

## Testimony of Bert Krages in Support of SB 857

I am an attorney and former practicing environmental engineer who enjoys kayaking on the Willamette River. I paddled 97.3 hours on the Willamette River in 2020 and have paddled over 30 hours on the river this year. I have spent many additional hours observing the river from its shorelines and documenting its condition with video cameras. These observations are summarized in the following videos:

<https://youtu.be/rnOMEWxTdEc> (2:07)

<https://youtu.be/IUEGmSchkyE> (7:48)

<https://youtu.be/EZBavoyasts> (15:13)

### Wake Boat Physics Explain Much of the Problem.

Although wave height is the immediately noticeable aspect of boat wakes, wave energy is a more relevant parameter with respect to environmental damage. This is because waves retain much of their energy, and thus their ability to cause damage, even after their height decreases. The physics associated with waves is complex, but in a general sense wave energy can be thought of as the ability to exert scouring-type forces on nearshore sediments and to transfer force onto shoreline structures. It is these forces that suspend sediment and cause the high turbidity seen in the ecologically-critical edge habitat of the Newberg Pool and damage shoreline property.



Wake experienced 300 feet from a wakesurfing boat, river mile 32.5, Newberg Pool.

Several studies have been done on wakes generated by wakesurfing and wakeboarding and they consistently show that these activities create much more powerful wakes than does the typical recreational boat when cruising. In his study conducted on the Newberg Pool in 2018, Associate

Professor Gregor Macfarlane of the Australian Maritime College evaluated six models of wake boats with dry weights ranging from 3000 to 5500 pounds that were ballasted between 5520 and 10840 pounds.<sup>1</sup> The wakes from these boats in wakesurfing mode contained 3 to 6 times the energy of a ski boat at 200 feet and about 2 to 5 times the energy at 300 feet. Another study funded by the Water Sports Industry Association (“WSIA”) in 2015 evaluated a wake boat ballasted to 10,150 pounds and found that the wake energy from wakesurfing at 210 feet was 3 times greater than that of the same wake boat when unballasted at cruising speed.<sup>2</sup> The same boat with less ballast in wakeboarding mode generated wakes that had twice the energy of the wakes generated in cruising mode.<sup>3</sup> A more recent study using a similarly-ballasted wake boat found that the energy from a wake boat in wakesurfing mode was 6 times greater at 200 feet and at 300 feet than the wakes made when in cruising mode.<sup>4</sup> Similarly, the energy in wakeboarding mode was about 2 times greater.

The physics associated with wake boats is well established. Furthermore, although each of these studies evaluated the effect of one wake boat moving at a time, in practice it is common for multiple boats to be engaged in wake sports and tubing in the same stretch of the river. Likewise, each of the studies evaluated boats traveling in straight lines whereas in practice boats frequently perform power turns which generate larger and more energetic wakes. There is sufficient research to establish that wake boats are a problem in the Newberg Pool. The clamor by opponents to SB 857 that more studies are needed is nothing more than obfuscation, because the laws of physics do not change on the Newberg Pool.

### **Wakes from Wake Sports Cause Turbidity and Damage Wildlife Habitat**

The most compelling reason to restrict the size of boats used for wake sports is damage to the

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<sup>1</sup> Gregor Macfarlane, Wave Wake Study: HB 4099 Motorboat Working Group, National Centre for Maritime Engineering & Hydrodynamics, Australian Maritime College, University of Tasmania. 28 August 2018.

<sup>2</sup> Goudey C.A and L. Girod. 2015. Characterization of Wake-Sport Wakes and their Potential Impact on Shorelines, prepared for the Water Sports Industry Association. 24 November 2015.

<sup>3</sup> The WSIA study downplays the damaging potential of wakes from wake boats by calculating the energy from wind waves generated at wind speeds between 10 and 30 mph and comparing the cumulative energies with those of wake boats. The deficiency of this analysis is that it ignores the fact that sediment erosion does not occur unless the wave energy exceeds a critical minimum threshold. In other words, erosion does not occur until waves exceed a certain size. Furthermore, wind speeds in the Portland area rarely exceed 6 mph.

