September 12, 2010

Rome Rock Association, Inc.
1875 U.S. 6
Rome, OH 44085

RE: Survey Report: Depth survey and sediment profiling of lake inputs, Lake Roaming Rock Reservoir.

Dear Sirs:

EnviroScience, Inc. (ES) performed sediment accumulation surveys on Lake Roaming Rock in August and September of 2010. This report details the results of those survey efforts and data collections.

Scope of Work

The goals of this project were:

1. Survey key lake inputs (streams and drainage inputs) and record depths of accumulated sediment on the lake bottom above original grade;
2. Compare present-day lake depth to historical data;
3. Identify and map areas of the relatively highest sediment accumulation, and
4. Provide recommendations for restoration and prevention efforts.

Background

RoamRock Association, Inc. (RoamRock) has expressed concerns about sediment inputs to Lake Roaming Rock. In nature, soils and other materials are eroded from upland areas and mobilized by wind, rain, and streams, then enter drainages and are carried downstream. Natural sediment loads for Ohio streams during pre-European times probably varied due to local geology and land cover. However, most sediment loads then were certainly much lower that what is found in most of today's waterways due to human activities.

Sediment loading from problematic human-related land uses such as open construction, industrial and residential development, impervious surface, and poorly managed pasture and cropland can mobilize tremendous amounts of suspended solids in waterways. Sediments and runoff commonly contain nutrients such as lawn and agricultural fertilizers and pesticides. These nutrients increase lake eutrophication; leading to lake problems such as excessive algae and aquatic plant growth, low oxygen, reduced water clarity, and increases in sedimentation as dead algae and plant material seasonally dies accumulates on the lake bottom.

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Because Lake Roaming Rock is man-made reservoir, the majority of sediments entering the lake from streams and other sources settle out in the reduced velocity of lake before water exits the lake via the spillway. As sediments settle to the lake bottom, the volume of the reservoir is reduced. Therefore, through this study RoamRock is being proactive in identifying the largest potential sources of sedimentation and nutrients which ultimately reduce the working lifespan and quality of the reservoir. Depth and substrate transects were targeted at suspected sources of sediment in inlets and other areas identified by RoamRock, and not completed as comprehensive surveys of the inlets as previously proposed to reduce costs.

Field Methods

ES conducted sediment and depth sampling on twelve (12) inlets on Lake Roaming Rock (Figure 1, Coves A - O). A first attempt used sonar to map sediments but this attempt was unsuccessful due to plant growth in the study areas and high water turbidity interfering with the sounder, as well as equipment malfunctions. A second survey was completed on September 2, 2010 using metered sounding rods. Sediment and depth surveys were completed from an ES work boat at no additional charge to RoamRock.

At each of the locations, the water depth and sediment depth was measured using marked steel pipes to the nearest 0.5ft. Sediment depth was defined as the amount of soft sediment on top of hard bottom. To measure sediment depth, the steel pole was pushed into the sediment until refusal.

Results

A total of 147 sediment / depth samples were collected from 12 coves within Lake Roaming Rock (Appendix A). Coves were labeled alphabetically from A to O beginning at the upper northeast corner of the reservoir and proceeding clockwise (Figure 1, Table 1). Cove “N” was subdivided into “Nn” and “Ns” to differentiate the north and south branches of the coves. ES conducted sediment and depth sampling on twelve (12) inlets on Lake Roaming Rock (Figure 1, Coves A - O).

Table 1. Summary of Survey Results for Lake Roaming Rock Sediment Survey

Cove	Avg. Water Depth (ft)	Avg. Sed. Depth (ft)	Ratio (Water / Sed.)	No. Samples
A	4.02	1.00	0.25	11
B	3.50	1.50	0.43	2
C	4.72	1.14	0.24	18
D	6.73	1.21	0.18	13
E	3.90	1.52	0.39	25
F	2.25	1.75	0.78	2
G	3.50	1.38	0.39	4
H	3.56	1.13	0.32	16
I	3.67	1.67	0.45	3
J	4.06	0.31	0.08	8
K	4.67	2.10	0.45	21
L	4.00	1.33	0.33	4
M	4.33	1.33	0.31	3
Nn	3.25	1.25	0.38	4
Ns	3.40	0.00	0.00	5
O	5.25	1.00	0.19	8

