

**Comprehensive Fisheries Survey of the Boom-Rhineland Chain,  
Oneida County Wisconsin during 2011.**



John Kubisiak  
Senior Fisheries Biologist  
Rhineland  
March, 2012



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## EXECUTIVE SUMMARY

A comprehensive fisheries survey was conducted on the Boom-Rhineland Chain of lakes and the associated Wisconsin River reach below Rainbow Flowage during spring and fall, 2011. We found moderate populations of gamefish including walleye (population estimate, PE = 1,950 adults spawning in the Wisconsin River), northern pike (PE = 1.2 adults per acre), largemouth bass, smallmouth bass and muskellunge. The game species had moderate size and appeared to be in good condition. Panfish species were abundant, with moderate to good size structure. We found high catches of bluegill, moderate catches of yellow perch, pumpkinseed, yellow bullhead and black crappie, and lower numbers of bluegill x pumpkinseed hybrids, rock bass, and black bullhead. Non-game species in the catch include chestnut lamprey, bowfin, burbot, golden redhorse, golden shiner, greater redhorse, northern hog sucker, shorthead redhorse, silver redhorse and white sucker. I recommend continuing to manage the Boom-Rhineland Chain of lakes for a diverse fishery including trophy muskellunge, walleye, northern pike, largemouth bass, smallmouth bass and panfish. Given the low muskellunge catch and low numbers of small fish in the population, I recommend supplemental stocking at a low rate.

### Lake and location:

The Boom-Rhineland Chain of lakes is an impoundment of the Wisconsin River and Pine Lake Creek in south-central Oneida County. Other direct tributaries to Rhineland Flowage include Fourmile Creek, Newbold Creek, Newbold Spring Creek and Cedar Spring Creek from the west and Skunk Creek and Tom Doyle Creek from the east. Named lakes in the Chain include Rhineland Flowage (Waterbody Identification Code, WBIC 1580100), Boom Lake (WBIC 1580200), Bass Lake (WBIC 1580300), Thunder Lake (WBIC 1580400) and Lake Creek Lake (WBIC 1580500). The Chain is in the towns Newbold and Pine Lake, and the city of Rhineland lies on the south shore of Rhineland Flowage, Boom Lake and Thunder Lake. The upstream end of Rhineland Flowage is designated as the Bridge Road bridge, but the survey also included spring electrofishing in about 11 river miles of the Wisconsin River from Rainbow Flowage dam downstream to Bridge Road. A dam owned by Wausau Paper Corporation regulates the Wisconsin River outlet in Rhineland. The dam holds back 10 feet of head, but a canal cut into the underlying rock provides 32 feet of head at the turbines.

### Physical/Chemical attributes of the lakes and flowage (Andrews and Threinen 1966):

**Morphometry:** 2,231 acres with maximum depth of 30 feet and 54.6 miles of shoreline.

**Watershed:** 904 square miles, with around 1,000 acres of adjoining wetlands.

**Lake type:** Impoundment of the Wisconsin River.

**Basic water chemistry:** Soft – Boom Lake alkalinity 34 mg/l, conductance 82 µmhos.

**Water clarity:** Clear water of moderate transparency.

**Littoral substrate:** 60% sand, 25% muck, with gravel and some rubble present.

**Aquatic vegetation:** moderate; dense in some areas. Significant wild rice beds in upstream reaches of Rhineland Flowage.

**Winterkill:** none.

**Boat landings:** Wisconsin River: Concrete plank ramps along Hwy D and at Bridge Road with parking for 18 vehicles with trailers and 38 additional vehicles and a canoe takeout at River Road with parking for several vehicles. Rhineland Flowage: 3 concrete plank and two gravel ramps with parking for 33 vehicles with trailers and 56 additional vehicles. Boom Lake: One concrete plank ramp with 4 launch lanes and parking for 27 vehicles with trailers and 13 additional vehicles (fee); one gravel ramp with roadside parking. Bass Lake: asphalt ramp with roadside parking. Thunder Lake: one gravel and one asphalt ramp with roadside parking. Lake Creek: gravel ramp with parking for 2 vehicles with trailers and 3 additional vehicles.

**Other features:** Shoreline approximately 65% upland with bog, shrub, coniferous and meadow wetlands adjoining portions of the shoreline. Large stump fields present, especially in upstream areas outside the impounded river channels.

Purpose of Survey: Assess status of game and panfish species and develop management recommendations.

Dates of fieldwork: Walleye electrofishing in Wisconsin River, April 12-16, 18, 25. Walleye netting, April 18 – May 3. Muskellunge netting May 4 – 8. Panfish netting September 12-16 2011.

## BACKGROUND

### Wisconsin River

Three Wisconsin River locations downstream of Rainbow Flowage were set with fyke nets in April of 1957 (Burdick, 1957). At the most downstream site near “Manley’s Tap,” vegetation was described as rushes, scattered rice, lilies, vegetation in back water, scarce in channel. At this site (presumably an upper Rhineland Flowage location), three fyke nets captured 3.4 walleye (9.0 to 28.3 inches) and 13.0 northern pike (11.8 to 30.1 inches) per net night. In addition, “Countless numbers of large redhorse and suckers were netted. 200 to 300 panfish netted each day, including nice crappies, perch and bluegills. 25-100 very fine bullheads were also netted each day. No muskies were captured... River very low.” One large mesh fyke net with two 100-foot wings to block off the River were set at the bridge on River Road during April 22-25, 1957. The catch included 8.7 walleye (12.1 to 27.5 inches) and 6.3 northern pike (12.4 to 22.1 inches) per net night. Additionally, “at least 600 suckers were captured in one day. Very few other fishes were netted other than 25-30 redhorse a day.” Three fyke nets were set near Gilmore Creek outlet during April 18-26, 1957. The catch included 2.8 walleye (13.0 to 28.5 inches) and 3.5 northern pike (13.0 to 26.1 inches) per net night. Comments indicate “River very low – net catches low. A few suckers and redhorse captured daily. Also a few perch and panfish.”

On October 5, 2000 a crew of 5 stream-shocked with 2 electrodes for 2 hours, 42 minutes in Wisconsin River “1 mile below Rainbow Dam to rock riprap strip by Hwy D.” Their catch consisted of black bullhead, black crappie, bluegill, burbot, central mudminnow, creek chub, golden shiner, hornyhead chub, johnny darter, largemouth bass, longnose dace, mottled sculpin, pumpkinseed, rock bass, rosyface shiner, slenderhead darter, smallmouth bass, troutperch, walleye, white sucker, yellow bullhead and yellow perch.

