Willamette River – Newberg Pool

- Dams restrict summer flow
  - A stagnant ”Pool” in summer
  - Mostly vertical soft sediment banks
  - Wakes impact at the same level all summer
- Development:
  - 400 homes
    - 32 of 306 built after 2000
  - 385 docks in 29 miles
  - 400 boats moored in the Newberg Pool
    - 30 exceed 5,000 pounds
- Fish and wildlife
  - Essential Salmonid Habitat
  - Blue Heron
  - Bald Eagles
  - River Otter
  - Osprey
  - Oregon Beaver

  And more

EXPERT SCIENTIFIC TESTIMONY OREGON HOUSE OF REPRESENTATIVES – 3/4/2021

DR. PEDRO LOMONACO, PhD –
Director, O.H. Hinsdale Wave Research Laboratory, Oregon State University

•"Shoreline changes are very minor due to nature".

•"Shoreline changes are not produced by flooding".

•"Wakes multiple waves of the same size and location, is significant".

•"Changes in the river margins are significant when we are talking about several meters of erosion".

•"Rapid change is human, otherwise it would have reached equilibrium over the last hundred years".

•"Any changes you can see are not caused by nature, changes by nature take a long time, like 15,000 years"

•"Boat wakes results in banks eroded cross sectionally".

•"The controlled flow of the Willamette significantly reduces the velocity of the river.

•Changes caused by nature are very minor in comparison to the effect of many waves in a single day, that is a very significant component".

•"Changes to the river margins are not produced by flooding, they are produced by boats that create instability in the sediment, which changes the shoreline by removing that sediment".

***DR GREGOR MACFARLANE, PhD*, Director Australian Maritime College, University of Tasmania**
(CONDUCTED WAVE WAKE STUDY IN THE NEWBERG POOL, 2019)

"The Willamette River is deep, which means the waves that are generated by these boats are totally unaffected by the bathymetry of the riverbed". (no gradual shoreline resistance)

"Surfing - Lateral distance of 400' is necessary for wake energy to be nearly comparable to water skiing."
Wake boarding - Lateral distance of 300' is necessary for wake energy to be comparable to water skiing"

***DR. STAN GREGORY, PHD* – Oregon State University, Department of Fisheries and Wildlife**

"Sediments suspended during summer months settle on plants and block the sun, also blocking nutrients, and oxygen".
"There is a huge difference between the effects of erosion in the summer".

"Juvenile salmon and salmonids move along the edges of the Willamette River every month of the year".

"They prefer shallow water within 6' of the bank, in water which is 2 -3' deep. "Erosion of the habitat affects many species".

EXISTING SCIENCE

University of Australia Maritime College, University of Tasmania

Dr. Gregor MacFarlane, 2018

Dr. McFarlane concluded at 10,000 pounds, the resulting force is 100 lb.ft/foot. At 4,000 pounds, the resulting force is 50 lb.ft/foot.

Recommended distance from structures and shoreline;

300 ft for wake boarding, 400 ft for wake surfing minimum.

Dr. MacFarlane has over 100 scientific publications in wave science, has received 69 grants, with grant and funding over $26,000,000 and manages the college's $15,000,000 wave lab facilities.

Western Colorado University study for Big Payette Lake

Alex Ray, 2020

This study determined **a no wake zone of 500' from the shore, and structures** is necessary to protect the Beds and Banks of Big Payette Lake.

University of Quebec

Sara Mercier-Yves, Blais and Prairie, June 2014

"Our data demonstrate that the **energy produced by the wake boat dissipates completely before reaching the shore** (and therefore has no significant effect) when the passages wake boats are **984 ft or more from shore."**

Boat Wake Impact Analysis Prepared for Lake Rabun Association & Lake Burton Civic Association

Water Environmental Consultants – Mt. Pleasant, SC 1/20/2021

"waves generated by wakeboarding and wakesurfing have longer periods than those from cruising/waterskiing and have more energy and power. Even a **225-ft buffer for wakeboarding and a 950-foot buffer for wakesurfing conditions will still allow waves to impact other vessels,** structures, or the shoreline with more power than those from cruising/waterskiing at a 100-ft buffer distance."

