

EXECUTIVE SUMMARY TO THE BATEMAN ISLAND CAUSEWAY MODIFICATION CONCEPTUAL DESIGN REPORT

January, 2016

Bateman Island, located at the confluence of the Yakima and Columbia Rivers in Richland, WA, is connected to the mainland by an earthen bridge referred to as the Bateman Island Causeway. The earthen causeway is a complete barrier to river flow. The backwater area behind the causeway offers ideal habitat for non-native predatory fish such as bass, walleye and catfish, which feed on outmigrating steelhead, Chinook, sockeye, and coho salmon smolts in the spring. Summer temperatures on the south and west sides of Bateman Island routinely exceed 25 or even 30 degrees C. Such extreme thermal conditions are a migration barrier to late-migrating salmon, including sockeye, summer Chinook and fall Chinook.

The Bateman Island Causeway Modification Conceptual Design project engaged a fisheries Technical Advisory Group (TAG) and local stakeholders to identify objectives for changing or preserving conditions around Bateman Island. The TAG identified two key issues for salmon migration through the Yakima Delta: predation on outmigrating smolts in the spring, and temperature barriers to returning adults in summer. The TAG was also concerned with habitat conditions for rearing fall Chinook salmon, and with the preservation of clear cues for upstream migrants.

The issues raised by local stakeholders were diverse. Stakeholders described the value of slackwater for navigation around the Columbia Park marina and boat launch, for wakeboarding west of the island, and for recreational moorage. Conversely, the mosquito control district described how slackwater and exposed mud banks necessitate \$100,000 in annual mosquito control efforts. A kayaker expressed the desire to circumnavigate the island, and a salmon fisherman described the value of bank fishing opportunities. Many people emphasized the value of pedestrian access to the island for birdwatching and hiking. City of Richland staff explained that if pedestrian access to the island is maintained, then emergency access to the island must be maintained as well.

The Conceptual Design project used public comments to shape eight alternatives for modifying conditions around Bateman Island, and then employed hydrodynamic modeling to evaluate the alternatives. Alternative 1 was “no action,” and was modeled as the existing condition. Alternative 2 was to disconnect the thalweg of the Yakima River from the backwater Delta area. Modeling indicated that disconnecting the thalweg would not improve temperature conditions for salmon, and the alternative was dismissed from further consideration. Alternative 4 considered realigning the causeway and forcing

Yakima River flow through a small channel on the southeast of the island. It was dismissed from further consideration due to concerns with cost and impacts to cultural resources. Alternatives 3, 5, 6, 7 and 8 were varying causeway breach sizes and configurations.

Hydrodynamic models AdH and CE-QUAL-W2 were used to simulate stream flows, velocities, and temperatures in the Bateman Island vicinity and calculate changes in temperature, velocity, flow, and sediment.

All of the calculated temperature metrics indicated that adding a breach to the existing causeway will decrease water temperatures and improve salmonid habitat on the west and south sides of Bateman Island. The alternatives with breaches of 260 feet or greater (Alternatives 5, 3 or 8) produced the most benefit, but all of the alternatives (also including smaller 130-foot and 200-foot breaches) resulted in some reduction of temperatures west and south of Bateman Island.

In spring, flowing water around the west side of Bateman Island will slow the warming of the Yakima Delta area, and retard the activity of warmwater piscivorous fish. Between March 15 and May 31 of 2012, the maximum 7-day average of the daily maximum temperatures (7-DADMax) to the west of Bateman Island was 19.6 degrees C (67 degrees F). Modeling suggests that if half of the causeway (Alternative 5) had been opened to flow, the maximum would have been 17.6 degrees C (64 degrees F). In 2014, a lower water year, the maximum would have been reduced from 21.1 degrees C to 18.3 degrees C (70 degrees F to 65 degrees F) under Alternative 8 (full causeway breach without breakwater).

This decrease in stream temperature could be significant for smolt survival. In 1999, McMichael et al. used a bioenergetics approach to estimate that predation on juvenile salmonids in the lower Yakima River during May would be reduced 23 percent by a 2 degrees C decrease in water temperature (from 13.2 to 11.2 degrees C). McMichael (2015) calculated that reducing the temperature from 21 degrees C to 18.3 degrees C (as predicted under Alternative 8) would be expected to reduce the consumption rate of smallmouth bass on juvenile salmonids by 29.5 percent. In regard to the Bateman Island Causeway Modification report, McMichael (2015) stated: “Changes in habitat conditions that increase travel rate, reduce water temperature, and/or directly or indirectly affect predator abundance or effectiveness would be expected to improve survival for juvenile salmonids migrating through or rearing in the [Yakima River Delta].”

