

Scheuerell et al 2006: Temperature and Chinook Egg-to-Fry

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Species Information

Common Name: Chinook Salmon
Genus: *Oncorhynchus tshawytscha*

Stressor Details

Stressor Name: Temperature
Units: C
Metric: Mean Daily Temp During Incubation
Scale: linear
Function Type: continuous
Vital Rate/Process: Survivorship

Life Stage & Context

Life Stages: Egg
Geography: Oregon
Activity: Incubation
Season: Incubation

Descriptions

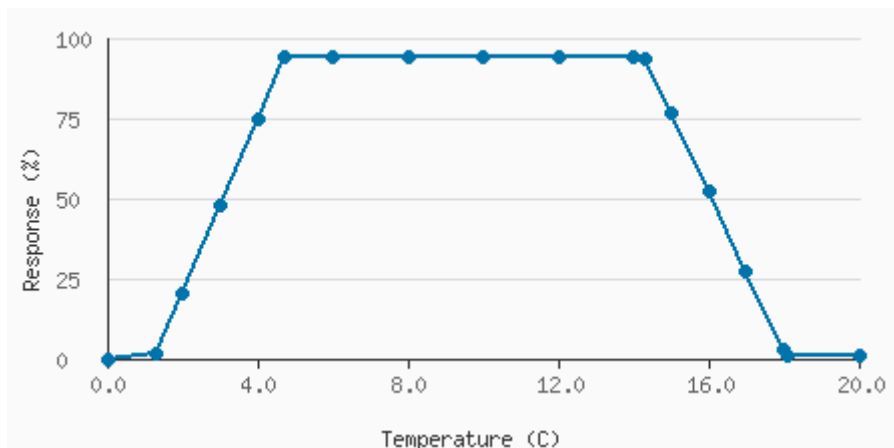
Overview

Function applied in Honea et al., (2009) and Scheuerell et al. (2006) for life cycle model for wild spring-run Chinook salmon. Survivorship function from Scheuerell et al. (2006):

Probability of egg-to-fry survivorship based on stream temperature where T_{inc} is the mean daily temp during incubation (Aug-May for their population):

$T_{inc} \geq 1.3 \ \& \ T_{inc} < 4.7: ((0.273 * T_{inc}) - 0.342)$
 $T_{inc} \geq 4.7 \ \& \ T_{inc} < 14.3: 0.94$
 $T_{inc} \geq 14.3 \ \& \ T_{inc} < 18.1: ((-0.245 * T_{inc}) + 4.44)$
 $T_{inc} \geq 18.1: 0.01$

Stressor Response Data



| Raw Stressor Values | Scaled Response Values 0 to 100 | SD | low.limit | up.limit |
|---------------------|---------------------------------|----|-----------|----------|
| 0 | 0 | 0 | 0 | 100 |

| | | | | |
|------|-------|---|---|-----|
| 1.3 | 1.29 | 0 | 0 | 100 |
| 2 | 20.4 | 0 | 0 | 100 |
| 3 | 47.7 | 0 | 0 | 100 |
| 4 | 75 | 0 | 0 | 100 |
| 4.7 | 94 | 0 | 0 | 100 |
| 6 | 94 | 0 | 0 | 100 |
| 6 | 94 | 0 | 0 | 100 |
| 8 | 94 | 0 | 0 | 100 |
| 10 | 94 | 0 | 0 | 100 |
| 12 | 94 | 0 | 0 | 100 |
| 14 | 94 | 0 | 0 | 100 |
| 14.3 | 93.65 | 0 | 0 | 100 |
| 15 | 76.5 | 0 | 0 | 100 |
| 16 | 52 | 0 | 0 | 100 |
| 17 | 27.5 | 0 | 0 | 100 |
| 18 | 3 | 0 | 0 | 100 |
| 18.1 | 1 | 0 | 0 | 100 |
| 20 | 1 | 0 | 0 | 100 |

Citations

Scheuerell M.D., Hilborn R., Ruckelshaus M.H., Bartz K.K., Lagueux K.M., Haas A.D. & Rawson K. (2006) The Shiraz model: a tool for incorporating anthropogenic effects and fish-habitat relationships in conservation planning. *Canadian Journal of Fisheries and Aquatic Science*, 63, 1596–1607.

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.