<sup>4</sup> Water Environment Consultants, Boat Wake Impact Analysis: Lake Rabun and Lake Burton, Georgia, Prepared for Lake Rabun Association, Inc. & Lake Burton Civic Association. 20 January 2021.

river's ecosystems, particularly the edge habitat near the shorelines. Federal and state environmental agencies have long recognized that the adverse effects of turbidity in waters include reducing available food for fish, impeding fish migration and other natural fish movements, preventing the development of fish eggs and insect larvae, and decreasing the fishes resistance to disease.<sup>5</sup> In addition to erosion and turbidity, the high energy levels observed in wakes from wake sports create turbulence that can disrupt the growth and survival of organisms such as *Daphnia* that serve as major food sources for juvenile salmon and other fish species.<sup>6</sup>



Turbidity and erosion in the edge-habitat regions of the Newberg Pool, river mile 35.

Stan Gregory, a professor in the Department of Fisheries and Wildlife at Oregon State University has previously testified before the Legislature that the disruption of sediments and turbidity created by wake sports in the Newberg Pool is harmful to the benthic organisms that constitute the food source for juvenile fish, and that the river's edge habitat is critical for the health of wildlife habitat along the river. When the foundation of the river's food chain is damaged, the effects cascade into higher trophic levels, resulting in population-level reductions to fish and other species.<sup>7</sup>

Furthermore, it is important that the State not ignore the letter that the National Marine Fisheries

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<sup>5</sup> U.S. Environmental Protection Agency, Turbidity: Water Quality Standards Criteria Summaries. September 1980

<sup>6</sup> For example, kinetic energy at levels observed from wakesurfing wakes at 300 feet reach those found to disrupt the growth and survival of *Daphnia*. Serra, T., Müller, M.F. & Colomer, J. Functional responses of *Daphnia magna* to zero-mean flow turbulence. *Sci Rep* 9, 3844 (2019)). See also, Seuront, L., Yamazaki, H. & Souissi, S. Hydrodynamic disturbance and zooplankton swimming behavior. *Zool. Stud.* 43, 376–387 (2004).

<sup>7</sup> Several studies have established that boat wakes can damage shorelines and habitat. E.g., Donna Marie Bilkovic et al, Defining boat wake impacts on shoreline stability toward management and policy solutions, *Ocean & Coastal Management*, Vol. 182, 2019, 104945, ISSN 0964-5691.

Service (“NMFS”) sent to the Oregon State Marine Board on January 16, 2020, expressing its concern that wake sports such as wakesurfing pose a serious threat to the Willamette populations of salmon and steelhead listed under the Endangered Species Act. Note that this agency is not a waterfront homeowner or other kind of straw man on whom opponents of SB 857 seek to deflect the need for this important legislation. Rather, NMFS holds the sword of Damocles over the State by virtue of its listing of salmon and steelhead populations under the Endangered Species Act. If salmon and steelhead runs continue to decline, the ensuing restrictions on permitting, development, and fisheries management have the potential to affect the State and its citizens far more drastically than making a relatively few number of wakeurfers practice their recreation on the Columbia River or nearby reservoirs.

### **Wakesurfing Cannot Be Mitigated in the Newberg Pool**

Many wake sport enthusiasts claim erroneously that more education and enforcement of existing laws could mitigate the adverse effects of wakesurfing in the Newberg Pool, However, no amount of education or enforcement is going to change the physics associated with these wakes and what they do to the ecosystems of the river. As someone with an environmental engineering background, I find it emotionally difficult to observe the suspended solids and turbidity caused by the scour from these wakes, because I understand what they are doing to the environment.

Finally, the weight limit proposed in SB 857 is eminently reasonable. For example, water skiing is best done with unballasted boats that fall well below the 4000 pound limit proposed in the bill. Similarly, tubing can be done with lighter boats that do not generate massive wakes. Thus, the proposed weight limit would not unduly restrict towed water sports. The few businesses which may be affected by SB 857 can adapt their operations. Passage of SB 857 will not eliminate towed water sports, but would encourage the industry to adapt so that these activities are done in a more responsible manner.

Thank you for considering my testimony.

s/ Bert P. Krages II