

Effects of a Minimum Length Limit on Bluegill and Largemouth Bass Size Structure

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Introduction

- Ridge Lake is a 5-hectare impoundment in central Illinois
- In 2005, a 200-mm (8-inch) minimum length limit and 10 fish per day bag limit for bluegill was established
- No harvest regulations for bluegill existed prior to 2005
- Establishment of a minimum length limit was expected to increase the size structure of bluegill, with possible effects on largemouth bass size structure due to predator-prey interactions

Objective

- To determine whether the minimum length limit for bluegill significantly altered total length (TL), size structure, catch-per-unit-effort (CPUE), or harvest of bluegill and largemouth bass in Ridge Lake

Methods

- Data from a mandatory creel survey was used for TL and harvest records
- Effort was determined by recording the number of anglers, duration of fishing, and the species targeted for every boat on the lake
- Proportional size density (PSD) was calculated to summarize size structure
- Stock and quality sizes were 80 and 150 mm for bluegill and 200 and 380 mm for largemouth bass, respectively
- Size structure and harvest statistics were compared between the period before (1999-2004) and the period after (2006-2012) the bluegill minimum length limit using a two-sample t-test



Results

- Mean bluegill TL decreased significantly from 185 mm before to 170 mm after the length limit ($t=22.18$, $p<0.00005$, Figure 1)
- Mean bass TL increased significantly from 282 mm before to 305 mm after the length limit ($t=-16.9$, $p<0.00005$, Figure 2)
- Mean bluegill PSD decreased as mean bass PSD increased after the establishment of the length limit (Figure 3)
- Mean CPUE for bluegill did not change significantly ($t=-1.39$, $p=0.3557$)
- Mean CPUE for bass decreased from 1.7 before to 1.1 after the length limit ($t=-3.97$, $p=0.0031$)
- Mean number of harvested bluegill decreased significantly from 274 per year to 71 per year ($t=-2.19$, $p=0.0482$, Figure 4)

