



## Summary of Fishery Surveys Island Chain of Lakes, Rusk County, 2010

WDNR's Fisheries Management Team from Park Falls completed fyke netting and electrofishing surveys in spring 2010 to assess the status of important fish populations in Chain, Clear, Island, and McCann lakes, collectively known as the Island Chain of Lakes. Fyke nets set shortly after the spring thaw targeted walleye, muskellunge, northern pike, and yellow perch. An electrofishing survey on May 25-28, 2010 documented the abundance and size structure of smallmouth bass, largemouth bass, and bluegill populations. Fyke netting in early April and mid June yielded complementary information on black crappie and bluegill. Quality, preferred, and memorable sizes referenced in this summary are based on standard proportions of world record lengths developed for each species by the American Fisheries Society. "Keeper size" is based on known angler behavior.

### Survey Effort

We set 3 to 5 fyke nets at locations selected to intercept spawners in each lake and fished them overnight for two nights in early April and for one night in mid June. With water temperature 71–75 °F, our late May electrofishing survey was well-timed to represent target species during their spawning activities. We sampled 11.2 miles of shoreline in 5.3 hours, including 2.6 miles sub-sampled for panfish.

	Surface Area (acres)	Fyke netting April 1-7, 2010	Electrofishing May 25-28, 2010				Fyke netting June 14-15, 2010
		Net-nights	Gamefish		Panfish		Net-nights
			Miles	Hours	Miles	Hours	
Chain Lake	468	10	3.15	1.40	0.51	0.25	5
Clear Lake	95	6	1.87	0.88	0.51	0.27	3
Island Lake	526	10	4.09	1.87	1.00	0.47	4
McCann Lake	133	8	2.04	1.18	0.53	0.42	4
Combined	1,222	34	11.15	5.33	2.55	1.41	16

### Habitat Characteristics

The Island Chain of Lakes is a recreational impoundment formed by an 11-foot-high concrete dam on Swift Creek, tributary to Fireside Lakes. The Chain's 20 shoreline miles are highly developed with many residences, piers, and rafts. The four lakes share similar habitat conditions (range of maximum depth = 38–74 feet; proportions  $\leq$  3 feet deep = 7–16%), though Chain and Island lakes seem to have more rocky substrate. Moderate concentrations of nutrients rarely

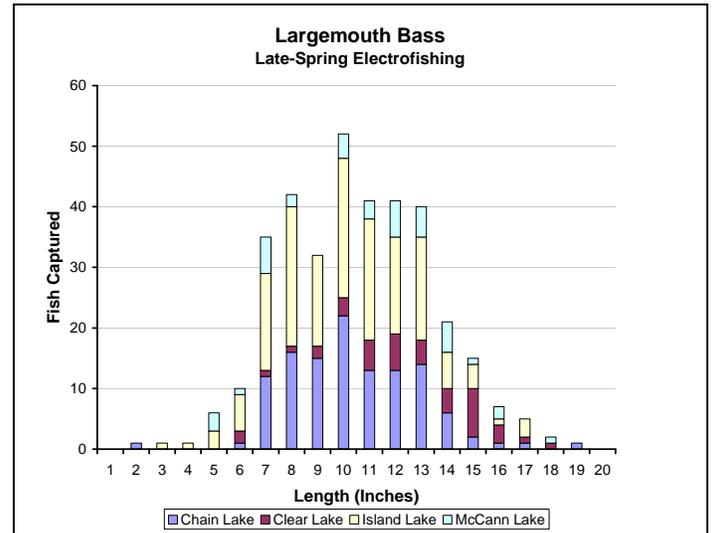
result in high rates of organic production, so severe algae blooms are uncommon. The hard water reservoir supports a diverse plant community; northern water milfoil and several pondweeds were common in 2004, including the invasive curly-leaf pondweed. Good water clarity allows rooted plants to grow at depths exceeding 12 feet. After rusty crayfish numbers declined, aquatic plants became abundant again and formed some dense stands in shallow areas. Pronounced and stable thermal stratification in summer leads to very low dissolved oxygen concentrations in the lower portion of water column. Similar water quality, plant and fish communities, and physical habitat among the four lakes allow us to manage the Chain’s fishery as a single unit.

## Summary of Results

### Largemouth Bass



	Number per mile $\geq 8''$	Number per hour $\geq 8''$	Quality Size $\geq 12''$	Preferred Size $\geq 15''$
Chain Lake	33	74	37%	5%
Clear Lake	20	43	71%	34%
Island Lake	31	68	37%	6%
McCann Lake	14	25	69%	
Combined	27	56	44%	10%

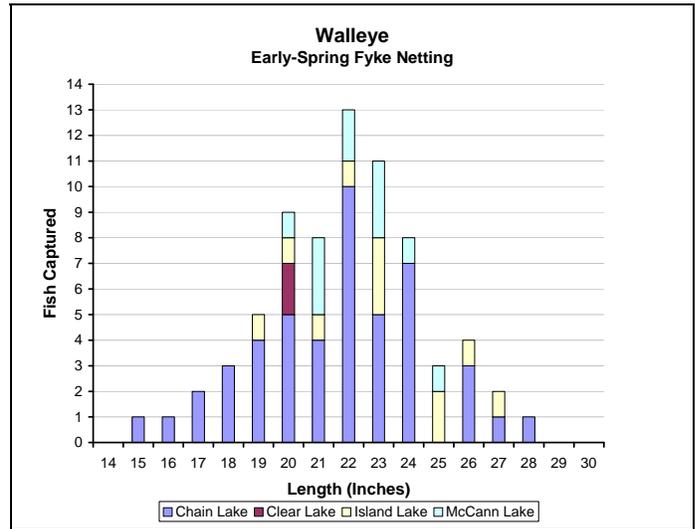


Largemouth bass, absent from a September 1987 electrofishing survey when walleye recruitment was sustained solely by natural reproduction, steadily increased in abundance to their dominance in the fish community today, perhaps in response to a resurgence of aquatic plants after the rusty crayfish population declined. Our electrofishing capture rates indicated moderate to high largemouth population abundance—levels likely to suppress recruitment of young walleye by predation. Age analysis using scales revealed that largemouth bass grew very slowly, averaging only 10¾ inches long at age 5 (range = 9.1–13.2; n = 16 from 3 of 4 lakes) — 2¼ inches less than the regional average length at that age. Largemouth bass ranked eighth among species of interest to stakeholders who helped define the fishery’s desired condition. Except for occasional attention from competitive anglers, participants generally held largemouth bass in low regard, probably due to the predator’s direct and indirect role in structuring more important walleye and panfish populations. Intensive efforts from the lake association to encourage angler harvest of intermediate-size largemouth bass (9 – 12 inches long) under liberalized regulations (no minimum length limit beginning in May of 2011) may serve to decrease their abundance and improve recruitment, growth rate, and size structure of several higher priority populations.

# Walleye



	Number per net-night $\geq 10''$	Quality Size $\geq 15''$	Preferred Size $\geq 20''$	Memorable Size $\geq 25''$
Chain Lake	4.8	100%	77%	11%
Clear Lake	0.5	100%	100%	0%
Island Lake	1.2	100%	91%	36%
McCann Lake	1.4	100%	100%	9%
Combined	2.2	100%	83%	14%

