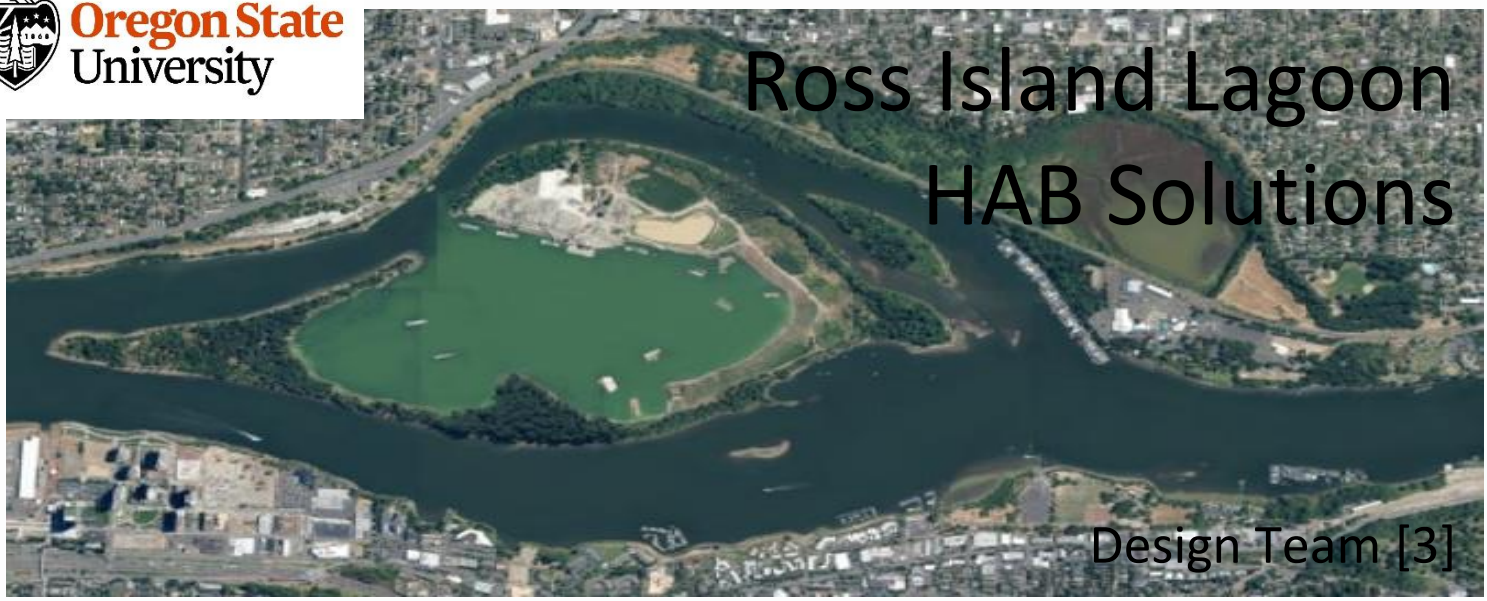
Oregon State University



Ross Island Lagoon HAB Solutions

Design Team [3]

THE OBJECTIVE OF THIS ANALYSIS IS TO IDENTIFY PRACTICABLE SOLUTIONS TO REDUCE THE FREQUENCY & DURATION OF HABS AT ROSS ISLAND LAGOON.

Design team [3]

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Alternatives analyzed

1. **Hydraulic Solution:**

   Southwest breach coupled with Northwest breach.
2. **Using alum as a coagulant**
3. **No Action**

