Mean Annual Discharge and Atlantic Salmon

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Function Updated by leah.egeryhaley on Tue, 06/23/2026 - 18:07.

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: Abundance

Life Stage & Context

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

Descriptions

Overview

> Final curve was derived from a linear regression.
>
> System capacity was derived from the number of adults in Catamaran brook. Specifically, the number of adult Atlantic salmon entering Catamaran Brook annually was estimated using the Peterson method (cite). This includes marking upstream migrants then recapturing post-spawned adults at the counting-fence during the same 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: Adult Atlantic Salmon fish passage/abundance is positively correlated with maximum discharge during upstream migration

Function Derivation

> Observational data. Final curve derived from linear regression.

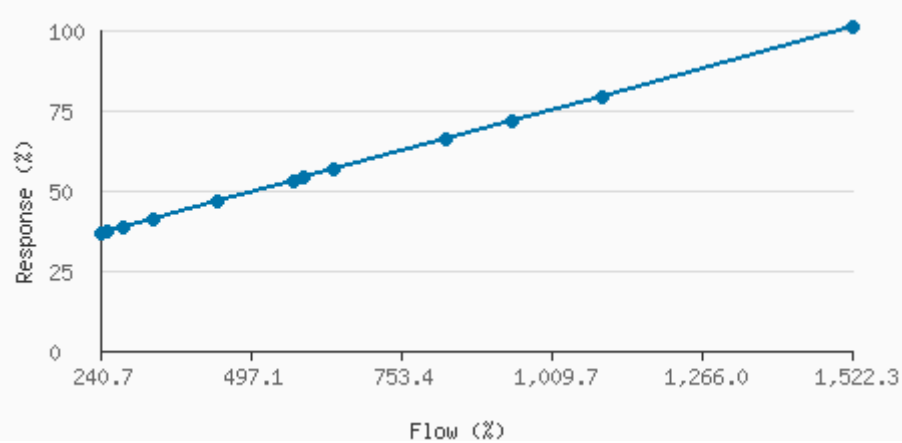
Transferability of Function

> Appropriate for winter stream flow impacts on Atlantic Salmon spawners. 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
240.7384615	36.5669231	0	0	100
251.2461538	37.0923077	0	0	100
280.1384615	38.5369231	0	0	100
329.7076923	41.0153846	0	0	100
440.8307692	46.5715385	0	0	100
571.6461538	53.1123077	0	0	100
586.0769231	53.8338462	0	0	100
639.6615385	56.5130769	0	0	100
830.5538462	66.0576923	0	0	100
943.1384615	71.6869231	0	0	100
1096.107692	79.3353846	0	0	100
1522.323077	100.6461539	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.