Summary of Findings
Cedar Creek and Eagle Mountain Reservoirs Sediment Budget Analysis

The following are requested summaries of the results of the preliminary analysis of the sediment budgets of Cedar Creek and Eagle Mountain Reservoirs. These are based on limited field and reservoir surveys and are meant to give estimates of process rates within these watersheds for models and planning. The limits of these methods and results have been given in the related reports.

Estimates of Channel and Gully Erosion

Basin	1	2	3	4	5
	Sq. Miles (adj)	**Channel (Tons/year)**	**Gully (Tons/year)**	**Combined (Tons/year)**	**Tons/sq. mile**
Cedar Creek	385.3	161,646	64,276	225,922	586.4
Eagle Mtn.	517.6	131,675	166,732	298,407	576.5

Table 1. Estimates of Channel and Gully Erosion for the basins. **This does not include sheet and rill erosion.**

Note:
Cedar Creek calculations:
Column 1: Contributing Drainage Area from Griener (1982)
Column 2: Table 12: Mean methods 2,3,4,5 channel erosion
Column 3: Table 12: Gaged Method 6 – Column 2
Column 4: Sum of 2 and 3
Column 5: 4/2

Eagle Mountain calculations:
Column 1: Contributing Drainage Area from Griener (1982)
Column 2: Table 7: Mean methods 2 and 3 channel erosion
Column 3: SEDNET method gully erosion 166,732 tons/year
Column 4: Sum 2 and 3
Column 5: 4/2

These rates do not include sheet and rill erosion. This factor can easily be ascertained by subtracting the channel and gully yield from the total reservoir yield. This is possible in Cedar Creek but not in Eagle Mountain owing to the highly subjective sediment volume estimates compiled to date. The results have been refined to give consistent units for use in the models.

It should be noted that monitoring activities have begun in the Blackland portion of Cedar Creek watershed by Stephanie Capello as part of her M.S. work at Baylor. To date she has collected stream channel erosion rates for major storm events at over 6 sites in the watershed. She plans to continue this research through the fall. This should aid in future refinement of erosion rates. A grant has been submitted for similar assessment in other watersheds.

Estimates of Total Reservoir Sediment

Reservoir	Dry Density(lbs/cuft)	Total Sediment Tons/yr.
Cedar Creek	21.5	492,247
Eagle Mountain	25.2	Inconclusive: See Comments on Cesium

Table 2. Results of Core and Preliminary Sub-Bottom Profiling of Cedar Creek and Eagle Mountain reservoirs.

