

**Recruitment of Brown Trout in the South Branch of the Au Sable River, Michigan in  
Relation to Stream Flow and Winter Severity**

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*Abstract.*-We monitored brown trout *Salmo trutta* populations at four 0.5-0.7 hectare sampling stations in the South Branch of the Au Sable River for 16 years between 1974 and 1993. We used linear regression analysis to search for empirical relationships between recruitment (annual abundance of age-0 brown trout) and measures of stream flow (for example, discharge during spawning, incubation, and emergence periods) and winter severity (for example, number of days air temperature was below -10 C, 20 C, 25 C, or 30 C). We found recruitment was inversely related to mean daily flows during specific 30-day periods in the spring, the dates of which varied slightly between stations. The period giving the best statistical fit to recruitment was 6 April to 5 May for the station farthest downstream ( $r^2 = 0.82$ ), and 13 April to 12 May for the other stations. These periods seem to correspond well with the estimated times fry would enter the free-feeding stage of development. Year class strength appeared affected by both the pattern and magnitude of discharge during the 30-day periods, perhaps because multiple peaks in discharge were more likely to impact more fry during a vulnerable stage of development. We could not find statistically significant relationships between recruitment and stream flow during other periods of the year, including brown trout spawning and egg incubation periods (mid-September through March). We did not find a statistically significant relationship between recruitment and any measure of winter severity.