

THE STRATEGY OF RECREATIONAL SWIM POND MANAGEMENT

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WHAT MAKES A POND A “SWIM” POND

- HIGH WATER QUALITY
- DESIGNATED SAND BEACH ENTRY
- LOW FERTILITY WATER
- MINIMAL OR NO ALGAE/NUISANCE PLANT GROWTH
- DEFINED SHORELINE WITH DECORATIVE ROCKS OR EDGING
- MINIMAL FISH PRESENT (LARGEMOUTH BASS FOR LEECH/BUG REDUCTION)
- SWIM RAFTS AND INFLATABLES
- AQUATIC SAFE, E.P.A. APPROVED PRODUCTS USED IN MAINTENANCE (NO CHLORINE)



BENEFITS OF A SWIM POND

- SAFE SWIMMING ENVIRONMENT
- INCREASED SWIMMER CAPACITY COMPARED TO A STANDARD POOL
- BEACH FOR OUTSIDE WATER RELAXATION AND AMENITIES
- ENVIRONMENTALLY FRIENDLY
- LARGE INFLATABLES AND TOYS FOR MANY SWIMMERS TO USE
- MINIMAL TO NO PLANTS/ALGAE PRESENT
- IMPROVED WATER CLARITY AND QUALITY COMPARED TO NATURAL PONDS
- DESIGNED TO HAVE SHALLOW AREAS FOR YOUNGER CHILDREN (ZERO ENTRY)



CONSIDERATIONS OF HAVING A SWIM POND

- ROUTINE MAINTENANCE REQUIRED
- SIZE OF POND MUST ACCOMMODATE DESIRED SWIMMER CAPACITY (I.E. 50 SWIMMERS PER ACRE FOOT OF WATER)
- ANNUAL TO BI-ANNUAL DRAIN AND CLEAN OUT RECOMMENDED OF ALL MUCK/WATER
- POND MAX DEPTH MUST BE AT LEVELS TO ACCOMMODATE IMPROVED WATER QUALITY AND ALSO FOR INFLATABLE SAFETY
- WATER QUALITY TESTING MAY BE REQUIRED (E. COLI, FECAL COLIFORM, CYANOTOXINS)



BLUE-GREEN/CYANOBACTERIA ALGAE

- WHAT CAN CAUSE THESE BLOOMS?

- WATER TEMPS ABOVE 75°F
- PHOSPHORUS LEVELS ABOVE 0.03PPM
- LONG PERIODS WITHOUT RAIN

- WHY AN ISSUE?

- REDUCES WATER CLARITY
- CAN PRODUCE CYANOTOXINS
 - DERMAL TOXINS (SKIN IRRITATION, RASHES)
 - GASTROINTESTINAL TOXINS (NAUSEA, VOMITING)
 - EYE IRRITANTS
- REDUCES SWIMMER INTEREST IN POND
- CAN RESULT IN NEGATIVE REVIEWS OF POND

- HOW DO YOU MONITOR?

- JAR TEST

- [HTTPS://WWW.PCA.STATE.MN.US/SITES/DEFAULT/FILES/WQ-SWM1-04.PDF](https://www.pca.state.mn.us/sites/default/files/WQ-SWM1-04.pdf)

- WEEKLY TESTING OF WATER CLARITY (SECCHI DISK)

- ROUTINE WATER QUALITY TESTING

- CHLOROPHYLL A
- ORTHO-PHOSPHATE
- NITRATE/NITRITE

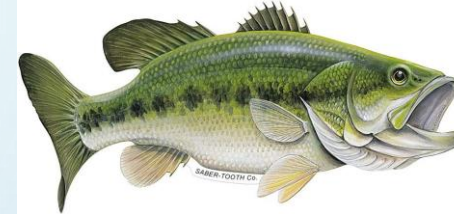
- BI-WEEKLY MONITORING FROM A BIOLOGIST



SWIMMERS ITCH AND LEECH MANAGEMENT

- CHEMICAL TREATMENT PROTOCOL

- EARTH-TEC PRIMARY PRODUCT FOR CONTROL
- APPLIED AT LOW-DOSAGE RATES THROUGHOUT EXTENDED PERIODS OF TIME
- FORMULATED TO ORIGINALLY CONTROL QUAGGA AND ZEBRA MUSSELS
- KILLS THE HOST OF THE PARASITE CAUSING THE SWIMMERS ITCH
- ABLE TO KILL LEECH POPULATIONS WITHOUT THE HARMFUL RESIDUAL THAT COPPER SULFATE CAN HAVE ON A POND



