



SCAPMSNEWS

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July, 2023

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President's Message...

Dear Fellow South Carolina APMS Members,

First of all, I hope you and yours are having a safe and prosperous year. Although we had a slow start to the year, with the heavy rainfall in the spring and cooler weather as of late, the season is in full swing.

Secondly, on behalf of the board, I would like to thank all of you, our members, for your continued support. SCAPMS wouldn't be what it is today without your ongoing commitment, engagement and generosity.

This year the Annual South Carolina APMS Conference will be back at the Ocean Drive Beach and Golf Resort in Myrtle Beach, SC, October 9-11, 2023. This venue has been very accommodating for SCAPMS in the past, so it was an easy decision to bring the conference back for another year. Plus, we get to listen to our talented members sing karaoke down the street.



#SCAPMS



Every year we are always looking for new faces on the board. If you are interested in serving and would like to learn more about what is involved, feel free to contact myself or someone on the board.

I would like to thank the entire Board of Directors this year for their dedication to continuing the tradition and growth of the society. They are most certainly making my job easier.

Thank you for allowing me to represent the society as your president. I truly appreciate the support and encourage you to share any feedback and ideas you may have as we work diligently on this year's conference.

I look forward to seeing everyone in Myrtle Beach, SC!

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FREE MONEY!



The South Carolina Aquatic Plant Management Society is seeking applications for its annual Phillip M. Fields Scholarship Award.

The Society intends to award a \$5,000 scholarship to the successful applicant at the joint SCAPMS Annual Meeting in North Myrtle Beach, SC October 9th-11th. Scholarship funds are provided directly to the student and may be used by the recipient to cover costs associated with education and research expenses. Eligible applicants must be enrolled as full time undergraduate or graduate students in an accredited college or university in the United States. Course work or research in an area related to the biology, ecology or management of aquatic plants in the Southeast is also required.

Applications must be received no later than September 1, 2023 and will be evaluated on the basis of relevant test scores (ACT, SAT, GRE, etc.), college grades, quality and relevance of course work or research, a proposed budget, information obtained from references, and other related considerations. Other factors being equal, preference will be given to applicants enrolled in Southeastern and South Carolina academic institutions. The successful applicant may be requested to present an oral report on research activities at the annual meeting of the Society.

Application forms and additional information are available at www.scapms.org/scholarship.html. Note: All application information is to be submitted electronically.

Justin Nawrocki
SCAPMS Scholarship Chairman
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What are the Desired Oxygen Levels in Water and is Too Much Oxygen Bad? by Patrick Goodwin, Natural Lake Biosciences, OST

Oxygen is arguably the most important water quality parameter governing overall lake health. It's required to sustain aquatic life and is directly related to a multitude of water quality parameters and overall aesthetics. The US has national and state dissolved oxygen (DO) criteria for lakes, which are centered around maintaining the minimum amount of DO to sustain life. For example, the US national minimum DO criteria is 5 mg/L, with many states adopting this criterion (USEPA 1986). However, this minimum DO criteria is by no means the desired oxygen level for aquatic life or for overall lake water quality and aesthetics. If we are to assign the desired DO level to a water body, we must first define it based on its effect on a given parameter. Two definitions can be identified based on 1) aquatic life and 2) water quality and aesthetics, which are as follows:

Desired DO for aquatic life - is the level at which no production or impairment occurs across all life.

Desired DO for water quality and aesthetics – is the level at which the maximum reduction in pollutant(s) can be achieved that is not detrimental to aquatic life.

The desired DO (no production impairment) on aquatic life has been identified by the EPA 1986 publication and is 11 mg/L for salmonid waters (cold to cool water fisheries) and 8 mg/L for non-salmonid waters (warm water fisheries; Table 1). While 6.5 mg/L is where no production impairment occurs for non-salmonid water, it does not protect the invertebrates, and therefore 8 mg/L applies as the desired DO for non-salmonid waters.



