Dear Representatives,

I am unable to attend the public input hearing on Monday, February 12. I am wanting to state my **opposition to HB 4099 and HB 4138**.

HB 4099:
My main objection to this bill is legislation is being proposed while the Oregon State Marine Board has an opened rule making process in motion addressing the same issues.
If you recall, the OSMB opened rule-making regarding this issue during their quarterly meeting on January 10, 2018. The OSMB is addressing the issues that this piece of legislation is attempting to address - although this proposed bill will not address the main component of this issue which is education and boater compliance (of all and any type boat). The OSMB has already considered an increase in the distance from shoreline/docks/structures and is part of the conversation within the OSMB committee.

A group complained about "those boats" many years ago and restrictions were put in place. A group now complains about "those boats" because with the restriction in place, "those boats" must congregate in a small portion of the river, in front of their river homes. The complaint of boats and a boat wake coming to close to shore/docks/structures is not limited to a WED boat. I have observed from our neighborhood dock boats of every kind breaking this rule. At times the rule is broken due to a safety issue within the river channel. This is a boat captain compliance issue and the OSMB is desiring to increase boating compliance with an increase in distance from shoreline/docks/structures.

A committee was put together by the OSMB and this committee attempted to bring compromise and resolution to this issue this past summer. A majority 9-1 consensus was reached; however, the OSMB desired an unanimous agreement. Since the unanimous agreement was not made on the current rule, the OSMB opened rule-making on this issue.

I received a notice today, 2/9/18, that the Oregon State Marine Board - Wake Sports Rules Advisory Committee (RAC) is meeting on February 15, 2018. The OSMB news release states, "The RAC is meeting to assist in developing statewide rule proposals to increase safety and reduce boating concerns related to wake sport boat operation within 200 feet of the shoreline and objects in the water. The committee will also assist in the assessment of a fiscal impact of any proposal."

Why is the legislature needing to step in during the OSMB rule-making process?

And to what end will adding another committee/task-force to this issue benefit? A committee is already in place and the OSMB is actively addressing this issue.

As to restrictions on a certain type of boat - all boats create a wake and each wake has its own energy and rate of energy dissipation. The Willamette River has been a river "highway" for boat vessels of all sizes. Before a law is restricting a certain type of boat, there should be some data to support that restriction.
There may be studies done in different countries and different states on boat wakes and erosion, but when reading those reports a few components of the study need to be considered for its application to the Willamette River. Is the study for a lake or a river, is the water sea/salt water or fresh water, what is the depth of the waterway, what is the width of the waterway, does the body of water have a marsh along its shoreline, what type of soil makes up the waterway shoreline (or bank line), what type of vegetation is along the waterway (and slope if applicable), does the waterway have a floodplain, what is the velocity of the waterway current, does the water have wind waves as a factor, what is the development around the waterway, what type of boat was used, etc.

Each study and report I have read over the past few weeks has its own characteristics for that waterway being studied.

HB 4138:
There are many causative factors of erosion. There are been reports in other states, other countries, even on waterways here in Oregon. There is not a current report, that I can find, along this stretch of the Willamette River.

In the *Willamette River Basin Challenge of Change*, on page 16 it states: "Rivers are dynamic and complex living systems. When waters rise or flood, they move gravel around, carve new banks, topple trees, and push sediment downstream. These processes form and reform habitat for aquatic creatures by carving new side channels, building sheltering alcoves, damming pools with large logs, and forming new gravel bars."
https://ir.library.oregonstate.edu/downloads/s1784r73f

The Willamette River is an active, continuous waterway with a documented history of cyclical and historic flooding. There are properties along the Willamette River are in the FEMA Regulatory Floodway (zone AE) - per the FEMA Flood Plain information (https://msc.fema.gov/portal/search#searchresultsanchor). The Willamette River has has been subject to cyclical flooding during the winter caused from seasonal variations in precipitation and snow accumulation in the mountains, which can lead to an increase in volume (and velocity) of water in the river. Damage can also occur to trees along the riverbank and upper bank. It states in the Woodland Workbook, May 2013, on page 6 - "Fast-moving, turbulent waters can kill trees outright by uprooting them. Or, extensive erosion can strip soil from tree roots, diminishing the tree's ability to extract water and nutrients from the soil."
https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/ec1501.pdf

The Willamette River has also had historic flooding. The flooding of 1861 & 1894 wiped out some small towns that were built along the Willamette River floodplains, including Champoeg. The flooding in 1964 and 1996 also caused extensive damage. During the winter of 2016-2017, we had extensive snow and ice throughout the Willamette Valley. Damage to trees and other structures along the river could be seen.

