fisheries management objectives is to "maintain acceptable pH levels in selected ponds by periodic lime application if necessary to maintain their fish populations." Appendix I of this plan lists many waters as potential liming candidates. The error referring to a West Canada Lakes Wilderness Area Unit Management Plan has been corrected. Management of state lands which do not as yet have completed unit management plans will be conducted in consultation with the APA and in accordance with new guidelines and memoranda of understanding. The Horn Lake liming should have been preceded with consultations with the APA. The revised liming policy states clearly that liming projects will be carried out according to the guidelines of the SLMP, adopted unit management plans, and *memoranda of understanding between the APA and the DEC.*

Z. This statement, which is the first sentence of Section II.D.1, is a valid general summary statement. Fisheries management activities, including liming, are an integral part of unit management planning, and for the units where lake acidification is a problem liming is included as a management strategy. In cases where unit management plans have not been completed, the APA will be consulted in accordance with memoranda of understanding. Consultation with the

APA on these activities is important, and although not always part of the process in the past, will be followed under the revised liming policy. The Memorandum of Understanding referred to is deficient in that it contains no discussion of any fisheries management activities. It will be important in the near future to correct this deficiency and reach a consensus on what fisheries activities require APA approval. Regarding the adopted Cranberry Lake Unit Management Plan, these specific details should be dealt with in the UMP revision process. It should be noted however that neither Dog nor Curtis Ponds meet the flushing rate criteria for liming candidates.

AA. The last sentence of Section II.D.1 has been changed to reflect the APA concerns about fisheries management activities in wilderness areas. Section II.D.2 has been added to fully discuss liming in wilderness areas. The DEC agrees fully with the APA that fisheries management activities in wilderness areas must be consistent with the SLMP Wilderness definition and guidelines.

BB. The new Section II.D.2 discusses how liming can be conducted in wilderness areas and be consistent with the SLMP guidelines. Appendix B also discusses in detail the DEC policy on fisheries management in wilderness, primitive and canoe areas. This includes specific guidelines related to ecosystem restoration which were developed in conjunction with the APA. The DEC recognizes that there are certain limitations on management activities within these areas.

CC. This error in Table 5 has been corrected.

DD. The second paragraph of Section V.A.3.b has been rewritten to correct this error. As is mentioned above and in the revised liming policy, all liming projects in the Adirondacks will be carried out according to the guidelines of the State Land Master Plan. Motorized equipment will not be used in designated wilderness areas.

EE. As discussed above the FEIS includes a new section on Liming in Wilderness Areas (Section II.D.2) plus the Policy Guidelines from DEC Commissioner Jorling on Fisheries Management in Wilderness, Primitive, and Canoe Areas (Appendix B). These guidelines were developed in conjunction with the APA with the objective of perpetuating natural aquatic ecosystems. The new sections of the FEIS address the primary concerns the APA has relative to the DEC liming program in wilderness. It is not the intent of the FEIS to provide a full sociological dissertation of wilderness and the backcountry experience. Hikers, canoeists, photographers, skiers, and non users of Wilderness are all included in the general statements in the first two paragraphs of Section III.D.

FF. A wild forest area may provide a similar recreational setting as a wilderness area. In wild forest areas, however, a higher level of human use of the area may be encountered and certain

motorized vehicles may be used. Wild forest areas allow a large range of human recreational activities and experiences. A brief discussion of the wild forest classification is found in Section II.A.2.b.2 and a complete discussion can be found in the Adirondack Park State Land Master Plan.

GG. Section II.D.2 of the FEIS discusses liming in wilderness areas in more detail. Section V.A.3.d has also been expanded to mention the additional concerns which the APA listed. Lakes and ponds which are naturally acidic (bog waters) are not to be treated as part of the DEC liming program. It is also not the intent of wilderness liming projects to develop, restore, or promote intensively utilized fisheries in wilderness areas. Low density angling is essential to preserve the quality of the wilderness experience. The primary purpose of aquatic resources management in wilderness areas is to perpetuate natural aquatic ecosystems.

HH. The intent of the DEC liming program is to restore anthropogenically acidified waters, not to alter the productivity of these systems. The productivity of Adirondack waters is low, and following liming the productivity will remain low. Phosphorus is usually the limiting nutrient in Adirondack waters and is discussed in Section V.A.1.g. Successional sequences and long term trophic changes in unlimed natural waters are difficult to predict. In limed waters as in unlimed waters different lakes or ponds may respond differently over a long period of time. It is not expected that any major adverse changes in the successional sequences or trophic status will result from liming.

II. The "so called wilderness atmosphere" refers to the primeval character of a wilderness area which "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable..." (taken from the SLMP definition of wilderness). Diminution of this wilderness atmosphere and possible mitigative measures would be assessed and proposed as part of the Forest Preserve Unit Management Planning process.

JJ. Item #3 of the current policy has been added to the revised policy in response to this APA concern. Item #5 was already listed on page 142 of the DEIS, and is an integral part of the revised policy. The revised policy is not a significant departure from the current policy as this comment states.

KK. The Pharaoh Lakes Wilderness Area is a popular area which has a number of unique problems. The unit management plan for this area has therefore created a considerable amount of controversy. No waters in this area are currently limed, and no treatments are proposed. Liming is indeed a significant management activity and should be evaluated within the context of unit management plans. Consultation and communication with the APA is important prior to liming waters in areas which do not have completed unit management plans and this is part of the revised policy. Possible increases in public use resulting from liming and increased fishing activity

need to be evaluated as part of the unit management planning process.

