Bowfin
Age and Growth in the Chowan Drainage

The bowfin *Amia calva* has been called a living relic. It is the sole surviving species from the order Amiiformes, family Amiidae. Native to the Coastal Plain of Virginia, its distribution includes the Blackwater (Chowan) and Nottoway Rivers. Very little is known about wild populations of bowfin in Virginia. Ages up to 9 years have been found in the wild; however, much older individuals have been held in captivity.

In 2007, biologists with the Virginia Department of Game and Inland Fisheries, sought to determine age, growth and sex ratios of the bowfin in the Nottoway and Blackwater Rivers in southeastern Virginia. Total length (mm) and weight (g) information along with sagittal otoliths (sagittae, Figure 1) were collected from Blackwater (N=57) and Nottoway River (N = 60) bowfin. Sex and sexual maturity was also noted for each fish.

Figure 1. Picture of an otolith taken from the bowfin viewed at 10x magnification.

Electrofishing catch rates of bowfin have varied widely over the past several years (Table 1). This led to the discussion of possible causes of such high variability. Water temperature, flow, time of year during which samples were taken were all discussed. It was determined that there was no age data; therefore no determination could be made on year class strength. Filling in the data gaps with bowfin age and growth data was the next step.

Table 1. Electrofishing catch rates of Nottoway and Blackwater River bowfin.

Nottoway		Blackwater	
2007	N = 60	2007	N = 54
2006 – 17 f/hr	N = 57	2006	
2005 – 44 f/hr		2005 – 31 f/hr	N = 90
1996	N = 19	1996	
1994 – 3 f/hr	N = 2	1994 – 14 f/hr	N = 7
1993 – 20 f/hr	N = 89	1993 – 23 f/hr	N = 76
1992 – 16 f/hr	N = 126	1992	

Bowfin length-weight relationships followed a tight exponential growth pattern (Figures 2 & 3). All sampling was conducted in late summer (July). No young-of-year fish were seen and few fish less than 400 mm TL were collected. Bowfin grew at similar rates between the two rivers (Figure 4). Fish as old as 9 years were collected on the Blackwater River and as old as 8 years on the Nottoway River. No bowfin younger than 3 years were collected in any sample. Bowfin seem to slow their growth at about 600 mm TL with a maximum total length of around 700 mm.