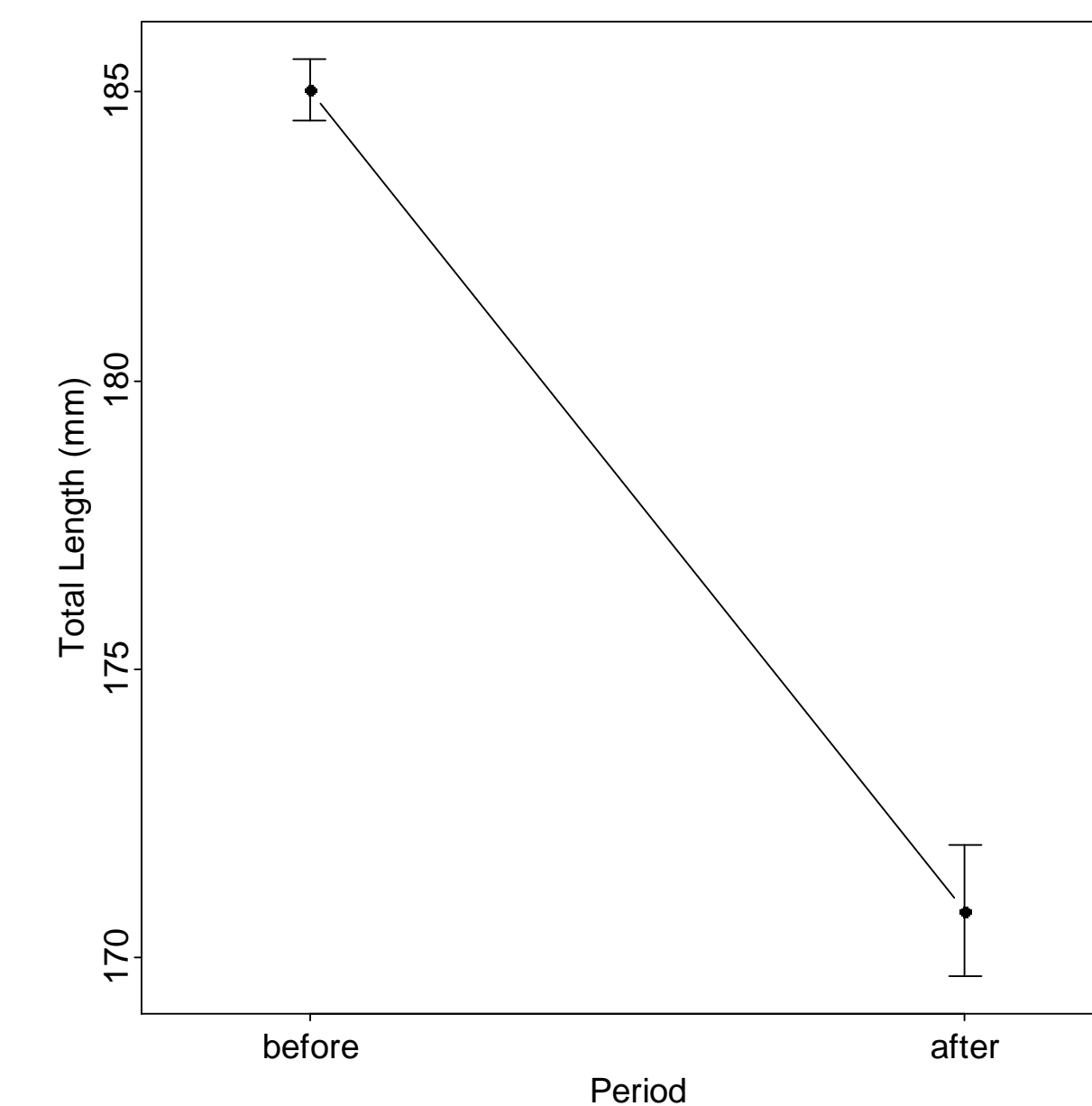


Figure 1. Mean total length of bluegill before and after the establishment of a 200-mm minimum length limit