LL. Section II.A.2.a has been expanded to include a more complete discussion of Freshwater Wetlands Act jurisdiction and permit requirements. Basically, in areas outside of the Adirondack Park the DEC has jurisdiction over wetlands and would require a wetlands permit according to Riexinger and Luciano (1989). They also determined that a permit should be issuable, since lake liming in the context of the Division of Fish and Wildlife's liming program is a compatible activity. For waters located within the Adirondack Park the APA has the responsibility for wetlands management and issuance of wetlands permits. Discussions have been held between the APA and the DEC regarding when a permit would be required for a DEC liming project and the following preliminary agreements were reached. Waters which have been limed in the past in which plant communities have adapted to the water chemistry, and which would not experience a major change of more than 2 pH units during reliming would be judged non jurisdictional and would not require permits. For waters which have never been limed and which would experience a considerable pH change during the initial liming APA review would be required for jurisdictional determination and possible permit requirement. The APA also has the opportunity for review of proposed liming projects thru the unit management planning process, since all new projects should be incorporated into unit management plans.

MM. Table 1 lists all (n=32) of the waters which are in the current liming program. The new Section II.B.3. states that with the addition of 18 waters in the new Adirondack Brook Trout Restoration and Enhancement Program, the total number of waters in the DEC liming program would increase to 50. This number is not expected to change by more than a few waters in the next decade.

NN. There is a very limited amount of data available on heavy metal concentrations in Adirondack waters - not enough data to be useful in terms of selecting possible liming candidates. More importantly however, data from Scandinavia indicate that liming actually reduces heavy metal concentrations. It is in acidic waters where metal concentrations become a problem. Naturally acidic waters are to be excluded from the DEC liming program (see candidate selection criterion #2). The acceptable water quality goals are targeted for brook trout because this is the most important native Adirondack fish species being impacted by acidic deposition, and this is the primary species being managed in 30 of the 32 waters in the current program (Little Otter Pond is managed for brown trout and Black Pond contains both brook trout and rainbow trout). All 18 additional waters in the new Brook Trout Restoration and Enhancement Program will of course be managed for brook trout, and a number of these will also be managed for other indigenous fish species. In comparison with other species of fish brook trout are relatively tolerant of moderate acidity. Certain species are more tolerant and many species are less tolerant.

As is discussed in this EIS the maintenance of these water quality goals would also benefit many other species of plants and animals and would therefore help to protect the entire aquatic ecosystem. The water quality will be monitored on a once yearly basis as is discussed in Section II.D.4.a. More intensive sampling may be conducted if funding and staff are available and if there is a need or desire to assess the status of the water quality at a certain time (immediately post liming). The cost of this "more intensive sampling" was not factored into the renumbered Table 7 because it is not a scheduled or budgeted part of the program.

OO. The proposed liming policy (Section I.) and Section II.D.4.b. have been revised in response to this comment. The revised criterion requires that "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 revised criterion also acknowledges however that in some waters there may be low oxygen levels or high temperatures, but small refuge areas, springs, or cold tributary streams serve to sustain brook trout during part of the year. Historical evidence that brook trout once were present in a lake on a year round basis is evidence that dissolved oxygen and temperature must be suitable for survival of this species.

PP. Based on the ALSC data the range in flushing rates for 1461 Adirondack lakes and ponds is from 0.1 to over 500 times per year, with a median flushing rate value of 6.8 times per year. The proposed flushing rate of 2.0 times per year does not represent a major change from the previous 1.0 time per year. The change in the flushing rate criterion from 1.0 to 2.0 times per year is also consistent with the current research on which hydraulic regimes respond favorably to liming. As is discussed in Section II.D.4.d. recent studies and unpublished DEC data show that waters with flushing rates of 2.0 times per year do not require more frequent liming or more frequent monitoring. By increasing the flushing rate to 2.0 times per year the DEC also is able to select liming candidates from a larger number of waters which have been impacted by acidic deposition. Selected waters from this group can be satisfactorily neutralized and acceptable water quality conditions maintained, and the revised liming policy reflects this new information. It is unclear how lake mixing regimes could be used as a criterion to help select suitable liming candidates. The last statement on page 9 of the APA comments is similarly unclear.

QQ. The only fish species currently considered under the heritage fisheries criterion is the brook trout, and the only other species considered for possible future protection is the round whitefish. It is not anticipated that other species need to be considered, but it is unwise to exclude all other species. A discussion of threatened and endangered species and how they might benefit from this liming program is found in Section V.B.1.b. Appendix B of Keller's 1979 report on brook trout management is a listing of waters which contain existing populations of wild strains of brook trout. Dr. C. Krueger of Cornell University is presently

conducting a study to genetically identify the different strains of brook trout present in New York State. This study will greatly add to our understanding of heritage strains. The number of waters limed for the purpose of protecting or restoring heritage strains is currently two and may increase to possibly four or five.

