Natural Lake Restoration™

Maple Lake South Basin & Turtle Bay Aeration Options

May 2010

Contents

- About Lake Savers
- The Lake Savers Approach…
  Natural Lake Restoration™ Methods
- Results
- System Design and Proposal for Maple Lake South Basin & Turtle Bay as Pilot Programs

About Lake Savers…

Mission:

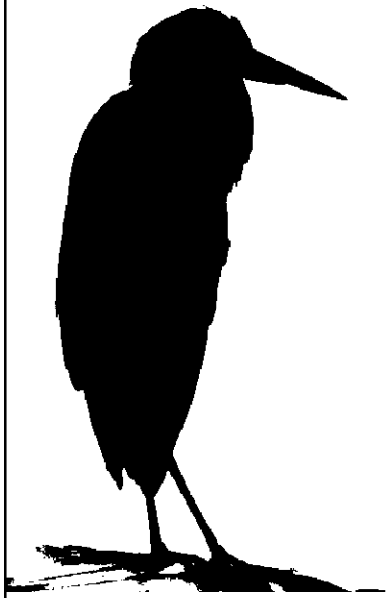
To deliver *ACTIONABLE* strategies to restore lakes to a balanced, pristine condition for the benefit of current stakeholders and future generations.

Lake Savers

Natural Lake Restoration™

Natural Methods for Lake Restoration

The Four Key Points Guiding Natural Lake Restoration™



1. **Most water bodies are overfed and out of balance.**
2. **Conventional strategies are primarily people management strategies not lake management strategies.**
3. **Nutrient reduction *(Internal & External)* is the only sustainable approach to Lake Restoration.**
4. **Lakes Need to Breath to Be Healthy!**

The Reality

Fact:

Most lakes are receiving more nutrients *(primarily, Phosphorus and/or Nitrogen)* than they can handle to stay in balance.

As a result, most lakes/ponds are in a state of accelerated *"Eutrophication"* – a fancy word for an over-fed, rapidly deteriorating lake.

Sources of Excess Phosphorus

1 Pound of Phosphorus can produce 10,000 pounds of wet weeds and algae!

Source: State of Maine Dept. of Environmental Protection

So What?

- **20 fertilized acres puts 80 pounds of excess Phosphorus into a watershed.**

Food for 800,000 pounds of weeds and algae!

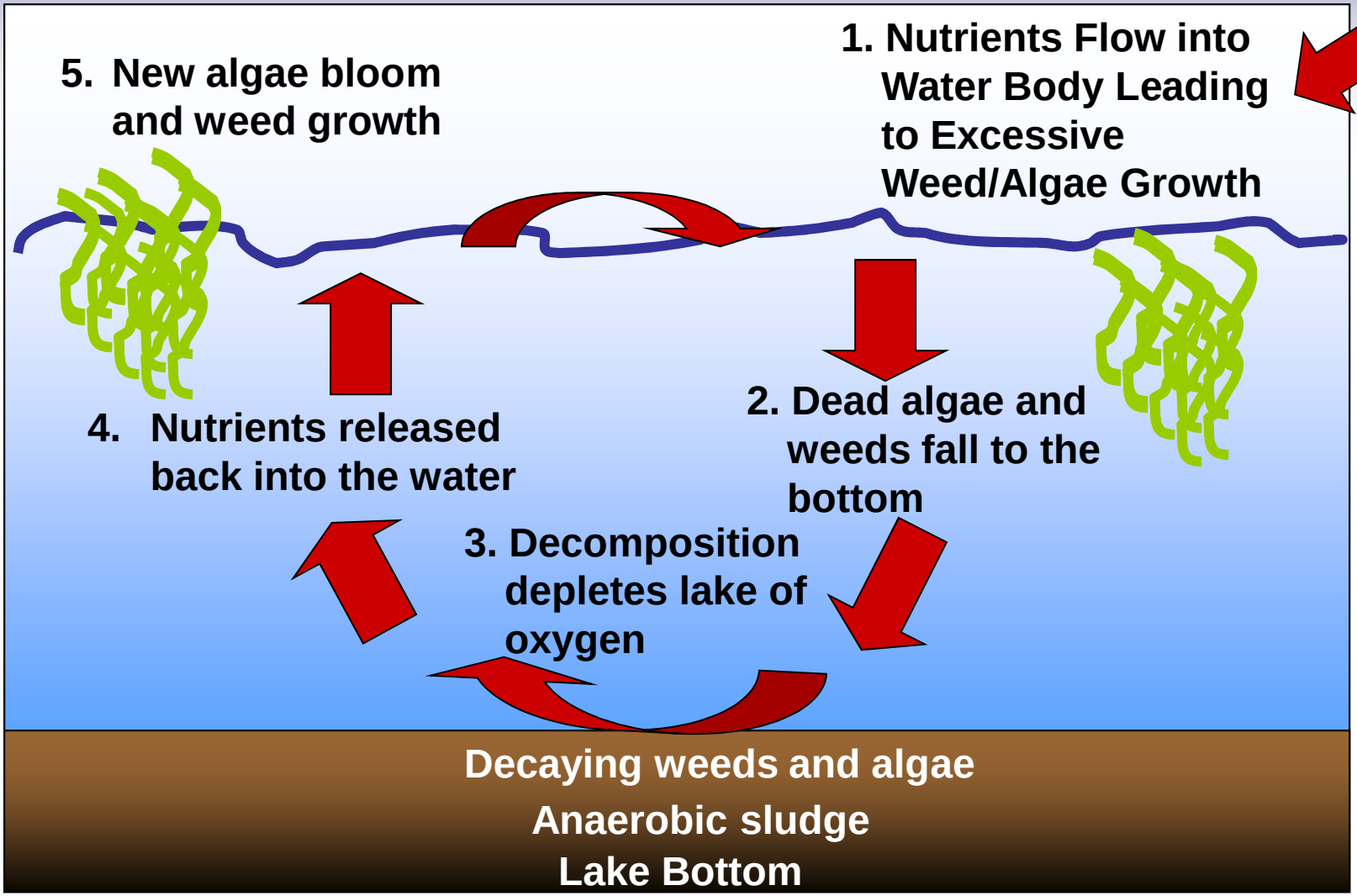
=

Dumping 300 Pick-Up Trucks into your water body!

Excess Nutrients…What's the Big Deal?

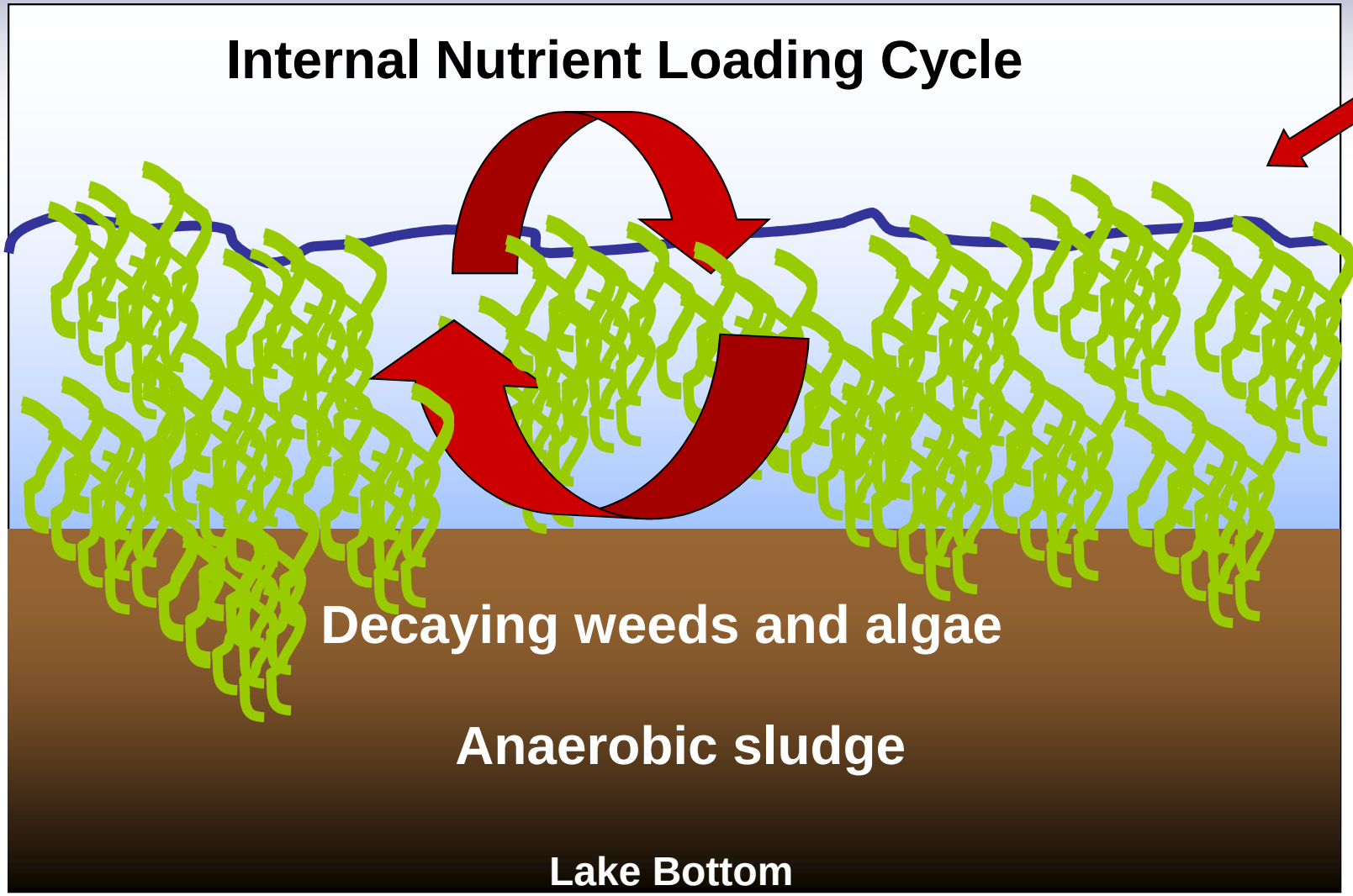
- **Phosphorus is typically the *limiting* nutrient that controls plant and algae growth inland waters. Nitrogen can be the limiting nutrient in some environments.**
- **Excess phosphorus/nitrogen means excess algae and weeds.**
- **Excess weeds and algae overwhelm a water bodies natural self-cleaning/renewal process.**
- **Water quality diminishes and the water body begins to literally die from overfeeding.**

