House Bills 2351 and 2352

Testimony by Associate Professor Gregor Macfarlane

At the request of members of the Legislative Working Group, and in collaboration with the Oregon River Safety and Preservation Alliance (ORSPA), Associate Professor Gregor Macfarlane of the Australian Maritime College (AMC) performed a series of full-scale experiments on the Willamette River in which the waves generated from a range of different craft were measured and analysed. The primary aim of the study was to acquire reliable wave wake data for typical speeds associated with wakesurfing, wakeboarding and waterskiing activities in a scientific manner such that it can aid decision making processes. A technical report was prepared that provided relevant background to the specific topic area, details of the experiments performed and presented test results (Ref. AMC Report 18WW01). Some additional analysis of the experimental data was also performed at a later date.

To the author's knowledge, this was one of the most comprehensive full-scale experimental studies performed anywhere in the world to date that has specifically investigated the characteristics of the waves generated by boats engaged in wakesurfing, wakeboarding and waterskiing activities.

For the present study, it is suggested that the most appropriate benchmark from which to make informed decisions be based on the characteristics of the waves generated by typical waterski boats and runabouts operating at speeds that are commonly used for waterskiing and tubing activities. This is due to the fact that waterskiing has been a commonplace and generally well-accepted activity on numerous inland waterways for many decades, including the Willamette River Greenway (Newberg Pool Congested Zone) – the subject of House Bills 2351 and 2352.

There are clear and notable differences in the three water sports of wakesurfing, wakeboarding or waterskiing, particularly the speed they operate:

- Wakesurfing: Slow speed (approximately 10-12 mph)
- Wakeboarding: Moderate speed (approximately 18-22 mph)
- Waterskiing: High speed (approximately 30-32 mph)

The most salient points from the experiments and subsequent data analysis are:

- Regardless of whether the boat was designed for wakesurfing, wakeboarding or waterskiing activities, when operating at typical wakesurfing speeds (slow, 10-12 mph) the energy of the maximum waves generated at a lateral distance of 100 ft were roughly between 2 and 10 times greater than the benchmark case (i.e. waterski boat operating at waterski speeds; 30-32 mph).
- A lateral distance of at least 400 ft was required to allow the waves generated by typical wavesurfing/wakeboarding boats (with additional ballast to enhance the wake generated) operating at wakesurfing speeds (10-12 mph) to disperse and attenuate sufficiently such that the energy of the maximum wave had reduced to be approximately equivalent to that of the benchmark case.
- Similarly, a lateral distance of approximately 300 ft was required to allow the waves generated by typical wakeboarding boats (with additional ballast to enhance the wake generated) operating at wakeboarding speeds (18-22 mph) to disperse and attenuate sufficiently such that the energy of the maximum wave had reduced to be approximately equivalent to that of the benchmark case.

In my view, the significant increase in wave energy created at the slow wakesurfing speeds (10-12 mph), especially from the heavier (ballasted) boats, warrants the adoption of special regulations to protect sensitive river banks where there may be insufficient lateral distance for these waves to sufficiently disperse and attenuate, such as the Willamette River Greenway.

Author Biography:

Dr Gregor Macfarlane is an Associate Professor in maritime hydrodynamics at the Australian Maritime College, a specialist institute of the University of Tasmania, Australia. Gregor is a naval architect with 25 years experience in experimental techniques applied to engineering hydrodynamic problems. Water waves are a central theme to his work, particularly quantifying the waves created by boats and ships and the effect they have on the surrounding environment and other waterway users. He has published 24 peer-reviewed articles, prepared more than 50 technical reports and consulted to many government and other regulatory bodies on matters directly related to this specific field.

Dr Macfarlane enthusiastically contributed to the wake study on the Willamette River for several reasons – it is not easy getting access to such a range of boats during the one test session; water depth is an important factor for boat wave generation (especially for wakesurfing activities) and the Willamette River at the test site is notably deeper than the locations generally available in his locality (where suitable boats are also available); the data acquired is greatly beneficial to his research, and he was very impressed by the professionalism of Steve Gregg and the team from the Oregon River Safety and Preservation Alliance in the lead-up to (and subsequently during) the tests. Undertaking these type of experiments in a semi-controlled environment is not a trivial exercise and Dr Macfarlane had confidence that the dedication and attention to detail by the entire ORSPA team ensured that the experimental campaign would be the great success that it turned out to be.