

Version 1.0, August 2013



Introduction

Skeena Salmon

Skeena River Basin

This habitat report card is part of a 2013 project by ESSA Technologies that summarizes pressures on the habitat used by Skeena salmon Conservation Units (CUs) during their freshwater life history stages (migration, spawning and rearing), as well as their relative vulnerability to those pressures. Report cards are available for each individual CU in the Skeena watershed; this supplementary 'Skeena River Basin' report card summarizes information for indicators that are important for salmon in the Skeena but cannot be clearly associated with an individual CU. For a summary explanation of the indicators shown below, please see the end of this report card. All report cards, as well as a detailed report with full methods and results are available at <u>www.skeenasalmonprogram.ca</u>.

Sockeye Escapement (1991-2010)¹

Average number of spawners



Minimum monthly average precipitation and maximum monthly average air temperature Summer low-flow period (July—September)



¹ClimateBC/WNA-http://www.genetics.forestry.ubc.ca/cfcg/climate-models.html

² Murdock, T.Q. and D.L. Spittlehouse. 2011. Selecting and using climate change scenarios for British Columbia. Pacific Climate Impacts Consortium, University of Victoria, Victoria, BC.

Recent historical flows (1991-2010)¹

Minimum monthly average flow $(m^3 s^{-1})$

Summer low-flow period (July-September)



¹ Water Survey of Canada—Environment Canada—http://www.ec.gc.ca/rhc-wsc/

Glacier loss (1985-2005)¹

Total glacial extent across major drainage basins²



Example area showing glacier extent in 1985 (dark blue) vs. 2005 (light blue).

² GIS glacier data layer provided by University of Northern British Columbia (UNBC).

Snow monitoring $(1991 - 2010)^1$

Snow water equivalent (mm) measured on April 1st



¹ BC River Forcast Centre (RFC) - http://bcrfc.env.gov.bc.ca/

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1. Sockeye Escapement. Average escapement numbers for each lake sockeye CU provide a relative indication of the amount of marine-derived nutrient inputs to the CU rearing lake that are derived from the carcasses of returning sockeye spawners. Marine-derived nutrients deposited by salmon carcasses are retained in lakes and can be important for enhancing nutrient levels present in naturally low productivity coastal lakes.

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2. Historical and Future Climate (Precipitation and Air Temperature). High water temperatures and low flows can affect salmon by increasing energy expenditures, create physical or thermal blockages to migration, exacerbate the progression of diseases and parasites, and decrease fecundity of eggs. Modelling of future water temperatures and flow conditions within the Skeena watershed was beyond the scope of this project; we instead used air temperature as a surrogate pressure indicator with potential influence water temperatures, and precipitation as a surrogate pressure indicator with potential influence water are also important in maintaining summer flows, there are undoubted linkages between rainfall patterns and seasonal stream flow. There is also a well-known relationship between air and water temperatures, although the strength of this relationship is highly variable as stream thermal response to air temperature can depend on a suite of local influences (e.g., groundwater inputs, riparian type, hydrology).

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3. Recent Historical Flows. Sockeye migrating and spawning through the summer months need adequate stream flows to provide unimpeded access to spawning areas and proper spawner distributions on the spawning grounds. In addition to potential impacts on water quality (i.e., water temperature and dissolved oxygen), low stream flows can limit sockeye spawner distribution to sub-optimal stream reaches, or force fish to spawn in the center of the stream channel which can lead to increased egg and alevin mortalities during winter floods.

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4. Glacier Loss. Glacier runoff can be a vital component of surface flows in glaciated drainage basins, especially during summer when water demand is high. Glaciers represent natural reservoirs that can yield the most water during the driest periods of late summer. As glaciers retreat the size of the reservoir shrinks and so does the available runoff to support sufficient flows to maintain salmon habitats (although the significance of this impact will vary by drainage dependent on the contribution of glacier runoff to natural stream flows).

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5. Snow Monitoring. Surface runoff from snowmelt can be essential for maintaining seasonal flows in coastal streams, especially during the summer when demand for water is high. Snow field extents can have significant influences on water quantity, water quality (e.g., water temperature), and timing of flow events; all critical factors for maintaining aquatic habitat conditions for salmon.

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