Mean Annual Discharge and Atlantic Salmon

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Function Updated by leah.egeryhaley on Tue, 06/23/2026 - 18:29.

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: Fry
Geography: Catamaran Brook, NB, Canada
Season: Summer

Descriptions

Overview

Final curve was derived from a linear regression.

System capacity was derived from 0+ age class densities. Fish abundance was estimated during annual electrofishing surveys in the summer and autumn using a multiple-sweep depletion method (Zippin, 1958). The original data points represented the composite densities pooled over all electrofished study sites within both the Lower and Gorge reaches (8 sites in total).
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.
Note that mean density in Cataman brook as estimated by digitizing densities from Fig. 2 pg. 512 of Imre et al. 2005.
Implicit pathway of effect: fish passage and survival

Function Derivation

Observational data. Final curve was derived from linear regression.

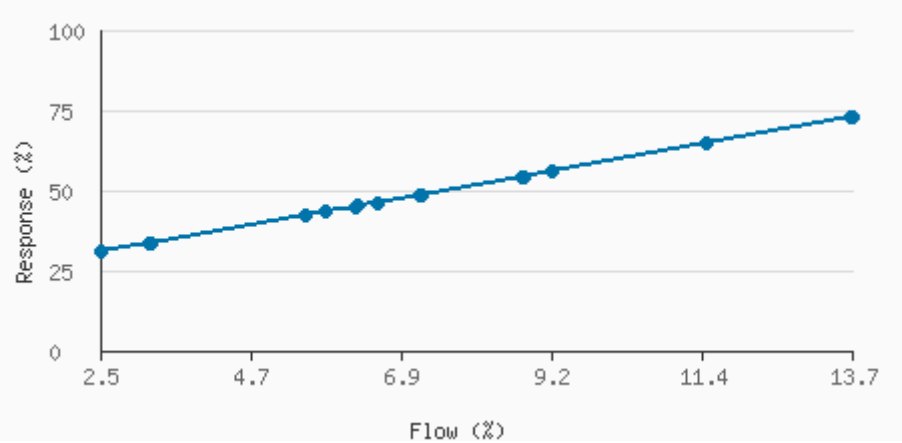
Transferability of Function

Appropriate for summer stream flow impacts on 0+ age class densities of Atlantic Salmon. 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
2.451846154	30.6353862	0	0	100
2.452307692	30.6371077	0	0	100
3.18	33.3514	0	0	100
3.230923077	33.5413431	0	0	100
5.535692308	42.1381323	0	0	100
5.535846154	42.1387062	0	0	100
5.828461538	43.2301615	0	0	100
5.828615385	43.2307354	0	0	100
6.286153846	44.9373538	0	0	100
6.309076923	45.0228569	0	0	100
6.598461538	46.1022615	0	0	100
7.223692308	48.4343723	0	0	100
7.251846154	48.5393862	0	0	100
8.766923077	54.1906231	0	0	100
8.790769231	54.2795692	0	0	100
9.205384615	55.8260846	0	0	100
11.51876923	64.4550092	0	0	100
13.68876923	72.5491092	0	0	100
13.69	72.5537	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.