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Natural Resources Conservation Service
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A partner in conservation since 1935

August 31, 2005

Lake Wyola Association
C/o William Elliott
PO Box 276
Shutesbury, MA 01072

Dear Lake Wyola Association,

I have enclosed six copies of the Lake Wyola Inventory and Evaluation report that was prepared by the Natural Resources Conservation Service. This report includes; information gathered from the landowner surveys, a Resource inventory, information on the existing dams, evaluations of the various sites, alternatives and recommendations, and various photos.

Please contact this office if you would like more copies of the report, or if you have any questions.

Sincerely,

Lisa Hall

Lisa Hall
Soil Conservationist

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

An Equal Opportunity Provider and Employer

Lake Wyola Inventory and Evaluation
Shutesbury, Massachusetts

Prepared by:
Natural Resources Conservation Service
August 2005

Situation

On June 8, 2005 Loretta Gass, representing the Lake Wyola Association, met with Natural Resources Conservation Service representatives (Lisa Hall, Soil Conservationist, Misa Cady, Student Trainee, Rudy Chlanda, Geologist, and Dennis Verdi, Civil Engineer). The purpose of the site visit was to evaluate the erosion along Fiske Brook and sediment entering Lake Wyola.

The Lake Wyola Association received 19 responses from landowners to a survey about problems around the lake. The landowners are concerned about sediment accumulating in the lake, particularly at the North Cove above and below Lakeview Road. They indicate that sediment has accumulated in the lake from several recent storm events over the past several years; including a microburst in the last few years, Hurricane Bertha in 1997, Hurricane Floyd in 1999, and annual spring runoff events.

In the survey, landowners mentioned that the roads are heavily sanded and salted during the winter and much of the material washes into the lake. The areas contributing to the lake sediment are Lakeview Road and bridge, Locks Pond Road, Shore Drive, Pine Drive, and other dirt roads around the lake. Sand accumulates along the side of roads and during spring runoff events is washed into the lake. Other possible sediment sources mentioned are many landowners adding sand to their beaches and the opening of the public boat ramp which provides access for boats with larger engines to stir up the sediment. One landowner mentioned that 15 years ago the lake water depth near their house was over 6 feet and now it is less than 2 feet deep. Several landowners removed sediment from the lake during the last drawdown with the total excavated amount estimated as 400 to 500 cubic yards.

Other identified problems include weed growth in the lake over the past several years. A few landowners have tried to remove the weeds. There is also beaver activity in the upper watersheds on the streams flowing into the North Cove area and a need to increase the stream flow into the lake in this area.

The Lake Wyola Association objectives are identified as follows:

- Remove sediment from the lake, particularly at the North Cove above and below Lakeview Road and the cove at Pine Drive and Shore Drive

- Remove aquatic weeds and vegetation in the lake

- Control beaver activity in the upper watershed above North Cove and Lakeview Road
- Increase the stream flow into the North Cove

Resource Inventory

During the site visit we viewed problems in the watershed starting at the North Cove of Lake Wyola at Lakeview Road. We walked upstream along the Campground to Tyler Pond, then along Fiske Brook to Fiske Pond. We also looked at McAvoy Pond and the downstream area at Locks Village Road.

The water in the North Cove both upstream and downstream from Lakeview Road is shallow with sand bars and aquatic vegetation observed in several areas (Photo # 1). The sediment deposits and shallow water extend from approximately 200 feet above Lakeview Road to about 500 feet below the road. Part of the lake sediment problem appears to be from road sand which is used in the winter and washes into the lake (Photo # 2). We noticed that winter sand is swept from Lakeview Road, but some sand still remains along the edges of the road (Photo # 3). Debris and sediment are also accumulating under the Lakeview Road bridge. There are sediment deposits in the stream at the junction of Tyler Brook and Fiske Brook, as indicated by the sand bar in Photo # 4. Tyler Pond is located just upstream from this junction on Tyler Brook. The water level in Tyler Pond was lowered about 5 feet during the site visit. There does not appear to be much sediment deposited in the pond.

