

Temperature and Westslope Cutthroat Trout Survival

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Species Information

Common Name: Westslope Cutthroat Trout
Genus: *Oncorhynchus lewisi*

Stressor Details

Stressor Name: Temperature
Units: °C
Metric: Tank Temperature
Scale: linear
Function Type: continuous
Vital Rate/Process: Survivorship

Life Stage & Context

Life Stages: Fry

Descriptions

Overview

Percent survival of juvenile westslope cutthroat trout (white circles, black line in image) in relation to test temperature during a 60-d experiment. Mean survival of westslope cutthroat trout declined significantly ($P < 0.05$) to 35.7% at 20C, 12.5% at 22C, and 0% at 24C.

In this laboratory experiment, Westslope cutthroat trout were either eggs or age-0 fish from a wild stock at Rogers Lake, Montana, or age-0 fish from wild stock maintained at the Westslope Trout Company, a private fish hatchery near Ronan, Montana. Both sources are derived from a mixture of pure populations of westslope cutthroat trout from Montana.

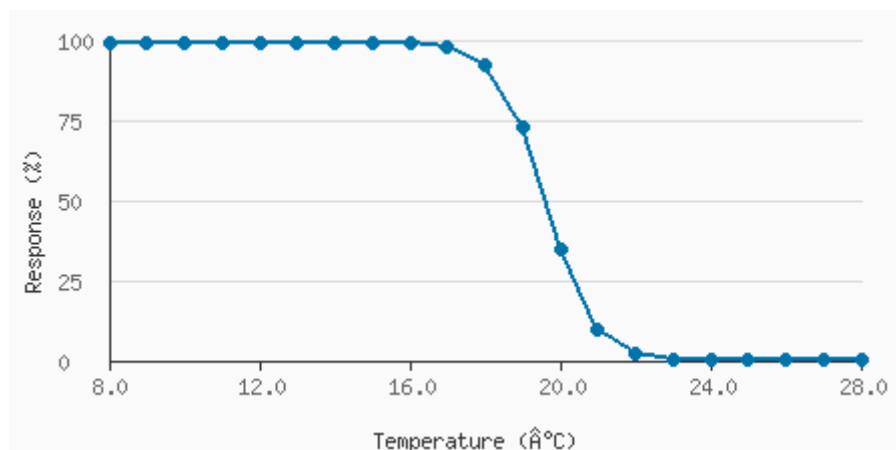
The survival rate is as follows:

$$\text{Survival} = 97.8846 / (1 + e^{-((\text{temperature} - 24.3522) / -0.5033)})$$

Function Derivation

laboratory experiment

Stressor Response Data



| Stressor (X) | Mean System Capacity (%) | SD | low.limit | up.limit |
|--------------|--------------------------|----|-----------|----------|
|--------------|--------------------------|----|-----------|----------|

| | | | | |
|----|-------------|-------|-------|-------|
| 8 | 99.07679939 | 5.8 | 63.75 | 99.96 |
| 9 | 99.07679688 | 5.8 | 63.75 | 99.96 |
| 10 | 99.07678415 | 5.8 | 63.75 | 99.96 |
| 11 | 99.07671946 | 6.16 | 63.75 | 99.96 |
| 12 | 99.07639066 | 6.52 | 63.75 | 99.96 |
| 13 | 99.07471965 | 6.52 | 63.75 | 100 |
| 14 | 99.06622808 | 7.23 | 63.75 | 100 |
| 15 | 99.02309436 | 7.23 | 63.75 | 100 |
| 16 | 98.80445774 | 6.88 | 63.75 | 100 |
| 17 | 97.70805061 | 6.88 | 63.39 | 100 |
| 18 | 92.49185485 | 12.59 | 55.89 | 97.46 |
| 19 | 72.75272938 | 18.3 | 15.54 | 94.24 |
| 20 | 34.89967684 | 2.23 | 0.54 | 66.03 |
| 21 | 9.576574791 | 1.16 | 0 | 44.96 |
| 22 | 2.042933961 | 0.09 | 0 | 38.53 |
| 23 | 0.408745022 | 0.98 | 0 | 33.88 |
| 24 | 0.080693572 | 2.59 | 0 | 33.88 |
| 25 | 0.015887957 | 2.59 | 0 | 33.53 |
| 26 | 0.003126576 | 2.59 | 0 | 33.88 |
| 27 | 0.000615212 | 3.66 | 0 | 33.88 |
| 28 | 0.000121052 | 3.66 | 0 | 34.6 |

Citations

Bear, E. A., McMahon, T. E., & Zale, A. V. (2007). Comparative thermal requirements of westslope cutthroat trout and rainbow trout: implications for species interactions and development of thermal protection standards. *Transactions of the American Fisheries Society*, 136(4), 1116.

References

Bear et al. - <https://afspubs.onlinelibrary.wiley.com/doi/10.1577/T06-072.1>