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1. Dissolved Table oxygen concentrations (mg/L) in the water column versus the quantitative level of effect on aquatic life (modified from USEPA 1986)

Salmonid Waters

Embryo and Larval Stages

No production Impairment = 11
Slight Production Impairment = 9
Moderate Production Impairment = 8
Severe production Impairment = 7
Limit to Avoid Acute Mortality = 6

Other Life Stages

No production Impairment = 8
Slight Production Impairment = 6
Moderate Production Impairment = 5
Severe production Impairment = 4
Limit to Avoid Acute Mortality = 3

Non-salmonid Waters

Embryo and Larval Stages

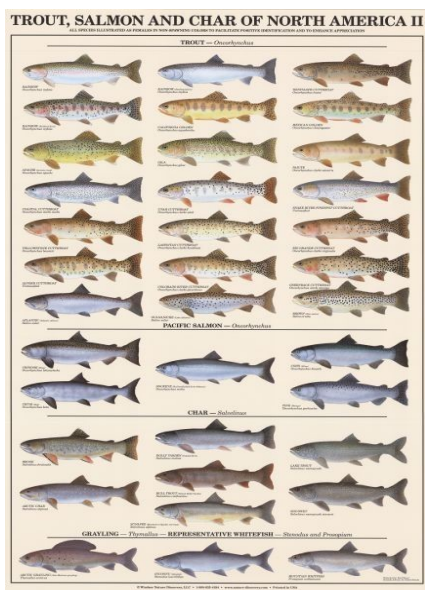
No production Impairment = 6.5
Slight Production Impairment = 5.5
Moderate Production Impairment = 5
Severe production Impairment = 4.5
Limit to Avoid Acute Mortality = 4

Other Life Stages

No production Impairment = 6
Slight Production Impairment = 5
Moderate Production Impairment = 5
Severe production Impairment = 4
Limit to Avoid Acute Mortality = 3

Invertebrates

No production Impairment = 8
Some production impairment = 5
Acute Mortality Limit = 4



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How does Hyperoxia Negatively Affect Aquatic Life?

The effects of low dissolved oxygen (hypoxia and anoxia) levels have been well documented and negatively affect all stages of aquatic life. The reverse, high dissolved oxygen or hyperoxia on the other hand is when oxygen levels go above 100% saturation at temperature and can occur naturally during high rates of photosynthesis, often seen during an algal bloom and/or from an oxygenation device. Hyperoxia can cause oxidative stress which is when more reactive oxygen species are being produced than what the organism can handle via its antioxidant system. Oxidative stress can be avoided by keeping oxygen levels < 25 mg/L (Colt 2006). Overall, the bulk of the evidence regarding hyperoxia and its impacts on aquatic life suggests it does not negatively impact fish growth or cause impairment (McArley et al. 2021). It may be of benefit as it can provide metabolic refuge during acute warming. This would reduce fish stress during less-than-ideal temperatures (McArley et al. 2021).

Does Hyperoxia Cause Gas Bubble Disease?

In short, no. Gas bubble disease (GBD) is the formation of bubbles inside a fish artery that will block blood flow and cause mortality. It is caused when the total gas concentration in water exceeds 100%. Only total gas concentrations can determine if there is a risk of GBD. For example, oxygen could be highly saturated (> 300 %), but if nitrogen is less than saturation, the total gas concentration may not exceed 100%. In fact, nitrogen is the most significant cause of gas bubble disease, not oxygen (Weitkamp and Katz 1980; USEPA 1986). Some examples of gas bubble disease occurrences are at hydropower dam spillways where atmospheric air is supersaturated into water. Air is primarily nitrogen (78%) which leads to the supersaturation of nitrogen and GBD. Aeration or nanobubble systems injecting atmospheric air (78% nitrogen) at high depths can be at risk of causing GBD. Oxygenation systems using pure oxygen (> 95% oxygen) as their gas supply do not pose a risk of GBD.





Desired DO for Water Quality and Aesthetics?

