

## **Bruin Lake**

Washtenaw County, T1S R3E Sec. 33  
Huron River Watershed, last surveyed 2008

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### **Environment**

Bruin Lake is a 136 acre lake located approximately 7 miles north of the village of Chelsea in Washtenaw County. Most of the lake is in the Pinckney Recreation Area, meaning much of the shoreline is state-owned. This land is managed by the Parks and Recreation Division of the Michigan Department of Natural Resources. Shoreline development is limited to several houses on the south end, several houses on the west end, and the Bruin Lake Campground on the northwest side. Due to limited development, much of the shoreline is wooded upland consisting of hardwoods and conifers. The geology of the area is characterized by sand and gravel outwash which are generally well drained and allow good infiltration to the ground water. A variety of emergent and submerged aquatic plants are present, but not overly abundant. Emergent species include bulrushes, cattails, and arrowhead and submerged species include eurasian milfoil, elodea, chara, and a variety of pondweeds. A state-owned and maintained boat launch is located on the lake's west side. Access can also be gained by launching at the Halfmoon Lake public boat launch and traveling upstream through Watson Lake.

Much of the eastern half of Bruin Lake is less than 5 feet deep; however, the western basin drops off abruptly to a maximum depth of 48 feet (Figure 1). Marl and sand are the predominant substrate types in the shallow areas and the deeper areas contain mainly pulpy peat. There are no inlets to Bruin Lake, but there is one outlet on the east end of the lake. The outlet connects Bruin Lake to a chain of lakes that are part of the Portage Creek system. This provides access to Watson, Patterson, and Woodburn lakes upstream and Halfmoon, Blind, and Hi-land lakes downstream. A dam located at the outlet of Hi-land Lake prevents boat passage further downstream. A short distance downstream from Hi-land Lake, the Portage River flows into Little Portage Lake, which is part of a chain of lakes on the Huron River.

Previous surveys on Bruin Lake characterized the water as clear, but the most recent survey in 2008 reported a slight green color. The clear water in Bruin Lake contrasts with the water color of Watson Lake immediately downstream and other lakes on the Portage River system. From the outlet of Bruin Lake and into Watson Lake, the water is brown. In early September 2008, water clarity in Bruin Lake was good with a Secchi disk reading of 11 feet. Bruin Lake is deep enough that the water stratifies annually. During the summer, the lake develops three distinct layers; the upper most layer (epilimnion) is warm and well oxygenated and temperature and oxygen are uniform in this layer; the middle layer or thermocline is intermediate in temperature and the amount of dissolved oxygen varies; the bottom layer (hypolimnion) is cold and lacks oxygen. In early September 2008, the thermocline was from 17 to 26 feet with good oxygen levels ranging from 4.1 to 7.3 ppm.

## **History**

Bruin Lake was stocked with bluegills, largemouth bass, and yellow perch intermittently between the late 1930's and the mid-1940's (Table 1). This practice was discontinued after research showed that stocking these species added little value to the overall fish population. Rainbow trout were stocked in 1955, 1956, 1958, and 1959. Local conservation officers reported good results from the initial plants, however the trout stocking program was discontinued because of subsequent poor catches by anglers. More recently, redear sunfish have been stocked in Bruin Lake in 1990, 1991, and 1993 (Table 1), with the goal of developing a self-sustaining population.

Past fisheries surveys on Bruin Lake were conducted in 1954, 1971, 1988, 1994, and 1998. With the exception of the addition of redear sunfish through stocking, fish species composition has remained relatively unchanged over this time period. Fishing reports from 1942 and 1954 indicated fair summer fishing for largemouth bass and bluegills, with some perch and a few northern pike caught. These reports accurately reflect the current fishery on Bruin Lake.

A fishing pier is located on the west end of the lake at the state-run Bruin Lake Campground in the Pinckney Recreation Area. The pier was built and installed by Fisheries Division in the late 1980s. A fish survey report in 1994 indicated that park personnel reported fair to good catches of panfish from the fishing pier. The pier was destroyed by ice in 2005 and a new, longer pier was built in the same location in late November 2008. Park personnel indicate that the pier continues to be a popular fishing location, with fair to good catches of panfish.

A fish structure installation project was completed in 1990 with the goal of improving fishing success at the fishing pier. The project consisted of using a 6 - 7 foot Christmas trees and securing a cinder block to the base of the tree using cement. The trees were installed vertically, spaced approximately 5 feet apart and placed in two groups of twelve trees in water approximately 15 feet deep (within casting distance from the pier). This project was completed jointly by Fisheries Division, Parks Division, and the Avid Bass Anglers of Michigan. There were no records evaluating this project, but Christmas trees have soft wood which deteriorates easily, so any expected benefits were likely short-term. It is now recommended that habitat projects use hardwoods which have a much longer life-expectancy.

## **Current Status**

A general fisheries survey was conducted on Bruin Lake in spring 2008 using a standardized sampling protocol (Status and Trends Program). A variety of gear was used in attempts to accurately survey the fish community. Two trap nets and a large-mesh fyke net were tended daily and fished three net-nights each. An additional trap net and two 125 feet experimental gill nets were each fished for two net-nights. Finally, three seine hauls were made using a 25-foot seine and three ten-minute transects were electrofished at night. The lake shoreline was divided into approximate ¼ mile segments and gear set locations were determined randomly. The goal of the survey was to evaluate the current fish population and determine future management needs of the fishery.

A total of 1,929 fish were caught during the survey, represented by 26 species (excluding hybrid sunfish) (Table 2). Panfish such as bluegill, black crappie, pumpkinseed, rock bass, redear sunfish,

warmouth, and yellow perch comprised 80% of the total catch by number and 75% by weight (Table 2). Large gamefish including largemouth bass and northern pike accounted for only 3% of the total catch by number and 10% by weight. A variety of forage fish species including bluntnose minnows, blacknose shiners, brook silversides, Iowa darters, Johnny darters, logperch, sand shiners, and spottail shiners were caught in seines and during electrofishing.

Bluegills were the most abundant fish caught during the survey (Table 2). They represented 57% of the total catch by number and 46% by weight. The bluegill in the trap and fyke nets averaged 6.5 inches, with 40% of the catch being 7 inches or larger. The bluegills had a slightly positive Mean Growth Index (+0.1), which means that bluegills in Bruin Lake were growing slightly above statewide average growth rates (Table 3). The quality of the bluegill population in Bruin Lake was evaluated using Schneider's Index. This index provides a relative measure of the quality of the bluegill size in a lake based on a scale from 1 to 7, with 7 being the best (Schneider 1990). Based on the trap net catch, the bluegill in Bruin Lake scored a 5.0 and ranked "good." Both the average size and growth rates of bluegills in this survey were consistent with results from previous surveys (Table 4).

Rock bass were the next most abundant fish in the survey, making up 11% of the total catch by number. The rock bass averaged 7.0 inches and 25% were eight inches or larger (Table 5). A total of 54 pumpkinseeds were caught. The pumpkinseeds averaged 7.0 inches and were growing about half an inch faster than the average statewide growth rate (Table 3). The catch rate, average size in trap nets, and growth index were all improved in the 2008 compared to earlier surveys (Table 4).

Redear sunfish stockings from the early 1990's have created a self-sustaining population. The redear sunfish in the current survey averaged 7.7 inches with one-third of the catch being 9 inches or larger (Table 5). The catch comprised seven year-classes of redears from age-2 to age-10, indicating good natural reproduction (Table 6). Similar to other panfish in Bruin Lake, redears had above average growth rates (Table 3). Although redears are reproducing and growing well, catch rates (1.7 per net night) were low compared to other established lakes.

A total of 33 black crappies were caught, averaging 8.8 inches. Growth rates were well above the statewide average (+0.7), but the catch was made up of only three year-classes; age-2 through age-4 (Table 6). This is a fair catch of black crappies, as previous surveys indicate that they have never been abundant in Bruin Lake. A fair number of yellow perch were caught during the survey; however the catch was dominated by age-1 fish (90%) (Table 6). A variety of other panfish were caught in smaller numbers, including green sunfish, longear sunfish, warmouth, and sunfish hybrids.

Largemouth bass made up 2% of the total catch by number and 7% by weight (Table 2). The bass ranged from 2 to 20 inches long and 12% exceeded the minimum size limit of 14-inches (Table 5), but growth rates were slightly below average (-0.3). Age-classes 1 through 8 were represented in the catch, including one bass that was 11-years old (Table 6). Although a range of year-classes were present, about half the catch was made up of age-3 bass. Overall, the survey results indicate a good bass population in Bruin Lake.

Ten northern pike were caught, ranging in size from 12 to 28 inches. Six age-classes were represented from age-1 to age-9 (Table 6). Insufficient numbers of pike were caught to generate a Mean Growth Index, but length-at-age tended to be above average.

Only two ciscos were caught during the current survey from 4 gill net nights of effort. While ciscos were common in the 1954 survey (24 ciscos from 6 net-night of gill net fishing), ciscos were uncommon in following surveys. Only one cisco was caught in 4 net-nights of gill net effort in 1971, and no ciscos were caught in the subsequent surveys in 1988, 1994, or 1998. It was good to catch cisco to confirm they are still present in Bruin Lake.