Fiske Pond is located approximately 1000 feet upstream from the junction of Tyler Brook and Fiske Brook. Fiske Pond was recently bought (obtained) by the Town of Wendell for use as a conservation area. The dam has an earthen core with a laid stone facing on the downstream side. Stone slope protection was observed on the upstream side. The main outlet is a concrete overflow spillway on the right side adjacent to the abutment. This outlet is presently blocked with beaver debris (Photo # 5). The outlet channel is eroded. We observed channel downcutting and vertical banks devoid of vegetation (Photo # 6). As we walked along the outlet channel, the upper reach was a continuation of the eroded channel and the lower reach included sediment deposits and debris (Photo # 7). The beaver debris at the Fiske Pond outlet probably breaches during major storm events causing the channel to erode and sediment to deposit in the channel downstream all the way to Lake Wyola. The sand and silt sediment finds its way into Lake Wyola. There are also several beaver dams along Fiske Brook below Fiske Pond which hold water and could breach during storm events (Photo # 8). These likely also contribute to moving the sediment downstream.

McAvoy Pond is located immediately upstream of Locks Village Road. The concrete spillway outlet structure is clogged with beaver debris (Photo # 9). A small private pond, Ethier's Pond, is located below Locks Village Road; and Tyler Pond is located further downstream.

According to Loretta Gass, a dam safety study is scheduled for this fall at the Lake Wyola dam. The lake will be drawn down and borings will be taken at the dam.

According to Lake Wyola Association members from a previous meeting, the Town of Shutesbury has issued a blanket permit to allow landowners to clean-up their property and remove vegetation by hand along the shoreline. Every seven years the lake water level is drawn down to allow landowners to remove material from their shoreline area. A notice of intent needs to be filed by the landowners for removing soil and conducting other work along the shoreline during the drawdown period.

Information on Existing Dams

The information about the dams was obtained from the Soil Conservation Service publication: Inventory of Potential and Existing Upstream Reservoir Sites, Northern, Central, and Southern Connecticut Valley Study Areas, January 1975. Additional comments are added for current conditions.

Fiske Pond

The pond has a surface area of 8 acres and a drainage area of 0.86 square miles. The dam is an earthen structure about 200 feet long and 20 feet high. The spillway is an 8-foot wide concrete weir with a rock riprap channel below. The slopes of the dam are covered with brush.

Under current conditions, the outlet structure is covered with beaver debris (the concrete weir could not be seen) and the outlet channel is eroded. We observed laid stone on a portion of the downstream face of the embankment. There is no defined channel downstream near the center of the dam, where a pipe outlet might be expected. A laid stone wall on the left side of a wetland area near the midpoint of the embankment extends 20 to 30 feet downstream perpendicular to the dam.

McAvoy Pond

The pond has a surface area of 17 acres and a drainage area of 2.89 square miles. The dam is part of the Locks Village Road embankment and is about 150 feet long and 9 feet high. The outlet structure is a concrete drop-structure with a gate control. The spillway is 23 feet wide with a maximum flow depth of 2.5 feet and a 9-foot drop from the crest to the outlet channel.

Ethier's Pond

Information about this pond and structure was not available in the publication.

Tyler Pond

The pond has a surface area of 2 acres and a drainage area of 2.89 square miles. The dam is an earthen structure about 100 feet long and 7 feet high. The principal spillway consists of two 18-inch corrugated metal pipes and the emergency spillway is a rock channel. The embankment slopes were covered with brush.

Improvements have been made to the dam since the above inventory. Brush has been cleared from the dam, a stop-log water control structure was added to the principal spillway, and a concrete overflow structure was installed as part of the emergency spillway.

Lake Wyola

The lake has a surface area of 120 acres and a drainage area of 6.72 square miles. The dam is an earthen structure about 300 feet long and 8 feet high. The spillway is a concrete drop-structure, 24 feet wide with a maximum flow depth of 1.5 feet. The spillway outlets onto rock riprap at the outlet channel.

Evaluation

The sediment accumulation in the North Cove of Lake Wyola appears to have come from two major sources—road sand around the lake area and erosion from the banks and streambed of Fiske Brook accelerated by intermittent breaching of beaver dams or debris accumulated at the outlet spillway of Fiske Pond. A significant amount of sediment comes from winter road sand washing into the lake during storm events. Even though several of the roads are swept by the town in the spring, sand still remains on the road berms. Drainage swales carry storm runoff and sediment into the lake.

