

Spring 2019

Introduction:

JadEco, LLC was contacted to collect data on the fishery for Willow Lake located in Freeport, IL to determine if the fishery is improving since the previous survey in 2016. DC Electroshocking was conducted throughout the lake on May 9, 2019 during the day. Air temperature was 50°F and water temperature was 52°F. Water clarity was 18 inches. Fish population data was collected for a total of 30 minutes utilizing DC electrofishing equipment. A total of 323 fish were collected with 9 species being represented. Data analysis consisted of catch per unit effort per species and total catch per unit effort. This provides information on the fish population density, and potential trends in the fishery. PSD's (proportional stock density) were also calculated on important game species to assist with understanding the size structure within the lake. The last metric analyzed was the relative weight (Wr). This metric provides information on length to weight relationships to better understand if your game fish are relatively fat, or relatively thin and potential changes in the predator / prey relationships and available forage. The data was then compared to the spring 2016 collection and the data provided by the 2006 Fall IDNR report.

Summary of Fisheries Data:

A total of 323 fish were collected during the 2019 survey. There were 9 different species represented with four species being represented by undesirable species (carp, buffalo, grass carp, and green sunfish). Game species present consisted of largemouth bass, bluegill, black crappie, muskie and channel catfish. Common carp were well represented in the survey with 86 fish collected. Largemouth bass have greatly improved since the 2016 survey with better representation of multiple year classes. In particular, the larger size classes were well represented. Bluegill continue to be represented by a smaller, possibly stunted population.

Black crappie were collected again in 2019, but at much lower numbers than in 2016. The sizes collected were between 5 and 9 inches.

Carp consisted of nearly 13% of the total collection in 2016 and 10% of the 2006 collection and nearly 27% in 2019. The per unit effort was at 0.63 fish / minute in 2016 and 0.6 fish / minute in 2006 and over 2.8 fish per minute in 2019. This catch rate is substantially higher than the recommended goals at .25 fish per minute. Along with the carp, we also collected several big buffalo over 28" long.

In 2016, the catch per unit effort for largemouth bass, the main predator for your fishery, was lower than the collection rate in 2006 and well under our objectives of 1-2.5 fish per minute. The collection in 2006 was 0.73 fish / minute while the collection in 2016 was at 0.33 fish / minute and 2019 was approaching our goal at



0.90 fish per minute. A goal for your fishery would be to have a collection rate between 1 and 2.5 fish / minute. In comparing the condition of the bass, they were consistent with average relative weights at 100 in 2016 and 102 in 2006 and dropped to 95 in 2019. While this relative weight is at the lower end of the objective range, it is still acceptable.

Largemouth Bass:

When evaluating the fish population, we utilize a metric known as proportional stock density or "PSD". This metric analyzes the size structure within the population. The proportion of fish greater than quality size (12") divided by the number of fish greater than stock size (8") provides the PSD value. A desired PSD range for Largemouth bass is a value from 40 to 70. The PSD for largemouth bass collected at Willow Lake is above our objective at 80. Along with this, the RSD14 value (the proportion of fish greater than 14 inches divided by the number of fish greater than 8 inches) was at 76. A desired RSD14 range for Largemouth bass is 10 to 20. The larger bass are well represented in the survey, but we are still missing the smaller year classes.

We collected largemouth bass from 6" to nearly 19.4" during the survey, with an average size of 14.8". The average relative weights (Wr) for largemouth bass fell within the objective range at 95 (Range 90-110).

Bluegill:

The CPUE for bluegill was at 4.47 fish per minute (up from 2.29 fish per minute in 2016), which is within the objective range. Bluegills ranging from 2.2" to 8.3" were collected with the average size at 3.9". In 2019, 64% of the bluegill collection was between 4" and 4.9" in length.

The PSD for bluegill at Willow Lake was at 1, which is lower than the objective between 20 and 60. One bluegill were collected over 8" in the survey. The RSD7 value for bluegill (the number of fish larger than 7" divided by the number of fish 3" and larger) is at 1. The desirable range for RSD7 would be between 5 to 20. This would indicate that the bluegill biomass consists of a proportionally lower number of larger bluegill biomass desired by anglers. The majority of bluegill collected were in the 4.1"-4.9" range. The average relative weight for bluegill was at 102 (up from 88 in 2016). This indicates those fish are fairly plump and therefore, grow well. This increase may be due to the decrease in crappie observed, and thus less competition for forage.

