

Largemouth and smallmouth bass (LMB and SMB) have a complex life history in which males of both species are entirely responsible for building nests, courting females for spawning, and then once fertilized eggs are in their nests, solely providing extended parental care of the resulting offspring for another **4-6 weeks post-fertilization** (Ridgeway 1988). That parental care includes fanning the eggs until they hatch to keep them in contact with oxygenated water, as well as protecting the eggs, hatched larvae, and free-swimming fry from being consumed by brood predators like perch and sunfish. Uninterrupted parental care during development is imperative for offspring survival (Suski et al 2003). If a male abandons (or is removed from) his nest during this parental care period, brood predators will quickly consume the offspring with upwards of 50% being eaten within the first 8-10 minutes of the male's absence (Stein and Philipp 2013). In situations where anglers catch and harvest nesting bass, rapid predation of the entire brood is always the end result.

To protect black bass reproductive success in many areas across the province, the Ontario Ministry of Natural Resources decades ago instituted a seasonal closure of fishing for nesting LMB and SMB during the spawning season. Currently, for Charleston Lake and many of the other popular black bass fishing lakes in the province, that closed season is defined as the period from December 16th until the third Saturday in June. That regulation specifically prohibits the use of angling tactics that would hook nesting male bass. The fact that it is legal during this period to fish for other species such as northern pike, walleye, yellow perch, various trout species, as well as all centrarchid species other than LMB and SMB, however, complicates compliance with and enforcement of that regulation. Unfortunately, some anglers use this "loophole" in the regulation to (illegally) target, catch, and release nesting male bass, thereby rendering this regulation ineffective at accomplishing its objective of protecting LMB and SMB reproductive success and recruitment (the annual production of the next year class). In addition, even though catch-and-release angling can theoretically allow an angled nesting male the opportunity to return to his nest and resume guarding his brood, that often is not the case.

Traditional thinking among most anglers (as well as among most fisheries managers) has been that reproductive success and annual recruitment among LMB and SMB populations is determined primarily by environmental factors. Furthermore, that traditional thinking also believes that because each female bass can lay thousands of eggs, it only takes a few successful spawning pairs to re-populate the lake. As a result, angling nesting male bass is thought not be a major concern for the health of the LMB and SMB populations, because that angling should not affect overall recruitment in the lake (Einhouse et al 2002, Jackson et al 2015). Our working hypothesis differs from that traditional thinking, stating instead that although black bass reproduction and recruitment are indeed affected by environmental variables, any reduction in reproductive success (e.g., via angling nesting males off their nests) results in reduced annual recruitment as well.

Two recent papers together confirmed the validity of our working hypothesis, at least as it pertains to black bass populations in southern Ontario. First, Philipp et al (2023a) in a 27-year long-term study confirmed that annual recruitment was directly correlated with reproductive success. Second, Philipp et al (2023b) showed that when angling for nesting bass was eliminated during the springtime in a lake in southern Ontario (Opinicon Lake), as a result of the COVID pandemic, annual recruitment in 2020 and 2021 was the greatest since we began monitoring it back in 1990. That was in stark contrast to annual recruitment levels in the years immediately prior to COVID (2018-2019) and after it (2022-2024). Even though angling during the summers of 2020 and 2021 was at least as high as in “normal” years, this whole lake no fishing period just during the nesting season demonstrated the negative impacts of such “preseason” angling on black bass populations.

In response, our research group established an OMNR-sanction research project in two test lakes (Opinicon and Charleston) to test the effectiveness of Bass Spawning Sanctuaries (BaSSs), areas of a lake that are closed to all fishing, but only during the bass reproductive period (April 15 – first week in July). This study is a BACI (Before and After Control Impact Study) design wherein data on mating, nesting, reproductive success, and recruitment, as well

as actual angling pressure on nesting male bass were collected from areas of inside and outside the BaSSs both before and after the sanctuaries were activated. Our hypothesis would predict that the level of angling would decrease inside the sanctuaries, but not outside them. As a result, that change in angling pressure would result in an observed decrease in hook wounding, as well as a concomitant increases in nesting success (% of nests where the male guarded his brood until the fry were independent, i.e., able to avoid predators and survive in the absence of the male guardian), reproductive success (the number of surviving independent fry, and recruitment (the number of 1+ age individuals observed the next summer).

The following is an abbreviated description of what we have found over the first few years of the study, the years prior to the implementation of the BaSSs (2022-23) and the year after the BaSSs were established (>2024). We are showing the data only for LMB in Opinicon, where they represent >90% of the black bass population and only for SMB in Charleston, where they represent >95% of the black bass population:

COMPLIANCE: Prior to implementation of the BaSSs, the level of pre-season angling pressure on nesting bass in both years was very high in both the areas that were to become the BaSSs and the control areas that were not. It also demonstrated that the outside and inside BaSS sites were comparable, and, therefore, useful for the BACI design experiment.