RR. The terms "serious decline, unique fishery, and historically excellent fishery" are judgement statements which cannot be easily defined with the data available for most waters. Specific catch per unit effort information, accurate historical records, quality of experience information, and fishing pressure data are lacking for most lakes and ponds. Similar data are lacking for the waters in the current liming program. The actual decision as to whether or not a candidate water meets this criterion must be based on the best judgement of the fisheries management personnel familiar with the resource. It is in the best interest of fisheries management staff to select and treat waters which meet this criterion. In many cases discussions with local fishermen regarding fishing success and quality of experience in specific limed waters provide the best indication of the brook trout population status. An evaluation of the physical capabilities of a pond to support naturally reproducing populations of brook trout is a difficult task. The two waters in the current program which are managed for heritage strain protection (Horn Lake and Tamarack Pond) are not stocked and rely on natural reproduction to sustain the heritage strain. Most of the other waters in the program are stocked annually to maintain the brook trout populations. In wilderness areas an objective of liming projects will be to protect or restore indigenous fish species on a self sustaining basis. This will be accomplished by stocking the limed wilderness water with native Adirondack strain brook trout. Efforts may also be made to enhance the natural reproduction of indigenous species, but it is possible that in acid deposition impacted waters which historically supported naturally spawning brook trout these lakes may no longer contain suitable spawning habitat and may require periodic stocking.

SS. A consideration of available funds and manpower is not one of the specific criteria for selecting a candidate lake. It is however listed in the revised liming policy as one of the policy guidelines, and it is because of this factor that the number of waters in the program will be limited. The amount of funding and manpower available may vary on a yearly basis, and the need for reliming will vary based on water chemistry data. In some years no reliming treatments will be required, and in others numerous retreatments will be necessary. It is therefore difficult to list the specific conditions which would define when a pond would not be considered because of expense. During a liming season those ponds requiring retreatment would be treated first before any new waters are treated. In addition, if only a few waters require reliming, then a certain amount of lime should be stockpiled for the following season. These two actions will help to insure that the number of waters in the program is consistent with available funds and manpower.

TT. The candidate selection criteria discussed in this EIS are part of the proposed revised liming policy and were therefore not used to create the list of waters in the current liming program (Table 1). The current list consists of many waters which have been treated for a number of years and which were initially selected based on other criteria. Several waters currently on the list may have to be dropped because they do not meet all of the new criteria. Evies Pond for example is listed as a marginal bog by the ALSC and also does not appear to be supporting a viable brook trout population. Once the proposed liming policy is approved additional studies will be necessary to determine whether all of the waters in the current program meet the new criteria. The data are not presently available to show how all these waters meet the criteria.

UU. This FEIS and the proposed revision of the DEC liming policy apply to all New York State waters under DEC jurisdiction. On private waters DEC and APA authority may be limited to requiring a wetlands permit for consistently regulating private liming activities. Hutchinson (1986) concluded that neither SPDES nor aquatic pesticide permits were required for liming projects, and Riexinger and Luciano (1989) determined that for DEC jurisdictional waters (outside of the Adirondack and Catskill Parks) a wetlands permit was required. As is discussed in Section II.D.3. no liming projects will be carried out by private groups on state waters without the approval of the DEC fisheries staff and without any appropriate permits.

VV. This criterion has been revised in this Final EIS to reflect the definition of bog or marginal bog used by the Adirondack Lakes Survey Corporation and to incorporate a water color parameter. The criterion in the revised liming policy and in Section II.D.4.c. now states that in a liming candidate "Sphagnum moss must not occupy more than 50% of the shoreline and summer surface water color must not exceed 75 platinum cobalt units." It is important to state again that it is not the intent of the DEC liming program to neutralize any naturally acidic waters. The abundance of Sphagnum moss on the shoreline is the primary factor which identifies a bog and creates naturally acidic conditions for other acid loving organisms. Water color has been added to this criterion in response to APA comments, because waters which are highly colored include many which are naturally acidic, but not those acidified by acidic deposition. Not all naturally acid waters have high color, but if an acid water is highly colored it is because of natural organic acids. The other parameters listed by the APA to help identify bogs serve only to confuse and complicate the issue. The parameter "naturally occurring acidic condition" is not defined. Organic substrate also does a poor job of separating bog from non-bog waters. The ALSC determined the percentages of various shoalwater substrates (muck, sand, gravel, etc.) for each lake surveyed, and these data do not appear to increase our ability to better identify naturally acidic waters. The APA appears to agree that natural bog ponds can be identified based on their bog vegetation, and since Sphagnum moss is the most important bog plant, the abundance of this plant in combination with the water

color parameter, will be used to identify naturally acidic waters. It should be noted however that acid precipitation has created acidic environments which are more favorable for Sphagnum growth, and similarly naturally acidic ecosystems have been impacted by acidic deposition. The identification of pure naturally acidic systems is therefore not a clear black and white issue.

WW. In recognition of the need to count the costs before continuing, reducing or expanding the liming program, Table 9 has been developed. It presents costs projected to the year 2000 for the DEC Liming Program at its current and potential expanded level of effort (see Section II.B.3). Per acre and total annual program costs are given. Water by water cost details can be obtained by applying the appropriate cost per acre (from the table) to the acreage of any individual water.