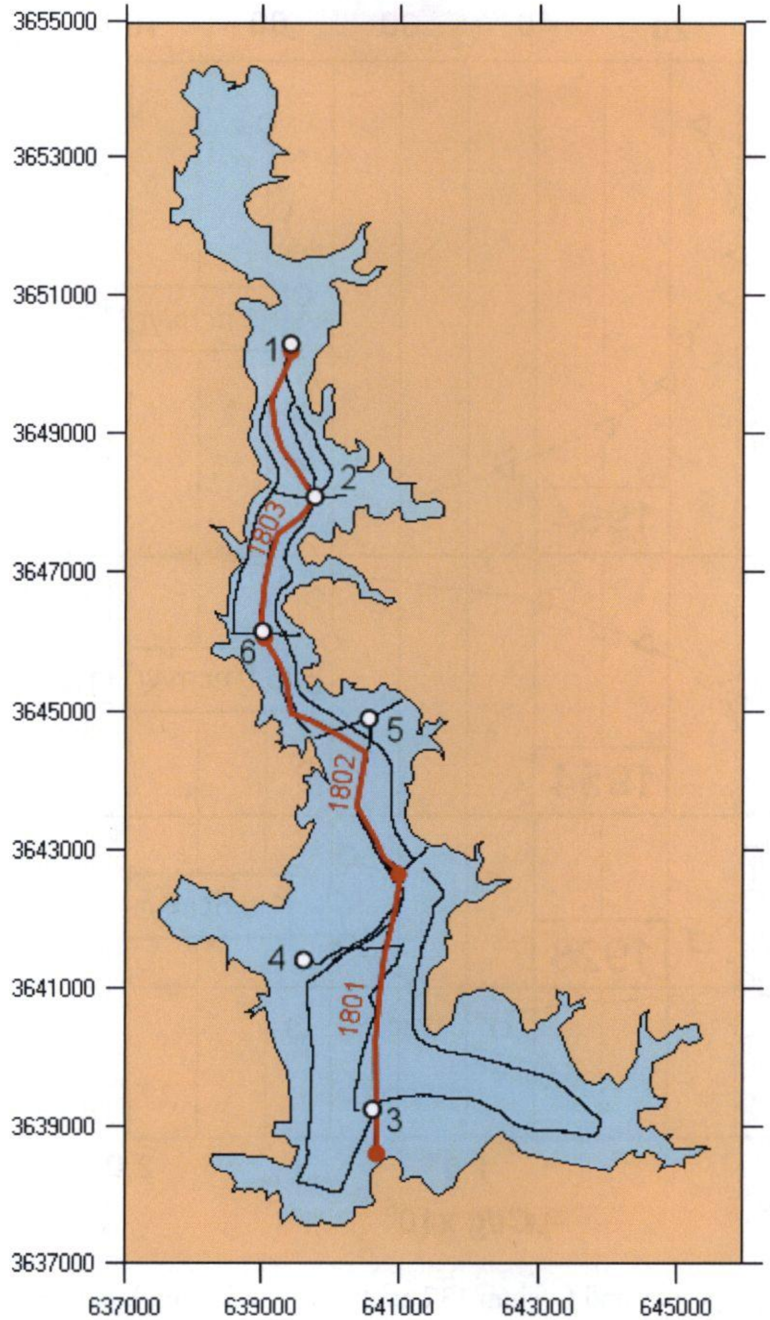
Notes:

Cedar Creek

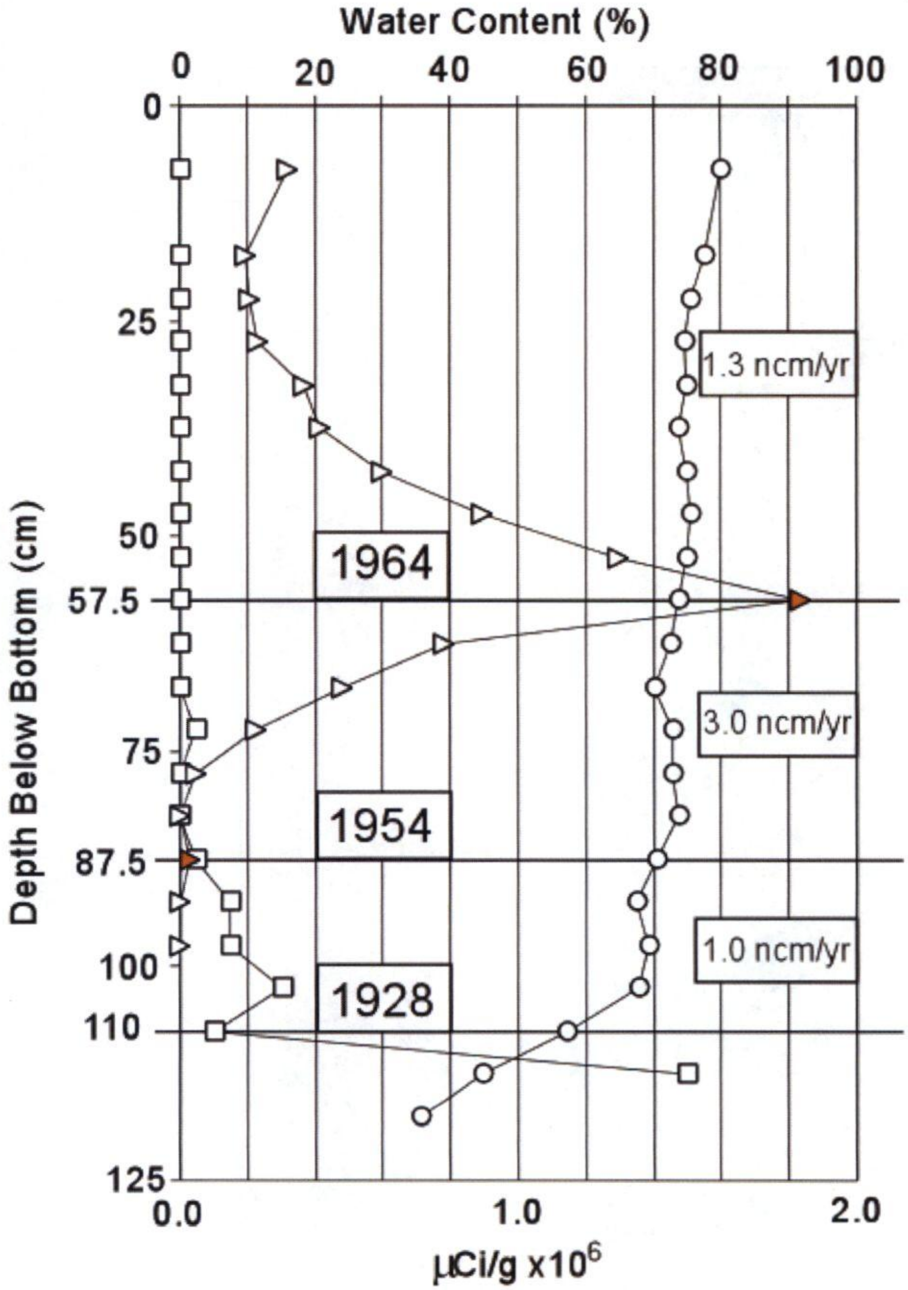
Assumes a sediment thickness of 1.29 feet in reservoir as per the report and limited survey lines.