UNIVERSITY OF MINNESOTA St Anthony Falls Laboratory Report, February 2022

Energy and Maximum Wave Power Produced by Four Recreational boats. Marr, Riesgraf, Herb, Lueker, Kozarek, Hill

“When researchers compared the wake waves of the four boats during their most typical mode of operations, data indicated that **wakesurf boats require distances greater than 500 feet from the shoreline/docks and other boats** (or the distance of a little less than 1.5 football fields) to decrease their wake wave characteristics to levels similar to the non-wakesurf boats.”

Shoreline Erosion Caused by Boat Wakes

https://www.marinfo.gc.ca/Doc/Erosion/Erosion_des_berges_En.pdf (Lehoux, 2004, personal comm.)

Wake is the wave action that strikes against the banks of rivers or channels.

Shoreline erosion has many consequences on the aquatic environment, including habitat destruction, an increase in sedimentation and in turbidity of the water, and the release of nutrients (phosphorous and nitrogen) that promote algal blooms.

As well, shoreline erosion can result in the loss of land and affect shoreline property values..

In smaller channels wake accounts for between 95% and 98% of the energy (Hill et al., 2002). Recreational boating in small channels, then, has a considerable impact.

Review of boat wake wave impacts on shoreline erosion and potential solutions for the Chesapeake Bay 2016

The literature review indicates an unequivocal connection between boat wake energy and shoreline erosion, sediment re-suspension and nearshore turbidity"

Boat wakes have been shown to have erosive effects on shorelines (e.g., Castillo et al. 2000, Bauer et al. 2002), **scour the bottom of the shore-face, and temporarily decrease water clarity** (e.g., U.S. Army Corps of Engineers (USACE) 1994, Asplund 1996). **In addition to shoreline erosion, boat wake impacts include vegetative damage and disruption of faunal communities** (Parnell and Koefoed-Hansen 2001).

In narrow waterways wake energy does not have the opportunity to dissipate over distance (FitzGerald et al. 2011). Although boat wakes are periodic disturbances **in comparison to wind waves, they can be a significant source of erosive wave force due to their longer wave period** and greater wave height, even when they represent only a small portion of the total wave energy (Houser 2010). Our review of the literature demonstrated that even small recreational vessels within 500 ft of the shore are capable of producing wakes that can cause shoreline erosion and increased turbidity (e.g., Zabawa and Ostrom 1980)

Impact of Wake on Tweed River Bank Erosion Study.

2012. (AUSTRALIA)

Towing activities are the most likely activities to cause wake waves capable of causing significant bank erosion. This is **due to the repetitive nature** (i.e. undertaking numerous laps along the same stretch of the river) and the **size of the wake waves these vessels generate** vessel wake resulting from towing activities have the potential to cause and increase bank erosion. Based on current practice the entire stretch of river between Chinderah and Bray Park has been shown to be susceptible to bank erosion as a result of vessel wake, as this area generally experiences limited wind generated waves.

Accordingly, wake waves have become the dominant erosion mechanism.

Based on previous research, towing activities are expected to account for the majority of vessel wake energy produced on the Tweed River. Accordingly, quantitative calculations have investigated wake energy produced by these vessel types to indicate the impact of vessel wake on river bank erosion.

COALITION FOR RESPONSIBLE AND SUSTAINABLE NAVIGATION Study of the Lower Gordon River 2014 / 2017

Reference: *Coalition for Responsible and Sustainable Navigation*

SUMMARY: A 2014 study by the University of Quebec Montreal revealed that wake boat waves, with ballasts engaged, traveled 984 ft before the waves lost their power. **This means that a wake boat with its ballasts full, to avoid shoreline erosion, must have 1986 ft passageway if it were to go down the middle of the passageway.**

A 2015 study from the University of Laval indicated that the water column, behind the propeller of a wake boat with full ballasts, descends to a depth of 16 ft. In other words, in depths of 16ft or less, the wake boat in question would stir up bottom sediments, releasing phosphorous in the process and thus contributing to the proliferation of aquatic plants, including algae.