Three, one-mile Wisconsin River reaches were electrofished during June 26-27, 2007 with a raft shocker. The reaches include 1.0 to 2.0 miles downstream of Rainbow Flowage, 0.5 to 1.5 miles downstream of River Road and 1.5 to 0.5 miles upstream of Bridge Road. The reach above Bridge Road was repeated on June 24, 2010 with a mini-boom shocker. Cumulative species captured include black bullhead, black crappie, bluegill, brassy minnow, chestnut lamprey, common shiner, golden redhorse, golden shiner, hornyhead chub, logperch, mimic shiner, muskellunge, northern hog

sucker, northern pike, pumpkinseed, rock bass, rosyface shiner, shorthead redhorse, silver redhorse, slenderhead darter, smallmouth bass, spotfin shiner, walleye, white sucker and yellow perch.

#### Rhinelanders Flowage

See description (above) of Wisconsin River fyke netting in 1957 near "Manley's Tap."

On October 10, 2000, a boomshocker was used to electrofish Rhinelanders Flowage for 3 hours, 10 minutes from Bridge Road downstream to the last trees entering the rice beds. The catch included 5 golden redhorse, 4 muskellunge, 1 northern hog sucker, 11 northern pike, 6 shorthead redhorse, 3 silver redhorse, 1 yellow bullhead and 13 walleye. A parasitic lamprey (most likely a chestnut) was noted attached to a redhorse.

Nine mini-fyke nets were set on August 24 and lifted on August 25, 2005 (9 net-nights). The catch included black crappie, bluegill, central mudminnow, golden shiner, Iowa darter, johnny darter, largemouth bass, pumpkinseed, rock bass, smallmouth bass, white sucker, yellow bullhead and yellow perch.

Fall electrofishing was conducted on 10 miles of the 26.2 miles of Rhinelanders Flowage shoreline by Great Lakes Indian Fish and Wildlife Commission (GLIFWC) in 2001 and 2002. Wisconsin DNR electrofished 8 miles in fall of 2005 and 14.2 miles in fall of 2011. Young of year (yoy) walleye catch ranged from 0.1 to 2.6 and averaged 1.0 per mile. Muskellunge under 30 inches totaled 1 in 2002, 4 in 2005 and 4 in 2011.

#### Boom Lake

Fyke net catch from October 14-16, 1957 lists 10 walleye, 3 northern pike, 1 muskellunge, 4 suckers, 46 crappies, 53 perch, 41 sunfish, 3 largemouth bass, 55 bullhead and 5 redhorse from 8, 5-foot nets in Boom Lake (16 net-nights). Catch data from lifts on October 22 and 23, 1957 includes 14 walleye, 32 northern pike, 1 muskellunge, 1 sucker, 106 crappies, 125 perch, 50 sunfish, 500 bullhead and 3 redhorse from 12 nets in Boom Lake (24 net-nights)

A contract and state fisherman's daily report from May 16 and May 18, 1963 is likely from bullhead removal prompted by a fall, 1962 electrofishing survey. The report lists a Boom Lake catch of 5 walleye, 10 northern pike, 270 crappie, 665 bluegill, 160 perch, 7 suckers and 100 pounds of bullheads.

Six mini-fyke nets were set on August 24 and lifted on August 25, 2005 (6 net-nights). The catch included bluegill, hybrid bluegill x pumpkinseed, golden shiner, largemouth bass, pumpkinseed, rock bass, yellow bullhead and yellow perch.

Fall electrofishing surveys were conducted in 1962, 2005 and 2011 by DNR and in 2002, 2004 and 2010 by GLIFWC. Young of year walleye catch ranged from 0 to 18.3 and averaged 4.3 per mile. Muskellunge were not targeted by GLIFWC; fish under 30 inches totaled 0 in 1962, 2 in 2005 and 0 in 2011.

#### Bass Lake

Fall electrofishing was conducted on September 13, 2011. Gamefish catch consisted of 57 largemouth bass, 9 northern pike and 1 walleye.

### Thunder Lake

Six mini-fyke nets were set on August 23 and lifted on August 24, 2005 (6 net-nights). The catch included black crappie, bluegill, johnny darter, largemouth bass, pumpkinseed, smallmouth bass, yellow bullhead and yellow perch.

Fall electrofishing found 0 yoy walleye in 2005 and 2011. Three muskellunge were captured, including a 20.5-inch fish in 2011.

### Lake Creek Lake

No previous surveys were conducted on Lake Creek.

## METHODS

A raft shocker was used to electrofish 11 miles of the Wisconsin River from Rainbow Dam to Bridge Road during 7 days between April 12-18, with a recapture run on April 25. Marking was mostly conducted from the plunge pool below the dam to near the top of Rainbow Rapids, about 2.3 miles of river, but the full 11 miles was electrofished on April 18 and 25. The raft shocker uses an inflatable raft with an internal metal frame, driven by a 15-hp outboard. It has an on-board electrical generator and a single dip netter stands on the bow. Except for the single dip netter, it operates similar to a boom shocker, but the rubberized exterior allows the raft to slide off or over rocks and shallows.

The ice was mostly out on Rhinelander Flowage by April 16, and 8 standard fyke nets (¾-inch mesh, bar measure) were set on April 18, with one more set on April 22, 2011. These nets targeted walleye and northern pike, and effort totaled 78 net-nights. The nets were moved to walleye and pike locations on Boom (6 nets) and Thunder Lake (3 nets) on April 27, although a large ice floe persisted on Boom for about 3 more days. One additional net was added to Boom and 2 nets to Lake Creek on April 28. The nets were moved to muskellunge locations on May 1, and 2 of the Boom Lake nets were moved to Bass Lake. On May 3, one of the Boom Lake muskellunge nets was moved to Rhinelander Flowage, along with 4 additional nets. One net was pulled from Boom and 2 from Thunder on May 6, 3 from Thunder, 2 from Boom and 1 from Bass on May 7, and the last 7 muskie nets were pulled on May 8. Eight standard ¾-inch nets targeting panfish (except one ½-inch mesh was set on Boom to target smaller fish) were set on September 12 and fished for 4 nights. They were distributed among Rhinelander Flowage (3 nets), Boom Lake (2), Bass Lake (1) and Thunder Lake (2). Walleye netting effort totaled 125, muskellunge effort totaled 92 and panfish totaled 32 net-nights.

Length or length category (nearest half-inch) was recorded for all gamefish in spring and for a sample of panfish. Half fin clips (only half the fin was removed to allow faster regeneration) were given to adult gamefish during spring for use in mark-recapture population estimates. Adult gamefish were given a left-ventral (LV) fin clip on Wisconsin River, right-ventral (RV) on Rhinelander Flowage, left-pectoral (LP) on Boom and Bass Lakes and right-pectoral (RP) on Thunder and Lake Creek Lakes. Juvenile gamefish were given a top-caudal (TC, i.e., top-tail) clip. Age structures (scales or spines) were removed from ten fish per species, per half-inch group.

