

Abstract

Inter-annual variation in recruitment (R) of many fish stocks is generally large (e.g. two orders of magnitude). One of many competing hypotheses proposed to explain this variation addresses how maternal factors, operating at the stock and individual level of female spawners, can propagate to R through variation in female number, size, age, and condition, egg size, fecundity, spawning experience and spawning time. In this thesis I address the influence of these maternal factors on recruitment in a comparative manner using Icelandic summer- (ISS) and Scotia-Fundy summer- and autumn-spawning (SFS) herring (*Clupea harengus*). The results show that spawning of ISS herring consists of one primary and contracted spawning wave although recruit spawners spawn, on average, 17 days later than repeat spawners. In contrast, SFS herring spawning appears to consist of several indistinct and protracted spawning waves. A twofold range in egg weight was observed for both stocks where 20% of the variation could be explained by spawner size. Total egg production (E) in each stock, estimated annually over several decades, using established fecundity relations that incorporated total length and body condition of spawners was not affected by atresia. When constrained to the repeat spawners, Generalized Linear Models showed E best explained R at age-3 for ISS herring. In contrast, Generalized Additive Models showed neither stock-related variables nor environmental variables were of significance in explaining variation in R at age-3 for SFS herring. However, in relation to the latter, an observed relationship between E (constrained to repeat spawners) and a larval abundance index, suggests that maternal effects on recruitment potential realized at the larval stage are not realized in R. Estimates of E derived from recruit spawners did not help explain variation in the larval abundance index for SFS herring nor in R for ISS herring. These findings appear to be related to the smaller egg size (both stocks) and the later spawning (ISS herring) of recruit spawners. It is concluded that maternal factors influence recruitment potential in herring and help provide better estimates of reproductive potential than those provided by spawning stock biomass.