Black Crappie:

We collected a low number of crappie in 2019 (4) compared to very high number of crappie (112) during the 2016 survey. Crappie collected in 2019 ranged from 5.7" to over 9" with an average at 6.7". The catch per unit effort for crappie was 0.13



(down from 2.24 fish per minute in 2016). The 2016 survey would indicate that the crappie were over populated and stunted. Willow Lake appeared to have this condition in 2016. In 2019, the crappie numbers were much lower. It is possible that the timing of the survey impacted the difference, or the higher number of bigger bass are controlling the crappie numbers.

Of the crappie collected in 2019, their relative weights were very low (average 80) and under our objective. Therefore, I anticipate the high numbers of crappie are still present and were under represented in the survey due to lower water temperature.

The size breakdown of the crappie collected indicated several year classes of successful spawn and recruitment. While the upcoming crappie fishing at Willow Lake should be very good, it is important to control the crappie fishery through harvest. The harvesting of crappie should continue to be allowed.

Other Species:

One grass carp was collected at 38". Along with the grass carp, buffalo and common carp were collected. The common carp comprise nearly 27% of the total collection at Willow Lake with a catch per unit effort of 2.87 fish per minute. This is much higher than the objective goals of less than 0.25 fish per minute. Carp are a non-native invasive species for Willow Lake, and by all indications, have been an issue for quite some time (collection rates for 2006 and 2016 remained consistent, but were much higher in 2019). The concern for carp and your fishery is that they root up native vegetation, create turbidity with suspended solids in the water due to the bottom feeding behavior of the species, they predate on game fish nests, and can limit reproduction of important game species, and they compete for food and space with preferred game species. These issues, along with the catch rate observed, indicate the need for Willow Lake to perform carp removal efforts. This high carp density may be impacting largemouth spawning. Carp collected were between 15.8" and 24.8" with an average size at 18.6". The three buffalo captured were between 28.1" and 31.9" with an average length of 29.4". Green sunfish were collected at a rate of 1.8 fish per minute with a total of 54 fish collected. They ranged in size from 1.9" to 4.2" with an average length at 2.9".

Other gamefish collected were channel catfish and muskie. Two muskie between 10.7" and 12.4" were collected. Channel catfish were collected at a rate of 0.4 fish per minute with 12 collected. They ranged in size from 13.6" to 16.2" If catfish have not been stocked in the past couple years, it is likely they are naturally spawning and recruiting. The relative weights for the channel catfish were low with an average at 88 (under our objective range).



Recommendations:

The following is a list of recommendations on how to improve the fishery at Willow Lake. The recommendations are in a priority order.

Creel Limits

- Continue to maintain creel limits to allow unlimited harvest of crappie at any size.
- Largemouth bass should be catch and release only until the population indicates an increase in size.
- Carp should be catch and remove, never release.

Carp Removal

Carp removal should be a big effort by the community annually; either through angling, bowfishing, tournaments, etc, or removal by electrofishing or commercial netting. Willow Lake has a limited biomass of fish it can carry. This is called 'carrying capacity' and currently a large portion of the biomass is in common carp. By removing the carp, you improve spawning and recruitment success of your game fish, improve water clarity, and improve fish habitat. This should be a priority for Willow Lake until electrofishing surveys indicate a catch rate closer to 0.25 fish per minute.

Black Crappie

Even with the lower collection of crappie, I feel the black crappie fishery needs to be controlled through angling pressure. Due to the low relative weight of the fish collected, I anticipate biomass and competition to be high. The high biomass of crappie create competition for limited food and space by other desired game species as well. By removing the crappie, you will observe larger crappie being caught while fishing as well as improvements in recruitment and growth by other important game species like bass and bluegill. If angling pressure isn't enough to reduce the population, commercial netting may provide the needed results.