Impact: Accelerated Eutrophication



Nutrient Reduction – The Key to Lake Restoration

Accelerated Eutrophication Cycle



Nutrient Reduction – The Key to Lake Restoration

The Importance of Dissolved Oxygen

Oxygen Depleted Lake

1. When oxygen runs out at the lake bottom phosphorus can release from the sediments and feed weed growth and algae blooms.
2. Anaerobic bacteria take over producing ammonia, methane and hydrogen sulfide.
3. Organic muck accumulation accelerates.
4. Fish Can't feed at the bottom *(where most of the food is)* – stunting, fish kills possible, rough fish begin to outcompete desirable species.

Oxygen Rich Lake

1. In the presence of oxygen Phosphorus stays locked in the sediments unavailable to weeds and algae.
2. Aerobic bacteria thrive forming a healthy bottom environment and base for the aquatic food chain.
3. Aerobic bacteria literally eat muck/organics converting it to carbon dioxide and water.
4. Fish can feed all the way to the bottom creating a healthy fishery both in size and population of desirable species.

Lakes Need To Breathe To Be Healthy!!!

Our Approach – Attack the Root Causes!

External nutrient loading

FLOATING ISLANDS

Internal nutrient loading

ENGINEERED AERATION & BENEFICIAL BACTERIA/ ENZYME TREATMENT

Oxygen Depletion

Lake Savers: A Diet & Exercise Program for Lakes!

Floating Islands for Reducing External Nutrient Loading

What are Floating Islands?

- **Porous mats made of a matrix of 100% recycled polyester and bonded together with a high grade marine foam for buoyancy.**
- **Highly flexible system with a multitude of design options for aesthetic and functional impact.**

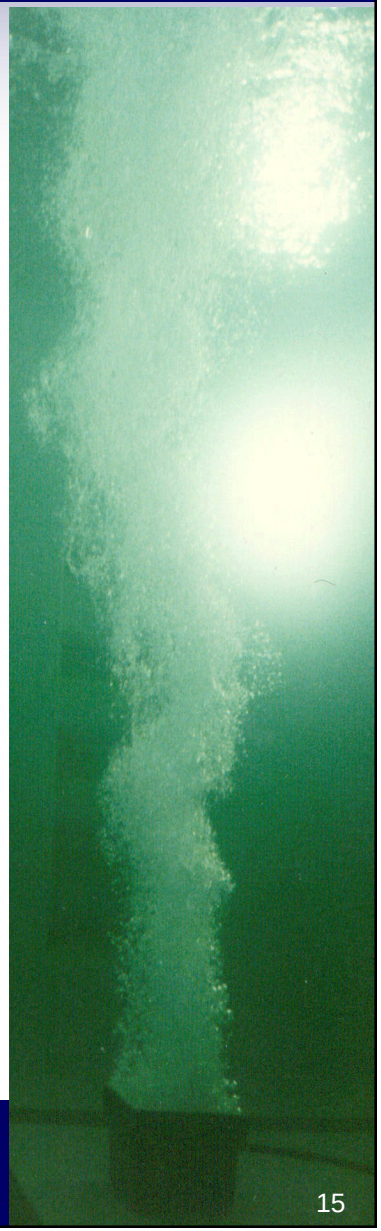
How do Floating Islands Work?

- **They create a self-contained environment for vegetation that can absorb significant amounts of nutrients from the water.**
- **They mimic natural wetlands at a much lower cost than reclaiming upland areas and converting them to wetlands.**
- **They are most effective for Lake Restoration when used around storm drains and inlets to trap nutrients flowing into the lake.**

Engineered Aeration & Beneficial Bacteria/Enzyme Treatments

How Engineered Aeration & Beneficial Bacteria/Enzyme Treatments Work

- **A system of underwater air diffusers connected to shore-based compressor units by self-sinking airline.**
- **Each system is custom engineered based on the specific needs and requirements of each lake.**
- **Water picks-up oxygen at the surface and is circulated back to the bottom maintaining a continuous supply of oxygen throughout the entire water column.**
- **High oxygen levels and "off-gassing" reduce nutrient levels, reducing weed and algae growth.**
- **Beneficial bacteria and enzyme products are added to restore balance to the aquatic eco-system.**
- **Beneficial bacteria that require oxygen, literally eat the organic muck on the bottom.**



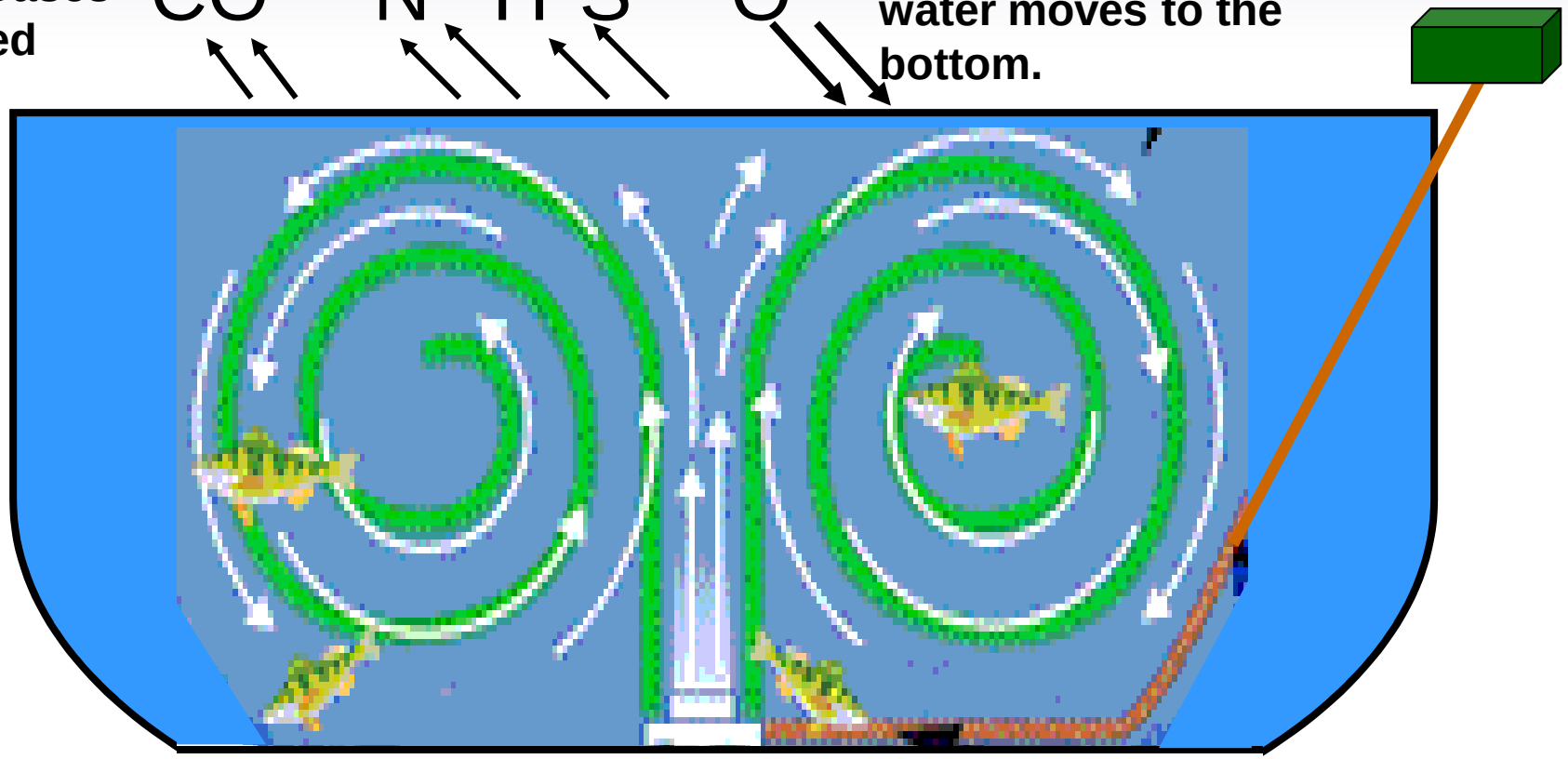
Lakes Need To Breathe To Be Healthy!!!

