

McHugh, Budy & Schaller (2004): Temperature and Chinook Fry Survivorship

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Species Information

Common Name: Chinook Salmon (stream type chinook)

Genus: *Oncorhynchus tshawytscha*

Stressor Details

Stressor Name: Temperature

Units: C

Metric: mean daily temperature

Scale: linear

Function Type: continuous

Vital Rate/Process: Survivorship

Life Stage & Context

Life Stages: Fry

Descriptions

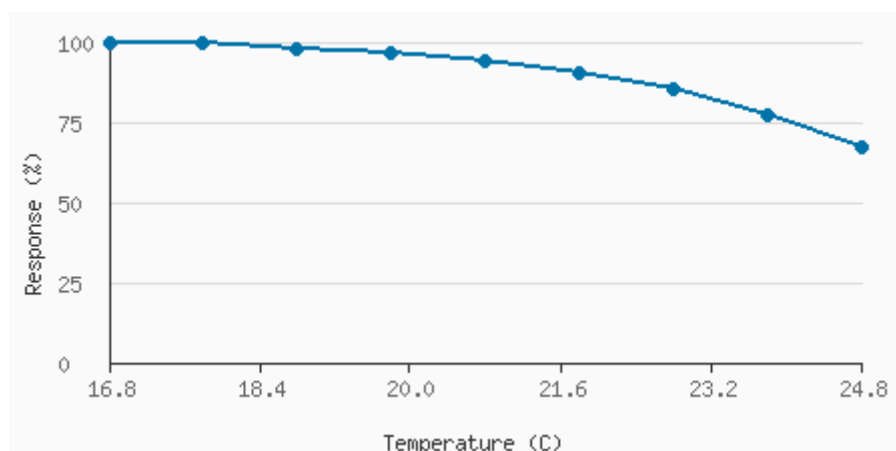
Overview

Fry stage: Survivorship through the fry stage to the overwintering stage is influenced by summer water temperatures (see reviews by McCullough, 1999; Richter & Kolmes, 2005). This survivorship function is developed for stream-type chinook by McHugh, Budy & Schaller (2004) based on data from Brett (1952), McCormick, Hokanson & Jones (1972), and Coutant (1973):

$$\text{Surv} = \exp\left\{-\left(\frac{\text{Tsum}}{27.0271}\right)^{10.74}\right\} \text{ if } \text{Tsum} > 17.8$$
$$\text{Surv} = 1 \text{ if } \text{Tsum} \leq 17.8$$

Where Tsum is mean daily temperature (°C) August–September.

Stressor Response Data



Stressor (X)	Mean System Capacity (%)	SD	low.limit	up.limit
16.8	100	0	0	100
17.8	100	0	0	100

18.8	97.99306031	0	0	100
19.8	96.52463997	0	0	100
20.8	94.17225078	0	0	100
21.8	90.53576285	0	0	100
22.8	85.13336276	0	0	100
23.8	77.47479759	0	0	100
24.8	67.22759619	0	0	100

Citations

McHugh, P., Budy, P., & Schaller, H. (2004). A model-based assessment of the potential response of Snake River spring–summer Chinook salmon to habitat improvements. *Transactions of the American Fisheries Society*, 133(3), 622-638.

Honea, J. M., Jorgensen, J. C., McCLURE, M. M., Cooney, T. D., Engie, K., Holzer, D. M., & Hilborn, R. (2009). Evaluating habitat effects on population status: influence of habitat restoration on spring?run Chinook salmon. *Freshwater Biology*, 54(7), 1576-1592.

References

McHugh P., Budy P. & Schaller H. (2004) -

<https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=ce7b3218c20966ffbda7b4247962c09294195284>

Honea et al (2009) - <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2427.2009.02208.x>