Habitat Enhancement:

The number one thing that can improve the bass fishery is improving habitat for young of the year survival and ambush for larger bass hunting grounds. The less energy a largemouth bass has to use to catch forage, and the bigger the forage base (or 'food packet') the more the bass can put into growth and less energy into hunting. On the same lines, young fish need to have a place they can evade predation and feed and grow as well. Strategic placement of quality structure throughout the lake will improve the fishery. Care should be taken to ensure any structures placed are placed safely for any other uses such as swimming.

Many fishing clubs do collections for Christmas trees in the winter to be placed with concrete blocks. While these are a good effort, small structures like this are not



going to greatly impact the fishery as a whole. Placement of larger cribs, and brush are the best option. Other artificial materials can also be used to build fish structures for both shallow and deep water. I can assist you with this design and placement if needed. With plans in place to work on dredging Willow Lake, structure placement should be documented.

Along with structure, native aquatic plants greatly benefit your lake. Not only the fishery through cover and foraging but also water quality. Native plants utilize nutrients, stabilize soils, and provide oxygen needed by living organisms. By reducing the carp population, native plants have a better opportunity to establish. If they don't establish on their own, selective plantings would be important. If or when plants begin to establish, be prepared to develop a plant management plan as you may begin receiving complaints by the membership. Educational efforts will be needed to inform your members of the many benefits of aquatic plants, and how to coexist with them.

Stocking:

I don't normally recommend stocking largemouth bass, but bass recruitment still appears to be low. There were only two fish collected under 6" in length. Continue stocking 4" to 6" largemouth bass to bolster the bass numbers at Willow Lake. Stock up to 300 largemouth bass annually until bass recruitment improves.

Consistent with the 2016 report, if catfish have not been stocked in the past couple of years, you may be getting natural recruitment from catfish spawning. With the low density of bass, this may be happening. However, if you are stocking, you will need to continue periodic stocking to ensure no gaps in age class. Channel catfish grow quickly, and they are relatively inexpensive to stock and should be stocked at a minimum size of 8"-10". This size range has better survival because they bass will not be foraging on them. A density of about 10 fish per acre stocked annually (or every two years) should provide angling opportunities. Generally, catfish can be purchased for about .90 cents per fish.

Stocking is always subjective to budgetary constraints, and all recommendations may not be able to be met. Stocking recommendations should always be re-evaluated based on subsequent fish population sampling. If budgetary constraints are a problem, stocking every other year may be an option, keeping in mind limited year-class strength and size gaps in the fish that anglers are catching.



Table 1: Catch Per Unit Effort (CPUE) by species

Species:	Number		Fish/Minute		Objective (fish/min)
	2019	'16	2019	'16	
Largemouth Bass:	27	25	0.90	0.33	1.0 – 2.5
Bluegill:	134	172	4.47	2.29	2.0 – 4.5
Black Crappie:	4	112	0.13	2.24	-----
Channel Catfish:	12	8	0.40	0.11	-----
Muskie:	2	--	0.07	--	-----
Common Carp:	86	47	2.87	0.63	Below 0.25
Buffalo:	3	--	0.10	--	-----
Green Sunfish:	54	10	1.8	0.13	-----
Grass Carp:	1	--	0.03	--	-----
Total CPUE	323	374	10.77	4.99	6.00 plus

Table 2: Proportional Stock Density (PSD)

