

**CONDITION REPORT TO SUPPORT AN ORDINANCE
RESTRICTING ARTIFICIALLY ENHANCED WAKES
IN THE WATERS OF THE TOWN OF CASEY, WASHBURN COUNTY
Proposed FINAL**

Introduction

Wisconsin's inland lakes are among the state's most critical natural resources and have incalculable aesthetic, environmental and economic value. In the interest of public health, safety, and/or welfare including the public's interest in preserving natural resources, and protection of the environment and outdoor recreation, the Town of Casey ("Town") has the authority to enact ordinances covering waters within its jurisdiction, if the ordinances are not contrary to or inconsistent with Chapter 30, Wis. Stats., and they relate to the equipment, use, or operation of boats or to any activity regulated by Wis. Stats. Sections. 30.60 to 30.71 and 30.77 (3)(a).

Purpose of the Ordinance

The purpose of this ordinance is to (1) prevent the environmental degradation caused by artificially enhanced wakes and corresponding downward propeller wash generated by boats for wake sports such as wake surfing and (2) protect public safety.

Specifically, the proposed ordinance would ban the use of ballast tanks, water sacks or fins to cause a boat to operate in a bow-high manner or which increase or enhance a boat's wake. It also would prohibit operating a boat in an artificially bow-high manner having the effect of increasing the boat's wake; this would include prohibiting wake enhancement by the use of ballast tanks, ballast bags, mechanical fins or continuous operation at transition speed (the speed below planing speed in which a boat is operating in plowing mode). In no event would any of the following operations be deemed a violation of the ordinance, provided such operations do not use ballast tanks, wave shapers or electro-mechanical fins: 1) water skiing, 2) tubing, 3) wakeboarding using a tow rope, 4) transition operation to empty a boat of water, or 5) transition operation of a boat accelerating into a planing condition. Thus, restrictions on water skiing and other tow rope activities are not within the intended scope of the proposed ordinance.

Moreover, nothing in the proposed ordinance would preclude the use of wake boats, provided the ballast tanks and other features intended to create enhanced wakes or cause the boat to operate in a bow-up stern-down orientation are not deployed. These boats could continue to be used for cruising, water skiing and other activities provided the ballast tanks and other wave-enhancing features are not deployed.

Various studies and surveys (see Appendix 1) have been conducted that reveal the negative effects of enhanced wakes on inland lakes. The results suggest that these negative effects can largely be avoided if the lake size is more than 1,500 acres; and the distance of the enhanced wake boating activity is at least 700 feet from the shoreline or other lake users and in water depths of a minimum of 20 feet.

By increasing displacement of the boat and equipped with very powerful engines, wake boats impart very large quantities of energy. The energy of these waves increases with the square of their amplitude, such that a two-fold increase in wave height generates four times more energy and a three-fold increase in wave height generates nine times more energy¹. Most of this wave energy is conserved until it encounters shallow water, concentrating energy on all materials or objects present, including the shoreline, lake bottom, wildlife habitat, docks, moored boats,

swim rafts and other lake recreators.

When wake boats operating in a bow-up stern-down manner, the propeller wash may scour the lake bottom when operating in depths less than a minimum of 20 feet, destroying aquatic vegetation and fish spawning beds, and churning the sediment into the water column, degrading the water quality.

Even according to the most conservative studies (i.e. sponsored by wake boat companies), none of the lakes in Casey Township are large enough to stay far enough away from the shoreline or have enough depth or depth structure to accommodate the use of wake boats. The most conservative studies still recommend a minimum depth of 15 feet and a minimum distance of 200 feet from shore.

The structure of most lakes that are in Casey Township do not have a deep channel that can be followed to accommodate a wake boat in surf mode. For wake boats to operate safely in appropriate depth, other users of the lake are forced out of the way, or the wake boat must navigate around users, forcing the boat to enter shallow areas, also causing great disturbance to users on the lake that are tossed around by the large waves.

Local Conditions Necessitating a Local Ordinance

In recent years, there has been a dramatic increase in boats equipped to generate artificially enhanced wakes on a number of Town lakes. More lake residents are expressing concern about the effects of enhanced wakes on their environment and on public safety.

More than 18,800 people responded to the 2024 Spring Hearing questionnaire either in person April 8 or online April 10-13. The Wisconsin DNR's Spring 2024 Survey² results indicate that Wisconsin residents as well as residents in Washburn County are overwhelmingly in favor of legislation that would prohibit the operation of boats in a manner that creates artificially enhanced wakes.