XX. The APA states that the Program Costs and Benefits discussion as presented in the Draft EIS were significantly flawed. This opinion was based on APA's analyses which concluded that program costs were underestimated and values given in the figures did not always match those presented in the text. A re-examination of the cost-benefit discussion in light of APA`s comments substantiated those concerns. An error in calculations on the renumbered Table 8 misrepresented the treatment costs and the resulting cost benefit ratio for remote limed waters. The renumbered Table 7, which was based on data from Table 8, also contained some erroneous information regarding expenditures for remote waters. As a result, the discussion regarding economic benefits of pond liming (Section V.B.3.) along with Tables 7 and 8 have been modified in the Final EIS to reflect the necessary corrections. The major change for Table 7 centers on the annual program cost per acre for remote waters, estimated at $52 per acre in 1988. It should also be pointed out that Table 7 is based on the current roster of waters in the DEC Liming Program (as of August 31, 1988) which includes two remote and 30 accessible ponds, representing 58 and 530 acres respectively. The reported flaws in the Draft EIS also resulted from misinterpretation by APA of the data presented in Table 7. The treatment costs were assumed to represent total treatment costs for the acreage in the liming program. These costs are actually total average annual costs. They were derived using a three step calculation. First average treatment costs per acre were determined using cost records from recent liming projects (Table 8). These figures were expanded to provide an estimate of the total treatment cost for all ponds in the current DEC Liming Program (ie. 588 acres). Finally, the total cost was broken down to an annual basis by dividing the total treatment cost by the effective life of the treatment (6 years). Misinterpretation also led to questions regarding monitoring costs. This cost for remote waters was reported in the DEIS as $238 (in 1988) per water. This figure was questioned because it was assumed that a helicopter would be involved. The current operating procedure is to collect all water samples on foot, thus eliminating the expense and problems associated with the use of a helicopter. The $238 figure includes personnel, motor vehicle and laboratory expenses. The average cost for annual laboratory analysis of limed

pond water samples was reported in the DEIS at $18 each. This figure was also alleged to be low. This cost figure is based on experience at the Rome Lab (DEC) and reflects the mean time and reagents it takes to analyze one water sample for the parameters established by the DFW Liming Policy (ie. pH, Alk., Cond. and Color). This figure is considered accurate in 1988 dollars. Analyses for sulfate, calcium, and monomeric aluminum are not part of the routine monitoring program. In the revised Table 8 Cost-Benefit Analysis, the treatment costs for remote waters have been modified to incorporate helicopter costs of $2,000 per day. The revised remote treatment cost per acre ($264) is more consistent with the literature, and realistically represents the higher costs of remote applications. Additionally, Table 8 was adjusted to 1988 dollars using the Consumer Price Index as a guide to give more representative 1988 cost estimates. In conclusion, the revised pond liming cost-benefit analysis (1 to 6 and 1 to 12 for remote and accessible ponds respectively) (Table 8), still indicates that pond liming is an economically feasible fisheries management tool.

YY. Reacidification and metal toxicity are not adverse impacts of the DEC liming program; these are impacts of terminating a liming program or of allowing acidification of a water to proceed without protective liming. The section where this subject is discussed, VIII.A. Commitment to Management Once Liming Initiated, was felt to be the most appropriate. It is agreed that this is an important topic which was important in the development of the revised liming policy. Under this new policy waters in the program will be relimed when the water chemistry reaches pH 6.0 and before reacidification results in toxic metal concentrations in the water.

ZZ. Section V.A.1.f. has been expanded to include a more detailed discussion of macroinvertebrate, benthos, and zooplankton in response to the APA comments. The discussion of adverse impacts of liming on fish is found on the previous page (Section V.A.1.c.).

AAA. This discussion of water chemistry fluctuations has been moved as the APA suggested to Section 1: Ecosystem Impacts. The discussion is now part of the section dealing with water quality impacts.

BBB. As is stated in the revised liming policy (Section I.) agricultural limestone will be the neutralizing material used in the state program "unless a research project is developed according to guidelines discussed under Exceptions." Any other material proposed experimentally would have to be evaluated prior to use to assess whether or not anticipated impacts are adequately discussed in this FEIS. It is possible that a supplemental EIS would have to be prepared in this case to fully discuss the potential adverse impacts associated with the proposed neutralizing material. The particle size information for the agricultural limestone used is discussed in Section VI A.2. and is based on laboratory studies and dissolution models. The reliming amounts used by Region 6 and the resulting water chemistry are actual field data of greater value. If the field data for a specific pond indicate that reliming can be

conducted effectively at a lower treatment rate than the Deacid model predicts, then the lower treatment rate will be used. The discussion of economic benefits (Section V.B.3.) incorporates the actual costs of using a lower treatment rate for reliming projects, even though this conflicts with the Deacid model predictions.

CCC. The potential impacts of transportation, staging and actual application of lime to project sites are considered minimal. Transportation of lime will be via truck to a staging area near the pond. The staging area will in most cases be a parking lot or clearing and for most treatments will be snow covered, since the liming will take place during winter. Staging areas for helicopter limings will similarly be either parking lot areas or large clearings to allow safe operation of the helicopter. The actual application by snowmobiles or helicopter will be conducted during periods of low public use of the resource. Numerous Swedish and Norwegian reports and publications were used in the preparation of this FEIS (see Section XIII). No evidence was found in the literature of lime diminishing sunlight through the ice nor of lime going out with the ice at springmelt. In the Adirondacks the deep snowpack covering the ice during winter undoubtedly diminishes the sunlight to a greater extent than the lime on top of the snow. Since lakes with high flushing rates are excluded from the DEC liming program it is not expected that much of the limed ice would go out the lake outlet during snowmelt.

DDD. A listing of rare, threatened, and endangered plants was made publicly available in September 1988 and was adopted on June 22, 1989. The plants on this list now have legal status under the state's protected plant regulations. Plants or any part of plants on this list cannot be legally picked, removed, or destroyed without the permission of the owner of the land where they are growing. The N.Y. Natural Heritage Program maintains a more extensive N.Y. Rare Plants Status List which also includes the legal status plants, plants which have historically been found in the state, and plants believed to have been extirpated from the state. The policy guidelines of the revised liming policy have been modified to include the fact that this listing should be consulted prior to treating a new water with lime. If plants on these lists are known to exist in the candidate water, then discussions should be held with the Natural Heritage Program staff and Division of Lands and Forests staff and other experts on the subject to evaluate the possible impact of liming on the plant of concern. The second paragraph of Section V.A.1.b. has been rewritten in response to the APA concerns.