How Engineered Aeration Restores Lake Health & Balance

Toxic Gases removed

CO^2 N H^2S O^2

Oxygenated surface water moves to the bottom.



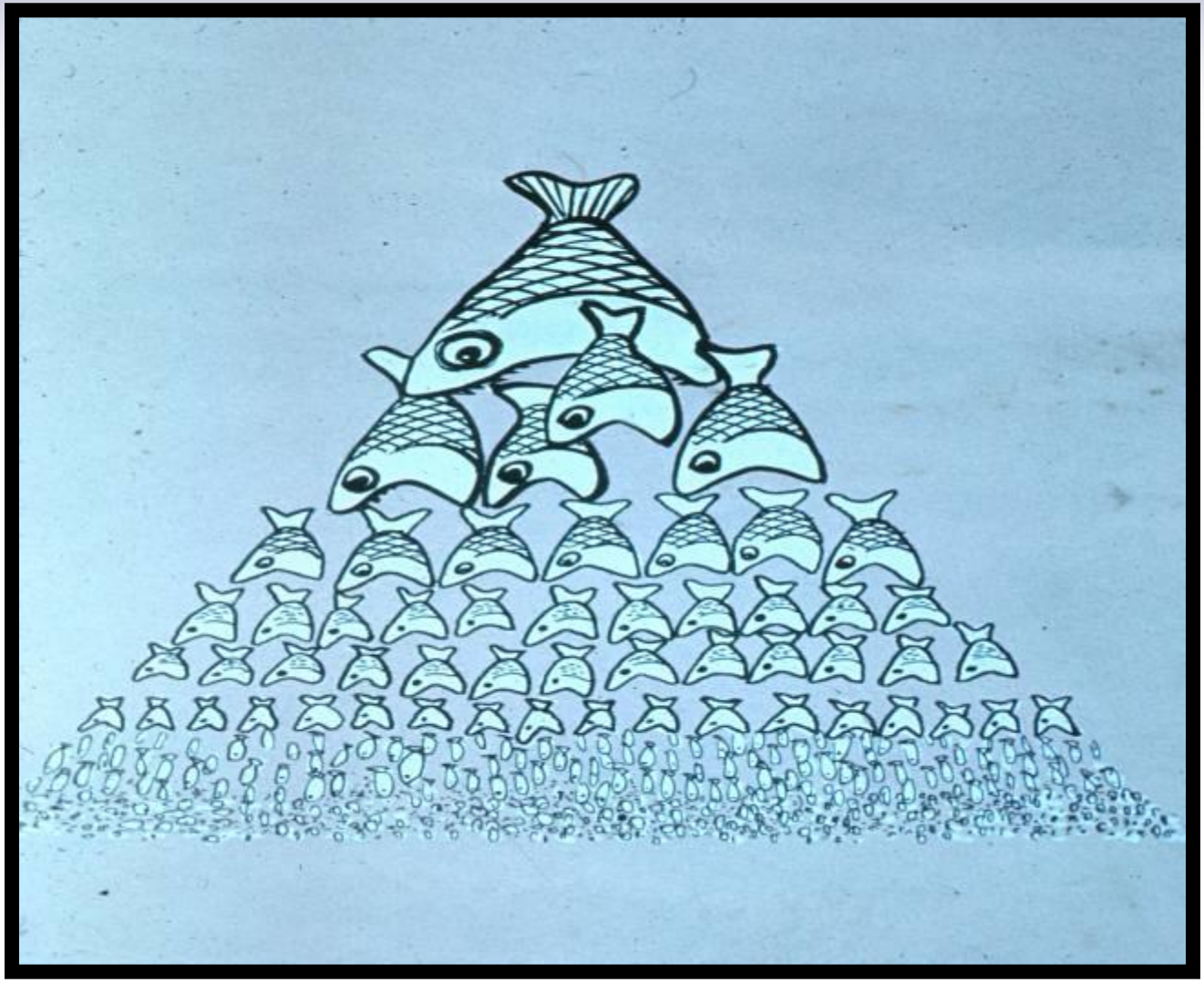
Aerobic benthic bacteria break down organics

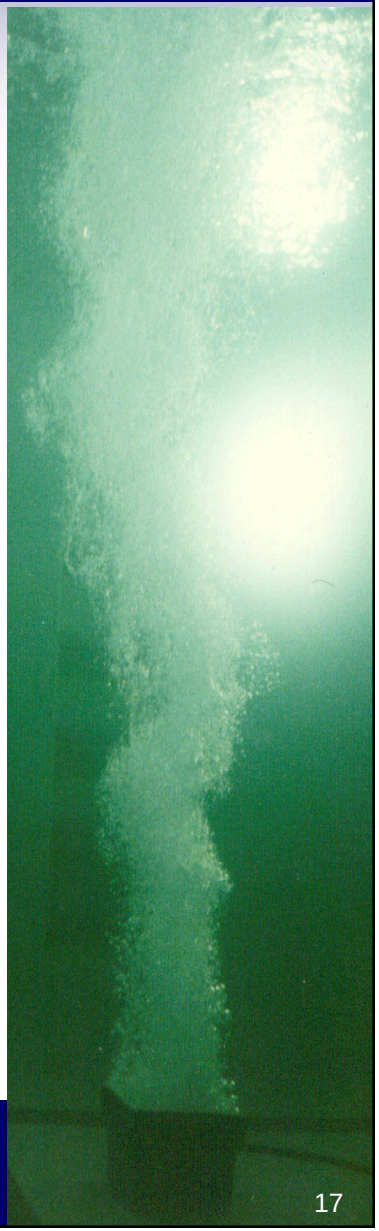
Phosphorus stays locked in sediment

Nutrients removed through the food chain

Lakes Need To Breathe To Be Healthy!!!

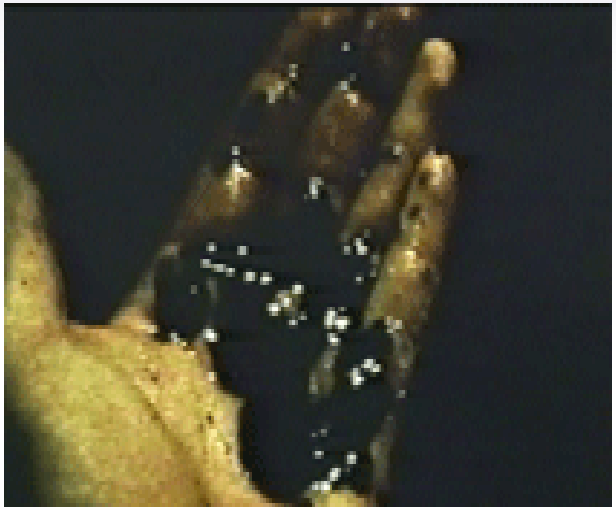
Accelerating a Lake's Natural Cleaning Mechanism



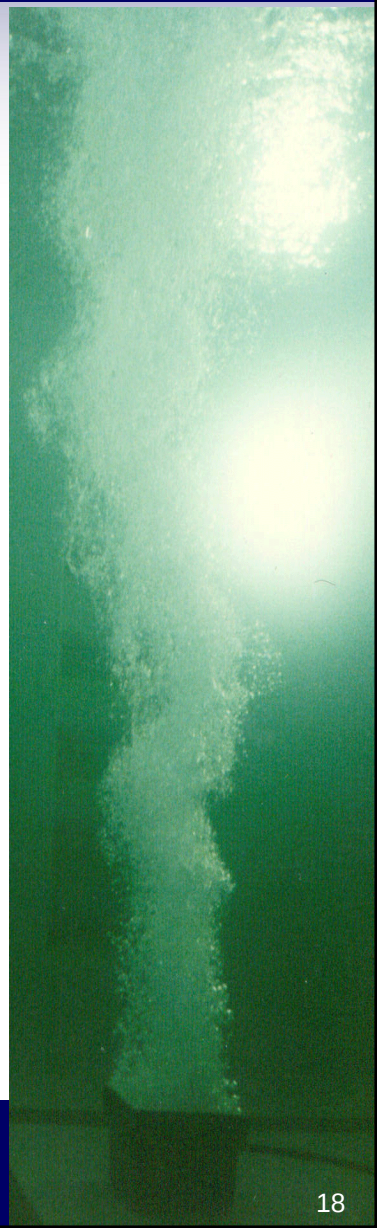


Lakes Need To Breathe To Be Healthy!!!