Carp were notably absent in the current survey. Although never abundant in the catch, carp were reported in all the surveys since 1971. Carp are likely still present at low levels. The poor carp catch is good because carp are a non-native species that can negatively affect native species and water clarity.

Bruin Lake was tested as part of a statewide monitoring program to evaluate lakes for viral hemorrhagic septicemia (VHS). VHS was first detected in the Great Lakes in 2005 and has caused mortalities in a number of species. Sixty rock bass, 60 bluegills, and 54 bluntnose minnows were collected from Bruin Lake during the survey and sent to the Aquatic Animal Health Laboratory at Michigan State University to be screened for the VHS virus. All results were negative.

### **Analysis and Discussion**

Bluegills continue to be one of the most abundant fish in the catch. Parameters including catch rates, average length, and growth rates were intermediate compared to earlier surveys, but were not dramatically different (Table 4). The catch rate of bluegills was good, growth rates were positive, and the catch had a range of age-classes. Schneider's Index, which is a measure of the size of bluegill in the catch, was highest in the current survey. All of the catch statistics indicate that Bruin Lake continues to support a good bluegill fishery.

The redear sunfish stocking has been successful; redears are now self-sustaining in Bruin Lake. The presence of seven age-classes in the catch indicates that redears are established. Although the size of redears and the growth rates were good, the catch rates were lower than other lakes where redear sunfish have been established. Even though catches were lower than preferred, the addition of redear sunfish complements an already good bluegill fishery. Because redear sunfish grow faster and attain a larger size than bluegills, the presence of these larger fish improves the quality of the panfish fishery.

In addition to bluegills and redear sunfish, other panfish such as pumpkinseeds, black crappie, rock bass, and yellow perch were present. These species were not abundant in the catch, but their catch rates were similar to that found in previous surveys. Although not abundant, these species diversify the fishery for panfish.

There were good catches of both largemouth bass and northern pike, and catches were consistent with earlier surveys. There was a good size range in the catch of both species, with good numbers of larger fish which anglers prefer to target. The largemouth bass was represented by nine age-class and northern pike had seven age-classes, indicating good reproduction for both species.

Even though only a couple ciscoes were caught in the current survey, their presence is important because ciscoes have a limited distribution in southeast Michigan. They are limited to deep lakes

which have sufficient oxygen in the thermocline. This species is important to monitor because they are sensitive to environmental changes and pollution. Thus, changes in cisco numbers may be a barometer water quality.

As noted in the History section above, the fishery in Bruin Lake has remained stable and relatively unchanged since the first fishery survey on Bruin Lake. Past surveys from 1954 to 1998 have found the same species, relative abundances, and size of fish. One likely reason contributing to the stability in the fishery is that Bruin Lake is an open system. The connection from Bruin Lake to other lakes on the Portage Creek river system allows movement of fish throughout the system.

### **Management Direction**

Bruin Lake is a stable fishery that has changed little over time, providing good opportunities for panfish and largemouth bass. All the panfish are growing at rates which are at or above the statewide averages. The fishing pier at Bruin Lake Campground is very popular and provides good access for shore anglers. No management actions are recommended at this time.

### **References**

Schneider, J. C. 1990. Classifying bluegill populations from lake survey data. Michigan Department of Natural Resources, Fisheries Division Technical Report 90-10, Ann Arbor.

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Table 1.-Summary of fish stocking into Bruin Lake, Washtenaw County (fish stocking records began in 1934).

Stocking Year	Species	Number Stocked	Average Size (in)
1934	Bluegill	6,000	1
	Yellow perch	2,000	3
1935	Bluegill	4,000	1
	Largemouth bass	300	3
	Yellow perch	5,000	3
1936	Bluegill	5,000	1
	Yellow perch	5,000	3
1937	Bluegill	5,000	1
	Largemouth bass	600	3
	Yellow perch	10,000	3
1938	Bluegill	6,500	1
	Largemouth bass	450	3
1943	Bluegill	10,000	1
	Largemouth bass	1,000	3
1955	Rainbow trout	5,000	8.9
1956	Rainbow trout	2,500	8.4
1958	Rainbow trout	2,500	8.0
1959	Rainbow trout	2,500	7.5
1990	Redear sunfish	15,200	1.6
1991	Redear sunfish	6,825	1.8
1993	Redear sunfish	14,000	1.4

Table 2.-Species catch and relative abundance of fishes collected with all gear types combined during the Bruin Lake fish community survey in Spring 2008.

