



March 30, 1990

Mr. Monroe Frados
Rome Rock Lake Committee
488 Peacock Lane
Roaming Shores, OH 44084

Dear Mr. Frados:

I am writing to address your questions as to whether or not the data show that Rome Rock Lake has deteriorated over the past 11 years (1978 to 1989). That question is very difficult to answer with only one set of data from 1989, but I hope my comments will help to shed some light on this question.

When Beth Buchanan and I came to Rome Rock Lake in August of 1989, to do a preliminary site study, we measured temperature, oxygen, and water transparency. If we can assume that weather conditions in 1978 and 1989 were very similar (and our lake temperature data support this), then the oxygen and water transparency data do suggest a worsening of water quality in Rome Rock Lake. The anoxic zone (without oxygen) in 1989 began at least one meter (three feet) closer to the surface throughout the entire length of the reservoir. Oxygen is used up during the decomposition of organic matter in the water. Thus, assuming that the Lake had been stratified for the same length of time in 1978 and 1989, the increase in the anoxic area would be due to an increase in the amount of organic matter.

The water transparency, as measured with a black and white Secchi disk, has decreased by 0.5 meters (1 1/2 feet) throughout the length of the reservoir, another indication of degradation of water quality. However, the complete story cannot be told without phosphorus, chlorophyll, and biomass measurements taken regularly over several years.

I hope that my comments will be helpful. If I can be of further assistance, please feel free to call.

Yours very truly,

Diane Conyers-Rizzo
Limnologist

DCR:bjg

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May 29, 1990

Mr. Monroe Frados
Rome Rock Lake Committee
488 Peacock Lane
Roaming Shores, OH 44084

Dear Monroe:

Enclosed is a draft outline for a five year plan for managing Rome Rock Reservoir.

After you have had a chance to look it over, please give us a call and we can arrange a time for a meeting or a long phone call to discuss it in more depth. Following discussion, we may need to update/revise it.

Sincerely,

Diane Conyers-Rizzo
Diane Conyers-Rizzo
Project Manager
216-325-7703 (home)

cc: Beth Buchanan

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FIVE YEAR MANAGEMENT PLAN FOR ROME ROCK LAKE

by
ACRT, Inc.
May 29, 1990

INTRODUCTION

The Rome Rock Lake Committee has initiated a five year lake management program beginning with a preliminary assessment of the reservoir in 1989. As a result of the preliminary assessment, several important steps were taken in 1989. This included purchase of a mechanical weed harvester, drafting shoreline protection guidelines/specifications and a public awareness program.

Guidelines for the next four years are summarized in Table 1 and a general description of each task is presented.

CONDUCT PUBLIC RELATIONS/EDUCATION PROGRAM

Procedure: Send invitations to the folks living around the lake to attend periodic meetings/workshops covering basic lake ecology and sampling strategies for the lake.

Expected Results: The lake users will become aware of the complexity of a lake ecosystem. Also, a list of interested volunteers can be made and these folks can be contacted for assistance with future lake projects.

CONDUCT VOLUNTEER SECCHI DISK MONITORING PROGRAM

Procedure: Volunteers from the lake community should be trained to properly measure and document water transparency and to assess water color. This information should be gathered every two weeks and the data compiled in a computerized data base.

Expected Results. These results will be used along with other monitoring data to evaluate trophic state of the lake. Secchi disk data is excellent baseline information that can be

collected at little expense over a long period of time. This data can also be incorporated with a statewide database that is currently being developed by the Ohio Lake Management Society and the Ohio EPA.

PERFORM WATERSHED STUDY

Procedure: The watershed should be studied to determine land uses and potential impacts. Aerial photos are the best and most efficient way to determine the land use around a lake or reservoir. The ASCS office in Ashtabula can be contacted to see if recent aerial photographs of the area are available. If none are available, or if the aerials are more than five years old, we can hire a pilot, fly the watershed and take our own photos.

Expected Results: A watershed study will show the potential sources of nutrient, organic and silt loads to the reservoir. Until these sources are identified, they can not be diverted and/or treated. The photographs will reveal the magnitude of the area contributing to the problems within the reservoir.