EEE. While up-to-date angler survey data specific to the limed waters would be helpful for determining accurate economic benefits from the liming program, it is not considered a critical need. Angler survey data does not impact the evaluation of water chemistry conditions, and usually does not influence re-liming decisions. In cases where restoration of the natural aquatic ecosystem is the primary objective of the liming, this is particularly true. Because of its less than crucial nature, and the very high costs

associated with on-ground angler surveys, such surveys are not required by the DFW Liming Policy. The potential for gathering current limed pond angler survey data does exist, however. Assuming that public use of limed ponds is comparable to public use of other productive brook trout ponds located in similar settings, results from other angler surveys, such as the on-going 1988 Statewide Angler Mail Survey, can be applied to limed brook trout ponds. Also, a DEC proposal to census individual limed waters has been discussed. Pending regional funding and priorities, this may be implemented in the near future. Section VI.B.3. on Economic Benefits has also been revised to reflect the fact that ecosystem restoration may be economically difficult to quantify.

FFF. Paragraph 2 of Section VI.A.1. has been rewritten in response to this APA comment.

GGG. Two new alternatives have been added to Section XI in response to APA concerns and also because of the addition of the Adirondack Brook Trout Restoration and Enhancement Program (Section II.B.3.) to this FEIS. These new alternatives are Section XI.G. Lime Only Lakes Critical to Survival of Unique Strains of Fish, Threatened or Endangered Fish Species or Lakes With Potential for High Use Fisheries; and Section XI.H. Do Not Lime Any Waters in Wilderness Areas Except Waters Critical to Survival of a Unique Strain of Fish or Threatened or Endangered Fish Species.

HHH. This alternative may be a viable option at some point in the future. At present stream liming has not been successfully demonstrated to be feasible in Adirondack streams. The critical time of the year when streams are most acidic and when young brook trout are emerging from the gravel is during spring snowmelt. During this period stream flows are very high, ice jams and anchor ice are common, and streams frequently overflow their banks. These conditions make it very difficult to satisfactorily dose the stream with the proper amount of lime. This alternative is therefore not included in the FEIS.

Responses to Nolan A. Curry's Comments (pp.185-190):

A. Dissolved organic carbon (DOC) is a measure of the organic acid content of a lake and was measured by the Adirondack Lakes Survey Corporation (ALSC) during 1984-87. Kretser et al. (1987) did not present a figure showing any relationship between DOC and sulfate for Adirondack waters, however such a relationship may exist. A detailed analysis of the ALSC data is currently underway and the results will be released in early 1990. In naturally acidic bog waters which frequently have high DOC levels sulfate levels would be expected to be low because of sulfate reduction processes which occur in bog waters and result in a release of hydrogen sulfide gas. The DEC liming program excludes bog waters which have greater than 50% of the shoreline covered with Sphagnum, and aims to

exclude naturally acidic waters which would be expected to have higher levels of organic acids.

B. As part of the Cornell Extensive Liming Study (see Section II.C.6.a. of this FEIS) Schofield et al. (1986) conducted batch titrations of agricultural limestone added to samples of lake water and sediments. They calculated their liming doses based on the amount of aglime needed to raise the acid neutralizing capacity (ANC) of the water to 200 ueq/l. This ANC level is approximately equivalent to a pH of 7.0. They found and numerous DEC treatments have demonstrated that agricultural limestone does raise the pH of the lake to the target levels of 6.5 to 7.0.

C. It is not clear from Mr. Curry's graphs how many lakes these figures are based on and what the differences are among 1A, 1B, and 1C. It is easy to draw false conclusions from incomplete or very small data sets. It is apparent however, from these graphs and also from Figure 3-29 in Kretser et al. (1989) that there is a relationship between sulfate concentrations and pH. There is also however a large amount of variability in this relationship, and the reasons for this are not clear. Sulfate reduction processes which occur in naturally acidic bog waters are undoubtedly part of the answer.

D. It is not clear how experiments conducted with dilute acetic acid solutions relate to the lakes and ponds which are considered as liming candidates. Lakes which have high organic acid levels (bogs) will not be included in the DEC liming program.

E. The goal of the liming program is to neutralize the acidity of candidate waters which has been caused by acidic deposition. Most of these waters are clear water systems with very low dissolved organic carbon levels. Those waters currently in the program have responded well to liming and provide evidence that liming is an effective fisheries management tool in certain carefully selected waters.

Responses to Barbara McMartin's Comments (p.191):

A. Section II.D.7. has been revised to state that in Adirondack areas where Unit Management Plans have not yet been completed and approved, liming projects will be conducted only after consulting with the APA and obtaining any necessary permits. All projects will of course comply with the selection criteria of the revised liming policy. The DEC is continuing to prepare new UMPs, and proposed fisheries management activities such as liming will

continue to be an important part of these documents. Until all of the UMPs have been completed however, the APA and the DEC need to work together to insure that important management activities are carried out in accordance with the guidelines of the Adirondack Park State Land Master Plan.

B. Restoration of an ecosystem and improvement of fishing possibilities are expected to result in greater human use of the resource, but this alternative is generally viewed as more desirable than not managing the resource. For this reason increased human use is viewed as an unavoidable adverse impact. The problems of increased human activity as a result of liming will be considered as part of the unit management planning process and in consultation with the APA. Liming projects conducted in wilderness areas will require more detailed evaluation than projects in wild forest areas. It is possible to reduce human use impacts by a number of resource management strategies which are listed in Section VII.B.2. Waters which are part of the DEC liming program will be more intensively managed than waters outside of the program. Consequently it will be possible and advisable to periodically evaluate public use of these waters in terms of their state land use classification. In most cases the unit management planning process will provide the framework for these evaluations.