<u>Hook Wounding % of nesting males:</u>	OPINICON		CHARLESTON	
	<u>Inside</u>	<u>Outside</u>	<u>Inside</u>	<u>Outside</u>
Prior to BaSSs	2022:	53% 51%	61%	57%
	2023:	51% 47%	48%	52%
	AVE:	52% 49%	55%	54%
During BaSSs	2024:	9% 43%	13%	64%
	2025:	11% 46%	15%	70%
	AVE:	10% 45%	14%	67%

Summary of Impact: Compliance, even in the first year of BaSS implementation (with less than one month of outreach to inform anglers of the study program), as evidenced by the substantial reduction in hook-wounding, was quite good in both lakes. We expected the compliance to increase in year two as a result of our presence and expanded outreach during Year 1, but, although still quite good, it did not increase in year 2. We attribute this mostly to a printing error in the annual Ontario Fishing Regulations re the dates of the BaSS closures, which indicated an early opening date within the sanctuaries. That error caused a great deal of confusion among anglers as to when the BaSSs were in fact in operation. **It is important to test this with an accurate set of dates within the printed booklet to get a measure of what we can expect compliance levels to reach, and hence, the upper limit of protection provided by the regulation.**

NUMBER OF NESTS: Prior to implementation of the BaSSs, the total number of nests that received eggs in the two areas (controls and future BaSSs) were fairly similar each year and across years, and that did not change after the BaSSs were implemented in 2024.

<u>Number of Nests Built:</u>	OPINICON		CHARLESTON	
	<u>Inside</u>	<u>Outside</u>	<u>Inside</u>	<u>Outside</u>
Prior to BaSSs	2022:	66 77	89 91	
	2023:	97 102	133 83	
	AVE:	81.5 89.5	110 87	
During BaSSs	2024:	79 75	103 89	
	2025:	52 71	131 109	
	AVE:	65.5 73	117 99	

Summary of Impact: The relative constancy of nest numbers indicted that any differences seen in reproductive output was not simply due to changing adult numbers.

NESTING SUCCESS: Prior to implementation of the BaSSs, the nesting success in both the areas (controls and future BaSSs) were equally low...but that changed after BaSS implementation.

<u>% of Males that Raised Broods to Completion:</u>	OPINICON		CHARLESTON	
	<u>Inside</u>	<u>Outside</u>	<u>Inside</u>	<u>Outside</u>
Prior to BaSSs	2022:	27% 23%	29% 25%	
	2023:	25% 35%	33% 40%	
	AVE:	26% 29%	31% 33%	
During BaSSs	2024:	62% 23%	84% 36%	
	2025:	64% 11%	77% 28%	
	AVE:	63% 17%	81% 32%	

Summary of Impact: Nesting success in both lakes increased greatly (more than twofold) inside as compared to outside the BaSSs, but remained very low outside them.

REPRODUCTIVE SUCCESS: Prior to implementation of the BaSSs, the reproductive success in both the areas (controls and future BaSSs) were equally low...but that also changed.

<u>Number of Independent Fry Produced:</u>	OPINICON		CHARLESTON	
	<u>Inside</u>	<u>Outside</u>	<u>Inside</u>	<u>Outside</u>
Prior to BaSSs	2022:	165K 152K	38K 28K	
	2023:	127K 197K	63K 47K	
	AVE:	146K 175K	50K 38K	
During BaSSs	2024:	377K 131K	129K 34K	
	2025:	346K 28K	148K 31K	
	AVE:	362K 79K	139K 33K	

Summary of Impact: Reproductive success increased greatly (almost 3-fold) inside the BaSSs, but remained very low outside them.

RECRUITMENT: Prior to implementation of the BaSSs, the recruitment in both the areas (controls and future BaSSs) were equally low...but that also changed.

<u>Number of 1+ Juveniles:</u>	OPINICON			CHARLESTON	
		<u>Inside</u>	<u>Outside</u>	<u>Inside</u>	<u>Outside</u>
Prior to BaSSs	2022:	19	22	23	13
	2023:	15	21	49	44
	AVE	17	21.5	36	28.5
During BaSSs	2024:	62	6	237	33
	2025:	TBD	TBD	TBD	TBD
	AVE	62	6	237	33

Summary of Impact: Annual recruitment increased greatly inside the BaSSs, but remained very low or even decreased outside them. In fact, for LMB in Opinicon, relative recruitment was over 10X higher inside the BaSSs compared to outside them. Similar results were seen for SMB in Charleston with an over 7-fold difference inside vs outside. We want to stress that these results are preliminary, in that data are only available for the 2024 year class (data collected during snorkel surveys conducted this this summer, 2025). The 2025 year class data await collection in the late summer of 2026.

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