The second problem is beaver activity at Fiske Pond and along Fiske Brook. The Fiske Pond overflow spillway is blocked with beaver debris which holds a significant amount of water behind the debris dam. As an example, one foot of water over the 8-acre pond surface amounts to a volume of 2.6 million gallons. During major storm events it appears the debris dam breaches and high streamflows pass through and erode the outlet channel. The sediment is carried downstream during the high flows. The coarser gravels are deposited along Fiske Brook, and the finer grained sand and silt are carried all the way to Lake Wyola and deposited in North Cove. This probably occurred during the microburst, Hurricane Bertha, Hurricane Floyd, and other major rainfall events.

The shallow water in Lake Wyola which resulted from the sediment accumulation promotes the growth of aquatic vegetation. If organic material and nutrients are also deposited in the shallow areas, the growth of aquatic vegetation is enhanced.

The beaver activity at McAvoy Pond does not appear to have much effect on the downstream sediment accumulations. McAvoy Pond, the downstream private pond

(Ethier's Pond), and Tyler Pond serve to trap any eroded material from the watershed. It appears that Tyler Pond is periodically cleaned out from accumulated sediment and debris.

Lake Wyola is located in the Town of Shutesbury. The Fiske Brook watershed, Fiske Pond, Tyler Pond, Ethier's Pond, and McAvoy Pond are all located in the Town of Wendell. Fiske Pond is also owned by the Town of Wendell. As a result, coordination and agreements are needed between both towns in order to implement protective measures for the erosion and sediment problems along Fiske Brook and sediment problems in Lake Wyola. Agreements are also needed with the owners of the dams.

Alternatives and Recommendations

Town Coordination and Agreements

- The towns of Shutesbury and Wendell should coordinate activities and develop agreements for installing protection measures and conducting maintenance at Lake Wyola, Fiske Pond, Tyler Pond, McAvoy Pond, and along Fiske Brook. Installed measures and maintenance performed upstream will affect downstream areas, and sometimes downstream measures may affect upstream areas.

- Coordination and agreements with the downstream Towns of Leverett and Montague may be needed for work done at Lake Wyola and the dam.

Road Sand

- Minimize the amount of sand applied to the road around Lake Wyola during the winter months

- Develop a regular road sweeping program for cleaning in the spring and during the summer and fall months, as needed

- Remove existing accumulations of sand along the shoulders of Lakeview Road

- Install curbs or berms along the edges of the roads to direct the road runoff into constructed sediment basins which can be periodically cleaned out

Shutesbury – Lake Wyola

- Remove accumulated debris from the Lakeview Road bridge. Measure the depth of sediment in the bridge opening as an indicator for determining the amount of sediment which has accumulated in the North Cove area. This can provide some basic information for planning a project to remove the sediment deposits from the lake area. Additional surveys of the current lake bottom in the North Cove area and sediment samples will be need for obtaining permits and removing the sediment.

- Plan annual or biennial lake drawdown periods for Lake Wyola to conduct regular maintenance along the lakeshore and at individual properties. When Lake Wyola is drawn down this fall for the dam safety study, it will provide a good opportunity for the landowners and the Lake Wyola Association to remove sediment and aquatic weeds from the lake area. It also provides an opportunity for landowners to do other needed maintenance

- Remove accumulated sediment and aquatic weeds from the lake area during the drawdown period

- Cut and remove aquatic weeds and vegetation from the problem areas during the growing season. Other Lake Associations have had success with aquatic weed harvesting; information about aquatic weed harvesters is available at the following web sites:
  http://www.lycott.com/Harvesting.htm
  http://www.inland-lake.com/harvester_models.htm

- Install vegetative and/or structural shoreline protection measures along exposed and eroding shoreline areas to control wave action from boats and reduce the amount of sand washing into the lake. Some of these measures can be installed along the shoreline of beach areas; such as, timber or coconut fiber (coir) roll borders. Information about shoreline protection measures can be obtained from the Shoreline Protection section (650.1602) of the NRCS Engineering Field Handbook, Chapter 16 at the following web site:
  http://www.info.usda.gov/CED/ftp/CED/EFH-Ch16.pdf

- Minimize the amount of sand used for beach replenishment around the lake

Wendell – Fiske Pond and Fiske Brook

- Remove accumulated beaver debris from the spillway outlet structure and maintain the spillway free of debris. This will prevent the debris blowouts and periodic surges of water downstream in Fiske Brook which are contributing to the erosion of the outlet channel and associated sedimentation in Lake Wyola.

