Rosenfeld et al. 2016: HSI Coho Juvenile Depth (6 cm FL)

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Species Information

Common Name: Coho Salmon
Genus: Oncorhynchus kisutch

Stressor Details

Stressor Name: Depth
Units: m
Metric: Water Depth (total depth; 6-cm FL juvenile)
Scale: linear
Function Type: continuous
Vital Rate/Process: Habitat Suitability Index

Life Stage & Context

Life Stages: Parr
Geography: Washington/BC.
Activity: rearing
Season: Late summer–early fall (low flow)

Descriptions

Overview

> Bioenergetic-based depth habitat suitability curve for 6-cm fork length (~2.5 g) juvenile Coho Salmon. Suitability is standardized net energy intake from a drift-foraging model (focal depth assumed at 40% of water column depth), rescaled to 0–100. Suitability increases with depth as the volume of the reactive field (and therefore prey flux) increases, approaching the maximum at ~1 m; unlike frequency-based depth curves, suitability does not decline in deep water.
>
> Stressor-response relationship data sourced from: Appendix, TABLE A.2. Depth habitat suitability values for 6-, 8-, 10-, and 12-cm-FL juvenile Coho Salmon based on bioenergetics — 6 cm FL column (p. 1219); see also Figure 3b.
>
> See curve for 12cm FL. See source publication for remaining curves.

Function Derivation

> Mechanistic drift-foraging bioenergetic (net energy intake) model, standardized to a maximum of 1.

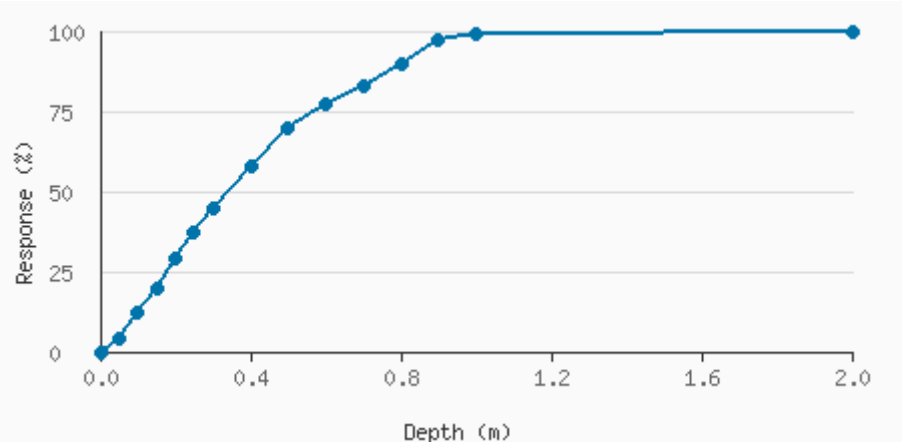
Transferability of Function

> Sensitive to drift concentration, temperature (fixed at 12°C) and fish size; best suited to drift-feeding juvenile salmonids.

Source of Stressor Data

> Drift-foraging bioenergetic model (Hughes & Dill 1990 framework) run over homogeneous depth-velocity fields; drift concentrations from Husdon Creek, BC; fixed 12°C.

Stressor Response Data



Raw Stressor Values	Scaled Response Values 0 to 100	SD	low.limit	up.limit
0	0	0	0	100
0.05	4	0	0	100
0.1	12	0	0	100
0.15	20	0	0	100
0.2	29	0	0	100
0.25	37	0	0	100
0.3	45	0	0	100
0.4	58	0	0	100
0.5	70	0	0	100
0.6	77	0	0	100
0.7	83	0	0	100
0.8	90	0	0	100
0.9	97	0	0	100
1	99	0	0	100
2	100	0	0	100

Citations

Rosenfeld, J., Beecher, H., & Ptolemy, R. (2016). Developing bioenergetic-based habitat suitability curves for instream flow models. North American Journal of Fisheries Management, 36(5), 1205–1219.

References

Rosenfeld et al., 2016 - https://doi.org/10.1080/02755947.2016.1198285