- FISHERY MANAGEMENT PROTOCOL

- INTRODUCTORY OF PREDATORY FISH CAN REDUCE POPULATIONS
- LARGEMOUTH BASS PREFERRED
- RECOMMENDED TO HAVE MINIMUM OF 1-4 BASS PER HALF ACRE OF WATER
- RECOMMENDED TO PULL FISH OUT DURING DRAW DOWN PERIODS
- CAN ALSO HELP REDUCE FROG, ROUGH FISH, AND BUG POPULATIONS

INTEGRATED POND MANAGEMENT TECHNIQUES

- WHAT WATER TREATMENT TECHNIQUES ARE USED FOR SWIM POND MANAGEMENT?
 - ALGAECIDE AND HERBICIDE APPLICATIONS
 - BACTERIA AND ENZYME APPLICATIONS
 - FLOCULANTS AND POLYMERS
 - POND COLORANTS
 - AERATION SYSTEMS
 - METERING/BIO-FEED SYSTEMS
 - ULTRASOUND UNITS
- WHAT PHYSICAL MANAGEMENT METHODS CAN BE USED?
 - DRAWDOWN
 - WASHING/VACUUMING
 - BEACH REDRESSING



ALGAECIDES/HERBICIDES

- ALL PRODUCTS MUST BE APPROVED FOR AQUATIC USE
- DNR NR107 PERMIT MUST BE APPLIED FOR PRIOR TO APPLYING PRODUCTS
- DATCP CATEGORY 5.0 COMMERCIAL LICENSE AND CERTIFICATION REQUIRED FOR APPLICATORS APPLYING PRODUCTS
- TYPES OF ALGAECIDES/HERBICIDES
 - CHELATED COPPERS
 - WEAK ACID HERBICIDES/ALGAECIDES
 - OXIDIZING ALGAECIDES



BACTERIA AND ENZYMES

- WHY BACTERIA AND ENZYMES?

- SAFE AND NATURAL PRODUCTS
- REDUCE NUTRIENTS IN PONDS
- REDUCE MUCK AND SUSPENDED SOLIDS
- APPLIED AS A LIQUID, POWDER, OR PELLET
- ENZYMES SPEED UP DECOMPOSITION PROCESS
- CAN BE APPLIED BEFORE, DURING, AND AFTER OF AN ALGAECIDE APPLICATION

- TYPES OF BACTERIA/ENZYMES

- WATER CLARITY BACTERIA
- SEDIMENT REDUCING BACTERIA
- WATER QUALITY ENZYMES



FLOCULANTS AND POLYMERS

- FLOCULANTS

- DNR NR109 PERMIT
- MULTIPLE USES
- NOT A PERMANENT SOLUTION
- CAN BE INJECTED
- RECOMMENDED APPLICATION TIMES
 - AFTER POND FILLS IN SPRING
 - MID-SEASON (JUNE/JULY)
 - POST-SEASON IN FALL