"The effects on the environment from our pleasure craft are increasing with the size, power, numbers and densities"... "Never in the history of boating have we had boats designed specifically for making ocean class waves on inland waters. Historically, boat design strove to minimize energy loss from wave creation for economic reasons and today, we strive to maximize them for simple pleasure."

"The effects of power boats on our environment can be significant:

The turbulent wash from the propulsion systems penetrate deep and wide under the surface, **perturbing and damaging fauna** and flora, **spreading invasive species**, **uplifting sediments**, rich with nutrients such as phosphorus and contaminants such as heavy metals back up into the water column. Moreover, this effect can go as far as to re- suspend and transport sediments in ways that remodel the bottom topology, segregate fine and coarse sediment, cover up fish breeding grounds and render bottoms silty. The waves generated from the hulls passing through the water are powerful, travel far and wide to stir up sediment in littoral zones, erode shorelines, damage docks and equipment and render navigation dangerous for others.

In 2017, the Coalition sponsored a research of the literature with Université Laval."

Notes on shoreline erosion due to boat wakes and wind waves 2011

http://www.perthhydro.com/pdf/Gourlay2011ShorelineErosion.pdf

These notes concern the effect of boat wakes and wind waves on shoreline erosion and are a review of the relevant literature on the topic. The relevance of wave height, period, energy density and transmitted energy, as measures of erosion likelihood, are discussed.

It appears that wave period is at least as important as wave height, due to the increased seabed particle velocities and often plunging breakers associated with long wave periods, as well as **the fact that riverbanks are not naturally adapted to long wave periods**

Boating and Habitat (Effects of Wakes on Fish Habitats)

Wakes can also cause erosion. **This erosion may eventually damage or kill plants and trees near the shoreline. Shoreline erosion caused by wakes also adds to sedimentation of our lakes and rivers. Strong wakes washing a shoreline can also uproot shallow-water plants and agitate the lake or river bottom.** The shorelines is one of the most important areas of an aquatic habitat. Many fish enjoy the warm shallow waters. Plants rooted to the bottom near the shoreline provide shelter for fish. Plants also attract macroinvertebrtates to the shoreline to live and lay their eggs. Fish feed on macroinvertebrates.

Trees and plants are also part of the shoreline habitat. They provide needed shade, and the falling leaves provide nourishment for other plants and animals. Trees and plants on the banks also help stop runoff and erosion. Shoreline habitat are also home to many of our state's amphibians and reptiles.

Water Sports Industry Association Commissioned Study*

Clifford Goudy 2015

Note: We hear a lot of comments from opponents stating, "studies show at 200' wakes do not cause erosion".

They're referring to ONE **WSIA commissioned study**, which actually does not say that at all.

In fact**, the WSIA engineer,** on retainer, testified before Minnesota Lawmakers, stating,

"in waves that travel over deep water, there is often very little energy loss until the waves reached the shore".

"If a shoreline has light winds or is narrow in the direction of prevailing winds, it probably is a good place to consider having a no wake zone."

"…it would benefit from a no wake zone"

Defining boat wake impacts on shoreline stability toward management and policy solutions

December 2019. https://www.sciencedirect.com/science/article/pii/S0964569118309633

In general, boat wakes have been shown to erode shorelines (e.g., Castillo et al., 2000; Bauer et al., 2002), scour the bottom of the shoreface, and decrease water clarity through turbulence (e.g., U. S. Army Corps of Engineers (USACE) 1994; Asplund 1996).

In our analyses, boat wake energy may be linked to elevated turbidity and shoreline erosion, particularly in narrow waterways.

Waves can be attenuated by shoreline vegetation in certain settings; however, frequent exposure to boat wakes may limit the capacity of these shorelines to mitigate erosion.