The Power of Engineered Aeration & Beneficial Bacteria/Enzyme Treatment



2 feet of organic muck prior to treatment



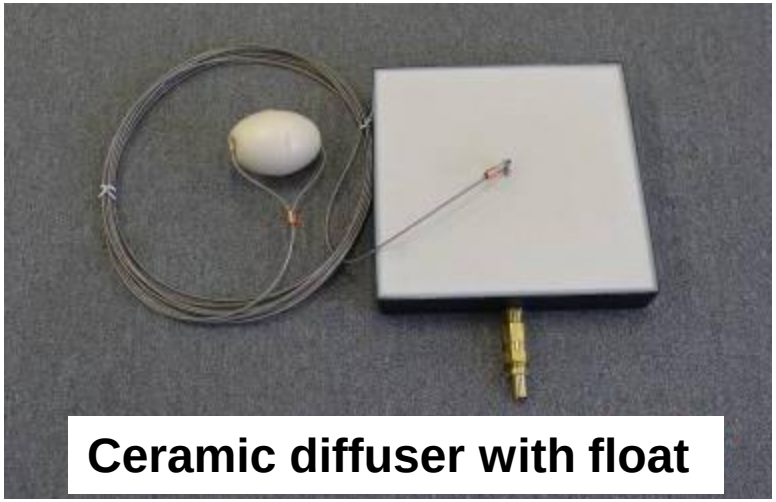
Aerobic bacteria can breakdown organic muck 30 times faster than anaerobic bacteria.

Lake Savers: A Diet & Exercise Program for Lakes!

CLEAN-FLO…
Engineered Aeration Equipment

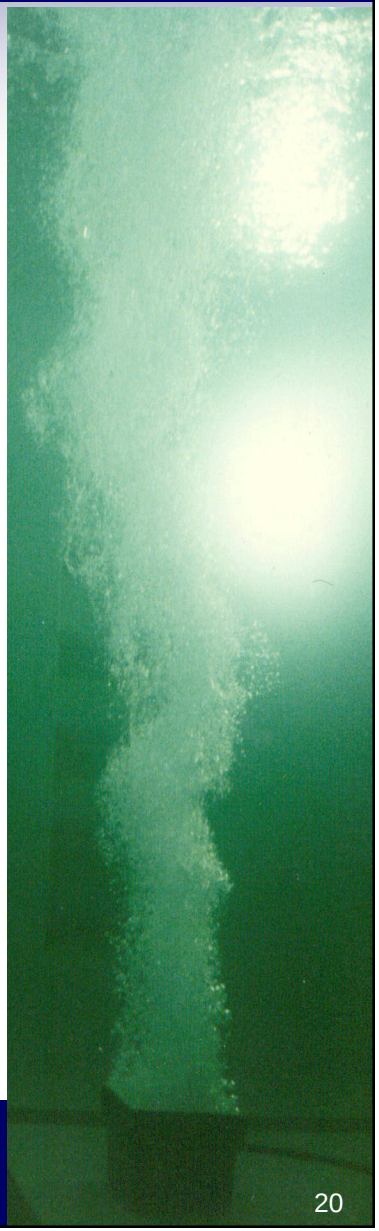
Small System

Very Large System



Ceramic diffuser with float

CLEAN-FLO…
Engineered Aeration in Action



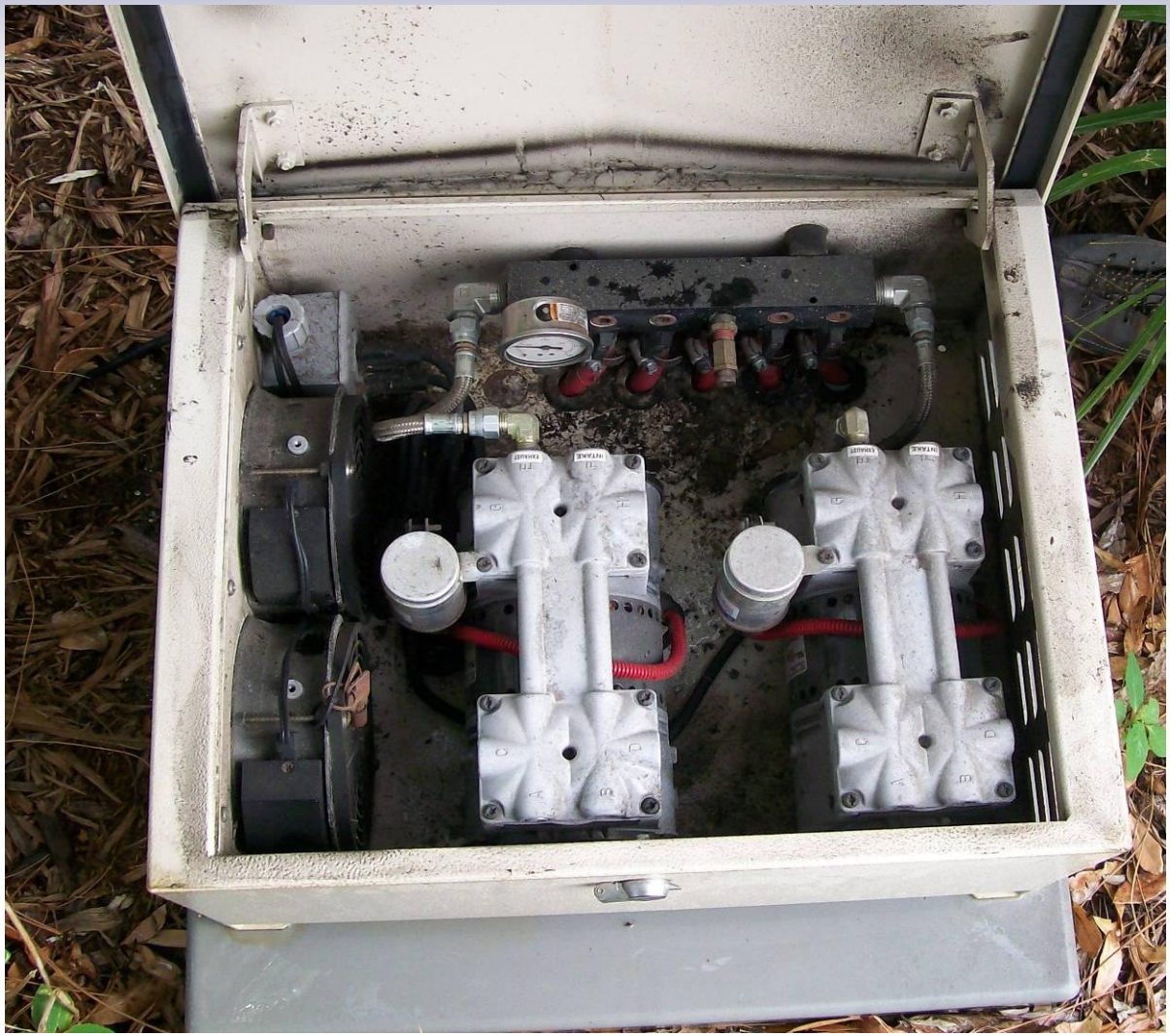
Lake Savers: A Diet & Exercise Program for Lakes!

CLEAN-FLO…
Engineered Aeration in Action

The CLEAN-FLO/Lake Savers Difference

Inside of a compressor cabinet after one year in operation under Lake Savers Management Program

The CLEAN-FLO/Lake Savers Difference



Competitor's system after 6 months operation

The Lake Savers /Clean-Flo Advantage – Aeration Engineered from Top to Bottom

1. A Custom Engineered Design

- **Every body of water is different.**
- **Proper depths, dimensions and condition *make a difference.***
- **Every CLEAN-FLO System is custom engineered to fit your water body.**

2. Simply the Best Equipment

- **Ceramic *lifetime* diffusers…not rubber *temporary* diffusers**
- **Highest quality compressors that are repairable…not disposable**
- **The highest quality hose and cabinets available**
- **Proprietary bacteria and enzymes that eat muck… 24 hours a day, 7 days a week.**

Lakes Need To Breathe To Be Healthy!!!

The Lake Savers /Clean-Flo Advantage – Aeration Engineered from Top to Bottom

3. Engineered Energy Efficiency

- **The *right* air supply…why use 2hp when 1hp will do.**
- **Air lines that don't leak and breakdown over time.**
- **Electrical connections that match available power.**
- **The highest oxygen transfer per horsepower hour in the industry.**

4. Innovative Leasing/ Management Program Delivers Long-Term Results

- **Leasing option reduces upfront investment.**
- **Costs decrease over time.**
- **Lifetime maintenance and repair program ensures "as new" performance.**

Lakes Need To Breathe To Be Healthy!!!