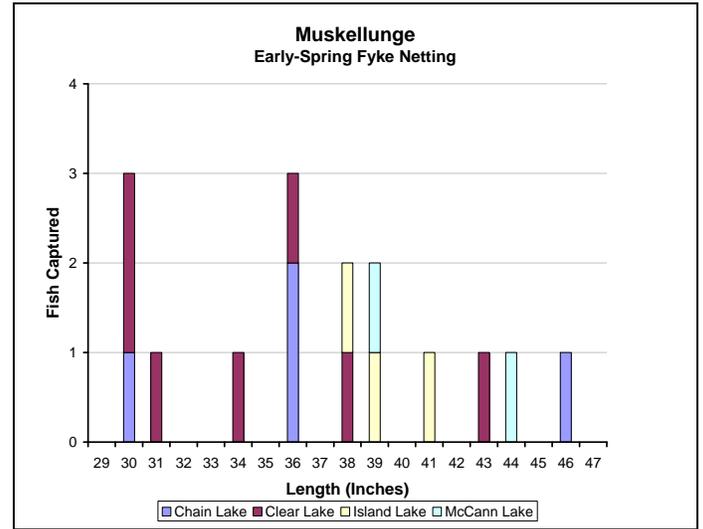


Low capture rates and high proportions of quality- and preferred-size walleye in early spring fyke nets point toward a low-density population of larger, older adults with no evidence that natural reproduction and stocking small fingerlings occasionally from 1999 to 2009 have been successful in contributing new recruits to the fishery. While there may be other predator-prey interactions working simultaneously, we hypothesize that abundant largemouth bass, efficient sight predators in clear-water lakes, consume virtually all small walleyes missed by other potential predators, particularly as young walleye move from open water toward shallower zones midway through their first season of growth. In years when reproductive success of yellow perch is poor, any surviving walleye fingerlings unable to find their preferred food (age-0 perch) will eat each other, further reducing the odds that they will grow and replace adults lost to angling or natural causes of mortality. With few or no young walleye to effectively control panfish abundance by predation, abundant bluegill and black crappie populations compete among themselves and develop unsatisfactory size structure. (We believe largemouth bass, as the only dominant predator, are unable to consume enough juvenile panfish to effectively control their numbers in such a large, weedy system.) Despite water clarity and habitat that favor survival and growth of largemouth bass over walleye, citizen participants in a 2005 fishery planning session expressed their strong desire for better walleye fishing opportunity. Fishing regulations and promotions in effect since April 2011 aim to relieve predatory pressure on young walleye by encouraging anglers to selectively harvest and responsibly utilize up to 5 largemouth bass per day 9 – 12 inches long under no minimum length limit. While anglers work to reduce largemouth bass density, stocking walleye in early autumn as large fingerlings 6 – 8 inches long may give them a size or behavioral advantage to evade predation. Results of scheduled surveys in spring 2012 should allow us to compare walleye population density with our objective of 2 – 4 adults per acre.

## Muskellunge



	Number per net-night $\geq 20''$	Quality Size $\geq 30''$	Preferred Size $\geq 38''$	Memorable Size $\geq 42''$
Chain	0.4	100%	25%	25%
Clear	1.2	100%	29%	14%
Island	0.3	100%	100%	0%
McCann	0.3	100%	100%	50%
Combined	0.5	100	50	19

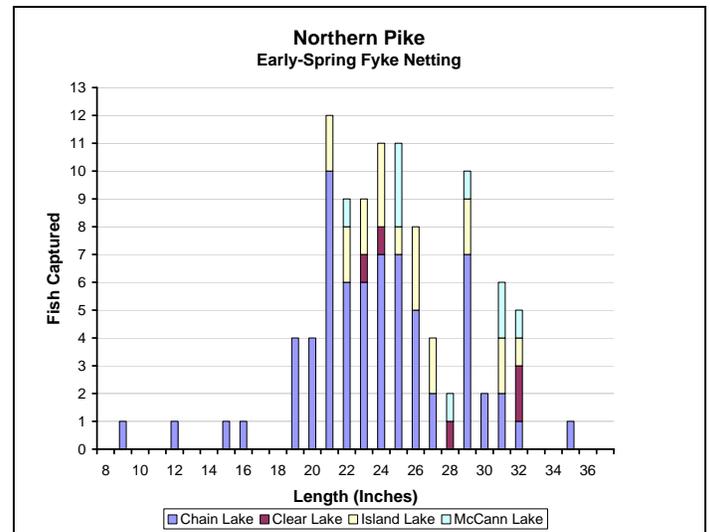


While netting preceded the peak of spawning activity and sample sizes were small, our capture rate of muskellunge  $\geq 20$  inches long in early spring fyke nets indicated a low-density adult population that included some fish of memorable size—a status consistent with the expectations of musky anglers statewide who generally prefer size over number and practice catch-and-release. Recruitment stems from a combination of natural reproduction and stocking one large (10 – 12 inches) fingerling per acre into Chain Lake in alternate years, though presently the in-lake contribution of young muskellunge is probably inconsequential in light of heavy predation expected from abundant largemouth bass and northern pike. It may be no coincidence that Clear Lake, with the lowest capture rate of northern pike, also had the highest capture rate of muskellunge.

