PERFORMANCE MEASURE INFORMATION SHEET #18

ARROW LAKES RESERVOIR: DUST

Objective / Location	Performance Measure	Units	Description
Dust Control/ Arrow Reservoir	Dust potential days	# days elevation is below 1410 ft between 1 March and 30 April	Sum of # days per year that the reservoir water level is below 1410 ft when dust generation potential is highest in the lower elevations.

Description

During the Columbia WUP process, there was an explicit decision by the Consultative Committee to not consider areas below 1424 ft in Arrow Lakes Reservoir for evaluating the performance of the operating alternatives in providing benefits to vegetation or setting guiding principles for the WUP Revegetation Program. This decision was driven largely by the assumption that that these lower elevations would be addressed by BC Hydro's Dust Control Program.

Since 1987, BC Hydro has seeded significant portions of the Revelstoke Reach (Revelstoke to Shelter Bay) with fall rye for erosion control and dust abatement. The purpose of the program was to control the generation of air borne dust during low reservoir elevations prior to spring freshet and reservoir filling. Historically, dust storms have been of primary concern during spring prior to reservoir refilling and in low elevation areas where natural vegetation communities have not become established. The optimal range for planting fall rye was therefore based on the reservoir inflows forecasts and rate of refill for a given year.

On average, about 2500 acres were treated with fall rye seed each year (Boehringer 2010). This was modified annually based on projected water levels, shifts in dust source locations, and the encroachment/establishment of native vegetation on previously seeded areas. Due to concerns about the risk of straw matt formations in the reservoir (Moody 2003), application of fall rye seed was timed to limit its growth and maturity by direct inundation. Annual fall rye distributions in the drawdown zone were therefore highly dependent on the dates of seeding and subsequent water elevations.

The dust control program continued annually until 2008, after which time fall rye treatment was suspended and photo monitoring of dust activity was implemented at selected locations in the drawdown zone (Boehringer 2010). In lieu of treatments, the 2009 and 2010 programs focused on data collection and monitoring activities to increase the understanding of current conditions of remaining dust sources in Revelstoke Reach. This was driven by a number of assumptions around the current state of dust sources within the drawdown zone. Specifically, it was believed that planting of fall rye was no longer required at a number of historical treatment areas due to native plant encroachment and establishment into lower elevations. Further, planting for dust control would only be required at a reduced intensity because much of the vegetation in dust control treatment areas now regenerates naturally, leaving smaller areas to be seeded in each subsequent year.

Based on a historical analysis of the dust control program (Boehringer 2010), it has been recommended that additional field data be collected to assess future treatment needs. There

are limited empirical data on vegetation communities that exist at the lower elevations targeted by the dust control program and factors beyond timing and extent of inundation that may be influencing the establishment of perennial and or annual vegetation at these lower limits.

Performance Measure

For the NTS analysis, a performance measure was developed to examine the relative impacts of the four scenarios on dust generation potential in Arrow Lakes Reservoir. The metric tracks the number of days over the year that the reservoir elevation is below 1410 ft during the period when dust potential is highest (March 1 to April 30).[1]

Calculations

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 below 1410 ft between 1 March and 30 April for each of the 60 years.
3. Summarize all statistics (Figure 2).

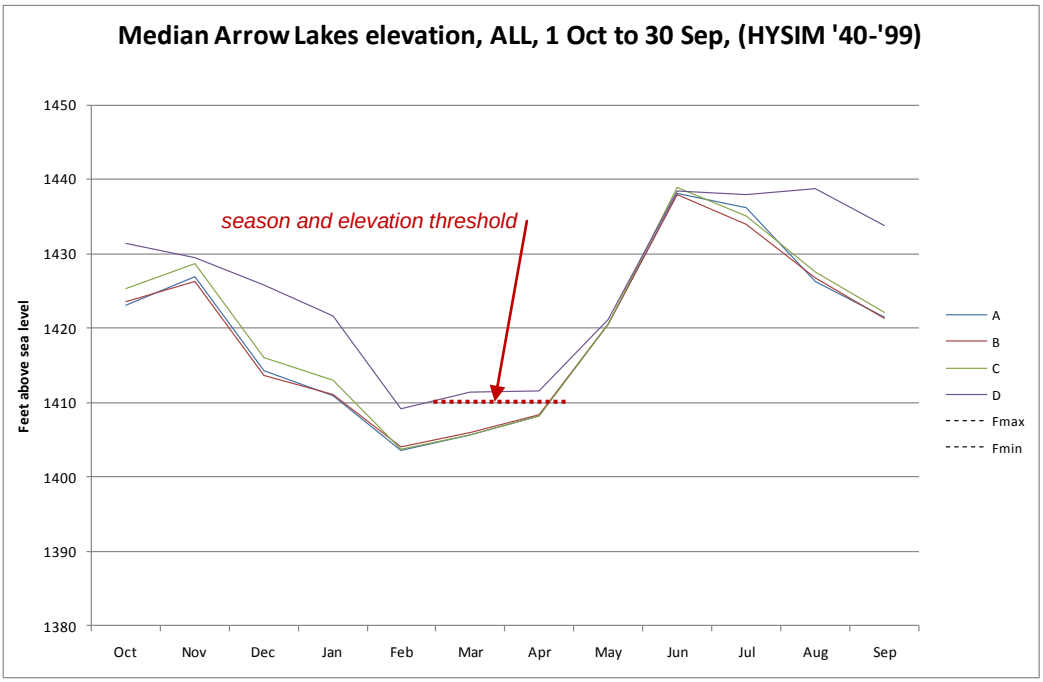


Figure 1. HYSIM Simulated Mid Columbia River (Arrow Lakes) elevations. Median over 60 years showing the elevation threshold for dust control.

[1] An elevation threshold of 1424 ft (434 m) was initially used in the analysis to correspond with the upper limit of the dust control program. However, this was found to be insensitive to the NTS scenarios and was masking differences at lower elevations.

Key Assumptions and Uncertainties

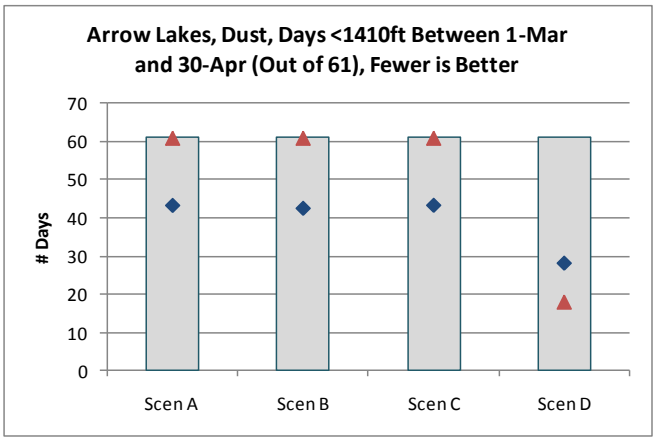
- Each scenario is simulated using the same set of system constraints, input assumptions (e.g., load forecasts) and historic basin inflows (1940 – 2000).

Results

Between 1410 and 1424 ft, none of the scenarios would perform significantly different in terms of inundation duration over the period when dust generation is of concern. However, the "with NTS" scenarios would keep the reservoir below 1410 ft for a longer period of time than Scenario D (no NTS) and therefore would have a greater potential to cause dust problems at these lower elevations.

Figure 2. Dust Control – HYSIM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	61	61	61	61
90th	61	61	61	61
Mean	43	42	43	28
Med	61	61	61	18
10th	0	0	0	0
Min	0	0	0	0



References

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