SCIENCE, DATA, FACTS

- THERE IS SOUND SCIENCE
- Many scientists have studied this issue
- Legislators relied on the testimony of these scientists
- **DR. PEDRO LOMANOCO – Head of O.H. Hinsdale Wave Institute**
  - Wave Lab Tour and presentation with 6 scientists from OSU and University of Portland
  - Legislators, county commissioners, city council members attended Newberg Pool Study
- **THERE IS DATA**
  - **National Data**
  - **Citizens and scientists gathering**
    - Hundreds of hours of video
    - Videos tying actual boats to their wakes
    - Thousands of Photos
    - Hundreds of aerial photos
    - Hundreds of nationwide articles

You can see the erosion in the Erosion Video

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232-1274

January 16, 2020

Chairwoman Val Early
Oregon State Marine Board
435 Commercial Street Northeast, Suite 400
Salem, Oregon 97301

SENT VIA U.S. MAIL AND ELECTRONIC MAIL TO marine.board@oregon.gov

Re: Effects of Wake Boat Activity on ESA-Protected Fish and Designated Critical Habitat

Dear Chairwoman Early:

National Marine Fisheries Service (NMFS) recently became aware that the draft agenda for the January 22, 2020 meeting of the Oregon State Marine Board (OSMB) will include an update from the Newberg Rule Advisory Committee (RAC) regarding the OSMB's options to regulate wakeboard or wake surfing in the Newberg Pool, and that a second RAC is examining this issue in the Lower Willamette River.

Moreover, we understand that work to date by the OSMB and the RACs on the justification for wake sport regulation has focused on impacts to boating congestion and private property damage, but has paid little attention to the impacts that wake sports have on aquatic life, including salmon and steelhead species designated as threatened under the Endangered Species Act (ESA), and their critical habitats. NMFS encourages OSMB and the RACs to add consideration of ESA protected resources to their list of concerns regarding wake sports, and offer the following comments in support of that approach.

Two ESA-listed species and their critical habitat occur in the mainstem of the Willamette River above Willamette Falls, including the Newberg Pool: Upper Willamette River (UWR) Chinook salmon and UWR steelhead. Three additional ESA-listed species from the Lower Columbia River (LCR) region and their critical habitat also occur in the Willamette River below Willamette Falls: LCR Chinook salmon, LCR coho, and LCR steelhead. All five species are listed as "threatened" under the ESA. Individual fish from each of these species use critical habitat within the affected reaches to complete essential life history functions related to freshwater migration and rearing, and their ability to do so depends on the presence and quality of specific physical and biological features (PBFs) that include, but are not limited to, freedom from obstructions (which may include artificial noise or excessive sediment), floodplain connectivity, forage (adequate food quantity and quality), natural cover, and water quality.

In NMFS' experience, noise and wave actions are frequently a threat to juvenile salmon and steelhead. Therefore, we expect that wake sports are likely to have a significant adverse impact on those listed species and their critical habitats by injuring and killing individual fish when, for example, the surge and wakes caused by artificial waves from passing boat and wake sport participants wash juvenile fish onto the shore, or otherwise modify or degrade PBFs in ways that injure or kill fish by significantly impairing their essential behavior patterns (see Williams and Holmes 2019, and literature cited therein, and additional citations below).

NMFS has a responsibility under the ESA to protect and recover threatened and endangered species, and we have a long history of working with state and local agencies in Oregon to restore salmon and steelhead populations and their habitat. We also have a responsibility to enforce the prohibitions of the ESA, which makes it unlawful for any person to harm threatened salmon and steelhead, through activities which injure or kill protected fish or interfere with the function of their habitat. Through the ESA, Congress has made the public at large responsible for avoiding harm to these species, and NMFS is offering to work proactively with the Board to minimize these concerns in the course of its review of wake sports.

Before the OSMB approves rules that authorize wake sports in the Willamette River that are likely to affect ESA-listed species or their critical habitats, it should ensure that it or the applicant will comply with the ESA either by avoiding the kinds of harm described above, or by showing that any harm that will occur is subject to an exception or exemption under the ESA.

I hope this letter gives the OSMB the information it needs to clearly understand NMFS' views o the wake sports in the Willamette River. My staff and I stand ready to work with the OSMB in any way necessary to comply with the ESA.

