PERFORMANCE MEASURE INFORMATION SHEET #9

REVELSTOKE RESERVOIR: PRODUCTIVITY

Objective / Location	Performance Measure	Units	Description	MSIC
Productivity/ Revelstoke Reservoir	Reservoir Stability	# times over a rolling 1-day and 3-day period reservoir drawdown exceeds 0.25 m per year/season.	Reports on the frequency of events that drawdown of reservoir exceeds 0.25 m each year and over the summer period as a measure of reservoir stability.	10%

Description

Physical attributes thought to drive thermal processes in a reservoir include residence time and drawdown extent. The extent to which Revelstoke Reservoir is drafted can be used as a general indicator of stability, where frequent large drawdowns may limit littoral productivity and disrupt the thermocline of the reservoir. The less stratified the reservoir environment becomes, the more habitats within the reservoir become riverine in nature. Ecosystems reliant on thermostratification, such as the relationship between daphnia and kokanee, are less productive in riverine environments.

Performance Measure

For the NTS analysis, a performance measure was developed to track the frequency and extent of drawdowns in Revelstoke Reservoir as an indicator of ecological impact. This analysis considers two time periods: year-round operations, and summer (01 June to 30 September).

The evaluation of frequency of drawdowns was divided into two sets: maximum drawdown greater than 0.25 m over 1-day and 3-day rolling time periods. A rule of thumb in considering significance between point values is to define what is measurable. During the WUP process, 10% difference became a standard for determining whether two values were significantly different.

Calculations

For each scenario:

1. Assemble the bi-hourly data from the GOM model for Revelstoke Reservoir elevations over 10 simulated inflow years (1964 and 1973) (Figure 1).
2. For each rolling 2-hour time step, the maximum minus the minimum elevation is recorded over a) a 1-day period and b) a 3-day period.
3. The number of occasions when the maximum minus the minimum elevation exceeds a threshold level of 0.25 m is counted over the entire year and over the summer period (1 June to 30 September).
4. Summarize all statistics (Figures 2-5).

