Info Sheet – Restoring Floodplain, Riparian and Wetland Ecosystems in the Reservoir Drawdown Zones June 2022

Stewart Rood, University of Lethbridge (rood@uleth.ca), *Greg Utzig, Kutenai Nature Investigations Ltd.* (g13utzig@telus.net) *and Adam Neil, Shuswap Nation Tribal Council* (adam@envis.ca)

Background

This Info Sheet provides an overview of the Indigenous-led research and assessments underway to determine how reservoir and river operations might be modified through the Columbia River Treaty to improve aquatic and riparian ecosystems in the B.C. portion of the Columbia Basin.

See the Background Info Sheet for more information about the overall process. This Info Sheet provides a summary of this research study and the current performance measure for vegetation communities and ecosystems in the drawdown zones of the four Treaty reservoirs.

To fulfill the objectives of flood control and hydropower generation, the four Treaty reservoirs are storage reservoirs with extensive drawdown over the winter followed by refill during the spring freshet. This annual cycle of inundation and exposure is lethal to plants and consequently the drawdown zones are relatively barren of vegetation, which would otherwise provide wildlife habitat and other values, including contributions to the aquatic food-web. The vegetation communities are limited to the upper few metres of the reservoirs and occur on generally flat surfaces such as floodplains or benches, riparian or streamside zones along the inflowing rivers and creeks, and seepage areas or wetlands, which are wet year-round due to supplemental water sources.

Ecosystem Goal and Objective

This study was undertaken to categorize the vegetation communities in the reservoir drawdown zones and their ecological requirements, especially tolerances to flooding. With this understanding, a model was developed that would allow projections of the vegetation distributions with different reservoir regimes. The objective was to develop management strategies that would increase the distribution and abundance of the different vegetation communities, and especially deciduous (broad-leaved) trees and shrubs. This would improve wildlife habitat and terrestrial productivity, and benefit the adjacent aquatic ecosystems, as well as providing cultural and socioeconomic outcomes.

Study Description

The study coordinated findings from prior field investigations in the drawdown zones of Kinbasket, Arrow and Duncan Reservoirs, which were generally sponsored by BC Hydro in association with water use plans and water licenses. The prior studies revealed the vegetation community types and some distributions, and further field studies were undertaken to verify the margins, or lowest elevational thresholds for the different community types. From those elevations, analyses of the recent reservoir regimes revealed the inundation tolerances of the different vegetation communities. These results were further considered by reviewing related research on similar plants from other areas.

Study Findings

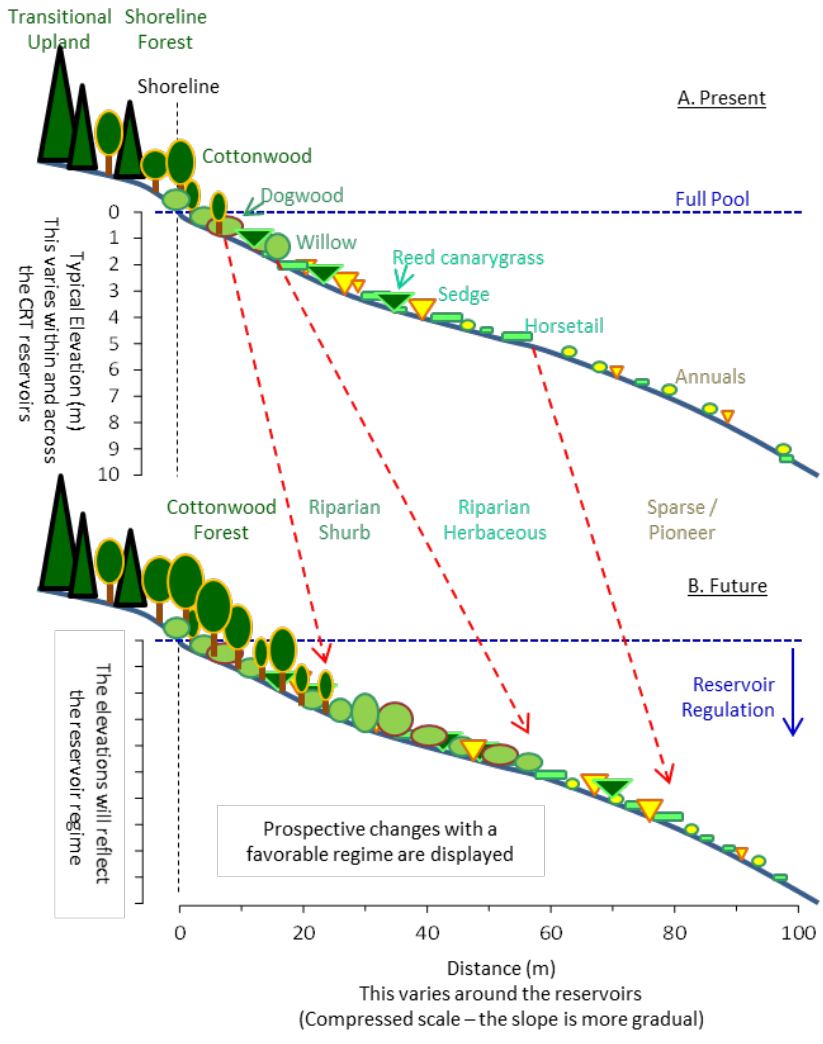
The studies revealed three primary vegetation community types that extend progressively lower in the reservoir drawdown zones: (1) cottonwood forest, (2) riparian shrub, especially willows, and (3) riparian herbaceous, including horsetails, sedges and the invasive plant, reed canary grass. The depths below the full-pool elevations and the corresponding flooding intervals were generally similar for each of the

three community types across the Treaty reservoirs. These indicated inundation tolerances of about 4 weeks for cottonwoods, 7 weeks for shrubs, and 15 weeks for the riparian herbaceous plants.

Performance Measure Description

From the study, the tolerances to average and occasional inundation provide the basis for performance measures for vegetation community maintenance. In addition, there must be periodic seedling recruitment to replenish the communities—this requires intervals with short or no inundation. Other environmental factors are also important, and mapping of the drawdown zones provided site suitability ratings for slopes, riparian zones, seepage, and seed sources. The combination of the predicted reservoir elevations with different management scenarios, combined with the mapped site suitability allows projections of the distributions of the three vegetation community types with the different scenarios. The performance measure is the potential area (hectares) of the cottonwood, shrub, and herbaceous vegetation communities.

Thus, it is anticipated that if reservoirs were filled to lower elevations, with full pool less often and for shorter durations, there would be opportunities for the development and expansion of riparian forest and shrub communities in the upper drawdown zones (figure below). This would provide ecological improvement, with cultural and socioeconomic benefits.



Further Work

The Treaty reservoirs are very large, and the study indicates some differences in the growing seasons and inundation tolerances within and across the reservoirs. Refinements to the performance measures to account for those variations should increase the accuracy of the vegetation projections. While there have been substantial field studies at the Canadian Treaty reservoirs, there has been limited investigation at Koocanusa and this requires further analysis.

Feedback Invited

Your feedback on this work is appreciated. You are encouraged to provide your input through the online survey or contact columbiarivertreaty@gov.bc.ca to receive a digital or paper copy. We hope to hear from you by 4 PM Pacific Time on July 11, 2022.