Low-Speed Boating . . .
Managing the Wave

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Remember the old days when the "cool" boats were the ones that glided across the water at such high speeds that they seemed to barely touch the surface of the water? A low wake was what slalom skiers desired as they skipped from side to side behind the boat. Oh, how times have changed. Now boats that plod along at a low rate of speed, deeply plowing through the water, throwing a large wake for wakeboarding and surfing are all the rage. I like to term this type of boating as "low-speed boating" and it comes with its own set of concerns regarding the health of a body of water.

Today's "wake boats" are designed to increase wave height. To accomplish this, the hull is shaped to achieve maximum wake and many have a hydrofoil device that lowers the stern when the boat is under power. Most wake boats also have built-in ballast tanks that can be filled with lake water to increase the weight in the back of the boat, causing more water to be displaced and larger waves created (Figure 1).

Figure 1. A typical, stern-heavy wake boat creates a large surfable wake. Photo from Pinsdaddy.

Problems with Increased Wake Height

As wave height increases, so do adverse effects that go along with waves. The larger the wave, the deeper it can churn sediment in the shallows of a lake. Larger waves also deliver more energy against the shoreline, exacerbating erosion of natural shorelines and islands. If the shoreline is a hard regular face like a concrete or sheet-pile seawall then the energy from waves is deflected back toward the center of the lake, which, again, disturbs sediment in the shallow areas of the lake.

Because of the shape of the boat and the means of lowering the stern of the boat through ballast placement or mechanical means, ultimately the propeller is deeper in the water. This can result in direct contact of the propeller with the lake bottom. However, even if the prop does not contact the bottom directly, the turbulence from the propeller can reach as deep as 10 feet. In either scenario, the end result is disturbance to the bed of the lake.

Whether it is propeller-induced or the result of boat-induced wave action, sediment and nutrients can become re-suspended due to low-speed boating. After a weekend of heavy boating, lake residents have surely noticed that the lake is not as clear as it was right before the weekend because of the disturbance of the sediment. Depending on how fine the bottom sediments are, it can take 24 hours or more to return to the clarity it was prior to an intense boating period. Sediment in suspension means nutrients like nitrogen and phosphorus have also been kicked-up. These nutrients in suspension are now available to interact with the biotic community in the water column. Often times these available nutrients fuel a planktonic algae bloom, which can contribute to additional water clarity problems. In the worst-case scenario, a harmful algae bloom can lead to water safety issues.

The deeper the propeller, the more chance there is to uproot or fragment aquatic vegetation. This can lead to the destruction of desirable native species, many of which do not reproduce via fragmentation. Invasive plant species, however, commonly use fragmentation as a means of propagation. Therefore, boats chopping up plants can facilitate the

proliferation of aquatic invasive plants, which can lead to their spread and crowd out native species.

Speaking of invasive species, the ballast tanks that assist in creating the large waves for surfing behind wake boats can facilitate the spread of detrimental species. Zebra mussel larvae, fish pathogens, or invasive plant fragments could be pumped into the ballast tanks. While the tanks would typically be de-watered when the boat is loaded on the trailer to go home, the tanks are never able to completely dry. Unwanted "hitchhikers" could remain viable in the tanks and could be expelled into the next lake that is visited.

Wake Boat BMPs

There are a number of best management practices (BMPs) that could be employed by low-speed boaters and lake residents to lessen the impacts from this style of boating. No one action can save a lake; rather, improved lake management could involve adopting many different practices.

The suspension of sediment and nutrients is arguably the greatest concern with wake boats because it can speed eutrophication of lakes. Boaters should consciously seek water 10 feet or deeper to operate wake boats since by design the propeller is much deeper underwater than boats that are not intentionally trying to create a large wake. While few if any wake boats are fitted with depth finders, there is other information available to guide recreational boaters toward deeper water. With today's technology, it is much easier than before for state agencies or other entities to gather lake depth data and produce maps showing depth contours. Check with your state's Natural Resources agency to see what lake maps may be available.

Another reason for wake boat operators to avoid shallow water is to minimize contact with aquatic vegetation. This will protect native vegetation from damage and will lessen the fragmentation and spread of invasive plant species. Vegetation fouling the propeller is certainly a nuisance to boaters and should cause wake boat operators to want to avoid these areas anyhow. For the sake of the health of the lake, the answer is not to perform more weed control in shallow water; the solution is for boaters to move to deeper water to avoid plants.

When wake boat owners move from one body of water to another, the greatest risk is the movement of aquatic invasive species. All boaters, not just wake boaters, should adopt practices to stop the movement of aquatic hitchhikers. Simple steps such as draining water from all parts of the boat, removing aquatic vegetation from the boat and trailer, and drying or decontaminating all parts of the boat that came in contact with the water are reasonable procedures to reduce the likelihood of transporting unwanted organisms. Unfortunately, the drying and decontaminating step can be problematic when dealing with the enclosed ballast tanks of wake boats. Check with the boat manufacturer to determine a method to treat the ballast tanks before visiting a different body of water.

It is not simply incumbent on wake boat operators to lessen the negative impacts of higher waves created; lake residents also play a key role. Flat-faced, vertical, bulkhead seawalls deflect most of the wave and its energy back toward the center of the lake causing additional lakebed erosion and suspension of sediment and nutrients. Irregular or natural surfaces actually dissipate wave energy. Lakefront owners can greatly improve the health of a lake by installing living, bioengineered shorelines that utilize native plant materials to protect shorelines. Other options providing some improvement over concrete or sheet-pile seawalls would include the installation of glacial stone seawalls or placing glacial stone on the face of a vertical seawall.

Another action shoreline owners can take is to maintain some submergent and emergent vegetation in the shallows of the lake. Aquatic vegetation does a remarkable job at dissipating waves, protecting shorelines, stabilizing sediment, and locking up nutrients. Low-speed, high-wake boating is the rage and certainly will continue. We just need to learn how to manage the wave all the way from the wake boat driver to the shoreline property owner in order to reduce the negative impacts of this boating style to protect our lakes.

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