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Use of life history information in a population model for Sacramento green sturgeon

Article in *Environmental Biology of Fishes* 79(3):315-337 · January 2007

DOI: 10.1007/s10641-006-9145-x



1st [Raymond C. Beamesderfer](#)



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Abstract

We review the available life history information on green sturgeon and develop a simple population model to inform interpretations of status and threats in the Sacramento River and throughout their range. A review of general life history information provides a context for interpretation of model results that are based on population parameters specific to the Sacramento River and inferences from other populations where Sacramento data are lacking. The simple life table model consisted of an age-specific schedule of demographic parameters including average length, weight, natural mortality, fishing mortality, sex ratio, and maturity that are used to project age-specific population size, biomass, fecundity, harvest, and yield for any given level of recruitment. While model assumptions of constant recruitment, population equilibrium, stable size and age structure, and a lack of density dependence are rarely met, the model provided useful descriptions of a hypothetical green sturgeon population based on current estimates of demographic parameters. The data available for Sacramento green sturgeon included young-of-year from juvenile salmon migrant traps in the river, pump salvage samples of juveniles from the Sacramento–San Joaquin delta, San Pablo Bay trammel net samples dominated by subadults, and Colusa River commercial fishery landings of subadults and adults. Life table results indicate that green sturgeon are vulnerable to salvage pumps for one or two years of age and that fishery slot limits of 117 cm to 183 cm include 14 years of vulnerability on average. Subadults that rear primarily in bay and ocean habitats would comprise the majority (63%) of an equilibrium population with adults only 12% of average numbers and only a fraction of the spawning each year. Population fecundity, which is the total number of eggs based on female number, size,

individual fecundity, peaks around age 24 when all females have matured. The sensitivity of sturgeon to increasing mortality is highlighted by abrupt declines in numbers, reproductive potential, and potential yield in hypothetical life table analyses. This review and modeling exercise identified significant research needs for sturgeon and supports a precautionary approach in conservation and management in the face of uncertain assessments of status and risk.

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"... range of reported values for *A. oxyrinchus* and other sturgeon species (Dadswell, 1979; Beamesderfer et al., 2007; Kahnle et al., 2007). Research on Gulf sturgeon (also *A. oxyrinchus*) predicted that an annual morta..."

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"...997), 5 -Atlantic sturgeon (Brown and Murphy 2010), 6 -green sturgeon (*A. medirostris*; **Beamesderfer et al. 2007**), 7 -lake sturgeon (*A. fulvescens*; Bruch 2008), 8 -European sturgeon (*A. ...*"

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"...populations, adults comprise a small part of the total population (Jaric et al., 2010). **Beamesderfer et al. (2007)** estimated adult green sturgeon *Acipenser medirostris* in the Sacramento River comprised only 12% of ..."

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