Natural Lake Biosciences

MuckBiotics

Powerful Muck and Nutrient Removal

MuckBiotics™ are a next generation probiotic tablet for restoration and maintenance of impaired water resources. This advanced probiotic combines scientific research with novel bioengineering, resulting in a product that treats the entire water body by starting at the bottom.

MuckBiotics are applied by broadcasting the tablets evenly over the surface of the targeted area. The tablets sink to the bottom and rapidly populate the aquatic environment in which they are applied. MuckBiotics should be applied across the entire surface of a water body for best results. They also excel at targeting shorelines, coves, or similar specific areas prone rapid accumulation of organic matter.
MuckBiotics DO NOT kill aquatic plants or algae.

PRODUCT HIGHLIGHTS

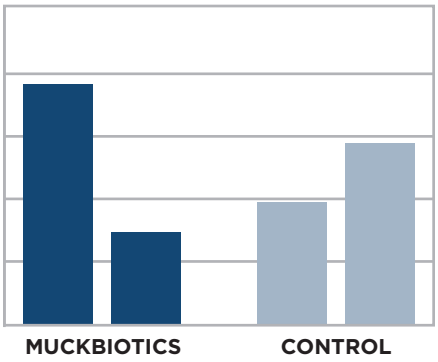
- Great for both targeted treatments and full water bodies
- Non-toxic, non-hazardous, pet-safe water treatment tablet
- Proven results backed by years of scientific research

BENEFITS

- Removes buildup of organic matter
- Improves water quality and clarity
- Restores balance to water bodies
- Reduces internal nutrient load

Analyte	Control	MuckBiotics
Total Nitrogen	1,200 mg/Kg	980 mg/Kg
Total Phophorus	400 mg/Kg	240 mg/Kg
Total Solids	44%	51%
Total Volatile Solids	6.7%	5.3%
Total Organic Carbon	13,000 mg/Kg	12,000 mg/Kg
Nitrate	<0.89 mg/Kg	<0.76 gm/Kg
Ratio TVS:TS	0.15	0.10

AVERAGE SEDIMENT LEVELS AFTER 3 MONTHS



To learn more about MuckBiotics, please visit www.NaturalLake.com or call 888.757.9575

Harmful Algae Blooms (HABS)

Naturalake Biosciences' Probiotics Testing

Study Summary

- HABs both impede use of water bodies where they occur, and pose a serious threat to the health of people and animals
- Studies show an increase of 68% in HAB blooms over the last few years
- Nitrogen and phosphorus are primary drives for HAB blooms
- Since 2016, Naturalake Biosciences has studied both MuckBiotics® and MD Pellets in water bodies, both real and lab-duplicated, with HABs
- All instances of applications of MuckBiotics resulted in soft sediment reduction that wasn't seen in the control

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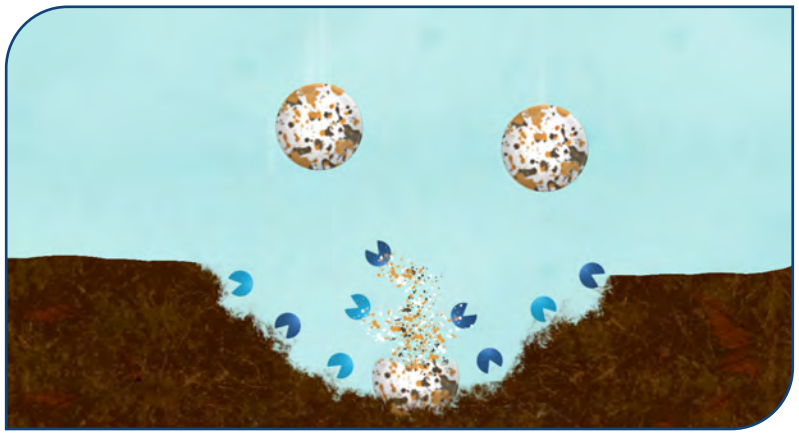
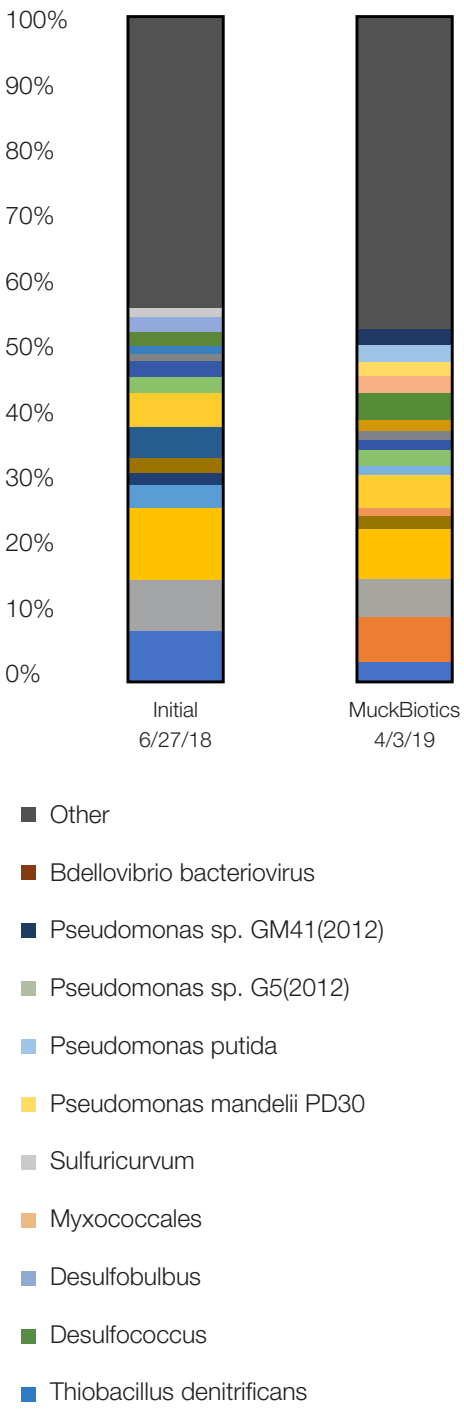
How MuckBiotics Works



