DRAFT
WAKE BOAT & WAKESURF STUDY

March 3, 2026

State of Connecticut
Department of Energy & Environmental Protection

Photo Credit: Watersports Foundation, Royalty Free Photos.

TABLE OF CONTENTS

DRAFT WAKE BOAT & WAKESURF STUDY

Connecticut Department of Energy & Environmental Protection

EXECUTIVE SUMMARY

Wakesurfing is a recreational activity enjoyed nationally as well as in the state of Connecticut. As wakesurfing grows in popularity, this report seeks to increase the level of information and analysis available to inform the management of this activity in a manner that balances environmental protection, shared use of Connecticut's lakes and rivers, and recreational benefits.

To inform this report, The Department of Energy & Environmental Protecting (DEEP) reviewed extensive public input, evaluated relevant scientific literature, and coordinated with boating safety officials nationwide. Public comments revealed strongly held, yet divergent views on wakesurfing, reflecting its importance to many Connecticut residents and the complexity of the topic. A review of policies in other states showed a range of regulatory approaches, underscoring the absence of a single national standard.

The analysis confirms that wake boats operating in wakesurfing mode generate larger and more powerful wakes than traditional motorized boating and towed watersports. While these wakes provide unique and valued recreational benefits, they also have the potential to adversely affect shoreline stability, aquatic habitats, water quality, infrastructure, and other waterway users.

Based on public comments, scientific research, and regulatory practices used in other states, DEEP observed three common management techniques used in other jurisdictions to address wakesurfing impacts:

1. **Distance restrictions from shore and structures** to reduce shoreline erosion, protect nearshore habitats and infrastructure, and minimize conflicts with other users.
2. **Minimum water depth restrictions** to protect lakebeds, aquatic vegetation, water quality, and fish habitat.
3. **Prohibitions on small water bodies**, where limited space increases the likelihood of environmental harm, safety concerns, and user conflicts.

DEEP found significant variation among public comments, research findings, and state policies regarding how these approaches should be executed in practice. Key factors to consider are enforceability, consistency, environmental objectives, and recreational access. Distance-based restrictions are most commonly used in other states and are generally easier to enforce, while depth-based restrictions offer additional environmental benefits but present greater challenges for compliance and enforcement. Restrictions based on the size

of the water body, such as regulations restricting water skiing (which, by statutory definition, includes wakesurfing in Connecticut), are already implemented on many smaller water bodies in Connecticut and represent a reasonable option given the availability of larger lakes for water skiing and wakesurfing.

Additional considerations include whether wakesurfing policy should be established at the state or municipal level, and whether regulations should target the activity itself or vessels operating in wake-enhancing modes. Overall, this report provides information to assist state and local policymakers and stakeholders in evaluating a variety of wakesurfing management options.

STUDY SCOPE AND METHODOLOGY

Recreational boating is a core part of outdoor life in Connecticut, supported by 117 publicly accessible DEEP boat launches, as well as many additional launches provided by towns, nonprofits, businesses, and private properties across the state. Boating thrives in Connecticut because the state offers every kind of on-water experience, from a quiet paddle through lily pad-filled ponds to a sail or motorized cruise across the wavy, salty expanse of Long Island Sound, and everything in between.

DEEP's boating responsibilities are just as broad. DEEP's Boating Division maintains boat launches, writes and updates regulations, coordinates with the United States Coast Guard (USCG), reviews municipal boating ordinances, installs navigation buoys, administers boating education and certification licenses, and provides boating safety outreach. DEEP's Environmental Conservation (EnCon) Police Division has jurisdiction to enforce all state boating laws on water bodies across Connecticut. DEEP's Office of Outdoor Industry and Experiences is focused on growing the state's outdoor recreation economy, which includes creating paddlecraft rental opportunities in Connecticut's State Parks. DEEP's Wildlife, Fisheries, and Land and Water Resources Divisions act as public trust stewards of the state's wildlife, fisheries, and water quality resources. Connecticut's water bodies and the diverse natural resources they support provide recreation users with a reason to get on the water in the first place. It is DEEP's responsibility to ensure the protection of these natural resources while also providing access for the public to enjoy them.

Wakesurfing is a recreational activity enjoyed nationally as well as in the state of Connecticut. DEEP recently received submissions for approval by statute of municipal boating ordinances that regulate wakesurfing and wake boat use, and as a result, the Department also received significant outreach on the topic, demonstrating the regulation of wakesurfing is an issue of growing significance to many residents and businesses in Connecticut and one that merits additional study. In October 2025, DEEP issued a Notice of Opportunity for Public Comment commencing this Wake Boat and Wakesurf Study (the Study) with the following goals:

1. Assess the economic, environmental, recreational, navigational, and public health and safety factors relevant to wake boat operation on Connecticut's water bodies;

2. Provide information to state and local waterway managers about key issues and opportunities for balanced, site-specific approaches to accommodating or addressing wakesurfing; and

3. Provide recommendations for consideration by policymakers at the state and local level.

The Notice invited public comment regarding the following prompts: factors related to public access; approaches other states or municipalities have taken to manage or regulate wake boat operation and wakesurfing; recreational factors (wakesurfing as a recreational activity, and compatibility with/impacts to other recreational activities such as fishing, rowing, water skiing, tubing, swimming, and other on-water uses); environmental factors (e.g., fish, wildlife, water quality, habitat, impacts to shoreline or lakebed, sediment suspension, vegetation, aquatic invasive species, etc.); navigation or safety factors to a variety of boating activities (e.g., power boating, kayaking, stand-up paddleboarding (SUP), rowing, personal watercraft (PWC) operation, pontoon cruising, etc.); economics and tourism; existing studies, reports, or research that DEEP should consider; and enforcement.

The comment period closed on October 22, 2025, and the public comments have been posted on the DEEP Boating Division website. DEEP has reviewed and considered all the public comments, the recommended studies, and other scientific literature and reports. This study addresses the public comments received as well.

DEFINITIONS

A "wake" is the pattern of waves left behind a vessel as the vessel moves forward and the boat's hull displaces water. The energy, size, and characteristics of a boat's wake are influenced by the boat's speed, weight, and hull shape, among other factors. The wake may cause unintended consequences as its energy travels away from its point of origin.

A "wake boat" is a motorboat designed to create an enhanced wake behind the vessel. To achieve an enhanced wake, a wake boat uses a specialized hull design and an internal ballast system filled with water to increase the vessel's displacement, which in turn creates a bigger wake behind the vessel as it moves forward through the water. This enhanced wake enables the activities of wakesurfing and wakeboarding – also referred to generally as "wake sports." Wake boats typically are equipped with large engines and can be equipped with accessory features such as wedges, wave-shapers, hydrofoils, or tabs that are engaged to further manipulate the size, shape, or direction of the wake. Some of these add-on features are aftermarket products which also can be installed on non-wake boats to create enhanced wakes on non-wake boats.

"Wakesurfing" is a water sport in which a rider surfs the wake behind a boat without a tow rope, typically on a specialized board. Wake surfers often use a tow rope to begin surfing, then let go to ride the boat's wake. Riders steer by shifting their weight on the board, like traditional surfing. Wakesurfing typically occurs at lower speeds than other towed sports – about 9 to 11 miles per hour.

"Wakeboarding" is a water sport where a rider maintains connection to the vessel by a tow rope – like water skiing – but uses a board with foot bindings. Wake boarders cross back and forth and use the enhanced wake to perform jumps, tricks, and aerial maneuvers. Wakeboarding typically occurs at higher speeds than wakesurfing, ranging from 12 miles per hour (beginners) to 20+ miles per hour (advanced).

A "ballast system" on a wake boat is a tank or bag filled with water and used to adjust a boat's weight distribution. By filling these tanks strategically, a wake boat's hull sits deeper in the water, thereby enhancing and shaping the boat's wake for optimal conditions for wake surfers.

"Propeller wash" is the accelerated flow of water moved by the propeller. Power boats use a motor-driven rotating propeller to push water behind the boat, which causes the boat to move forward. In most recreational boats, the propeller wash is directed straight back parallel to the propeller shaft, and the angle of the propeller shaft itself typically ranges from 8 to 15 degrees relative to the boat's waterline or the horizontal plane. On wake boats, the propeller shaft typically has a fixed downward angle around 16 to 20 degrees. This angle, when combined with a typical bow-up posture of 10 to 15 degrees when operating at wakesurfing speeds, means the thrust of the propeller wash is directed significantly downward at an angle of roughly 30 degrees into the water.

"Slow-no-wake" is defined in Connecticut General Statutes (CGS) CGS Section 15-154e and in the Regulations of Connecticut State Agencies (RCSA) RCSA Section 15-121-A1(j). It means the operation of a vessel at a speed which does not produce more than a minimum wake and is not greater than six miles per hour over ground unless a higher minimum speed is necessary to maintain steerage when traveling with a strong current.

"Displacement speed/mode" is when a vessel moves through the water at low speeds, where the hull pushes through the water, displacing it and creating a large wake.

"Plowing speed/mode" is when a vessel starts to accelerate but has not yet lifted onto the water surface transitioning to planing mode.

"Planing speed/mode" is the minimum speed a vessel with a planing hull must reach for hydrodynamic lift to overcome buoyancy, allowing the vessel to rise and skim over the water's surface, dramatically reducing drag for a higher efficiency and speed. Despite

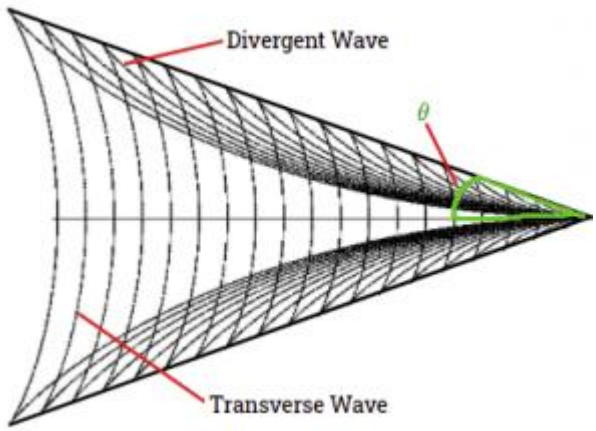
moving at a faster rate, when vessels travel at planing speed, they generally produce a smaller wake than when traveling at displacement or plowing speeds.

“Pressure waves” are disturbances in the water at the front (bow pressure waves) and the back (stern pressure waves) as a boat hull moves forward and displaces water downward. The displaced water from these waves reflects off the bottom and moves back up to the surface.

“Transverse waves” are a set of wake waves that extend from the stern of the boat and follow the boat path. The crests of these waves are perpendicular to the direction of boat travel.

“Divergent waves” are a set of wake waves that extend from the stern of the boat that move outward with the crests of these waves roughly parallel to the direction of boat travel.

This diagram shows the difference between a transverse wave and a divergent wave.[1]



WAKEBOARDING VS. WAKESURFING

Note that neither of the terms “wakesurfing” or “wakeboarding” is defined in Connecticut statutes. Rather, these activities are included in the definition of “water skiing,” specifically in CGS Section 15-127:

> *“[W]ater skiing” includes towing of any person behind a vessel under power, whether such person is connected by a towing line to such vessel or not, and similar forms of activity in which a passenger exits a vessel and uses the suction or wake of the underway vessel to engage in the activity.*

[1] https://sites.imsa.edu/hadron/2021/11/07/the-physics-of-water-wakes/

Because wakesurfing and wakeboarding are similar yet distinct activities, policymakers should thoughtfully consider whether the activities should be regulated together or separately. To help inform this discussion, DEEP reviewed other states' wakesurfing-related laws (which will be discussed later in this study). These reviews reveal a variety of approaches. For example, Alabama, Georgia, Maine, Oregon, South Carolina, Tennessee, and Vermont manage wakesurfing and wakeboarding together, essentially considering both activities the same for the sake of their regulations. Maryland's definition separates the two, while New Jersey considers wakeboarding as water skiing but distinct from wakesurfing.

PUBLIC COMMENTS

In response to the Notice of Opportunity for Public Comment, DEEP received 292 comments that included correspondence from municipal leadership, marine industry association representatives, lake associations, environmental groups, lawyers, boating instructors, waterfront property owners, and boating enthusiasts. Responses were received from all eight of Connecticut's counties.

Public sentiment as revealed through the responses ranged widely on recommendations as to how wake boats and wakesurfing should be managed in Connecticut. While there were some calls for statewide or lake-specific bans on the operation of wake boats, a majority of the comments opposed outright wake boat prohibitions, recommending instead statewide and uniform regulations supported by boater education and law enforcement.

Themes in public comments supporting a ban included:

Core Arguments:

- Safety hazards for kayakers, swimmers, anglers, and small boats resulting from capsizing and swamping.
- Property damage to docks and seawalls from large, repeated wakes.
- Environmental degradation: erosion, sediment resuspension, and spread of aquatic invasive species.
- Lake morphology: small or narrow lakes cannot handle large wakes safely.

Representative Quotes:

- "We were almost swamped while having young children on the boat with us."
- "Our gangplank collapsed from wake-induced torque."
- "Wakesurf boats generate waves that destroy shoreline habitat and threaten safety."

Recommendations:

- Full or partial bans on wake boats, especially on narrow or shallow lakes.
- Setback distances from shore.
- Enforcement and signage to protect non-motorized users.

- Replicate Lake Waramaug's ordinance restrictions elsewhere.

Themes in public comments opposing a ban included:

Core Arguments:

- Unfair targeting: wake boats singled out despite comparable wakes from other large boats.
- Economic impact: marinas, boat shops, and tourism depend on wake sports.
- Scientific criticism: local studies cited as flawed or not peer reviewed.
- Equity and consistency: local bans create a "patchwork" of rules that confuse boaters and undermine statewide recreation rights.
- Preference for science-based, statewide standards instead of local restrictions.

Representative Quotes:

- "I believe that banning one form of recreation in favor of others goes against the spirit DEEP's mandate to promote the enjoyment of our state's public resources."
- "Statewide regulations could save countless towns across Connecticut from wasting time and resources on developing a patchwork of inconsistent and contestable regulations."
- "Any boating activity, when conducted irresponsibly or recklessly, can endanger others on the water."

BACKGROUND

Statutory Authority & Regulatory Responsibility

The following section provides an abbreviated summary of the relevant statutory authorities related to wakesurfing and is not intended to serve as a comprehensive guide for boaters. DEEP annually publishes the Connecticut Boater's Guide, which provides up to date guidance on boating laws and regulations.

Legislative & Statutory Authority

The General Assembly has enacted and codified extensive boating policy in Chapter 268 of Title 15 of the Connecticut General Statutes, which defines water skiing broadly to encompass various forms of towed water sports including tubing, wakeboarding, and wakesurfing. Chapter 268:

- Defines water skiing to include wakesurfing as well as various towed watersports: *"water skiing" includes towing of any person behind a vessel under power, whether such person is connected by a towing line to such vessel or not, and similar forms of*

activity in which a passenger exits a vessel and uses the suction or wake of the underway vessel to engage in the activity." (CGS Section CGS Section 15-127)

- Establishes laws for water skiing including mandatory observer requirements, geographic and time-of-day restrictions, and safety standards to prevent collisions or hazardous operation. (CGS Section 15-134)
- Establishes distance restrictions regarding the operation of vessels in the following scenarios:
    - Restricts vessel operation or water skiing within 100 feet from a scuba diver. (CGS Section 5-135)
    - Restricts operation of a jetted articulate vessel within 200 feet of shore, etc., or 100 feet of another vessel. (CGS Section 15-140j)
    - Restricts the operation of a vessel above no-wake speed within a 200-foot distance from stationary law enforcement or a vessel towing. (CGS Section 15-154)

Agency Regulatory Authority

In addition to the statutes above, DEEP is authorized to create state regulations pertaining to boating and water skiing.