## Northern Pike



	Number per net-night $\geq 14''$	Quality Size $\geq 21''$	Preferred Size $\geq 28''$
Chain	6.8	85%	20%
Clear	0.8	100%	60%
Island	2.0	100%	25%
McCann	1.1	100%	56%
Combined	3.0	90%	26%



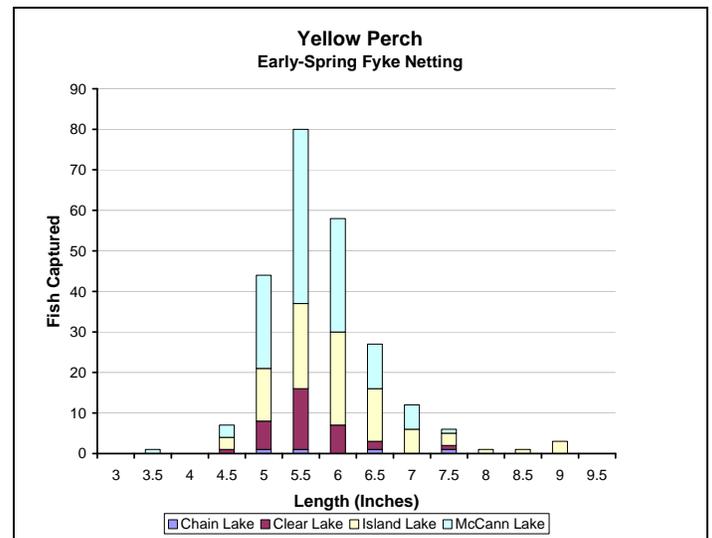
Capture rate of northern pike in early spring fyke nets was highest in Chain Lake, possibly indicating upstream movement of pike to excellent spawning habitat in the cattail marsh at the mouth of Cedar Creek, the Chain's major tributary. Though no objectives have been established for northern pike, our overall catch rate of 3 pike per net-night suggests a moderate adult density. Population size structure was respectable with 26% of all pike  $\geq 14$  inches attaining preferred size  $\geq 28$  inches long.

Predation by northern pike is known to influence the size structure of yellow perch populations. Northern pike, which eat more perch and possibly larger perch in relation to their own increasing size, are the probable cause of poor size structure in the yellow perch population (see below). Yellow perch appear to be most abundant among lakes in the Chain with the fewest largemouth bass and northern pike.

## Yellow Perch



	Number per net-night $\geq 5''$	Quality Size $\geq 8''$	Preferred Size $\geq 10''$
Chain	0.4	0%	0%
Clear	13	0%	0%
Island	8.4	6%	0%
McCann	14	0%	0%
Combined	8.2	2%	0%



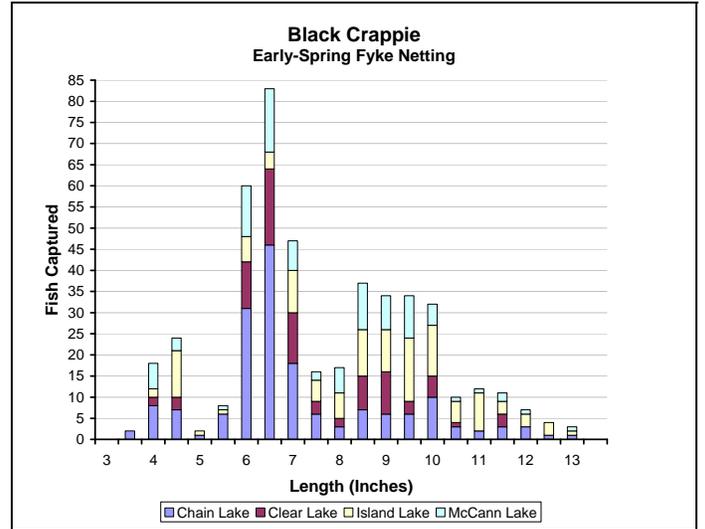
Low catch rates in early spring fyke nets revealed that yellow perch fell short of local expectations (moderate population density with 20 – 40% of all perch 5 inches or longer at least 8 inches long). Quality-size perch  $\geq 8$  inches were rare throughout the Chain, suggesting that muskellunge and abundant northern pike are eating the largest perch from the population. Egg-damaging ultraviolet light penetrates to greater depths in clear water lakes with low concentrations of dissolved organic compounds to aid in its attenuation, affecting the reproductive success of yellow perch. Yellow perch are the preferred food for all predatory sport fishes in the Chain, and their low rate of production may also be due to predation by abundant largemouth bass and moderately abundant northern pike. Low yellow perch abundance may partially explain poor walleye recruitment and slower-than-average growth in smallmouth bass and largemouth bass populations. Installing branched woody structure at mid range depths may increase the amount of suitable substrate for adhesive perch eggs. A coupled strategy to supplement perch spawning habitat while encouraging liberal angler harvest of abundant largemouth bass and northern pike may serve to increase perch recruitment and indirectly improve growth and length distribution in higher-priority fish populations.

