

PERFORMANCE MEASURE INFORMATION SHEET #24
SOFT CONSTRAINTS FOR ARROW LAKES RESERVOIR: WILDLIFE

Objective / Location	Performance Measure	Units	Description
Wildlife Soft Constraint/Arrow Reservoir	Nesting Birds	# days elevation is below 1424 ft between 30 April and 16 July	Sum of # days per year that the reservoir water level is within the defined elevation range over the nesting birds
	Fall Migratory Birds	# days elevation is below 1437 ft between 7 August and 31 October	Sum of # days per year that the reservoir water level is within the defined elevation range over the fall migratory period

Description

The Revelstoke Reach of Arrow Lakes Reservoir undergoes annual and seasonal fluctuations in water levels due to variations in precipitation, snow pack melt and water use requirements downstream at Hugh Keenleyside Dam and upstream at Mica Dam. The spatial extent, timing and duration of flooding of the reach are important factors that determine habitat availability and nesting success for birds utilizing this area.

During the Columbia WUP process, concern related to operational impacts on migratory bird habitat was addressed through a simple performance measure that tracked the frequency (number of days) at which an operating alternative met preferred conditions for Revelstoke Wetlands to function as a migratory bird stopover. More detailed bird habitat performance measures were subsequently developed to address the risk of nest inundation under a rising reservoir in the late spring and early summer, and availability of habitat for birds arriving in the fall months. Parameters used in the modeling included specific time windows and nesting chronology for a range of migratory shorebirds and breeding birds in Revelstoke Reach. These parameters were modified during the Rev5 and Mica 5/6 EA processes, and are shown below.

Parameters for Nest Inundation and Fall Migration Habitat

	Grassland Nesting Waterfowl	Late Nesting Waterfowl	Ground Nesting Landbirds	Shrub Nesting Landbirds	Short-Eared Owls	Land Bird Migration	Shorebird Fall Migration	Waterfowl Migration
Start Nest Date	15 Mar	14 May	14 May	14 May	30 Apr	25 Jul	Jul 20	Sep 1
End Nest Date	18 Jun	16 Jul	16 Jul	30 Jul	16 Jul	30 Sep	Sep 15	Nov 15
Peak Nest Date	5 Apr	1 Jun	4 Jun	10 Jun	28 May	28 Aug	Aug 15	Oct 15
Fledge Time (weeks)	9	9	6	6	11	n/a	n/a	n/a
Lower Elevation Range (metre)	434	435	434	436	437	432	434	432
Upper Elevation Range (metre)	440	439	439	440	439	440	439	440

The modelling results reported on the percent of habitat that is not inundated during the nesting season (using average statistics for short-eared owl used as a proxy for multiple species), and percent of habitat that is available for fall migratory birds (using 10th percentile statistics for shorebird migration used a proxy for fall migration). A comparison to recent historical operations (1984-1999) was provided to the Consultative Committee to provide a more literal point of comparison for the PM results.

In developing soft constraints for nesting and fall migrating birds in Revelstoke Reach, the Committee suggested that the goal for BC Hydro operators should be to ensure that inundation of nesting bird habitat by rising reservoir levels is no worse than that which occurred on average over recent history (1984-1999), as inflows over this period were far more 'bird friendly' than previous years on record. The Committee suggested that BC Hydro match operating levels to inundation statistics for elevations 1424 ft and above over the 1984-1999 period, which were used to produce average historic performance measure scores for nesting short-eared owl habitat. For fall migrating birds, the Consultative Committee recommended that BC Hydro ensure that availability of migratory bird habitat in the fall is as good as or better than that which was provided on average over recent history (1984-1999). This could be accomplished by drafting the reservoir quickly after full pool is reached. As a specific target, the group wanted to reduce water elevations to 1438 ft by 7 August.

Note: The current PM sheet provides a relative comparison across scenarios based solely on the number of days that the reservoir is within the preferred elevation range and timing window for nesting and fall migrating bird habitat. More detailed modelling of the NTS scenarios has been undertaken to report out on nest survival and useable fall habitat across the range of bird groups, based on both surface water elevations of Arrow Lakes Reservoir and discharge from Revelstoke Dam. These results are presented in the Arrow Wildlife PM Information Sheet.

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 1424 ft between 30 April and 16 July for nesting birds, and below 1437 ft between 7 August and 31 October for fall migrating birds for each of the 60 years.
3. Summarize all statistics (Figures 2 and 3).

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).