## RESULTS AND DISCUSSION

### Walleye

Multiple walleye spawning sites may exist on the Boom-Rhinelander system, but the Wisconsin River from Rainbow Flowage Dam to just below Rainbow Rapids appears to be the primary location

for walleye spawning. During electrofishing on Wisconsin River, 831 walleye were captured in 6 days of marking, including 152 recaptures and 9 juvenile fish less than 15 inches in length. The recapture sample yielded an additional 191 walleye, including 62 recaptures. The mark-recapture population estimate is 1,950 adult walleye ( $\pm 200$ , SD).

Low numbers of walleye were captured in other areas. On Rhinelander Flowage, 154 walleye were captured, including 1 juvenile fish, 1 LV-recapture marked in Wisconsin River and 17 RV-recaptures marked in Rhinelander Flowage. The Rhinelander Flowage fish appeared to be cruising the limited spawning gravel and they may represent a subpopulation that spawns in the flowage. The north shore of Boom Lake was likely formed by an esker deposit. The shore is mostly clean gravel that appears to be quite suitable for walleye spawning. However, ice-out on Boom happened 11 days after ice-out on Rhinelander Flowage and 15 days after we started electrofishing on Wisconsin River, so fish may have headed upriver rather than wait for ice to leave the lake. Only 9 walleye were captured on Boom Lake despite setting nets in 6 locations with clean gravel. The fish we captured in Boom Lake were mostly spawned out, and 3 of the fish were carrying the LV fin clip given in Wisconsin River. One walleye was captured in Thunder Lake and none in Lake Creek. These results suggest that fish mostly left the impounded areas to spawn in Wisconsin River and either had not returned or were no longer vulnerable to nets in shoreline areas by the time we pulled muskie nets on May 8.

Adult walleye showed good size structure, but we found few upper 20-inch fish (Figure 1). Forty-three percent of adult walleye were at least 15 inches long, and 9.7% were 20 inches or longer, but only 1.3% (12 fish) were 25 inches or longer. The largest walleye were two 28.3-inch females from Wisconsin River, aged at 11 and 12 from scales. Walleye length-at-age was quite variable among fish. Females were about a year behind average through age 10, and mean length-at-age stagnated at 25.1 to 25.8 inches for ages 11-15. Male walleye length-at-age varied between average or a year behind for most ages (Appendix A).

Figure 1. Length-frequency of adult walleye during 2011 in the Boom-Rhinelander Chain of lakes, Oneida County WI.

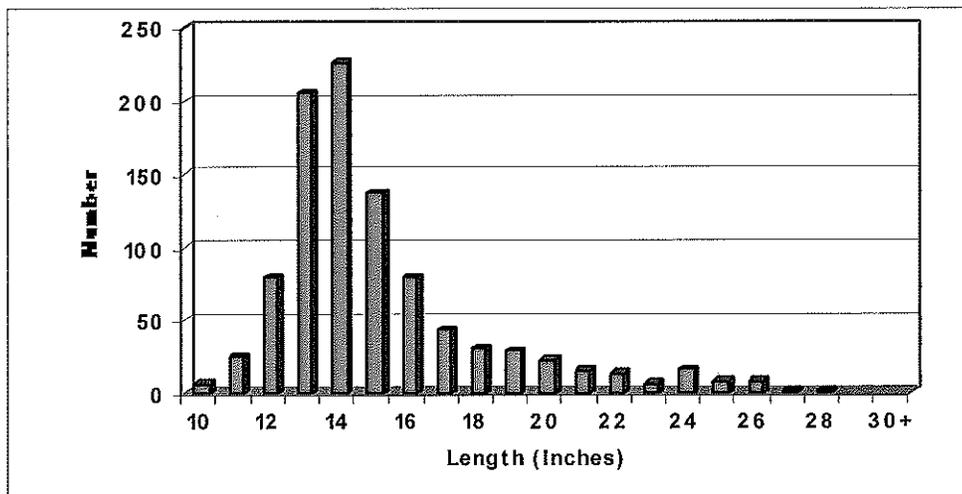


Table 1. Fish stocking record during 1975 through 2011 in the Boom-Rhineland Chain of lakes, Oneida County Wisconsin.

| Year | Species         | Size                       | Number  | Comments                           |
|------|-----------------|----------------------------|---------|------------------------------------|
| 1975 | muskellunge     | lg fingerling (10 inch)    | 175     | Thunder Lake                       |
| 1976 | muskellunge     | lg fingerling              | 515     | Boom Lake                          |
| 1979 | muskellunge     | lg fingerling (9 inch)     | 800     | Boom Lake                          |
| 1981 | muskellunge     | lg fingerling (10 inch)    | 125     | Boom L. – MU Clubs Alliance        |
| 1981 | muskellunge     | lg fingerling              | 1,000   | Boom L. – permit to WI Musky Guild |
| 1981 | muskellunge     | lg fingerling (10 inch)    | 125     | Rhineland Flowage – Alliance       |
| 1982 | muskellunge     | lg fingerling (9 inch)     | 759     | Boom Lake                          |
| 1982 | muskellunge     | lg fingerling (11 & 12”)   | 2,300   | Rhineland Flowage                  |
| 1984 | muskellunge     | lg fingerling              | 400     | Boom Lake                          |
| 1984 | muskellunge     | lg fingerling (8 inch)     | 1,105   | Rhineland Flowage                  |
| 1985 | muskellunge     | lg fingerling (8 inch)     | 800     | Boom Lake                          |
| 1985 | muskellunge     | lg fingerling (10 inch)    | 2,500   | Rhineland Flowage                  |
| 1987 | muskellunge     | lg fingerling (11 inch)    | 801     | Boom Lake                          |
| 1989 | muskellunge     | lg fingerling (12 inch)    | 400     | Boom Lake                          |
| 1989 | channel catfish | lg fingerling (4-8 inch)   | 4,231   | Rhl Flg – Northwoods Fishing Club  |
| 1990 | muskellunge     | lg fingerling (11-13 inch) | 3,000   | Boom Lake                          |
| 1990 | channel catfish | lg fingerling (6-8 inch)   | 6,328   | Boom – Northwoods Fishing Club     |
| 1991 | muskellunge     | lg fingerling (10.8 inch)  | 400     | Boom Lake                          |
| 1991 | muskellunge     | lg fingerling (10.8 inch)  | 910     | Rhineland Flowage                  |
| 1993 | muskellunge     | lg fingerling              | 400     | Boom Lake                          |
| 1993 | muskellunge     | lg fingerling              | 2,500   | Rhineland Flowage                  |
| 1994 | muskellunge     | lg fingerling              | 470     | Boom Lake                          |
| 1995 | muskellunge     | fry                        | 100,000 | Boom Lake                          |
| 1996 | muskellunge     | fry                        | 100,000 | Boom Lake                          |
| 1996 | muskellunge     | fry (0.5 inch)             | 100,000 | Rhineland Flowage                  |
| 1996 | muskellunge     | lg fingerling              | 467     | Boom Lake                          |
| 1997 | muskellunge     | lg fingerling              | 200     | Boom Lake                          |
| 1997 | muskellunge     | lg fingerling              | 1,250   | Rhineland Flowage                  |
| 1998 | muskellunge     | lg fingerling (12.5 inch)  | 870     | Boom Lake                          |
| 1999 | muskellunge     | lg fingerling (11.8 inch)  | 1,000   | Rhineland Flowage                  |
| 2000 | muskellunge     | lg fingerling (10.9 inch)  | 870     | Boom Lake                          |

