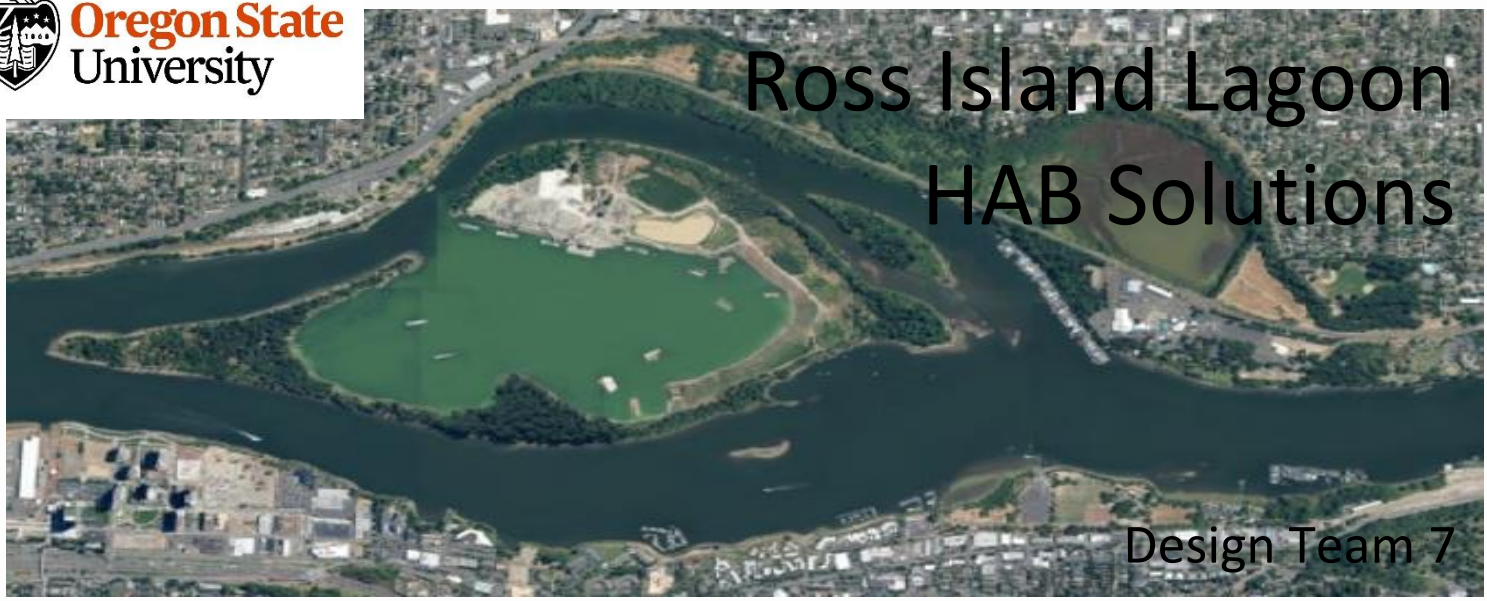
Oregon State University



Ross Island Lagoon HAB Solutions

Design Team 7

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

Design Team 7

Contact:

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Alternatives analyzed

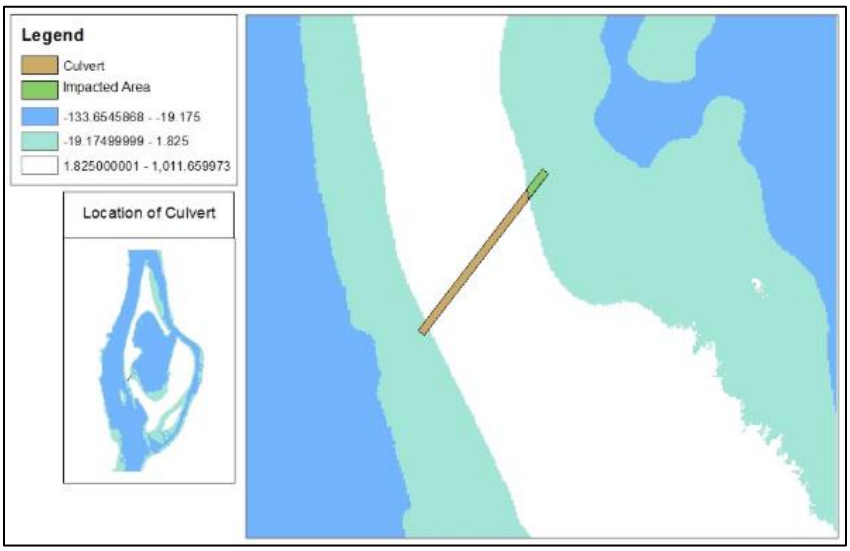
1. **Culvert conveyance to introduce mixing**
2. **Deposition of soil to bury algal spores**
3. **No action**

KEY FINDINGS AND RECOMMENDATIONS

Although cheapest in the short-term, No Action is not considered an acceptable solution in the long-term for the harmful algal blooms. An alternatives analysis was completed to evaluate a hydraulic versus non-hydraulic solution on the basis of cost, impact on habitat, effectiveness, likelihood of failure, risk to CAD cells, benefits to species, and unintended consequences. Although recommendations are presented within the report, there are several knowledge gaps and questions that should be addressed as this project moves forward.