Lake Savers

Management Strategies for Healthier Lakes

CLEAN-FLO *Engineered Aeration…*
What Results Are Possible?

Collins Lake
Scotia, New York

About the Lake

- 60 acre lake with public beach.
- Beach closed for two years due to fecal bacteria issue.
- Milfoil and pondweed growth out of control.
- Watershed management strategies and herbicide treatment were not producing adequate results.

Management Program

- One-time herbicide treatment for milfoil and pondweed (2006).
- Clean-Flo Engineered Aeration installed in June of 2006.
- Clean-Flo bacteria and enzyme treatment applied in July of 2006.

Results

- Beach opened in August of 2006, remained open all of 2007.
- No significant re-growth of milfoil or pondweed.
- Dissolved oxygen maintained throughout water column all winter despite shutting down the system for 3 months.
- Noticeable reduction in dead plant material and muck in 2007.

Collins Lake “Before” Pictures 2006

Collins Lake “After” Pictures 2008
(Similar View of the Lake)

Collins Lake “Before” Pictures 2006

Collins Lake “After” Pictures 2008
(Similar View of the Lake)

Collins Lake “After” Pictures 2008

Collins Lake “After” Pictures 2008

Willow Lake
Kalamazoo, Michigan

About the Lake

- 7 Acre lake/pond.
- Completely over-run with milfoil, filamentous algae, lily pads, and coontail

Management Program

- Clean-Flo System installed in June of 2007.
- One-time herbicide treatment for milfoil.
- Harvesting program for lily pads.
- Bacteria and Enzyme treatment applied in July of 2007.

Results

- Filamentous algae problem eliminated.
- No significant re-growth of milfoil.
- Coontail significantly reduced.
- Lily pads did grow back after harvesting, however, we are starting to see tubers “pop” to the surface.
- Clear signs of breakdown of organics in the lake.

Willow Lake “Before” Pictures June 18, 2007

Willow Lake "After" Pictures June 23, 2007 *(5 days after installation of the CLEAN-FLO System)*

Willow Lake May 15, 2007 (Last Year. Notice How bad the Lake looked)

Willow Lake May 12, 2008
(Just under One Year Later)

Sherman Lake Channel – Michigan

About the Lake

- **5 Acre Channel connected to 165 acre lake.**

Management Program

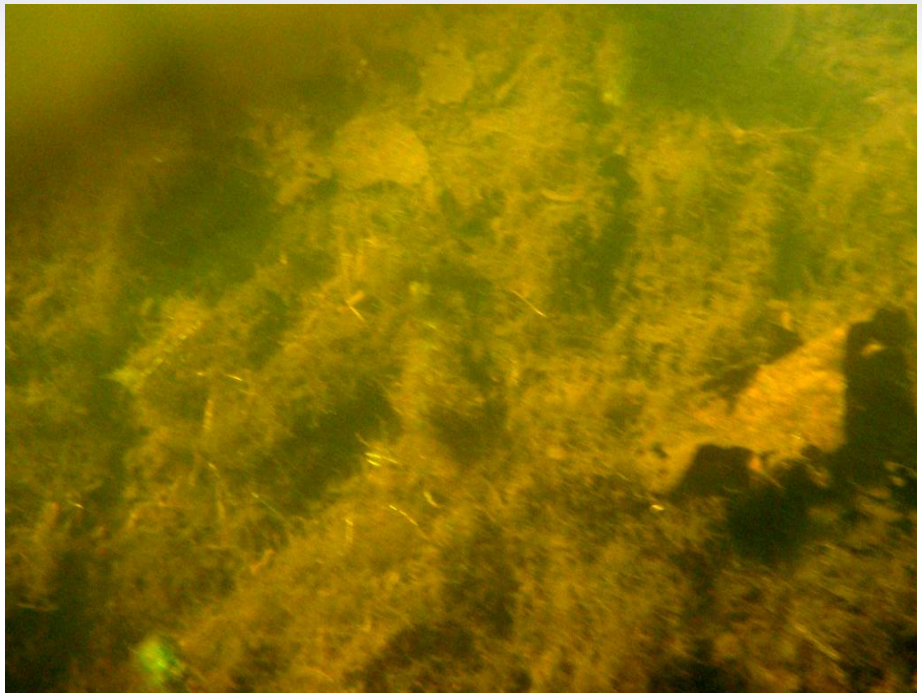
- **Clean-Flo Engineered Aeration installed with bacteria and enzyme treatment.**

Results

- **Significant reduction in weed density – Milfoil, Pondweed and Coontail**
- **Major improvement in water clarity from 1 – 2 feet to 6 feet**
- **Estimated 1 foot muck reduction from June to September 2008.**

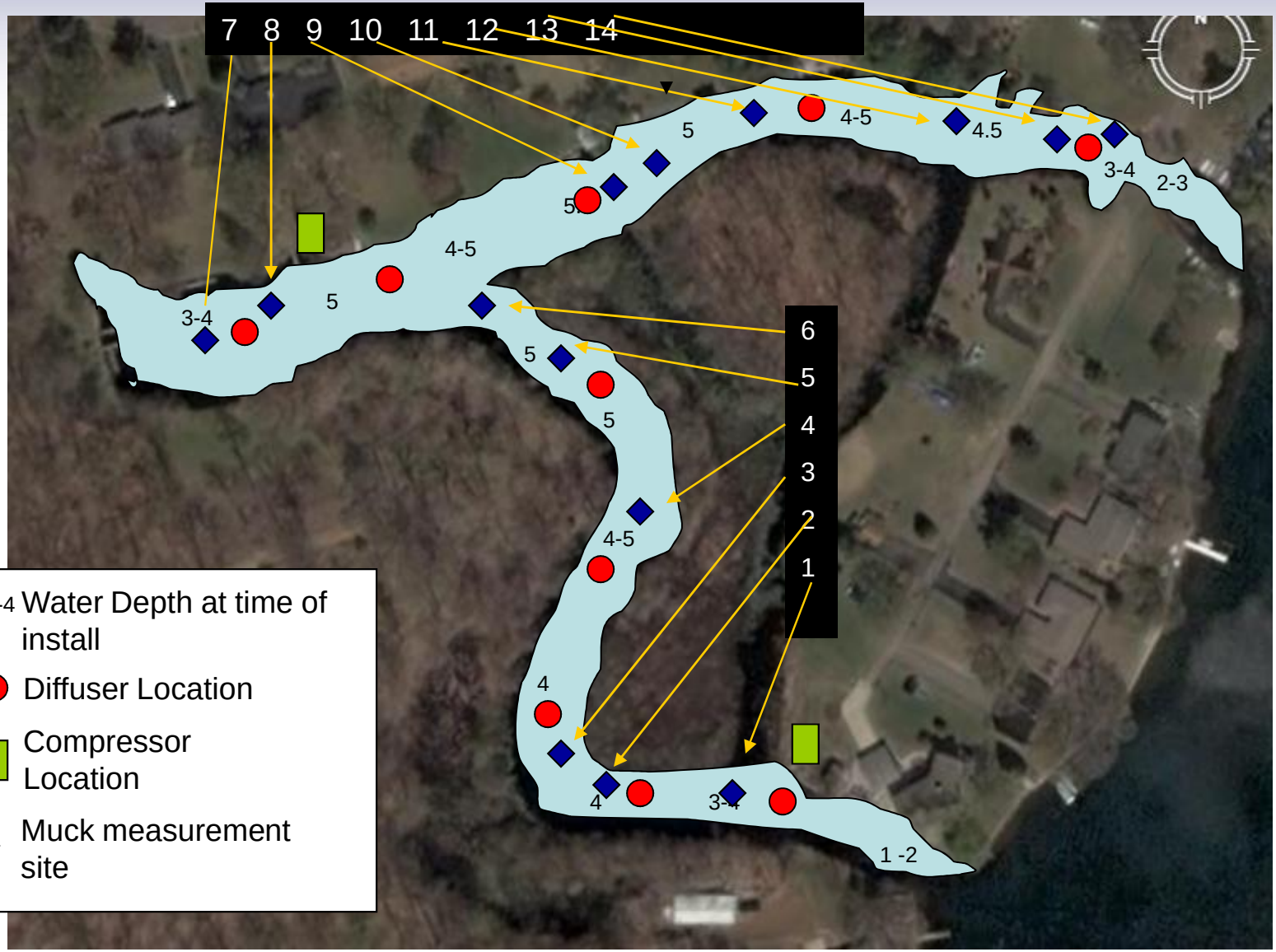
Sherman Lake Channel – Michigan

Aquatic Plant Growth near Channel (No – Clean-Flo diffuser) Notice: Very healthy Eurasian Watermilfoil Growth



Aquatic Plant Growth in Channel (with – Clean-Flo diffusers) Notice: Breakdown of Organic Matter from Decaying Aquatic Plants