Table 2. Catch per unit effort during a 2011 survey of the Boom-Rhineland Chain of lakes, Oneida County WI. Electrofishing catch rates are number of fish per hour, while netting catch rates are number of fish per net night. April 12-16 shocking occurred within about 2.3 miles of Rainbow Dam, while April 18 and 25 shocking encompass 11 river miles from the dam to Bridge Road.

| species                       | April 12-16<br>shocking | April 18<br>shocking | April 25<br>shocking | walleye<br>netting | muskie<br>netting | panfish<br>netting |
|-------------------------------|-------------------------|----------------------|----------------------|--------------------|-------------------|--------------------|
| walleye                       | 35.5                    | 32.3                 | 44.7                 | 1.2                | 0.12              | 0.34               |
| largemouth bass               | 0                       | 0                    | 0                    | 0.62               | 1.1               | 0.59               |
| smallmouth bass               | 0.20                    | 0                    | 0                    | 0.26               | 0.16              | 0.41               |
| muskellunge                   | 0.31                    | 0                    | 0.47                 | 0.18               | 0.31              | 0                  |
| northern pike                 | 1.8                     | 0.72                 | 0.70                 | 4.1                | 1.7               | 0.69               |
| black bullhead                |                         |                      |                      | 0.016              | 0.033             | 0                  |
| black crappie                 |                         |                      |                      | 5.4                | 7.3               | 6.5                |
| bluegill                      |                         |                      |                      | 41.3               | 18.1              | 152.9              |
| hybrid bluegill x pumpkinseed |                         |                      |                      | 1.4                | 0.7               | 6.4                |
| bowfin                        |                         |                      |                      | 0.65               | 1.5               | 0.53               |
| burbot                        |                         |                      |                      | 0.008              | 0                 | 0                  |
| chestnut lamprey              | present                 |                      |                      | present            | 0                 | 0                  |
| golden redhorse               |                         |                      |                      | 0                  | 0.011             | 0                  |
| golden shiner                 |                         |                      |                      | 0.22               | 0.25              | 0.094              |
| greater redhorse              |                         |                      |                      | 0.016              | 0                 | 0                  |
| northern hog sucker           |                         |                      |                      | 0.024              | 0                 | 0                  |
| pumpkinseed                   |                         |                      |                      | 3.3                | 1.7               | 14.0               |
| rock bass                     |                         |                      |                      | 1.3                | 0.29              | 1.1                |
| shorthead redhorse            |                         |                      |                      | 0.24               | 0.011             | 0.13               |
| silver redhorse               |                         |                      |                      | 0.81               | 0.21              | 0.28               |
| white sucker                  |                         |                      |                      | 0.28               | 0.076             | 0.28               |
| yellow bullhead               |                         |                      |                      | 2.4                | 11.3              | 3.0                |
| yellow perch                  |                         |                      |                      | 29.7               | 13.1              | 0.91               |

#### Largemouth and Smallmouth Bass

We captured 179 largemouth bass during spring sampling, including 10 juvenile fish less than 8 inches and 3 recaptures of previously-marked fish. Largemouth bass averaged 14.2 inches and 67% were 14 inches and larger (Figure 2). The longest largemouth were two fish 19.4 inches in length from Rhineland Flowage.

Fifty smallmouth bass (including 3 fish smaller than 8 inches) were captured during the survey. Average length was 15.0 inches and 79% were 14 inches and larger (Figure 3). Only 3 smallmouth were captured electrofishing in Wisconsin River, despite good numbers of smallmouth reported by anglers in the summer months. The peak of fish at 18 to 20 inches, including the largest fish at 19.3 inches, was mostly contributed during May 25-27 by the most upstream net in Rhinelander Flowage. It is likely we intercepted a group of fish moving from wintering areas in the flowage to spawning and feeding areas in Wisconsin River. No fin clipped smallmouth were recaptured to allow calculation of a population estimate.

Figure 2. Length-frequency of adult largemouth bass during 2011 in the Boom-Rhinelander Chain of lakes, Oneida County Wisconsin.

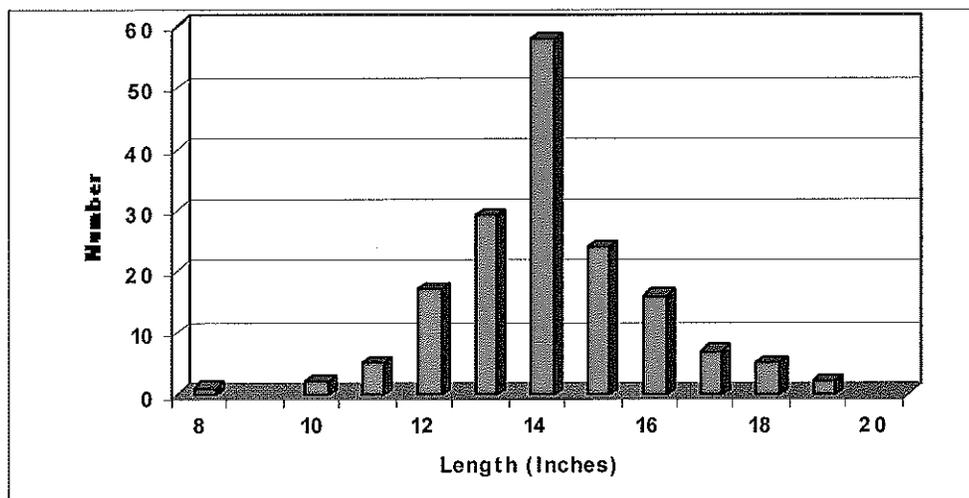
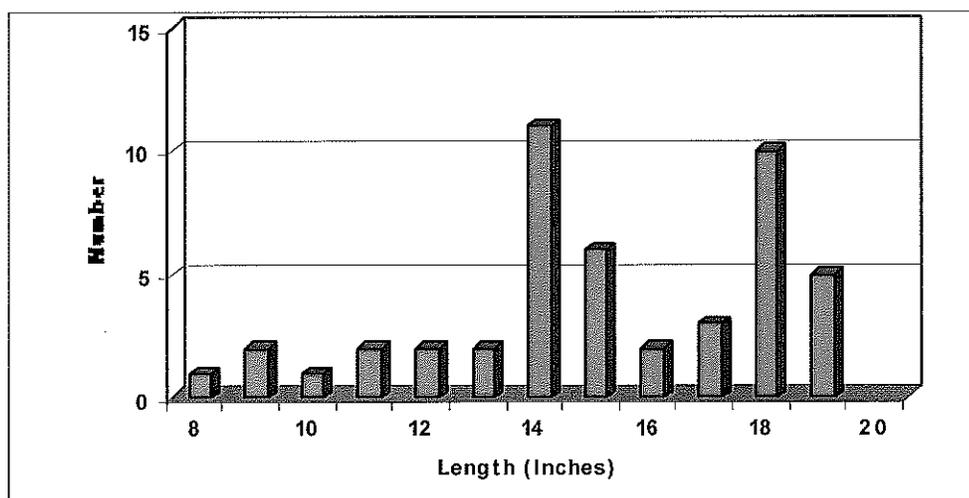