I recommend a quick read on the the FEMA Floodplains/Flood Inundations report:
"Floods raise many concerns for communities living along major rivers such as the Willamette River…….Development of urban and agricultural areas along the Willamette River has placed many homes, buildings, and other structures within the floodplain of the Willamette. Communities and landowners often protect these investments by hardening the banks and minimizing channel change, which leads to reduced channel dynamics and impaired ecological conditions."
"During the recent floods of 1964 and 1996, the Willamette River fully occupied its historical floodplain in the lower, narrow river and occupied most of the historical floodplain in the middle section of the river."
http://www.fsl.orst.edu/pnwerc/wrb/Atlas_web_compressed/3.Water_Resources/3e.flood&fema_web.pdf

More information regarding flooding can also be found in the FEMA Flood Insurance Study - Clackamas County, Oregon - Effective: June 17, 2008:
http://www.oregonriskmap.com/index.php?option=com_docman&view=download&category_slug=pdf&alias=37-clackamas-co-fis-vol1&Itemid=32

On the *US Army Corps of Engineers* website: "The floods of winter 1964 (Dec. 19, 1964–Jan. 31, 1965) were some of the largest flood events ever recorded for many rivers in western Oregon. Heavy rain fell directly on high elevation snowpack, melting the snow and increasing the floodwaters to levels not seen since the historic floods of 1861. The excess water altered the landscape and substantially changed river channels

throughout the region. Headwater streams in the mountains of the Cascades and Coast Range became choked with debris from landslides that were triggered across the steep terrain. Floodwaters scoured the previously stable sediment from the floodplain of valley-bottom streams, causing channels to widen and meander and new gravel bars to form.
Today, nearly 50 years after the flood, the geomorphic impacts of this flood can still be seen throughout western Oregon. The sediment that was deposited along many rivers during the flooding became seeded with cottonwood, willow, and alder trees, creating distinctive, even-aged modern forests. Many of the channel changes triggered by the 1964 floods have survived recent smaller floods, so that the habitats, ecosystems, and infrastructure still show the effects of the 1964 floods."
http://www.nwp.usace.army.mil/Missions/Water-Management/Flood-Ready/Were-We/Impact/

On the *Lincoln Soil and Water Conservation District* website is states under stream bank erosion:
"Rivers and streams are not fixed landscape features. Over time their banks shift and move through out a wider area called a floodplain which results in a natural level of erosion. The results can be dramatic like during a flood event or very subtle such as the down cutting of a stream bed."
http://www.lincolnswcd.org/streambank-erosion.html

The "*Geomorphic and Vegetation Processes of the Willamette River Floodplain, Oregon—Current Understanding and Unanswered Questions*" 2013 study is a report that "summarizes the current understanding of floodplain processes and landforms for the Willamette River and its major tributaries." Pages 14 - 25, and page 40 has information on riparian vegetation, flooding, bed-material sediment, and large wood affects on river channels.
On page 19, the study states:
"Flooding shapes landforms, habitat, and vegetation patterns along river corridors in the Willamette River Basin (fig. 10). The capacity of floods to form and modify channels and flood- plains is dictated largely by interactions between flood magnitude and channel geometry, and resulting local hydraulics and patterns of sediment erosion and deposition. Stream velocity and sheer stress can be highly variable, but generally increase with channel slope and water depth. Complicating the relations between floods and geomorphic consequences is the nonlinear behavior of erosion and sediment transport in relation to stream velocity and sheer stress."
https://pubs.usgs.gov/of/2013/1246/pdf/ofr2013-1246.pdf

The "Willamette Riverbank Design Notebook" is a notebook by the GreenWorks company published in May 2001. On the company website it states: "Hired by the City of Portland, GreenWorks led a team of biology, engineering, and erosion consultants to investigate existing bank conditions along the Willamette River in downtown Portland." Although this notebook focus is on the Willamette River in Portland, the beginning of the notebook gives descriptions and characteristics of the Willamette River.
http://greenworkspc.com/willamette-design-notebook/ https://www.nps.gov/WaterTrails/Toolbox/DownloadFile/127

