FLMS Half Day Workshop
Tuesday, August 30, 2022 12:45pm – 4:45pm
Oxygenation and Circulation Techniques to Improve Water Quality

Presenters: Paul Gantzer, Ph.D., P.E., Gantzer Water LLC, and Patrick Goodwin M.S., CLM, Good Aquatics LLC

This workshop is designed to train water resource managers, scientists, engineers, and any interested stakeholder in oxygenation and circulation techniques. This two-part workshop will provide a comprehensive review of both theory and practice of oxygenation and circulation techniques. Participants will be provided the tools and training to be able to properly select and design oxygenation and/or circulation system to address a particular water quality issue(s).

This half-day workshop will focus on fundamentals and will be a series of PowerPoint presentations and excel exercises covering a range of topics, including:

- Reasons for oxygenation and circulation
- Types and proper selection of oxygenation and circulation techniques
- Caveats and lessons learned from oxygenation and circulation techniques
    - Sediment features
    - External nutrient loading
- Life cycle costs
- Methods for calculating oxygen demands
    - Incoming oxygen demands
        - Biological oxygen demands
        - Chemical oxygen demands
    - In-lake oxygen demands
        - Sediment oxygen demands
        - Dissolve oxygen and temperature profile data
- Oxygenation and circulation system sizing
    - Freshwater Vs. brackish/saltwater Vs. wastewater
    - Models (“rule of thumb”) Vs. site-specific data
    - Sizing for manganese
    - Sizing for hydrogen sulfide
    - Sizing for ammonia/ammonium
    - Sizing for algal control
- Quantifying thermal structure and determining target waters
- Calculating theoretical Vs. actual oxygen transfer rates
- Calculating water movement from air
- Remote monitoring and system calibration

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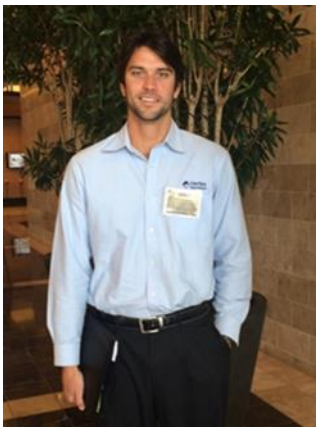
Paul Gantzer Ph.D., P.E., Gantzer Water, LLC

Dr. Paul Gantzer, Owner of Gantzer Water, LLC (Gantzer Water), is a world-renowned limnologist. Dr. Gantzer is especially recognized for his work with oxygenation techniques to restore lake water quality and ameliorate harmful algal blooms. Gantzer Water provides expertise in the review and design of oxygenation and circulation systems used to enhance or improve water quality through in-lake management strategies. Services provided by Gantzer Water include comprehensive analysis of baseline oxygen demand data used to size oxygenation systems and identify the preferred approach. Gantzer Water works closely with their clients to identify oxygenation needs and goals and to provide the most robust long-term management strategy within budget constraints. Representative projects include C.W. Bill Young Reservoir (air-lift aerator and destratification), Bear Lake (direct oxygenation), and Sarah's Pond (Side-stream saturation). Dr. Gantzer has published numerous peer-reviewed papers on aeration and oxygenation, including articles that were featured in the September 2019 NALMS Journal of Lake and Reservoir Management, which highlighted the use of oxygenation in the restoration of large lakes and reservoirs.

Patrick Goodwin, M.S., CLM Good Aquatics LLC



Patrick Goodwin, CLM | Water Resource Manager
Patrick has training and experience in all aspects of water resource management and has completed multiple comprehensive water management plans ranging from 8 to 13,000-acre water bodies. Patrick specializes in using the Lake Loading Response Model (LLRM) and field data collection to evaluate nutrient loading and the consequences of that loading in terms of algal blooms and water clarity. Patrick also has unique industry insight into applied restoration techniques and has conducted numerous experiments evaluating restoration techniques for clients. He has successfully restored multiple water bodies and is considered an expert in oxygenation and circulation techniques. Patrick is a certified lake manager and is the current Region 4 director for the North American Lake Management Society (NALMS).

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Patrick created Good Aquatics in 2021 after spending the prior decade working in the water quality management industry. Good Aquatics was created with a core belief to provide well-engineered water quality solutions that are backed by science; something that has been lost in the shuffle as the water quality management industry has become more commercialized. Good Aquatics aims to provide technically effective water quality solutions at the lowest possible cost. This is done by collecting the right data (brings direct management utility) to make a management decision. Goodwin Aquatics welcomes scientific evaluation and is transparent with case studies and industry know-how such that water resource managers can make the most informed and best decisions for lake stakeholders. Good Aquatics stands behind its workmanship and technical support.