MuckBiotics sinks into the muck layer for optimal degradation.

Soft Sediment Metagenomic Analysis

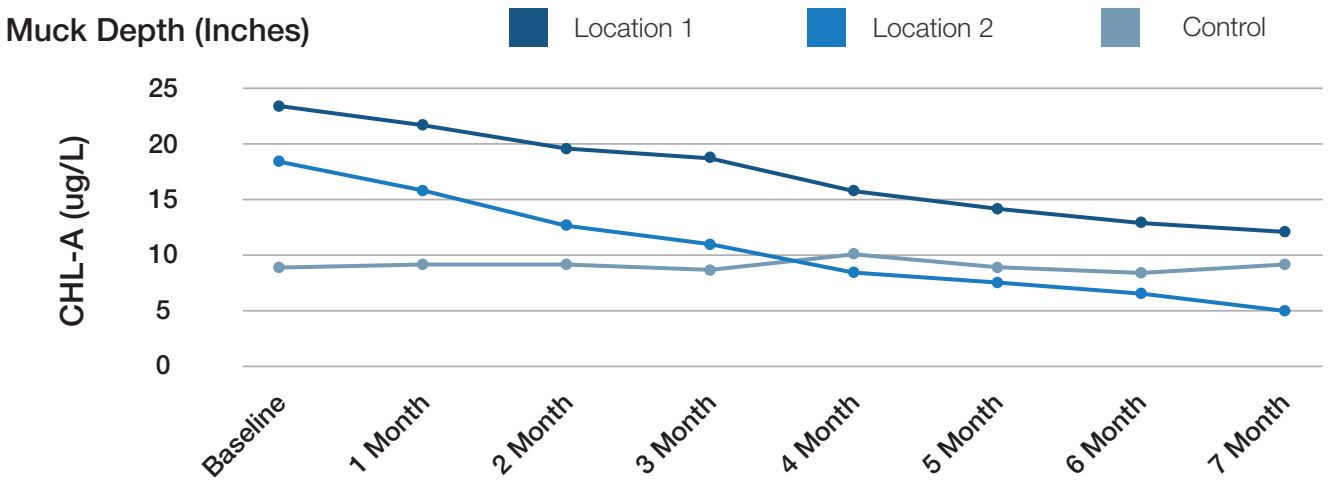


Organic Muck Reduction Case Study

Lake and Wetland Management, Patrick Teaf

Organic muck build-up from sources like fertilizer runoff and grass clippings can cause serious problems to stormwater systems. Removal can be extremely costly, and in some cases, access does not allow the necessary machinery entry to the location that needs to be addressed. Using MuckBiotics may be a more cost effective and environmentally friendly option for reducing the buildup of muck and organic materials in stormwater lakes and ponds.

We used a soil core sampling tool to measure the depth of the muck each month in three sampling locations over a period of 7 months. We sampled from two locations treated with MuckBiotics and one control site. Each sample was taken from the exact same location in each lake every month. During the sampling period we treated both treatment sites with 50 lbs of MuckBiotics per surface acre per month using a Vortex granular applicator. When the samples were taken, they were allowed to rest vertically for five minutes to allow the disturbed sludge to settle into a position in which we could accurately measure the depth of the layer on the bottom of the pond.



Both locations saw a reduction in the depth of their muck layer by at least 10 inches over the course of just one treatment season. Aeration was present in both treatment locations, but not in the control. Only a surface aerator was present in location 1, while location 2 had both a surface aerator as well as a diffused aeration system. As is shown in the graph above, not only was the depth of muck drastically reduced in both locations, but the effectiveness of the MuckBiotics was increased with the presence of additional aeration. The levels of reduction varied month to month, but this could have been due to storm events and differing levels of additional nutrient load on the treatment sites from things like fertilizer runoff.

