

## PERFORMANCE MEASURE INFORMATION SHEET #23

### SOFT CONSTRAINTS FOR ARROW LAKES RESERVOIR: EROSION

| Objective / Location                    | Performance Measure | Units   | Description   | MSIC            |
|---|---------------------|---|---|-----------------|
| Erosion Soft Constraint/Arrow Reservoir | Erosion Control     | # days elevation is at or above 1440 ft over the year | Sum of # days per year that the reservoir water level is potentially causing bank erosion | 7 days per year |

### Description

BC Hydro purchased a flowage easement for almost the entire perimeter of Arrow Lakes Reservoir up to an elevation of 1455 ft (i.e., 11 ft above full pool) to allow for any sloughing or erosion due to wave action. During the Columbia WUP process, the Consultative Committee expressed concern that use of the surcharge zone (1444 -1446 ft) could lead to erosion damage of the easement area. A performance measure was developed to track the expected frequency that reservoir water levels would rise above full pool in any given year. This performance measure was eventually dropped, as the surcharge metric did not capture any differences across the proposed operating alternatives. This was largely due to the fact that the alternatives were modelled to provide erosion control benefits. Further, the Committee noted that bank slumping from wave action is not limited to the surcharge zone but also occurs at lower elevations and the surcharge measure was not capturing this. Consequently, a new performance measure was developed to report on the frequency at which the reservoir is at or above 1440 ft.

In developing erosion control targets for the Arrow Lakes Reservoir, the Consultative Committee highlighted the need to minimize the duration of full pool events and avoid sudden drawdown once full pool has been reached, particularly if high runoff has saturated the reservoir banks to prevent slumping of the shoreline. It was noted that the ideal target would be to maintain reservoir water levels at 1440 ft.

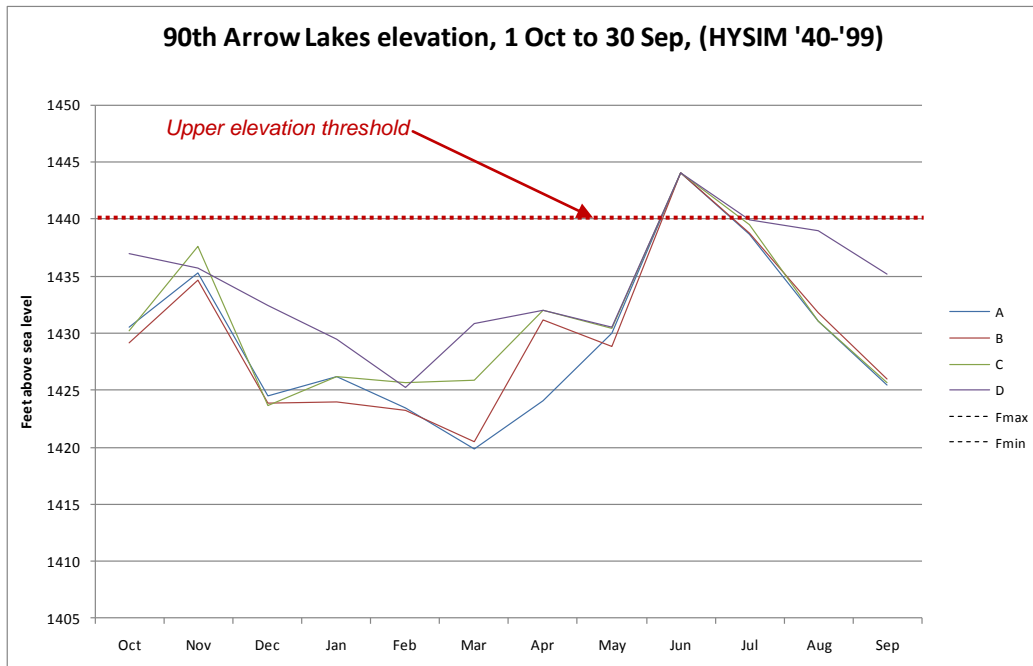
### Calculations

For each scenario:

1. Assemble the simulated results for Arrow Reservoir elevations over 60 years (1940-2000; Figure 1).
2. Count the number of days over the year that the reservoir is at or above 1440 ft each of the 60 years.
3. Summarize all statistics (Figure 2).

### 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 (1940 – 2000).



**Figure 1. HYSIM Simulated Arrow Lakes Reservoir Elevations. 90<sup>th</sup> percentile over 60 years showing the elevation threshold for erosion.**

**Results**

On average, none of the scenarios perform significantly different in improving shoreline erosion in the upper elevations of the drawdown zone. However, there is one year over the 60 year simulation period when scenario D would cause reservoir water levels to exceed 1440 ft over a greater number of days.

**Figure 2. Erosion – HYSIM Results for all NTS scenarios**