Figure 3. Length-frequency of adult smallmouth bass during 2011 in the Boom-Rhinelander Chain of lakes, Oneida County Wisconsin.

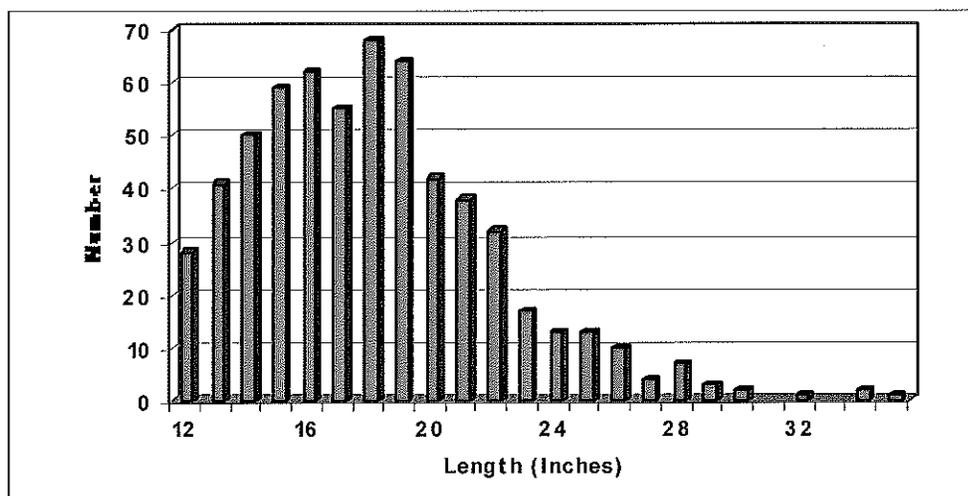


### Northern Pike

We captured 726 northern pike (including 92 recaptures of previously-marked fish and 5 immature fish less than 12 inches in length). The northern pike population (excluding the Wisconsin River and including sexually mature fish and all fish over 12 inches) was estimated at 2,719 ( $\pm 330$  SD), or 1.2 per acre, using the Schnabel multiple-capture method (Ricker 1975). This is considered low density

for a northern pike population. The low density may in part be due to low netting effort in well-vegetated upstream reaches of Rhinelander Flowage and Lake Creek, coupled with inclusion of the total area in calculating catch per acre. The male population was estimated at 0.38 ( $\pm$  0.06) and the females at 0.81 ( $\pm$  0.15) per acre. Average size of northern pike was 18.5 inches; 4.7% of pike were 26 inches or larger and only 0.95% exceeded 30 inches (Figure 4). The largest northern pike was a 35.9 inch female from Rhinelander Flowage that weighed 13.3 pounds.

Figure 4. Length-frequency of northern pike during 2011 in the Boom-Rhinelander Chain of lakes, Oneida County Wisconsin.

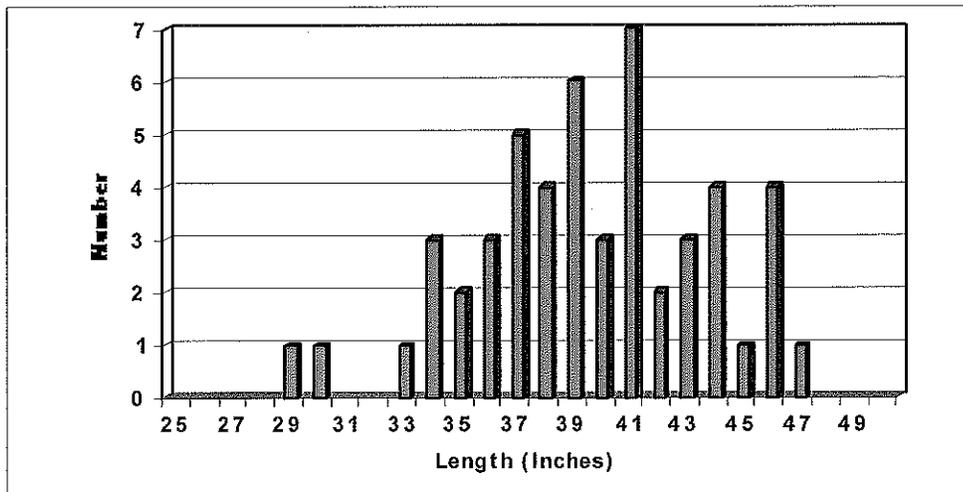


### Muskellunge

We captured 60 muskellunge during the spring survey, including 9 recaptures of previously-marked fish. Adult muskellunge ranged from 29.6 to 47.1 inches in length and averaged 40.2 inches (Figure 5). Muskellunge were last stocked in The Boom-Rhinelander Chain 11 years ago, in 2000 (Table 1), although it is possible for stocked fish from Gilmore Lake to enter the system over a low-head dam. In Northern Wisconsin, average length of an 11-year-old male muskellunge is about 37.9 inches in length, while age-11 females average 43.2 inches. Muskellunge in the Boom-Rhinelander Chain were generally growing at or above average, so smaller fish likely originate from natural reproduction. Five muskellunge between 8 and 30 inches in length captured during fall, 2011 electrofishing also provide evidence of natural reproduction. However, the low catch of 0.31 per net night (Table 2), the high mean length and a length-frequency centered on 40 inches suggest a low-density, ageing population with low recruitment. A low rate of muskellunge stocking is warranted to supplement the population.