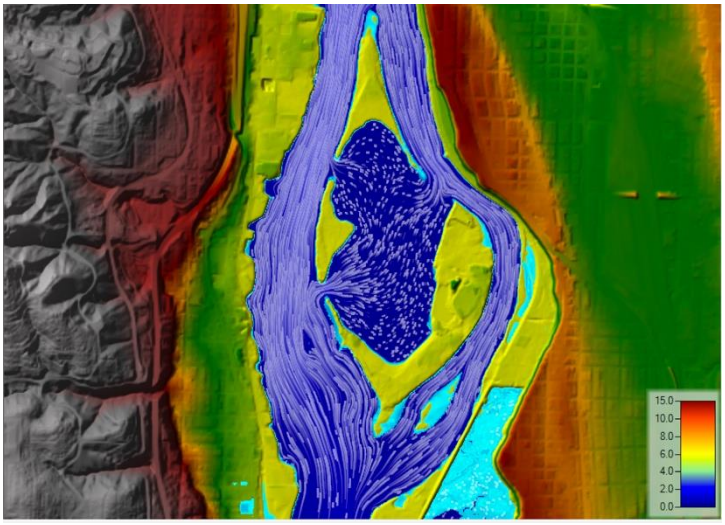
KEY FINDINGS AND RECOMMENDATIONS

The recommended alternative for the reduction of the frequency and duration of HABs in the Ross Island Lagoon is terrain adjustments to the NW and SW portions of the island. The addition of these adjustments to the terrain allow for more flow and mixing into the lagoon, while maintaining the safety of the CAD cells. Quantification of the exact outcome is difficult to say; however, it is believed that the addition of these terrain adjustments will reduce the frequency of the HABs. The second alternative solution that was analyzed a periodic addition of alum into the lagoon to promote flocculation of the phosphorus that would form the HABs. Although it can be effective in mitigating algae blooms, it is a short-term option and continual application would lead to economic infeasibility. It is recommended that the hydraulic alternative be implemented on the Ross Island Lagoon.

For more information, see: http://blogs.oregonstate.edu/rivers/ross-island-harmful-algal-bloom/

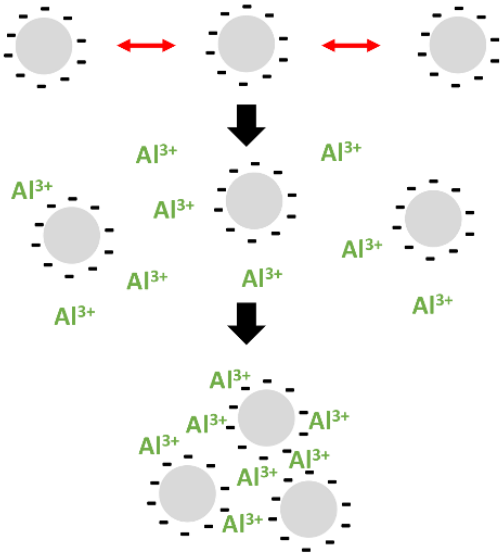
ALTERNATIVE 1

Two separate terrain modifications were modeled, one on the SW portion and one on the NW (see image below). The addition of these two entrances into the lagoon increased mixing and mobilized the entire lagoon to a degree. The placement of the upstream breach was such that the CAD cells would not be at risk.



ALTERNATIVE 2

The periodic addition of alum to the Ross Island Lagoon was also analyzed. Harmful algal blooms are formed when an abundance of nutrients, such as phosphorus, is present in a water body. The addition of alum would be used to promote flocculation of phosphorus particles so that the phosphorus essentially clumps together (see image below) and sinks to the bottom of the lagoon where it cannot form HABs.



ALTERNATIVES ANALYSIS RESULTS

Evaluation criteria	1. Hydraulic Solution	2. Non-Hydraulic Solution	3. No action
Capital cost ($)	$2,857,790.00	$176,749.77	NA
O&M ($, frequency)	$286,438.75/year	$22,093.72/year	NA
Loss and creation of shallow water habitats (acres)?	+3.68 acres	NA	NA
Expected effectiveness at controlling HAB (unknown, low, med, high)?	Unknown	Medium	Low
Likelihood of failure during flood events (unknown, low, med, high)	Medium	Low	Low
Risk to CAD cells (USACE likelihood scale)	Moderate	Remote	Remote
Likely benefit to widest range of aquatic taxa (Steelhead, chinook, lamprey, sturgeon, mussels)	Birds, land animals, aquatic taxa listen in evaluation criteria	Aquatic taxa listed in evaluation criteria	NA
List any unintended impacts (List species, infrastructure, RISG operations, etc.)	Risk of river capture Risk to CAD cells	Risk of toxicity to aquatic species	NA

References:
https://www.google.com/search?q=alum+flocculant&rlz=1C1CHBF_enUS793US793&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjgy7Tso-niAhWGCnwKHQk2BlkQ_AUIEigD&biw=1366&bih=657#imgrc=krc2e7H_RvtSyM: