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We propose and investigate a discrete-time predator-prey model with a structured predator population. We describe the predator population using two stages, juveniles, and adults and assume that only the adult stage consumes the prey species. The unit of time is taken to be the maturation period so that all juveniles mature after one time unit. Meanwhile, prey population growth, in the absence of an adult predator, is assumed to follow the Beverton-Holt nonlinearity. For this model, we discuss conditions for the existence and global stability of the extinction and predator-free equilibria as well as conditions for the existence and uniqueness of an interior equilibrium. We also find the conditions for the persistence of both prey and predator. Finally, we use numerical simulation to demonstrate various dynamical scenarios. (Received September 15, 2019)