- Once the debris is removed the concrete spillway should be inspected to ensure water is not flowing around the ends of the spillway and endangering the integrity of the abutment.

- Install streambank and channel protection measures along the eroded outlet channel below the spillway outlet structure

- As part of future planning for the Town of Wendell, a hydraulic analysis should be conducted on Fiske Pond dam to evaluate the capacity of the spillway and the safety of the dam from overtopping.

- The Town of Wendell should develop a regular inspection and maintenance program at Fiske Pond to remove pond weeds, accumulated beaver debris, and other debris which accumulate at the spillway outlet structure.

- A log boom structure installed upstream of the spillway would help to prevent the debris dams at the spillway and allow water to pass freely over the spillway structure.

- Install beaver control measures at the active beaver areas downstream on Fiske Brook. Check with the Massachusetts Division of Fisheries and Wildlife for acceptable beaver control devices.

Wendell – McAvoy Pond

- Remove the accumulated beaver debris from the spillway outlet structure

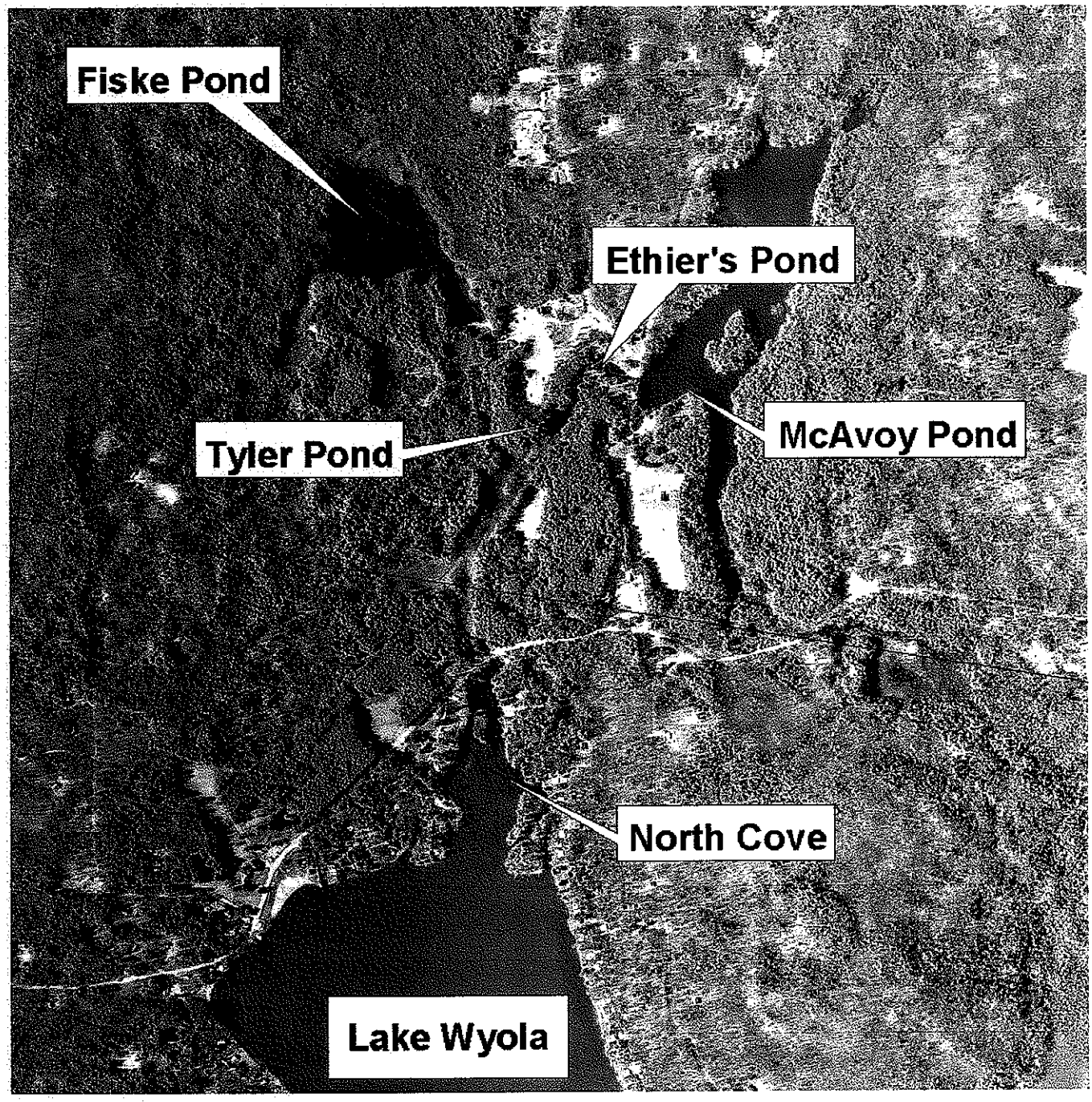
- Periodically inspect the spillway outlet structure during the active beaver season and remove the debris