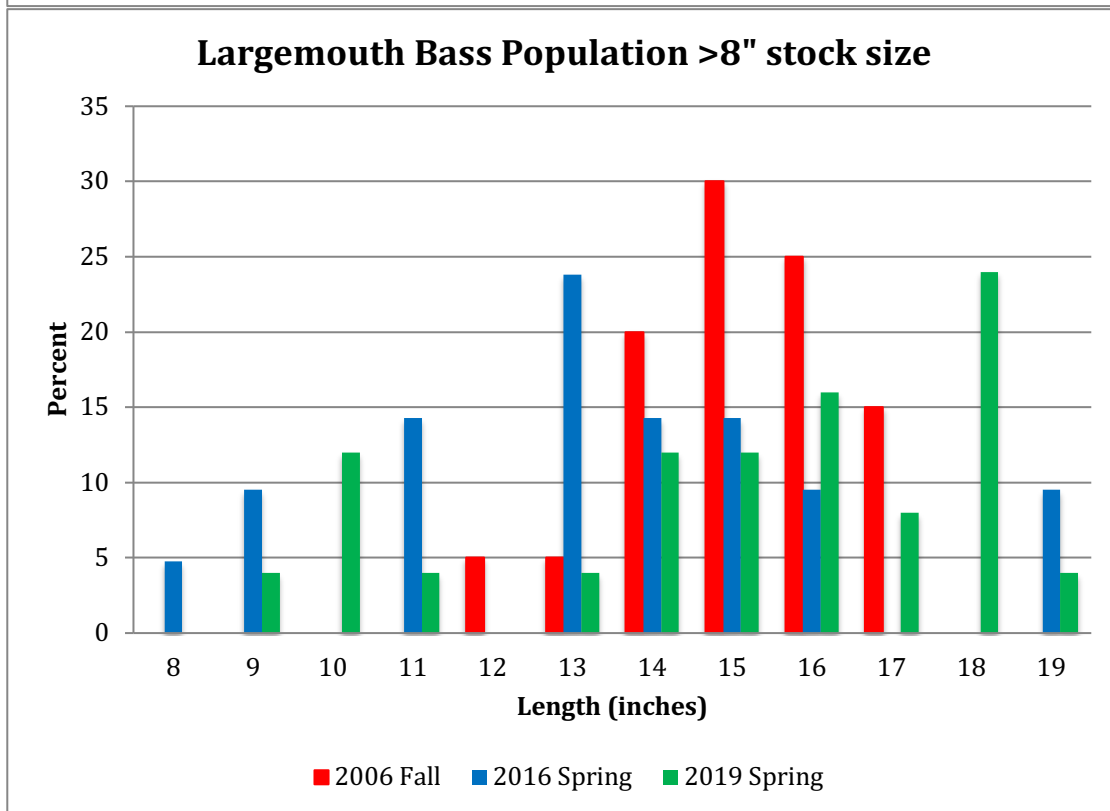
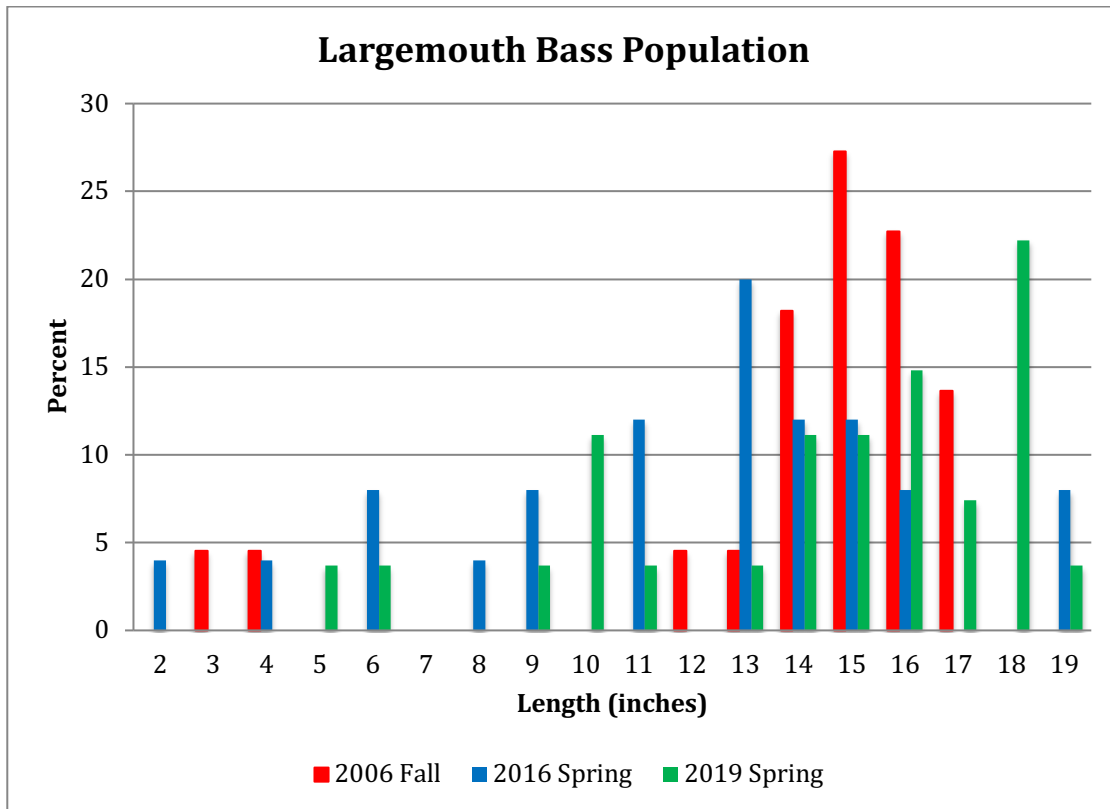
Species:	PSD		Objective
	2019	'16	
Largemouth Bass:	80	71	40-70
Bluegill:	1	4	20-60

