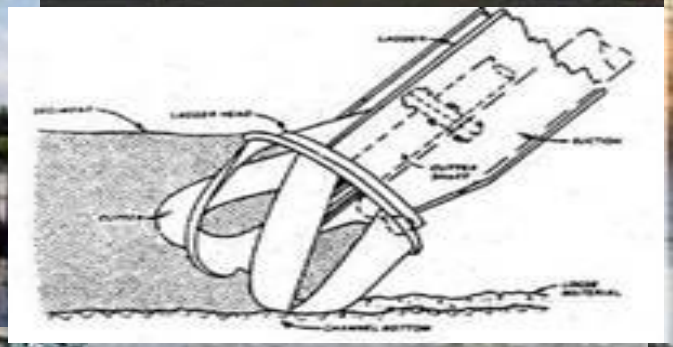
Welcome to OSR Systems' Presentation on Hydraulic Dredging







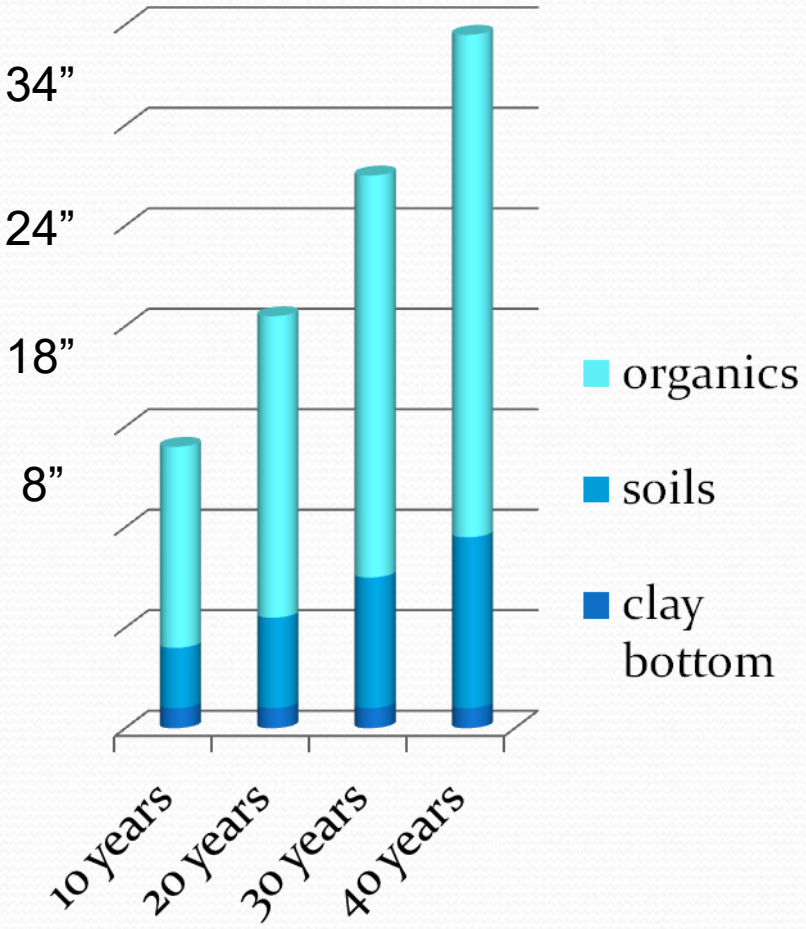


There are many different types of dredging designs for different applications.