STUDY WATER LEVEL CONTROL AND DRINKING WATER INTAKE PIPE

Procedure: A full understanding of how the water level of the reservoir is controlled and the design/location of the drinking water intake pipe is necessary. This will require examination of construction plans and discussions with appropriate people.

Expected Results: This information will be used to determine if certain management techniques are feasible (e.g., hypolimnetic withdrawal).

MONITOR BASELINE PARAMETERS (TEMPERATURE, OXYGEN, PHOSPHORUS, CHLOROPHYLL AND TRANSPARENCY).

1200
Procedure: Temperature, oxygen, phosphorus, chlorophyll and transparency should be measured every two weeks from June through September at the three in-lake sites previously measured. In addition, dissolved oxygen profiles should be taken along the entire length of the reservoir to determine where and when anoxia occurs.

Expected Results: These parameters are used to determine the trophic state of a lake. When these values are plugged into Carlson's trophic state index, the condition of the lake at the present time is determined. This condition can be compared with the 1978 data set as well as over this current proposed 4 year monitoring period.

The monitoring of these parameters will be key in identifying the extent of certain problems (such as internal nutrient loading, loss of fisheries habitat, and taste problems in drinking water). Ultimately, this information will be used to determine the best in-lake treatments.

In particular, the dissolved oxygen data is needed to consider the feasibility of using certain treatments (e.g. hypolimnetic aeration) to inhibit internal release of nutrients.

INVENTORY THE SHORELINE CONDITION AND IMPLEMENT A PUBLIC EDUCATION PROGRAM

Procedure: A field survey would be conducted by boat and the data recorded on predesigned data sheets for computerization and analysis.

Expected Results: The shoreline information could be entered into a database and letters could be sent to residents describing the problems, along with guidelines for solving them.

Literature could be provided or workshops scheduled to assist the homeowners in addressing these shoreline problems.

MAP MACROPHYTE COMMUNITY/DEVELOP HARVESTING STRATEGY

Procedure: The macrophyte community should be mapped and the plant species identified. This task can be done with a boat, a rake, and a measuring tape.

Expected Results: This information is important when planning a harvesting strategy for the lake. Keeping fish spawning and boat access in mind, a harvesting time table can be for Rome Rock once areas plagued with early spring plants and later plants are identified.

MONITOR WATER COLUMN AT DRINKING WATER INTAKE PIPE.

Procedure: Algae identification should be done at the water intake pipe to determine the nuisance species that are interfering with treatment. Dissolved oxygen, total phosphorus and chlorophyll profiles (surface to bottom) along with iron and manganese measurements should be taken near the intake pipe.

Expected Results: The profile measurements can be used to determine if there is a depth at which the algae is not growing and the water has not been depleted of oxygen and/or does not contain high levels of iron and manganese. The total phosphorus measurements would be used to determine if there is internal release of nutrients.

MEASURE SEDIMENT INCOME THROUGH MAJOR STREAMS (TOTAL SUSPENDED SOLIDS)

Procedure: Flow data and measurement of total suspended solids will be measured at Rock Creek, Plum Creek and Sugar Creek during storm events over the course of a summer season.

Expected Results: This information will help identify whether upstream watershed management practices are effective. If upstream practices were not implemented or were not effective, then sediment detention basins are a cost effective control and can be sized with sediment and flow data.

Table 1. Rome Rock Lake: 5 Year Plan Summary (May 1990)