Sincerely,

Kim W. Kratz, Ph.D.
Assistant Regional Administrator
Oregon Washington Coastal Area Office

cc: Jason Miner (Oregon Governor's Natural Resources Office)
Larry Warren (Oregon State Marine Board)
Jennifer Wigal (Oregon Department of Environmental Quality
Bruce McIntosh (Oregon Department of Fish and Wildlife)
Vicki Walker (Oregon Division of State Lands)
Travis Williams (Willamette Riverkeeper)

IN THE **LETTER FROM NMFS** TO THE OREGON STATE MARINE BOARD

…The justification for wake sport regulation has focused on impacts to boating congestion and private property damage but has paid little attention to the impacts on aquatic life including …..

NMFS has a responsibility under the ESA to protect and recover threatened and endangered species…

We have responsibility to enforce the prohibitions of the ESA which make it unlawful for any person to harm threatened salmon and steelhead through activities which injure or kill protected fish or interfere with the function of their habitat….

I hope this letter gives the OSMB the information it needs to clearly understand NMFS views on the wake sports in the Willamette river. ….

Over 600 pages of supporting documentation was sent to the Oregon State Marine Board

So what are the solutions to the problem?

Here is a summary:

Do nothing: It's public water, right? Recreational navigation is guaranteed, right? Yes, it's public water, but individual uses aren't guaranteed. The Marine Board or even the state legislature could respond with specific restrictions.

Do something: Proposals suggested to the Marine Board include anything from "no wake-enhancing devices" to "no towed devices" on narrow stretches of the river or stretches that are highly developed.

Do prevention: This is the best option. For this to work, boaters must recognize the need to "play away" from waterfront development and other people who do not appreciate large boat wakes. Boaters should reduce the volume of their stereo, pick up their litter, and be courteous to local residents and other waterway users.

Watch for increased law enforcement in 2007.

ORS 830.305 Unsafe operation. A person commits the crime of unsafe operation of a boat if the person operates a boat in a manner that endangers or would be likely to endanger any person or property. *Fine: Maximum $499*

ORS 830.315 Reckless operation; speed. (1) A person commits the crime of reckless operation of a boat who operates a boat carelessly and heedlessly in willful or wanton disregard of the rights, safety or property of others. *Fine: Maximum $6,250*

Oregon State Marine Board
P.O. Box 14145
Salem, OR 97309-5065

2007

Watch your wake

According to the OSMB IN 2008

"Hydrologists estimate that a wake 5 inches high produces limited damage to the shoreline, but a 10- inch wake is 5 times more destructive, a 25-inch wake is 30 times more destructive, and so on"

WATCHING YOUR WAKE

Fast Fact

You are legally responsible for your wake and the damage or personal injury it causes, no matter how large or small the wake.

My Wake Isn't That Big. How Much Damage Can it Really Do?

Recreation

- Can be a danger to inexperienced swimmers or wading anglers
- Can rock, swamp or capsize boats; passengers can even be thrown off balance or overboard
- Can erode sediment from the shoreline, creating cloudy water

Property

- Can thrust docked boats against a moorage
- Can wash floating trees against docks or boats
- Can erode shoreline property

Wildlife

- Can cause churned sediment to settle to the bottom of the waterway and smother aquatic vegetation
- Can disturb bird nesting along the shore

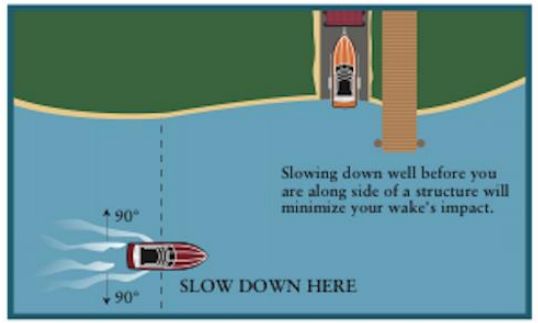
WAKE SIZES AND EFFECTS

- 5-inch wake ➤ limited damage
- 10-inch wake ➤ 5x more damage potential
- 25-inch wake ➤ 30x more damage potential

HOW DO I COMPLY?