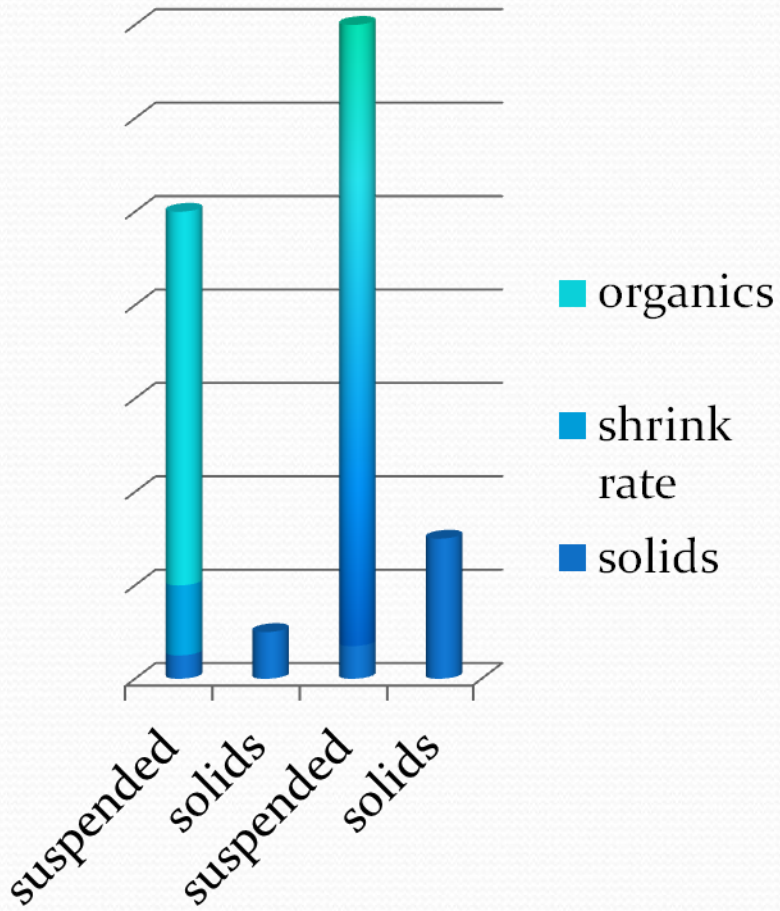
- Dredging systems are constructed to remove foreign materials that have migrated into natural or pre-designed waterways.

Sediments

Sediment Accumulation
.8” to .10” per year



Compression or Shrink Rate
12 to 1 10 to 1 6 to 1



The most common types of materials that migrate or form in these aquatic areas are: Organics and Inert Material.

- Organics - Consist of leaves, weeds, algae, fish, etc. that are dead and decomposing at the bottom - commonly known as **bio-mass**. The two groups of bacteria decomposing this bio-mass are aerobic and anaerobic. The anaerobic bacteria live in low oxygenated waters at the bottom and are so slow at decomposing organics that they continue to build, filling in the water column. The main by-product of this decomposing action is methane, ammonia, phosphates, and sulfur dioxide gasses, and is causing the most environmental damage to the water system, making the bio-mass one of the primary targets of some dredging operations. **What is important to remember is that this bio-mass is lightly suspended in the water averaging a 12 to 1 ratio (12 parts water - 1 part organics). Because of their suspension, the slightest agitation will disperse the sediments throughout the rest of the water column to the deeper areas.**

Inert Material

- Inert Material - Consists of loam soils, clays, sands, and gravel that usually enter the water system through wind, erosion, streams, culverts and flooding. These materials create shallow areas, allowing the water to heat up quickly in the spring and summer months. This reduces oxygen levels, killing off certain species of fish. It also allow weeds, aquatic plants, and grasses to take over the system. Lastly, they inhibit navigation. These materials are mainly targeted to increase water volume in the system to promote a reduction in weeds and improve aquatic life, resulting in a larger volume for water retention and flood control and deeper water depth for navigation. The suspension of the loam soils and light clays in the water column averages 5 to 1 (5 parts water - 1 part solid). **What is important to remember with both materials (inert or organic) is the dewatering process is known as compression ratio or shrink rate, resulting in the dried material left in the discharge area after the water has been removed. Projects are usually estimated at liquid cubic yards removed. Few contractors will bid on hard-dried cubic yards removed because it is difficult to estimate the shrink rate of the different types and multiple layers of material.**



Mechanical Dredging

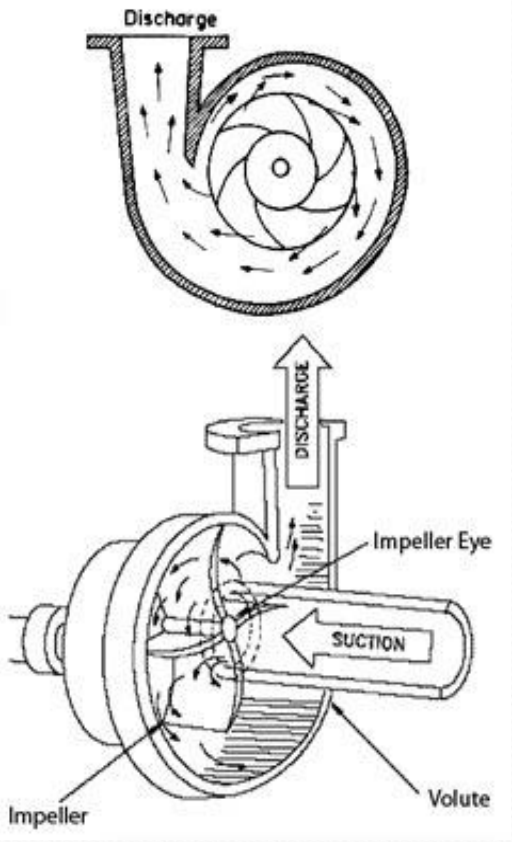
We should first touch a little on mechanical methods. These systems were very effective to dig and trench new areas, deepen existing areas, or remove eroded hard bottom sediments. They were ineffective in removing organic and soil sediments that were lightly suspended in the bottom water column and rather destructive to the aquatic and surrounding environment. The industry needed a more efficient and eco-friendly system for these softer suspended sediments.