Studies have been done on other waterways in Oregon. Such as the *"Investigation of Motorboat-Induced Streambank Erosion on the Lower Deschutes River*" study in 1990, which states:
"Most streambank erosion is due to more than one cause . Secondary causes have increased the amount of bank erosion at some sites over that which would have resulted from the primary cause acting alone. Streambank erosion is most common near the river mouth . This zone has the most intensive human activities .and local animal grazing . But bank erosion occurs locally throughout the study area. Motorboat operation is only a minor and local cause of streambank erosion along most of the Lower Deschutes River. However, severe erosion at the State Recreation Area is largely due

to boat mooring and waves . Bank erosion occurs in river reaches where motorboats are excluded . Hence, prohibiting the use of motorboats will not halt bank erosion."
https://ir.library.oregonstate.edu/concern/defaults/2b88qh38b

The Oregon report, "*Roadway Applications of Vegetation and Riprap for Streambank Protection Study*" in January 2002, states:
"Erosion and deposition are normal processes in the dynamic systems of a river. From a highway perspective, the best time to recognize and deal with this is in project planning and design. If not considered early, the subsequent maintenance and emergency measures may be quite costly. Erosion and deposition occur irregularly over time and are local in extent. Erosion is mainly associated with wet season flows and snowmelt floods, but may also occur locally as steep banks dry out and unravel. Erosion and deposition lead to the movement of bank lines and channels. Over centuries, these processes have formed wide floodplains for many rivers. In the short term (decades or less), they have led to startling changes in local conditions at places such as bridges and water intakes.
Meandering occurs where a floodplain exists with widespread erosion and deposition, due to the accumulation and interaction of many local erosion events. Elsewhere, lateral changes may be restricted by bedrock, cemented gravel, and hardpan soils. Meander changes are likely to be most evident during the larger, less common floods. Avulsive changes (abrupt, extreme, and often unpredictable events that typically involve the cut-off of a meander loop) are most likely to occur with major floods. Meandering and avulsive changes are probably the greatest concerns for highway maintenance, causing new and unexpected threats as well as emergencies for roadways and bridges."
http://www.oregon.gov/ODOT/Programs/ResearchDocuments/RdWayApplicVegRipRap.pdf

I did find an out-dated report,"*Corps of Engineers Actions Affecting Riverbanks and Channels in Willamette River Basin, Oregon*", from May 1974 that does discuss this portion of the Willamette. It is interesting to consider statements made in this report as to erosion along the river. Such as:
"Presumably, the proposed major reduction in Willamette River dredging will result in some increase in meandering and bank erosion by Willamette River."
"Lands along the river which were formerly left in brush and trees because of of the threat of erosion are sometimes plowed and planted up to the riverbank following revetment construction. This change in land use has been frequently observed over many years by Corps project engineers, but no information is available as to the amount of land involved or whether this is a significant impact of bank protection."
"Continue the past dredging practice…….from the Willamette River between Portland and Corvallis, as well as snagging. While the channel has been maintained at only 14 percent of the authorized project, it has provided considerable benefits to commercial and recreational boaters and has served to reduce bank erosion and channel changes."
https://books.google.com/books?id=JhU0AQAAMAAJ

Some in favor of these bills will reference the "*Review of Boat Wake Wave Impacts on Shoreline Erosion and Potential Solutions for the Chesapeake Bay*" report.
(http://ccrm.vims.edu/2017_BoatWakeReviewReport.pdf) Interesting to note in the Chesapeake Bay report that *"The amount of boat wake energy impacting a given shoreline is a function of not only the size and speed of vessels passing that shoreline, but also the frequency of vessels (Zabawa and Ostrom 1980, Glamore 2008)"* something to consider with an ordinance that restricts boats with WED's to certain areas of the river and will increase the frequency of boats having certain style of wakes in a condensed area.