CLEAN-FLO System Design for Sherman Lake Channel



Sherman Lake Channel Muck Assessment

Site	Muck Depth August 2, 2008
1	6’
2	4’4”
3	5’7”
4	3’4”
5	2’6”
6	2’0”
7	6’6”
8	2’9”
9	4’3”
10	4”5”
11	2’2”
12	3’0”
13	3’11”
14	6’2”

- **6” to 12” of muck reduction in one season is a conservative estimate based on water depth changes and informal muck depth testing at time of install in June 2008.**
- **Average water depth increased for 3 – 4 feet to 5 – 6 feet. The section of the channel between points 6 & 9 is 7 feet deep.**
- **There were no areas in the channel where you could probe and find the “hard bottom” less than 3 feet from the top of the muck.**

Lake Powai, India

About the Lake

- 500+ acre lake in India.
- Hydrilla and Water Hyacinth had taken over the lake.
- Lake heavily polluted from watershed

Management Program

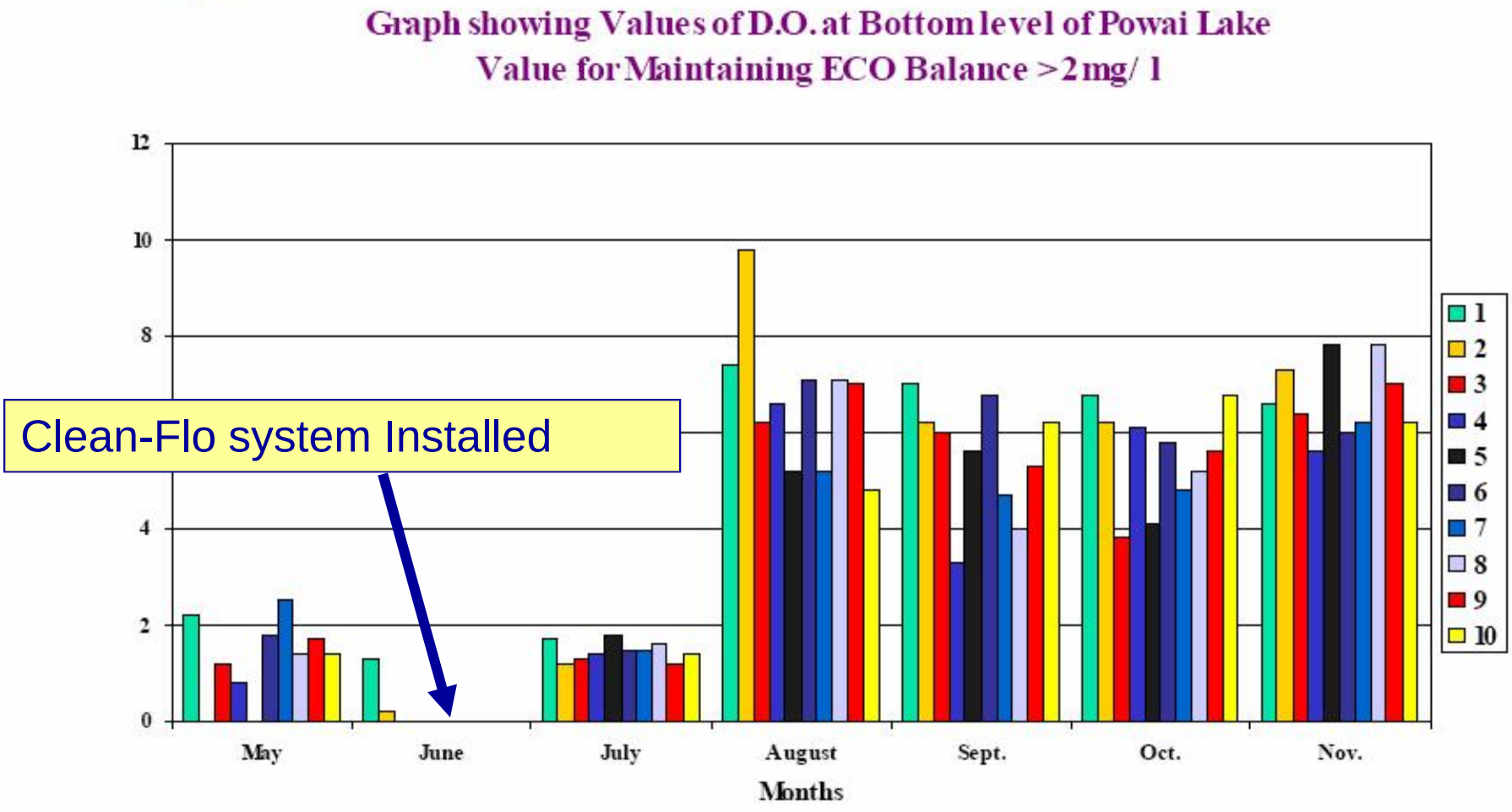
- Clean-Flo Engineered Aeration installed with bacteria and enzyme treatment.
- Harvesting program initiated to reduce Water Hyacinth.

Results

- Nutrient levels in the lake reduced by 90% in the first year.
- Hydrilla and Water Hyacinth reduced to non-nuisance levels.
- Significant improvement in all water quality indicators.

Lake Powai, India – Results

Dissolved Oxygen at Bottom



Lake Powai, India – Results

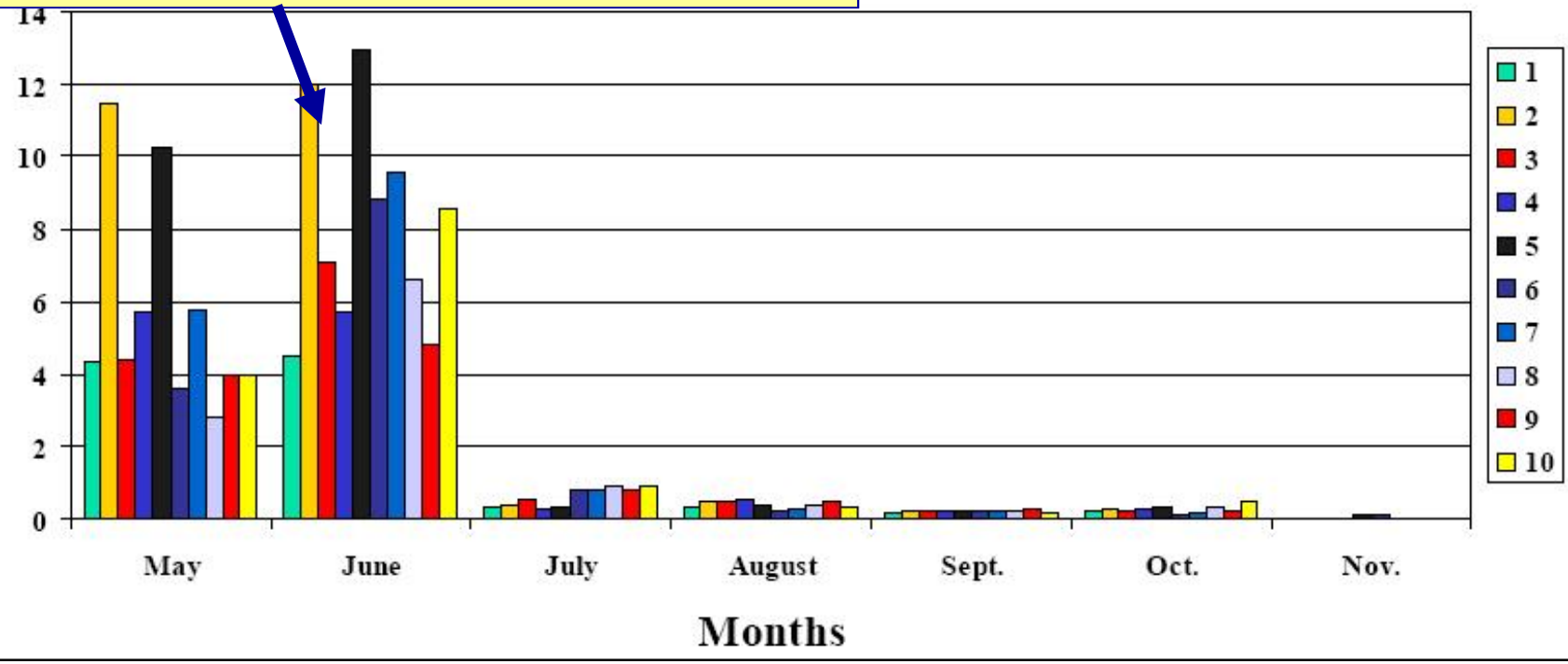
Phosphorus at Bottom

Graph showing Values of Phosphates at Bottom level of Powai Lake

Value for Maintaining ECO Balance 10-35mg/m^3

(values in table are in mg/l)