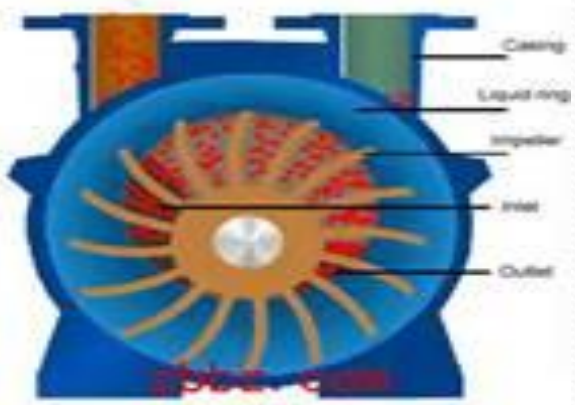


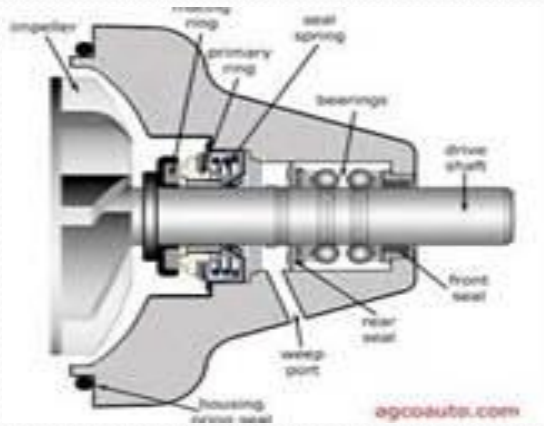



Hydraulic Dredging or Suction Dredging Simply Put is Converting Mechanical Energy to Hydraulic Energy.

By use of a mechanical wheel called an impeller, spinning in a fixed housing called a volute, water is pushed with such force it creates a positive force on the discharge side of the pump and a negative force on the intake side of the pump, creating suction to remove material. These are typically called centrifuge pumps and are the most commonly used.







Suction Auger Dredge Heads

- These auger heads are mounted to platforms and pulled across the area by cables or can be self-propelled. They are good at moving thicker materials, but are a little slow. The biggest drawback is they have to auger the material 3 to 5 feet to the center of the suction intake. Some of the lightly suspended organics usually explode into the water column due to the agitation of the auger and huge plumes of sediments are noticed around the unit. Regulations have been passed to have a floating silt curtain around the entire suction head. They also have a hard time in sands and clays, and are basically designed to slide along the firmer bottoms. Teeth have been added to the auger blades to cut deeper into thicker clays, sands, and gravel.

Types of Barges with Augers

Cutter Dredge Head

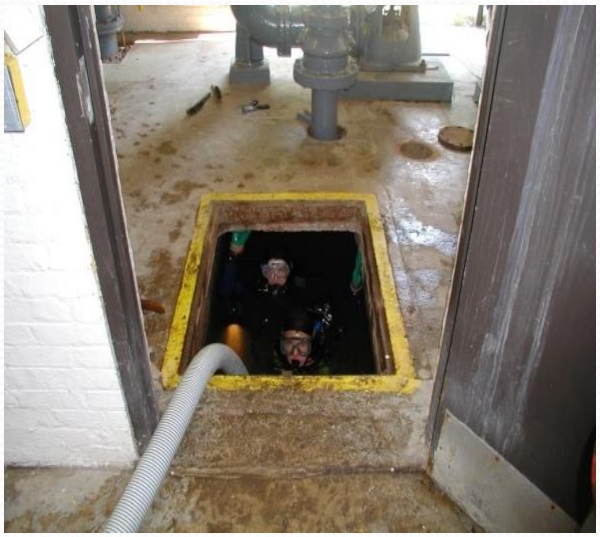
- The cutter head is slightly more of an efficient system. It is primarily designed to rip through the hardest bottoms. The efficiency comes not only from the pronounced massive teeth, but the suction intake is located directly at the bottom of the cutter head. As the barrel turns and scrapes the bottom, the sediments are quickly removed. These units are mainly used for your thickest sediments, such as clays, sands, and gravel on navigational waterways. Most all are self- propelled, except for some of the smaller units which use spud bars. The cutter and suction head sweeps side-to-side in an arch pattern as the barge moves forward. **Heavy weeds are a problem for both the augers and cutter head designs**.

