

# Why Big Bubble Circulation Pumps (BBCPs) Help Slow Evaporation and Make Lakes Friendlier to Lunker Bass

## Protecting Water and Fish in a Changing Climate

### 1. Surface Cooling Slows Evaporation

BBCPs gently circulate cooler water from the lakebed to the surface. This lowers surface water temperature, reducing the vapor pressure difference between air and water—directly slowing evaporation. Cooler water evaporates more slowly, preserving valuable water storage during hot weather.

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### 2. Vapor Layer Protection

On calm days, lakes naturally form a thin vapor layer at the surface—a humid buffer that slows evaporation. The gentle, consistent ripples created by BBCPs help stabilize this vapor layer, keeping it intact longer and reducing sudden evaporation bursts when the air gets dry.

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### 3. Wind Ripple Dampening

Strong winds increase evaporation by roughening the water surface and enhancing turbulence. BBCPs generate ripples that move against incoming wind-driven waves, dampening their energy and limiting the wind's ability to churn up the surface. This reduces evaporative loss, even on breezy days.

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### 4. Sunlight Reflection and Diffusion

The ripples generated by BBCPs reflect up to 30% of incoming sunlight. The remaining sunlight is scattered (diffused), reducing how deeply solar energy penetrates the lake. By limiting deep heating, BBCPs protect the thermocline and keep deep water cool, slowing the overall heating of the lake.

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### 5. Thermocline Preservation

Traditional aerators destratify lakes, destroying the natural thermocline. BBCPs, however, **preserve this natural layering**. The thermocline acts as a protective barrier, keeping warmer water near the surface while maintaining a cooler, oxygen-rich refuge below. This cooler zone is critical habitat for lunker bass seeking temperature refuge in hot weather.

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## 6. Nutrient Lockdown and Water Quality

By maintaining stratification and reducing sediment disturbance, BBCPs help trap nutrients at the bottom. This reduces the likelihood of harmful algal blooms, keeping the water clearer and healthier. For lunker bass, this means better oxygen, improved visibility for hunting prey, and a more stable food chain.

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## 7. Year-Round Resilience

- **In Summer:** BBCPs cool the surface, reduce evaporation, and protect deep-water bass habitat.
  - **In Winter:** BBCPs prevent full ice cover by maintaining gentle circulation, protecting overwintering bass and preserving oxygen levels.
  - **In Drought:** BBCPs help reservoirs retain more water by slowing surface loss, while preserving water quality.
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## BBCPs: A Smart Investment for Fisheries, Water Supply, and Climate Resilience

This multi-benefit technology supports both **water conservation goals** (critical for agencies like TWRI and TWDB) and **fisheries management goals** (important for Texas Parks & Wildlife and local lake managers). For lakes prized for trophy bass fishing, BBCPs offer an affordable, energy-efficient way to protect **water, fish, and recreation** from Texas' increasingly extreme weather.

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## Call to Action

### Demonstration Project Opportunity

We propose a BBCP demonstration project on a Texas lake to scientifically measure:

- Evaporation reduction
- Surface cooling
- Algae suppression
- Fish habitat improvement