Boom-Rhinelander Chain has good potential to produce large muskellunge due to its large acreage, abundant perch and sucker forage, and an ability to produce large fish in the past. The system's current muskellunge classification of A<sub>1</sub> is appropriate for this type of trophy water with the potential to produce large muskellunge, but where overall numbers are relatively low.

Figure 5. Length-frequency of muskellunge during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.



### Panfish

The Boom-Rhineland Chain is an impoundment with moderate depth, good fertility, extensive stump fields and aquatic vegetation. These conditions often result in high panfish abundance and fast growth. We found very high September catches of bluegill and pumpkinseed, while black crappie showed moderate abundance in all three netting periods. Catch of yellow perch was fairly high in April when they were moving to spawn, while yellow bullhead catch was highest during May muskellunge netting (Table 2).

Average bluegill length was 6.2 inches and we found good numbers of fish out to 8.5 inches (Figure 6). Pumpkinseed were most abundant from 5 to 6.5 inches and only 2 of 372 fish broke 7 inches (Figure 7), while bluegill x pumpkinseed hybrids averaged 6.1 inches and had a broad peak from 5.5 to 8 inches (Figure 8). Yellow perch were broadly distributed from 5.5 to 10 inches (Figure 9). Black crappies had a strong peak at 4.7 inches, but we found strong numbers out to 11.5 inches (Figure 10).

Figure 6. Length-frequency of bluegill during 2011 in the Boom-Rhineland Chain of lakes, Oneida County Wisconsin.

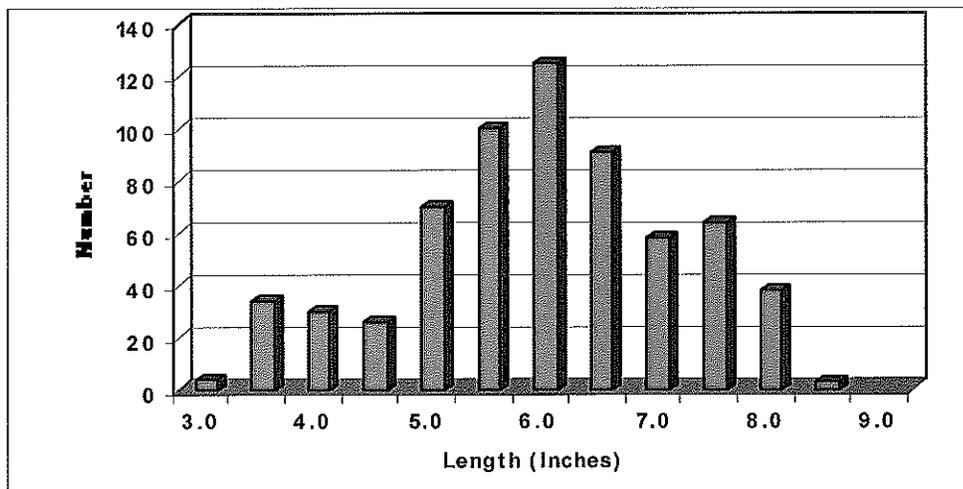


Figure 7. Length-frequency of pumpkinseed during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.

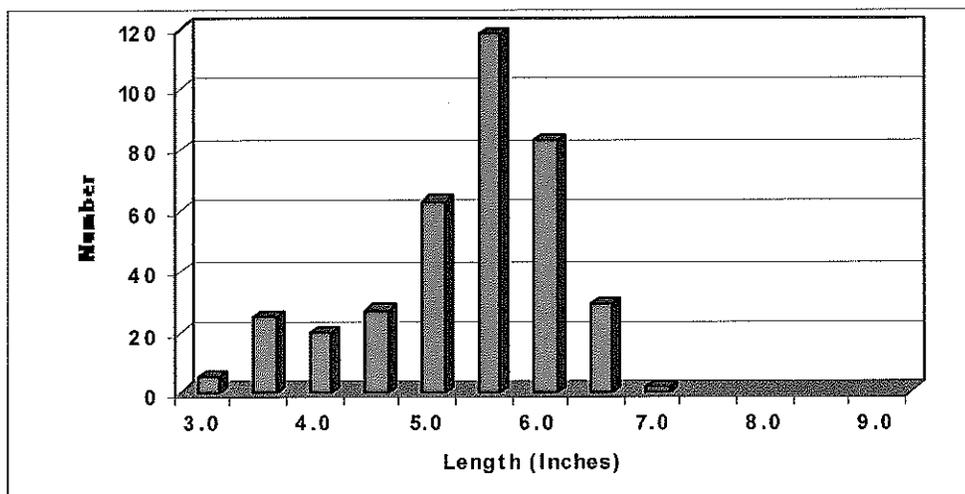


Figure 8. Length-frequency of bluegill x pumpkinseed hybrids during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.

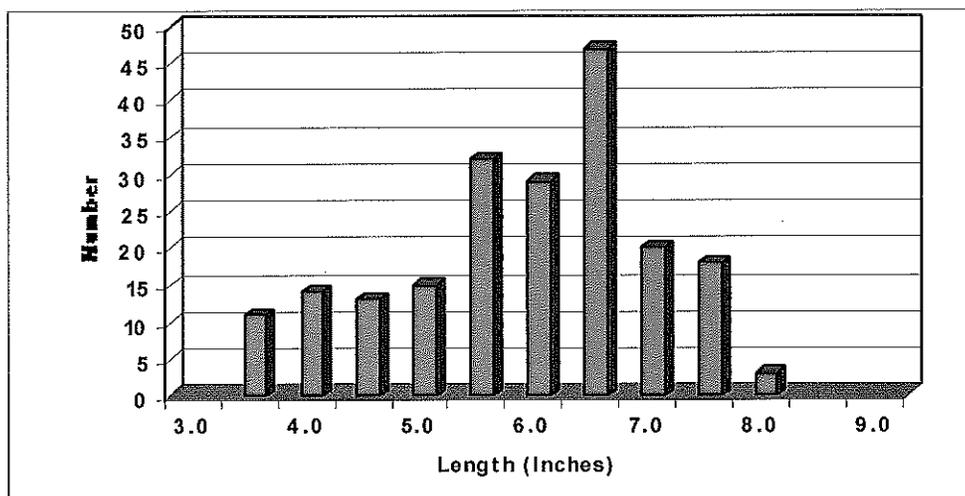


Figure 9. Length-frequency of yellow perch during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.