Eagle Mountain

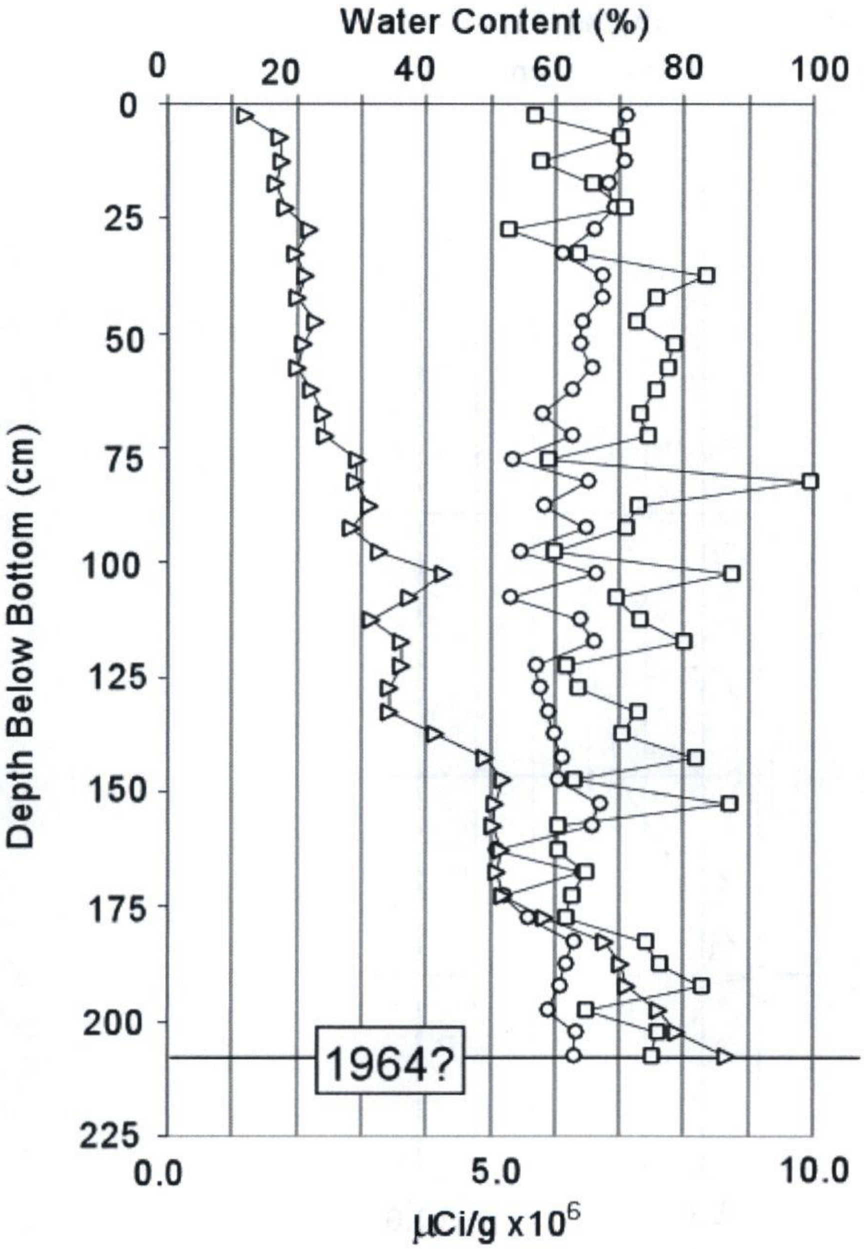
Results of Cesium analysis of existing cores are illustrated below.