Task	Year 1	Year 2	Year 3	Year 4	Year 5
Preliminary Lake Assessment	x				
Annual Progress Report/Plan Update	x	x	x	x	x
Shoreline Protection Guidelines/Specifications	x				
Conduct Public Relations/Education Program	x	x	x	x	x
Conduct Volunteer Secchi Disk Monitoring Program		x	x	x	x
Perform Watershed Study		x			x
Study Water Level Control and Drinking Water Intake Pipe		x			
Monitor Baseline Parameters (Temperature, Oxygen, Phosphorus, Chlorophyll, Transparency)		x	x	x	x
Inventory Shoreline Condition and Implement a Public Education Program			x	x	
Map Macrophyte Community/Develop Harvesting Strategy		x		x	
Monitor Water Column at Drinking Water Intake Pipe		x	x	x	x
Measure Sediment Income Through Major Streams (Total Suspended Solids)			x		
Initiate Treatments Depending on Results of Monitoring and Data Analysis (e.g., hypolimnetic aeration, hypolimnetic drawdown, winter drawdown, artificial circulation, alum application, and others)			x?	x	x
Details of plans for treatments will be developed over the next two years.					



October 25, 1990

Mr. Newt Bakley
2288 Morning Point
Roaming Shores, OH 44084

Dear Mr. Bakley:

The purpose for my last visit to Rome Rock Lake was to determine if the reservoir had undergone fall turnover. This is determined by measuring the temperature and oxygen at one meter increments from the surface to the bottom. If the water is completely mixed, the temperature and oxygen values will be uniform throughout the water column.

The data show that the thermocline which had been between 4 and 5 meters during our summer visit, is now between 8 and 9 meters. The areas of the reservoir that are shallower than 8 meters have completely mixed. However, the deepest portion of the reservoir has not turned over, as evidenced by the low oxygen content and colder temperatures of the deep water (Table 1 and Table 2).

The measurements taken are important to the management of Rome Rock Lake because they highlight the fact that internal release of nutrients (from the sediment) may be a problem in the reservoir from June through October, and possibly under winter ice cover as well. The nutrients released during low oxygen conditions collect below the thermocline and are distributed throughout the water column during spring and fall circulation. These nutrients will then become available to support the growth of algae and some aquatic macrophytes in the surface water.

The data collected on this visit and previous visits will also be useful as the Lake Association or water utility considers aeration as a method for controlling internal release of iron and manganese, as well as nutrients. From our data collected thus far, we have found that a large portion of the reservoir is anoxic for five to six months of the year. Therefore, an aeration system would have to be operating at least six months out of the year.

As we explore the possibilities of aeration, much more information is needed:

- 1) a scaled map of the reservoir
- 2) hypolimnetic volume
- 3) water level fluctuation
- 4) water withdrawal rates (from the water plant)
- 5) water treatment costs during summer months
- 6) water treatment costs during winter months
- 7) costs for sludge handling and disposal

Mr. Newt Bakley
October 25, 1990
Page 2

- 8) oxygen depletion rate (time from spring turnover to stratification)

One recommendation is that the Lake Management Committee begin gathering this data or alert water plant personnel that this data will be needed in order to adequately research the effectiveness and cost of aeration on Rome Rock Lake.

Thank you, in advance, for your help in obtaining this information and thank you for your assistance in the field! If you have any questions, please call.

Sincerely,



Diane Conyers-Rizzo
Project Manager

DCR:bjg

Table 1. Surface and Bottom Temperature and Oxygen Readings at Two Sites on Rome Rock Lake, October 17, 1990.

A) The Buoy

<u>Depth</u>	<u>°C</u>	<u>O₂</u>
Surface	12.9	7.5
Bottom	12.8	6.4

B) Sugar Creek Arm

<u>Depth</u>	<u>°C</u>	<u>O₂</u>
Surface	13.5	6.5
Bottom	13.0	6.5

Table 2. Temperature and Oxygen Profiles Taken at the Deep Hole in Rome Rock Lake, October 17, 1990.

<u>Depth</u>	<u>°C</u>	<u>O₂</u>
Surface	14.2	5.6
1M	14.0	5.5
2M	14.0	6.0
3M	13.9	5.9
4M	13.8	5.7
5M	13.8	5.4
6M	13.7	5.4
7M	13.6	5.2
8M	12.9	3.9
8.5M	12.8	2.6
9M	12.7	1.7
10M	11.2	0.9
10.5M	10.7	0.8



May 20, 1993

Monroe Frados
488 Peacock Lane
Roaming Shores, Ohio 44084

Dear Mr. Frados:

I have been researching the benefits and uses of harvested aquatic weeds as a soil additive, and specifically the benefits their use would have to Mr. Manners for his Christmas trees. There is not a lot of information available regarding the use of aquatic plants as a nutritional amendment to soils; however, I will detail the information that I have been able to find.