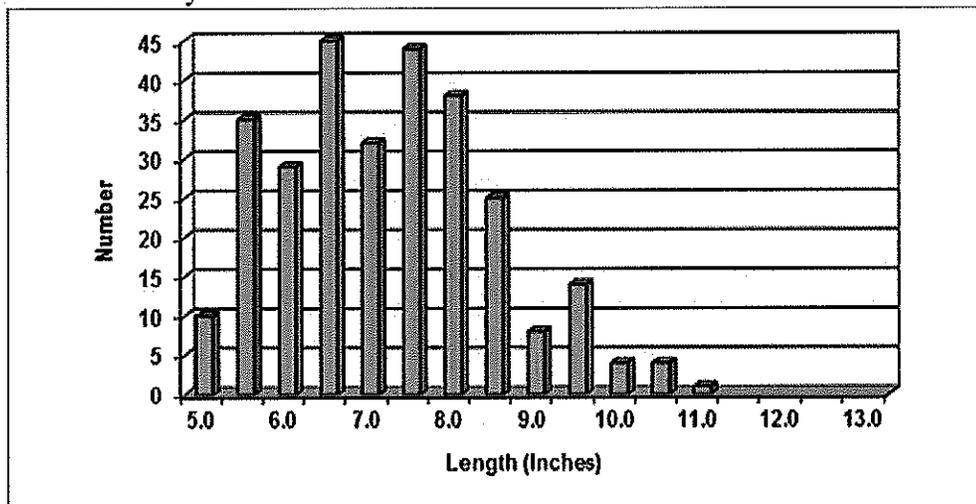


Figure 10. Length-frequency of black crappie during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.

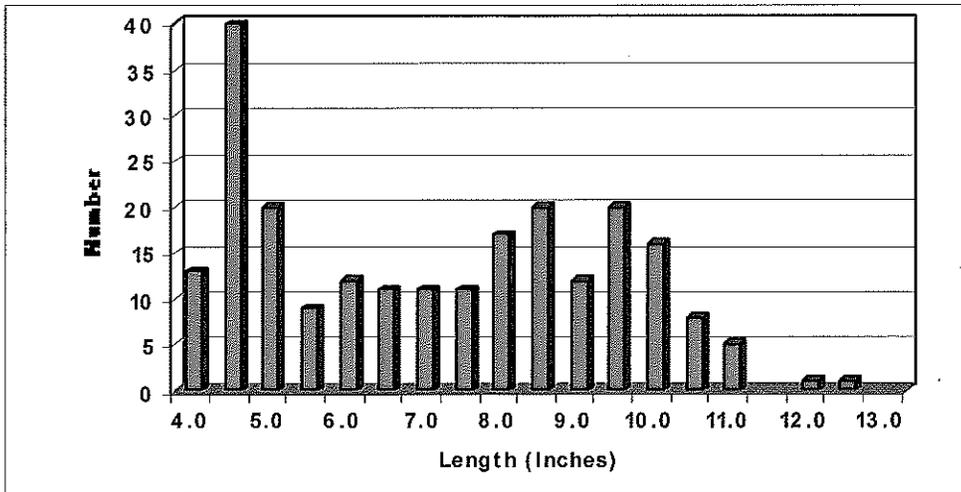


Figure 11. Length-frequency of rock bass during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.

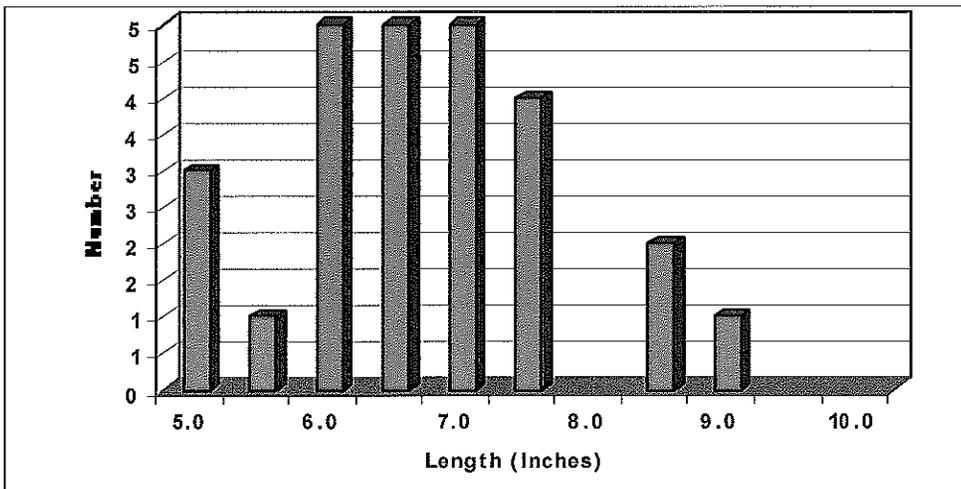
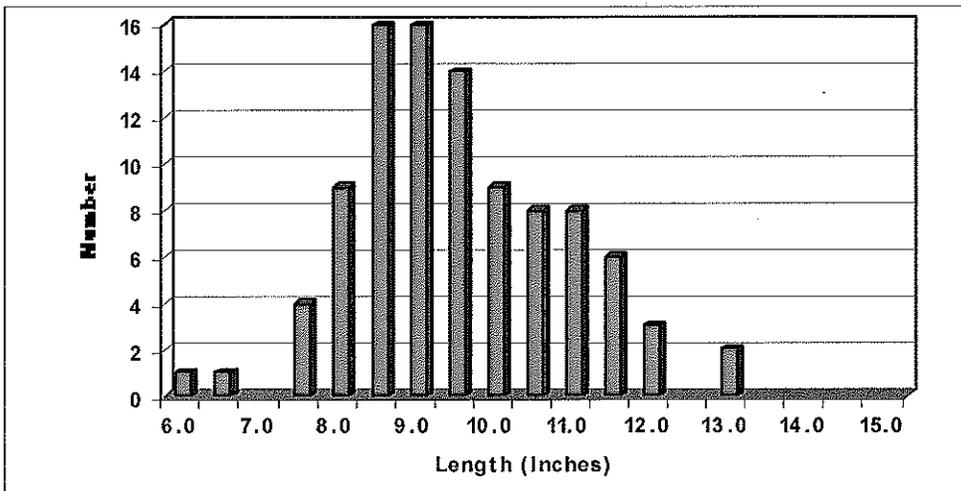


Figure 12. Length-frequency of yellow bullhead during 2011 in the Boom-Rhineland Chain of lakes, Oneida County WI.