In general, the higher the oxygen level, the better the water quality and aesthetics. This is because a higher oxidative state drives better water chemistry and allows for more oxygen penetration downward into lake sediments, often the primary source of water quality issues in the first place. If we are to keep with the desired oxygen definition, the level at which the maximum reduction in pollutant(s) can be achieved that is not detrimental to aquatic life; then it would be between 15 – 25 mg/L DO, not exceeding 25 mg/L to not cause oxidative stress to aquatic life. This would provide the maximum water quality improvements and reduce/eliminate:

- Harmful Algae Blooms (HABs)
- Phosphorus re-cycling from the sediments
- Ammonification from sediments
- Metal like iron, manganese, and mercury re-cycling from the sediments
- Organic muck decomposition
- Taste and Odor
- Aesthetics water clarity and color
- Fecal Coliform

Colt, J. 2006. Water quality requirements for reuse systems. *Aquacultural Engineering* **34**: 143–156.

McArley, T. J., E. Sandblom, and N. A. Herbert. 2021. Fish and hyperoxia—From cardiorespiratory and biochemical adjustments to aquaculture and ecophysiology implications. *Fish and Fisheries* **22**: 324–355.

USEPA. 1986. Quality criteria for water 1986. EPA 440/5-86-001, US Environmental Protection Agency, Washington, DC.

Weitkamp, D. E., and M. Katz. 1980. A review of dissolved gas supersaturation literature. *Transactions of the American Fisheries Society* **109**: 659–702.



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AIRMAX

Airmax Aeration 2022 System Line-Up

Changes to the Airmax Aeration systems are the result of our commitment to quality through innovation, as well as feedback that we receive from our pros and distributors. Airmax products are developed by the pros, for the pros.

Upgraded Features:

- Upgraded 3 year warranty on all system compressors and electrical components
- All PS & LS systems now aerate to a max depth of 50 feet
- Quick-change fitting added to all PS & LS airflow manifolds for easy maintenance

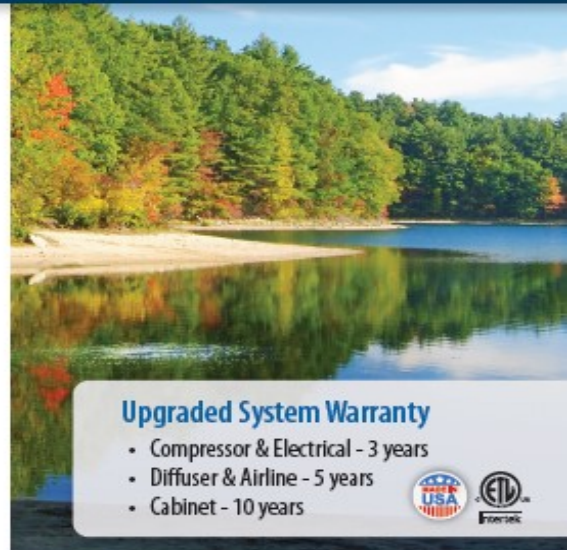
2022 System Line-Up Summarized

SHALLOW WATER®	POND SERIES®	LAKE SERIES®
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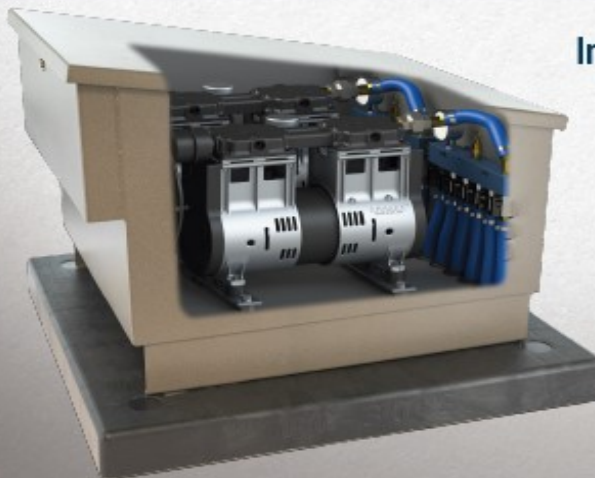
SW20HP, SW40HP, PS80, LS40, LS60 have been discontinued

Upgraded System Warranty

- Compressor & Electrical - 3 years
- Diffuser & Airline - 5 years
- Cabinet - 10 years



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Where are they now?