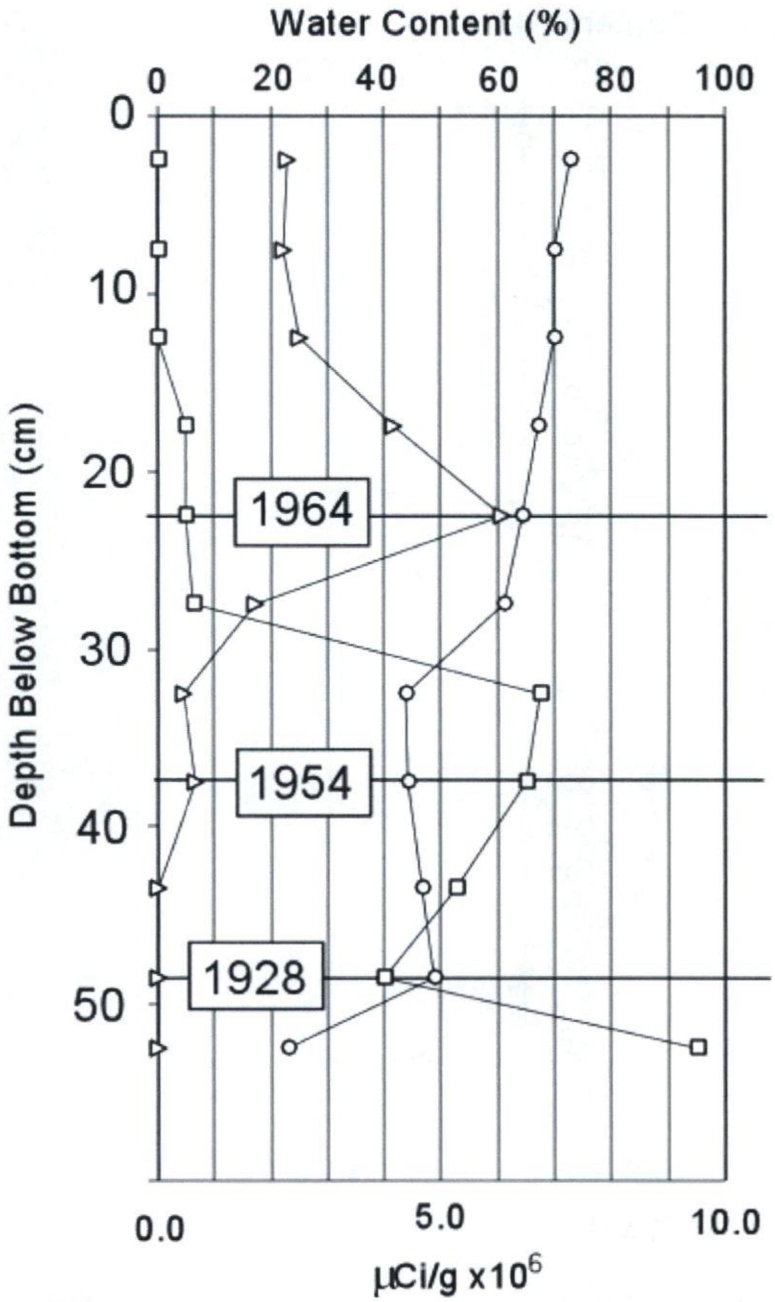
Map of reconnaissance survey data collected in Eagle Mountain Reservoir. Acoustic profile lines are shown in black and red. The axial profile marked in red is used to estimate survey accuracy versus profile spacing in future surveys. It was collected in three segments (1801, 1802, and 1803), the ends of which are marked with red circles. White circles mark the 6 core locations. Geographic coordinates are in UTM Zone 14, meters. (Figure 12 from Eagle Mountain survey report).