C. Section XI.H. has been added to this EIS as an additional alternative in response to this comment.

Responses to Adirondack Council Comments (pp.192-197):

A. In response to comments received from the APA, Adirondack Council, and others this FEIS has been revised, corrected, and expanded to more clearly address a number of topics which were not adequately covered in the DEIS. Liming projects undertaken by the DEC are done so for the purpose of protecting, maintaining, and restoring important populations and ecosystems. The document undoubtedly contains numerous sections which discuss fisheries management because the program is coordinated and carried out by fisheries management personnel. The document is by no means limited to discussing only fisheries issues. The FEIS includes extensive discussions covering the many impacts of both acidification and liming on all facets of the ecosystem. Please refer to sections III and V, particularly Section V.A.3.

B. A new Section II.D.2. discusses liming in wilderness areas and was prepared partly in response to Adirondack Council's comments on this issue. Section II.A.2.b. was also expanded to include more complete definitions of wilderness and the SLMP guidelines. A detailed discussion and policy guidelines for fisheries management in wilderness, primitive, and canoe areas are included in Appendix B of this FEIS. The primary purpose of liming projects in wilderness areas is to perpetuate natural aquatic ecosystems, including perpetuation of indigenous fish species on a self-sustaining basis.

C. This position is considered as a new alternative in Section XI.H. Section II.D.2. further discusses how the liming of wilderness waters can be carried out using a helicopter and lime bucket approximately once every six years. This liming would be conducted during periods of low public use. To further protect the integrity of these areas, annual water sampling of these lakes would be conducted on foot.

D. Please see Responses WW and XX to the APA comments for a complete answer to concerns about the cost/benefit analyses of the program. Numerous corrections, changes, and additions have been made to this FEIS.

E. The topic of metal toxicity in acidic waters is discussed in Sections III.C.1., V.B.1.K, and VIII.A. As was discussed in response YY to the APA comments, reacidification of limed waters will not be allowed to occur under the revised liming policy. The concern is a valid one, and is the reason why reliming is an important part of the DEC program. When a water in the liming program has an acidity level of pH 6.0, then reliming will be scheduled. This threshold is intended to prevent the lake from reacidifying to toxic levels.

F. Adverse impacts of liming to wildlife have not been documented, and the Adirondack Council has not provided any evidence of a problem. The subject of adverse impacts on fish is discussed in Section V.A.1.c. No mortality to fish life is expected as a result of treating Adirondack waters with agricultural limestone.

G. and H. Please refer to response P to the APA comments for a full discussion of this question. One of the guidelines of the DEC liming policy is that planning for liming projects will be an integral part of the Forest Preserve Unit Management Planning Process and will be reflected in the management strategies of each plan. The DEIS did not state that all current Unit Management Plans allowed liming, but it did state in Section II.A.3. that, "Unit Management Plans developed for specific areas within the Adirondack Park include provisions for liming ponds." Refer to response X to the APA comments for additional discussion on the DEC's view that liming is consistent with the SLMP and ECL.

I. The DEC does not have any plans to increase the size of the liming program beyond 50 waters as is discussed in this FEIS, and the revised policy clearly states that the "number of waters treated will be limited." The new Section II.B.3. of this FEIS describes the new Adirondack Brook Trout Restoration and Enhancement Program and states that the expected number of waters in the DEC liming program after full implementation of the Brook Trout Program is 50. This number is not expected to change by more than a few waters during the next decade. The treatments planned under this Brook Trout Program are funded by federal Wallop-Breaux funds, and these monies are expected to be available for many years. Response SS to the APA comments provides additional discussion of how funds and manpower will be allocated to meet the needs of the program. As

stated in the DEC liming policy, the decision to neutralize an acidified lake requires a long term commitment of funds and personnel to manage these waters.

J. The FEIS contains a new Section II.D.2. Liming in Wilderness Areas and an Appendix B - Policy Guidelines for Fisheries Management in Wilderness, Primitive and Canoe Areas. These additions to the EIS were made in response to comments from the Adirondack Council and others on wilderness issues. The definition of wilderness in Section II.A.2.b.2.) has also been expanded to include more of the wording from the Adirondack Park State Land Master Plan.

K. Please see response F above. The primary reason why agricultural limestone was selected as the neutralizing agent is that the resulting change in water chemistry is more gradual than with the other materials discussed in Section II.C.2. Mortality of aquatic insects and other organisms due to "drastic changes in chemistry" is unlikely and has been discussed in the expanded Section V.A.1.f. There is no evidence that liming has reduced prey food species to an extent where existing populations of fish have been lost or even reduced.

L. Please see response E above.

M. This topic is discussed in Section V.A.1.b. of this FEIS. See also response DDD to the APA comments for a discussion of site-specific evaluation of the occurrence of threatened or endangered plants. New liming candidates will be evaluated in accordance with the revised liming policy and the necessity of preparing a supplemental environmental impact statement will be determined at that time. Records of the occurrence of all rare, threatened, or endangered species should be a part of all Unit Management Plans.

N. The Department agrees with the Adirondack Council and has made several changes to the revised liming policy (Section I.) and presents more detailed discussion of the subject in Section II.D.2. and Appendix B.