- Other than McKenzie Lake, which is mainly in Burnett County, the largest lake, Island Lake, is only 252 acres. The average depth of Island Lake is only 14 feet.
- Artificially enhanced wakes can cause irreversible damage to shorelines, lake beds, moored boats, and shoreline structures. Enhanced wakes and the associated propeller wash can uproot aquatic plants and resuspend the lake sediment. This churning action can increase phosphorus levels in the water column that lead to algae blooms. Any toxic substances that may be present in the sediment reenter the water column, degrading water quality and posing additional risks to aquatic wildlife and plants.
- In 2019, Island Lake Preservation Association (ILPA) worked with DNR, Matthew Berg and Endangered Resource Services LLC to conduct a Macrophyte Survey on Island Lake. The report is included as part of this submission.
 - The survey found macrophytes growing at 400 of 543 survey points which extrapolated to 73.6% of the entire lake bottom and 88.9% of the 25.5ft littoral zone. The report stated, "Plant diversity was exceptionally high with a Simpson Index value of 0.94 – one of the highest values of any lake we have ever surveyed".
 - Richness was also moderately high for such a small lake with 38 species found in the rake sampling. This total jumped to 59 species when including visuals and plants found during the boat survey. The majority of these additional species were uncommon to rare, highly localized along undeveloped shorelines, and sensitive to habitat modification making them vulnerable to lake

wide extinction.

- Island Lake is classified as an Oligotrophic Lake, representing less than 10% of lakes in Wisconsin. Because the water clarity is on average ~15+ feet, the high clarity produces a littoral zone that extends to 25.5 feet (from report in July 2019). Oligotrophic lakes are often referred to as the healthiest type of lake and have high oxygen levels with low levels of nitrogen and phosphorous.
- Enhanced wakes have negative effects on wildlife, such as the nests of loons and other waterfowl.
 - Island lake has not had loon babies for multiple years, even though they have nested and laid eggs this past spring. The root cause is unsure if wake disrupted the floating nest or there was some other factor they are not successfully reproducing.
- The use of ballast and wake-enhancing fins, vanes, shapers or other such devices puts the boat in a bow-up stern-down position. This may obstruct the driver's view, leading to increased safety risks for others on the lake: anglers, kayakers, paddleboarders, and swimmers.
- Ballast systems are virtually impossible to empty completely, thereby increasing the risk of carrying aquatic invasive species from one lake to another, which is illegal in the state of Wisconsin.
- Lake users also reported to ILPA members complaints and concerns for safety when just one or two boats are out operating in wake-surf mode. After our annual 4th of July boat parade on Island Lake, while many users were out on the lake enjoying the sunny day, one small wake boat was surfing people around the lake and caused a major upset to users on the lake. Multiple people had their boats flooded by the waves and people in kayaks were forced to vacate the lake. Other complaints brought to ILPA board (through email, complaints at the annual meetings and verbally to board members directly) have included:
 - Kayakers and paddlers not going out on lake when wake surfing activity is occurring.
 - Boats towing skiers or tubers returning to their docks out of safety concerns.
 - Anglers having to move to other areas of the lake to ensure they can safely fish.
 - Pontoon boats getting swamped or completely re-routing areas to avoid large waves caused by the artificial wake.

At least 20 townships in Wisconsin are enacting or have passed recent wake protection ordinances including: Dayton, Farmington, Lind, Bass Lake, Round Lake, Hayward, Hunter, Mequon, Thiensville and Newbold.

ILPA Board is unanimously in favor of this ordinance.

How a Town Ordinance Would Solve the Above Issues for Casey

Compliance with a Town ordinance prohibiting boats from generating artificially enhanced wakes would result in the following benefits for the Town:

- The negative environmental impacts associated with boats generating artificially enhanced wakes, described above, would be prevented.
- The safety risks associated with boats generating artificially enhanced wakes, noted above, would be eliminated. Everyone enjoying the lakes would be that much safer.
- The likelihood of ballast tanks used by these boats transferring aquatic invasive species from one lake to another would be reduced or eliminated.

Upon adopting the proposed ordinance, appropriate signage would be placed at all public landings, in accordance with Wisconsin law. Based on the experiences of other Wisconsin municipalities that have adopted ordinances regulating the creation of enhanced wakes, such signage and general education regarding the ordinance will help ensure compliance.

Possible Negative Effects of Adopting the Ordinance

Certain individuals may be opposed to any or all forms of regulation and a limited number may feel the ordinance is infringing on their rights to lake usage. However, when one or two people can operate boats that intentionally generate artificially enhanced wakes on small or mid-size lakes, many others can't navigate safely or enjoy their activities and the scenic beauty, water quality and aquatic habitat will be damaged or destroyed.

The boating industry claims they can self-regulate. However, this has not proven to be the case given the mounting damage and concerns raised by other lake users.