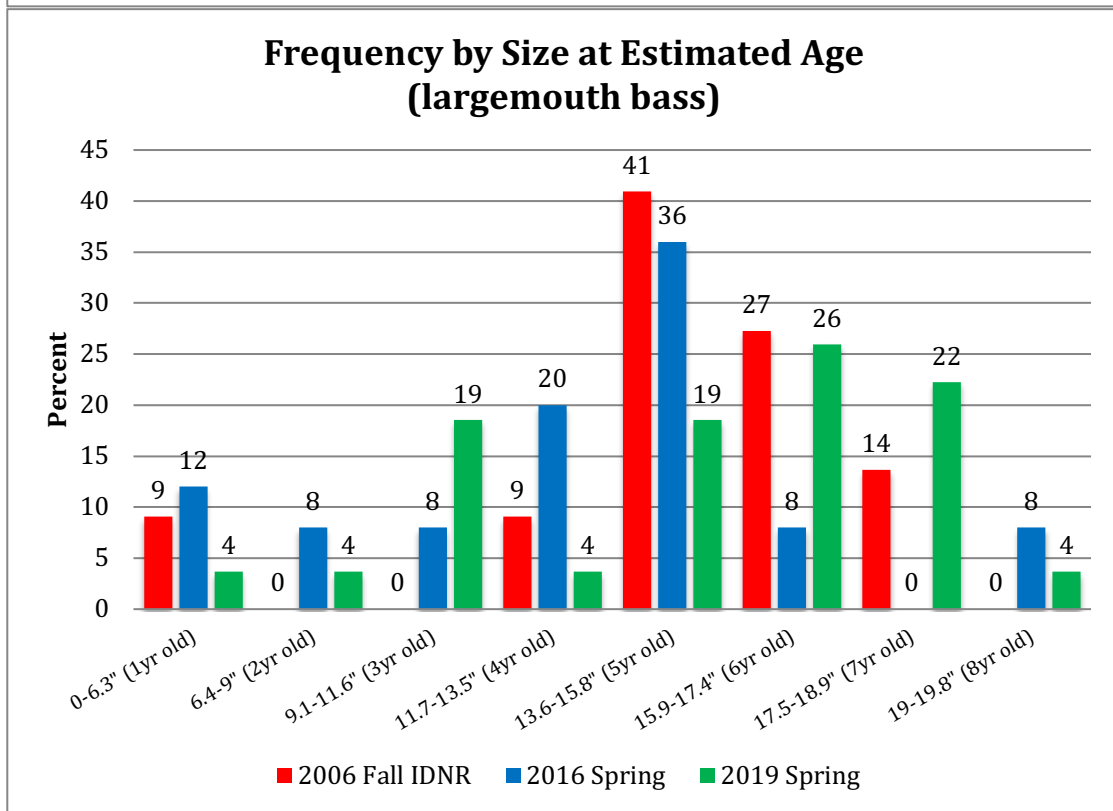
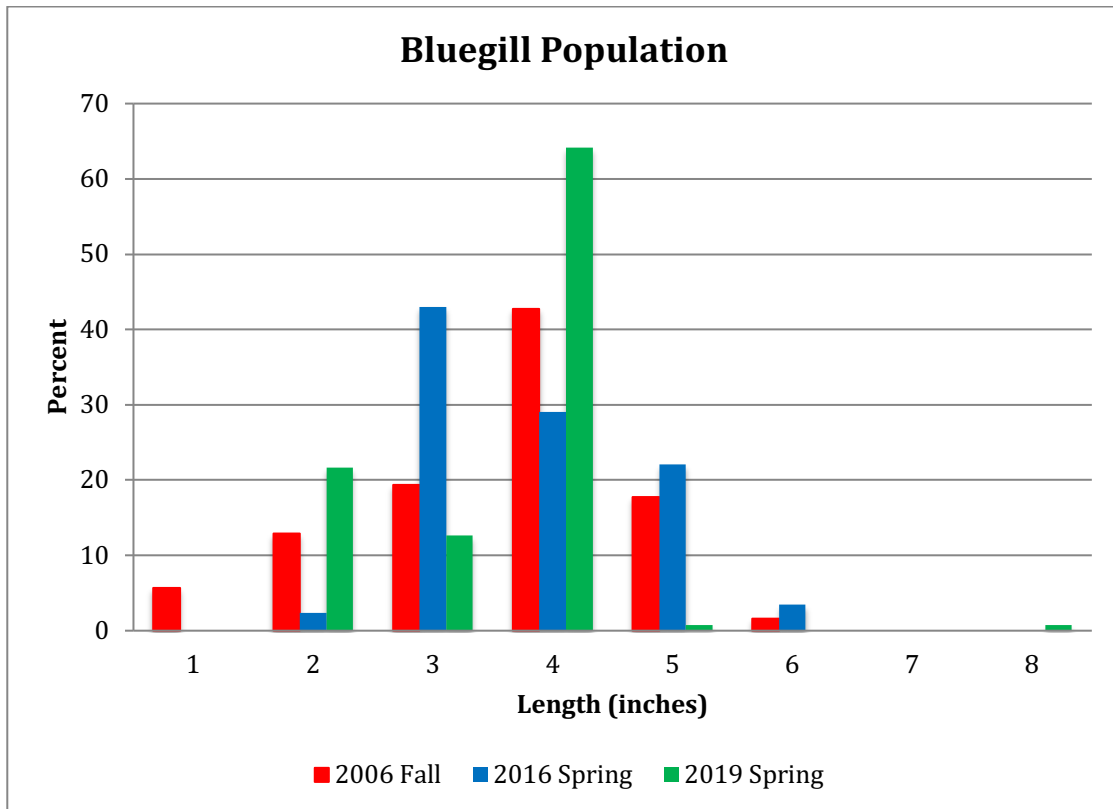
Table 3: Relative Weight (Wr)