O. Horn Lake was first limed in 1975 and has been limed a total of five times (including 1989) in order to protect the heritage strain of brook trout present in the lake. A unit management plan for the West Canada Lake Wilderness where Horn Lake is located has not been completed as yet. Because of the importance of protecting the Horn Lake strain of brook trout, which were on the verge of being lost to acidification, the liming projects were undertaken even though a unit management plan was not in place. The APA should, however, have been consulted in this regard and will be consulted on all future liming projects. The revised liming policy reaffirms that Memoranda of Understanding between the APA and DEC will be followed regarding management activities in areas without completed unit management plans.

P. Please see response OO to the APA comments for a discussion of this

topic and the changes made in the liming policy. Response TT to the APA comments further explains how the candidate selection criteria relate to the listing of waters currently in the program.

Responses to Association for the Protection of the Adirondacks Comments (pp.198-200):

A. As is discussed in the new Section II.D.2. Liming in Wilderness Areas,acid rain has had a negative impact on all Adirondack State Land classifications, not just wild forest or intensive use areas. Because of the value of wilderness areas certain management activities are important to help protect, restore, and maintain these ecosystems. The FEIS contains more detailed discussions of fisheries management in wilderness areas in Section II.D.2 and in Appendix B. The primary purpose of aquatic resource management in wilderness areas is to perpetuate natural aquatic ecosystems. The Association is correct in arguing that it should be considered and wise judgement that determines the acceptability of liming in Wilderness rather than any broad sanction by the SLMP.

B. In response to this and other similar comments the liming policy in wilderness areas has been revised. In wilderness, primitive, and canoe areas the objective of liming projects will be to perpetuate natural aquatic ecosystems, including perpetuation of indigenous fish species on a self-sustaining basis. This guideline is in agreement with the Association's wilderness statement referred to below as comment D.

C. Including liming as a possible management activity in certain waters is an important part of the unit management planning process. This guideline is included in the revised liming policy (Section I.). However fisheries management in general, and liming in particular are also important in the many areas which do not have completed unit management plans. In these areas any planned liming projects will require prior consultation with the APA according to Memoranda of Understanding between the APA and the DEC.

D. This statement adopted by the Association is in general agreement with the revised DEC liming policy. The wording of the guideline found in the policy was stated above in response B. Although heritage strains or endangered species are not mentioned in particular, they are included as "indigenous fish species." The subject of this FEIS and the policy is liming. The stocking of fish when liming is not involved, whether it is in Wilderness or other areas, is not considered as a topic for this impact statement.

Response to Forest Preserve Advisory Committee Comment (p.201):

A. As is discussed above in other responses the planning for liming projects will be an integral part of the unit management planning process. Multiple uses and management strategies may then be considered and planned in an integrated fashion for the specific unit. However in areas where unit management plans have not been completed certain management activities such as liming may be advisable and proposed. In this case discussions will be held with the APA prior to any liming as is outlined in Memoranda of Understanding between the DEC and APA. All lakes considered for liming must meet the DEC criteria which are proposed in the revised liming policy.

Response to Camp Fire Club of America Comment (p.202):

A. Please see response D to the comment made by the Association for the Protection of the Adirondacks. The revised liming policy contains the guideline, "All wilderness, primitive, and canoe area ponds which are limed as part of the DEC liming program will be limed with the objective of perpetuating natural aquatic ecosystems, including perpetuation of indigenous fish species on a self-sustaining basis."

Responses to Adirondack Mountain Club Comments (pp.203-206):

A. As is discussed throughout the EIS the impacts of liming (both beneficial and adverse) have been studied by researchers in the U.S., Canada, and Europe. The majority of these research projects have been conducted since 1983 and many are referenced in the EIS. These studies and data from DEC liming projects provide the basis for DEC's conclusion that there are no major adverse biological impacts of liming if these waters are not allowed to reacidify.

B. Dr. Eville Gorham is correct in stating that liming does not restore a lake to its prior state. An important corollary point is that controlling acidic deposition may also not restore a lake to its prior state. Once a lake becomes acidified many plant and animal species are lost, and restoring the water quality (either by liming or by stopping acidic deposition) does not guarantee that all of the plants and animals will return. Controlling air pollution is the primary goal in DEC's efforts to reduce acidic deposition impacts. As is discussed in Section XI.A DEC's efforts to push for effective federal acid rain legislation are not affected by the DEC liming program. This section also discussed how even after legislation is passed there is a considerable time lag before acidified lakes would be expected to recover. The lakes near Sudbury have recovered to some extent relatively quickly, but these waters were receiving very large amounts of acidic deposition which now has been reduced to about a third of the previous level. In the Adirondacks we would expect a more moderate recovery of

acidified systems with some lakes responding more quickly than others. Many lakes could take as long as a generation to recover to the point where viable fish populations could be established. Liming is an effective means of restoring satisfactory water quality and allows for a more rapid restoration of a wilderness ecosystem capable of supporting brook trout, otters, osprey, and loons.

C. Please see response YY to the APA comments for a discussion of the reacidification issue. Response SS to the APA comments discusses how funds and personnel can be allocated on a year to year basis for liming. The DEC remains committed to the long term management of waters in the liming program as is stated in the revised liming policy.

D. As is stated in the first paragraph of Section VII.A Acidic Events, these acidic episodes occur in both limed and circumneutral lakes. The problem is associated more with acidic deposition than with liming. Acidic snowmelt periods and large rainstorm events result in large amounts of acidic water entering a lake and resulting in zones of acidic water with possible toxic aluminum levels. Certain organisms are able to avoid these areas of toxic water, but others may experience some mortality. This subject is discussed in the FEIS under the heading "Unavoidable Adverse Impacts", but the situation is avoidable if we reduce the amount of acidic deposition falling on the Adirondacks.

