August Mean Dissolved Oxygen Stressor Estimation Function

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Species Information

Common Name: Salish Sucker/Nooksack Dace
Genus: Catostomus sp./Rhinichthys cataractae sp. cataractae

Stressor Details

Stressor Name: August Mean Dissolved Oxygen
Units: mg/L (= ppm)
Metric: Average Disolved Oxygen for the month of August (ideally integrated using continous data, or the most representative data available).
Scale: linear
Function Type: continuous
Vital Rate/Process: Growth

Life Stage & Context

Life Stages: Adults, Juvenile
Geography: Lower Fraser Valley (British Columbia), Washington State (US)
Activity: All activities
Season: All seasons

Descriptions

Overview

> This stressor estimation function is intended to provide a multiple regression for estimating Mean August Dissolved Oxygen in lower Fraser Valley streams, based on data collected at 33 representative sites in Ramirez (2024). The regression equation is
>
> Mean DO = (50.50 · log10[(gradient+0.2)^0.05)] + (9.02 · log10(discharge+0.2)) + (-2.84 · log10(Ntot+0.1)) + (-5.84· log10(Ptot + 0.1)) + 6.63
>
> See the attached Excel file "Mean DO Stressor Estimation Function.xls" for details.

Function Derivation

> Based on dissolved oxygen data from 33 sites in the lower Fraser Valley from Ramirez (2024).

Transferability of Function

> Should be valid for lower Fraser Valley streams, assuming that the data set of 33 stream/pond sites is representative of the broader conditions in lower Fraser Valley streams.

Source of Stressor Data

> This STRESSOR ESTIMATION FUNCTION has been generated using data from Ramirez et al. (2024, M.Sc. thesis UBC), and is available in this SR Function Library by searching for "August Mean Dissolved Oxygen Stressor Estimation Function".

Citations

Rosenfeld, J.S., and Lee, R. 2022. Thresholds for Reduction in Fish Growth and Consumption Due to Hypoxia: Implications for Water Quality Guidelines to Protect Aquatic Life. Environmental Management https://doi.org/10.1007/s00267-022-01678-9

Usoof, A.M. and Rosenfeld, J.S. 2024. Relationship between system capacity and Dissolved Oxygen concentration for Salish Sucker.

Ramirez, Samantha. 2024. MODELLING THE IMPACT OF HUMAN DEVELOPMENT AND WATER QUALITY ON HYPOXIA. UBC Masters thesis, UBC Institute for the Oceans and Fisheries.