- POLYMERS

- FIRST UTILIZED FOR STREAM RESTORATION BELOW PAPER MILLS
- REMOVES NUTRIENTS AND SOLIDS
- USED WITH AERATION SYSTEMS



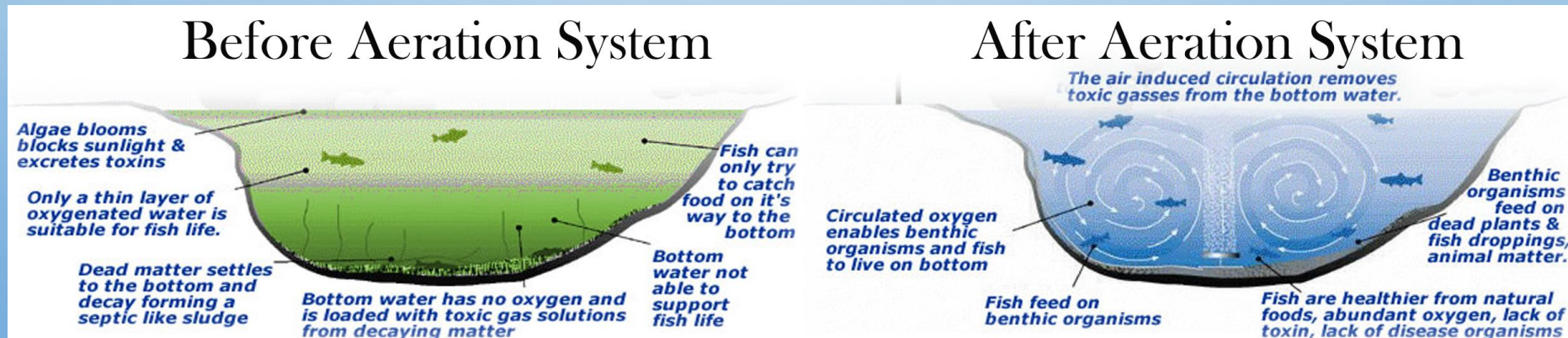
POND COLORANTS

- WHAT DO POND COLORANTS DO?
 - IMPROVE AESTHETICS
 - REDUCE POND GROWTH (*E.P.A. REGISTERED DYES ONLY*)
 - CREATE CARIBBEAN APPEARANCE
- HOW OFTEN SHOULD YOU DYE A POND?
- WHAT COLORS ARE AVAILABLE?



AERATION

- WHY AERATION?
 - REDUCES STAGNATION OF POND
 - PREVENTS STRATIFICATION IN POND
 - IMPROVES AEROBIC ACTIVITY OF BENEFICIAL BACTERIA
 - DISRUPTS PLANKTONIC ALGAL SPECIES BIOLOGICAL ACTIVITY WHEN RUN AT NIGHT (TIMER REQUIRED)
 - ALLOWS FOR OTHER MANAGEMENT APPROACHES TO BE UTILIZED (SEE BELOW)
- AERATION OTHER USES
 - USED TO MIX AND CIRCULATE PRODUCTS
 - REDUCE WATER TEMPERATURES
 - PRODUCTS ATTACHED TO FURTHER AID IN WATER QUALITY



METERING SYSTEMS

- BENEFITS OF METERING SYSTEMS
 - ALLOWS DAILY APPLICATION TO POND
 - MAINTAINS BACTERIA POPULATION
 - PREVENTS BACTERIA POPULATION CRASHES
 - REDUCES IN POND TREATMENTS
- WHAT CAN BE METERED?
 - ALGAECIDES
 - FLOCULANTS
 - BACTERIA
 - ENZYMES
 - POND COLORANTS



