

# ANNEX A: MANUSCRIPT RECORD FORM – MRF (1) – PRIMARY PUBLICATIONS

## MRF for PRIMARY (PEER REVIEW) PUBLICATIONS

<b>AUTHOR(S)<sup>1</sup> and AFFILIATIONS</b>	
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<b>REMINDER:</b> For bibliometric purposes, please use standard affiliation, i.e., first name, last name and “Fisheries and Oceans Canada”. Please identify the Author who will be in communication (main contact) with the journal.	
<b>Title:</b> Assessing the Impacts of Environmental and Ecological Variables on the Performance of Fraser Sockeye Salmon Forecast	
<b>Abstract:</b> Fraser River Sockeye salmon ( <i>Oncorhynchus nerka</i> ) is one of the largest stock complexes in North America, supporting major commercial, recreational, and First Nations fisheries. Sockeye fisheries management relies on an annual pre-season forecast of adult returns, including Sockeye salmon to be caught by fisheries and those escaping to spawning ground. In this study, we developed a framework with Taylor diagram to evaluate pre-season forecast models on an annual basis and identify external drivers of importance for forecasting Fraser Sockeye returns. Specifically, we incorporated five new covariates including sea surface temperature in the Gulf of Alaska and annual abundance of other salmon species into the existing forecast models. Results revealed that both Ricker and Power models coupled with the newly included covariates performed well. In addition, models selected a decade ago underperformed compared to those selected based on our retrospective analysis for the period of 2009 to 2020. We conclude that forecast models need to be continuously evaluated in the face of increasing environmental change, and that new models able to deal with non-stationary relationships between the environment and Sockeye dynamics are to be developed and evaluated with environmental and ecological factors being explicitly incorporated and assessed for their impacts.	
<b>PUBLICATION (JOURNAL, SERIES) NAME/FULL CITATION INFORMATION/URL</b> (If not available, please submit when so, to Division Manager):	
Canadian Journal of Fisheries and Aquatic Sciences	
<b>PRE-SUBMISSION REVIEWER(S):</b>	
Reviewer Name (print name):	Date Submitted:
Reviewer Name (print name):	Date Submitted:
<b>DFO COMMUNICATIONS BRANCH SUPPORT REQUIRED?</b> (Division Manager’s Determination):	
Communications Advisor Name (print name):	Date Assigned:
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<sup>1</sup> The author (main contact) communicating with the journal is this person responsible for managing editorial issues as well as final format and content of the manuscript (an identifier is usually assigned to the communicating author i.e. an asterisk or other symbol). This person is not necessarily the “first” author, which could have different meanings in different fields. For examples, it could a first or a last author or the person overseeing the publication process and, often, responsible for conceiving, supporting, and managing the project.

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(Manuscript Reform Form for Primary Publications, page 2)

<b>REMINDER:</b> For PRIMARY peer-reviewed publications only, authors are required to write a very short (i.e., 150 words) plain language summary of the manuscript to explain the relevance of the science to the Department. It is intended for internal use to identify linkages to programs, policies and stakeholders and for use externally in the plain language promotion of science.	
<p>The Canadian Fraser River Sockeye salmon is one of the largest stock complexes in North America, supporting major commercial, recreational, and First Nations fisheries. Sockeye fisheries management relies on annual pre-season forecast of adult return. In this study, we developed a framework of good visualization to evaluate pre-season forecast models on an annual basis and to identify external drivers of importance for forecasting Sockeye return. Specifically, we incorporated five new covariates including sea surface temperature in the Gulf of Alaska and annual abundance of other salmon species into the existing forecast models. Results revealed that models generally performed better when couple with the new covariates and in comparison, models selected a decade ago generally performed more poorly. We advocate that forecast models need to be continuously evaluated in the face of increasing environmental change and that more environmental and ecological factors need to be explicitly incorporated and assessed for their impacts.</p>	
<b>SCIENTIFIC IMPLICATIONS OF THE PAPER</b> (i.e. field, importance, focus, purpose, benefits, etc.): Field: Salmon stock dynamics, pre-season forecast, fishery management, ecosystem Purpose: Evaluating the performances of Fraser sockeye pre-season forecast models and assessing the impacts of environmental and ecological factors on the sockeye forecast. Benefit: This research assists decision-making processes including international total catch allowance negotiation, escapement surveys, and hatchery enhancement experiments.	
<b>ANY GEOGRAPHICAL SCOPE/REGION and</b> (if applicable) <b>SPECIES</b> (to include common names): Region: Northeast Pacific	
<b>RELEVANT TO PROGRAMS, PROJECTS, ACTS, INITIATIVES, ETC.</b> (please identify): Program: Salmon Data Unit, Ecosystem modeling Acts: Fisheries Acts Initiatives: Aquatic Climate Change and Adaptation Services Program, Strategic Program of Ecosystem Research Advice	
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