Core 3 physical properties and Cesium 137 analysis. Circles mark percent water content by weight, squares mark relative penetration resistance, and triangles mark Cesium 137 activity. The peak in Cesium-137 concentration occurs at a depth of 57.5 cm in the core and is interpreted as 1964. The first occurrence of detectable Cesium 137 occurs at a depth of 87.5 cm and is interpreted as 1954.



Core 5 physical properties and Cesium 137 analysis. Circles mark percent water content by weight, squares mark relative penetration resistance, and triangles mark Cesium 137 activity. The peak in Cesium-137 concentration occurs at the bottom of the core, at a depth of 207.5 cm. Because the peak occurs at the bottom of the core, the date is ambiguous. The date at the base could be 1964 or younger, but it cannot be older than 1964.



Core 2 physical properties and Cesium 137 analysis. The peak Cesium concentration occurs at a depth of 27.5 cm and is interpreted as 1964. The first occurrence of Cesium 137 occurs at a depth of 42.5 cm and is interpreted as 1954.

Year	Core 2	Core 5	Core 3
1964	27.5 cm.	207.5 cm.	57.5 cm.
1954	42.5 cm.	Not reached	87.5 cm.

Table 3. Results of Cesium- 137 Analysis on the Eagle Mountain Cores.

Table 3 indicates that the sediment flux in the reservoir is uneven and some areas have received more sediment than others. This is commonly referred to as *sediment focusing.* Such sediment focusing has been observed by the authors as being more common in silt-sand reservoirs than in clay dominant systems (Cedar Creek). This result is consistent with the preliminary estimates of profile spacing with the sub-bottom system to accurately map the sediment thickness in the reservoir. In the report, it was stated that in order to achieve a 10 percent accuracy, one would have to survey at a line spacing of around 990 meters; and down to 170 meters for a 2% accuracy. It was also inferred in the initial report that the past resurveys of the reservoir, while able to give reliable lake volumes, were not precise enough to give sediment volumes.

This report and the submitted reports indicate three methods useful in interpreting sediment volumes. They consist of sub-bottom acoustics, core analysis and Cesium-137 analysis. The best survey, which would give flux as well as sediment volume, would be a combination of all three. Below are some suggestions for future studies to refine the existing level of knowledge of the sediment in the Eagle Mountain reservoir.

1. High Level Survey and Cores:
A complete survey of the reservoir with sub-bottom acoustics at a scale based at a narrow line spacing. This approach would give the prescribed thickness at the defined level of accuracy but only flux from the date of impoundment. Cores would be taken at select sites to assess the sub-bottom acoustics interpretations and define the reservoir bottom or base of sediment. For this size reservoir it is suggested that a minimum of 6 cores be taken.

2. Lower Level Survey, Cores and Cesium.
More extensive Cesium analysis coupled with perhaps a lower level survey of the lake at the largest line spacing of 990 meters. . This approach would give a far better indication of thickness as well as flux. More line spacing could be added in the future as a resurvey. (Cesium cores without some idea of sediment thickness and variability is not advised).

3. High Level Survey, Cores and Cesium.
This is the gold standard for surveying reservoir volume and flux. Based on the preliminary findings it should be possible to get at least three dates (1928,1954,1964) from the Cesium and cores as well as a more refined density of the lake sediment as well as detailed sediment volumes.

In summary, all these suggestions coupled with the existing data obtained to date, infers that at least 3 or four more cores preferably with Cesium and some increased analysis of the lake using sub-bottom acoustics is needed to refine the sediment flux into the lake.