Sam Sardes has joined the UPL team as an Aquatics territory manager. Her territory covers the east coast, Florida all the way up to Maine. Sam has more than 10 years of experience in aquatic plant and algae management and has served in various roles including aquatics/wetland applicator, operations manager in lake management, research biologist, and most recently as the Weed Science Director at a lake management firm overseeing the aquatics program and water quality/algae laboratory. Her primary responsibilities with the lake management firm were training commercial applicators, conducting research and development, being a technical resource for colleagues, and overseeing a water quality laboratory. Sam has participated in and held various roles with national and regional aquatic plant & lake management societies. Currently, she is a director for FAPMS. In her free time, Sam enjoys reading, traveling to hike mountains around the world, and spending her time with family including three cats and a beagle.



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John Cortell

M&I Product Manager
Aquatics

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Irrigation is essential to the vast agricultural industry in the western United States. Since 2001, Cygnnet has assisted irrigation districts and other municipal agencies with aquatic weed and algae control in their canals and water conveyance systems. Our team of professionals offers on-site support in the following areas:

- Plant and algae identification
- Canal dye studies
- Product and rate recommendations
- Application and equipment assistance
- Pre and post application surveying
- Group training events



Customer Service

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Industry Support and Stewardship

- Cygnnet is a leader for industry support
- We work with government entities, industry societies, nonprofits, communities and lake managers across the nation to better the industry and make a difference to improve our water resources from a local level all the way to the national level
 - Cygnnet recycles tens of thousands of pounds of used pesticide containers on an annual basis to prevent them from ending up in landfills



Aquatic Resource Management

Our expertise focuses on aquatic plant management and conservation of all water resources. Managing water bodies is a complicated process, we can assist in development and implementation of an effective plan that is specifically designed for each water body. Please reach out to one of our experts for more information.



Cygnnet Team

Cygnnet employs an experienced and knowledgeable staff that strives for outstanding customer service:

- On-staff biologists
- Former professional lake managers
- Over 200 years of combined experience and first-hand knowledge

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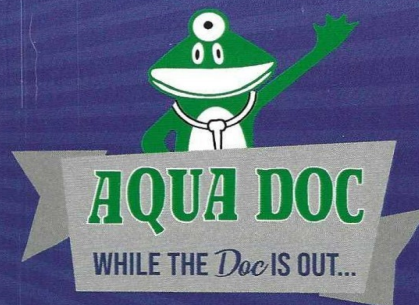
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BIOFILM OR Algae?

Problem ponds can display all sorts of issues over the summer growing season. In the later part of the growth season when water temperatures rise above 75°F, whitish-grey scums known as biofilms can sometimes appear on the surface of lakes and ponds. Still and stagnant water, along with prolonged periods of time without rainfall can often make these issues worse causing them to appear more unsightly. So, what causes these biofilms, and how can they be prevented?

Often times when observed in the field these films are misidentified as either an algal bloom or an oil spill of some sort. Strangely enough, neither of these is true. Biofilms are generated from the lack of decomposition of organic matter. Simply put your lake or pond is out of balance. Dead organic matter is floating to the surface at a faster rate than decomposers, such as bacteria and fungi, can process them- causing a buildup of biofilm. The source of this organic matter however is variable and can stem from a number of different sources including Euglena, Diatoms, Iron Bacteria, Protozoans, and even Zooplankton depending on the lake or pond. This often makes them difficult to prevent, or even treat once they appear.

The key thing to remember is that once a biofilm is observed at the surface of your lake or pond it is no longer actively growing, it is dead organic matter. Therefore, algaecides and herbicides are no longer a viable treatment option. Researchers and lake managers have been working for years on developing bacteria and enzyme products to help with this issue. In theory if you supplement your pond with increased levels of beneficial bacteria or an enzyme to help bacteria break down the film, this should reduce the occurrence of biofilms. However, field application of this type of strategy has led to mixed results.