Barges with Cutter Heads

OSR Systems Advantage

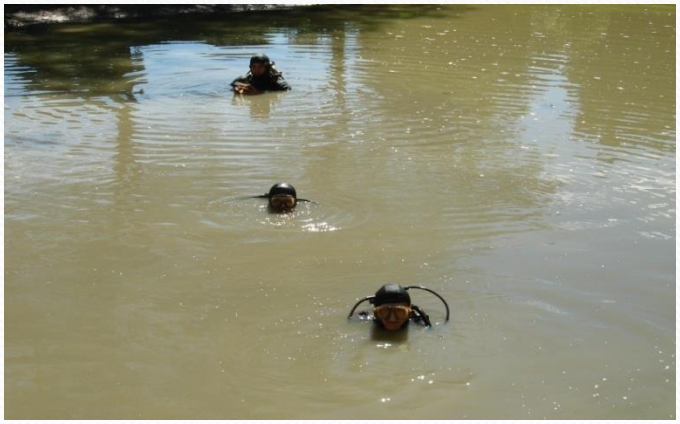
OSR Systems uses its own patented suction head. It is a direct contact suction head guided by divers. This makes it light , compact, and uses no heavy equipment. Because of these unique features and versatility, it has many advantages. The advantages under the water are:

1. There are no spinning augers or cutter heads dispersing sediments into the water column.
2. Divers can target specific types of sediment, areas, and depths of sediment to be removed.
3. This avoids removing unnecessary material, saving time and cost and later hauling charges.
4. Divers can work in confined areas and deeper depths than barges.
5. Its low profile makes it the most aquatic and eco-friendly system, yet is able to tackle some of the toughest projects.



Above the Water

Because it uses no heavy equipment, it has an extremely low footprint to the aquatic vegetation on the banks of ponds, and surrounding, fine, landscaped areas. A 4-6 inch hose enters the aquatic area that the divers use to enter and exit the system. Only footprints are left behind.



Sediment Disposal Options

Open Pits

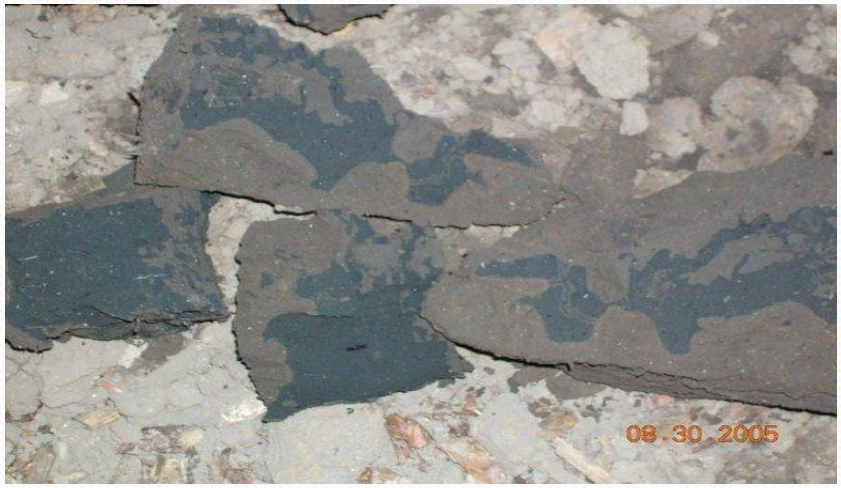
Wooded Depressions and Flat, Level Fields

Other Disposal Options - Silt Containers

- Silt containers are polypropylene strands, woven into a 40-grain sieve and are used in developed, rural areas where room is limited. A container 30’ x 100’ can hold up to 1,600 liquid cubic yards.

After Sediments Have Hard-Dried

- After drying, the containers and material can be hauled off site.
- Or, graded in place to be sodded or seeded over, avoiding hauling charges.