Impact on Public Health, Safety or Welfare if the Ordinance is not Adopted

After reviewing science-based studies, lake experiences and public input, many townships in Wisconsin have concluded that public safety and protection of its valued resources would be best served by adopting the proposed ordinance. Most of these townships have lakes much larger than any in Casey township and have had overwhelming support to pass these ordinances. Survey results prove that a vast majority of the residents in Casey would be in support of this ordinance and past survey results on zoning showed preservation of lakes and shoreline was a high priority². The size of the lakes in Casey Township are not nearly large enough to allow for the destruction that can be caused by these artificial wakes.

Summary of Findings

The intent of this condition report is to highlight the damage to lakes in respect to erosion of plants and shore, negative impact to water quality, disturbance to aquatic life and animals that rely on the lake and potential for spread of invasive species. In addition, public opinion in Wisconsin and Washburn County support additional restrictions imposed on artificial wake. There have been multiple complaints issued to ILPA members from lake users about the disturbance to others trying to use the lake with flooded pontoons and kayakers and paddle board users being nearly toppled from the large waves. The authors of this report are in full support of fun and community in and around the lake, the size, structure, and depth of the lakes in Casey Township are not nearly large or deep enough to accommodate the use of wake boats in plow mode without long term devastating effects.

¹ Formulas for Boat Wakes, webpage <http://boatwakes.homestead.com/files/form.htm>

² WIDNR 2024 Annual Spring Hearing Results: <https://dnr.wisconsin.gov/about/wcc/springhearing>

³ Washburn County Government Town of Casey Survey Results: <https://www.co.washburn.wi.us/county-information/comprehensive-planning/casey>

Appendix 1

Relevant Research Studies and Surveys

Several studies contributing to the facts in this condition report were completed a few years ago. Since that time, boats generating enhanced wakes have gotten more powerful and their wakes bigger (e.g., increasing in height from 2-4 ft. to 4-6 ft, and more) and more powerful. Therefore, the figures cited in this report are likely conservative. More studies are underway and in review.

- Ballast tank water retention and invasive species: "Volume and contents of residual water in recreational watercraft ballast systems," Management of Biological Invasions (2016) Volume 7, Issue 3: 281-286, first published online 04/18/2016, https://www.reabic.net/journals/mbi/2016/3/MBI_2016_Campbell_etal.pdf.
- Wave height, power and energy: "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 Laboratory, College of Science & Engineering, University of Minnesota, SAFL Project Report No. 600, 02/02/2022, <https://conservancy.umn.edu/handle/11299/226190>.
- Wave size, power and turbidity: "A phased study of the water quality and wave propagation dynamics currently impacting a small southeast Wisconsin freshwater lake: Waukesha," Terra Vigilis Group, as contained in Responsible Wakes for Vermont Lakes (see pp 16-37 of linked presentation where study is embedded), <https://dec.vermont.gov/sites/dec/files/wsm/lakes/docs/Additional%20supporting%20Information%20submitted%2007292022.pdf>.
- Oneida County Clean Waters Action, Information on Wave Boats <https://occwa.org/wave-boats>
- Silent Sports magazine: Silent Alarm: Proposed Wakeboarding Bill Bad for Paddling, Fishing, and Invasive Species <https://silentsportsmagazine.com/2024/01/02/silent-alarm-proposed-wakeboarding-bill-bad-for-paddling-fishing-and-invasive-species/?fbclid=IwAR1I2...>
- NW Wisconsin Lakes Conference – Keynote Speaker, Ted Rulseh, Protecting the Lakes: The Ultimate People Business <https://nwwislakesconference.org/2022-nwlc-keynote/>

Appendix 2

Casey Lakes Greater than 50 Surface Acres⁴

Lake Name	Surface Area (acres)	Max. Depth (ft)	Mean Depth (ft) (where known)	Comments
Island	252	44	14	Oligotrophic Lake
Casey	240	27	10	
Lincoln	98	27	13	
McKinley	103	23	12	
Dunn	181	39	18	
Little Casey	30	22		
Goose	58	11		
Loon	50	63	25	
Sunfish	60	33	11	
Jerry	64	5	3	
Bass	<187	<35	<18	
Little Bass	25		4	
McKenzie*	1129	71	19	Mesotrophic Lake
Middle McKenzie*	527	45	20	Oligotrophic Lake
Lower McKenzie*	206	17	9	Eutrophic Lake
Deer	105	19		
Leisure	71	26	12	
Mud	48	4		

* Lake partially in Casey Township but majority is in Burnett County

⁴Wisconsin Lakes, Find a Lake, <https://apps.dnr.wi.gov/lakes/lakepages> =

Appendix 3

Macrophyte Survey, Island Lake - WBIC: 2470600 (2019)

Attached as Separate Document