> Burial of the HABs is straightforward in design with low risk, but contains high uncertainty of effectiveness and long-term management.

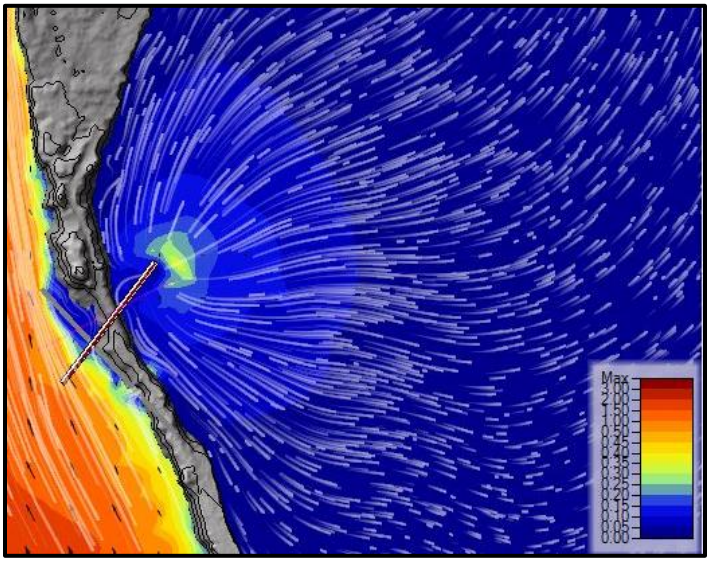
> It is recommended that the hydraulic solution is pursued to full design. Introducing long-term mixing into the lagoon with a culvert is a robust attempt to disrupt stratification as the root cause of HABs.



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

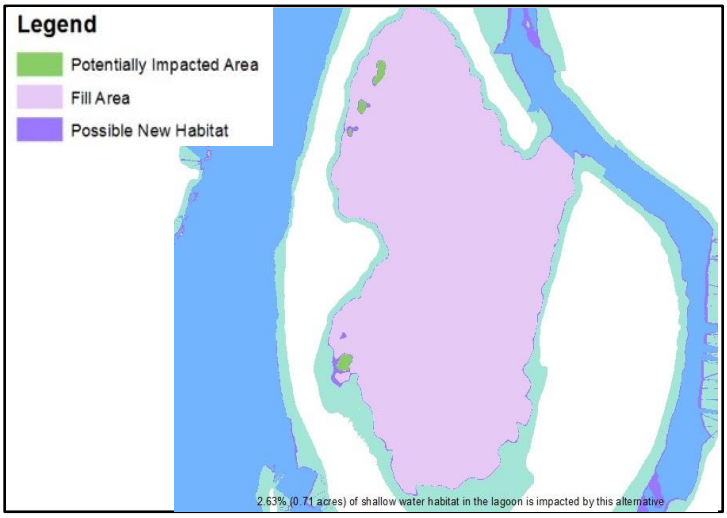
ALTERNATIVE 1

A 12 ft diameter, 300 ft long corrugated steel culvert is placed through the southwest bank of Ross Island. The culvert will pass through the berm to minimize surficial impacts to shallow water habitat, and distribute flows from the river to disrupt the stratification. This was modeled with a 2D HEC-RAS model to identify velocities for a Richardson's number of 6.22 during high flows. Initial construction disturbs 4.7 acres, but will be restored after installation.



ALTERNATIVE 2

One foot of clean sand would be used to bury the algal spores when they settle on the lagoon floor during the winter. As these spores rely on turbulence to move them into the lagoon over summer, the soil will theoretically prevent them from resurfacing. The volume of sediment added is approximately 193,000 cubic yards. There is much uncertainty for the longevity of this solution and the potential for repeated application in the future.



ALTERNATIVES ANALYSIS RESULTS

Evaluation criteria	1. Culvert	2. Burial	3. No action
Capital cost ($)	$14,355,000	$6,564,000	Uncertain
O&M ($, frequency)	$10,650/clean	Same price/year	Uncertain
Loss and creation of shallow water habitats (acres)?	+0 (-0.01)	+0.71 (-0.71)	NA
Expected effectiveness at controlling HAB (unknown, low, med, high)?	Medium	Low	None
Likelihood of failure during flood events (unknown, low, med, high)	Low	Low	NA
Risk to CAD cells (USACE likelihood scale)	3/7	1/7	1/7
Likely benefit to widest range of aquatic taxa (Steelhead, chinook, lamprey, sturgeon, mussels)	Likely Beneficial	Some Benefit	No Benefit
List any unintended impacts (List species, infrastructure, RISG operations, etc.)	Potential erosion	May create turbid water	Could spread HABs downstream

References:
Williams, John E., et al. *Field Guide to Common Fish of the Willamette Valley Floodplain*. Oregon State University, 2014.
Hale, Derrick, editor. *Heavy Construction Costs with RSMeans Data*. 33rd ed., Gordian, 2018.
"HEL-COR® CMP Pipe." *Contech Engineered Solutions*, Quikrete,