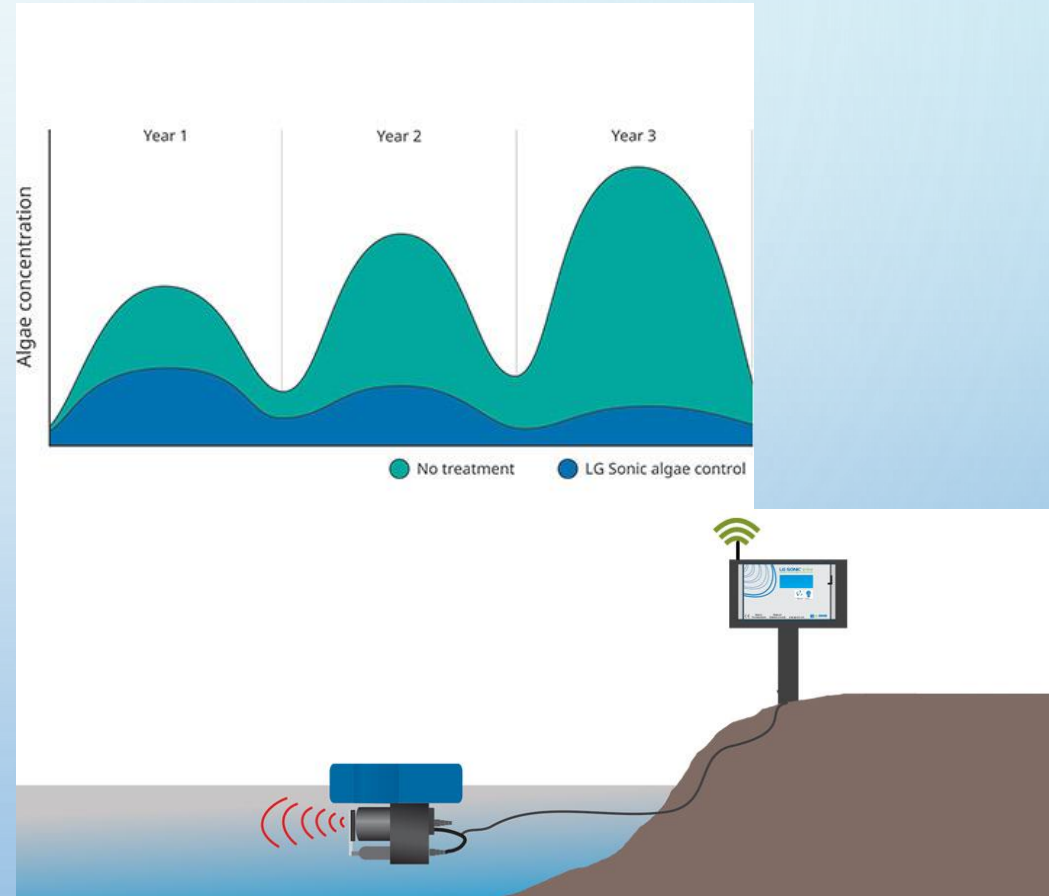
ULTRASOUND UNITS

- HOW ULTRASOUND WORKS

- CREATES AN ULTRASONIC PRESSURE IN THE TOP LAYER OF WATER ACTING AS A BARRIER TO THE SURFACE
- THIS BARRIER PREVENTS MANY PLANKTONIC SPECIES FROM REACHING THE SURFACE TO ABSORB LIGHT FOR PHOTOSYNTHESIS
- WHEN PHOTOSYNTHESIS IS NOT ACHIEVED THE ALGAE CELL DIES, BUT DOES NOT RELEASE ANY CYANOTOXINS

- IS IT SAFE?

- YES!



PHYSICAL MANAGEMENT METHODS

- DRAWDOWN

- TYPICALLY COMPLETED IN FALL
- WATER LEVEL DRAWN DOWN TO BELOW ROCK/SAND SHELF OR TO REMOVE WATER ENTIRELY
- HELPS BLEACH SAND/ROCKS, AND KILL SOME ALGAL SPECIES
- RE-FILLING COMPLETED IN SPRING

- WASHING/VACUUMING

- CLEANOUT OF ORGANIC BUILDUP
- REDUCE NUTRIENT LOAD FOR FUTURE
- REMOVE BREEDING SITE FOR LEECHES
- MAINTAIN A SUPERIOR WATER QUALITY AND CLARITY ANNUALLY

- BEACH RE-DRESSING

- KEEP WATER CLEAR BY REMOVING ORGANIC BUILDUP
- REDUCED NUTRIENT LOAD GOING INTO FOLLOWING SEASON
- KEEP SAND AESTHETICALLY PLEASING AND REDUCES COMPACTION
- REMOVE DORMANT ALGAE AND BACTERIA SPECIES



WATER QUALITY TESTING

- WHAT DO WE SAMPLE FOR?
 - WATER CLARITY
 - SECCHI DISK
 - ORTHO AND TOTAL PHOSPHORUS
 - TOTAL NITROGEN (NITRATE + NITRITE)
 - 10MG/L OF NITRATE IS WATER QUALITY THRESHOLD
 - KJEDLDAHL NITROGEN (ORG NITROGEN + AMMONIA)
 - DISSOLVED OXYGEN
 - WATER TEMPERATURE
 - PH



WATER QUALITY TESTING (CONT.)

- WHAT SHOULD YOU BE TESTING FOR
 - WATER CLARITY
 - SECCHI DISK
 - E. COLI (REQUIRED PER DNR BEACH MONITORING REQUIREMENT)
 - **ALL** BEACHES SHALL POST CLOSURE SIGNS WHENEVER THE LEVEL OF *E. COLI* IN THE BEACH WATER SAMPLE EXCEEDS 1000 CFU/100ML.
 - BUCKET/JAR TEST
 - TEST TO INDICATE PRESENCE OF PLANKTONIC ALGAE IN WATER COLUMN



SWIMMER QUANTITY RECOMMENDATIONS

- WHAT HAS BEEN OBSERVED/FOUND SO FAR?
 - POND HEALTH DIRECTLY CORRELATES TO USAGE OF THE SWIM POND
 - HIGHER USAGE OF POND EQUALS A HIGHER POSSIBILITY OF ALGAE GROWTH
 - INCREASE IN NITROGEN THROUGH NITROGEN FIXATION CAUSES PLANKTONIC BLOOMS TO BE MORE COMMON
 - APPROXIMATELY 20 GALLONS OF URINE IN A 220,000 GALLON SWIM POND WHICH EQUATES TO WHICH EQUATES TO APPROX. 2 GALLONS OF PURE NITROGEN (NPR.ORG)
 - INITIAL RESULTS INDICATE A POSSIBLE THRESHOLD OF 50 SWIMMERS PER ACRE FOOT OF WATER (150 SWIMMERS/DAY IN ½ ACRE POND)
 - BEYOND THIS AMOUNT INCREASES CHANCE OF ALGAE GROWTH AND REDUCTION IN WATER QUALITY
- WHAT IS OUR NEXT STEP?
 - RESEARCH SWIMMER INFLUENCE ON WATER QUALITY
 - DETERMINE A SWIMMER TO POND SIZE RATIO
 - FINE TUNE PRODUCT RATES



ANNUAL MANAGEMENT TIMELINE

- **EARLY SPRING (APRIL)**

- RE-DRESS SAND
- FILL POND
- START AERATION SYSTEM
- ONCE POND HAS BEEN FILLED TO NORMAL WATER LEVEL, PERFORM INITIAL INSPECTION
- ATTACH POLYMER BLOCKS ABOVE EACH DIFFUSER
- FILL METERING SYSTEM CONTAINERS WITH LIQUID BACTERIA AND FLOCULANTS (IF APPLICABLE) AND SET INJECTION TIMES
- APPLY INITIAL POND COLORANT

- **LATE SPRING TO EARLY FALL (MAY-AUGUST)**

- BEGIN MONTHLY TO BIWEEKLY SCHEDULE TO MONITOR THE POND
- PERFORM ANY TREATMENTS AS NECESSARY (ALGAECIDES, HERBICIDES, BACTERIA, FLOCULANTS, ENZYMES)
- FILL METERING SYSTEMS
- MAINTAIN POND COLORANT CONCENTRATION
- PERFORM WEEKLY WATER TESTS (MONDAY MORNING RECOMMENDED)

- **EARLY TO MID-FALL (AUGUST-SEPTEMBER)**

- ONCE POND HAS BEEN CLOSED, BEGIN DRAW DOWN OF POND TO BELOW ROCK/SAND SHELF OR COMPLETELY PENDING GOAL
- PRIOR TO DRAW DOWN, TREAT ANY REMAINING ALGAE
- SHUT DOWN AERATION SYSTEM
- PRESSURE WASH AND/OR VACUUM POND BOTTOM TO REMOVE ORGANIC MATTER

SO....WHY A SWIM POND?

INCREASED REVENUE

REDUCED REGULATIONS

INCREASED CAMPER VOLUME

ENVIRONMENTALLY FRIENDLY

CUSTOMIZED FOR ANY LOCATION

“IN-WATER” ACTIVITIES

“ON THE WATER” SITES

BEACH AREA

SHALLOW ZONES FOR CHILDREN



QUESTIONS???

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