E. Fisheries management in Wilderness, Primitive, and Canoe areas is discussed in Appendix B of this FEIS. Liming projects undertaken in wilderness areas will receive high priority and will not be inadvertently handled. Wilderness areas deserve special attention and will not be simply dropped from the program to save money. As was stated above an important part of the revised liming policy is the DEC commitment to maintaining the water quality of the lakes and ponds in the liming program and to insure that funds and personnel are available to accomplish this program.

F. The subject of intrusions by aircraft is discussed in detail in Sections II.D.2 and V.A.3.b. These sections have been expanded in response to comments from the Adirondack Mountain Club, APA, and others. Lime application by helicopter will occur on the average of once every six years during periods of low public use. Annual water sampling will be conducted by hiking in to each pond or lake during the summer sampling period. Helicopter use for this project is therefore very infrequent and will be kept to a minimum. It should also be noted that the helicopter will never need to actually land on the pond. Section V.A.3.b. has been revised to eliminate the reference to use of aircraft for a "specific major research project."

G. Liming has been demonstrated to be an effective fisheries management tool in acidified waters. Living Lakes, Inc. (see next comments and responses) has effectively publicized liming and has as its logo, "an aquatic liming and fish restoration demonstration

program." DEC needs to continually publicize the fact that liming is not going to solve the acid rain problem. This publicity needs to occur regardless of whether DEC is doing the liming or Living Lakes is doing the liming. It is imperative that the DEC continue to push strongly for effective federal legislation to control emissions of sulfur dioxide and nitrogen oxides. As mentioned in numerous other locations, it is the responsibility of DEC fisheries managers to manage the resource. It appears irresponsible to allow heritage strains of fish to be lost or to allow once productive lakes to remain acidified and degraded when restoration by liming is possible.

H. As stated above and in this FEIS the DEC is pursuing every avenue to arrive at a real solution to the acid rain problem. Numerous legal battles have been fought, hearings attended, proposals submitted, and lobbying conducted, and these efforts will continue. This FEIS presents data showing that liming as proposed by the DEC is no longer a major research project, that the adverse impacts are minimal, and that a liming program can be carried out at the same time as efforts are made to reduce acidic deposition.

Responses to Living Lakes, Inc. Comments (pp.207-210):

A. More frequent water samples and analyses from a number of depths would undoubtedly be a benefit to the program and would give fisheries managers a better understanding of the limnology of the pond. The required sampling of lakes in the liming program is once a year during the summer. This is intended to be the core program with more samples collected whenever feasible and practical. Most waters which have been limed as part of the DEC program exhibit higher pH levels in the deep water samples than in the surface (1 meter depth) samples.

B. Agricultural limestone is used in the DEC program because it is readily available, easily handled, inexpensive (frequently donated), does not create rapid pH changes, and because it has been proven to be effective. It is true that finer grades of limestone which have a small particle size would dissolve more completely and less of this material would be required to reach the same target pH level. However, whether or not this is cost effective compared with present methods is another question. The agricultural lime used is frequently donated by sportsmen and sometimes donated by the aglime producer. Similarly the labor for spreading the lime on the lake surface is usually volunteer labor. The cost of a finer grade of limestone spread as a slurry would most likely be greater than the cost of the current program. If finer grades are available at competitive costs however, use of these materials in the DEC program would certainly make the treatments more effective. Living Lakes has not presented adequate data to evaluate this possibility. Although the Deacid model will be used to some extent in the DEC program, there are some questions as to how well it

predicts actual field limings and as to how well the model has been verified. DEC intends to use the model as a tool in helping to arrive at the appropriate treatment level.

C. The data for White Deer Lake are not presented in a form which can be evaluated to document that liming on the ice was ineffective. In fact a recent report (Bradt et al. 1989) shows that the ice liming was effective and that the length of effectiveness of treatment depends on the flushing rate of the lake. DEC experience has been that liming on the ice in the Adirondacks has resulted in successful treatments with neutralization of acidic waters and sediments. Liming on the ice during the winter is a time of low public use of the resource and has also proven to be the most convenient time of year for DEC staff and a popular winter activity for local sportsmen. The DEC program does maintain some flexibility regarding the timing and methods used for treatment, and changes could be made if data clearly indicate that a change is warranted.

D. During May 1986 Doug Britt of International Science and Technology met with DEC staff as a subcontractor of Living Lakes, Inc. At this meeting Dr. Britt presented specifics of the Living Lakes program, and copies of the LLI protocols were supplied to the DEC. The 1987 meeting subsequently did not include discussion of these same specifics. Living Lakes is correct in stating that "the primary reason for the DEC decision not to work with LLI was unrelated to that meeting." The reasons behind that decision are those stated in the FEIS in Section II.C.5. Several changes in this section have also been made in response to comments. The DEC does believe that liming is an effective fisheries management tool in certain selected waters. The majority of acidic waters in the Adirondacks are not suitable candidates however. The current DEC liming program also does nothing for the many acidified streams in the Adirondacks. Liming lakes does nothing about the adverse acidic deposition impacts on forests, buildings, visibility, and respiratory problems. It is the opinion of DEC that participation in a liming program with LLI would send a signal to Washington legislators that part of the acid rain problem is being solved. The DEC intends to maintain a small limited liming program and at the same time continue efforts to push for effective federal acid rain legislation.