CARTER BAILEY // *Aquatic Biologist*



The option we typically come back to for most of our customers is a physical control. The use of a surface agitator unit that constantly mixes the surface of your water will help stabilize oxygen levels and pH, and increase the surface area for naturally occurring bacteria and fungi to more effectively breakdown this film. Any of our Aquatic Specialists can properly identify a biofilm on your lake or pond and help you make the right decision in the management of this often unsightly and problematic issue.

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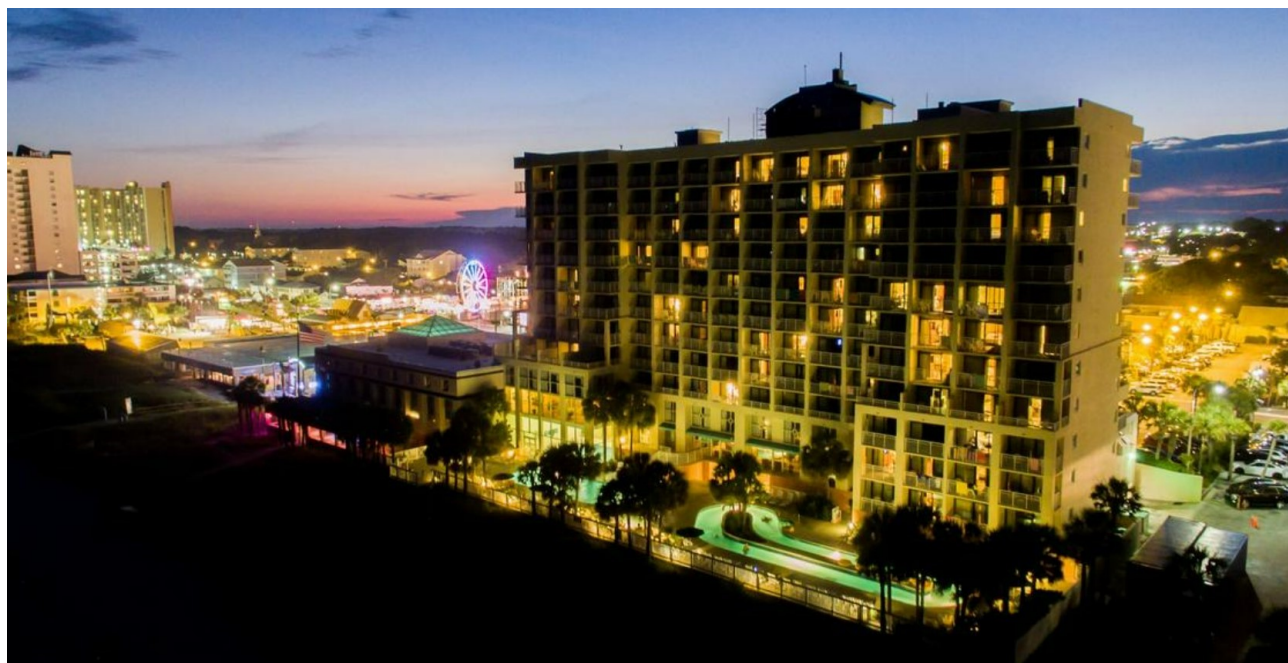
ANNUAL MEETING OCTOBER 9-11, 2023

45th Annual Conference at

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The Ocean Drive Beach and Golf Resort has all the ideal amenities for a SCAPMS conference; plenty of space for meetings and vendors, delicious food, walking access to restaurants and bars, ocean views, beach access, pools, and of course, a lazy river for the duck race! The hotel also has a 'retro' feel that will be very fitting for the 45th annual meeting! As always, the annual meeting is a great place to accumulate the CEU's you need for your Cat 5 license. This meeting will also be packed with informative presentations and educational workshops which will be sure to bring you up to date on current topics. Socials and various gatherings will help you network and get reacquainted with colleagues.

Register at: www.scapms.org



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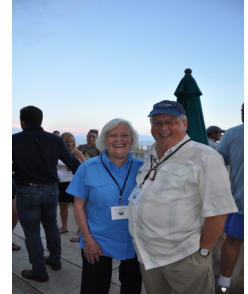


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