Mean Annual Discharge and Atlantic Salmon

Function Updated by leah.egeryhaley on Tue, 06/23/2026 - 18:20.

Species Information

Common Name: Atlantic Salmon
Genus: Salmo salar

Stressor Details

Stressor Name: Flow
Units: %
Metric: Mean Annual Discharge (MAD)
Scale: linear
Function Type: continuous
Vital Rate/Process: Density change (%)

Life Stage & Context

Life Stages: Juvenile
Geography: Catamaran Brook, NB, Canada
Season: Winter

Descriptions

Overview

> Final curve was derived from a linear regression.
>
> System capacity was derived from seasonal electrofishing data which was available for 13 years (1990-2002) from 8 to 10 sites in the Lower Reach of Catamaran Brook. Fish abundance was then estimated using a multiple-sweep depletion method (Zippin, 1958) during annual electrofishing surveys in the summer and autumn.
> To normalize and rescale each ecological response, each value was scaled by the maximum ecological response observed in the study such that mean habitat capacity percentage (normalized response) = response / maximum ecological response observed.
> Implicit pathway of effect: Over-winter density decline of juvenile Atlantic salmon is reduced at higher average winter flows.

Function Derivation

> Observational data. Final curve was derived from linear regression.

Transferability of Function

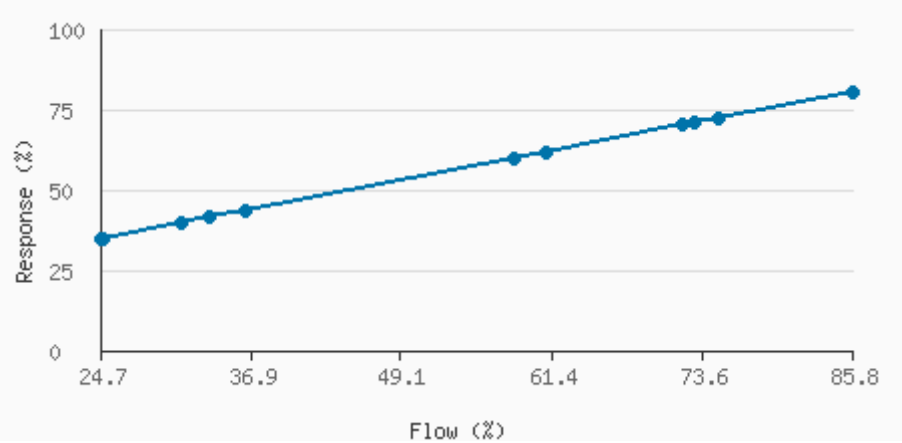
> Appropriate for winter stream flow impacts on Atlantic Salmon juveniles. General transferability to other salmon stocks in unclear, but likely appropriate for other autumn-spawning salmonids (i.e., regions with similar hydrology to the Catamaran Brook).
> The relationship may be unreliable if extrapolated to a flow range outside the original data (see the Average Salmonid flow-ecology SR function entry based on Rosenfeld and Enright (2025) for a more generalizable function across a wider range of flows).

Source of Stressor Data

> The winter streamflow data (discharge) for Catamaran Brook was collected using a streamflow gauging station located in the mid-basin. See methods of Cunjack et al. 2013 for details.

Data was then standardized by dividing absolute flow by MAD to achieve %MAD values (see Rosenfeld & Enright 2024). Such standardization allows for comparison of flow metrics across a wide range of stream sizes (see Rosenfeld et al. 2017).

Stressor Response Data



?PERCENT_MAD	Mean System Capacity (%)	SD	low.limit	up.limit
24.67369231	34.6152692	0	0	100
24.86276923	34.7570769	0	0	100
31.22107692	39.5258077	0	0	100
33.62246154	41.3268462	0	0	100
36.42353846	43.4276538	0	0	100
58.38076923	59.8955769	0	0	100
60.97584615	61.8418846	0	0	100
72.04476923	70.1435769	0	0	100
73.09984615	70.9348846	0	0	100
75.02830769	72.3812308	0	0	100
85.82707692	80.4803077	0	0	100

Citations

Cunjak, R.A., Linnansaari, T., and Caissie, D. 2013. The complex interaction of ecology and hydrology in a small catchment: a salmon's perspective. Hydrol. Process. 27: 741-749.