- Chapter 268 of Title 15 of the Connecticut General Statutes provides DEEP with regulatory authority over "all waters of the state" (CGS Sec. 15-121) including:
    - Water skiing – "*adopt such regulations respecting water skiing and underwater swimming and diving as he finds necessary for public safety*";
    - Safety education – "*study, plan and recommend the development of boating facilities, safety education and means of improving boating safety*"; and
    - Regulating boating for safety and environmental quality – "*adopt such regulations to provide for public safety and environmental quality as he finds necessary to administer and enforce the provisions of said part and to promote the safe use and protection of waters and the safe operation of vessels"*.
- DEEP also approves (or disapproves) municipal boating ordinances within 60 days of local passage and has regulatory authority over the operation of vessels on a water body in two or more towns when no local regulations exist or when state-level regulations are required to establish uniformity in the boating regulations of the several towns. (CGS Sec. 15-136)

DEEP's regulations include general boating requirements that impact water skiing and/or local water bodies, as well as specific water skiing requirements. DEEP has not created regulations pertaining solely to wakesurfing because wakesurfing has been included in the broader statutory definition of water skiing.

- General boating regulations impact water skiing in many ways. For example, a specific regulation especially pertinent to this study restricts boats from operating

at speeds greater than slow-no-wake speed within 100 feet from shore. Since water skiing occurs at speeds greater than slow-no-wake speed, this general boating speed limitation – by default – essentially also restricts water skiing within 100 feet from shore, with an exemption for water skiers who are taking off or landing. (RCSA Sec. 15-121-B14)

- Specific water skiing regulations include requirements to have an observer when water skiing, prohibitions on water skiing at night, personal flotation device (PFD) requirements, and other water skiing specifics. (RCSA Sec. 15-121-A9)
- Specific water body regulations include restrictions that only apply on a single water body. These restrictions may limit the size or type of motor, speed, and/or time of day an activity may occur. RCSA Sec 15-121-B through Sec 15-121-B16)

Municipal Ordinance Authority

The Connecticut General Statutes provide towns with the right to make boating-related ordinances or local regulations on water bodies within their territorial limits, subject to DEEP disapproval:

> *(a) Any town, by ordinance, may make local regulations respecting the operation of vessels on any body of water within its territorial limits. Upon adoption, each such ordinance shall be submitted to the commissioner and, if not disapproved by the commissioner not later than sixty days after such submission, shall take effect as provided in subsection (c) of this section. The commissioner may disapprove any ordinance or part thereof that the commissioner finds to be arbitrary, unreasonable, unnecessarily restrictive, inimical to uniformity, duplicative of any state law or regulation or inconsistent with the policy of this part.* (CGS 15-136)

Localities have adopted ordinances on various water bodies across the state pertaining to water skiing, horsepower limitations, and speed limit restrictions, to name a few. At present, local ordinances impacting wakesurfing specifically have been enacted on a few water bodies in Connecticut, including Bashan Lake, Lake Waramaug, and Moodus Reservoir.

Public Access to Inland Waterbodies

Public access to water bodies is provided in a variety of ways including state, municipal, and private access points such as boat launches or marinas. DEEP plays a vital role in protecting and enabling equitable public access to Connecticut's waterways.

Outdoor recreation enriches the lives of Connecticut residents. Time outside supports physical health, mental well-being, and community connection. Because these benefits should be available to everyone, DEEP works to reduce barriers and expand opportunities so all people, regardless of socio-economic background, physical ability, or municipality of residence, can enjoy Connecticut's natural spaces. Meaningful outdoor experiences also

foster environmental stewardship. When people can safely and joyfully boat, fish, swim or simply spend time in nature, they are more likely to value these places and support efforts to protect our outdoor spaces for future generations.

DEEP facilitates these on-water recreation opportunities through a statewide network of 117 public boat launches, providing free access to lakes, ponds, rivers, and coastal waters throughout Connecticut. State boat launches are supported, in part, through federal funds, so free access is provided for residents and non-residents alike.

Many municipalities also provide boat launches with various degrees of public accessibility. Some launches are free and open to the public, while others are restricted to municipal residents. Many municipalities also charge fees that may differ for municipal residents and non-residents. Marinas and boating clubs can also provide access for boaters but these are generally restricted to fee-paying members or customers. While DEEP strives to provide robust public access to water bodies across the state, not all water bodies have state boat launches or unrestricted public access. See DEEP's Boating Guide for a list of water bodies that have state or municipal boat launches in Connecticut.

For decades, DEEP has supported the public's right to recreate on the state's waters by ensuring that boating laws and local ordinances are applied equitably to all users, regardless of whether they access the water from public or private property. This commitment helps maintain consistent, transparent rules that protect both public use and the long-term health of these shared resources.

As discussed in more detail later in this study, conflicts occasionally arise between recreational users and shoreline property owners, and DEEP regularly helps resolve these issues to ensure outcomes that are fair, lawful, and respectful to all. The agency works to secure and protect public access to as many water bodies statewide as possible, while encouraging safe and responsible recreation. DEEP's goal is to preserve the public's ability to enjoy Connecticut's waters for many purposes – including fishing, boating, and swimming – so these places remain shared, welcoming, and well-maintained for generations to come.

DEEP also supports all types of on-water recreation. When safety concerns or user conflicts arise, DEEP generally aims to manage these conflicts with rules that apply consistently across multiple recreational activities. For example, the agency has promulgated regulations, or supported through local ordinances, management approaches such as speed limits or horsepower restrictions that apply equitably to a variety of recreation users rather than supporting bans targeted at prohibiting a specific recreational activity or vessel type.

Connecticut's Inland Waterbodies & Resources

The State of Connecticut contains 2,267 lakes and ponds greater than 10 acres in size.[2] While most of these are quite small and better suited to the use of paddlecraft than power boats, there also are many large water bodies fitting for motorized vessels. Connecticut has 108 lakes greater than 100 acres in size available for boating-related recreation. These include Candlewood Lake (5,064 acres), Lake Lillinonah (1,547 acres), Lake Zoar (909 acres), ten lakes between 500 and 1,000 acres, fourteen lakes between 300 and 500 acres, and 81 more between 100 and 300 acres.[3]

These inland water bodies are special ecological and recreational havens, each shaped by the state's glacial history and diverse landscapes. They support rich wildlife communities, from nesting loons and herons to thriving populations of turtles, amphibians, and migratory birds. Many lakes also have well-managed fisheries, offering anglers opportunities to catch bass, trout, and pike, in settings that balance access with conservation. In addition to providing access for motor boating, Connecticut's inland lakes also support a wide range of low-impact recreational opportunities such as paddling, canoeing, sailing, swimming, hunting, and quiet nature observation.

Connecticut also features many tidal rivers, including some sizable waterways like the Thames River, Connecticut River, and Housatonic River. As defined in 33 CFR Part 329 Section 329.4, these are considered navigable waterways as they are subject to the ebb and flow of the tide and are presently used, or have been used in the past, to transport interstate commerce. The USCG is the primary regulatory authority on these waters, however they are typically managed in partnership with state authorities. State and local law enforcement agencies, including DEEP EnCon Police, are empowered to enforce state and federal boating regulations on these waters. As with any other state boating law or regulation, any state or municipal rule placed on "inland water bodies" would be in full force and effect on each of these riverine water bodies.

WAKE BOATS: MECHANISMS OF IMPACT

A review of the literature on the impacts of wake boats revealed compelling evidence for two mechanisms of impact where wake boats were assessed to be more impactful than comparable non-wake boats during robust field studies. These mechanisms include divergent waves traveling at an angle away from the boat's path and increased water velocities beneath the boat and along the boat path.

Divergent waves traveling at an angle away from a boat's path extend outward from the boat toward the shoreline or into the lake (Marr et al. 2022). The effects of divergent waves are

[2] CT DEEP Website https://portal.ct.gov/deep/water/inland-water-monitoring/lake-water-quality-monitoring
[3] Connecticut SCORP, 2005

relevant to the question of the distances at which wake boats should operate in relation to shorelines and other vessels. Marr et al. (2022) found that wake boats created divergent waves that were 2-3 times higher, had 3-9 times more energy, and were 6-12 times more powerful than non-wake boats operating at planing speeds. Additionally, Marr et al. (2022) found that wake boats require minimum operational distance of 500-600 feet from shore to achieve the same maximum wave height, total wave energy, and maximum wave power produced by a non-wake boat operating at planing speed 200 feet from shore; it is important to note that this does not mean that waves have completely dissipated to ambient conditions.

Wake boats can also produce increased water velocities beneath the boat and along the boat path due to bow and stern pressure waves, propeller wash, and transverse waves (Riesgraf et al. 2025). The effects of these phenomena occur simultaneously and penetrate down into the water column along boat path with sufficient energy to interact with the lakebed. These factors are relevant to the question of the depths at which wake boats should operate.

Riesgraf et al. (2025) evaluated the effects on the lakebed and water column from both wake and non-wake boats in multiple modes of operation; key findings related to bow and stern wave velocities, transverse waves, propeller wash, near bed velocities, and resuspension of sediments are summarized below:

- **Bow and Stern Wave Velocities**: The horizontal velocities of bow and stern pressure waves produced by wake boats were substantially larger than those of non-wake boats and extended further down into the water column. In measurements collected with an Acoustic Doppler Current Profiler (ADCP) in 27 feet of water, wake boats produced wave velocities that exceeded the threshold to resuspend coarse silt (0.27 ft/s) down to a depth of 22.5 feet. This exceeded the depths reached by the largest boat tested, a 34-foot yacht, which exceeded the coarse silt threshold to a depth of 18.5 feet.[4] In measurements collected in 14 feet of water wake boats produced horizontal velocities that exceeded the coarse silt threshold by 3-4 times and reached 0.9 ft/s and 1.2 ft/s. The horizontal and vertical velocities produced by the wake boats at shallower depths were substantially larger than non-wake boats, in many cases nearly double.

- **Transverse Waves**: Like the bow and stern waves, the velocities produced by the transverse waves were substantially larger for wake boats and extended further down into the water column than non-wake boats. At depths of 10 and 15 feet transverse wave velocities produced by wake boats were 2-3 times larger than non-wake boats.

[4] For regional context, vessels larger than 26 feet in length have been restricted from operating on Candlewood Lake since 2014 per RCSA Section 15-121-B15a. This regulation was not directly established due to impacts associated with wave or wake activity though it was an element of consideration. The primary issue was user-conflict due to escalating vessel size.

At depths of 20 feet wake boats produced velocities that were equivalent to non-wake boats at 10 feet, while velocities produced by non-wake boats were negligible.

- **Propeller Wash:** For all test boats (wake and non-wake) there was notable difference in the velocities of propeller wash at depth according to the mode of boat operation (planing vs semi-displacement/displacement mode). In planing mode, all test boats' propeller wash velocities were slightly above 0 ft/s at depths of 10-15 feet and were not detectable at 20 feet. In semi-displacement mode, wake boats produced slightly larger vertical velocities (upwelling) at 10 feet that approached 0.1 ft/s and were slightly larger than non-wake boats. Measurements at shallower depths (8-12 feet) showed that wake boats produced propeller wash velocities that were 5-10 times larger than non-wake boats. However, velocities declined sharply by 10 feet and were near zero at a depth of 12 feet, indicating that the effects of propeller wash do not extend as deep into the water column as the bow and stern and transverse waves. See diagram from Reisgraf, et al, (2025), below.

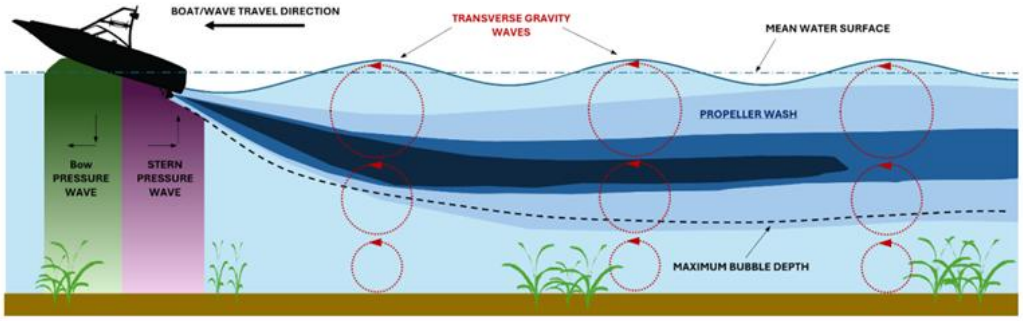


Figure 3. Conceptual illustration of the three hydrodynamic phenomena formed during displacement and semi-displacement modes of operation when transverse waves are present, that produce orbital movement in the water column. The figure represents the first ~10 seconds of time following a boat in forward motion. The arrows in the green bow and purple stern regions represent the direction that the water is moving as it is being displaced by the boat's hull.

- **Near Bed Velocity:** The velocity produced 4 inches above the lakebed was assessed using an Acoustic Doppler Velocimeter (ADV) deployed at depths of 9 and 16 feet. The maximum bow wave velocity produced by the wake boats was substantially larger than non-wake boats including the largest non-wake boat (34 feet), and wake boats operating in planing mode. At depths of 9 feet the two wake boats produced velocities that exceed the threshold to resuspend coarse (~0.65 ft/s) and medium sand (0.5 ft/s). Non-wake boats did not reach the threshold for coarse silt (0.3 ft/s). In depths of 16 feet the bow wave velocities produced by wake boats were smaller and generally below the threshold for medium sand or coarse silt; non-wake boats did not exceed the threshold for coarse silt. A similar trend was observed for stern waves, but with higher overall velocities for all boats. In 9 feet of water the two wake boats greatly exceeded the threshold for coarse sand producing velocities of 1.6 and 1.2 ft/s; non-wake boat velocities were substantially smaller at 0.31 and 0.44 ft/s which exceed

coarse silt threshold. In 16 feet of water the velocities for all boats were lower, but the wake boats still produced larger velocities that reached the threshold for medium sand and exceeded the coarse silt threshold. A similar trend was observed for transverse waves, where in 9 feet of water the wake boats produced the greatest velocities and approached or exceeded the threshold for medium sand and coarse silt respectively, while the non-wake boats remained below the coarse silt threshold. In 16 feet of water, all test boats remained below the coarse silt threshold. Propeller wash was only detectable by ADV for wake boats at a depth of 9 feet which produced velocities in the range of 1.0 ft/s while non-wake boats were not detectable.

- **Resuspension of Sediments:** The extent of plumes of resuspended sediment was measured using the echograms produced by an ADCP deployed in 14 feet of water. Non-wake boats did not produce plumes that could be detected while wake boats produced plumes that were detected at an average of 4.3-5.7 feet above the lakebed. The bow and stern pressure waves for wake boats were found to initiate the movement of lakebed sediments to a depth of 20 feet. The velocities decrease with depth but can resuspend coarser sediments in shallower water. The bow and stern pressure waves are short-lived in any given location as they travel with the boat. The transverse wave and propeller wash velocities persist much longer than the bow and stern pressure waves and the vertical velocities produce an upwelling effect responsible for the sustained suspension and transport of disturbed sediments. Transverse wave velocities between 0.12 and 0.21 ft/s were measured at depths of 15-16 feet but it decreases to near zero at depths of 20 feet. Propeller wash velocities were substantial at depths less than 10 feet but decreased to near zero by 15 feet. The ability for all these factors to resuspend and transport lakebed sediments was clearly documented using underwater video and aerial drone surveys. The two drone photos below are figures excerpted from Riesgraf et al. (2025), that illustrate ability of wake boats to produce large persistent (>1.5 hours) plumes of suspended sediment in depths of 10-14 feet. The aerial visibility of plumes at depths greater than 11 feet was limited due to the transparency of the study lake, however plumes of sediment were detected on the ADV in 14 feet of water. For the non-wake boat that was observed by drone, plumes of resuspended sediment were not observed.