Limit Your Wake

- Be aware of your wake, especially when changing speeds.
- Slow down enough to eliminate wake when needed.
- Trim tabs help keep your boat level and limit time in transition speed.
- Boat in deeper waters, away from shore/other boats.
- Arrange passengers; a heavy stern creates a big wake.
- Slow down ahead of time to avoid a following wake.

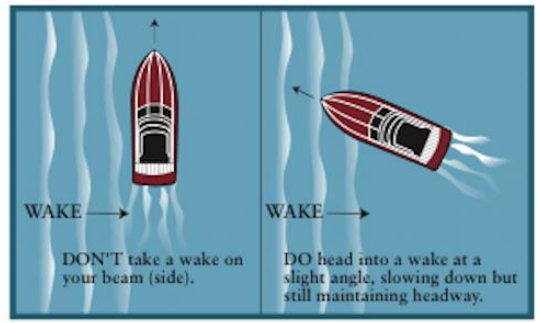


Wakeboard Boats And Cruisers

Boats that create wakes in excess of 18 inches under normal operation create hazardous conditions that can lead to new restrictions. To prevent unnecessary restrictions, such as extended "no wake" zones, please **play away** from developed shorelines, other boaters, steep banks of soft sediment or areas used by wildlife. Only use wake-enhancing devices in larger waterbodies. When producing 24" wakes or larger, please stay 500 feet or more from the shoreline. Respect private property – and other boaters, too.

Protect Against Other Wakes

- Warn passengers ahead of time.
- Slow down but don't stop. You need headway to be able to maneuver through the wake.
- Keep older passengers aft.
- Cross at a slight angle to prevent the bow from being thrown high into the air.
- While overtaking a boat, cross its wake quickly.
- Try not to take a wake on your beam. Turn the bow into the wake at an angle and then resume course.



WHAT'S THE LAW?

Operators of boats must observe Slow-No Wake, Maximum 5 MPH speed limit within 200 feet of a boat ramp, marina or moorage with a capacity for six or more vessels; a floating home moorage with six or more structures; or people working at water level.

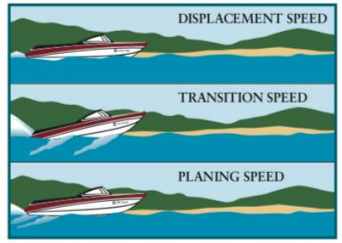
* ***Exemptions:*** Commercial vessels or if more speed is needed for safe passage in river navigation.

How Speed Affects Wake

1) Displacement Speed: The boat operates with the bow down in the water. This is the slowest speed, and it creates the least wake.

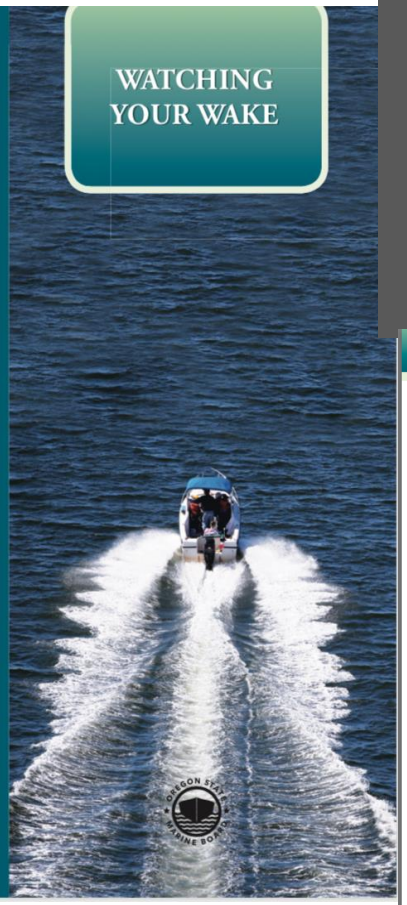
2) Transition Speed: As you increase power, the bow rises and causes the stern to plow through the water. This speed creates the largest wake.

3) Planing Speed: The bow drops back down, and only a small portion of the hull contacts the water. This speed creates less wake than transition speed but more than displacement speed.