If we can be of further assistance, please call Diane or Beth at 216-673-8272.

Sincerely,

Diane Conyers-Rizzo
Limnologist/Aquatic Ecologist

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BENEFITS OF USING HARVESTED AQUATIC PLANTS AS A SOIL ADDITIVE

PROCEDURE

The primary nutrient and micronutrient content of the dried plants collected from RomeRock Lake during the summer of 1992 was determined by the Research-Extension Analytical Laboratory at The Ohio State University. In order to assess their usefulness as a fertilizer a comparison to other types of organic fertilizers is made in Tables 1 and 2. The values for the animal manures have been taken from Splittstoesser (1979).

RESULTS

Primary Nutrients

Table 1 lists the approximate percent by weight of the primary nutrients in aquatic plants and animal manures. The dried plant material from RomeRock Lake contains a higher percent of nitrogen (3%) and potassium (3.2%) than most animal manures. The phosphorus content of the plants is lower than most of the manures (0.2%). Phosphorus values obtained by Conyers (1983) in a study of the plants at East Twin Lake, Kent, Ohio, were considerably higher than those found in the sample from RomeRock Lake and ranged between 11 and 23 percent phosphorus.

Micronutrients

Values for the micronutrient content of the harvested plants and various manures is given in Table 2. The aquatic plants are higher than most manures in iron (Fe) and manganese (Mn) and are in the mid to low range in many of the other micronutrients (boron, calcium, copper, magnesium, and zinc).

DISCUSSION

The presence of a nutrient element in the soil is no guarantee of its availability for absorption by the plant. The pH of the soil will directly affect the nutrient availability. For most plants a soil pH of 6.5 (slightly acidic) is the best condition to maximize nutrient availability. The "acid-loving" plants such as pines, azaleas, and rhododendrons require comparatively large amounts of the elements that are more available in an acid soil. Iron, manganese, boron, copper and zinc form a large proportion of soluble compounds in a soil with a pH of 5.5 (Fig. 1). Iron and manganese are found in higher proportions in aquatic plants than in any animal manure.

Soil pH testing is critical for effective treatment of tree nutrient deficiencies. After talking with several people at the Division of Forestry in Columbus and in Middlefield, ACRT recommends that a soil test be taken to determine the nutrient content of the soil and the specific nutritional deficiencies, if any, at Mr. Manners Christmas tree farm. This soil test can be done after plowing in the aquatic weeds and prior to the addition of other types of organic or inorganic fertilizers.

The potential benefit of using aquatic vegetation to increase the fertility of soil will depend not only on the nutrient content of the plants, but on how the plants are handled after cutting. Aquatic macrophytes have a high concentration of phosphorus and nitrogen when first cut. If the plants are immediately applied to a field and then plowed under, the nutrients leached from the aquatic vegetation will be added directly to the soil. Of particular interest to a tree grower would be the pulse of nitrogen and phosphorus which would come from the aquatic plants. If the harvested plants are not applied close to the time of cutting, most of the phosphorus will have already leached out at the spot where the plants have been piled. Therefore it is important to remove the plants from the shoreline the same day they are cut if nutrient removal is one of the goals of harvesting.

A more common method for utilizing harvested weeds is to compost them prior to spreading them on a field. In order to effectively decompose the weeds they will need to be mixed with a material having a high carbon content, such as; decayed sawdust, wood chips, or last years leaves. The green plant material is very high in nitrogen and for active decomposition to take place a nitrogen/carbon ratio of 1:30 is desirable.

