MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

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Scope of Work
Deep Creek Lake Sediment Study
Phase II

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Introduction

Deep Creek Lake was constructed in 1925 in order to provide electric power to Western Maryland. The hydroelectric function of the Lake is still in use today; however, it works within defined parameters to ensure the environmental health, recreational use, and flood control functions of the Lake and its downstream river system. The construction of Deep Creek Lake flooded existing river valleys, farmlands, and woodlands. It encompasses over 3900 acres with an estimated volume of 34.5 billion gallons of water.

Sedimentation is a natural process where soil is deposited through erosion and transportation into a body of water. Many factors affect this process including rainfall amounts, soil types, land use, vegetation, land slope, and implemented sediment controls. A complete model of the Deep Creek Lake basin has not been developed; however, generalized planning factors calculate a potential of 11.7 to 33.8 acre-feet/year of sediment deposited into the Lake. Due to the volume of the Lake and its depth, it is estimated that over 99.9% of all sediment which enters the Lake will remain in the Lake.

An initial study of sedimentation was conducted in 2010-2011 by the Department of Natural Resources in response to citizen's concerns to determine the severity of sedimentation in the Lake. The study was focused on selected coves, in relatively shallow water, and over the last 40 years. Results showed that sedimentation is occurring in the lake and it is variable throughout the lake.

This Phase II study incorporates the recommendations from Phase I by conducting a study throughout the entirety of the lake rather than selected areas. It also will identify the sediment character and chemistry in order to determine realistic and feasible alternatives for the fate of the accumulated sediment. Furthermore, it addresses the need to reduce the input of sediment into the lake.

Study Objectives

The objectives of this proposal are to:

1. Determine and map accumulated sediments within Deep Creek Lake.

2. Identify physical and chemical properties of the accumulated sediment.

3. Identify sediment inputs to the lake and develop strategies to minimize additional accumulated sediment within the lake.

4. Identify realistic, feasible, sustainable alternatives to address the accumulated sediment.

Methodology

1. Conduct geophysical subbottom profiles using a FM chirp-based seismic system operating at ranges between 4 and 28 KHz. Subbottom penetration will provide total sediment thickness in Deep Creek Lake and an independent corroboration of sediment accumulation determined from the comparison of bathymetric surveys and sediment coring.

2. Conduct a new detailed bathymetric survey in Deep Creek Lake using digital bathymetric data collection techniques combined with Differential-GPS positioning. These data will provide a suitable baseline for comparison with any surveys conducted in the past and future. Efforts will be focused towards a detailed survey of identified coves and a general survey of the main Lake. If possible, data from the 2007-2008 USGS bathymetric survey will be used to supplement these surveys.

3. Analyze the bathymetric data relative to topographic maps, previous bathymetric survey data to determine sediment accumulation in the Lake since dam construction and the remaining storage capacity of the Lake.

4. Collect a total of 36 cores to identify sedimentation within the Lake. Identify 10 cores for nutrient and pollutant testing. Selected cores will be analyzed for physical properties, grain size, total organic carbon (TOC), inorganic carbon, total nitrogen (TN), sulfur, total elemental analysis, semi-volatile compounds (EPA8270), Volatile Organic Compounds (EPA624/8260B), Organochlorine Pesticides and PCBs (EPA 608/8081B), and Priority Pollutants Metals and Cyanide (EPA 200.8/6020A).

5. Identify sediment inputs to the lake and develop engineering solutions to minimize sediment transport and deposition into the lake.

6. Based upon the results of the accumulated sediment map and State policies, an alternatives analysis will be conducted to outline various options and the impacts of those options of handling the accumulated sediment. This analysis will include, at a minimum, the following items:

   i. No Action --DNR allows the current natural state of sedimentation to continue
   ii. Excavation during low lake levels (Fall – Early Spring) --Utilize the drawdown capability of the lake to allow earthmoving equipment to reshape the sediments through removal of the exposed sediments or reshaping of the sediments

iii. Excavation during high lake levels (Dredging) --During periods of high water, dredge identified areas.
iv. Options for dredging the entire area of concern or just a navigation channel.
v. Options for removal of material to an off-site placement area, to the creation of a living shoreline, for the creation of shoreline stabilization projects, and other beneficial use projects.
vi. Environmental impacts
vii. Recreational impacts
viii. Costs.

Deliverables

1. Map of accumulated sediment from 1970 to the present.
2. Georeferenced video of the entire Lake shoreline.
3. A detailed report including
    a. Interpretation of the seismic and coring data specifically identifying the amount of sedimentation between 1925 and the current surface.
    b. Analysis of sediment character and chemistry throughout the lake identifying any anomalous pollutants or areas of concern.
4. A detailed report identifying sources of sediment to the lake and mitigation strategies to minimize this sediment input. Results will be published in two different formats:
    a. Handbook for County/State/Land Developers with templated engineering solutions.
    b. Pamphlet/Handbook for homeowners identifying how they can reduce sediment runoff from their property and their community.
5. A detailed report analyzing different alternatives in dealing with the accumulated sediment in the lake. This report will explore at a minimum:

Budget

Expenses for this project are estimated below:

1. Sediment accumulation:	
a. Seismic and ancillary bathymetric data collection	$20,000
b. Seismic data analysis and sediment accumulation mapping	$30,000
c. Sediment core collection, sampling, and lab analysis	$30,000
2. Sediment input identification and reduction strategies	$50,000
3. Alternatives analysis for accumulated sediment	$50,000
Total:	$180,000

It is anticipated that budget items 2 and 3 will be contracted to others outside of the Department of Natural Resources.

Projected Schedule

The timing of the tasks on this schedule is subject to weather conditions, lake levels, and sub-aquatic vegetation density. Any offset to the April-May Field Survey will push the project back an entire year.

April-May 2012:	Field Survey. Seismic Data and Bathymetry data collection
May-September 2012:	Analysis of Seismic data/Development of Sediment Thickness Map
August 2012-May 2013:	Identification of sediment sources and development of better management practices (BMP).
September 2012- May 2013:	Alternatives Analysis of the accumulated sediment
September 2012- February 2013:	Coring / Sediment Analysis / Sediment Accumulation Map verification