Species	Number	Percent by number	Weight (lb)	Percent by weight	Length range (in)	Average length (in)	Percent legal size*
Bluegill	1,108	57.4	180.7	45.5	1-9	5.6	51
Rock bass	212	11.0	59.4	15.0	4-11	7.0	71
Bluntnose minnow	107	5.5	0.6	0.1	1-3	2.4	--
Blacknose shiner	84	4.4	0.4	0.1	2-3	2.5	--
Pumpkinseed	54	2.8	14.5	3.6	2-9	6.6	80
Brook silverside	48	2.5	<0.1	<0.1	3-4	3.5	--
Yellow perch	44	2.3	1.1	0.3	2-9	3.5	5
Sand shiner	43	2.2	0.2	<0.1	1-3	2.4	--
Largemouth bass	41	2.1	28.8	7.2	2-21	9.8	12
Brown bullhead	39	2.0	26.7	6.7	6-14	11.1	97
Black crappie	33	1.7	12.8	3.2	6-10	8.8	97
Hybrid sunfish	31	1.6	13.6	3.4	5-10	8.1	97
Redear sunfish	20	1.0	8.0	2.0	4-11	7.8	80
Warmouth	20	1.0	5.6	1.4	3-9	6.9	85
Northern pike	10	0.5	22.5	5.7	12-29	20.5	30
Logperch	8	0.4	0.1	<0.1	2-4	3.4	--
Yellow bullhead	5	0.3	2.9	0.7	8-13	10.5	85
Lake chubsucker	5	0.3	0.1	<0.1	3-5	3.7	--
Longnose gar	4	0.2	5.5	1.4	14-29	24.3	100
Bowfin	3	0.2	11.8	3.0	20-25	22.2	100
Iowa darter	2	0.1	<0.1	<0.1	1-3	2.0	--
Cisco	2	0.1	--	--	13-15	14.0	100
Black bullhead	2	0.1	1.5	0.4	10-13	11.5	100
Spottail shiner	1	0.1	<0.1	<0.1	3-4	3.5	--
Longear sunfish	1	0.1	<0.1	<0.1	3-4	3.5	100
Johnny darter	1	0.1	<0.1	<0.1	2-3	2.5	--
Green sunfish	1	0.1	0.2	0.1	6-7	6.5	100

\* Legal size refers to minimum legal size limit where applicable or minimum size acceptable to anglers.

Table 3.-Mean length-at-age (inches) for selected fish species from Bruin Lake 2008. Number in parenthesis represents the number of fish aged.

Species	Age group	State average	Total length (inches)
Black crappie	II	6.0	7.6 (2)
	III	7.5	8.3 (11)
	IV	8.6	9.06 (13)
	Mean Growth Index		+0.7
Bluegill	I	1.8	2.0 (18)
	II	3.8	2.5 (2)
	III	5.0	4.4 (24)
	IV	5.9	6.5 (13)
	V	6.7	7.0 (17)
	VI	7.3	7.3 (9)
	VII	7.8	8.1 (3)
	Mean Growth Index		+0.1
Largemouth Bass	I	4.2	3.2 (2)
	II	7.1	6.1 (7)
	III	9.4	9.2 (20)
	IV	11.6	12.0 (7)
	V	13.2	13.5 (2)
	VI	14.7	15.8 (1)
	VII	16.3	16.8 (1)
	VIII	17.4	16.6 (1)
	XI		20.3 (1)
	Mean Growth Index		-0.3
Northern pike	I	11.7	13.2 (2)
	II	17.7	18.5 (3)
	III		
	IV	23.4	23.3 (2)
	V	25.5	26.8 (1)
	VI	27.3	28.6 (1)
	IX		23.7 (1)
Pumpkinseed	II	3.8	2.8 (5)
	III	4.9	4.1 (1)
	IV	5.6	6.8 (17)
	V	6.2	6.9 (9)
	VI	6.6	8.0 (5)
	VII	7.1	7.7 (1)
	Mean Growth Index		+0.6

Table 3.-Continued

Species	Age group	State average	Total length (inches)
Redear sunfish	II	4.4	5.0 (3)
	III	6.2	6.7 (7)
	IV	7.6	7.9 (5)
	V	8.7	9.7 (3)
	VI	9.6	9.5 (1)
	VII	10.3	9.4 (1)
	X		9.9 (1)
	Mean Growth Index		+0.4
Yellow perch	I	3.3	3.0 (20)
	II	5.2	5.3 (2)
	III	6.5	6.9 (2)

Table 4.-Comparison of catch statistics for selected species from trap net catches among surveys.

Species	Survey year	Catch/net night	Average length (in)	Mean growth index	Schneider's Index
Bluegill	1994	91.0	6.8	+0.6	4.25
	1998	18.9	5.6	0	3.75
	2008	72.1	6.5	+0.1	5.0
Pumpkinseed	1994	3.0	6.2	+0.1	
	1998	1.8	5.2	-0.3	
	2008	4.0	7.0	+0.6	

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