CLEAN-FLO system Installed



CLEAN-FLO System Anticipating Questions and Concerns

- **Will the system create a safety hazard for boats?**
  - **No, there is nothing at the surface of the lake. The diffusers and airline are located on the lake bottom.**
- **Will the system create a safety hazard for swimmers?**
  - **No, the diffuser boils are very gentle and do not pose a hazard for swimmers.**
- **Will the system harm the lake in any way?**
  - **No, the system is simply putting air into the water. The bacteria and enzyme products used do not even require DEQ Permit Approval – unlike herbicides.**
- **Will the system deplete the lake entirely of plants and algae?**
  - **No, the system will gradually bring the lake back into a healthy balance of aquatic vegetation.**
- **Will the system harm fish and other wildlife?**
  - **No, fish benefit as will the entire food chain in the lake.**

Lake Savers

Management Strategies for Healthier Lakes

System Design & Proposal For Maple Lake South Basin

Objectives for Maple Lake South Basin

- **Increase depth through the reduction of organic muck on the bottom.**
- **Bring excessive weed and algae growth under control, while reducing/eliminating the need for aquatic herbicides *(this may be a "stretch goal" given the amount of nutrients entering from the watershed).***
- **Improve water quality and clarity eliminating septic conditions that can develop in the summer months.**

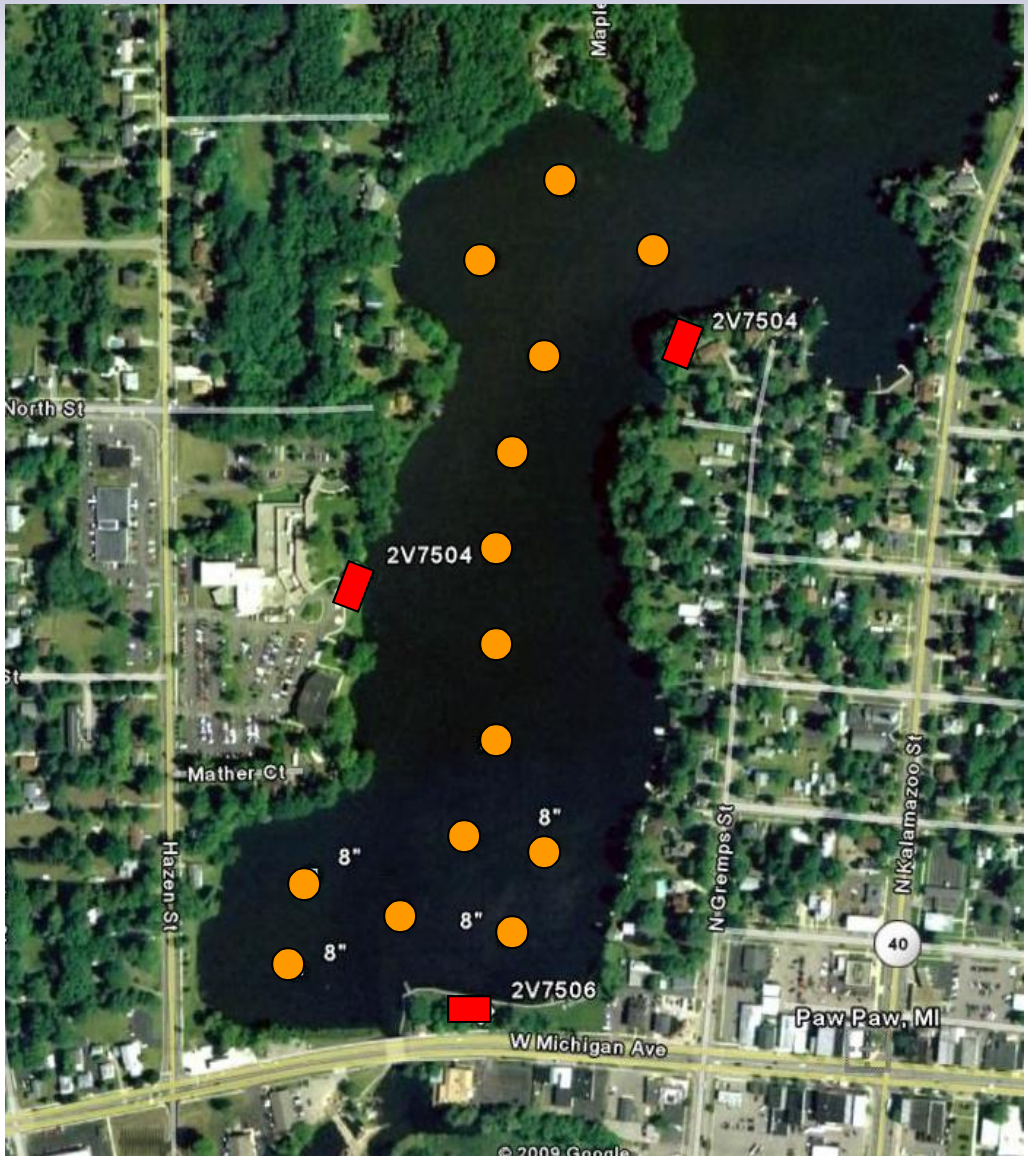
Clean-Flo System Components for Maple Lake South Basin

System Components:

- **Six 3/4 HP Rotary Vane Compressors**
- **Four 8” and Ten 12” Micro-Porous Ceramic Diffusers**
- **7000 feet of self-sinking airline**
- **Three Durable, Insulated Fiberglass Cabinets with Cooling Fans for Rotary Vane Compressors and all required fittings for all systems,**
- **Three sound insulating covers.**
- **Beneficial Bacteria and Enzyme Treatment for Year One:**
  - **100 Gallons of Clean & Clear Enzymes (catalyst for muck reduction)**
  - **100 lbs of C-Flo Bacteria (muck & nutrient reduction)**

*** All additives are certified as zero toxicity.**

Clean-Flo System Design For Maple Lake South Basin



Compressor Location – Clean-Flo Standard Cabinet (not to scale it will be much smaller)

Diffusers placed on the bottom (not to scale they will be much smaller)

Leasing Proposal for Maple Lake South Basin

Installation: **$2,700**

Shipping: **$1,000 *(Estimated)***

System Leasing:

- **Years 1 – 5** **$13,750 per year**
- **Years 6 – 10** **$11,700 per year***
- **Years 10+** **$9,675 per year***

* **Does not include inflation adjustment every 2 years. Buy-out option available after year 10.**

Includes:

- **System Maintenance and performance monitoring**
- **FULL replacement/repair of equipment at no additional cost. *(Exceptions for vandalism/negligence, lightning strikes/power surge, fire and storm damage/flooding.)***
- **Bacteria and enzyme treatment for year one**

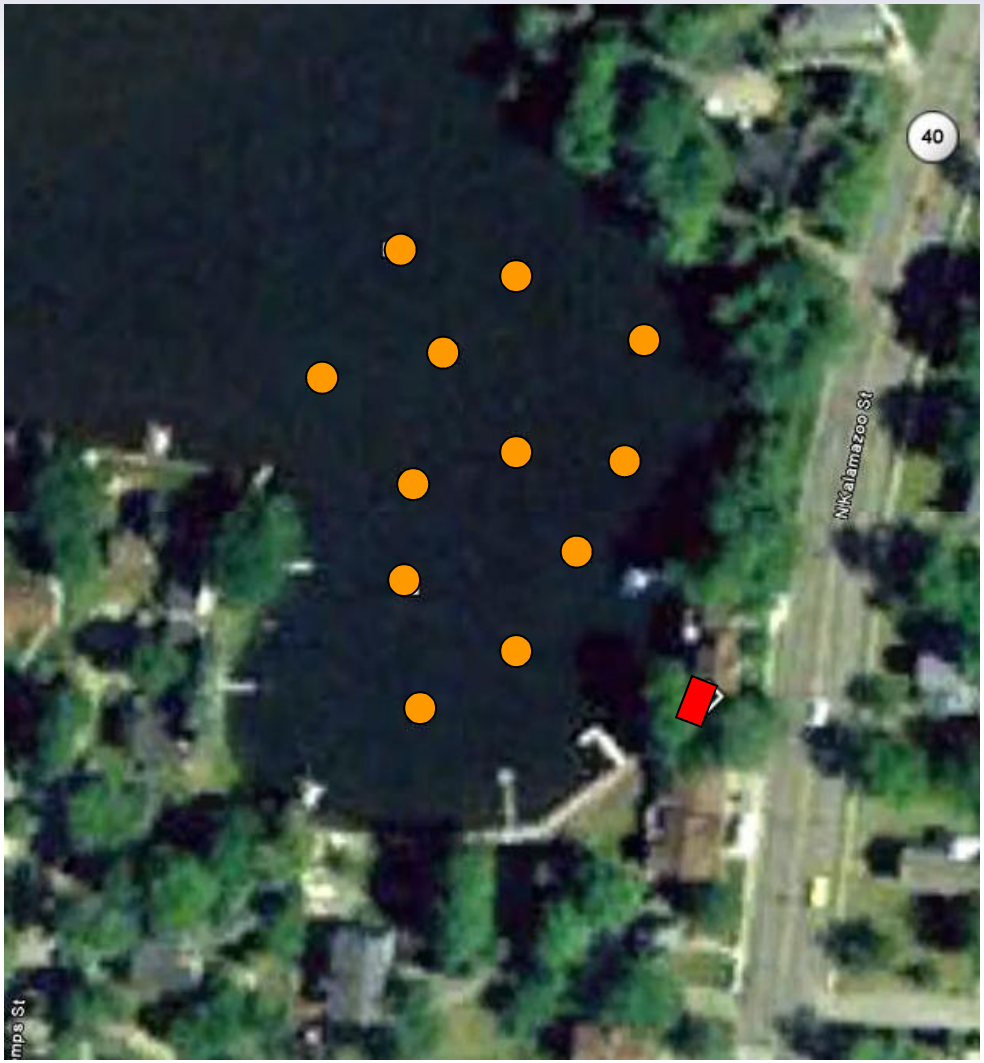
Clean-Flo System Components for Maple Lake Turtle Bay