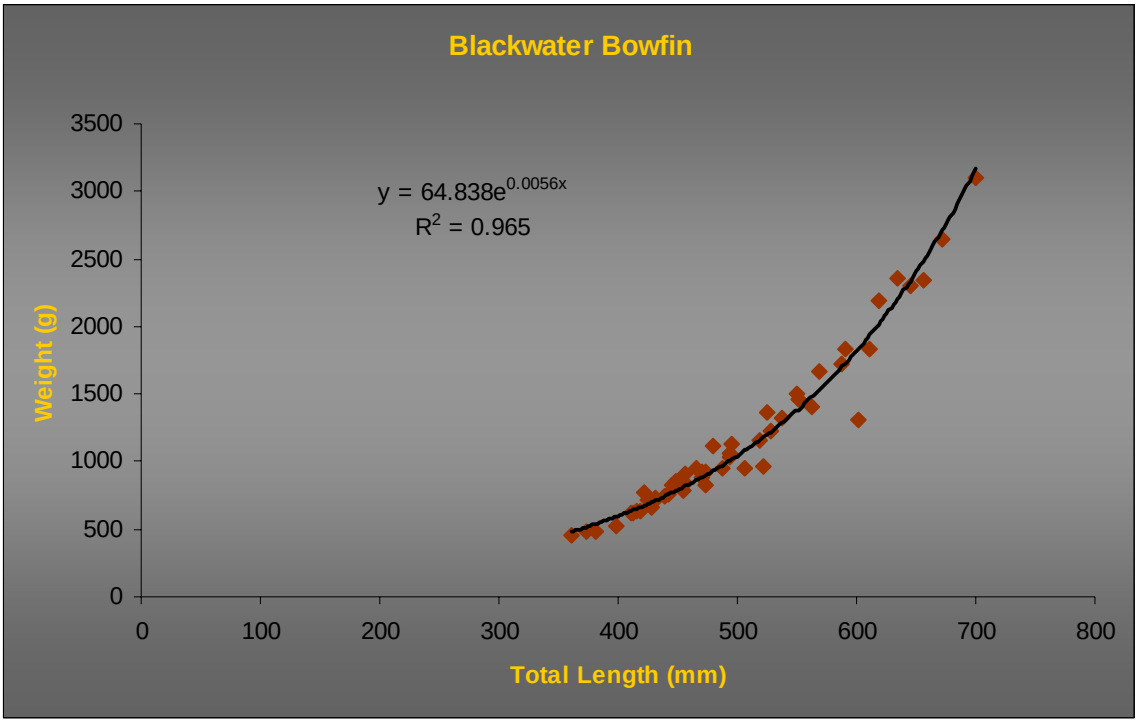
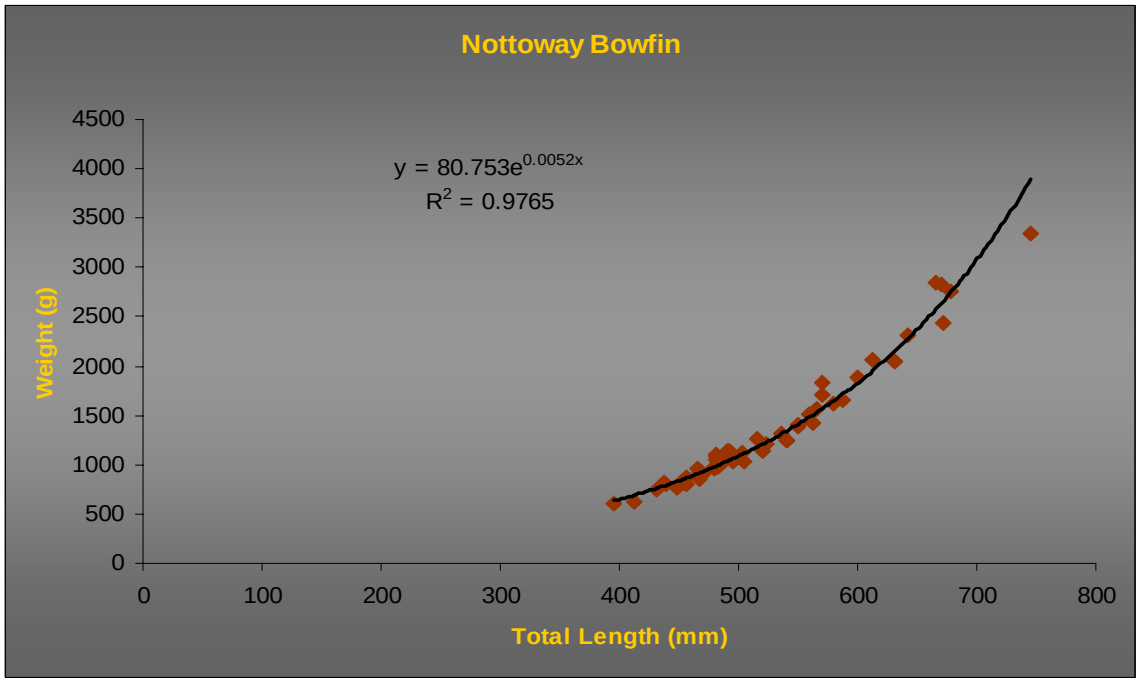