- A log boom structure installed upstream of the spillway would help to prevent the debris dams at the spillway and allow water to pass freely over the spillway structure.

Wendell – Tyler Pond

- Remove accumulated sediment from the pond and debris from the spillway, as needed

Lake Wyola Inventory and Evaluation Location Map



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Town Boundary

Lake Wyola Inventory and Evaluation

Photographs

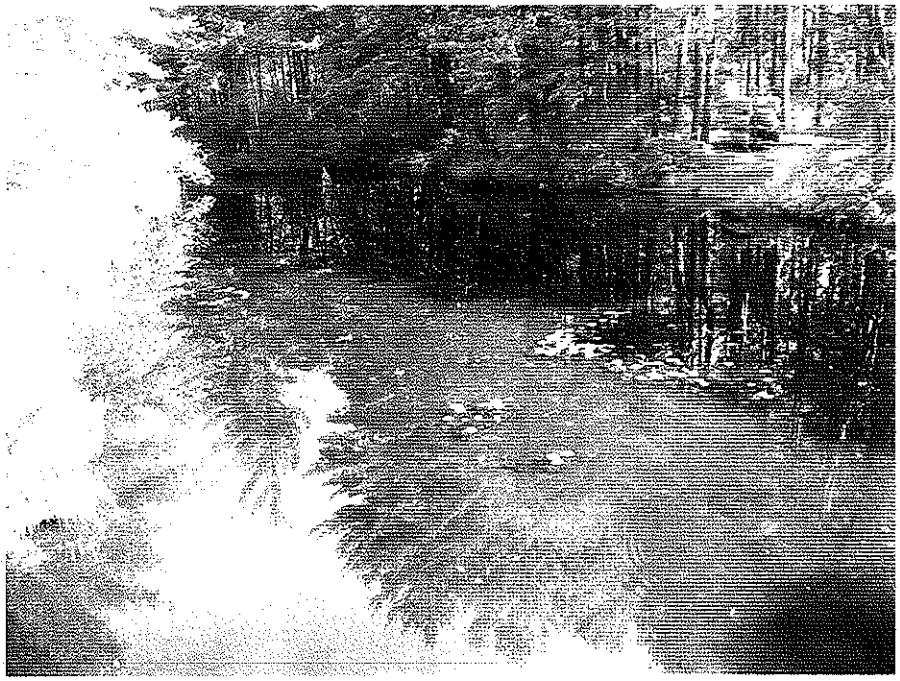

Photo # 1 – Lakeview Road Upstream, Shallow Pond Area

