

DECEMBER 2022

PERFORMANCE MEASURE INFORMATION SHEET

ARROW RESERVOIR: AGRICULTURE POTENTIAL

Note to reader: This PM documents areas with agriculture potential within the Arrow drawdown zone. We are aware that these areas will also be potential areas for establishing floodplain, riparian and wetland ecosystems. If operations are changed to provide for infrequent flooding at the higher elevations, where there is interest in seasonal agriculture there will need to be a process to identify areas for agriculture and those for ecosystem establishment.

We have not pursued the elevation details to fully develop this PM for the lease areas as the existing information is adequate to assess this interest.

SUMMARY

Goal: Maximize agriculture opportunities.

Objective: Maximize the area available for seasonal agriculture within the reservoir drawdown area.

RECOMMENDED PERFORMANCE MEASURE:

Objective / Location	Performance Measure	Units	Description
Agriculture Potential/ Arrow Reservoir	Agriculture potential hectares	# of hectares per year	# hectares the mapped area of previously cultivated lands that are exposed throughout the growing season (April 1 to September 15) per year. More is better.

INTRODUCTION

Prior to inundation, there were extensive farms and orchards within what is now the Arrow Reservoir, particularly in the area south of Revelstoke to Shelter Bay, from Nakusp to Needles and at the southern end of the reservoir. The potential for agriculture activities within the drawdown zone during years when the reservoir is not filled to the full pool elevation was not identified as an interest during past scenario evaluations, so performance measures were not created during these processes.

The Upper Arrow Lakes Reservoir Drawdown Zone Management Plan (2007), which includes the reservoir area from Revelstoke dam to Shelter Bay, states (pg. 9): “There are a number of leaseholders located within the drawdown zone who lease both BC Hydro property and Crown land. Most leaseholders are property owners who own land adjacent to the reservoir. Most of the leased land is used for pasture forage or livestock grazing.”

The Arrow Lakes Reservoir Mid-Elevation Scenarios: Scoping Evaluation (2018) provides more information in the agriculture section (pg. 71):

Literature review

“With the exception of information on agricultural areas prior to dam construction, no literature was found regarding agricultural potential in the drawdown zone.

The dam impacts study completed by the Fish and Wildlife Compensation Program – Columbia Basin (Utzig and Schmidt, 2011) reported that approximately 2,200 ha of the drawdown zone were in orchards, under cultivation, or had been cleared for pasture prior to dam construction.

In a recent report for the Columbia River Treaty discussions, Penfold (2012) summarizes agricultural activity prior to inundation, noting various types of agricultural production. Penfold quotes reports from the 1960s indicating there were approximately 260 farmsteads in the area, with the majority of them under 12 ha in size, and the remainder between 12 and 70 ha. According to those reports approximately 2,400 ha of agricultural land use included orchards, hay, cereal grains, vegetables and pasture. It was also estimated at the time that there was an additional 5,200 to 9,500 ha in the area that had agricultural potential.

Summary of Interview and On-Site Visit Results

Interviews with agricultural practitioners adjacent to and within the drawdown zone confirmed that there is potential for expansion of agricultural production within the drawdown zone.

Presently there are agricultural operations in the Revelstoke Reach that utilize approximately 400 ha of the drawdown zone for grazing and hay production. They operate on private land and land leased from BC Hydro, the Crown and other owners. The operations make use of reed canary grass and other grasses, as well as some improved pasture areas. The main limitations are the length of season when the farmlands are not inundated, as well as having to occasionally clear in-washed debris.

In response to the proposed Scenarios, an agricultural operator said that both [proposed mid-elevation operational] Scenarios would definitely improve his operations and would allow for expansion of both grazing and hay production areas. It would also likely increase productivity of existing use areas due to longer seasons.