System Components:

- **Two 1 HP Rotary Vane Compressors**
- **Twelve 8” Micro-Porous Ceramic Diffusers**
- **3100 feet of self-sinking airline**
- **One Durable, Insulated Fiberglass Cabinets with Cooling Fans for Rotary Vane Compressors and all required fittings for all systems,**
- **One sound insulating covers.**
- **Beneficial Bacteria and Enzyme Treatment for Year One:**
  - **12 Gallons of Lake Clear Bacteria (algae and muck reduction)**
  - **10 lbs of C-Flo 6 Bacteria (nutrient reduction)**
  - **3 Gallons of Clean & Clear Enzymes (catalyst for muck reduction)**
  - **3 lbs of C-Flo Bacteria (muck & nutrient reduction)**

*** All additives are certified as zero toxicity.**

Clean-Flo System Design For Maple Lake Turtle Bay



Compressor Location – Clean-Flo Standard Cabinet (not to scale it will be much smaller)

Diffusers placed on the bottom (not to scale they will be much smaller)

Leasing Proposal for Maple Lake Turtle Bay

Installation: **$1,400**

Shipping: **$490 *(Estimated)***

System Leasing:

- **Years 1 – 5** **$4,725 per year**
- **Years 6 – 10** **$4025 per year***
- **Years 10+** **$3,250 per year***

* **Does not include inflation adjustment every 2 years. Buy-out option available after year 10.**

Includes:

- **System Maintenance and performance monitoring**
- **FULL replacement/repair of equipment at no additional cost. *(Exceptions for vandalism/negligence, lightning strikes/power surge, fire and storm damage/flooding.)***
- **Bacteria and enzyme treatment for year one**

Advantages of Leasing vs. Purchase of a Clean-Flo System

- **Lake Savers is responsible for ALL maintenance and repair. The leasing agreement includes strict performance criteria for maintaining the equipment in peak operating condition.**
- **The customer is not making a capital investment in equipment that sits outdoors and at the bottom of a lake 365 days a year.**
- **Under the leasing agreement the equipment is guaranteed to be working in "as new" condition for the life of the lease.**
- **Results and performance monitoring is included in the lease *(Muck reduction assessment, weed algae and water quality assessment)*.**
- **The leasing agreement offers an "out clause" after 30 months if the system is not delivering results as specified at lease inception.**

NOTE: Lake Savers will quote a purchase option with a minimum 4 year service contract if requested. Lake Savers will NOT sell a Clean-Flo System without a service contract.

Additional Costs

Other Costs:

- **Installation of Electrical service to compressor locations – customer responsibility.**

- **Electricity to power compressors – customer responsibility.** ***Estimated Annual Electricity Costs based on $.13 per kW-h.***

  - ***Year- Round Operation South Basin : $4,200/year***
  - ***Year-Round Operation Turtle Bay: $1,725/year***

- **Bacteria Treatment Costs beyond year one.**
  - **Additional treatments in future years may be required, however, many lakes do not require follow-up treatments.**

Lake Savers – Growth Path

2007

- Willow Lake Kalamazoo, MI – 8 acres
- Willowridge Lake , Kokomo, IN – 8 acres
- Sherman Lake Channel, Kalamazoo, MI – 5 acres

2008

- Lake Brown Kissimmee, FL – 60 acres
- Several additional ponds – 4 – 6 acres

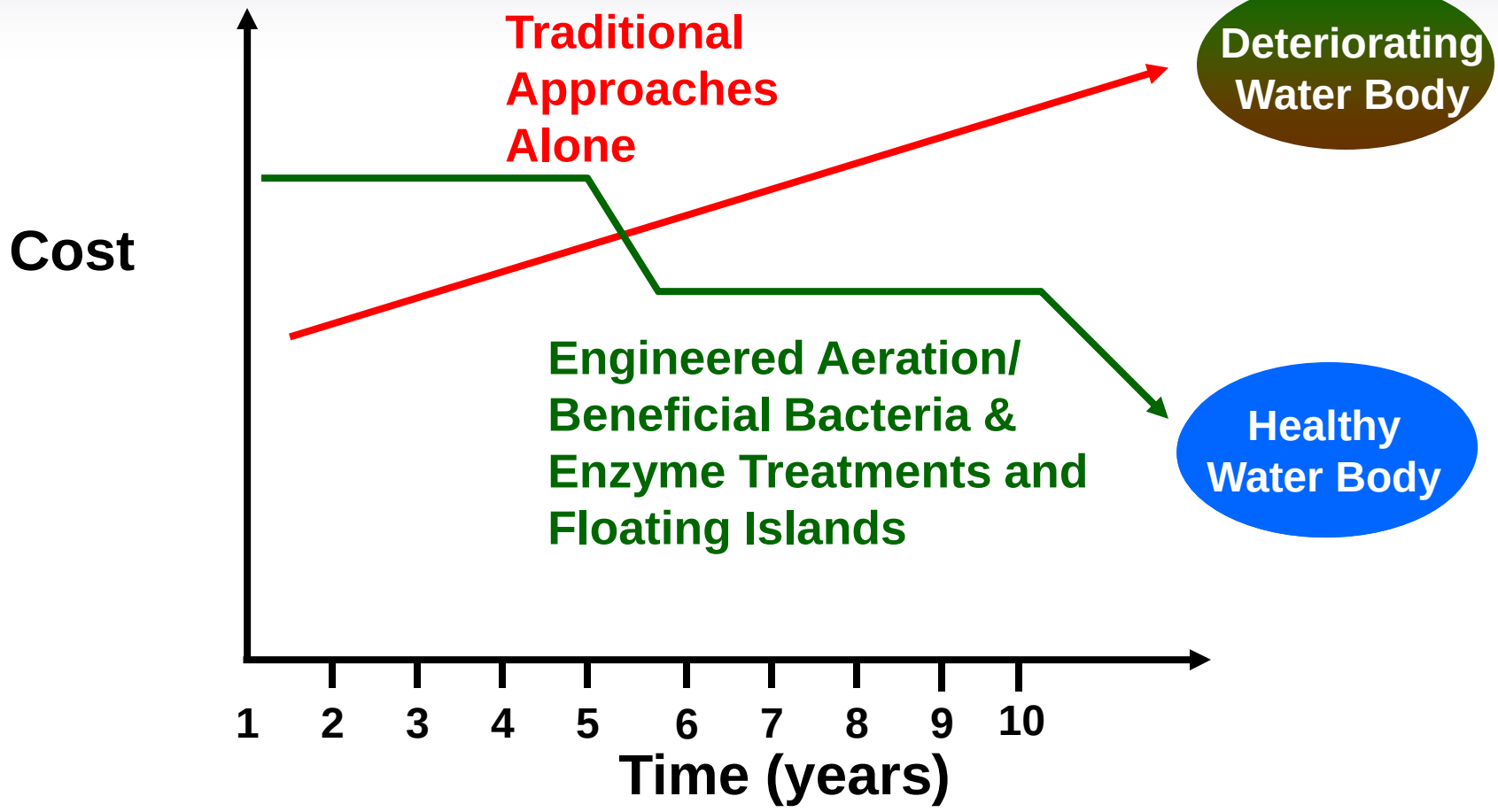
2009

- Turnberry Lakes – 100 acres
- Chippewa Lake (Channel) – 6 acres

2010 Scheduled Installs

- Lake Bridgeport Reservoir Fort Worth, Texas – 700+ acre treatment area
- Lake Benbrook Reservoir Fort Worth Texas – 800+ acre treatment area
- Indian Lake Dowagiac, MI – 86 acre treatment area
- Greenwood Lake Greenwood Lake, NY – 40 acre treatment area
- Upper Tarrytown Reservoir, Tarrytown, NY – 30 acres
- Sherman Lake Richland, MI – 165 acres

Why Lake Savers!!



Questions & Comments…

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