The Ohio EPA regulates composting facilities in Ohio. After reading the Ohio EPA publication entitled *Yard Waste Management Guidebook for Ohio Communities* prepared by the Division of Solid and Infectious Waste Management, June 1992, I have found that Mr. Manners would be classified as a Class III composting facility (less than 3 acres in size) and would not be required to obtain a license to compost the aquatic vegetation from RomeRock reservoir. He can register as a Class III facility and would receive a registration packet and a copy of the regulations for approximately \$7.50. The laws are presently being revised and if Mr. Manners would like to be put on the mailing list to comment on the revisions he should contact Randy Sheldon at 614-644-2922. If either Mr. Manners or the RomeRock Board of Directors has any questions concerning the transport and composting of the harvested weeds, these can be answered by Kurt Princic at the Northeast District office of the Ohio EPA (216-425-9171). Kurt handles Ashtabula County and also fields the composting questions for Northeast Ohio.

Whether used immediately, dried, or composted, the application of aquatic vegetation to the soil will add needed organic matter. Soils rich in organic material will resist compaction, retain moisture, and have a better cation exchange. A loose, highly organic soil will allow adequate gas exchange between the atmosphere and the root zone of plants or trees. The moisture content of highly organic soils is higher than compacted inorganic soils because the water can percolate more easily through loose soil, can penetrate to a greater depth, and the water is absorbed by the organic component in the soil.

The question of whether or not the addition of the harvested aquatic vegetation would decrease the amount of other fertilizers used by Mr. Manners is still difficult to answer. The soil on Mr. Manners tree farm will be unlike that of other property in Ashtabula County due to previous additions of organic and inorganic fertilizers. The pH of the soil will directly affect the nutrient availability. A soil test would help assure Mr. Manners that he is not applying fertilizer in excess. ACRT can assist Mr. Manners with a soil analysis if he chooses.

CONCLUSION

ACRT highly recommends the use of harvested plants for improving the organic and nutrient content of the soil. The plants from RomeRock lake contained a higher concentration of nitrogen, potassium, iron, and manganese than did the animal manures and contained a comparable concentration of phosphorous and other micronutrients. The addition of organic matter to the soils is valuable in preventing soil compaction and in increasing the moisture content.

REFERENCES

- Splittstoesser, W.E. 1979. *Vegetable Growing Handbook*. AVI Publishing Company, Inc., Westport, Connecticut. 298 pp.
- Conyers, Diane L. 1983. *A Comparative Study of Harvesting and Herbicides for the Control of Aquatic Macrophytes*. M.S. Thesis, Kent State University, Kent, Ohio.
- Gerstenberger, Peter. 1990. Soil pH and Nutrient Availability. *Tree Care Industry*. p. 13.

Table 1. Approximate percent of the primary nutrients in aquatic plants and in animal manures.

Organic Fertilizers	% N	% P	% K
aquatic Plants, dried	3.0	0.2	3.2
cattle, fresh	0.5	0.2	0.5
cattle, dried	1.5	2.0	2.3
goat, dried	1.4	1.0	3.0
horse, fresh	0.7	0.3	0.5
swine, fresh	0.7	0.6	0.7
sheep, fresh	1.4	0.7	1.5
sheep, dry	4.2	2.5	6.0
chicken, fresh	1.5	1.0	0.5
chicken, dry	4.5	3.5	2.0

Aquatic plants were harvested in 1992 from RomeRock Lake, Ashtabula County, Ohio and were analyzed at The Ohio State University Research-Extension Analytical Laboratory.

Manure values from W.E. Splittstoesser, Vegetable Growing Handbook, 1979.

Table 2. Micronutrients in aquatic plants and in animal manures. All values given are lbs. of nutrient/1,000 lbs. of organic material.

