

Aeration Technique Selection



Artificial Circulation Layer Aeration

Hypolimnetic Aeration No Aeration Needed

Deep, Stratified,
Oligotrophic;
No "Problematic Anoxia"

**Low Nutrients
Good Habitat and
Water Quality**

Deep, Stratified,
Mesotrophic,
Hypolimnetic Anoxia

Moderately Deep,
Stratified, Eutrophic,
Hypolimnetic And
Metalimnetic Anoxia

Shallow, Weakly Stratified,
Highly Eutrophic
Anoxia Ascends into
Euphotic Zone

Increasing Oxygen Demand

EUTROPHICATION

**High Nutrients
(Nutrient Control Not Feasible)
Poor Habitat and
Water Quality**

Artificial Circulation

Advantages:

- ▶ Good Control of Metals
- ▶ Phytoplankton Species
- ▶ Aerobic Benthic Habitat
- ▶ Few In-Lake Structures

Disadvantages:

- ▶ Warming of Bottom
- ▶ Benthic Fluxes (Fickean)
- ▶ Continuous Algal Culture
- ▶ Fouling & Sediment Suspension

Hypolimnetic Aeration

Advantages:

- ▶ Good Control of Metals
- ▶ Nutrient Control (Sometimes)
- ▶ Habitat (Cold)
- ▶ Maintains Stratification

Disadvantages:

- ▶ Metalimnetic Anoxia
- ▶ Thermocline Fluxes (Fickian)
- ▶ Gas-Solute Transfer Efficiency
- ▶ Structural Components

Layer Aeration

Advantages:

- ▶ Good Control of Metals
- ▶ Nutrient Control (Sometimes)
- ▶ Habitat (Cool and Cold)
- ▶ Quality Supply Layers
- ▶ Ambient O₂ Sources

Disadvantages:

- ▶ “Manipulates” Stratification
- ▶ Database Requirements (Design)
- ▶ Structural Components

Oxygenation

Advantages:

- ▶ Good Control of Metals
- ▶ Nutrient Control (Sometimes)
- ▶ Habitat (Cool and Cold)
- ▶ High DO can be accomplished

Disadvantages:

- ▶ Maintenance of Underwater Mechanicals
- ▶ Structural Components, Cost
- ▶ Steep DO Gradients
- ▶ Very high DO is Toxic to many organisms.

Specialty Aeration Functions

- ▶ **AirStrip Aerator Function**

- ▶ re: Henry's Law Constant of Organic

- ▶ **Chemical Feed Injections**

- ▶ re: Focused Algicide Application
- ▶ re: Nutrient Inactivation
- ▶ re: Front-End Treatment

- ▶ **Pneumatic Skimming**

- ▶ re: Floatables Removal

- ▶ **Multiple Function Aerators**

- ▶ **Enriched Air Feed**