Bowerman et al. 2018: Temperature and Chinook Prespawn

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Species Information

Common Name: Spring Chinook Salmon
Latin Name: tshawytscha
Genus: Oncorhynchus

Stressor Details

Stressor Name: Temperature
Units: C
Metric: 7-DADM
Scale: linear
Function Type: continuous
Vital Rate/Process: Survivorship

Life Stage & Context

Life Stages: Spawners
Geography: Willamette River, OR
Activity: Prespawn
Season: Summer

Descriptions

Overview

> Density-independent survivorship for spring Chinook upstream migration and holding and stream temperature. Stream temperature is modelled as the 7-day average of daily maximum (7-DADM). Functional relationship is originally sourced from the Willamette River OR (see original source data from (Bowerman et al. 2018).
>
> Regression line shows relationship for wild (non-hatchery) origin fish. Mortality increases with stream temperature
>
> General Application Prespawn

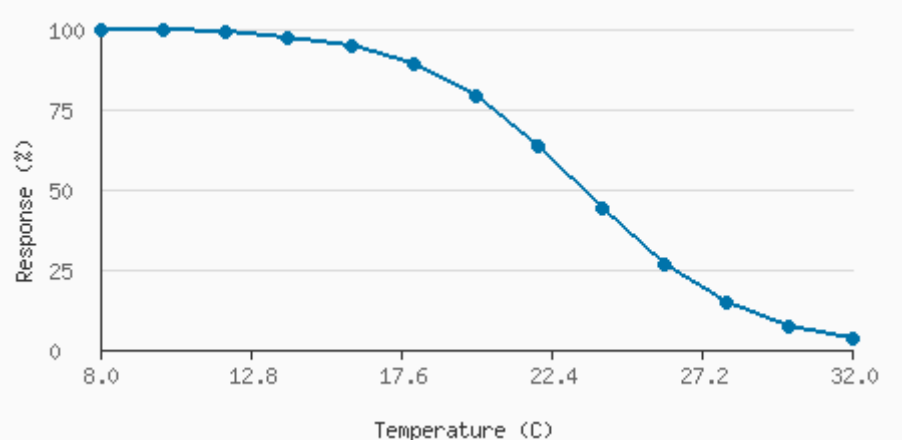
Stressor Magnitude Data

> Empirical model that estimates fine sediment from road density, slope and bankfull width

Pathways of Effect

> Upland development, road building, fine sediment, smothering of eggs, egg to fry surviorship

Stressor Response Data



Stressor (X)	Mean System Capacity (%)	SD	low.limit	up.limit
8	99.74	0	99.74	99.74
10	99.44	0	99.44	99.44
12	98.8	0	98.8	98.8
14	97.43	0	97.43	97.43
16	94.59	0	94.59	94.59
18	88.96	0	88.96	88.96
20	78.8	0	78.8	78.8
22	63.16	0	63.16	63.16
24	44.15	0	44.15	44.15
26	26.72	0	26.72	26.72
28	14.39	0	14.39	14.39
30	7.2	0	7.2	7.2
32	3.45	0	3.45	3.45

Citations

Beechie, T. J., C. Nicol, C. Fogel, J. Jorgensen, J. Thompson, G. Seixas, J. Chamberlin, J. Hall, B. Timpane-Padgham, P. Kiffney, S. Kubo, and J. Keaton. 2021. Modeling Effects of Habitat Change and Restoration Alternatives on Salmon in the Chehalis River Basin Using a Salmonid Life-Cycle Model. U.S. Department of Commerce, NOAA Contract Report NMFS-NWFSC-CR-2021-01.

Bowerman, T., A. Roumasset, M. L. Keefer, C. S. Sharpe, and C. C. Caudill. 2018. Prespawn mortality of female Chinook salmon increases with water temperature and percent hatchery origin. Transactions of the American Fisheries Society 147:31-42.

References

Beechie et al 2021 - https://repository.library.noaa.gov/view/noaa/29486