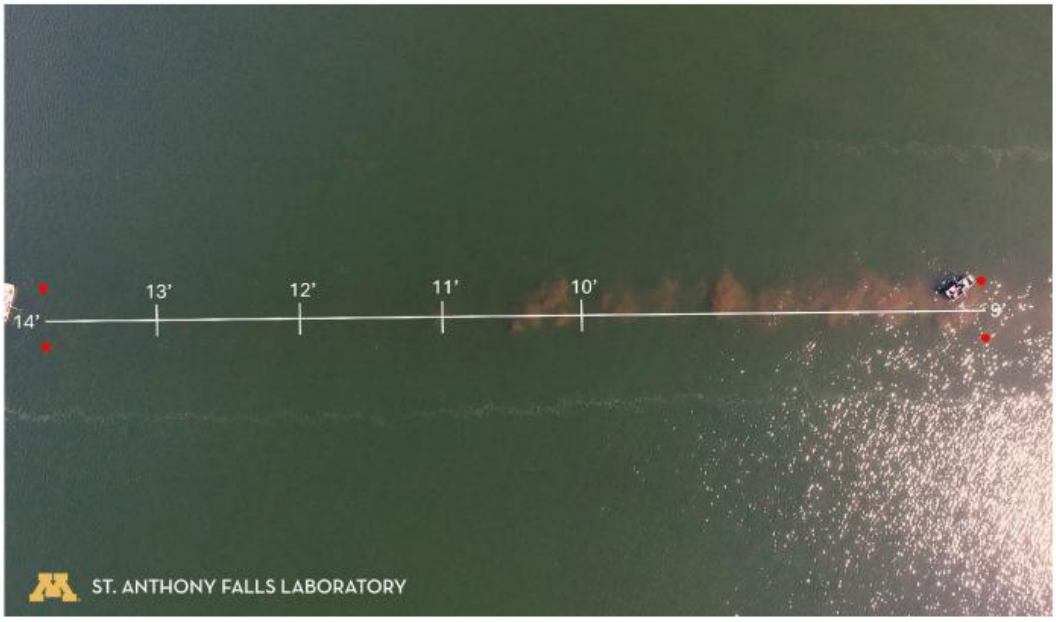


Figure 69. Drone screenshot taken 1.5 minutes after the first pass of the Malibu VLX Wakesetter during semi-displacement mode (Condition 2) testing. The sediment resuspension plume is visible at water depths of 10-11 ft.

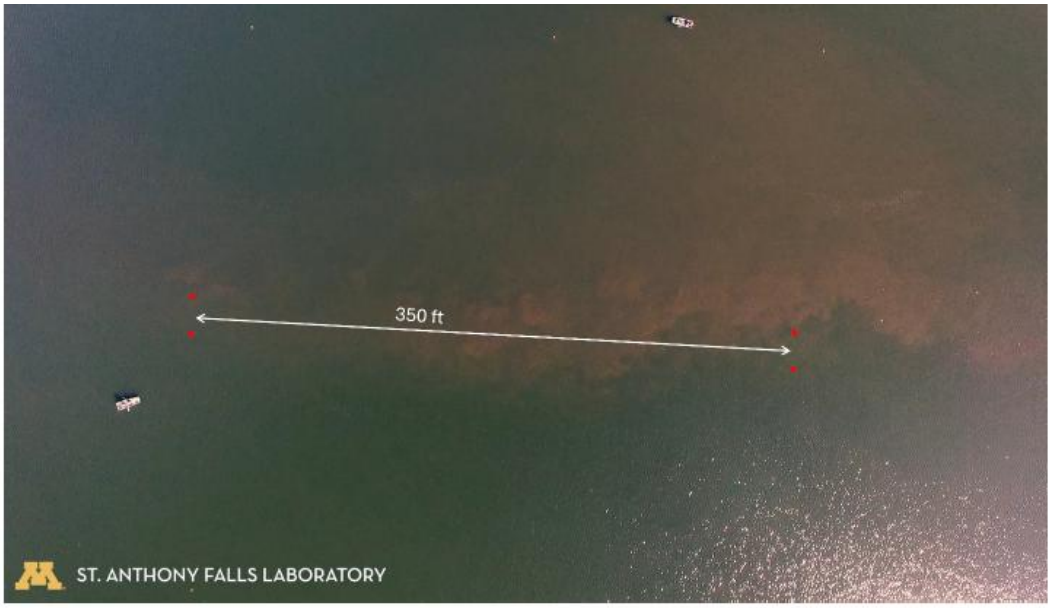


Figure 71. Drone screenshot captured approximately one hour after the first pass of the Malibu VLX Wakesetter under semi-displacement mode (Condition 2). The distance between sensor pads (red buoy goals posts) is 350 ft and provides a visual scale of the plume size.

There were two studies, Fay et al. (2022) and Goudey and Girod (2015) which recommended minimum shoreline distances (200 feet) and operating depths (>10 feet) that were inconsistent with the majority of other studies related to wake boats. These studies are

frequently referenced and discussed in the literature and merit discussion here. Fay et al. (2022) was a computational fluid dynamics (CFD) simulation study funded by the National Marine Manufacturers Association (NMMA) and concluded that the operation of wake boats at a 200-foot minimum distance from the shoreline and depths greater than 10 feet would result in minimal impacts to shorelines and the lake bottom. The Fay et al. (2022) report has been extensively critiqued by multiple authors that identified substantive flaws in the methods and conclusions (Reisgraf et al. 2025, Francis et al. 2023, VTDEC, 2022)

Goudey and Girod (2015) was a field study funded by the Water Sports Industry Association (WSIA) that also concluded that the operation of wake boats at a 200-foot minimum distance from the shoreline and depths greater than 10 feet would result in minimal impacts to the shoreline. However, the results indicate that the wave heights and power produced by wake boats are substantially larger than non-wake boats; for reasons that were not articulated the discussion of these results focused on the greater initial rate of attenuation of wake boat waves rather than the absolute differences in wave height and energy at equivalent distances between wake and non-wake boats. Additionally, Goudey and Girod (2015) stated that impacts to the shoreline due to wake boats are insignificant compared to wind driven waves. However, this study has been criticized for evaluating the impacts of wind driven waves using high wind speeds that occur very infrequently.

MANAGING ENVIRONMENTAL & NATURAL RESOURCE IMPACTS

Because Connecticut is small and densely populated, pressures on the state's water bodies concentrate quickly. Even though Connecticut residents typically value these natural resources and recreational users are some of the best advocates for protecting these places, regular recreational use, if not managed correctly, can have unintended impacts on natural resources.

Protecting Connecticut's water bodies is central to DEEP's mission. While the state's lakes, rivers, wetlands, and shorelines support fish and wildlife habitat, safeguard water quality, and provide the setting for recreation that residents enjoy year-round, they also face constant pressure. Shoreline development, stormwater runoff, legacy pollution, climate change, and the spread of aquatic invasive species all stress lake ecosystems.

The state has invested for decades in clean water, strong fisheries, and protected shorelines. Of course, these successes make our lakes and ponds even more attractive for public enjoyment. The better these resources are protected, the more people want to enjoy them, creating a constant need to balance recreational access with stewardship so the environmental foundation of boating activity stays healthy for the long term.

There are two main factors when it comes to considering the impact of the operation of wake boats: the wake (the energy that moves laterally across the lake) and the propeller wash (the energy that is directed by the propeller in a downward direction towards the lakebed). These impacts are addressed in greater detail in the following sections of this report.

A. Wakes

Wake boats are specially designed to increase the wake height for water sports, and the result is a consistently larger and more powerful wake. The specialized V-shape hull of wake boats is designed to achieve enhanced wakes, and many wake boats also employ devices or tabs that customize or amplify the wake when the boat is underway. Wake boats are also fitted with ballast systems that increase weight and customize wakes. The wake energy dissipates as it travels away from the source but still can have impacts when it reaches the shoreline.

B. Propeller Wash

As described in the definition for "propeller wash," a significant difference between wake boats and other recreational boats is the angle of the propeller wash generated by a spinning propeller. In most recreational boats, the propeller wash is directed straight behind the boat parallel with the water surface, while a wake boat's propeller wash is angled downward towards the lakebed. This is important because the energy generated by the propeller wash when directed towards the lakebed can have adverse impacts on the substrate. Sediments that are churned up by the propeller wash can cause turbidity and nutrient cycling. In turn, these can affect fish spawning beds and aquatic plant and invertebrate assemblages.

The following sections specifically discuss DEEP's findings regarding the potential impacts of wakes and propeller wash on the natural resources of water bodies.

Impacts to Water Quality

Research reviewed by DEEP indicates that wake boats can pose greater adverse effects on lake water quality than other types of motorized watercraft. When ballast compartments are full, wake boats displace more water and create larger wakes than traditional boats, leading to phosphorus resuspension in the water column from lake sediments and decreased water clarity (turbidity). Also, the force of the boat propellers pushing water downwards can disrupt a lake's natural water column stratification process.

Wake boat activity during the summer months may lead to unnatural water column mixing causing nutrient rich water from the bottom layer of a lake (i.e. hypolimnion) to enter the top layer of lake water (i.e. epilimnion) (Riesgraf et al. 2025). This increase in phosphorus can contribute to the acceleration of algal growth and lead to cyanobacteria blooms (Riesgraf et

al. 2025, Orihel et al. 2015). Cyanobacteria blooms can produce toxins that limit recreational activities in which people contact the water – like swimming.

Lakes with shallower depths are likely to be more impacted because wake boat propellers can mix water down to the bottom of the lake more easily. Riesgraf et al (2025) found that at depths of 10 to 15 feet transverse wave velocities produced by wake boats were 2–3 times larger than non-wake boats. Such constant water column mixing from wake boating can adversely disrupt the ecological system of a lake. Dissolved oxygen levels and water temperatures may be impacted as the warm water from the epilimnion is forced down to the hypolimnion layer which is cold and oxygen depleted (Riesgraf et al. 2025).

According to the studies reviewed by DEEP, it is important to consider existing natural resources, bottom substrate, common watercraft types, and local recreation styles when considering management strategies for boating. This, of course, could potentially pose challenges if managers consider a statewide review. While individual municipalities can develop ordinances concerning boating activities on their lakes in light of site-specific conditions such as lake bed substrate composition and other factors, statewide boating management would be better suited to focus on vessel speed, water depth, and distance to shore.[5] However, it should be noted that most lake bottoms in Connecticut are consistently comprised of soft substrates since lakes age with time and accumulate sediment. Propeller wash generated from downward angled wake boat propellers in shallow water can increase the likelihood of scouring the bottom, disrupting aquatic plants, and resuspending sediment. A management technique to reduce this impact to aquatic resources would be to require a minimum water depth for wake boat operation.

One study (Daeger, 2022) observed nutrient resuspension after a wake boat operated in 5 feet of water but found no resuspension by any watercraft in 10–15 feet of water. Other recreational vessels, such as runabouts and inboards, may also be capable of impacts in 5 feet of water on a waterbody which lacks a stabilizing submerged plant, or macrophyte, population.

In summary, DEEP's review of available research concludes that the operation of wake boats can cause impacts to water quality of lakes through turbidity, phosphorus resuspension, and changes to the natural water column stratification process. These impacts can be addressed through management approaches which require operation of wake boats in deeper water. Based on the studies reviewed, DEEP concludes that depth restrictions on wake boat operation – such as limiting the operation of wake boats in wakesurfing or wakeboarding mode to areas at least 10-15 feet in depth – is a reasonable approach to minimize water quality impacts from the activity such as turbidity, phosphorus resuspension from the sediments, and water column de-stratification.

[5] Daeger, 2022.

Impacts on Fisheries Resources

A fisheries textbook defines the field of Fisheries Management as "The manipulation of aquatic organisms, aquatic environments, and their human users to produce sustained and ever-increasing benefits for the people." (Nielsen, 1999) This definition of fisheries management captures the importance of considering the human dimension of fisheries issues in addition to the traditional focus on fish and their habitats. As such, in addition to the impacts on fish and lake habitats, the effects of recreational activities on anglers and other stakeholders should be considered.

It is important to note that the impacts to fish, lake habitats, and anglers are not unique to wake boats and have also been attributed to other styles of motorboats in the literature. The intent of this evaluation is not to attribute all motorboat related impacts to wake boats but instead to identify impacts that are demonstrably greater than traditional watercraft and regulatory approaches that could mitigate them.

Assessment of Potential Impacts on Lake Habitats

The potential for wake boats to impact lake habitats relevant to fisheries resources has been extensively reviewed in reports prepared by other states including a robust report prepared by the State of Michigan (Francis et al. 2023). Relevant excerpts from Francis et al. (2023) that pertain to the disturbance of aquatic vegetation, resuspension of benthic sediments, shoreline erosion/armoring are provided below and supplemented with additional considerations.

Aquatic Vegetation: Excerpt from Francis et al. 2023:

> *Reductions in native aquatic plants will affect fish populations. Aquatic vegetation provides rearing areas for juvenile fishes (Bryan and Scarnecchia 1992), allows for increased fish growth and total fish biomass (Radomski and Goeman 2001; Nohner et al. 2018), and reduces wave energy in the nearshore zone. While there are no studies that directly address the effects of wake boats on aquatic plants, previous research on powerboats provides a basis for inference. For example, Asplund and Cook (1997) documented 20% reductions in aquatic plant coverage due to the physical disturbance caused by recreational boating in Wisconsin, which has similar 100-foot regulations to Michigan. They also found that excluding powerboats from experimental plots dramatically increased aquatic plant biomass, coverage, and shoot height compared to areas with boats. Results indicated that powerboats affected plant growth through scouring of the sediments and direct cutting as opposed to increased turbidity, and it was unclear if the amount of plant material lost would have larger-scale or long-term impacts on the ecosystem (Asplund 2000). Murphy and Eaton (1983) documented an inverse relationship between recreational boating traffic and both submersed and emergent aquatic plant abundance in canals*

> *in British Columbia. Since wake boats produce greater wave energy, propeller turbulence, and sediment resuspension compared to the powerboats observed in these studies, it follows that wake boats could significantly disrupt native aquatic vegetation in inland lakes.*

Resuspension of Benthic Sediments: Excerpt from Francis et al. 2023:

> *Sediment resuspension increases nutrients and decreases water clarity in lakes, subsequently reducing the ability of fish to find food, the depth to which aquatic plants can grow, and the dissolved oxygen content within the water column (Gardner 1981; Canfield et al. 1985; Chambers and Kaiff 1985; Barrett et al. 1992; Irvine et al. 1997; Stuart-Smith et al. 2004; Trebitz et al. 2007). Numerous studies indicate that decreases in water quality (e.g., Jacobson et al. 2008; Phelps et al. 2019) can stress or kill fishes. In addition, as sediments are resuspended and nutrients become available in the water column, excessive algae growth can occur. Boat wakes resuspend sediments, especially fine substrates such as silt or sand, in shallow waters (USACE 1994) and this resuspension increases with wave energy. Existing studies have shown that resuspended sediments caused by powerboats increase turbidity and phosphorus concentrations in rivers, lakes, and shallow experimental ponds (Yousef et al. 1980; Johnson 1994; USACE 1994; Asplund 1996, 1997; Anthony and Downing 2003).*

Additional DEEP Perspective: The increased availability of nutrients such as phosphorus due to the sediment disturbance created by wake boats have the potential to exacerbate nuisance algae and cyanobacteria blooms. The benthic sediments in lakes serve as a reservoir of phosphorus which is a limiting nutrient for the growth of algae and cyanobacteria. Examples of Connecticut lakes which regularly experience nuisance blooms include but are not limited to Bantam Lake, the impoundments of the Housatonic River, Rainbow Reservoir, and Lake Pocotopaug. Nuisance algae and cyanobacteria blooms can result in the loss of recreational opportunities and cause fish kills from oxygen depletion or toxins released by the cyanobacteria. In Connecticut, such blooms are regularly treated with algaecide products such as copper sulfate or peroxide-based products at significant cost to lake communities, municipalities, and other stakeholders. Both products, and particularly copper sulfate, can cause mortality to zooplankton and other invertebrates which are important forage for sportfish and the prey species upon which they rely. Copper sulfate can be used as a contact herbicide, so while the target of the treatments is algae/cyanobacteria there is the potential to impact non-target vegetation. DEEP Fisheries regularly reviews permit applications related to the use of algaecides and herbicides on Connecticut lakes. Algicide treatments have been documented to cause fish kills due to direct toxicity (copper products) and through the depletion of dissolved oxygen caused by the decomposition of dead algae. The increased availability of nutrients caused by the disturbance of wake boats has the potential to increase the frequency of algal blooms and, in turn, bring the negative impacts typically associated with algaecide treatments.