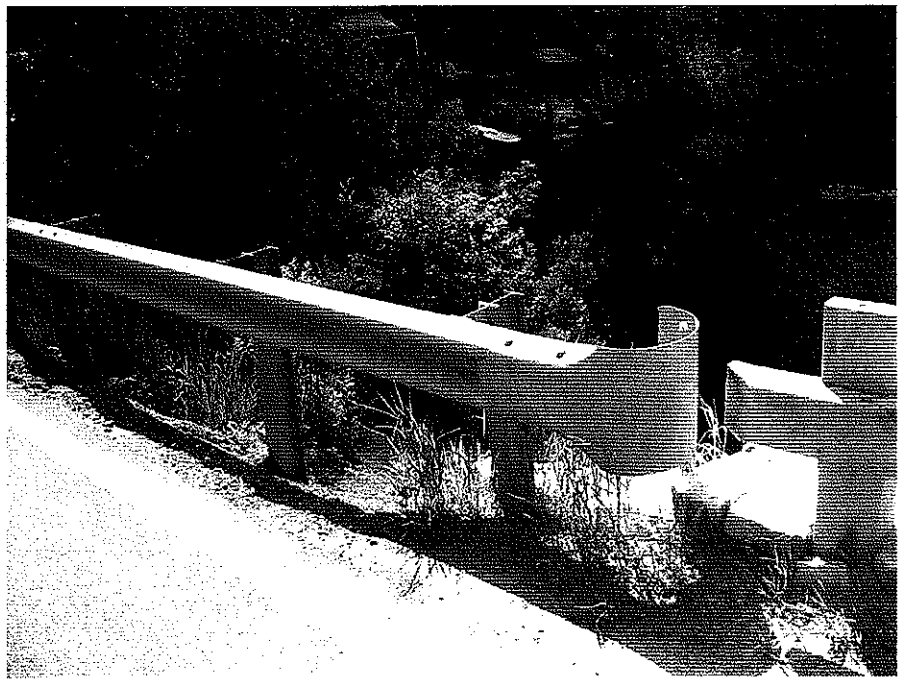

Photo # 2 – Lakeview Road Downstream Runoff Area

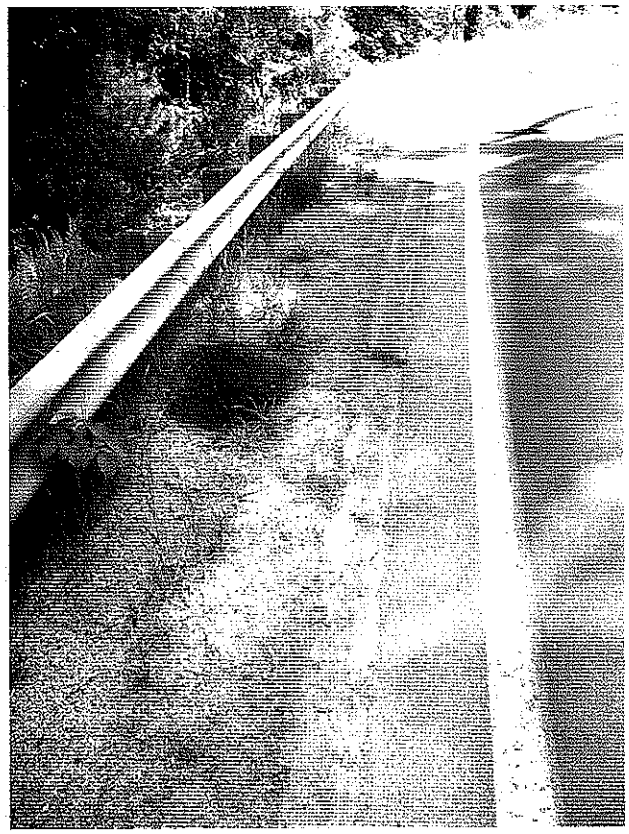

Photo # 3 – Lakeview Road Edge, Sand Accumulation

Photo # 4 – Junction of Tyler Brook and Fiske Brook, Sand Bar

Photo # 5 – Fiske Pond Overflow Spillway, Beaver Debris

Photo # 6 – Fiske Pond Spillway, Eroded Outlet Channel

Photo # 7 – Channel below Fiske Pond, Sediment and Debris

Photo # 8 – Beaver Dam along Fiske Brook

Photo # 9 – McAvoy Pond Outlet with Beaver Debris