Figure 2. Blackwater River bowfin length-weight relationships



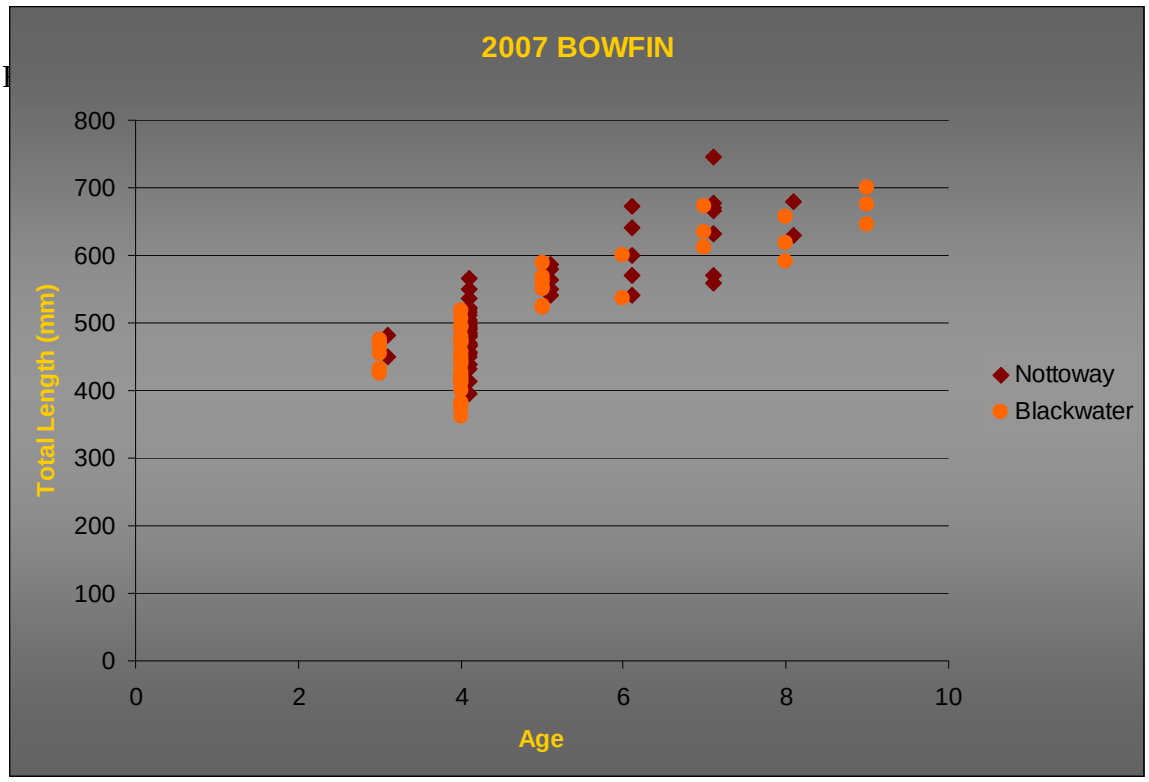


Figure 4. Length at age of Nottoway and Blackwater River bowfin.

Year class strength was highest on the Nottoway in 2003. Spawning success (determined by number of individuals collected from each age class) was average or below average for 1998 – 2002 and 2004 (Figure 5). The Blackwater River followed a similar pattern of year class strength. 2003 was a banner year in terms of spawning success, while the all other years were average or below average (Figure 6).

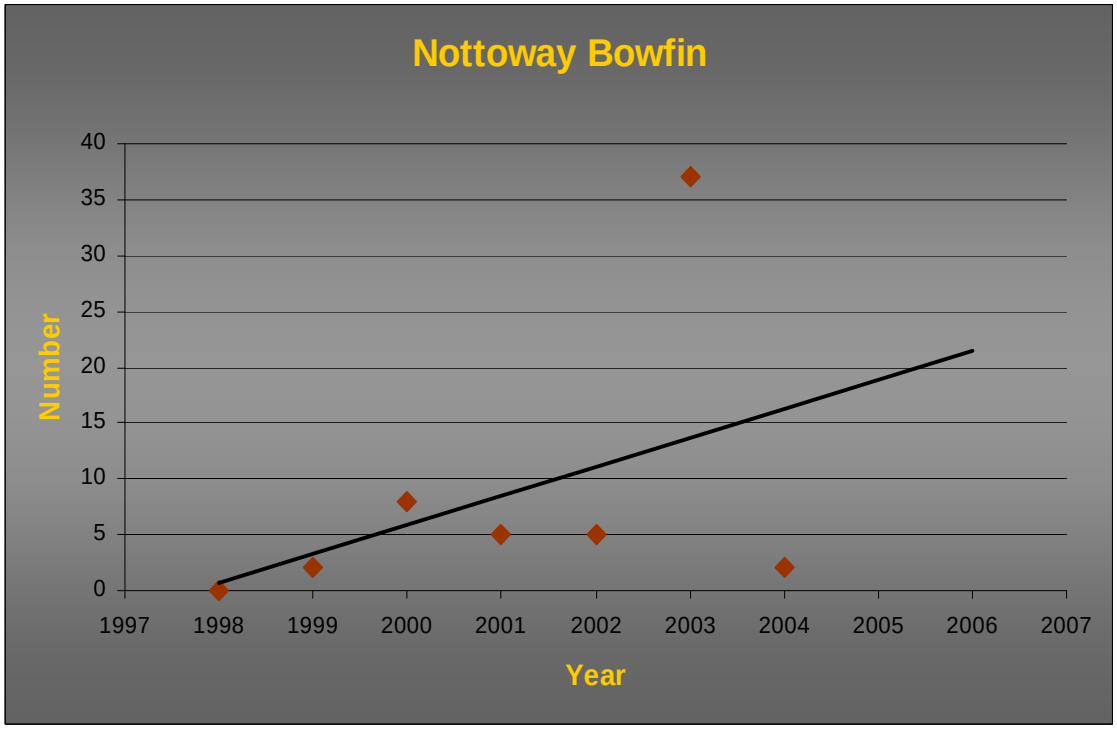


Figure 5. Nottoway River bowfin year class strength.