The possibility for growing other crops was also discussed with a number of agricultural stakeholders. There are likely possibilities for cereal production in some areas (primarily the Revelstoke Reach), and a variety of vegetable crops at various sites throughout the reservoir. Use of the drawdown zone for annual crops would be greatly enhanced with a reliable spring warning system regarding the likelihood of that year being the 1 in 5 or 1 in 7 full pool operating year. Agricultural use would generally be limited to sites with suitable soils and topography, access to irrigation water, and likely require investments in soil amendments. Dust control may be a limitation for annual crops in some areas.

Information Needs

- an inventory of agricultural potential within the drawdown zone above the selected baseline elevation (including limitations due to climate, topography, soil texture and nutrient status)
- an assessment of the potential range of crops suitable for the drawdown zone

- research to aid in the development of an effective agricultural land tenure system for the drawdown zone that encourages and supports agricultural operations, while taking into account the unique risks associated with periodic inundation.”

Interviews with the Columbia Basin Regional Advisory Committee (CBRAC) and the Local Governments Committee (LGC) members and others indicated that due to the lack of local arable lands there is high interest in expanded agriculture in the drawdown zone from Revelstoke to Shelter Bay, with less interest in the southern areas because there is substantial arable land in that area that is not currently cultivated. This interest is expected to grow as food security becomes more of a concern.

RECOMMENDED PERFORMANCE MEASURE

The Team recommends establishing an agriculture potential performance measure that reports the total of:

- a) the number of hectares within existing agriculture leases that are exposed from April 1 to September 15 each year (*Note: The team has received maps for these leases, which are all located in the reach from Revelstoke to Shelter Bay. Future GIS analysis is needed to document the number of hectares in the elevation bands in Table 1 below*); and
- b) the number of hectares of previously cultivated lands that are exposed from April 1 to September 15 each year, less any hectares included in a).

This provides a general measure of agriculture potential as some of these areas will not be suitable for agriculture due to changes in the soil from reservoir operations.

Objective / Location	Performance Measure	Units	Description
Agriculture Potential/ Arrow Reservoir	Agriculture potential hectares	# of hectares per year	# hectares of the mapped area of previously cultivated lands that are exposed throughout the growing season (April 1 to September 15) per year. More is better.

Table 1 below provides the area that is potentially suitable for agriculture as the reservoir elevation declines below full pool. Approximately 60% of the mapped area is located in the Revelstoke Reach, between the City of Revelstoke and Shelter Bay.

Table 1. Potential agriculture area by reservoir elevation

Between reservoir elevations:		Leased agriculture area hectares	Potential agriculture area hectares
metres	Feet		
440-438	1444-1437		184
438-436	1437-1430		280
436-434	1430-1424		529
434-432	1424-1417		543
432-430	1417-1411		281
430-428	1411-1407		320

428-426	1404-1398		408
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COMPARISON OF PROPOSED PERFORMANCE MEASURE WITH HISTORICAL OPERATIONS

We have not undertaken analysis to provide this information for this measure at this time.

CALCULATIONS

1. Assemble the simulated results for Arrow Reservoir elevations.
2. Use a sub-model to calculate how many mapped leased hectares plus agriculture potential hectares less overlap of leased area and potential area, are exposed between April 1 and September 15 each year.
3. Summarize all statistics.

KEY ASSUMPTIONS AND UNCERTAINTIES

- Each scenario is simulated using the same set of system constraints, input assumptions (e.g., load forecasts) and historic basin inflows.

REFERENCES

Penfold, G. 2012. [A Review of the Range of Impacts and Benefits of the Columbia River Treaty on Basin Communities, the Region and the Province](#). Prepared for the Ministry of Energy, Mines and Natural Gas Columbia River Treaty Review. 71 pgs. plus appendices

Thomson, A., G. Utzig, B. Green and N. Kapell. 2018. [Arrow Lakes Reservoir Mid-Elevation Scenarios: Scoping Evaluation](#). Prepared for the Province of British Columbia and BC Hydro and Power Authority. 109 pgs. plus appendices.

McPhee, Michael. 2007. Upper Arrow Lakes Reservoir Drawdown Zone Management Plan FINAL DRAFT. 43 pgs. (*Not available online*)