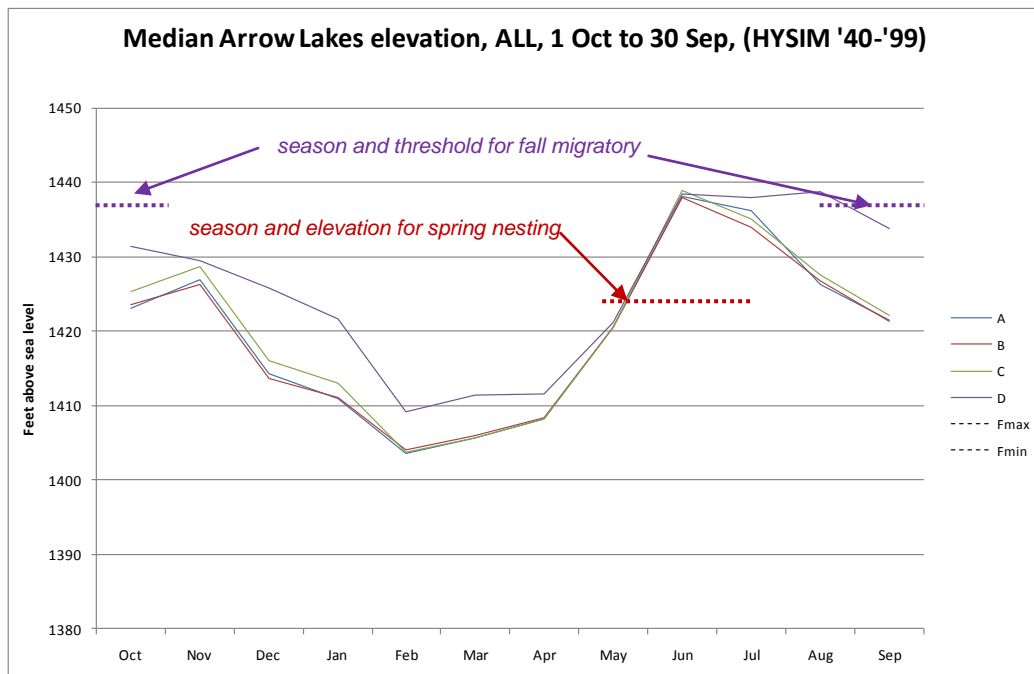


Figure 1. HYSIM Simulated Arrow Lakes Reservoir elevations. Median result over 60 years showing the critical elevation thresholds and timing windows for nesting and fall migratory birds.

Results

Based on number of days that Arrow Lakes Reservoir is below 1424 ft over the 30 April-16 July period, the modeling indicates that all of NTS scenarios would perform similarly in providing habitat for nesting birds in general. Under Scenario B (3.0 MAF), the reservoir would be operated lower in dry years and therefore would provide some marginal improvements in nesting habitat in those years.

Scenario D (no NTS) would provide fewer days below 1437 ft in the fall period than the “with NTS” scenarios and, therefore, can be thought of as performing worse in providing fall migratory bird habitat.

Figure 2. Nesting Bird Habitat – HYSIM Results for all NTS scenarios

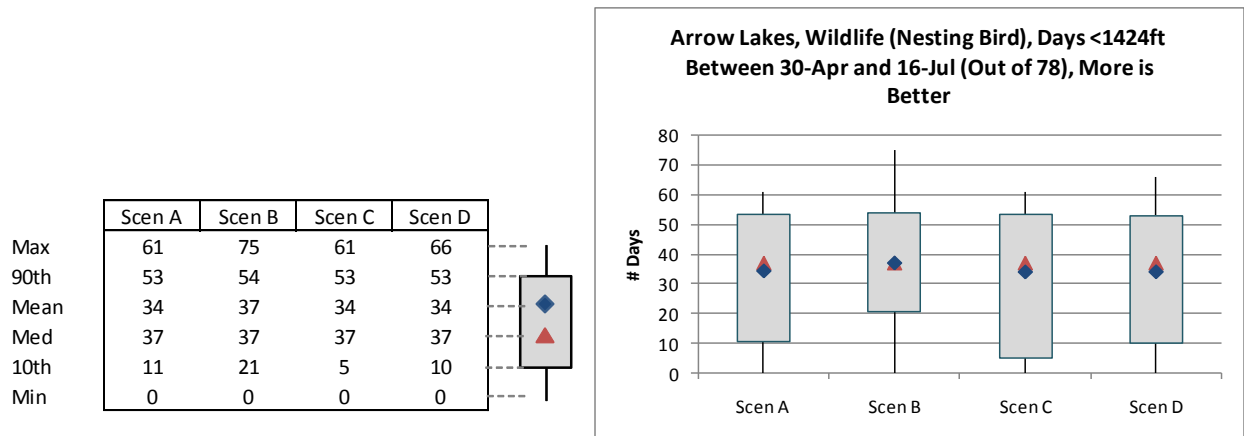


Figure 3. Fall Migrating Bird Habitat – HYSIM Results for all NTS scenarios