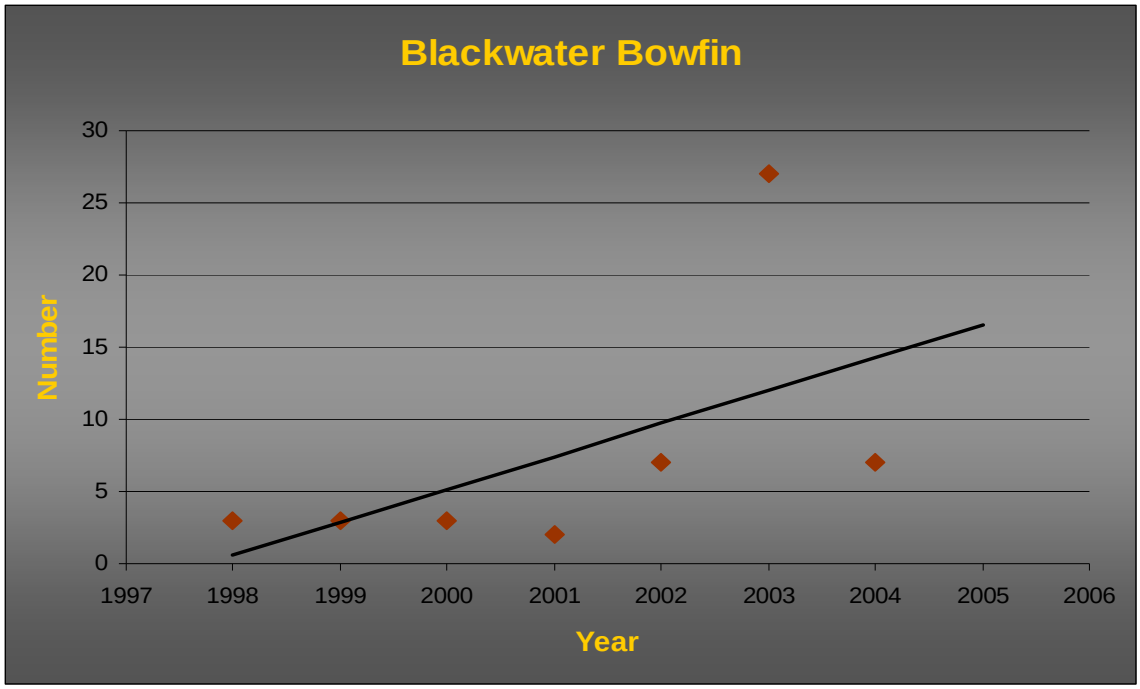


Figure 6. Blackwater River bowfin year class strength.

Sex ratios on the Nottoway River were significantly different from the Blackwater River. Male-female ratios were close to 50-50 in the Nottoway; however, there were more female bowfin than male bowfin collected in the Blackwater (Figure 7). Nottoway female bowfin were significantly larger than females in the Blackwater. Overall female bowfin were much larger than their male counterparts (Figure 8).