# Black Crappie



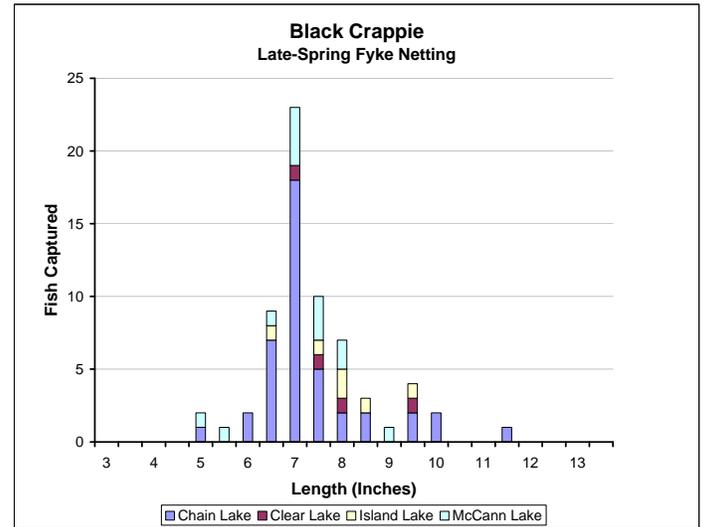
## Early-Spring Fyke Netting

	Number per net night $\geq 5''$	Quality Size $\geq 8''$	Preferred Size $\geq 10''$
Chain	15	29%	15%
Clear	13	42%	12%
Island	11	74%	34%
McCann	10	55%	13%
Combined	12	48%	19%



## Late-Spring Fyke Netting

	Number per net night $\geq 5''$	Quality Size $\geq 8''$	Preferred Size $\geq 10''$
Chain	8.4	21%	7%
Clear	1.3	50%	0%
Island	1.5	67%	0%
McCann	3.3	23%	0%
Combined	4.0	28%	5%



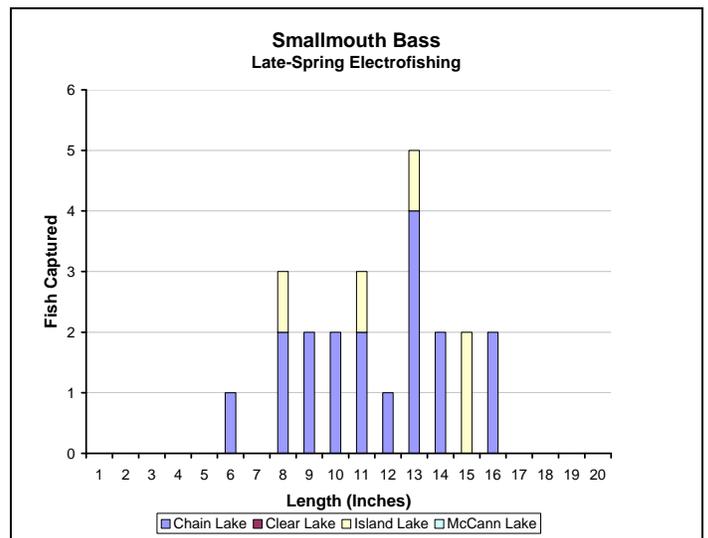
Early-spring fyke nets captured black crappie  $\geq 5$  inches at a rate 3 times greater than those fished in mid June, and the proportion of preferred-size crappie  $\geq 10$  inches taken in early-spring was nearly 4 times higher than in late-spring. Though capture rates were similar among the four lakes in early spring, we do not know whether either sample would allow a valid comparison of current status with our goal for moderate population density. With the exception of Island Lake where 34% of all crappie  $\geq 5$  inches in early-spring fyke nets were of preferred size, both samples reveal that we have not attained our objective for population size structure (25–35% at least 10 inches long), probably because anglers selectively harvest a high percentage of the largest adults. Age analysis using scales collected from both periods in Chain Lake suggest that

