Substrate Cover and Nooksack Dace

Function Updated by mbayly on Thu, 04/24/2025 - 19:10.

Species Information

Common Name: Nooksack Dace
Genus: Rhinichthys cataractae

Stressor Details

Stressor Name: Substrate Cover
Units: % Cobble and Boulder Cover
Metric: Percent Cobble and Boulder Cover
Scale: linear
Function Type: continuous
Vital Rate/Process: System capacity

Life Stage & Context

Life Stages: Adults, All life stages
Geography: Lower Fraser Valley (British Columbia)
Activity: All activities
Season: Summer

Descriptions

Overview

> The final curve was based on relationship between % cobble substrate cover and Nooksack Dace density identified in Gray et al. (2024) using empirical data. We capped the maximum habitat capacity at 80% to prevent unrealistically high predicted capacity using the Gray et al. (2024) power function between dace density and % cobble. (see Fig. below). The habitat suitability curve for Longnose Dace (Edward et al., 1983) also generally supports a positive association between % cobble cover and system capacity. Note that while there is a generally positive overall relationship between cobble substrate and dace density, the variance around the line is large, particularly at higher cobble substrate cover. While we can be reasonably confident that dace abundance increases up to 20-40% cobble cover, it could also be reasonable to assume that it plateaus above this level as implied by the Edwards et al. (1983) curve for Longnose dace. At the expert elicitation workshop held in November 2024, John Gray indicated that Dace may even prefer larger substrate (i.e. boulder) and that a SR for boulder would be similar to the one for cobble. Therefore, for the x-axis of this SR function %cobble and boulder combined is more appropriate for more general application to streams/reaches that actually have boulder-sized substrate present.

Function Derivation

> Based on data from Longnose Dace and Nooksack Dace; Empirical data (correlative model); Published

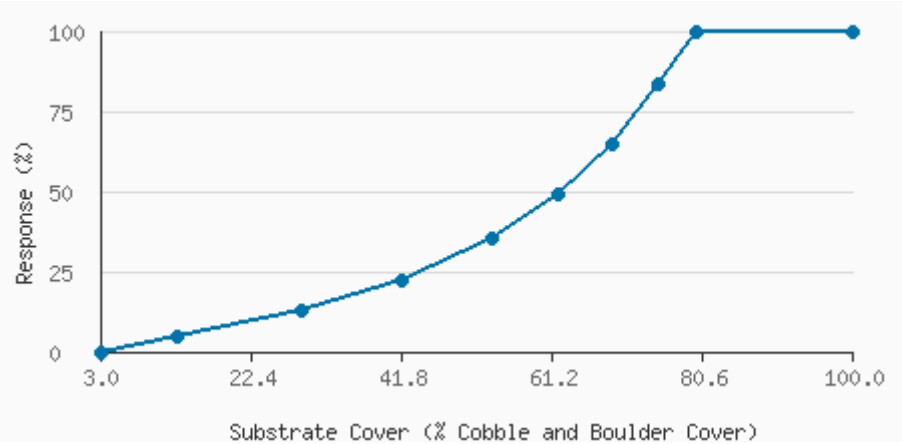
Transferability of Function

> As local adaptations are likely minimal among different Nooksack Dace populations, we would not expect much variation in true tolerance among populations. This function should therefore be broadly applicable to all populations of the species with caution.

Source of Stressor Data

Percent cobble substrate data is available for most (but not all) reaches in Bertrand, Pepin, Fishtrap Creeks, and the Salmon River, collected as part of Pearson (2004) and subsequent field work to define critical habitat for Nooksack dace.

Stressor Response Data



% Cobble and boulder	Mean System Capacity (%)	SD	low.limit	up.limit
3.00	0.00	0	0	100
13.00	4.50	0	0	100
29.00	12.73	0	0	100
42.00	22.13	0	0	100
53.50	35.07	0	0	100
62.00	49.06	0	0	100
69.00	64.80	0	0	100
75.00	83.33	0	0	100
80.00	100.00	0	0	100
100.00	100.00	0	0	100

Citations

Usoof, A.M. and Rosenfeld, J.S. 2024. Relationship between system capacity and Percent Cobble Substrate Cover for Nooksack Dace.

Gray, J., J. Rosenfeld, M. Pearson, K. Colletti, and J. Ross. 2024. The effect of riffle restoration on the recovery of endangered Nooksack Dace (Rhinichthys cataractae sp. cataractae). Facets 9:1–15.