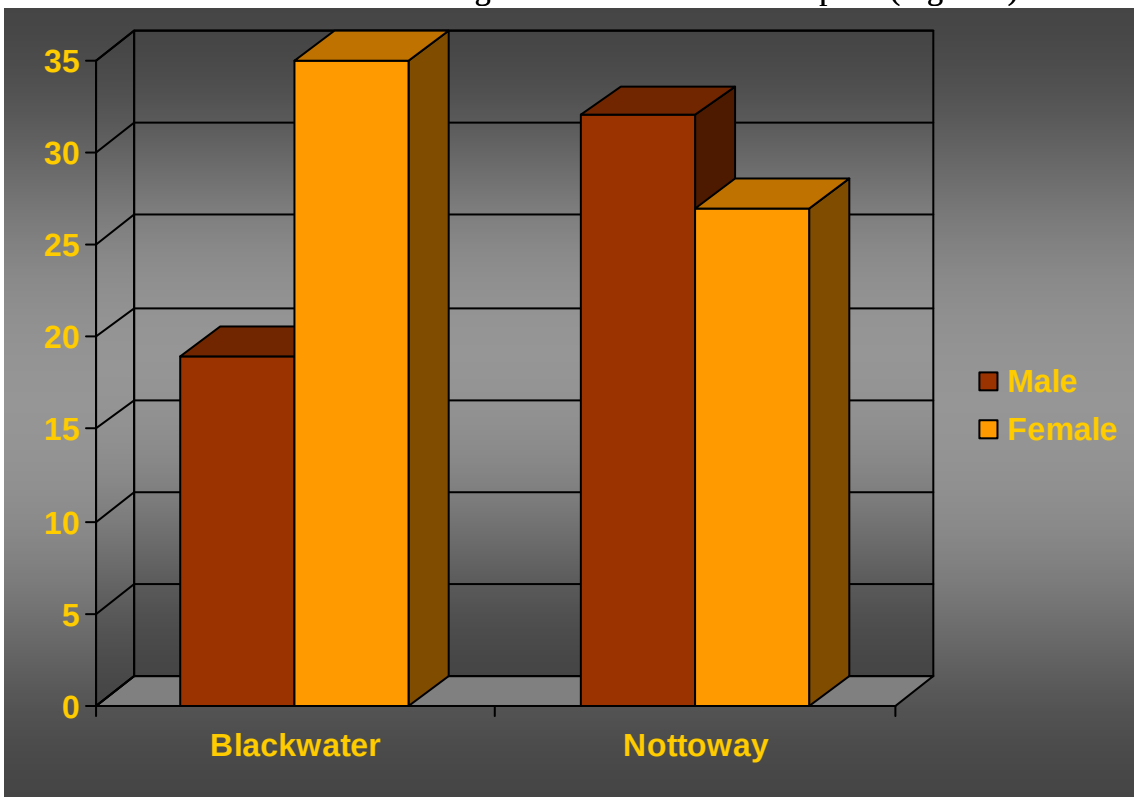


Figure 7. Sex ratios of bowfin in the Nottoway and Blackwater River

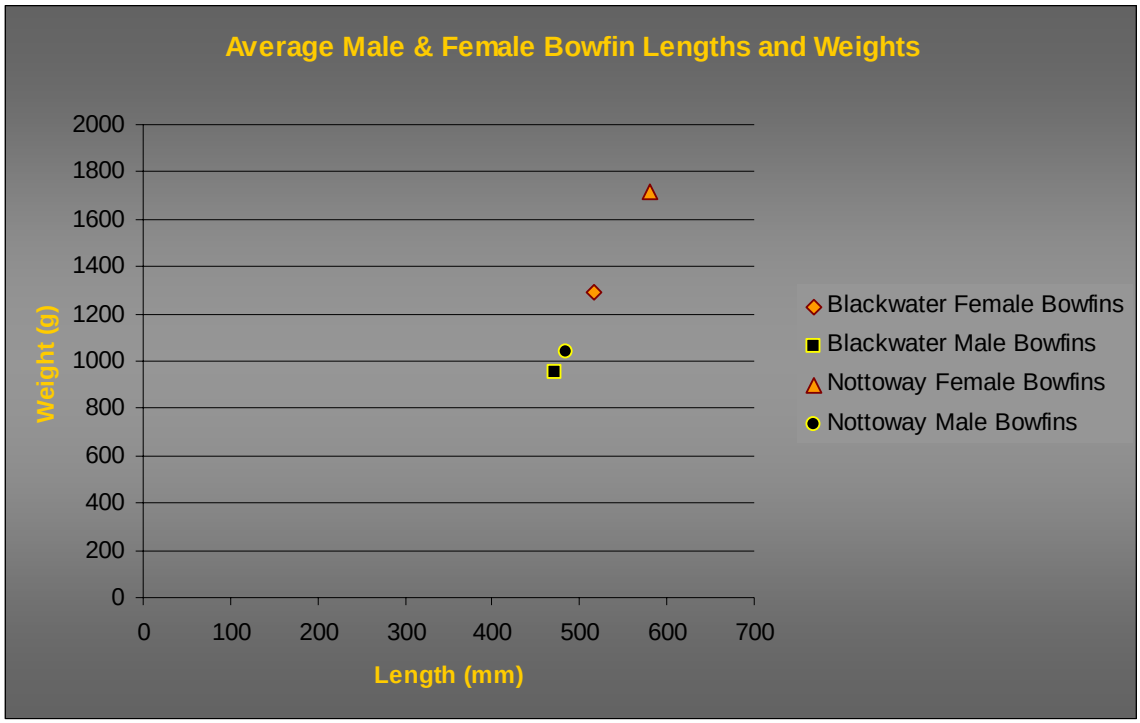


Figure 8. Average lengths and weights of male and female bowfin.

In summary, electrofishing catch rates of bowfin will probably remain very variable. However, age data (from otoliths) is a viable way to collect year class strength information that may help explain that variability. Biologists need to collect more bowfin less than 400 mm TL (or 3 years). Older age classes (> 7 years) also need to be collected in future sampling efforts. Blackwater and Nottoway River bowfin, grow fast (500 mm or 20 inches by age 4) compared to other top predators such as largemouth bass. Female bowfin are on average larger than their male counterparts. Year class strength was similar between the two rivers; 2003 was a very successful year, all other years were average or below.