## MANAGEMENT RECOMMENDATIONS

The Boom-Rhineland Chain of lakes supports a diverse fishery. Walleye, northern pike, largemouth bass, smallmouth bass and muskellunge are all important parts of the gamefish community, with no one species dominating. Size structure of game species was moderate, and individual fish were robust. Bluegill, pumpkinseed and yellow perch dominated the panfish catch, while yellow bullhead, black crappie and hybrid bluegill x pumpkinseed were moderately abundant. Rock bass and a few black bullhead were also present.

We found 25% of bluegill were at least 7 inches and 32% of perch were at least 8 inches. The 10-inch mark was met or exceeded by 13% of black crappie and 37% of yellow bullhead. Forage and non-game species include parasitic chestnut lamprey (we captured three attached to a walleye or redhorse), bowfin, burbot, golden redhorse, golden shiner, greater redhorse, Iowa darter, northern hog sucker, shorthead redhorse, silver redhorse and white sucker. Troutperch and log perch were noted while electrofishing the Wisconsin River. The Boom-Rhineland Chain is best managed as a mixed fishery for consumptive opportunity of most species. Natural reproduction of muskellunge appears to be limited. Supplemental stocking at a low rate is recommended to support a low to moderate-density muskellunge fishery with trophy size potential.

## ACKNOWLEDGEMENTS

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Cover image courtesy of Oneida County website. [www.co.oneida.wi.gov](http://www.co.oneida.wi.gov)

## APPENDIX A FISH AGE RESULTS

The aged subsamples were applied against the full length-frequency to eliminate bias from a non-random subsample of age structures.

Table A.1. Male walleye length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 3   | 8              | 12.8        | 11.9             |
| 4   | 18             | 13.3        | 13.3             |
| 5   | 32             | 13.9        | 14.2             |
| 6   | 20             | 14.7        | 15.6             |
| 7   | 25             | 15.4        | 16.6             |
| 8   | 16             | 16.2        | 17.6             |
| 9   | 5              | 18.6        | 18.7             |
| 10  | 8              | 16.5        | 19.2             |
| 11  | 4              | 20.1        | 19.4             |
| 12  | 5              | 21.1        | 20.0             |
| 13  |                |             |                  |
| 14  | 1              | 19.6        |                  |

Table A.2. Female walleye length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 3   |                |             | 13.3             |
| 4   | 3              | 13.6        | 15.0             |
| 5   | 24             | 15.4        | 16.2             |
| 6   | 37             | 16.6        | 17.8             |
| 7   | 30             | 17.7        | 19.6             |
| 8   | 15             | 19.8        | 21.0             |
| 9   | 9              | 20.0        | 22.5             |
| 10  | 10             | 22.6        | 23.5             |
| 11  | 11             | 25.2        | 24.7             |
| 12  | 12             | 25.1        | 25.4             |
| 13  | 5              | 25.1        | 26.5             |
| 14  | 4              | 25.8        | 27.4             |
| 15  | 1              | 25.4        | 27.7             |

Table A.3. Largemouth bass length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 1   | 1              | 4.8         | 3.5              |
| 2   | 3              | 7.3         | 6.6              |
| 3   | 6              | 8.0         | 8.9              |
| 4   | 7              | 11.6        | 10.5             |
| 5   | 9              | 12.8        | 12.1             |
| 6   | 20             | 14.4        | 13.6             |
| 7   | 24             | 14.3        | 14.9             |
| 8   | 24             | 15.3        | 15.8             |
| 9   | 8              | 16.5        | 16.2             |
| 10  | 6              | 16.9        | 17.1             |
| 11  | 5              | 18.7        | 17.8             |
| 12  | 1              | 16.6        | 18.2             |

Table A.4. Smallmouth bass length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 1   |                |             | 3.5              |
| 2   | 1              | 5.1         | 6.9              |
| 3   | 1              | 7.0         | 9.3              |
| 4   | 4              | 9.1         | 11.8             |
| 5   | 5              | 12.1        | 13.5             |
| 6   | 11             | 14.4        | 15.2             |
| 7   | 4              | 14.8        | 16.1             |
| 8   | 4              | 16.9        | 17.1             |
| 9   | 5              | 18.2        | 17.7             |
| 10  | 7              | 18.5        | 18.3             |
| 11  | 2              | 19.2        | 18.5             |
| 12  | 2              | 19.0        | 19.8             |

Table A.5. Male northern pike length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 2   |                |             | 13.4             |
| 3   | 19             | 14.5        | 16.2             |
| 4   | 54             | 15.3        | 18.9             |
| 5   | 46             | 16.7        | 20.6             |
| 6   | 29             | 18.3        | 22.3             |
| 7   | 30             | 19.5        | 23.4             |
| 8   | 21             | 19.9        | 24.8             |
| 9   | 11             | 21.3        | 23.9             |
| 10  | 5              | 19.9        |                  |
| 11  |                |             |                  |
| 12  |                |             |                  |

Table A.6. Female northern pike length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 2   | 1              | 18.2        |                  |
| 3   | 25             | 14.8        | 16.9             |
| 4   | 38             | 16.1        | 20.4             |
| 5   | 61             | 19.1        | 23.1             |
| 6   | 40             | 20.4        | 24.4             |
| 7   | 35             | 22.8        | 27.3             |
| 8   | 9              | 22.0        | 28.8             |
| 9   | 8              | 28.2        | 32.1             |
| 10  | 5              | 26.7        |                  |
| 11  | 1              | 20.3        |                  |
| 12  | 3              | 29.6        |                  |

Table A.7. Male muskellunge length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 5   |                |             | 29.2             |
| 6   | 2              | 30.0        | 31.5             |
| 7   | 2              | 35.2        | 33.3             |
| 8   | 1              | 35.2        | 34.4             |
| 9   | 5              | 37.1        | 35.8             |
| 10  | 7              | 39.1        | 37.3             |
| 11  |                |             | 37.9             |
| 12  | 3              | 39.9        | 39.0             |
| 13  | 3              | 42.1        | 38.9             |
| 14  |                |             | 43.5             |

Table A.8. Female muskellunge length at age in the Boom-Rhineland Chain, Oneida County Wisconsin during 2011.

| Age | Number of fish | avg. length | Northern WI avg. |
|-----|----------------|-------------|------------------|
| 5   |                |             | 31.9             |
| 6   | 3              | 36.1        | 33.7             |
| 7   | 2              | 37.7        | 35.8             |
| 8   | 1              | 39.5        | 38.1             |
| 9   | 1              | 41.5        | 39.5             |
| 10  | 9              | 43.1        | 41.0             |
| 11  | 4              | 43.2        | 43.2             |
| 12  | 1              | 42.3        | 43.7             |
| 13  | 2              | 43.4        | 44.3             |
| 14  | 3              | 44.4        |                  |