Shoreline Erosion and Armoring: Excerpt from Francis et al. 2023:

> *The effects of wake boats are not the only changes occurring on Michigan's lakes. Shoreline armoring such as seawalls and riprap are being installed throughout the state, and this shoreline armoring reflects wave energy back into the lake as well as laterally toward neighboring properties. Shoreline armoring degrades up to 54% of lake shorelines in some highly populated areas (Wehrly et al. 2012), which are also the areas that receive greater boating traffic. Shoreline armoring increases wave energy in lakes and is often present on lakes with wake boats, thus it exacerbates the effects of wake boats on aquatic resources. These effects are further compounded by the reductions in aquatic vegetation (Radomski and Goeman 2001) and large woody habitat that historically occurred throughout Michigan's inland lakes (Wehrly et al. 2012). Aquatic plants and large woody habitat reduce wave energy in the nearshore zone, so their removal creates circumstances for increased wave.*

DEEP Fisheries regularly reviews permit applications for shoreline stabilization/ armoring projects. The large wakes produced by wake boats have the potential to increase the frequency of such projects and further modify riparian (shoreline) habitats. A secondary consequence of building more shoreline stabilization structures is a potential increase in the frequency and or depth of lake drawdowns requested by lake communities. Drawdowns consist of lowering a lake's water level using water control structures typically during the winter months and are followed by a refilling period. Drawdowns expose benthic habitats for extended periods of time and result the mortality of benthic invertebrates, reduction in aquatic vegetation, shifts in the aquatic vegetation community to species tolerant of drawdowns, reduction in fine sediments in the littoral zone, and reduced nutrient storage in the littoral zone (Carmignani and Roy, 2021). Drawdowns can reduce the use of public boat launches during the target drawdown period and beyond if there an extended refill period due to drought. Lake drawdowns also alter the natural flow regime in streams below the lake because of the large increase in flow during the drawdown and then a later reduction to minimum flows during the refill period. DEEP Fisheries regularly reviews requests for lake drawdowns; the maintenance of shoreline structures is one of the most common justifications for drawdown requests.

Potential Direct Effects to Sportfish

The increased water velocities produced by wake boats along the boat travel path and the areas that such wakes travel have the potential to impact the spawning success of important centrarchid gamefish such as Smallmouth bass (*Micropterus dolomieu*), Largemouth bass (*Micropterus salmoides*), Bluegill (*Lepomis macrochirus*), and Pumpkinseed (*Lepomis gibbosus*). The greater turbulence produced by wake boats has the potential to dislodge eggs/larvae from nests or impact the development and survival of eggs and larvae due to the settling of resuspended sediments onto the nest. During the spring and early summer these species create nest depressions by clearing fine sediments and organic material from areas of sand, gravel, and other coarse substrates in the littoral zone of lakes in water depths of

roughly 10-12 feet or less. Centrarchid species in Connecticut typically nest in calm areas with limited water velocities to protect their eggs and larvae. Smallmouth bass eggs and weak swimming larvae can be flushed from nests at velocities of 0.16-0.72 ft/s; the velocities produced by wake boats can exceed the lower end of this range to a depth of 20 feet and greatly exceed the top end at depths of less than 10 feet (Larimore and Duever 1968, Bestgen, 2018, Reisgraf et al. 2025) Studies related to Smallmouth bass nest failure were more readily available and due to the similarity in habitats and nesting behavior provide a reasonable surrogate for other centrarchids in Connecticut. The rate of Smallmouth bass nest failure was found to increase substantially in years with greater frequency of storms or stronger wind/wave conditions during the nesting season (Goff 1986, Ridgeway and Friesen 1992, Steinhart et al. 2011). Increased incidence of Smallmouth bass nest failure was also documented during periods of high flow in river systems (Lukas and Orth 1995, Reynolds and O'Bara 1991). Lukas and Orth (1995) found that the causes for nest failure were likely due to eggs being flushed from the nest, the nest being buried by sand, or abandonment of the nest by male Smallmouth providing parental care due to elevated water velocity. West and Moore (2025) found that male Smallmouth bass providing parental care spent less time swimming on the nest tending it and more time off the nest displaying aggression in response to a single pass over the nest by a 35-horsepower pontoon boat. Reduced parental care increases the risk of nest failure due to predation. In summary, it is plausible to think that the more powerful wake boats would produce a stronger adverse effect on parental care and greater disturbance to benthic nests due to increased water velocities and sedimentation.

Water Column Mixing and Impacts on Lakes with Coldwater Fisheries

As discussed in the water quality section of this report and in Riesgraf et al. (2025), the stronger turbulence produced by wake boats reaches greater depths than traditional styles of motorboats. This could lead to downward mixing of the warm surface layer of the water column into cooler and deeper areas, which could potentially impact fish species that depend on cooler water temperatures. The potential for wake boat-related water column mixing to disturb the limited summer habitat for coldwater fish species is an area where research is needed. During the summer months lakes with sufficient depth thermally stratify into distinct layers separated by a sharp transition in water temperature and density known as a thermocline. The upper layer (epilimnion) is characterized by warmer temperatures and higher dissolved oxygen content while the lower layer (hypolimnion) has lower temperatures, lower dissolved oxygen content, and greater concentrations of nutrients.

DEEP Fisheries manages a selection of lakes to provide fisheries for holdover Brown trout (*Salmo trutta*) and Kokanee salmon (*Oncorhynchus nerka*). The volume of habitat with suitable temperatures (<19°C) and dissolved oxygen (>4 mg/l) during the summer months is a critical factor in determining whether a lake can support a coldwater fishery. The layer of suitably cold oxygenated water in Connecticut lakes with coldwater fisheries can occupy a narrow portion of the water column that is only 1-7 meters wide (CT DEEP 2017). The narrow band and small volume of summer habitat make coldwater fisheries vulnerable to

disturbance, particularly with the potential of a warming climate to reduce the volume of summer habitat for coldwater species.

The effects of wake boats on water column mixing and the potential for disturbance to critical summer habitats for cold water fish is an area where additional research is needed.

In summary, based on a review of the available literature, there is strong evidence that wake boats are more impactful to the shoreline, lakebed, and water column than other recreational boats. In particular, Reisgraf et al. 2025 asserts that a 10-foot minimum operating depth is insufficient to protect the water column and lakebeds from the impacts of wake boats and recommends a 20-foot minimum depth. A deeper minimum water depth restriction would reduce the impact on the resources as discussed in this section.

Impacts to Wildlife Resources

Wave energy, which is dramatically enhanced by wake boats, can erode, damage, or interfere with wildlife dependent on shorelines and lake bottoms. Connecticut's inland lakes provide critically important habitat for a host of wildlife and plant species. Many of these species are listed in Connecticut's Wildlife Action Plan Species of Greatest Conservation Need (SGCN), meaning they are vulnerable, declining, and in need of conservation action[6]. Disturbance of breeding, foraging, thermoregulation, and metamorphosis from increased intensity and frequency of wave action has the potential to impact wildlife species. Similarly, disturbance to the phenology and reproductive cycles of submerged and emergent aquatic vegetation from increased erosion, sediment suspension (increases to turbidity and nutrient availability), as well as fragmentation of plant material and habitat substrate, due to the increased physical forces of wave action[7], has the potential to impact plant species. Additionally, the introduction of aquatic invasive species is a major threat to aquatic ecosystems statewide with potentially devastating effects on ecological communities in inland lakes (CT DEEP 2025).

Per Connecticut's Wildlife Action Plan water-based recreation can threaten wildlife through shoreline erosion, sedimentation, and displacement of sensitive species. The Connecticut Statewide Comprehensive Outdoor Recreation Plan (SCORP) prescribes that DEEP "Assess, monitor, remediate, and reduce the negative impacts of recreational activities on the environment" in strategy 3I[8]. As discussed previously in this study, wake boats produce waves with more energy than similar-sized powerboats, potentially impacting wildlife and plant species including the following SGCN species listed in Connecticut's Wildlife Action Plan:

[6] Connecticut Wildlife Action Plan, 2025.
[7] Francis, 2023.
[8] Connecticut SCORP, 2024.

- Dragonfly and damselfly species like New England Bluet (*Enallagma laterale*) spend the first part of their lives underwater as predatory nymphs. To transform into adults, nymphs crawl out of the water on the stems of marginal vegetation just above the water level and emerge from their nymphal exoskeletons. Physical disruption during this transformational stage can cause malformed wings and death of the individual. Increased wave energy has the potential to disrupt this process.

- Tiger beetles are active predators that use sandy shorelines for breeding and foraging. Disturbance from wave action can interrupt mate-guarding behavior and disrupt foraging opportunities. This problem is pronounced along the Connecticut River where wakes disrupt habitat for the federally listed Puritan tiger beetles (*Ellipsoptera puritana*), but freshwater lakes host more common tiger beetle species that are similarly vulnerable.

- Freshwater mussels like the Eastern pondmussel (*Sagittunio nasutus),* are filter feeding animals that live on lake bottoms. They are dependent on clean water and stable fish populations which are necessary for their reproductive process. Increased wave energy can cause high levels of turbidity and sedimentation from erosion, which can affect feeding, mating, and mortality of mussels.

- Waterbirds like common loons (*Gavia immer*) build their nests just inches from the water edge of large lakes. These nests are vulnerable to flooding from waves and erosion, which can lead to nest failures.

- At least 37 SGCN plant species occur in habitats that are likely to be negatively impacted including pondweeds and native milfoils that occur in the shallows of lakes. All these are relatively delicate and shallow-rooted and adapted to quiet waters. Also occurring in the lake shallows are emergent species, an important group of plants growing out of crevices in low lake-side marble bedrock outcrops within just a few feet of the normal lake water level. Increased wave action can wash out the tiny accumulation of soil in the crevices on which the plants subsist. Finally, there is a group of SGCN plants that occur in sandy and gravelly lake-shore draw-down zones; these species are small delicate annuals that are dependent on a late natural late summer draw-down of water levels and are not adapted to unpredictable inundation and mechanical energy of large waves.

In addition to direct threats from the energy of the waves, human responses to waves can cause indirect effects. A common response for a waterfront property owner facing shoreline erosion is to armor or harden the shoreline to mitigate the impacts of wave energy. This shoreline hardening can destroy and degrade habitat for shoreline ecological communities.[9] Riprap or other land-water interface barriers can sever the natural connection between terrestrial and aquatic habitats and degrade shallow water habitats on the edges of water

[9] Bilkovic et al. 2017

bodies. These interfaces are crucial for organisms like those listed above which rely on this lake edge interface.

Invasive species are identified in Connecticut's Wildlife Action Plan as a key issue for the conservation of wildlife populations statewide. Aquatic invasive species (AIS) frequently have effects on ecological communities and pose a serious threat to sensitive wildlife. More information on AIS is contained in its own section below.

Based on a review of the data, DEEP concludes that the operation of wake boats is likely impactful to important and sensitive wildlife resources on shorelines and lake bottoms and that this impact can be addressed through restrictions limiting the operation of wake boats in wakesurfing mode to a minimum distance from shore and minimum depth. While a study, funded by NMMA and based on computational fluid dynamics simulations, determined that, "if a wake surf boat is operated 200 ft from shore and in at least 10 ft of water, the environmental impact is minimal"[10], other studies relying on field studies have reported much larger effects[11][12] and raised issues with the methodologies of the simulated impacts[13][14]. Depending on configuration and conditions, wave energy from wake boats take an additional 225-950 feet to dissipate compared to similar boats not configured to generate large wakes[15]. While potentially restrictive to the recreation areas available for boaters, these data suggest that operating wake boats within 500 feet of shorelines subjects these habitats to additional wave energy which can erode, damage, or interfere with wildlife life histories, mapped critical habitats, or known occurrences of state listed species[16]. Additionally, DEEP concludes that additional education and cleaning resources are necessary to limit the spread of aquatic invasive species through ballast tanks, which data show contain large numbers of veliger and are difficult to effectively clean[17].

Implications for Aquatic Invasive Species

Aquatic invasive species (AIS) are non-native plants and animals capable of causing significant ecological, economic, and recreational impacts when introduced into previously unimpacted aquatic ecosystems. Many water bodies across Connecticut have been impacted by AIS with common invasive plant species such as hydrilla (*Hydrilla verticillata* ssp. Lithuanica), Eurasian water milfoil (*Myriophyllum spicatum*), curly leaf pond weed (*Potamogeton crispus*), fanwort (*Cabomba caroliniana*), and water chestnut (*Trapa natans*), as well as common invasive animal species such as zebra mussel (*Dreissena polymorpha*), rusty crayfish (*Orconectes rusticus*), and Asian clam (*Corbicula fluminea*).

[10] Fay et al 2022
[11] Marr et al. 2022
[12] Francis et al. 2022
[13] Riesgraf et al. 2025
[14] Francis et al. 2023
[15] Francis et al. 2022.
[16] Marr et al. 2022.
[17] Doll 2018.

Invasive species are also a major threat to native wildlife as identified in Connecticut's Wildlife Action Plan[18]. These species can spread widely – often aided unintentionally by human activity – in the absence of competitors and conditions present in their native environments. In addition to the economic and recreational impacts discussed elsewhere in this report, invasive species upset the ecology of native communities, outcompeting native organisms for resources, altering natural processes like nutrient cycling, and degrading habitat. These impacts are detrimental to most native species but can especially devastate species that have very specific requirements to maintain healthy populations.[19]

Boats are one of the common vectors by which AIS are spread within and between water bodies. When plant fragments, seeds, other plant propagules, mussel veligers, or small organisms get stuck to or trapped within wet areas aboard boats they can be carried to new locations and deposited there. Wake boats pose a particularly increased risk to the transmission of AIS compared to other common recreational vessel types due to their large ballast tanks which are designed to be filled and emptied directly into water bodies and are often difficult to completely drain. If not sufficiently cleaned, drained, and dried or otherwise effectively decontaminated, ballast tanks have the potential to transport live plant fragments or organisms suspended in residual water over long distances and long time periods.

In addition to concerns about transporting AIS in ballast tanks, the downward-directed propeller wash and increased wave energy produced by wake boats can also contribute to the spread of AIS. These forces can break apart plants, stir up sediments, and lift AIS fragments into the water column that would otherwise remain sedentary, increasing the chances that these species drift, spread, and become established in new areas

From the Michigan study:

> *Wake boats can increase the likelihood of vector transmission through their large ballast tanks which can be filled from or emptied directly into the water body they are operating on. For example, research has shown that ballast tanks from wake boats operated on a lake with the invasive Zebra Mussel Dreissena Polymorpha typically carried 247 Zebra Mussel veligers per sample (Doll 2018), which was much greater than stern drive motor compartments (13 veligers per sample), outboard motor lower units (1 veliger per sample), live wells, or bilges. Although wake boat ballast tanks are typically emptied before trailering, they are rarely ever completely dry which increases the survival time for invasive species potentially trapped inside. Doll (2018)*

[18] Connecticut Wildlife Action Plan, 2025.

[19] To prevent the spread of aquatic invasive species, DEEP may want to consider requiring that wake boats remain within a home lake for a calendar year and that they can only be moved between water bodies when ballast tanks are cleaned according to Clean, Drain, Dry methods such as instructed in this Vermont flyer.

