Waterfront Protection Coalition

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Environmental insights regarding the Dock Management Plan (DMP)

A) Environmental science used to inform the DMP was inadequate and inappropriate:

- The environmental opinions relied upon for the draft DMP[1] were not subjected to a peer review process that is generally felt to be the foundation of scientific advice. Several recent studies and reviews would not support a plan as sweeping as the DMP and they recommend further studies and broader consideration before application in any management process[2]. To this point, the science support for the DMP was derived from investigations of a small geographical component of the ecosystem being managed (Pender Harbour), and the data were collected on a single month and year (October 2017, after initial winter die-off). Greater insight could be gained from more extensive seasonal coverage at a resolution that considers the biophysical diversity on BC's coast. Experimental designs that include reference stations in a control-impact monitoring design may also be useful in assessing the influence of human encroachment on harbour environments[3].

- Furthermore, scientific data and environmental justification for restrictions in freshwater environments was completely absent, when evidence for positive environment effects relating to freshwater docks have been demonstrated in other parts of North America[4].

- To provide perspective and inform restoration policy, an evaluation of the significance of all current and previous anthropogenic influences should be part of the management plan, including upland activities. In the shíshálh swiya concern for impacts from past log storage, sorting, transportation in shallow coastal and freshwater areas and coastal property development pressures are of concern. Managing complex harbour ecosystems by regulating a single stressor (docks) is to ignore interaction among many natural and human-sourced processes, and violates fundamental ecological principles[5].

B) Current management concepts if properly implemented, will consider the values of all user groups:

- Habitat management strategies have advanced beyond the fine scale site-specific designs that align with the scale set by development pressures and reclamation opportunities.

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[1] M.C. Wright (2017)
[2] Lambert, M.R., R. Ojala-Barbour, R. Vadas Jr., A. McIntyre, and T. Quinn. (2023). Do small overwater structures impact marine habitats and biota? Pacific Conservation Biology, doi 10.1071/PC22037
[3] Tillin, H.M., S.I. Rogers and C.L.J. Frid. 2008. Approaches to classifying benthic habitat quality. Marine Policy 32, 455-464.
[4] Holberg, K. R., & Baird, R. (2009). The effects of residential docks on light availability and distribution of submerged aquatic vegetation in two Florida lakes. Lake and Reservoir Management.
[5] Macdonald, J.S., H. Herunter, and E. Chiang (2018). Small Craft Harbours in the Pacific Region: Habitat Impact, Benign Alteration or Habitat Creation? Can. Tech. Rep. Fish. Aquat. Sci. 3255, 58pp.

Ecological-based decision making has now entered our scientific understanding and approach, and with it a recognition that managing complex environments requires acceptance of a holistic approach with many perspectives[6].

- An adaptive approach has been prescribed in situations where the knowledge from managing a resource can augment an inadequate environmental database while promoting buy-in from interest groups to provide reliable scientific advice. This does require patience for a long-term commitment to investigations and a concerted effort to monitor many environmental aspects of the ecosystem being managed. You can't manage what you don't understand, so it's best to "learn by doing"[7].

- Address knowledge gaps with realistic situations that reflect local conditions, avoiding the use of data from large port developments and geographical locations not applicable to recreational dock management challenges in the Pacific Northwest[2].

C) All aspects of the DMP require a net environmental benefit analysis such that impacts and environmental offsets are considered together within the regulation process:

- With the existing amendments to the DMP, as tenures come due, one can expect a sudden, large number of "non-compliant" docks, still functional, entering landfills, being burned illegally or left derelict in the environment as so many boats have been abandoned recently[8]. Allowing a dock to remain for it's full life cycle avoids wasted resources and minimizes these environmental impacts.

- Biological colonization of newly constructed docks can take many years, while the removal of an existing dock is the destruction of existing productive habitat and biotic assemblages.

- Although North America contributes <5% of the world's plastic pollution[9], plastic use in dock construction as grating or flotation elements requires a full life cycle analysis before the material should be considered. Natural materials such as wood have their advantages. Optimum building materials need to be selected with consideration to their longevity and environmental impact, and efforts taken to mitigate their use.

