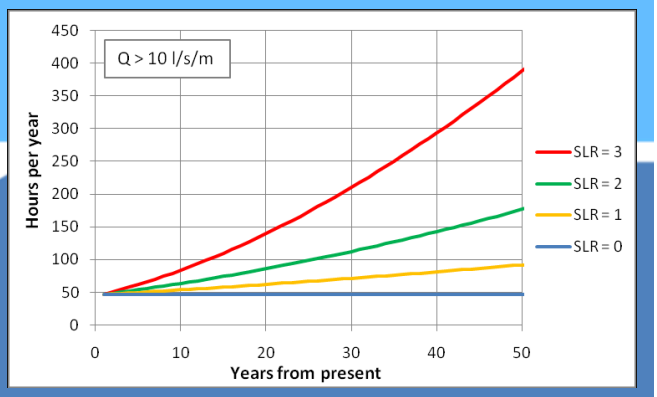
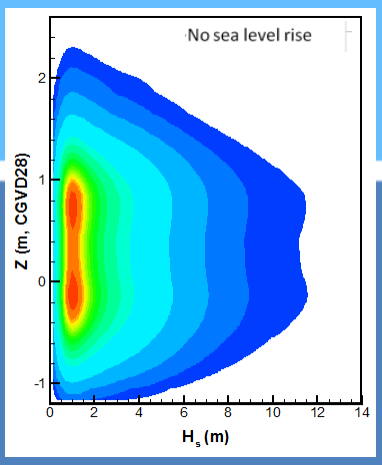
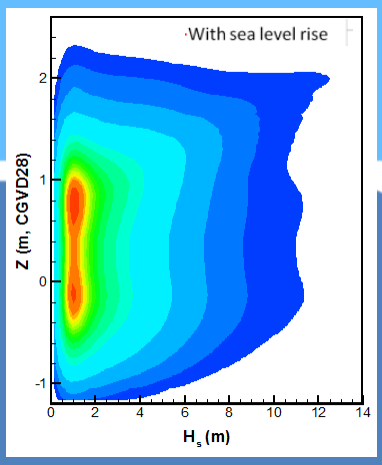
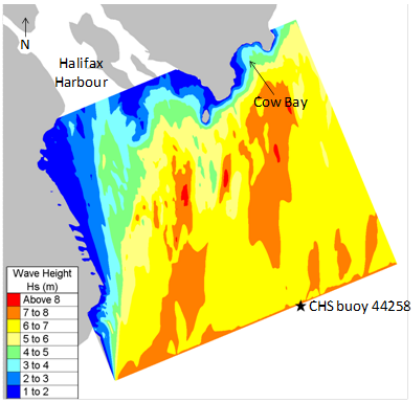
CAPABILITY Life-cycle Costing Model for Coastal Structures

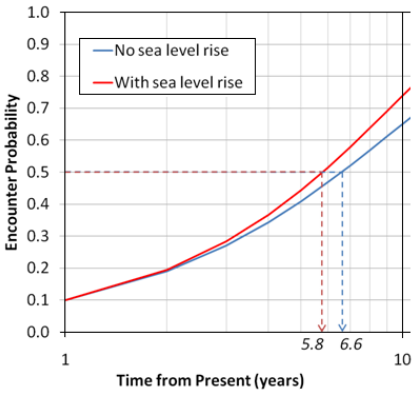








Computer modelling is used to transform statistics to the site



Encounter probability as a function of time with and without sea level rise

COASTAL INFRASTRUCTURE ADAPTATION & PLANNING SYSTEM (CIAPS)

Storm surges can lead to severe damage to coastal structures and under conditions of relative sea level rise, these damages are likely to increase in the future. To address these issues from both an engineering and economic standpoint, Coldwater has developed a new model to provide a consistent and statistically-based evaluation of the performance of coastal structures. The *Coastal Infrastructure Adaptation and Planning System* (CIAPS) computes the likelihood of failure of a structure over time using probabilistic descriptions of waves and water levels under scenarios of changing sea levels. This results in a life-cycle cost analysis for the structure.

A CIAPS analysis combines deterministic design equations for structure response along with a probabilistic assessment of the risk of encounter of a broad range of met-ocean condition over the life of a structure. Structure designs are optimized by considering the total cost of ownership, including the initial capital cost and anticipated maintenance costs over the life of the structure. Repair costs can fluctuate considerably with time-varying risk factors.

CIAPS's probabilistic approach incorporates the risk from all events that may cause damage, not just one design event. And, while typical analysis of coastal structures assumes that the probability of failure is constant in time, CIAPS allows for the probability of failure to vary in time due to sea level rise, increasing storminess, etc. The resulting analysis allows a comprehensive assessment of the likelihood of failure over the life of a structure under realistic time-varying conditions, such as climate change effects.

Each application of CIAPS uses site-specific customization to characterize the geometry of the study site and structure and the nature of the met-ocean loading conditions. Met-ocean conditions are defined using combined probability distributions of water levels and wave heights transformed to the site using computer models. Structural loading and/or damage assessment is assessed using actual structure profiles.

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