> *found that 5% of zebra mussel veligers remained alive in ballast tanks after 48 hours. Furthermore, the greater propeller turbulence and increased scouring caused by wake boats may result in fragmentation and proliferation of aquatic invasive plants already found in the waterbody (Keller 2017).*[20]

The disturbance caused by wake boats can potentially result in the fragmentation of invasive aquatic plants and potentially exacerbate the spread of these species. It is important to note here that Connecticut state law[21] prohibits the transportation of vegetation and AIS on any trailer or vessel and other state regulations[22] make it illegal to possess AIS.

The National Marine Manufacturer's Association's public comment letter provided additional content on AIS:

> *The recreational boating industry has proactively addressed [AIS issues] through voluntary yet widely adopted design and education standards that go far beyond what regulation requires.*
>
> *A leading example is the American Boat & Yacht Council's (ABYC) Technical Information Report T-32: Design and Construction in Consideration of Aquatic Invasive Species (2021). This report outlines best practices for boat and trailer design to minimize the risk of AIS transport — including recommendations for self-draining hulls, accessible ballast systems, easy-to-clean surfaces, and clear owner education on "Clean, Drain, Dry" procedures.*
>
> *While T-32 is a voluntary standard, it has become a de facto industry norm. The majority of recreational boat manufacturers have implemented its recommendations, and 100% of NMMA-certified manufacturers comply with ABYC standards, including T-32, as part of NMMA's comprehensive certification program. This means that every NMMA member boat and engine manufacturer—representing over 85% of all boats sold in the U.S.—already meets or exceeds AIS design considerations through proactive self-regulation.*
>
> *This industry-wide commitment demonstrates that the marine manufacturing community is not waiting for mandates — it is already designing, building, and educating to prevent AIS spread. Through continued collaboration with DEEP and stakeholder groups, these voluntary standards can serve as the foundation for effective, consistent statewide AIS prevention strategies without imposing duplicative or punitive restrictions on one category of boats.*[23]

---

[20] Francis, 2023

[21] CGS Section 15-180

[22] RCSA Section 26-55-5

[23] The NMMA comment letter references the American Boat & Yacht Council's (ABYC) Technical Information Report T-32: Design and Construction in Consideration of Aquatic Invasive Species (2021). This report is not

DEEP Boating Education Regarding Aquatic Invasive Species

Through its boater education programming, DEEP has a two-pronged approach to the education of boat owners – including wake boat owners – on the threats of AIS in Connecticut: (1) safe boating course requirements and (2) programmatic outreach. As part of this study, DEEP reviewed these two approaches to determine if there are opportunities for improvement in AIS messaging as it relates specifically to wake boats.

Safe Boating Class: To operate a sailboat 19.5 feet in length or more or a power boat, Connecticut residents are required to obtain a valid boating certificate. This can be obtained by attending a state-approved safe boating class offered by DEEP Boating staff, DEEP volunteer instructors, or DEEP-approved private providers. DEEP Boating has created a standardized classroom presentation that is used by all DEEP instructors. DEEP also offers a Safe Water Skiing Endorsement which enables boaters to legally tow a water skier in Connecticut (including, by definition, a wake surfer or wake boarder). For this study, the presentation content for both the class and the endorsement was reviewed for AIS content specific to wake boats and DEEP Boating identified that there are five slides in the course, including one video that address AIS. However, it was determined that the presentation does not include any text or instructor prompts which specifically mention wake boat ballast tanks as a potential vector for transmission. The DEEP Boating Education & Outreach team will be working to update the presentation and instructor notes for the 2026 boating education season. This has been included as a recommendation to come out of this study.

General AIS Outreach: DEEP Boating has a robust outreach program ranging from printed publications, social media, in-person speaking engagements, and industry and trade show booths, to name a few. Much of the outreach materials include information regarding the "Clean, Drain, Dry" method which is a national effort to educate boaters on how they can prevent the spread of AIS. DEEP Boating and DEEP Fisheries also hire seasonal staff to interact with boaters in the field to further educate them on proper inspection techniques to prevent AIS transmission. During these field interactions, seasonals encourage boaters to conduct the inspections each time they retrieve their vessel. The "Clean, Drain, Dry" technique is relevant to all vessels including wake boats and their features such as ballast tanks. The DEEP Boating Division has reviewed its publications and printed outreach materials and have identified a few publications and presentations which could be improved or expanded to better identify the specific issue associated with AIS and ballast tanks on wake boats. This has been captured as a recommendation to come out of this study.

In summary, there are opportunities for better communication of AIS threats from DEEP to Connecticut's boaters – in particular wake boat owners. This study finds areas for

---

available without paid membership to ABYC. While the report was facilitated by ANSI to ensure voluntary consensus-based standards were met, the report has not been independently reviewed or verified by DEEP officials.

improvement of education in Connecticut's Safe Water Skiing Endorsement education program to include specific curricula on the topics of wakesurfing and aquatic invasive species; in Connecticut's Safe Boating classes; and in outreach publications where DEEP could include specific references to educating owners of wake boats about AIS.

IMPACTS TO SHORELINE PROPERTIES AND STRUCTURES

All waterfront properties are at some risk due to increased exposure to flooding, wave action, and erosion, leading to costly damage, higher insurance premiums, and potential loss of land or waterfront structures. These risks can be exacerbated by climate change, leading to more frequent and intense natural disasters and storm systems. Human activities which increase the energy and frequency of waves hitting shore will only amplify these impacts.

DEEP reviewed available literature and relevant public comments to assess the potential effects of wakesurfing and wake boating on shoreline property and structures. The study by Francis, et al (2023) reveals that wakes produced by a wake boat generated more energy than waves produced by the same vessel operated in cruising mode at 100 feet.[24] Operating in wakeboarding mode increased wave energy by 68% while operating in wakesurfing mode increased wave energy by 581%. Shoreline properties are at greater risk from waves generated from wake boats, which impact shore with a greater force than natural wind-driven waves or wakes from other vessels.

A study conducted in Maryland (Bilkovic et al 2017) considered the state of the science of boat waves on shoreline stability, erosion, turbidity, and shoreline armoring patterns. The authors found that boat wake energy may be linked to elevated turbidity and shoreline erosion, particularly in narrow waterways.[25] In Michigan, authors found that wake boats create larger wakes than traditional watercraft, therefore the greater energy of waves created by wake boats operating in wakeboarding or wakesurfing mode are likely to exacerbate boat wave-induced shoreline erosion.[26]

Another study (Goudey, 2015) examined the impact of wake boat-generated wakes on shorelines. The study found that at 200 feet, the wave energy of a boat in wakesurfing mode is akin to that of a 20mph wind blowing naturally over a mile of water, and that wave energy dissipates quickly as it moves further from the vessel. Other peer-reviewed studies, including those analyzed by Endicott Fay (2022), suggest that wakesurfing conducted at least 200 feet from shore and in 10 feet of water produces wake energy equivalent to natural wind-driven waves. Further modeling from MacFarlane et al. (2023) and Goudey (2015) demonstrates that wake energy dissipates rapidly with distance, and that properly managed

[24] Francis et al, 2023.
[25] Bilkovic, 2019
[26] Francis et al, 2023

wake sports have no measurable increase in shoreline erosion or turbidity compared to traditional motorboat activity.

However, other studies such as Mercier-Blais (2014) used statistical models to determine that the distance required for wake boat-generated waves to dissipate is substantially further at 984 feet. These findings are supported in the study conducted by Water Environmental Consultants (2021), who determined that waves from a wake boat in wakeboarding and wakesurfing mode would need distances of 225 feet and 950 feet to dissipate, respectively.[27]

DEEP notes that several public comments received on this study indicated reports of damage to shoreline structures including seawalls, docks, and vessels berthed at docks. The commentors attributed the increase in damage to the operation of wake boats with repeated passes or operation too close to the shoreline.

The studies collectively reveal one consistent finding: the negative effects of wake boats diminish correspondingly as a wake boat operates further from shore. Implementing a minimum distance from shore where wake boats could operate at greater than slow-no-wake speed would allow more time and distance for wave energy to dissipate. This would decrease the likelihood of potential damage to nearshore areas and structures.

Most relevant studies (Mercier-Blais, 2014; Ray, 2020; Water Environment Consultants 2021; Marr et al., 2022) show that an operating distance of at least 500 feet is necessary to eliminate impacts to the shoreline and shoreline structures. Other studies provided evidence for a range of operating distances from 400 feet (Macfarlane et al. 2018) to near 1,000 feet (Mercier-Blais, 2014; Ray, 2020; Water Environment Consultants 2021). DEEP's assessment of the available studies at this time is that some buffer zone requirements are appropriate and would likely be effective tools to mitigate impacts on aquatic natural resources and shoreline structures.

Based on a review of the data and public comments, it is evident that the wakes generated from the operation of wake boats – when employing ballast tanks or other wake enhancing devices – can have adverse impacts on shoreline property and waterfront structures. These impacts can be addressed by creating a buffer between the area of operation and the shoreline and by restricting access of these vessels from small bodies of water. In practice, a 200-foot setback from shore would require at least a 400-foot-wide waterbody (i.e. a 200-foot setback on either side of the vessel) for the length of the pass and, presumably, with a wider area on either end of the run to allow for a turning radius. A 200-foot buffer would align with the existing regulation in RCSA Section 15-121-A15 which requires PWCs to operate at least 200 feet from shore in Connecticut. A minimum waterbody size for this activity should also be considered.

[27] Francis, J.J. et al, 2023

IMPACTS ON NAVIGATION AND BOATER SAFETY

The public comments provided numerous reports of wake boats creating adverse boating conditions for those on the water, especially for non-motorized vessels navigating on Connecticut's inland water bodies. Smaller vessels such as SUPs, canoes, kayaks, rowboats, and small sailboats are all vulnerable to the effects of wake boats because they have a low freeboard which is the vertical distance between the waterline and the top of a boat's hull or gunwale; they tend to be lightweight; and they can be difficult to maneuver quickly. Large wakes can cause swamping, which is when a boat fills with water that enters the boat over the gunwales; create a risk of capsizing; send smaller boats off course into dangerous areas; and cause the need for continuous bracing for waves creating fatigue and anxiety. In addition to these non-motorized vessels, other motor boaters routinely also passively recreate on Connecticut's waters by drifting or anchoring to fish, picnic, swim, or just enjoy the sun. When not under power these passively recreating motor boats can also be dangerously rocked by a wake boat operating within close proximity – or compounding the effects when more than one wake boat is operating nearby.

Here is a sample of some of the public comments received on this topic:

- "I am an avid angler and fish Candlewood Lake very often. The issues of wakeboarding is becoming very dangerous on this body of water in particular. They will run right next to you while fishing with no regards for safety or courtesy of angler."
- "The size and force of the wakes can pose hazards to smaller watercraft, paddlers, anglers, and swimmers. These conditions can make the lake less enjoyable and more dangerous for other users."
- "The wakes and subsequent wave action is dangerous or disruptive to fishermen, kayaks, canoes, swimmers, paddle boards and most boaters. We use a 20' pontoon on the lake and have been bounced around many times and perhaps dangerously so when passed on both sides simultaneously."
- "Wake boats generate large, artificial wakes that create dangerous conditions for other lake users — especially fishermen, kayakers, paddleboarders, and swimmers."

From a boating safety data perspective, DEEP considered recent boating accidents reported to DEEP. Between 2015 and 2025, DEEP's boating incident data reveals a total of 26 reportable boating incidents statewide with "wake" as the primary contributing factor of the incident. Of these 26 incidents, there was one fatality (exposure to elements) and 19 other injuries. It is important to note that neither the fatality nor the injuries were attributed specifically to wakes caused by wake boats, but the data shows that any wakes can cause dangerous situations for boaters on the water.

To increase safety while encountering waves or wakes while operating a paddlecraft, DEEP recommends that boaters follow the best available safety practices. First, boaters should turn the bow of the vessel to a 90-degree angle into the wake or wave and keep paddling

through it. Maintaining forward momentum helps the vessel cut through the wave rather than being pushed sideways and significantly reduces the risk of swamping or capsizing. For additional stability, paddlers are encouraged to lower their center of gravity by staying low in their vessel. This can be accomplished by the paddler dropping to their knees, especially when operating an SUP or canoe. When combined with pointing a vessel into the wave, lowering body position increases balance and control, particularly when navigating through larger waves or boat wakes.

While boating safety education can assist a paddler's understanding of the best way to negotiate wakes encountered on the water, DEEP must also seek to address wake impacts on all users of the waterway. Generally, as wakes dissipate over distance, it would follow that larger water bodies would be more appropriate where wake sports and other boating activities can be conducted further apart. To minimize on-water user conflicts, DEEP recommends the consideration of restrictions for the operation of wake boats while employing ballast tanks or other wake enhancing devices to water bodies greater than 100 acres. As mentioned above, and as displayed in the table later in this study, some other states have already adopted minimum lake size to manage the conflict between recreational users. For example, Tennessee has an existing law that requires a minimum lake size of 50 acres to operate wake boats and Vermont requires a minimum of 50 acres of contiguous lake area after distance from shore and lake depth requirements have been met.

For Connecticut, restricting wakesurfing to lakes of 100 acres or greater would align with several existing water-skiing bans on smaller water bodies in state regulation and local ordinance. These include Long Pond (99 acres) Burr Pond (85 acres), Halls Pond (83 acres), Eagleville Lake (80 acres), Park Pond (77 acres), Holbrook Pond (73 acres), North Farms Reservoir (64 acres), Hatch Pond (62 acres), Pattaconk Lake (56 acres), Lake Chaffee (54 acres), Gorton Pond (52 acres), Avery Pond (51 acres), Ashford Lake (50 acres), Bush Pond (50 acres), Beachdale Pond (46 acres), Morey Pond (45 acres), Higganum Reservoir (32 acres), Dooley Pond (28 acres). Larger Connecticut water bodies with existing water-skiing restrictions include Mansfield Hollow (500 acres), Lakeville Lake/Wononscopomuc Lake (353 acres), West Hill Pond (239 acres), Powers Lake (153 acres), Babcock Pond (146 acres), and Hopeville Pond (137 acres). Recent municipal ordinances have also enacted restrictions on wake-enhancing devices or the activity of wakesurfing on some larger water bodies including Lake Waramaug (656 acres), Moodus Reservoir (486 acres), and Bashan Lake (273 acres).[28]

The public comments and study recommendations for restrictions of wake boat operation within certain distances from shore and in minimum water depth create a potential unintended consequence that merits consideration. When various restrictions are overlaid together, it can create an excessively limited lake surface area for operation of wake boats. On some lakes, this could potentially concentrate the activity of multiple wake boat operators into much smaller areas, thereby operating in too close proximity to each other or

[28] Note that any *water skiing* bans or restrictions include the activity of wakesurfing or wakeboarding.

creating compounded wakes and dangerous transiting situations for other boaters. This must also be considered as a potential navigation safety issue and could be ameliorated with a minimum wake boat operation zone of 50 contiguous acres – even on lakes that meet other minimum criteria such as 100 acres.

DEEP also considered the safety aspects of the activity of wake surfing which is considered a lower risk water sport. Once a wake surfer is riding the wave, they drop the tow rope which is pulled into the vessel. As they are surfing without the use of a tow rope, any risk of tow rope tension injuries and entanglement injuries is eliminated. Since a boat towing a wake surfer is generally traveling at approximately 9-11 miles per hour, a wake surfer fall will occur at a much slower speed and with much lower force than traditional water skiing. This reduces the potential risk of high-impact injury and trauma. Also, with the slower speed of the boat, the reaction and retrieval time to return to the surfer in the water is greatly reduced, thereby improving safety for the fallen surfer when in the water especially on busy waterways.