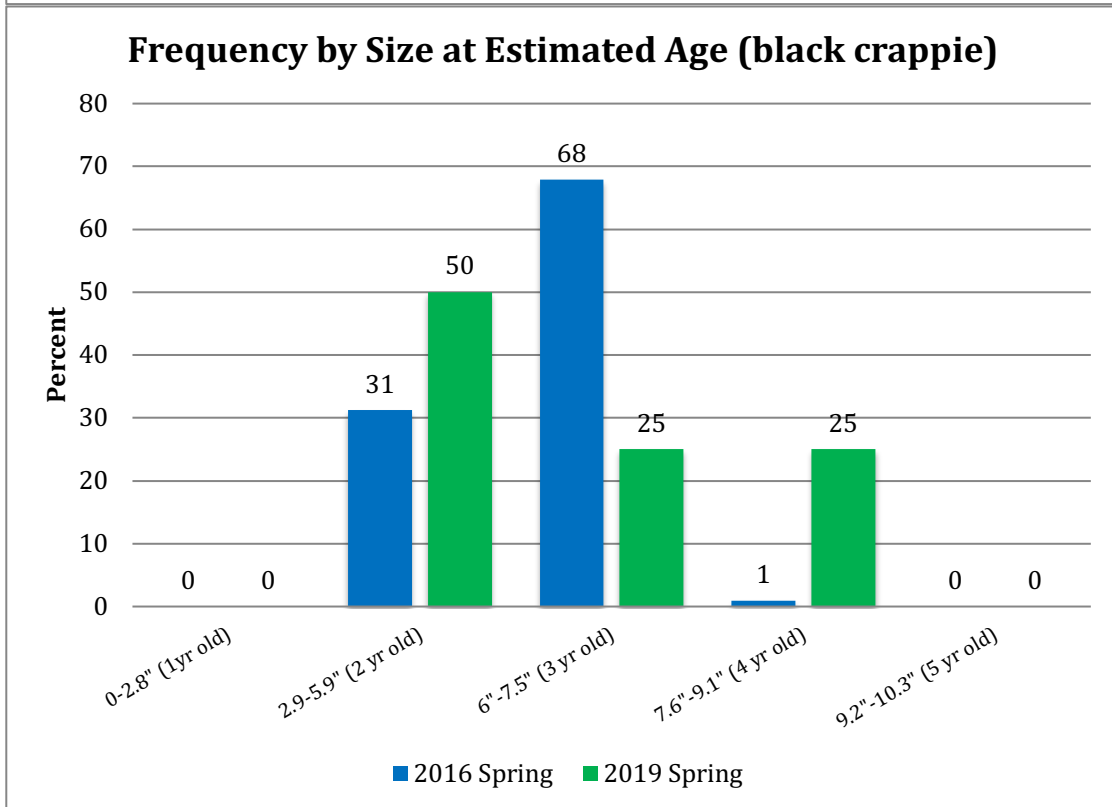
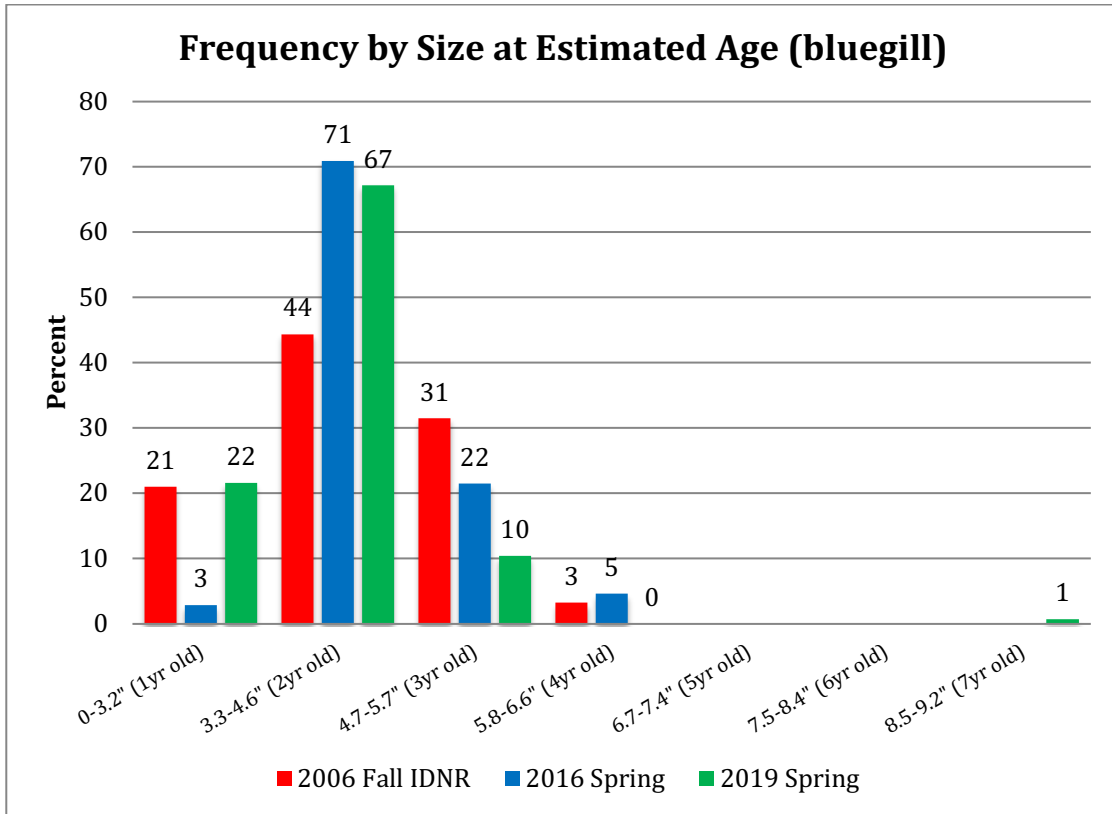
Species:	Wr (Ave)		Range		Objective
	2019	'16	2019	'16	
Largemouth Bass:	95	101	80-108	(81-118)	90-110
Bluegill:	102	88	73-159	(65 – 105)	90-110
Black Crappie:	80	93	62-93	(72 – 121)	90-110
Channel Catfish:	88	94	76-97	(86 – 123)	90-110