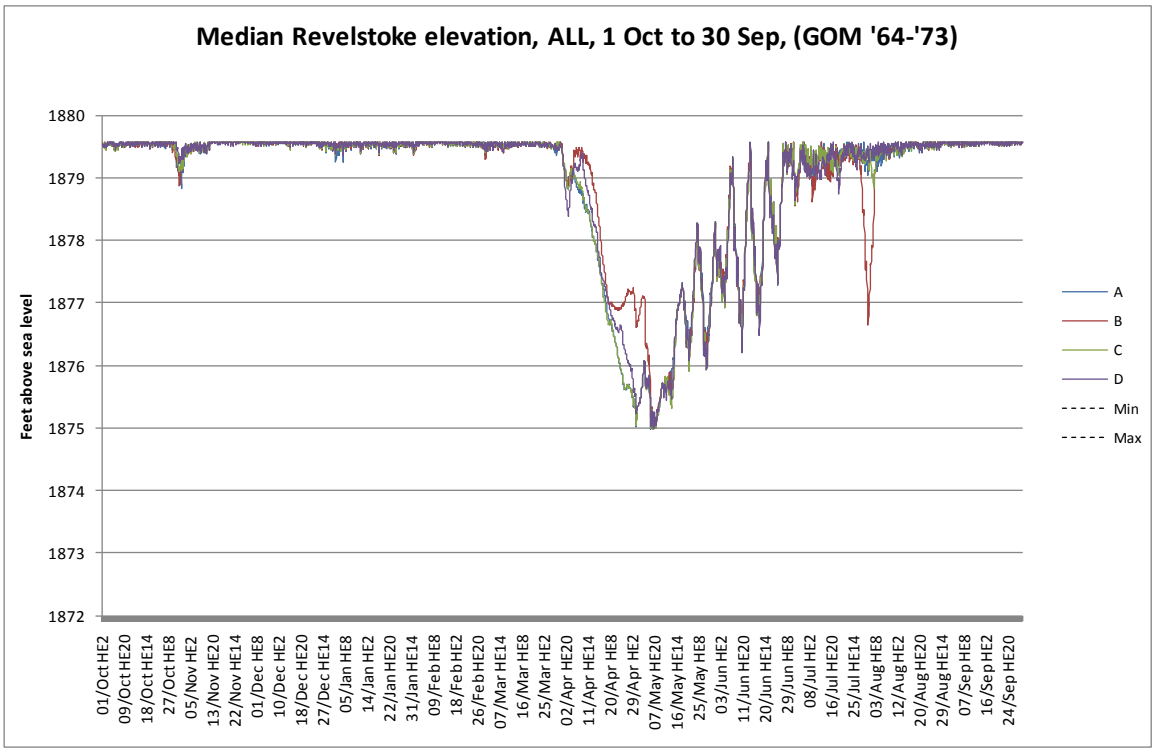

Figure 1. GOM Simulated Revelstoke Reservoir elevations. Median over 10 years

Key Assumptions and Limitations

- Each scenario is simulated using the same set of system constraints, input assumptions (e.g., load forecasts) and historic basin inflows (1964 – 1973).
- The analysis was conducted under the premise that the physical impacts on the reservoir will drive any changes to temperature conditions in the reservoir. It is unclear what level of influence is possible through operations, but it is possible to compare the data to subjectively assess relative differences across the four NTS scenarios.
- This analysis is not intended to quantify the impacts of the scenarios in terms of fisheries or aquatic productivity impacts.

Results

When considering the median statistics, Scenario B (3.0 MAF) performs worse (i.e., draws Revelstoke Reservoir down beyond 0.25 cm more often over a 1-day and 3-day period) than Scenario D. On average, there are only marginal differences across the scenarios. This holds true for both the entire year and summer simulation periods.

Figure 2. Revelstoke Reservoir Stability (Productivity) – 1-day All Year – GOM Results for all NTS scenarios. Red-shaded results carried forward into Consequence Table

	Scen A	Scen B	Scen C	Scen D
Max	356	357	361	398
90th	309	345	301	328
Mean	210	227	212	204
Med	216	244	220	209
10th	104	105	108	59
Min	40	47	40	47

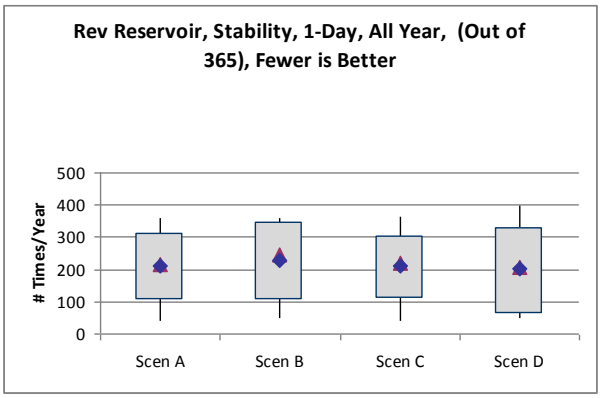

Figure 3. Revelstoke Reservoir Stability (Productivity) – 1-day Summer – GOM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	222	221	221	210
90th	211	211	214	189
Mean	135	152	139	127
Med	146	168	134	131
10th	36	84	84	40
Min	31	43	36	15

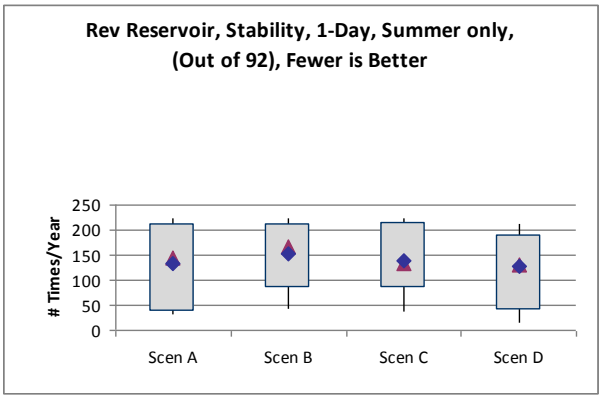

Figure 4. Revelstoke Reservoir Stability (Productivity) – 3-day All Year – GOM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	1,264	1,402	1,140	1,289
90th	1,120	1,072	1,132	1,222
Mean	831	888	841	821
Med	786	913	880	705
10th	553	570	569	567
Min	472	538	486	485

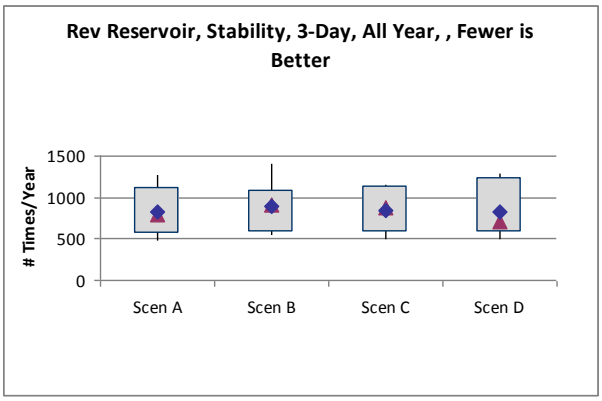

Figure 5. Revelstoke Reservoir Stability (Productivity) – 3-day Summer – GOM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	598	629	574	614
90th	533	574	518	527
Mean	441	480	451	415
Med	433	456	469	412
10th	328	388	328	302
Min	316	371	323	282