In summary, DEEP has navigational and safety concerns regarding the larger wakes generated by wake boats. Non-motorized craft – including kayaks, canoes, SUPs, rowboats, and small sailboats – are particularly vulnerable to large wakes due to their low freeboard, light weight, and limited maneuverability. Even motorized boats that are drifting or anchored can be dangerously rocked, especially when multiple wake boats operate nearby. Public comments support issues associated with wake boats when passing too close to other waterway users, causing hazardous and disruptive wave action. Because wakes dissipate over distance, larger lakes are better suited for wake sport activities. To reduce user conflicts and improve safety, DEEP suggests considering restrictions on wake boats using ballast or wake-enhancing devices on lakes smaller than 100 acres. This threshold would align with many of Connecticut's existing water-skiing restrictions.

RECREATIONAL IMPACTS

As of 2024, Connecticut has over 88,800 registered vessels which are comprised of sailboats that exceed 19.5 feet in length and motorboats. As Connecticut does not require registration of SUPs, canoes, kayaks, rowboats, and small sailboats, there is no precise estimate for the total number of these non-motorized vessels which are owned or operated in Connecticut. However, DEEP estimates Connecticut residents own and use several hundred thousand paddlecraft in the state.

Impacts to Anglers and Angling Experience

Anglers represent a large and important recreational user group and constituency. In Connecticut, anglers generate a substantial amount of economic activity by spending $2 billion annually, which contributed $175 million to state and local taxes, and supports nearly 15,000 jobs (ASA, 2025). In a 2023 outdoor recreation survey, 23% of Connecticut

households were reported to have participated in freshwater fishing; for water-based activities this was only exceeded by activities at the beach and swimming (CT DEEP, 2023). Spending by anglers supports fisheries conservation through license sales and by way of excise taxes collected on fishing equipment and supplies funding to the U.S. Fish & Wildlife Service's Sport Fish Restoration and Boating Fund. As such, angler satisfaction and the extent to which it is impacted by wake boats is a worthy consideration for fisheries managers.

Angler satisfaction can be impacted by recreational boat and PWC traffic that interferes with fishing activities or the expectation of a more tranquil outdoor experience (Schroeder and Fulton, 2010). In response to conflict with other boaters and PWC operators, anglers have exhibited coping mechanisms that include shifting fishing effort to times and locations where boat traffic is less prevalent (Schroeder and Fulton, 2010). Displacement from preferred fishing locations is of concern to anglers as fish are not equally distributed throughout the lakes and can have small home ranges or exhibit seasonal preferences for specific habitat features (Driscoll and Smith, 2024).

Compared to other areas of the country, Connecticut's lakes are generally smaller, which can make it difficult for anglers to avoid exposure to the effects of wake boats. Anglers fishing along the shoreline experience impacts from large wakes breaking in shallow areas. In lakes with coldwater fisheries, anglers targeting trout and kokanee salmon often fish in open water areas away from the shoreline. Anglers targeting largemouth and smallmouth bass have traditionally targeted nearshore areas but in recent years have increasingly been targeting these species in open water areas as fishing tactics and recreational sonar have evolved. These anglers are more likely to cross paths with active wake boats. The noise and turbulence produced by boat traffic can alter fish behavior, causing them to avoid the area of disturbance and reducing feeding activity which in turn reduces angler catch rate.

Boats and paddlecraft used for fishing inland waters are typically small and many styles have low gunwales. Large wakes can result in severe rocking or pounding that reduce angler comfort and safety as well as cause damage to an angler's equipment or vessel. DEEP has received reports from anglers about wakes breaking over the side of low gunwales on bass boats and the vertical heave from wakes driving trolling motors into the lake bottom or obstructions resulting in damage.

In recent years, there has been substantial growth in the number of kayak-based anglers. Paddlecraft represent an affordable and low impact way for anglers to explore the lakes of Connecticut. In a 2023 outdoor recreation survey, 22% of Connecticut households were reported to have participated in canoeing, kayaking, and paddleboarding (CT DEEP, 2023). Smaller paddlecraft such as SUPs, kayaks, and canoes are particularly vulnerable to the larger wakes which can swamp or capsize small craft. Concerns related to safety and comfort in paddlecraft and small boats were prominently featured in the public comments received in relation to this and numerous other studies related to wake boats.

Considering the popularity of a variety of recreational activities on Connecticut waterways, user conflicts are inevitable. From towed water sports, paddling, rowing, sailing, fishing, and cruising, every user has a perspective of their ideal water conditions. With the increasing popularity of wake boats, the waterways have a new variable in the mix with sizable wakes. To reduce user conflict between recreational vessels on the water, it would be prudent to require that wake boating occur only on lakes that have the capacity to have multiple users of various boating types to ensure there was sufficient space to operate and be setback from each other. Therefore, DEEP should consider restricting wake boating to larger bodies of water such as lakes larger than 100 acres in size.

ECONOMIC CONSIDERATIONS

Connecticut's $5.5 billion outdoor recreation economy is the second largest in New England and grew by 9.2% in 2023, outpacing the national average of 9% and demonstrating a continued trend of strong growth since the pandemic. Boating/fishing, as combined by the U.S. Bureau of Economic Analysis (BEA), is the largest contributor to Connecticut's outdoor recreation economy.[29] In recognition of this economic impact, in 2024 DEEP launched a new, interactive State Parks website, Governor Lamont and the Legislature committed an historic $70 million to the Restore CT State Parks initiative, and most recently DEEP established the Connecticut Office of Outdoor Industry & Experiences.

As DEEP works towards establishing and growing the outdoor industry in Connecticut, the Office of Outdoor Industry & Experience seeks to partner with private sector vendors to provide new or expanded outdoor recreation experiences in Connecticut State Parks, to expand and protect equitable access to outdoor recreation experiences, and to promote Connecticut both as an outdoor recreation tourism destination and as a place to live, work and play outside. One partnership envisioned through the Partnerships in Parks initiative is for vendors to offer paddlecraft rental services including canoes, kayaks, and SUPs at multiple State Park locations.

Having equipment rental vendors in the State Parks will enable people who may not otherwise have the means or experience to get on the water. Paddlecraft rentals will likely be of most interest to beginners, who may not have any experience navigating wakes by any type of motorized vessel. To ensure patrons have a positive experience, safety and quality must be top priorities. While vendors will be responsible for customer safety, training, and familiarity with the local waterway, DEEP may want to consider the impact of boat wakes near paddlecraft rentals. Doing so would reduce the potential of negative recreational experiences or safety concerns of people renting/using paddlecraft. Further, if the patrons experience is negative, vendors of such services may receive negative reviews and lose customers. Depending on the waterbody and relevant motorized boating activity, DEEP may want to consider enacting site-specific slow-no-wake zones in areas adjacent to vendors

[29] https://apps.bea.gov/data/special-topics/orsa/summary-sheets/ORSA%20-%20Connecticut.pdf

offering paddlecraft rentals in Connecticut State Parks. These slow-no-wake zones could allow beginners to paddle in relatively calm waters adjacent to the rental business, while allowing more experienced paddlers to venture further into the waterbody where wakes are unregulated. Minimizing user conflict is always important, but even more timely as DEEP seeks to launch new paddlecraft rental services in multiple state parks.

Connecticut offers a wide variety of outdoor sports and activities which contribute to the strength of the outdoor recreation economy. DEEP supports tourism and marine-related industries in Connecticut and recognizes that overly restrictive boating regulations can adversely impact economic growth and activity. With the smaller geographical size of our state, DEEP also recognizes that boaters can easily opt to seek alternate recreational opportunities in our neighboring states if desired. Wakesurfing is a growing outdoor recreation activity that is popular with many users across the state and contributes to Connecticut's economy and quality of life for residents.

In summary, boating and fishing are the foundations of Connecticut's outdoor recreation economy as measured by the U.S. BEA. Wakesurfing and wake boat use contribute to this important economic sector and, where appropriate, should be allowed to continue. However, wakesurfing should be regulated in a way that still allows the activity to continue to occur while minimizing impacts on other outdoor recreation users and the environment.

ENFORCEMENT CONSIDERATIONS

DEEP Environmental Conservation (EnCon) Police Division is the statewide agency responsible for enforcement of state boating laws[30] and they have substantial experience conducting law enforcement on the water. EnCon Police have reviewed the wake boat laws in other states and the suggested management approaches included in this study, above, including distance-from-shore, minimum water depth, and minimum lake size in the context of an EnCon Police officer's ability to enforce laws in the field.

Wake boat operational restrictions from shore, or of a dock, pier, float, or anchored or moored vessel, are relatively straightforward to enforce and are consistent with other current regulatory structures in Connecticut. For example, EnCon Police currently have the responsibility to enforce a 100-foot buffer from shore for any vessels above slow-no-wake operation under RCSA Section 15-121-B14 and a 200-foot buffer from shore for the operation of PWCs above slow-no-wake speed under RCSA Section 15-121-A15(4). While the impacts associated with the operation of recreational vessels, PWCs, and wake boats are different, the enforcement of distance-to-shore is a capability that EnCon Police already have. A recommendation of aligning wake boat distance-to-shore with the existing 200-foot PWC distance-to-shore rules would create a standard that would be clear and consistent for law enforcement officers. EnCon Police also suggest consideration of implementation of

[30] CT DEEP EnCon Police do not have the authority to enforce municipal ordinances.

statewide standards, rather than water body-specific rules through regulations or ordinances – as this would provide consistency and uniformity for officers and for wake boaters who visit different water bodies. EnCon Police suggest that minimum lake size would also be easily enforceable in practice as any lakes which do not meet the minimum threshold could be identified as "no wake sport" lakes. These could be advertised in the Connecticut Boater's Guide and signage posted at state boat launches.

However, EnCon Police have concerns about implementing restrictions on minimum water depths due to enforceability issues in the field. EnCon Police raised concerns that, without additional mapping resources, enforcing any restrictions on minimum water depths may be very difficult, as depths are not always easy to ascertain for either the operator or the officer in the field. Not all vessels are equipped with depth finders and contours displayed on maps or charts can change throughout the season due to natural variations in water levels, particularly on water bodies that are affected by, or rely heavily on, rainfall. Additional resources such as "wake sport zones" as mapped out by the by the State of Vermont[31] would be necessary to ensure appropriate enforceability of water depth requirements. As discussed in an earlier section of this study, EnCon Police are also concerned about distance-from-shore and water-depth restrictions causing a concentration or congestion of boating activity in small allowable areas that meet the allowable criteria.

On December 2, 2025, DEEP staff held a virtual meeting with law enforcement representatives from three other New England states which have existing or proposed wake sport laws in their states. Lt. Irwin C. Malilay (New Hampshire State Police, Marine Patrol Bureau), Lt. Jason Luce (Maine Warden Service, Dept. of Inland Fisheries & Wildlife) and Sgt. Jacob Metayer (Vermont State Police Marine Division) provided insight into the wake boat law enforcement situations in each of their states. DEEP also heard about the difficulty of enforcing existing setbacks from shore for headway speed (i.e. slow-no-wake) and minimum-depth requirements in the absence of additional resources such as prepared wake sport zone mapping.

CONNECTICUT BOATER EDUCATION

Any resident or person owning real property in Connecticut or a boat required to be registered or numbered in the state must obtain a Safe Boating Certificate (SBC) or Certificate of Personal Watercraft Operation (CPWO) before operating any vessel required to be registered or numbered. Owner/operators of documented vessels or out-of-state registered vessels other than PWCs may use Connecticut waters for no more than 60 days in a calendar year without registering the subject vessel in the state. If operating more than 60 days in a calendar year, the vessel must be registered, thereby invoking the requirement for the operator to obtain a Connecticut-issued SBC or CPWO.

[31] See https://dec.vermont.gov/watershed/lakes-ponds/vermont-use-public-waters-rules/wakeboats

An SBC will allow an individual to operate any recreational vessel excluding PWCs on Connecticut's waters. The SBC course was taught from 1990 to 1999. If a customer presents an approved SBC diploma, DEEP will honor the diploma as meeting educational requirements for the operation of recreational boats only. In 1999, a combination course was introduced by DEEP, which included education of all recreational vessels, including PWCs. Successful completion of the combination course allows a student to purchase their CPWO. Boaters with an existing SBC may complete a stand-alone PWC upgrade course to be eligible to purchase their CPWO.

Students in the CPWO course must successfully complete a Connecticut -approved boating course by attending an 8-hour course and passing a proctored exam with a score of 80% or greater. Topics included in each course include registration, certification, towing, anchoring, PFD requirements and fit, visual distress equipment, fire prevention, sound signals, carbon monoxide, hypothermia, boating under the influence, aquatic nuisance species, rules of the nautical road, safety equipment, aids to navigation, speed regulations, age restrictions, towed water sports, and the operation of other vessels including PWCs and paddlecraft.

Effective July 2012, CGS Section 15-140e was amended to require safe boating courses to include instruction on the proper means of inspecting a vessel and trailer for the presence of AIS, as well as best practices for removal and disposal. The statute requires that any course in safe boating operation approved by DEEP include:

> *instruction on the proper means of: (1) Inspecting a vessel and trailers used for transporting such vessels for the presence of vegetation and aquatic invasive species, as determined by the commissioner pursuant to subsection (a) of* section 15-180*; and (2) properly disposing of such vegetation and such aquatic invasive species*. CGS Section 15-140e(h),

All boating education courses – conducted by DEEP personnel, DEEP volunteer instructors, or private providers – must be approved by the DEEP Boating Division. Therefore, DEEP has the ability to update statewide boating education course materials and instructor guidance to ensure that responsible wake boat operation and courtesy on the water is delivered to all students regardless of provider.

While towed sports education has always been included in Connecticut's safe boating courses, CGS Section 15-140f was amended in 2014 to require that all CPWO courses approved by the Commissioner resulting in a Connecticut boating certificate must contain information and assessment regarding towed water sports to qualify for the Safe Water Skiing Endorsement. CGS Section 15-140e states that beginning October 1, 2015, vessel operators engaged in towed sports must meet the additional requirement of a Safe Water Skiing Endorsement (SWE).

The following list are the SWE requirements to operate a vessel that is engaged in tubing, water skiing, or wakesurfing in Connecticut: (1) be at least 16 years of age; (2) possess a valid

USCG-issued vessel operator license or a valid boating certificate issued by CT, MA, NH, NY or RI; and (3) possess a Connecticut Safe Water Skiing Endorsement issued by CT DEEP. Boaters who are under the age of 16, or who do not have a valid license issued by the USCG or a valid boating certificate issued by CT, MA, NH, NY or RI, are not eligible to operate a vessel engaged in tubing or water skiing.

Water skiing-related topics covered in the stand-alone and combination courses include Connecticut specific laws on towing (i.e. age, line length, observer, endorsements, etc.); responsibilities and requirements of the vessel operator; responsibilities and requirements of the person being towed; and recognized safety practices for towing (lookout, towing in areas clear of obstruction, engine shut off, etc.). The SWE education has been included in combination courses beginning October 1, 2015, and the endorsement is issued upon purchase once the operator meets all requirements. Students who took a Connecticut-approved safe boating course, but did not purchase their boating certificate - SBC or CPWO - prior to October 1, 2015, must take the stand-alone course to receive the mandatory towed water sports education and earn a SWE. The stand-alone course is on-line and available to anyone who needs a SWE and meets the SWE requirements for age and possession of a valid boating certificate.

