Waterway Assessment

Remediating the muck, and its spewing of nutrients into our waterways, requires knowledge of how much and where it is. This is critical in selecting the remediation technique (if any) to result in a positive cost effective result.

Contradictions in the Harper report indicates that the muck may be concentrated in few canals. This opens up options and is indicative of the importance of knowing the situation to enable better decisions.

Lacking information drives decisions towards a “one size fits all” solution or indecision.

When evaluating the accumulation of organic muck—the dark, highly fluid, nutrient-dense sediment you need specialized tools.

Because muck behaves almost like a fluid liquid layer over hard limestone or sand, standard depth-sounders won't give an applicable readings.

Assessing muck requires either physical sampling or dual-frequency bathymetric surveys (using high and low frequencies simultaneously) to find both the top of muck and the true hard bottom

Clear tube used to manually determine sediment and muck levels is called a **Sludge Judge** for highly fluid, nutrient-dense organic muck in shallow water.

Physically go down through the water column into the bottom sediment to pull up a visible cross-section of what is sitting at the bottom of a canal.

- **How it works:** Long clear plastic (polycarbonate or PVC) pipe sections that screw together. It has a float-valve at the bottom. Lower the tube into the water, the valve opens, water and liquid muck to flow up into the tube. When you hit the hard bottom and pull the tube up, the valve locks shut, trapping the liquid column.
- **What it tells you:** Look through the clear plastic to measure exactly how many inches of dark, fluid muck are sitting on top of the hard sand or rock bottom.

The price of a Sludge Judge generally ranges from $170 to $280 for a complete setup, depending on the pipe thickness and plastic material and come as three **5**-foot screw-together sections.

Dual-Frequency Bathymetry / Sub-bottom Profiling: An acoustic signal at a high frequency (200 kHz) to map the top of the soft muck layer, and a low frequency (24 kHz) to penetrate the fluff and bounce off the solid sand or limestone bedrock below. The difference between these two readings calculates the true volume of the muck layer.

Core Sampling & Sediment Characterization: A physical push core of the muck. This confirms the acoustic data and provides samples to test for **Total Organic Matter (TOM)**, water content, and potential contaminants to ensure compliance with FDEC disposal criteria.

- **Dual Frequency Instrument Kits** $8,000 – $12,000
- **Hydrographic Survey Software:** Log data, map track lines, and calculate muck/sediment volume $2,200 to $2,400
- **GPS/GNSS RTK Receiver Integration:** To create an accurate, three-dimensional model, must interface with an external RTK GPS rover to correct for tide heights and exact positioning. $150-$1200

In Florida’s Indian River Lagoon, an Arc/Aquares survey, was conducted to locate the interface of muck with the natural uncontaminated bottom using advanced geophysical techniques to develop a plan for **surgical excavation of muck.**

The survey generated 100% coverage of the test area producing a 4D model of the subsurface isolating the **area of contaminated sediment to 1/3rd of the waterway.** The exact position and thickness of contaminated muck was obtained, including the interface with native bottom.

This survey reduced dredging costs by identifying areas for surgical excavation of only contaminated sediments, reducing unnecessary excavation of uncontaminated sediments placed in expensive and scarce disposal areas.

Humiston & Moore Engineers (Naples): A highly regarded, local coastal engineering firm specializing in Southwest Florida marine structures, beach restoration, and inlet/canal dynamics. They have extensive experience navigating local regulatory frameworks like the South Florida Water Management District (SFWMD) and the Army Corps of Engineers.

Turrell, Hall & Associates (Naples): A prominent local marine consulting and environmental firm. They specialize in marine permitting, dock/marina design, and hydrographic surveys. They are highly active in Collier County waterways and frequently coordinate the types of benthic and sediment assessments required prior to maintenance dredging.

Other components of an assessment:

Dissolved Oxygen meter with salinity and temperature compensation $400-$2500

Visual observation of flora and fauna,

Water clarity/tubidity by Secchi Disk. 8-inch alternating black-and-white disk attached to a calibrated line or pole. $35-$120

Algae presence by:

Percent coverage mapping

The "Jar Test": qualitative field test

Chlorophyll-a Testing: scientific standard probe gives algae density $1500-$4000