# Mean Annual Discharge and Atlantic Salmon

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Function Updated by leah.egeryhaley on Tue, 06/23/2026 - 18:26.

## 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:** Smolt
**Geography:** Catamaran Brook, NB, Canada
**Season:** Winter

## Descriptions

### Overview

> Final curve was derived from a linear regression.
>
> System capacity was derived from smolt totals. This data was gathered using a fish-counting fence near the stream mouth to enumerate the smolts emigrating in the spring. Atlantic salmon smolts are typically age 3 when emigrating.
> 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: Total Atlantic salmon smolt outmigration in Catamaran Brook is positively associated with higher average winter discharge.

### Function Derivation

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

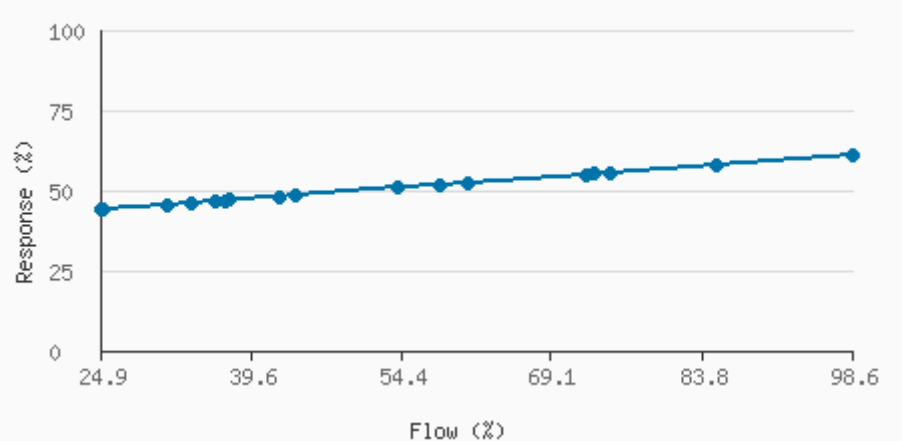
### Transferability of Function

> Appropriate for winter stream flow impacts on Atlantic Salmon smolt. 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 |
|---|---|---|---|---|
| 24.91769231 | 43.9710692 | 0 | 0 | 100 |
| 25.26738462 | 44.0514985 | 0 | 0 | 100 |
| 31.50723077 | 45.4866631 | 0 | 0 | 100 |
| 33.78138462 | 46.0097185 | 0 | 0 | 100 |
| 36.19030769 | 46.5637708 | 0 | 0 | 100 |
| 37.26046154 | 46.8099062 | 0 | 0 | 100 |
| 37.62738462 | 46.8942985 | 0 | 0 | 100 |
| 42.44338462 | 48.0019785 | 0 | 0 | 100 |
| 44.09461538 | 48.3817615 | 0 | 0 | 100 |
| 54.08276923 | 50.6790369 | 0 | 0 | 100 |
| 58.12476923 | 51.6086969 | 0 | 0 | 100 |
| 60.88615385 | 52.2438154 | 0 | 0 | 100 |
| 72.52969231 | 54.9218292 | 0 | 0 | 100 |
| 73.246 | 55.08658 | 0 | 0 | 100 |
| 74.80861538 | 55.4459815 | 0 | 0 | 100 |
| 85.37307692 | 57.8758077 | 0 | 0 | 100 |
| 98.56138462 | 60.9091185 | 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.