One of the best ways to promote recreational boating safety is through education and outreach. Education and outreach campaigns are an important component of a comprehensive approach to protect various water bodies and all users from the impacts of enhanced wakes. The inclusion of safe wake boat operation in approved Connecticut safe boating courses is of the utmost importance to educate all users on best practices. DEEP Boating has reviewed its boating safety course curricula and has determined that additional – or more specific – wake boat content could be included. The DEEP Boating Education and Outreach team should also consider developing new outreach materials to improve awareness of on-water courtesy and implementation of any new wake boat-related laws or regulations that may result from this study.[32]

OTHER STATES' WAKE BOAT MANAGEMENT

DEEP considered how other states are currently managing wake boat impacts to recreational users, shoreline structures, and habitat. Currently, two states have implemented water depth requirements – Maine (15 feet) and Vermont (20 feet). Currently, eight states have implemented laws or regulations that require wakesurfing setbacks from

[32] Other recreational boater education resources exist for towed water sports including: the "Wake Responsibly" campaign promoted by the Water Sports Industry Association (WSIA) and National Marine Manufacturer's Association (NMMA); WSIA has also partnered with the Emily Catherine Fedorko Foundation to develop a towed sports safety video; and the National Safe Boating Council which is a national organization that aids in developing a safe boating culture by providing educational resources, outreach programming, and training opportunities for industry partners and the boating community to influence safe, secure, and responsible boating.

shore. These include Alabama (100 feet, 200 feet, or 400 feet, based on the waterbody), Georgia (200 feet), Maine (300 feet), Maryland (200 feet), Pennsylvania (200 feet), Tennessee (200 feet), South Carolina (200 feet) and Vermont (500 feet). However, if increased wake boat buffer distance requirements are instituted on smaller lakes, there may be less space for wake boats to operate thereby concentrating the activity into a smaller space. This situation can be compounded if a lake has large shoals or shallow water areas that would further restrict boat use across its overall acreage. Two states have already implemented a 50-acre minimum lake size (Tennessee) or contiguous water area (Vermont) for wake boating. While an overall minimum lake size recommendation like Tennessee would be practical, the 50 acres of contiguous water area rule – like in Vermont – needs additional consideration.

For example, if wake boat distance-from-shore and water-depth requirements are implemented and then overlaid on a map, the resulting allowable lake surface area for wake sports could be significantly reduced. Even on larger lakes that exceed 100 acres, these distance-from-shore and water-depth restrictions could combine to reduce the overall area of allowable wake sport activity to an area less than 50 acres. This is especially the case on narrow lakes, such as Lake Zoar (909 acres), on which the overlays could create several smaller areas less than 50 acres of usable space, depending on the final setbacks and depths. In other cases, where lakes are particularly shallow, such as Gardner Lake (529 acres), the usable area of space could be compressed into a small area creating congestion and conflict between wake boaters. And yet other lakes, like Pachaug Pond (841 acres), though larger than 100 acres, would be prohibited from use by wake boaters due to its shallow nature.

The following table[33] shows the current laws regarding the operation of wake boats as of November 2025.

State	Laws	Reference / Link
AL	Restricts wakesurfing within 100ft or 200ft of any shoreline, dock, pier, boathouse, or other structure located on certain named impounded waters. Restricts wakesurfing to at least 400 ft from shore on certain named impounded waters.	AL Code Sec. 33-5-26.1
GA	Prohibits wakesurfing between sunset and sunrise and within 200 feet of any shoreline or structure.	GA Code § 52-7-13.1
ME	Requires wake sports to be conducted at least 300 feet from shore and in areas with at least 15 feet of water depth.	12 MRSA Sec. 13001, sub-§27-A
MD	Prohibits operation of a vessel involved in wakesurfing within 200 ft. from shoreline or structures.	MD Code Regs 08.18.01.09

[33] Note: this table does not reference other states' rules relevant to wakesurfing when such rules are (1) otherwise already captured under a given state's towed water sports safety requirements, or (2) already common to many or most states, i.e. PFD use requirements.

State	Laws	Reference / Link
NJ	Wakesurfing tow lines shall be not less than eight feet in length.... "Vessels utilized for the purposes of wakesurfing shall be direct drive or v-drive type propulsion vessels, where the propeller does not extend aft of the transom of the tow vessel. Any vessel in which the means of propulsion extends rearward of the transom of the tow vessel, including, but not limited to, outboard, inboard outboard, and jet drive, shall not be utilized for wake surfing."	NJ Administrative Code, Subchapter 3, Section 13:82-3.1
OR	Bans wakesurfing and wake-enhancing devices on the Newberg Pool section of the Willamette River. Requires boats to weigh less than 5500 lb. including max. ballast capacity, and the state may study raising or lowering that weight limit based on environmental effects. Bans all wakesurfing and wake-enhancing devices (in addition to preexisting ban of towed water sports) in Newberg Pool Congested Zone (Willamette River)	ORS Sec. 830.649
PA	Boats engaged in wakesurfing are limited to slow-no-wake speed when within 200 feet of shoreline, docks, launching ramps, swimmers or downed skiers, persons wading in the water, anchored, moored or drifting boats, floats, except for ski jumps and ski landing floats, and other marked areas.	58 PA Code Sec. 109.4
SC	Wake sports permitted only when at least 200 feet from docks, swimmers, and other anchored craft.	SC Code Sec. 50-21-870(B)(9)
TN	Prohibits wakesurfing between sunset and sunrise, within 200 feet of a shoreline or dock, and on bodies of water less than 50 acres in size.	TN Code Sec. 69-9-221
VT	Restricts wakesurfing to designated zones that are at least 500 feet from shore, at least 20 feet deep, at least 200 ft. wide, and on water bodies that provide at least 50 acres of acceptable wakesurfing zone.	12-027 Code VT R 12-030-027-X

SUMMARY

This report encompasses a review of public comments, numerous scientific studies, assessments of other states' regulatory structures for wakesurfing and insights from boating safety officials through the National Association of State Boating Law Administrators to increase the understanding of the impacts of wakesurfing and how other states are managing these impacts. The topic of wakesurfing is important to many Connecticut residents, particularly those who live or recreate on the state's waterways, as reflected in the hundreds of public comments expressing strongly held, yet diverging views on the activity. Nationally, some states have already established management approaches, while others are actively considering how best to address wakesurfing in ways that balance recreation, environmental protection, and shared use of water bodies – demonstrating a mixed approach to a relatively new watersport.

It is clear that the vessels associated with wakesurfing produce larger and more powerful wakes than traditional towed watersports, offering unique recreational benefits and an

enhanced experience for participants. At the same time, the size and energy of these wakes have the potential to adversely affect the shoreline and aquatic habitats, and other waterway users, underscoring the importance of thoughtful management to ensure that wakesurfing can be enjoyed responsibly in concert with environmental protection and shared public use.

For many participants, wakesurfing is a highly valued recreational activity in Connecticut. Participants described numerous benefits associated with the activity, including opportunities for outdoor recreation and quality time spent with family and friends, which aligns with DEEP's goal of providing public access for boating and outdoor recreation through its network of state-owned lakes and public boat launches. Several commenters noted that the lower speeds associated with wakesurfing enable them or family members to participate in towed watersports that might otherwise be inaccessible. The operation of wake boats also supports Connecticut's boating and fishing sectors and contributes to the state's robust outdoor recreation economy, the second largest in New England, with many marinas and watersports businesses emphasizing the activity's importance.

Wake boats, particularly when operating in wakesurfing or wakeboarding mode, produce larger waves and deeper propeller wash turbulence than traditional motorboats and potentially impact water quality, lake habitats, and the life cycles of fish and wildlife resources. Larger wakes and deeper propeller wash can compromise shoreline habitat, resuspend sediments, increase turbidity, and disrupt natural lake stratification, conditions that may contribute to algal and cyanobacteria blooms. These effects can influence fish habitat, especially for species that nest in shallow water, and may alter thermal and oxygen conditions important for coldwater fisheries. Shoreline properties and structures also can be affected by wake-generated waves, which may contribute to erosion of unprotected shorelines and damage docks and seawalls. Larger wakes also may create navigation challenges, safety concerns, and recreational conflicts for other water users. Smaller, non-motorized vessels or motorized vessels with shallow freeboards are more susceptible to the effects of large wakes, and anglers or drifting motorboats may experience disruptions from nearby wake boat activity.

Management Strategies

As stated in the public notice regarding the study, the findings in this report are intended to be informative for municipalities considering local ordinances on wakesurfing and could also potentially help inform legislative approaches if desired by the Connecticut General Assembly.

DEEP observed three consistent approaches to wakesurfing that are recommended in public comments, utilized by other states, and outlined in the literature.

1. Distance Restrictions

Distance restrictions are the most common approach to regulating wakesurfing in other states, as they address the impacts of surface waves - including environmental/habitat impacts along the shoreline, damage to shoreline infrastructure such as docks, and impacts on other boaters and recreation users. However, states demonstrated a wide disparity in how setback distances are applied, which is reflected in the rules from the eight states that currently restrict wakesurfing within varying distances, ranging from 100 - 500 feet.

Variation is also reflected in scientific literature, where some studies compare wakes generated by wakesurfing to different benchmarks, including to other motorized boating activities or to natural lake conditions. Researchers often faced challenges in isolating control variables because wake size and power are influenced by many factors, including boat length, weight, hull shape, and speed. Environmental conditions are also difficult to standardize, as each water body has unique characteristics such as lakebed composition, water clarity, depth, and shoreline topography. Despite these challenges, scientific literate provides helpful guidance on how to mitigate impacts of waves through distance restrictions.

Since motorized boating and towed watersports occur on Connecticut lakes where wakesurfing is allowed, studies that benchmark wakesurfing against other motorized uses are most applicable for policy objectives seeking to create lake conditions comparable to traditional motorized use. If policymakers aim to restore or maintain lakes to a natural condition without motorized use, studies that benchmark wakesurfing against natural conditions are most applicable. In this scenario, a broader management policy that addresses multiple forms of motorized use, in addition to wakesurfing, would be most effective. Appendix A includes a list of relevant studies, including recommended setback distances and water depths, and identifies the benchmarks used in the study.

Many states, including Connecticut, already enforce some general distance-based boating restrictions, making compliance and enforcement relatively straightforward. Boating law enforcement agencies and marine patrol units are equipped and trained to enforce these requirements, and the boating public is generally familiar with adhering to them.

Finally, setback distances should clearly define the features to which they apply. Most states with distance restrictions use the shoreline as an obvious reference point. However, of the eight states reviewed, six also include docks and other structures in setback requirements, while two included swimmers or certain other recreational users in their distance restrictions.

2. Depth Restrictions

While distance restrictions are the most common policies enacted by states, depth restrictions were frequently recommended in both public comments and reflected in other state's policies. Two states, include depth restriction for wakesurfing – Vermont in water depth less than 20 feet and Maine in depths less than 15 feet. Depth restrictions are important from an environmental perspective because they help mitigate water quality impacts as well as the fish and aquatic plants that depend on water columns and lake-bottoms for habitat. Despite researchers facing similar challenges as distance studies, these studies provide helpful insight into the impacts wakes and propeller wash can have on water bodies.

However, depth enforcement is less straightforward – both from an enforcement and compliance standpoint. Boating-related water depth restrictions are not common in Connecticut, making this a new regulatory structure for both the public and law enforcement. While it is more common for vessels operating in marine waters to be equipped with electronics to measure water depth, fewer vessels on inland waters typically have this capability. Law enforcement from Maine reported difficulties with effective field enforcement of a wake boat water depth restriction. Water levels vary seasonally depending on drought or rain conditions. Some lakes are deep and shaped like a basin, where distance from shore restrictions may also move wakesurfing to areas of sufficient water depth. However, other lakes have depths that are irregular and inconsistent, which make depth restrictions challenging for both enforcement and compliance.

To address some of these enforcement and compliance challenges, Vermont maps wakesurf zones based on their states' relevant water depth and distance restrictions. This provides both law enforcement and boaters with a clear map showing where wakesurfing is permitted and prohibited on each water body. There are also minimum size requirements for these zones, ensuring there is adequate space for wakesurfing to occur safely.

In sum, to be effective, depth restrictions should be crafted in a way that provides environmental protection and clear, straightforward enforcement and compliance.

3. Size or Acreage Bans

In Connecticut, wakesurfing is already prohibited on many small water bodies through water body specific restrictions that ban water skiing, which includes wakesurfing and other towed watersports. Currently, water skiing is prohibited in Connecticut on 16 inland water bodies that are smaller than 100 acres. Nationally, Tennessee is the only state that specifically restricts wakesurfing based solely on acreage, banning the activity on water bodies smaller than 50 acres.

4. Other Considerations

In addition to the management techniques listed above, there are a variety of additional factors policy makers could consider when enacting wakesurfing policy.

Local or Statewide Policy

Stakeholders expressed strong views on whether wakesurfing policy should be addressed locally or through statewide regulation. While most comments supported some form of statewide approach, opinions on how wakesurfing should be regulated varied widely, ranging from calls for or against a complete ban, to proposals that would allow the activity with restrictions such as minimum distances from shore or minimum water depths. Many of the comments referenced local issues, including support or opposition for existing local ordinances impacting wakesurfing on Bashan Lake, Moodus Reservoir, and Lake Waramaug.

Statewide approaches provide benefits of predictability, consistency, and enforcement. Local regulation allows policies to be tailored to the nuances of local water bodies, community preferences, and local enforcement. Connecticut's current boating laws contain many examples of statewide standards that apply equally across all water bodies and local regulations which only apply to a single water body.

For example, both statute and regulation establish laws that apply to water skiing state-wide, including mandatory observer requirements, geographic and time-of-day restrictions, and safety standards to prevent collisions or hazardous operation. These safety standards are universal and apply consistently across the state, providing water skiers with consistency and predictability. However, there also are many laws specific to individual water bodies. These laws vary widely based on the specific geography, use patterns, or needs of that water body. Examples include speed limits, horsepower restrictions, and even restrictions that only apply at certain times of the day, week, or year.

Including Wakeboarding in Wakesurfing Restrictions

Wakesurfing and wakeboarding are similar but distinct watersports, as described earlier in this study. Some states regulate both activities in the same manner, while others regulate them separately. Any wakesurfing policy should explicitly clarify whether its provisions also apply to wakeboarding.

Policy Specific to Wakesurfing or Boats Operating in Wake Modes

Wake boats are designed to operate in specialized wake modes that generate larger wakes and create the conditions needed for wakesurfing and similar activities. Policy options could include regulating boats operating in wake mode rather than regulating the specific activity of wakesurfing. However, defining wake mode in regulation is challenging because wake size can vary based on factors such as ballast tank levels and the use of underwater devices that

shape or enhance the wake. Because “wake mode” is difficult to define, regulations based on wake mode would likely be challenging to enforce effectively.

The management strategies and considerations outlined in this report represent some of the most commonly used approaches, but they are not exhaustive. A wide range of options are available to manage wakesurfing, and this report does not focus on any specific water body. Tools such as time-of-day restrictions or designating certain areas where wakesurfing is allowed or prohibited may be effective policies meriting additional study at the local level. As wakesurfing policies continue to evolve, there are meaningful opportunities for innovative, adaptive management approaches.

REFERENCES

American Sportfish Association (ASA). Economic Contributions of Recreational Fishing Connecticut, Statewide. 2025_ASA_Senate_Handout_Digital_Connecticut.pdf. 2025

Bassmaster, Texas Parks and Wildlife Department's telemetry study. 2024.

Bilkovic, D., Mitchell, M., Davis, J., Andrews, E., King, A., Mason, P., Herman, J., Tahvildari, N., Davis, J. Review of boat wake wave impacts on shoreline erosion and potential solutions for the Chesapeake Bay. STAC Publication Number 17-002, Edgewater, MD. 68 pp. 2017.

Bilkovic, D., Mitchell, M., Davis, J., Herman, J., Andrews, E., King, A., Mason, P., Tahvildari, N., Davis, J., Dixon, R. Defining boat wake impacts on shoreline stability toward management and policy solutions, Ocean & Coastal Management, Volume 182. 2019

Carmignani, J. R., and A. H. Roy. Annual winter water-level drawdowns influence physical habitat structure and macrophytes in Massachusetts, USA, lakes. *Ecosphere* 12(4):e03442. 10.1002/ecs2.3442. 2021.

Carroll University, North Lake Study – A phased study of water quality and wave propagation dynamics currently impacting a small southeast Wisconsin freshwater lake. 2020.