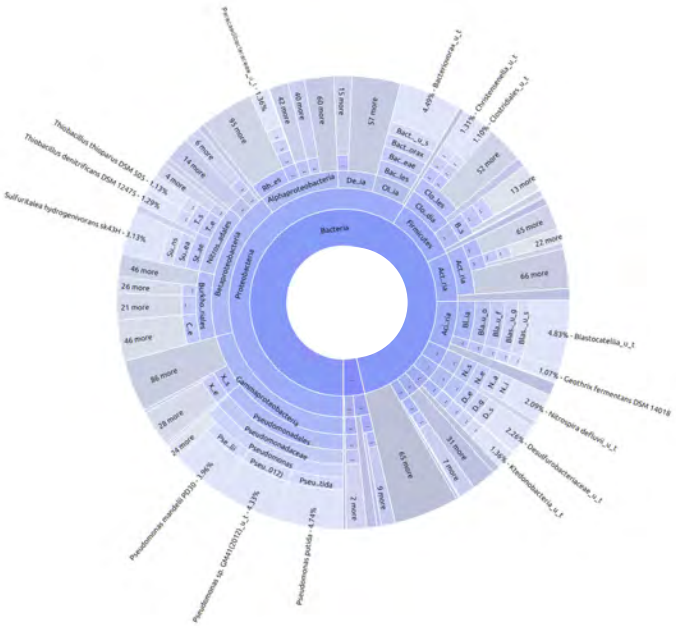
The drastic reduction in the levels of organic muck in the treatment locations shows treatment with MuckBiotics to be a viable alternative to dewatering and de-mucking a pond. Large piles of sediment and organics that have not biodegraded would still need to be removed mechanically to restore a pond to original condition, but the sludge that accumulates as sources of outside organic material continue to overload the pond with nutrients can be reduced to manageable levels using MuckBiotics tablets.

MuckBiotics™ Dosage - Once per month or as needed			
Surface Acres	Targeted Muck Reduction	Muck Maintenance & Prevention	Degradation of Floating Debris
1/4	5 - 12.5 pounds	2.5 - 6.25 pounds	1.25 - 3.75 pounds
1/2	10 - 25 pounds	5 - 12.5 pounds	2.5 - 7.5 pounds
1	20 - 50 pounds	10 - 25 pounds	5 - 15 pounds
5	100 - 250 pounds	50 - 125 pounds	25 - 75 pounds
10	200 - 500 pounds	100 - 250 pounds	50 - 150 pounds
100	2000 - 5000 pounds	1000 - 2500 pounds	500 - 1500 pounds

- *Do not mix directly with algaecides or herbicides*
- *If used in conjunction with algaecide or herbicide, apply MuckBiotics after chemical treatments for best results*
- *MuckBiotics are available in 30 pound biodegradable and resealable bags*

INCLUDE IN TREATMENT PROGRAMS FOR:

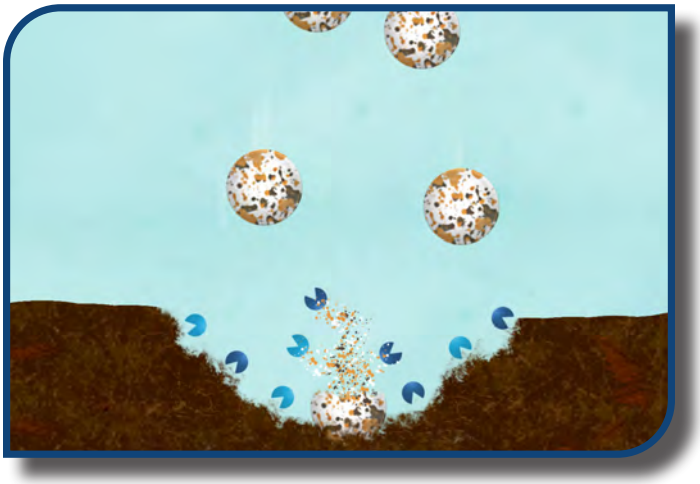
FILAMENTOUS ALGAE
CYANOBACTERIA
WATER CLARITY
AQUATIC PLANTS
PLANKTONIC ALGAE
MUCK & SLUDGE
NUTRIENT REDUCTION
SUBMERGED PLANTS



THE SCIENCE BEHIND IT

The nontoxic, organic technology saturates the surface of the sediment layer with rare earth stimulants and a broad spectrum of natural bacterial cultures. This establishes a healthy microbiota at the water-to-sediment interface that accelerates the digestion of organic matter. The microbiota functions as a biofilter, reducing harmful nutrient loading from both internal and external sources.

For more information on the science behind MuckBiotics, and the full details of our research into it's creation and effectiveness, visit us online at: www.naturalake.com/muckbiotics.



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