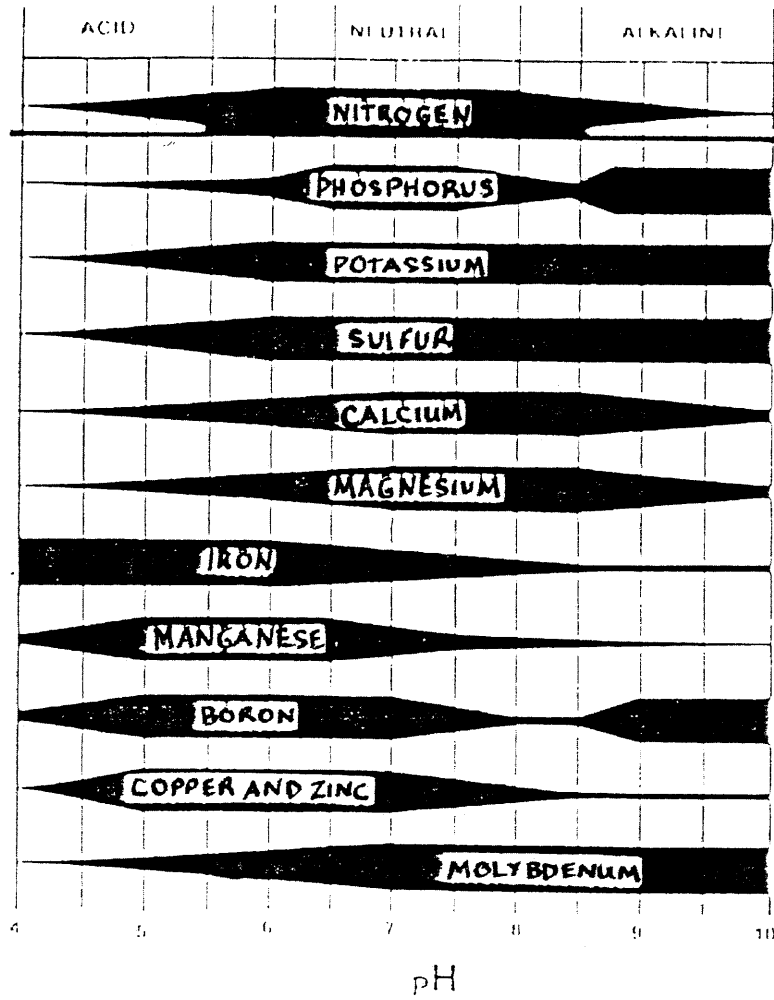
Organic Fertilizers	B	Ca	Cu	Fe	Mg	Mn	Mo	S	Zn
aquatic plants	0.02	9.3	0.01	1.90	3.2	0.43	no data	no data	0.03
cattle	0.08	15.0	0.03	0.21	5.9	0.05	0.005	2.7	0.08
horse	0.06	31.4	0.02	0.54	5.6	0.04	0.004	2.8	0.06
sheep	0.04	25.4	0.02	0.69	8.0	0.04	0.004	3.9	0.11
swine	0.20	28.5	0.03	1.40	4.0	0.10	0.005	6.8	0.30
chicken	0.20	123.6	0.05	1.55	9.7	0.30	0.018	10.4	0.30

Aquatic plants were harvested in 1992 from RomeRock Lake, Ashtabula County, Ohio and were analyzed at The Ohio State University Research-Extension Analytical Laboratory.

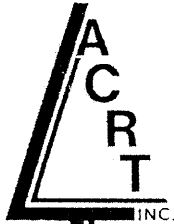
Based upon dry (15% moisture) manure. B = boron; Ca = calcium; Cu = copper; Fe = iron; Mg = magnesium; Mn = manganese; Mo = molybdenum; S = sulfur; Zn = zinc.

Manure values from W.E. Splittstoesser, Vegetable Growing Handbook, 1979.

Figure 1



Reprinted from *Tree Care Industry* - August 1990



August 20, 1993

Monroe
COPY

*Ron - John
Bob Waller*

Newt Bakley
Lake Committee
P. O. Box 437
Roaming Shores, OH 44084

Dear Newt:

It was so nice to see you, Peg, Monroe, and all of the others. Beth and I enjoyed the day we spent with you and we thank you for your hospitality.

We were very encouraged by all of the improvements you have initiated at RomeRock Lake. The addition of the seawalls has enhanced the beauty of the shoreline and worked to decrease the shoreline erosion. The outcome of the work done on the recreational lots is both aesthetically pleasing as well as functioning to prevent erosion of the banks.