Sediment Options Where Room is Very Limited

- Where there are no fields or room for containers, roll-off dumpsters can be used. They are limited to the volume of cubic yards and are rather expensive.
- Tank wagons are another option, but are limited to very small projects. They are not cost-effective, and are used for pump stations and small decorative ponds.

HOA – Downers Grove

Problem: Storm waters washed in thousands of yards of sediment and debris into this backyard pond.

Problem: Access of the property by mechanical equipment was limited by close houses and trees.

Problem: Deepest area of the pond was less than 6 inches of water.

HOA – Downers Grove

Solution: OSR Systems easily accessed the pond and started hydraulically removing the material.

HOA – Downers Grove

OSR Systems restored this pond to a depth of 7 feet without any damage to the property.

Estimated price for Mechanical Dredging: $45,000
OSR Systems Finished Cost: $20,280

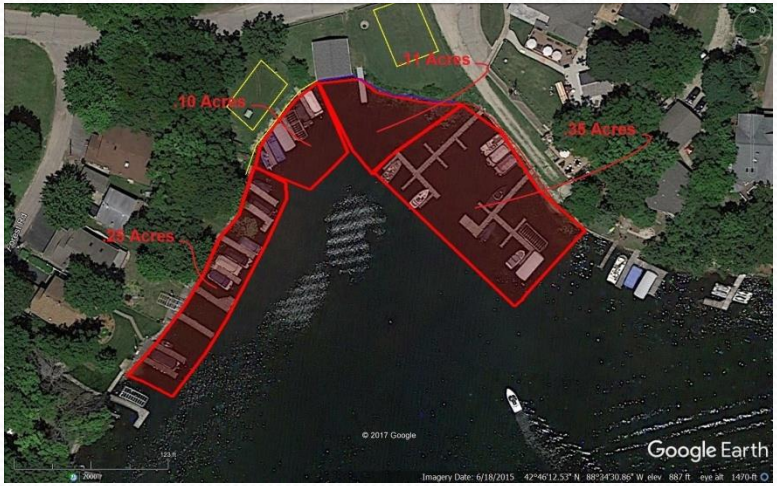
Lauderdale Lakes

Problem: Wave action and boat propellers pushed sediment into the harbor.

Problem: Lauderdale Lakes Fire and Rescue could not get there boats out into the lake.

Problem: Restaurant customers could not dock their boats at the docks.

Problem: Lake homeowners could not get their boats into their slips.



Lauderdale Lakes

OSR Systems advantage:

- Operate during peak boating season
- Enter the boat house to remove sediment
- Remove sediment under and between boat slips without their removal

Lauderdale Lakes

Home Owners Shoreline - Before

Home Owners Shoreline - After

Trout Ponds and Streams

McGraw Wildlife Foundation
- Buildup over time resulted in fish kills.

Christy Brook
- Bridge washed out sending 1,600 Cu.Yds of sand downstream.

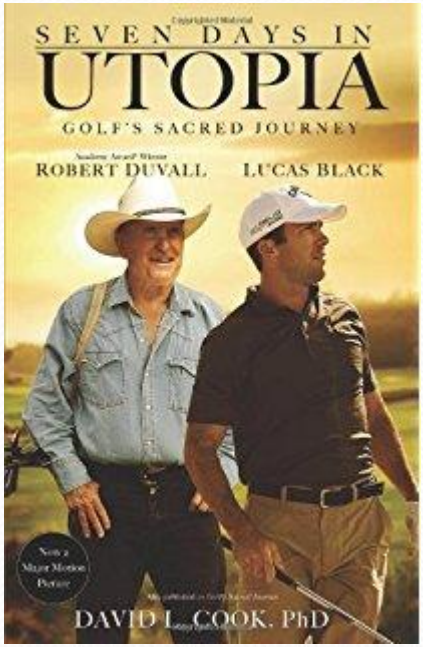
Trout Valley HOA
- Series of floods filled in 50% of the ponds capacity.

Minnesota Trout Farms
- Hundreds of thousands of fish contributed to the build up of fish waste.

Christy Brook

Trout Ponds and Streams

Sabinal River – Utopia, Texas



Private Home Owner

- Cattails collecting erosion
- 1.5’ of eroded sand buildup
- 1’ – 3’ of sediment buildup
- Excessive vegetation buildup
  - Sabinal River Video

Sabinal River – Utopia, Texas

Sabinal River – Utopia, Texas

[After video] Sabinal River, Utopia TX\Sabinal - N - S During.MP4

End of Presentation