WATCHING YOUR WAKE

Oregon State Marine Board
435 Commercial Street NE, Ste. #400
PO Box 14760
Salem, Oregon 97309
www.boatoregon.com



OSMB's publication Watch Your Wake:
"when producing a wake greater than 24",
please stay 500' from docks and the shoreline".

Yet, current rules allow larger boats to be closer to the shoreline.

**This publication has been removed from the OSMB website*

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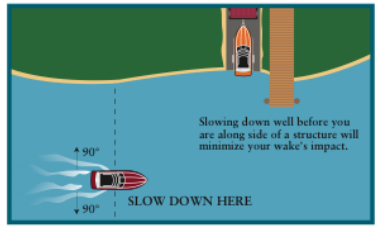

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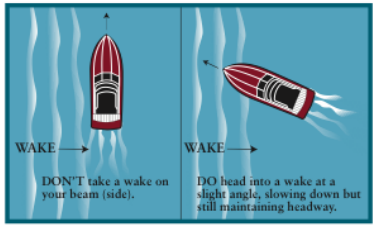
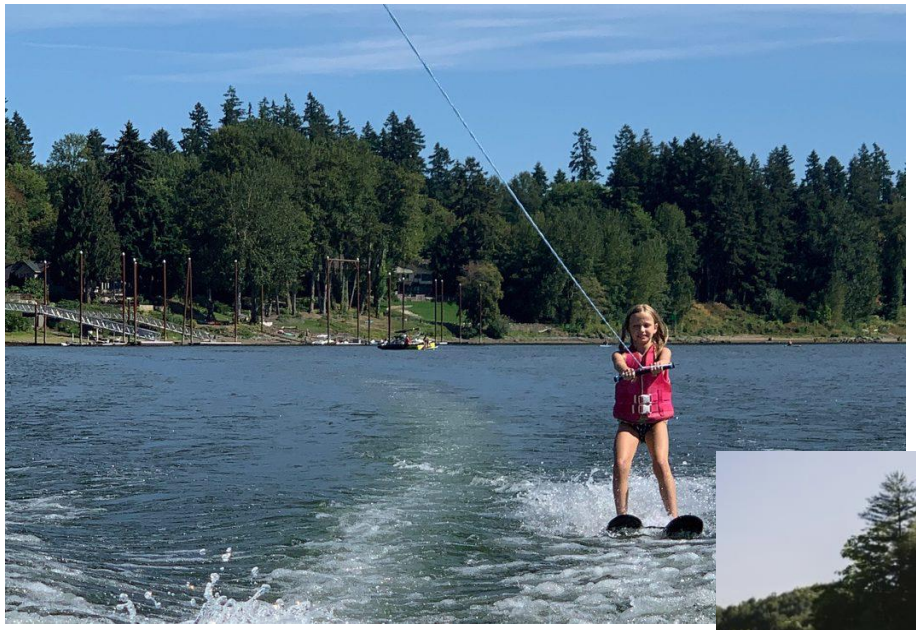


OREGON STATE MARINE BOARD 2008 publication

Throwing thousands of pounds of energy at docks and shorelines

Launching is dangerous

Depicted on opponent's website



But… these are the problematic wakes

One boat's wakes crash from shore to shore

Ski Nautique - 2020

7400 pounds dry weight
2200 pounds ballast
2500 pounds / 16 people

WAVE ENERGY

If Erosion in natural, caused by high water…..

WHY isn't there
EROSION in the no wake zone?

Bank erosion exposes tree roots

Turbidity regularly exceeds state and federal standards under the Clean Water Act

Bank erosion in one year

EROSION OCCURS DURING THE SUMMER

Morning vs. Afternoon

BIG BOATS HAVE BIG IMPACTS

Safety and user conflict with

- Swimmers
- Paddlers
- Kayakers
- Fishermen
- Canoers
- Water ski boats
- Recreational boaters
- People on docks
- Children in tubes
- Dragon Boats
- Skull

Property damage

- Private docks
- Embankments
- Public docks

User conflict

Devastation to near shore habitat