The Association is quite fortunate to have such informed, energetic, and motivated folks as you and Monroe heading the Lake Committee!

Our meeting with you gave us much to think about and to plan. Because we covered so many different topics, we thought perhaps a recap of the meeting would benefit both of us. Attached is a summary of the meeting. After you have had a chance to discuss it among yourselves, we would appreciate feedback; especially items we may have missed or areas you would like us to concentrate on. We can discuss this by phone or you all are welcome to be our guests at the ACRT office in Kent.

We appreciate the opportunity to continue working with you, and look forward to hearing from you.

Sincerely,

Diane Conyers-Rizzo

Diane Conyers-Rizzo
Project Manager/Limnologist

cc: Beth Buchanan
file 871477

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Summary of Site visit to RomeRock Lake: August 12, 1993

People present: Beth and Diane, Newt and Peg Bakley, Monroe Frados, Bob Wallis (lives on the lake and has been doing some fisheries management), Ron and Joanne Leach, Jerry and Peggy Tanhover (Jerry is the new V.P. of Association)

Purpose for the meeting:

1. To summarize what has been done during Newt and Monroe's term on the lake committee; and
2. To discuss current and long terms concerns regarding the lake
3. New assignment: update the 5 year plan

Items that will be addressed in the updated 5 year plan based on meeting on August 12, 1993:

1. *Aluminum dump at the site of Beach 2, located on the Sugar Creek branch of the reservoir*

This dump site was operated prior to 1967. The waste product is believed to be Al powder or residue which has been sealed with a clay cap. The concern is whether Al is leaching from this site. There is presently an aluminum plant operating in Rock Creek called Rock Creek Aluminum. Perhaps they could enlighten us as to what the potential hazards might be.

Questions: Should cores be taken of the sediment in this area?
Should water samples be taken in the area of the beach to measure the soluble aluminum in the water?

2. *Erosion problem on the steep banks*

Hydroseeding was not effective in most areas, probably because it was done during a drought year (1988). Other experiemental ideas should be considered, e.g. a bioengineering pilot project.

Questions: What can be planted?
How and when should the plantings be done?

3. *Evaluation of data from the sediment study conducted by Jim Wade of USDA-SCS (copy of the report in our file)*

Questions: What does the data tell about the lake?
What areas are receiving the largest amounts of sediment?
What can be done to slow the sediment input to the reservoir?
Is a stormwater sediment study going to be valuable to know where to target effort and money to slow the "filling in" process?

4. *Comparison of water quality in RomeRock reservoir now compared to 1978 and 1990.*
The temperature, Secchi disk and oxygen data that Newt has been collecting should be analyzed. Phosphorus data should be taken at the mouths of the streams and phosphorus profiles should be taken at the same sites as in 1978.

Question: Should a stormwater phosphorus study of the streams entering the reservoir be done?
Should a watershed/landuse sediment/phosphorus loading model be run to pinpoint any areas of concern?

5. *Geese are becoming a major problem.*

Question: What can be done? (Diane will refer to the Geese publication from the Muzzy Lake Meeting)

6. *Other water quality issues*
The promotion of using phosphorus free fertilizer will be addressed as well as easy-to-use weed rakes.

The following ideas/items will to be explored and addressed in the plan:

1. *Newt's idea #1:* Forty acres of land upstream of reservoir on Rock Creek are owned by the Village. The possibility exists to create a sedimentation basin in this area. This needs to be explored.
2. *Newt's idea #2:* To create an artificial macrophyte barrier system to slow water flow causing the sediment to be deposited prior to entering the reservoir.
3. *Tree Preservation:* There is an interest in adopting an official tree preservation code/ordinance for the association. Also, guidelines for 'pruning for views' would be useful. This is a broader issue related to the overall natural resource issues facing the Association and should be addressed.

ACRT's Task: Review and revise the 5 year plan written in May, 1990. We will try and get a draft of this to you by the middle to end of September so we finalize it by the end of October. This plan will address the issues listed above and prioritize tasks we feel are the most important. This plan will also include a review of the sediment report with recommendations on where to go from here.