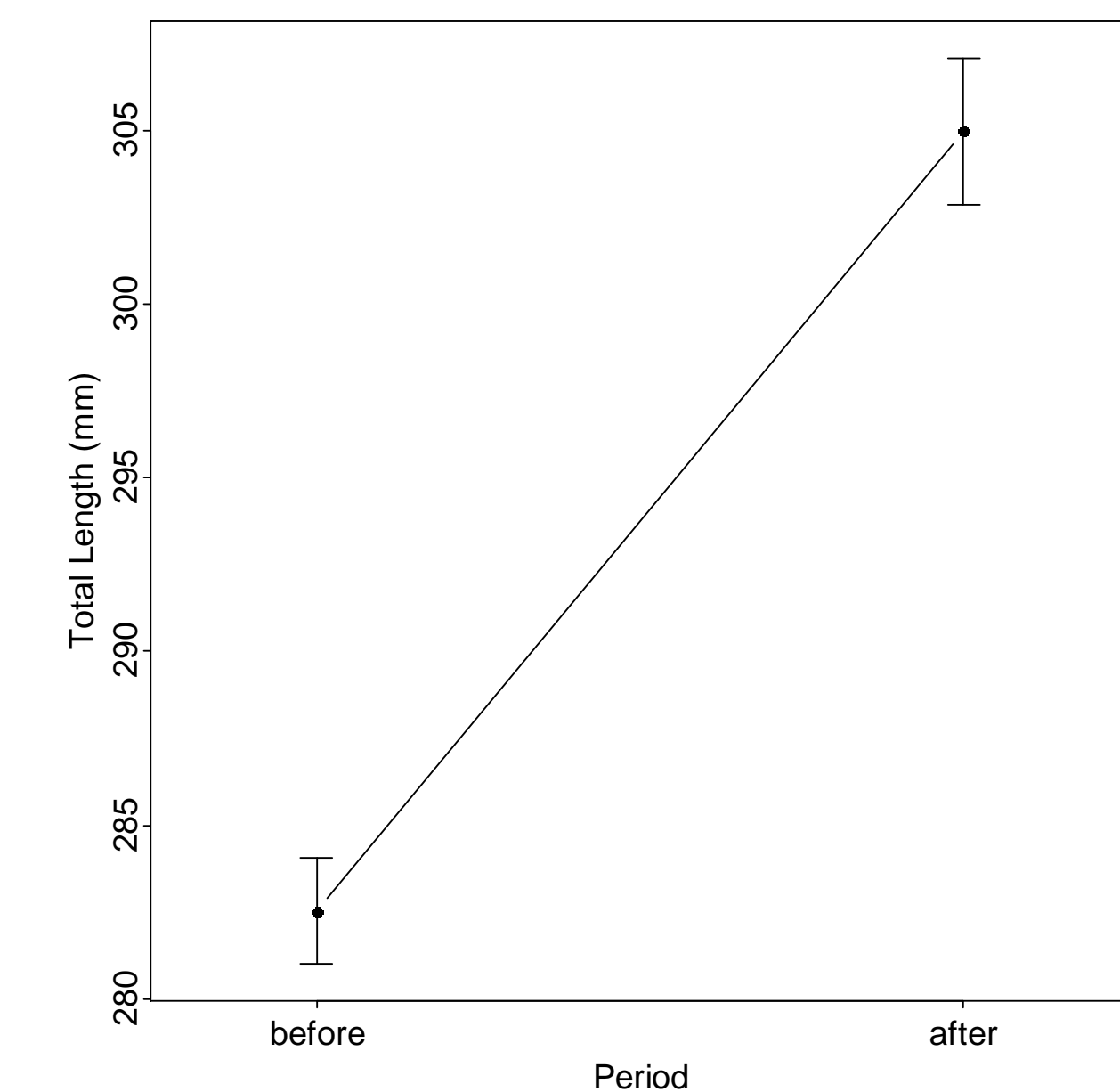


Figure 2. Mean total length of largemouth bass before and after the establishment of a 200-mm minimum length limit