In summer, temperatures will decrease as colder Columbia River water is introduced into the area west of Bateman Island; and Columbia River flow around the island increases with larger breach widths.

A comparison of AdH simulated temperatures are shown in Figure EX1 (from Appendix D) below with the causeway in place (existing conditions) and Alternative 8, a full causeway removal. Alternative 8 also includes a proposed breakwater to be

constructed around a marina on the east side of the Causeway. The proposed breakwater limits velocities within the marina to preserve navigability. The figure illustrates that removing the causeway allows colder Columbia River water to flow around the island when the Columbia River is at an adequately high discharge.

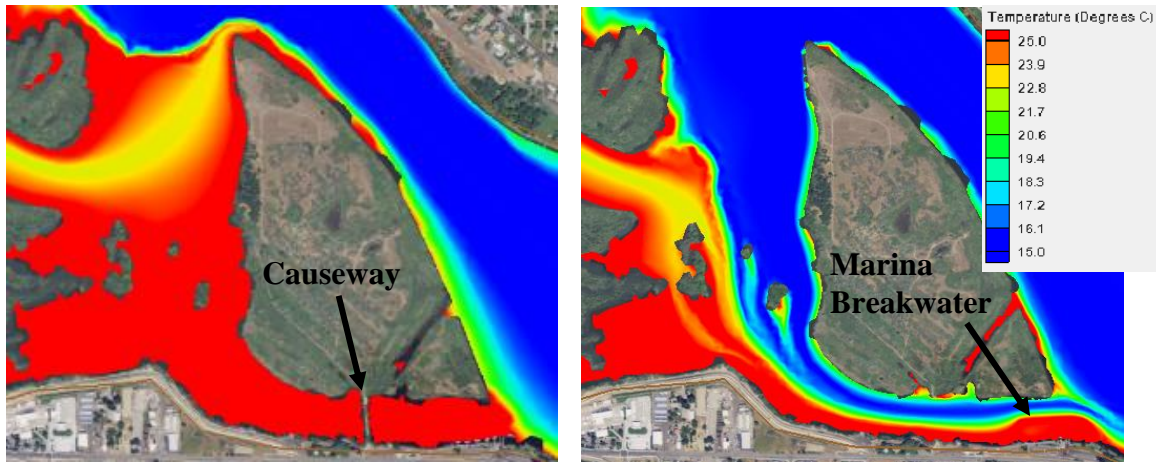


FIGURE E-1

Simulated Temperatures for a Moderately High Columbia River Discharge on July 8, 2012, (Left) Existing Conditions, (Right) Alternative 8, Full Causeway Removal with a Breakwater around Marina

An assessment of the sediment that has been deposited on the west side of Bateman Island found that they are of a cohesive nature that is best characterized as a fluid mud. And, more importantly, that the mud will be transported to the Columbia River under any of the breach alternatives considered and will not redeposit within the project vicinity. This prediction was based on application of theoretical equations for modeling cohesive sediment mobilization/transport and output from the AdH model.

Stream velocities were also evaluated to determine how opening the causeway could impact users of the marina and other recreation uses. Stream velocities west and south of Bateman Island will increase if the causeway is breached. Increases in average spring and summer stream velocity are less than 0.15 meters per second for the smaller breaches (130 feet and 200 feet), and more than double for the larger breaches (260-foot breach and greater). As a mitigation measure, Alternative 8 included a breakwater around the marina that would limit velocities under even the largest breach alternatives. Should a breakwater be included in the preferred alternative, however, further investigation of the resulting hydraulics is recommended.

Alternative cost estimating incorporated ranges of probable cost to display uncertainty about construction techniques. The estimated costs ranged from \$679,512 for a 130-foot breach with no pedestrian access or marina protection to nearly \$10 million for a full

breach with pedestrian and emergency vehicle access to the island and a breakwater to protect the marina from flow.

This report does not identify a preferred alternative. Selection of a preferred alternative is within the purview of the land owners (Washington Department of Natural Resources and United States Army Corps of Engineers), lessee (City of Richland), tribes (the Yakama Nation and the Confederated Tribes of the Umatilla Reservation), and agencies tasked with salmon recovery (Washington Department of Fish and Wildlife and NOAA Fisheries). River flow around Bateman Island is expected to improve migration conditions for salmon, especially in the spring. The nuances of how to achieve that improvement are yet to be determined.