This paper provides useful insights concerning the application of modeling to the study of recruitment to the adult stock in fish populations. This recruitment depends on both environmental conditions and the dynamics of juvenile fish cohorts. These dynamics can be quite complicated and involve the size structure of the cohort. Two types of models, \( i \)-state distribution models (e.g. partial differential equations) and \( i \)-state configuration models (computer simulation models following many different individuals simultaneously), have been developed to study this question. These two model types have been used extensively to deal with problems involving the size structure of populations but have not been previously compared in detail. Analytical solutions of three partial differential equation models of early life-history fish cohorts are compared with equivalent individual-by-individual computer simulation models. These two approaches can produce similar results, which suggests that one may be able to use the approaches interchangeably under many circumstances. The addition of simple uncorrelated stochasticity in daily growth in the individual-by-individual models produces results that do not deviate significantly from the pure deterministic cases. However, when the stochasticity is temporally correlated, the results may differ greatly.