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Richard DeVeau
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Mr. DeVeau,

Thank you for meeting with me on October 29, 2019 to discuss the letter you provided the Planning and Development counter on October 25, 2019. At our meeting, we discussed your concern over my explanation of the literature review. You are concerned County Council would apply the information presented between the Malibu/Axis wave enhancement system comparison (Manufacture's Comparison) for maximum wave height and the Water Sport Industry Association report Executive Summary (WSIA Study) presented maximum wave height as an absolute and not a best case/worst case range as I described. Your letter describes five specific points of concern. I have summarized these concerns into three topics validity of the studies, reported wave height, and the distance from shore policy.

Policy Development

In response to your written correspondence I have been making an effort to speak with individuals who have been involved since the beginning , this is a Council driven process which is different than the process I am most familiar where PDS staff prepares staff recommendations and a staff report for the next workshop. A County Council member must request clarification on how to use a literature review in developing regulations for a specific water body.

A literature review does not provide an analysis or recommendation for developing policy. Data and conclusions gathered from a literature review are conceptual; they provide a starting point or general understanding that there is a reasonable potential for producing similar results in the location of interest. From the literature review, we can conclude:

a. Studies have documented shoreline erosion caused by recreational boats in small water bodies.
b. As the size of the waterbodies increase the wave signature from recreational boats mixes with other wave signature making it difficult to determine a single point source of shoreline erosion.
c. Waves profiles from ballasted boats:
    i. Potential for shoreline erosion from ballasted boat wakes is significantly less than the wind waves, except for protected or small water bodies.
    ii. Reduce in wave height rapidly as the wave moves away from the energy source (boat).

iii. Increase in number as the wave moves away from the energy source (boat) this reduces the energy from the initial wave. Propagation of smaller waves transfers the energy of the initial wave between the smaller waves, each propagation of smaller waves reduces amount of energy in each wave.

iv. In deep water the reduction of height requires a greater distance than in shallow water.

Whatcom County Council asked all Departments to provide a brief literature review of potential shoreline erosion from ballasted boats at the October 22, 2019 County Council work session. I provided an example where wave heights could be larger do to wave enhancement systems than reported in another reference, the 2015 WSIA study. Using the maximum wave height from the Manufacture Comparison and the table in the WSIA Study, for a wakesurf setup in deep water, I stated the attenuation distance would need to reflect the increased maximum height from 300' up to 600'. This was intended to be a range from best case scenario to worst case scenario as the exact number would need to be measured in the field or using the equation for the attenuation curve presented in the WSIA. It would not be appropriate to use the attenuation distance as an absolute value when developing a policy for vessel distance from shoreline.

Point #5 of your letter correctly explains why applying the absolute value from a literature review does not make reasonable policy; the wave generated from the ballasted boat travels through both the deep and the shallow zone. For example, using the table provided in the Executive Summary of the WSIA study, the WSIA recommend policy distance of 200 feet from the shoreline and structures is 100 feet more than required to attenuate in shallow water to 12 and 100 feet less than required distance to attenuate the wake surf wave to approximately 12" in deeper water. Discussion on location of wave height measurement and the applicability is provided under the heading Maximum Wave Height.

Validity of the Information

The Manufacture Comparison and the WISA Study collected wave height data using different remote sensing technologies. Each of the remote sensing methods use known equations to calculate height of an object. The Manufacture Comparison used a trigonometric equation to determine height of an object compared to the reference height (known height of object in the image). The WSIA Study used a sensor to measure hydrostatic pressure which is converted to height by a simple equation (Height=Hydrostatic Pressure/(density) x(gravity).

Vessel

The WSIA study vessel is a Nautique G23 with factory ballast and an additional 1400lbs of ballast added to increase displacement. The Manufacture Comparison used multiple vessels including the Nautique G23 with factoring ballast and the use of each manufactures proprietary factory installed wave enhancement system. The WSIA Executive Summary is silent on the use of a wave enhancement system; the full report may provide this information.

Maximum Wave Height

Each study presented a maximum wave height in feet. From the information present in the WSIA Executive Summary, it is not possible to determine if the maximum wave heights were measure at the

same location on the wave profile. The WSIA Study measured the maximum wave height at the outward sensor. The Manufacture Comparison measured the maximum wave height as maximum wave height within the wavelength. The Manufacture Comparison defined wavelength as the distance from the boat stern to the end of the rideable area. Generally, a rider is between 10 to 18 feet from the stern of the boat. For a vessel traveling 10 miles per hour or 14 feet per second, the ridable area would be approximately 1 to 2 seconds behind the boat.

In the WSIA Executive Summary, the narrative provides a short discussion of sample methods, maximum wave height attenuation distance, wave frequency, and potential for shoreline erosion. The narrative provides this statement for the location of measurement “runs were done at three distances from the outer wave probe (10’, 110’, 210’) with the closest track resulting in a wave measurement being taken very close to the boat". The WSIA Executive Summary provides a graph of each wave profile and a graph of a wave attenuation curve. The wave profile vs. time graph begins at 0.0 seconds (0.0 is assumed to be when the boat passes the sensor) when describing the wave profile graph the WSIA narrative states, “It is worth noting that very close to the boat the trough is deeper than the height of the crest.” The attenuation curve graph vs distance from boat track begins at the intersection of maximum height and 0.0 feet from the boat track. From this information provided in the Executive Summary, I concluded the locations of measurement were generally similar; the full WSIA Study completed by C.A. Goudey and Associations may describe the precise location that disproves my general conclusion from the information available. Should the locations be significantly different then applying the maximum wave weights from the Manufacture Comparison would not be appropriate.

Conclusion

The WSIA study referenced in your letter is one of three studies I provided Whatcom County Council. The Manufacture Comparison was not provided to the County Council and as of the date of this letter has not been requested. What is evident and important from the brief literature review is each study concluded, except for areas of limited fetch or narrow waterways, that wave signature from recreational boats compared to wind waves is insignificant. In large bays the wave signature from recreational vessels are hard to tease out. The WSIA study concluded the shoreline erosion potential from ballasted boats was insignificant compared to wind waves. We know from the WSIA Study the wave height and energy quickly dissipates within the first 100 to 150 feet in deep water. According to the table in the Executive Summary, in shallow water the wakesurf maximum wave height reduced by half in the first 100 feet. From the literature review, the general understanding is waves generated by recreational boating does not create a greater impact the shoreline than wind-driven waves above a common wind speed on all but the smallest bodies of water.

Sincerely,

Ryan Ericson
PDS Supervisor