early-spring fyke nets captured a faster-growing portion of the population—averaging 9.7 inches at age 4 (range 9.2–10.3; n = 7) compared to the regional average length of 8.1 inches. Crappies of similar intermediate size captured in late spring grew to 6.7 inches in 3 years (range 6.1–7.2; n = 15), a rate nearly identical to the regional average length at age 3 (6.8 inches). Fluctuations in crappie abundance related to angling harvest and variable reproductive success will probably continue under moderate fishing pressure on the Island Chain of Lakes, but more restrictive regulations could help to improve population size structure and distribute the harvest more evenly among anglers and years.

## Smallmouth Bass



	Number per mile $\geq 7''$	Number per hour $\geq 7''$	Quality Size $\geq 11''$	Preferred Size $\geq 14''$
Chain	5.4	12	65%	24%
Clear	----		----	----
Island	1.2	2.7	80%	40%
McCann	----		----	----
Combined	2.0	4.1	68%	27%



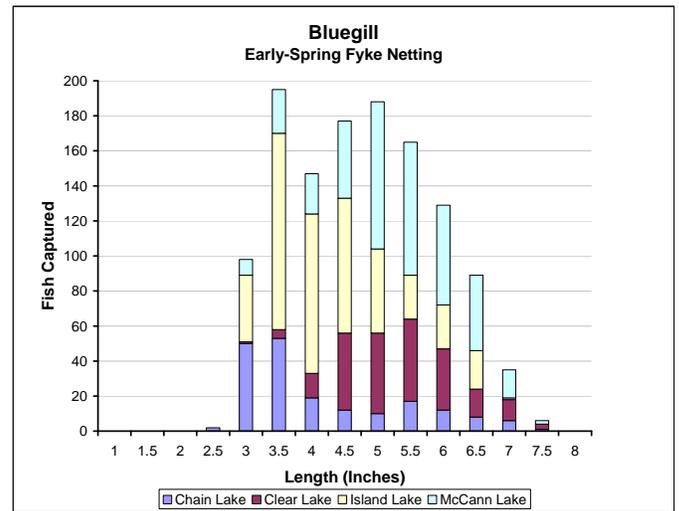
We found smallmouth bass in low abundance only in Chain and Island lakes, perhaps because rockier substrate in those lakes provides better escape cover for juvenile smallmouths and harbors more of their preferred food (crayfish). Abundant aquatic plants throughout the Chain and slower-than-average growth rate of smallmouth bass (2 inches shorter than the regional average at age 5; n = 3) suggest that crayfish have diminished from their high population density noted in the late 1980s and early 1990s. None of the smallmouth bass in our samples was of memorable size  $\geq 17$  inches. Smallmouth bass do not adversely affect walleye recruitment by predation as largemouth bass are known to do. If longevity can overcome their slow growth rate, voluntary release of legal-size smallmouth bass (currently without regulatory protection under no minimum length limit) may help to attain our objective to have 10 – 15% of all smallmouths  $\geq 7$  inches at least 17 inches long.

