# Age, Growth, Fecundity, Abundance, and Passage of Alabama Shad in the Apalachicola, Chattahoochee, and Flint River System

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*Abstract:* Alabama shad (*Alosa alabamae*) populations are thought to be in decline partly due to blockage of spawning migration routes. We examined the Alabama shad population in the Apalachicola River below Jim Woodruff Lock and Dam with the objectives of determining abundance, age structure, growth, and the feasibility of passing this species from the Apalachicola River into the Flint and Chattahoochee River systems. Population estimates were conducted from 2005 to 2009 using mark−recapture techniques. Population estimates averaged from a low of 2,767 (95% C.I $\pm$ 838−5,031) in 2006 to a high of 25,935 (95% C.I. $\pm$ 17,715−39,535) in 2005. A strong ($P = 0.17$, $R^2 = 0.9268$) relationship between electrofishing catch per unit effort (CPUE) and the population estimate of Alabama shad was determined. Two fish locking cycles (lockages) were performed each day (between 0800–1600 hours) (1 AM cycle and 1 PM cycle) during the study period. Passage estimates averaged from a low of 25% (95% C.I $\pm$ 0%−67%) in 2006 to a high of 41% (95% C.I $\pm$ 26%−57%) in 2007. An attractant flow was utilized to lure shad into the lock during 2006 and 2007. An attractant flow efficiency of 50% (95% C.I $\pm$ 0%−100%) and 63% (95% C.I $\pm$ 49%−78%) were observed in 2006 and 2007 respectively. Ages of Alabama shad ranged from 1–4 years. All sampled spawning males were between 1 and 3 years old whereas females were 2–4 years of age. Age distributions from this study differed from those of previous studies for both males and females. Female Alabama shad, on average, were found to be larger than males at age 2 and age 3. Growth of male and female Alabama shad is best described by the equations: $L_t = 359.6 \left[1 - \mathrm{e}^{-2.1712(t - 0.3757)}\right]$ and $L_t = 389.5 \left[1 - \mathrm{e}^{-2.3193(t - 0.6424)}\right]$. Mean back-calculated lengths were similar to those of observed values for males and females. Alabama shad demonstrated a positive correlation of length to fecundity, with fecundity estimates ranging from 26,095 to 208,494 eggs per female. Fecundity estimates appeared similar to other studies from the Apalachicola River. Variations in fecundity estimates may be contributed to partial spawning. Gonadosomatic indices of female shad ranged from 3.6–24.0.

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