These are other points from the report to consider:

"Boat wake energy is event-dependent and is influenced by the vessel length, water depth, channel shape, and boat speed (Sorensen 1973, Glamore 2008). Wakes are most destructive in shallow and narrow waterways because 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 150 m (~500 ft.) of the shoreline are capable of producing wakes that can cause shoreline erosion and increased turbidity (e.g., Zabawa and Ostrom 1980). Vegetated shorelines can effectively attenuate waves in certain settings; however, there is a limit to this capacity particularly if there is frequent exposure to boat wakes."

"Policy makers who are concerned about boat wakes may want to use existing models of boat wake erosive potential (e.g., BoMo, Decision Support Tool) to inform decisions on where to put no-wake zones or other boat policies. However, at this time, we do not have sufficient data to run either model for the Chesapeake Bay."

"Shoreline erosion is a natural process that can be exacerbated by human activities. Natural drivers of shoreline erosion include wind waves, currents, and sea level rise (SLR). Human activities that exacerbate erosion include shoreline hardening (armoring) and boat wake impacts. It is not possible to visually distinguish between the natural and human-induced components of erosion; these must be deduced from measure of human use of an area combined with wind wave erosion models.

This report focused on boat wake-induced erosion, but this should not be interpreted to mean that the other drivers of erosion are unimportant in the Chesapeake Bay"

"Waves that travel in water that is deeper than 1/2 of their wavelength (the distance between two successive wave crests) are referred to as deep water waves. The motion of deep water waves do not penetrate the full depth of the water column, thus these waves have little impact on the bottom sediments (Sorenson 1997, Hill et al. 2002). As a deep water wave travels away from the sailing line, wave height will decrease with distance traveled as wave energy spreads out along the wave crest. Given a long enough transit in deep water, much of the wave energy will distribute over a wide area before reaching a shoreline. In deep water, the speed at which a wave moves away from its point of generation is largely a function of wavelength; waves with longer wavelengths travel faster than those with shorter wavelengths"

"In the Kenai River, Alaska, Maynord et al. (2008) demonstrated higher shoreline erosion rates when peak boating conditions corresponded to times of high river flow and decreased erosion, despite high boat activity, during lower flow conditions. They noted that during low flow conditions, much of the wave energy was lost due to contact with gravel sediments near the river margins."

"As a result, the presence of living root material in shoreline soils results in a stronger soil that is less easily eroded (van Eerdt 1985, Francalanci et al. 2013). Additionally, shoreline vegetation like marsh plants combats erosion by attenuating wave energy (Yang et al. 2012, Möller et al. 2014; Figure 5) and this response is proportional to both the height and density of the vegetation (Möller 2006). The presence of even a narrow band (on the order of 1 m wide) of marsh vegetation in front of the shoreline has been shown to result in decreased rates of shoreline erosion (Currin et al. 2015)."
*** interesting to note for the Willamette River, most boating is done when the water level is low and some of the vegetation is on the higher slope of the riverbank.

"Shoreline change may include shoreline erosion and resuspension in the foreshore environment, although sediment can be transported landward as well. The balance of transport (whether the shoreline erodes or accretes) depends on the size of the wake (Osborne and Boak 1999, Houser 2011). Most studies found the

effects of boat wakes on the shoreline are dependent on many factors. Site-specific conditions such as water depth, bank profile, type, size and supply of sediment and bank resistance can control suspended-sediment concentrations (McConchie and Toleman 2003, Hughes et al. 2007).”

There is information on the importance of dock maintenance for long-term longevity and to withstand the natural elements of a waterway and seasonal climate changes.
(http://www.v-dock.com/wp-content/uploads/2015/04/A-Guide-to-Dock-Maintenance-and-Safety.pdf http://onthewaterdesigns.com/Blog.asp)

Unfortunately, I feel as though there was a rush to the legislative arm in regards to these issues and with proposed House Bill 4099 and House Bill 4138.
My opposition with HB 4099 is the restrictions on WED’s and the over-stepping of the Oregon State Marine Board rule-making process already in motion.
My opposition with HB 4138 is if homeowners, or a lobbyist, raise concerns of erosion being caused by motorboats, and the other causative factors of erosion are not considered nor the geomorphic topography for where the erosion is occurring considered, will a restrictions be placed on all motorboats? Erosion occurs along a waterway and information is needed to understand if the erosion a homeowner is having is a natural progression of living on a waterway or are their other causative factors for their erosion.

Thank you for your time and consideration for opposing both of these house bills.

Sincerely,
Elizabeth McCord