# Bluegill



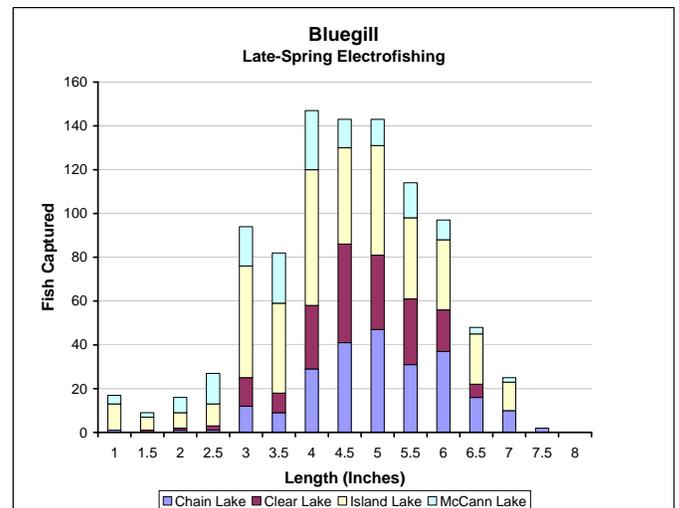
## Early-Spring Fyke Netting

	Number per net-night $\geq 3''$	Quality Size $\geq 6''$	Keeper Size $\geq 7''$
Chain	19	14%	4%
Clear	107	30%	7%
Island	44	11%	0.2%
McCann	47	31%	5%
Combined	48	21%	3%



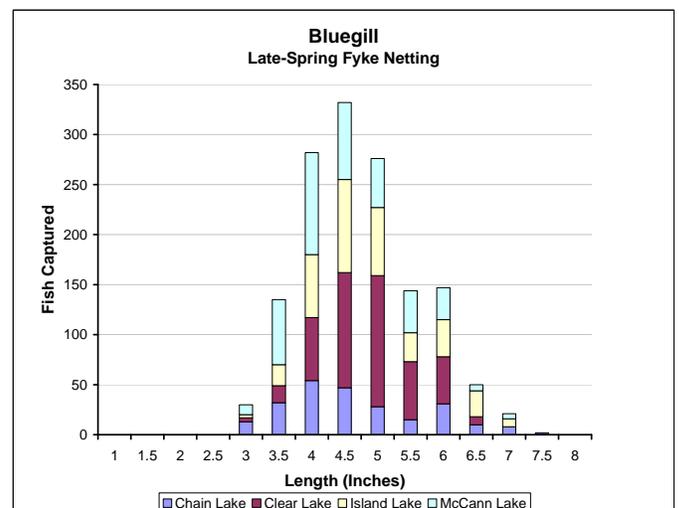
## Late-Spring Electrofishing

	Number per mile $\geq 3''$	Number per hour $\geq 3''$	Quality Size $\geq 6''$	Keeper Size $\geq 7''$
Chain	457	936	28%	5%
Clear	365	685	14%	0%
Island	353	751	19%	4%
McCann	233	293	11%	2%
Combined	351	635	19%	3%



## Late-Spring Fyke Netting

	Number per net-night $\geq 3''$	Quality Size $\geq 6''$	Keeper Size $\geq 7''$
Chain	48	21%	4%
Clear	250	12%	0%
Island	166	20%	2%
McCann	97	11%	1%
Combined	127	16%	2%



High capture rates of bluegill  $\geq 3$  inches in three spring 2010 samples indicate very high abundance, far exceeding our goal of moderate population density. Percentages of quality-size and “keeper-size” bluegill were similar among lakes, sampling periods, and gear, but we found no bluegill of preferred size  $\geq 8$  inches. Late-spring electrofishing showed that the Chain’s combined bluegill population nearly attained our very modest objective to have 20 – 40% of bluegills  $\geq 3$  inches exceeding the quality size of 6 inches—a slight improvement from 2005 when participants said there were very few bluegills  $> 6$  inches, though we expect most anglers will remain dissatisfied. Scale analysis revealed that bluegill length at age 4 was less than a tenth-inch below the regional average (5.4 inches), but at ages 5 – 8 bluegills in the Chain were 1 – 1.4 inches shorter than average. Bluegill populations suffer slow growth and poor size structure when dominant largemouth bass fail to consume enough bluegills themselves but suppress recruitment of young walleye that would otherwise effectively control bluegill abundance by predation. Worsening the problem, the substantial comeback in aquatic plants provides more hiding and escape cover for young panfish and reduces the effectiveness of all predators to control panfish abundance. Our strategies to encourage liberal harvest of largemouth bass should lead to increased walleye recruitment and improved size structure of the bluegill population. Also, liberal harvest of northern pike and voluntary angler release of quality-size perch would increase adult perch density and contribute toward achieving a state of balance, because adult perch can prey upon young bluegills significantly in the fall and winter months.

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