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[6] Simenstad, C. A., Hood, W. G., Thom, R. M., Levy, D. A., & Bottom, D. L. (2000). Landscape structure and scale constraints on restoring estuarine wetlands for Pacific Coast juvenile fishes. In: Weinstein MP, Kreeger DA (eds) Concepts and controversies in tidal marsh ecology. Kluwer Academic Publishers, Dordrecht, p 597–630. https://doi.org/10.1007/0-306-47534-0_28

[7] Walters, C.J. and Holling, C. (1990) Large-scale management experiments and learning by doing. Ecology 71: 2060–2068.

[8] https://tc.canada.ca/en/programs/funding-programs/abandoned-boats-program

[9] https://ourworldindata.org/ocean-plastics

- In the absence of docks it will likely increase anchoring and boat grounding pressures. This can be expected to create fragmented eelgrass habitats and environmental disturbances which may have a negative influence on benthic diversity and productivity[10]. See also a review by Broad et al. (2020)[11]

- Regulations must consider the positive habitat contributions associated with dock construction including the creation of additional substrate, and the provision of cover for refugia[12]. These features may be surrogates for natural habitat[13] or they may encourage assemblages of aquatic organisms adapted to the created opportunity[14]. As such the habitat created by a float of pile may promote an assemblage different from its immediate surroundings but may eventually increase species diversity in the area[15]. Docks in particular may act as biological "islands" promoting the distribution of plants and animals through immigration[16]. They may approximate the effect of compensation offsets prescribed in habitat restoration activities much like artificial reefs[15].

D) Not all habitats are susceptible to impacts from docks and vessels:

- A biophysical justification could be used to delineate zones based on environmental criteria that identify the most sensitive areas according to biological and sociological interests and to receive the necessary protection without implicating the entire shíshálh swiya (or the entire BC coast) with the same management approaches[17].

- Eelgrass beds are perhaps more sensitive to dock construction than consolidated benthic habitats, salt marshes, tidal lagoons or mud flats[2]. Light transmittance construction regulations should take into consideration the nature of the underlying substrate and biota, and the likelihood that it might support eelgrass.

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[10] Leatherbarrow, K.E. (2003) Monitoring environmental impacts of recreational boat anchoring on eelgrass (Zostera marina L.) and benthic invertebrates in the GNNPR of Cdn. MSc. Thesis U. of Victoria. 141pp.
[11] Broad, A. M.J. Rees and A.R. Davis (2020). Anchor and chain scour as disturbance agents in benthic environments: trends in the literature and charting a course to more sustainable boating and shipping. Mar, Poll. Bull. Vol. 161A.
[12] Brander, K. G., Fretwell, K., & Mundy, J. (2011). Species composition on the dock at Hakai Beach Institute: Does dock age and dock substrate influence composition? Hakai Beach Institute.
[13] Pister, B. (2009). Urban marine ecology in southern California: The ability of riprap structures to serve as rocky intertidal habitats. Mar Biol. 156: 861-873.
[14] Bulleri, F., and Chapman, M.G. (2010). The introduction of coastal infrastructure as a driver of change in marine environments. J. of Applied Ecology. 47: 26-35.
[15] Perkol-Finkel, S. and Y. Benayahu. 2007. Differential recruitment of benthic communities on neighbouring artificial and natural reefs. Exp. Mar. Biol. And Ecol. 340, p. 25-39.
[16] Similar to biologic islands discussed as "Island Biogeograpy".
[17] Beaty, F. and D. Sanford (2019). Town of Gibsons and Howe Sound/Atl'ka7tsem eelgrass survey report Tides Canada 11pp. https://howesoundguide.ca/wp-content/uploads/2020/02/Eelgrass-survey-report_MRG_final.pdf

- Water depth and dock orientation will influence light transmittance to the benthic communities and should be incorporated into regulations to create more realism[18]. However, many upland sediment sources can contribute to turbidity and should be integrated into amendments to the DMP. Subject to further examination, depths below 7M in Pender Harbour are generally considered below the limit that will support *eelgrass* [17,19]. Furthermore, sub-tidal installations won't ground at low tide as long as there is sufficient space beneath the dock to avoid interference with the bottom. Therefore depth could be used as a parameter to refine regulations for application where they are relevant.