Connecticut, State of, DEEP, Coldwater Lakes Management, 2016-2017.

Connecticut, State of, Statewide Comprehensive Outdoor Recreation Plan. 2005 – 2010.

Connecticut, State of, Statewide Comprehensive Outdoor Recreation Plan. 2024 – 2029.

Connecticut, State of, Wildlife Action Plan. 2025-2035.

Cox, Gregory and Gregor Macfarlane. The Effects of Boat Waves on Sheltered Waterways – Thirty Years of Continuous Study. Australasian Coasts & Ports 2019 Conference. 2019.

Cotty Fay Marine Design Inc, Technical Report TR-25-0020. Critical Review of SAFL Project Report No. 611. A Field Study of the Recreational Powerboat Hydrodynamics and their Impacts on the Water Column and Lakebed. 2025.

Daeger, Adrienne, Bosch Nathan S., Johnson, Ryan. Impacts on nutrient and sediment resuspension by various watercraft across multiple substrates, depths, and operating speeds in Indiana's largest natural lake. Proceedings of the Indiana Academy of Science 130:(2) 112-122. 2022.

Driscoll, M. Todd, Jacob D. Norman, Daniel L. Bennett, Brian K. Metz, David R. Smith. Movement, home range, and structural habitat use of the largemouth bass complex in two large Texas reservoirs. North American Journal of Fisheries Management, Vol. 44, Issue 3, June, 2024.

Fay, E. , Gunderson, A. and Anderson, A. Numerical Study of the Impact of Wake Surfing on Inland Bodies of Water. *Journal of Water Resource and Protection*, 14, 238-272. 2022.

Francis, J.J., Nohner, J. Bauman, and B. Gunderman. A literature review of wake boat effects on aquatic habitat. Michigan Department of Natural Resources, Fisheries Report 37, Lansing. 2023.

Goudey, C.A. & Associates. Characterization of Wake-Sport Wakes and Their Potential Impact on Shorelines. 2015.

Gehl, Kathlyn. Wakesurfing in the Newberg Pool in Oregon's Willamette River: Recreation, Preservation, and Regulation. Williams College – Mystic Seaport Maritime Studies Program.

Lukas, Joseph A., Donald J. Orth, Factors Affecting Nesting Success of Smallmouth Bass in a Regulated Virginia Stream. Transactions of the American Fisheries Society, 124(5): 726-735. September, 1995.

Macfarlane, Gregor. Wave Wake Study: HB4 Motorboat Working Group. University of Tasmania. 2018.

Macfarlane, Gregor. Wakesurfing, Wakeboarding, and Waterskiing: A Comparison of Wake Characteristics. River Research and Applications. 2025.

Marr, J., Riesgraf, A., Herb, W., Lueker, M., Kozarek, J., & Hill, K. A field study of maximum wave height, total wave energy, and maximum wave power produced by four recreational boats on a freshwater lake. St. Anthony Falls Project Report No. 600, University of Minnesota, Minneapolis. 2022.

Mercier-Blais, S. and Y. Prairie. Project evaluation of the impact of waves created by wake boats on the shores of the lakes Memphremagog and Lovering, University of Quebec, Montreal. 2014.

Maine, State of, Department of Inland Fisheries, Report Back On Resolve 2023, Chapter 33, Resolve, Directing the Department of Inland Fisheries and Wildlife to Study the Effects of Wake Boats on Shoreline Property and the Environment. 2024.

National Association of State Boating Law Administrators. Policy Position on Wake Boats. 2021.

New Hampshire, State of, Final Report of the Commission to Study Wake Boats. 2020.

Nielsen, L.A. History of Inland Fisheries Management in North America. Pages 3-28 in C.C. Kohler and W.A. Hubert, editors. Inlands fisheries management in North America, 2nd edition. American Fisheries Society, Bethesda, Maryland. 1999.

Orihel, D. M., Schindler, D. W., Ballard, N. C., Graham, M. D., O'Connell, D. W., Wilson, L. R., & Vinebrooke, R. D. The "nutrient pump": Iron-poor sediments fuel low nitrogen-to-phosphorus ratios and cyanobacterial blooms in polymictic lakes. Limnology and Oceanography, 60(3), 856-871. **https://doi.org/10.1002/lno.10076** 2015.

Ortiz, David A., Michael Meyer, Terry Daulton, Bob Kovar. The Effects of Wake Boats on Lake Ecosystem Health. Wisconsin's Green Fire Voices for Conservation. 2024.

Poor, C.J., Rachel Anderson, H.E. Dillon. Evaluation of Wave Energy on the Willamette River. Proceedings of the ASME, International Mechanical Engineering Congress and Exposition, IMECE2021-71796. 2021.

Raymond, S., and Galvez, R., Impact of Lake Navigation - Sediment Suspension Study: Lake Masson and Sand Lake Cases. Laval University. 30p. 2015.

Riesgraf, Andrew; Marr, Jeffrey; Herb, William; Lueker, Matthew; Kozarek, Jessica. A Field Study of Recreational Powerboat Hydrodynamics and their Impacts on the Water Column and Lakebed. Retrieved from the University Digital Conservancy. 2025.

Schroeder, Susan A., David C. Fulton, Land of 10,000 Lakes and 2.3 Million Anglers: Problems and Coping Response Among Minnesota Anglers. Journal of Leisure Research, 2010, Vol. 42, No. 2, pp 291-315. 2010.

Texas, State of, TPWD Completes Groundbreaking Bass Tracking Study. Press Release. July, 2024.

Terra Vigilis Environmental Services Group. Lake Waramaug Shallow Water Environment Wave Impact Study Final Report. 2024.

Terra Vigilis Environmental Services Group. Lake Waramaug Wave Impact Study Final Report. 2024.

Vermont Department of Environmental Conservation. (2022) Four Critiques of Recent Study Sponsored by National Marine Manufacturers Association. Critiques of NMMA CFD Study 20220419.pdf

Water Environmental Consultants. Boat wake impact analysis, Lake Rabun and Lake Burton, Georgia. Water Environmental Consultants, Final Report, Mount Pleasant, South Carolina. 2021.

West, Alexandria A., Paul A. Moore, The influence of boating disturbance on the parental care behaviors of smallmouth bass (Micropterus dolomieu). Science of the Total Environment. Science Direct. 2025.

APPENDIX 1: CONNECTICUT WATER SKIING STATE LAWS & REGULATIONS

Neither of the terms "wakesurfing" nor "wakeboarding" is defined in Connecticut statutes. Rather, these activities are already included in the definition of "water skiing." Specifically, CGS Section 15-127 which provides the definition as follows:

> *... "water skiing" includes towing of any person behind a vessel under power, whether such person is connected by a towing line to such vessel or not, and similar forms of activity in which a passenger exits a vessel and uses the suction or wake of the underway vessel to engage in the activity.*

Additional laws and regulations pertaining to water skiing are as follows:

CGS Section 15-134 states that no person shall:

> *Operate a motorboat towing a water skier unless there is present in such motorboat, in addition to the operator, a responsible person at least twelve years of age assisting the operator and observing the progress of such water skier.* CGS Section 15-134(a)(1)
>
> *Engage in water skiing and no person shall operate a motorboat towing a person so engaged on any water area on which water skiing is prohibited.* CGS Section 15-134(a)(2)
>
> *Engage in water skiing from one-half hour after sunset until sunrise or when weather conditions restrict normal visibility to less than one hundred yards.* CGS Section 15-134(a)(3)
>
> *Engage in water skiing in such manner as to strike or threaten to strike any person or vessel and no person shall operate or manipulate a tow line or other towing device in such manner as to cause a water skier to strike or threaten to strike another person or vessel.* CGS Section 15-134(a)(4)

Additional statutory references to water skiing include:

> *Notwithstanding the provisions of subsection (a) of this section, on and after October 1, 2015, no person shall operate on the waters of the state a vessel that is required to be registered or numbered pursuant to this chapter and that is engaged in water skiing, as defined in* section 15-127*, unless such person: (1) Is not less than sixteen years of age, (2) has a valid vessel operator license issued by the United States Coast Guard, has obtained a safe boating certificate or certificate of personal watercraft operation issued by the Commissioner of Energy and Environmental Protection or*

holds a boating safety certificate from a state that has a reciprocal agreement with the commissioner pursuant to section 15-140f *or* 15-140j*, and (3) has a safe water skiing endorsement on or accompanying such certificate that was issued by the Commissioner of Energy and Environmental Protection upon such person's completion of the safe water skiing instruction described in* section 15-140f. *No owner of a vessel shall knowingly authorize or permit a person who is less than sixteen years of age to operate such vessel while engaged in water skiing on the waters of the state. The requirements of subdivision (3) of this subsection shall not apply to any resident or person who, on or before October 1, 2015, received a valid vessel operator license issued by the United States Coast Guard, obtained a safe boating certificate or certificate of personal watercraft operation from the commissioner or held a boating safety certificate from a state that has such a reciprocal agreement with the commissioner. Nothing in this subsection shall be construed to prohibit the towing of a person or a vessel during the course of an emergency that poses a threat to human life or property.* CGS Section 15-140e(f)

No person less than sixteen years of age shall operate on the waters of the state a vessel that is required to be registered or numbered pursuant to this chapter and that is engaged in water skiing, as defined in section 15-127. CGS Section 15-140h(b)

The RCSA Section 15-121-A9 provides the following regulations which also apply to the activity of water skiing in Connecticut:

Any person required to obtain a safe water skiing endorsement by section 15-140e *of the Connecticut General Statutes shall be required to carry on board the vessel engaged in water skiing a physical copy or electronic proof of such endorsement.* RCSA 15-121-A9(a)

No person shall operate a vessel engaged in water skiing at such a speed or maneuver a vessel engaged in water skiing in such a manner as to impede the navigation of another vessel or endanger the life, limb or property of another person. No person shall water ski in such a manner as to impede the navigation of any vessel or endanger the life, limb or property of another person. No person shall engage in water skiing in such a manner as to strike or threaten to strike any person, vessel or object other than an object designed to be used in a water skiing course and no person shall operate a motorboat or manipulate a tow line or other towing device in such a manner as to cause a water skier to strike or threaten to strike another person, vessel or object other than an object designed to be used in a water skiing course. RCSA 15-121-A9(b)

No person shall operate a vessel towing a water skier without an observer present on the vessel who shall assist the operator and monitor the progress of the water skier. The observer shall be designated by the operator of the vessel and shall be at least twelve years of age. RCSA 15-121-A9(C)

The number of persons on board the vessel towing a water skier added together with the number of water skiers being towed shall not exceed the carrying capacity of the towing vessel, as indicated on the capacity label permanently affixed to the towing vessel by its manufacturer, except that the commissioner may grant a marine event permit, or seasonal marine event permit, to authorize the number of persons on board a towing vessel added together with the number of water skiers being towed to exceed the carrying capacity of such towing vessel as indicated on the capacity label permanently affixed to such towing vessel by its manufacturer. The commissioner may require appropriate safeguards or protections, as the commissioner deems necessary, when authorizing such marine event permit or seasonal marine event permit. RCSA Section. 15-121-A9(d)

No person shall stand or sit either on the bow or gunwales of a vessel which is towing a water skier except in an emergency. RCSA 15-121-A9(e)

Each water skier shall wear a personal flotation device approved by the U.S. Coast Guard and used in accordance with any requirements stated on the approval label and with any requirements in its owner's manual, if the approval label makes reference to such manual, and no vessel operator shall tow a water skier who is not wearing such a device. Notwithstanding the foregoing, no person shall use an inflatable personal flotation device to meet the PFD requirements of this section. RCSA Section 15-121-A9(f)

No person shall operate a vessel towing a water skier from one half hour after sunset until sunrise or when weather conditions restrict normal visibility to less than one hundred yards. RCSA Section 15-121-A9(h)

No person shall operate a motorboat at a speed in excess of Slow-No-Wake within one hundred feet of shore, or of a dock, pier, float, or anchored or moored vessel, unless such motorboat is approaching such float, dock or shore for the purpose of enabling a person engaged in water skiing to take off or land. RCSA Section 15-121-B14

APPENDIX 2: COMPENDIUM OF FINDINGS OF STUDIES CONSIDERED

Source	Distance to Shore	Water Depth	Comparison Notes
Water Env. Consult. (2021)	100		Wave energy from wakeboarding (553%) and wake-surfing (2,546%) greater than monthly maximum wind-driven wave energy.
Water Env. Consultants (2021)	100		Wave energy from wakeboarding (68%) and wake-surfing (581%) greater than cruising vessel wave energy.
Ray (2020)	135		Wake boat wave 9 inches high.
Fay et al. (2022)	200		Claims minimal impacts at this distance.
Water Env. Consult. (2021)	225		Wave height attenuation from wakeboarding to wake boat cruising at 100ft. Note that wave power may still be greater and that wake boat weight and hull design increase cruising wakes, thus this is an underestimate relative to typical boats.
Water Env. Consult. (2021)	300		Wake-boarding wave energy at 300ft similar to wake boat cruising energy at 100ft. Note that wake boat weight and hull design increase cruising wakes, thus this is an underestimate relative to typical boats.
Goudey and Girod (2015)	300		Measured large waves during wakeboarding (9.87in) and wake-surfing (12.92in) in deep water.
Ray (2020)	300		Wake boat wave 7.75 inches high.
Mercier-Blais and Prairie (2014)	328		Energy of wake waves decreased significantly but not assessed relative to typical motorboat.
Macfarlane et al. (2018)	400		Maximum wave height and energy similar to reference motorboats.
Marr et al. (2022)	>425		Wake boat waves match typical waterski boat in planing to plowing modes
Mercier-Blais and Prairie (2014)	492		Sediment resuspension observed from wake-surfing.
Water Env. Consult. (2021))	500		Wave energy from wake boating (192%) and wake-surfing (679%) greater than monthly maximum wind-driven wave energy.
Marr et al. (2022)	>575		Total wave energy similar to reference motorboat at 200ft.
Marr et al. (2022)	>600		Total wave power similar to reference motorboat at 200ft.
Mercier-Blais and Prairie (2014)	656		Sediment resuspension observed from wakeboarding at this distance from shore.
Mercier-Blais and Prairie (2014)	675–938		Estimated distances at which a wake boat waves result in equivalent sediment resuspension to normal conditions.
Mercier-Blais and Prairie (2014)	879–1023		Estimated distances at which a wake boat waves result in equivalent turbulent kinetic energy to normal conditions on two lakes.

Source	Distance to Shore	Water Depth	Comparison Notes
Water Env. Consult. (2021)	950		Wake-surfing wave height attenuation to typical boat at 100ft. Note that wave power is likely greater and that wake boat weight and hull design increase cruising wakes, thus is an underestimate relative to typical boats.
Mercier-Blais and Prairie (2014)	984		Modeled complete dissipation of wake boat waves.
Ray (2020)	1000		Wake boat wave 4 inches high.
Cotty Fay (2025)		8-10	No impact at this depth for any recreational vessels.
Terra Vigilis, Shallow Water Study (2024)		10	This depth is where the lake bottom causes upward wave displacement and results in the wave height rising rapidly.
Fay, et al. (2022)		>10	Environmental impact is minimal if wake boat operated in this depth.
Daeger, et al. (2022)		10-15	No resuspension by any watercraft in 10–15 ft of water.
Terra Vigilis, Wave Impact Study (2024)		15 – 25	Depths of observed increase in total phosphorus after wake boat pass of 25% and 30%, respectively.
Raymond and Galvez (2015)		16	Wake surfing and wake board practices impacts on the water column.
Terra Vigilis, Wave Impact Study (2024)		17	Propeller downwash effects were observed.
Riesgraf, et al. (2025)		20	To minimize impacts to the lakebed.
Francis, et al. (2023)		33	Wake boats generate enough turbulence to resuspend bottom sediments in water up to this depth.