Sediment and water depths were recorded in a field notebook and a GPS point was recorded for each sample location. GPS points were then linked with the data and mapped in a Geographic Information System (GIS). Maps of each cove were generated that illustrate the ratio of water depth (ft) to depth of loose sediments (see Figures 2 through 13). To further investigate the potential sources of sediments to Lake Roam Rock, a land cover layer of adjacent land uses was added to the GIS layer (Figure 14). Inlet depths were also compared to historical data for gross changes in water depths.

Historical Vs. Present Day Lake Depths

A map image of Lake Roaming Rock's water depth in 1978 was imported into GIS and corrected to real world coordinates. The 1978 lake depths were then visually compared to 2010 recorded values.

Overall, lake depths recorded in coves in 1978 showed little difference between 2010 data. Three moderate areas of concern were identified; Cove H, Cove K, and Cove O. Of these, Cove H and K were the primary area of concern, with consistent depth reductions of 1 to 3 feet since 1978. Otherwise, there was little difference found in depths of most coves between 1978 and 2010, however it is recognized that several of the coves have been partially or mostly dredged in recent years.

These findings are consistent with an August 1991 sediment survey reportedly conducted by James Wade, a geologist with an unknown affiliation. This survey estimated that the lake had lost approximately 6 percent of its volume since 1968, a relatively low value for Ohio reservoirs which typically lose up to one percent per year due to sediment accumulation.

Cove H has a moderately sized watershed relative to some other coves which contain major tributaries. However this moderate watershed was found, based on a 2010 land cover survey (Figure 14), to consist primarily of cultivated crops, and possibly pasture. A review of aerial photography found that the drainageways coming from the cropland did not appear to have a good wooded or vegetative buffer, relative to other similarly-sized watersheds. While other coves may have had cultivated crops, the relatively small size of the Cove H watershed and its proximity to Lake Roaming Rock make it a good candidate for future restoration efforts.

Cove K is where the main tributary of Lake Roaming Rock, Rock Creek, enters the reservoir and the where much of the sediment load of Rock Creek would be expected to drop out of the water column. Not surprisingly, an Island appears to be forming along the west side of the channel just north of G.A.R. Highway 6, with river depth two to three feet shallower than in 1978. This pattern of deposition is normal for a major reservoir input, and for this reason it was not considered a high priority concern.

Cove O was relatively small and had a relatively small watershed compared to other coves. Sediment surveys did not detect a high level of deposition but comparison of 1978 and 2010 depths did show a two to three foot reduction in depth at the very end of the cove. This cove has a primarily residential watershed and this area could be assessed for potential sediment limits.

A likely reason for the limited sedimentation that was noted in Lake Roaming Rock was that many of the major tributaries still appeared to have vegetated / forested riparian zones and most

were not located near urban centers. Lebanon Creek, a major tributary of Rock Creek upstream of the reservoir, appeared to have the most impaired land use relative to the other tributaries with the least amount of forested cover and highest concentration of residential and other development.

Conclusions

Lake Roaming Rock was found to have relatively little sedimentation over the 32 year investigative period (1978 – 2010) compared to other Ohio reservoirs based on ES's experience. A comparison of 1978 depth to 2010 depths found little changes, except as noted at Coves H, K, and O. Cove K sedimentation was expected because it receives the lake's primary tributary, Rock Creek. Cove H appeared to be the best candidate for watershed restoration or sedimentation controls because the watershed was relatively small. Lebanon Creek, a major upstream tributary of the lake, appeared to have an impaired watershed and Roam Rock may want to consider investigating restoration efforts in that area, such as teaming with a local watershed group to reduce nutrient and sediment inputs.

If you have any questions or comments regarding this work please do not hesitate to contact me or Marty Hilovsky at 800-940-4025.

Sincerely,

Gregory F. Zimmerman
Vice President

Figures