E) Are there other creative approaches to managing waterlots and recreational boating?

- Public participation and "buy-in" is a critical component of any management system. Avoiding untenable, disruptive, expensive and unnecessary regulations is an important management ideal. Some of the requirements contained in the current DMP have proposed sufficient expenses to the proponent that, for some, it will amount to expropriation without compensation. Will only the very wealthy be able to afford to have a dock or to access their water access only property?

- If light levels are critically reduced by specific over-water construction, LED lights during the day, on a timer, under the docks should be considered to mitigate against light loss[20]. The aquaculture industry has investigated this technology to increase productivity around farms[21]. Light augmentation solutions are particularly interesting as there is some evidence to suggest that metal grating decks on docks are ineffective for allowing adequate light transmission to the bottom[20, 22].

- Metal or concrete pilings engineered for the site may be environmentally benign where creosote or anchoring methods are not. However, even aged creosote pilings may best be left undisturbed as studies have shown their contaminant influence (PAH's) on surrounding sediments is restricted to <0.65M from the pile[23].

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[18]Campbell, K. R., & Baird, R. (2009). The effects of residential docks on light availability and distribution of submerged aquatic vegetation in two Florida lakes. *Lake and Reservoir Management*, *25*(1), 87–101. https://doi.org/10.1080/07438140802714486

[19] Greve, T.M. and D. Krause-Jensen. (2005). Predictive modelling of eelgrass (*Zostera marina*) depth limits. Mar. Biol. 146: 849-858. DOI 10.1007/s00227-004-1498-0.

[20] Blanton, S., R. Thom, A. Borde, H. Diefenderfer, J. Southard. 2002. Evaluation of the methods to increase light under ferry terminals. Wash. State Dept. of Transportation. PNNL 13714. 26pp.

[21] Aquaculture collaborative research and development program (ACRDP), (2013). Ecological effects of blue LED lights at marine finfish aquaculture sites in B.C. Issue 22, 4pp.

[22] Fresh KL, Williams B, Pentilla D (1995) Overwater structures and impacts on eelgrass (*Zostera marina*) in Puget Sound, Washington. In 'Puget Sound Research '95 Proceedings'. pp. 537–543. (Puget Sound Water Quality Authority: Seattle, WA).

[23] Goyette, D., and Brooks, K.M. 1998. Creosote Evaluation: Phase II Sooke Basin Study - Baseline to 535 Days Post Construction 1995-1996. Environment Canada, Environmental Protection Branch, North Vancouver, BC. Regional Program Report PR98-04. 484 p.

- Screw anchors are used around the world to hold buoys as a means to reduce the damage from chain pendants[24]. However they are limited to BC coastal areas with sufficient sediment depth which is generally not the case in Pender Harbour.

F) Conclusion:

The current environmental data informing the Dock Management Plan (DMP) is insufficient, particularly for key habitats in the shíshálh swiya region. The lack of biophysical zoning to identify sensitive areas, the absence of scientific basis for freshwater restrictions, and the disregard of the influence of water depth, bottom type and established biota results in a missed opportunity to create management regulations that are realistic and acceptable to all user groups. The result is the creation of unnecessary construction demands that may contribute, not alleviate, environmental concerns.

A narrow focus on constraints to dock design fails to identify interactions among so many other natural and human-sourced parameters that require consideration for a holistic approach to environmental management on our coast. The current amendments to the DMP disregard positive environmental offsets created by existing docks and boathouses and fail to recognize practical solutions that might promote a positive conciliatory attitude to address the concerns of all parties.

[24] Nicholson, D. (2009) and (2020). Marine anchors for sensitive seabeds. Practical Sailor 2020.