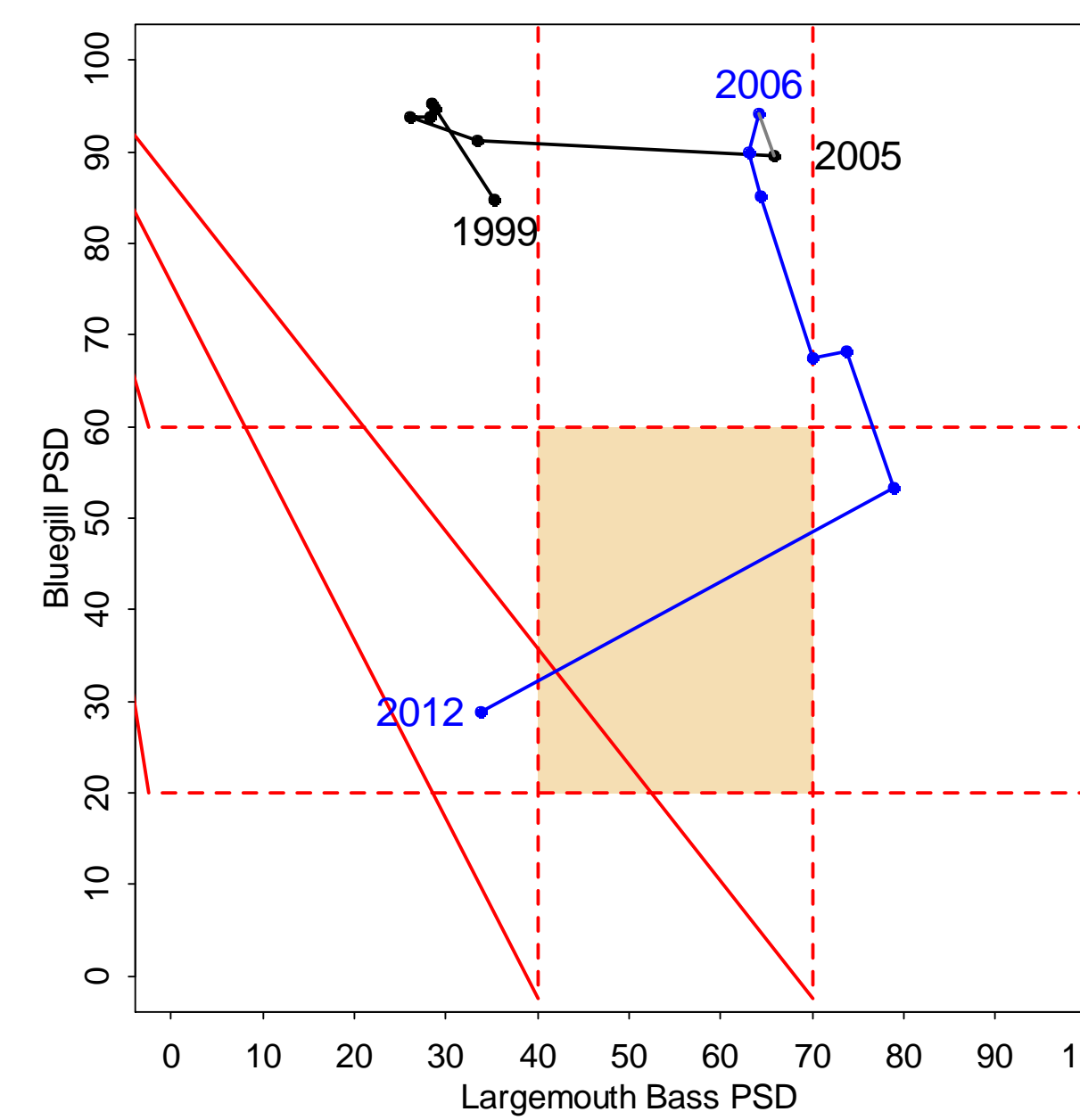


Figure 3. PSD of bluegill and largemouth bass from 1999-2012

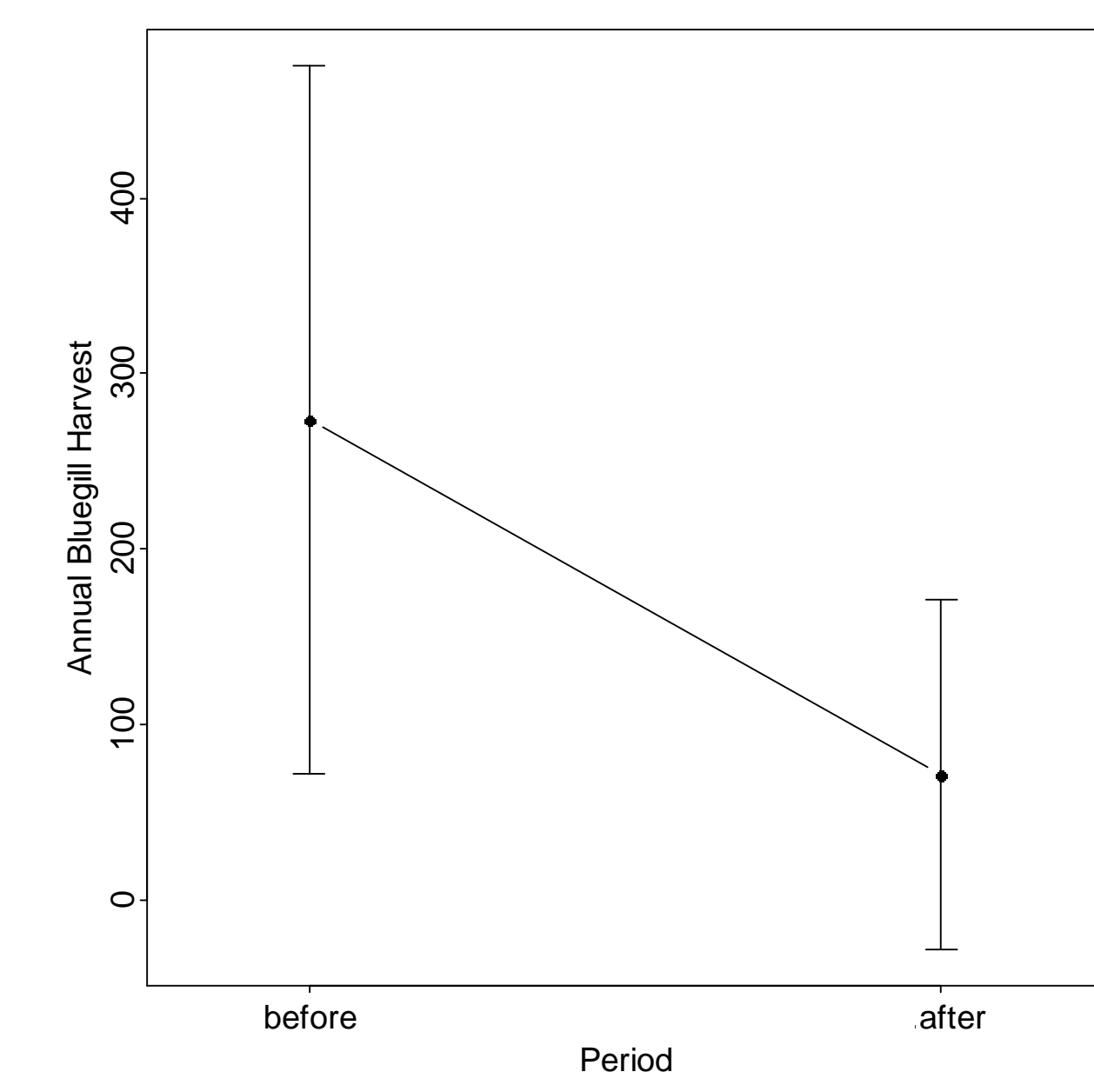


Figure 4. Mean number of bluegill harvested annually before and after the establishment of a 200-mm length limit

Conclusions

- The establishment of a 200-mm minimum length limit decreased the mean TL and PSD of bluegill but increased the mean TL and PSD of largemouth bass
- Reduced harvest of bluegill may have decreased bluegill size structure as a result of slower growth
- The high density of small bluegill after the length limit was enacted likely provided a larger forage base for bass, resulting in the increase in bass size structure