Table 4: Length Ranges by Species

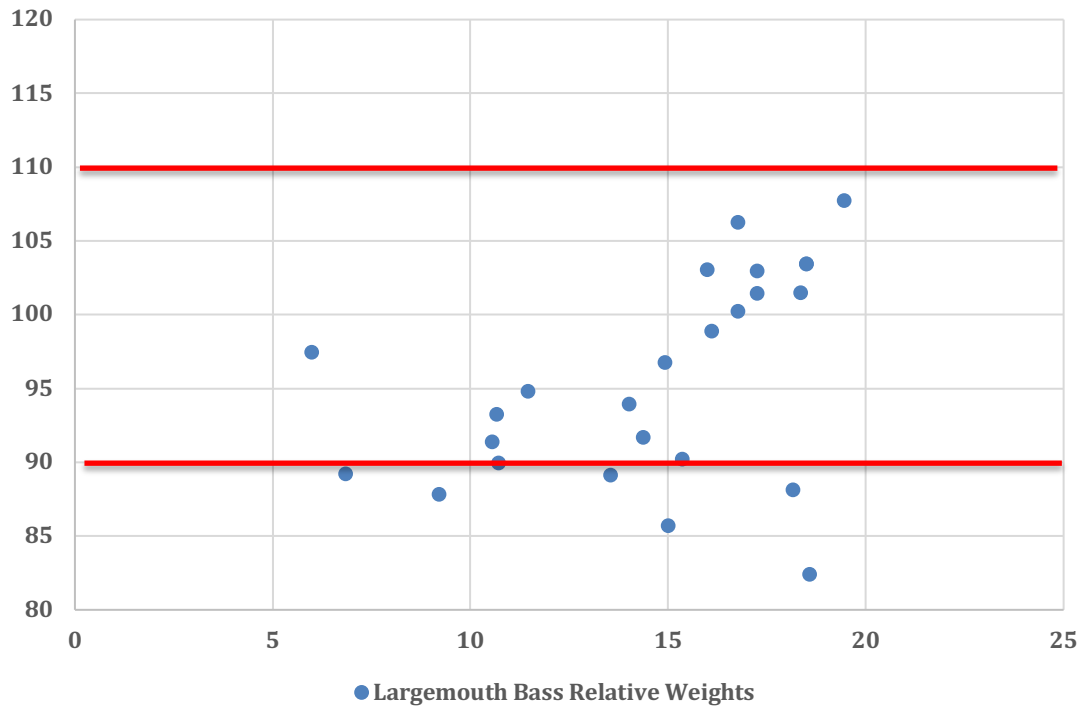
Species:	Length:		Average	
	2019	'16	2019	'16
Largemouth Bass:	6.0"-19.4"	2.9" – 19.9"	14.8"	12.6"
Bluegill:	2.2"-8.3"	2.6" – 6.1"	3.9"	4.3"
Black Crappie:	5.7"-9.0"	5.3" – 8.9"	6.7"	6.2"
Channel Catfish:	13.6"-26.1"	9.1" – 18.9"	16.2"	14.1"
Muskie:	10.7"-12.4"	----	11.5"	---
Common Carp:	15.8"-24.8"	15.9" – 22.6"	18.6"	18.8"
Buffalo:	28.1"-31.9"	----	29.4"	---
Green Sunfish:	1.9"-4.2"	2.8" – 6.5"	2.9"	4.9"
Grass Carp:	38.0"	----	38.0"	---







Largemouth Relative Weights



Bluegill Relative Weights

