LAKE RIPLEY FISHERY REPORT
AND MANAGEMENT RECOMMENDATIONS (2009)

I. Value and Role of Fisheries

Fisheries play a central role in maintaining a healthy lake ecosystem through their interactions with other biological communities. They are important not only for recreation, but as biotic indicators of environmental quality. For example, declines in native fish populations can be an early sign of water quality or habitat degradation, and are often accompanied by declines in other wildlife species. Water quality changes, non-native species introductions, and loss of natural habitat are common factors leading to such declines. These ecological disruptions can, in turn, create food-web imbalances and cascading effects that can materially alter the structure and composition of the entire fishery.

Bluegill (above) are preyed upon by bass and other large gamefish. They can easily over-populate, become stunted, and even affect water quality in the absence of this predator-prey dynamic.

Fishery composition and behavior can influence a lake's condition, and vice versa. Normal predator-prey dynamics, for example, function to keep populations in check, which controls overcrowding and over-competition that causes fish stunting and other problems. Changes in the amount and type of available plant cover can favor certain species over others, thereby affecting growth rates and the redistribution of nutrients and food resources. For instance, a lake dominated by small bluegill might signify the absence or reduced effectiveness of top predators, like bass or walleye. Excessive gamefish harvests, reduced water clarity, or overly dense plant beds that favor small bluegill are among the plausible variables that would precipitate such a situation. As a result, bluegills might overgraze on zooplankton (the tiny organisms that feed on algae), depleting the fish's own food stock while eliminating the lake's natural control on algae growth. Bluegills then become stunted, while algal blooms begin to occur with greater frequency and intensity.

Recognizing these types of interrelationships is a critical first step in diagnosing problems and finding solutions, especially in the context of larger management goals. It is also the basis for the following discussion and subsequent recommendations.

II. Habitat Requirements

A diverse mix of native aquatic plants offer important habitat for fish. Plants provide shelter, food, oxygen and other necessities.

The principal feature of a healthy fishery is the availability of suitable habitat, and each fish species has different requirements. Therefore, ideal habitat is that which supports the various life-cycle needs of the resident, native fish populations. Important habitat components include water chemistry, clarity, temperature levels, dissolved oxygen concentrations, spawning or foraging substrate, cover from predators, and access to sufficient food resources. If any one of these requirements is found to be in short supply, habitat quality is reduced and the lake's fish community can be negatively affected, beginning with the most sensitive or habitat-specific species.

Lakes with well vegetated shorelines and an abundance of coarse woody habitat (top) tend to support healthier fisheries than lakes without these features (bottom).

All else being equal, lakes with good water quality, well-vegetated shorelines, and thriving native aquatic plant communities are usually best positioned to support healthy fish populations. Alternatively, problems are often quick to develop in lakes with poor water quality, heavily developed watersheds and shorelines, and an absence of quality shoreland and aquatic vegetation. These particular lakes may become dominated by "rough fish" like carp.

A 2005 Lake Ripley study found significant shading under piers with a corresponding reduction in aquatic plant abundance, as well as a shift in community composition to one dominated by shade-tolerant species. The resulting loss of plant habitat under piers translated into a reduction in macroinvertebrates (a source of food for young fish), and declines in the catch rates of a number of fish species. Results suggest that the proliferation of piers and other near-shore structures may be contributing to the degradation of littoral zone habitat and biological diversity (Garrison et al, 2005).

III. Historical Overview

In 1927, northern pike, walleye, largemouth bass and white bass were all reported to be native to Lake Ripley, while bluegill, sunfish, catfish, yellow perch, bowfin, gar and carp were thought to have been either introduced or had worked their way up the Koshkonong Creek. It was further reported that extensive stocking of largemouth bass, perch eggs and walleye fry occurred from 1937-1945, in addition to the stocking of 17,000 "walleyed pike" fry in 1929 (Burris, 1971).

A 1946 survey by the former Wisconsin Conservation Department (WCD) showed bluegill, walleye, northern pike, largemouth bass, yellow perch, crappie, and bullhead as major contributors to the sport fishery (Mackenthun and Flakas, 1946). Sunfish, rock bass, longnose gar, bowfin, common sucker, bluntnose minnow, and top minnows were also documented in the lake at this time. During the 1950s and early 1960s, the former WCD removed native bowfin and longnose gar from Lake Ripley as "rough fish." Fisheries managers have since come to appreciate the importance of these native species for maintaining aquatic diversity and controlling slow-growing panfish and young carp (Marshall, 1994).

A June 1970 survey obtained similar results as in 1946, except for the apparent disappearance of the black crappie (re-inventoried in later surveys) and a large increase in carp. Rough fish, especially carp, have periodically been considered a problem in Lake Ripley, prompting state crews to come to the lake to periodically remove them. For example, an estimated 26,700 pounds of carp and 400 pounds of bowfin were removed from the lake between 1952 and 1956 (Burris, 1971).

Walleye fingerlings have been stocked in Lake Ripley about every two years since 1985 by the Wisconsin Department of Natural Resources (see Table 1). The objective of the walleye-stocking program is to supplement any natural reproduction and help control the stunting of the yellow perch population. However, recent electrofishing data suggest that perch remain under-sized despite this attempt at biomanipulation. These data are summarized in the next section.

Table 1: Wisconsin DNR fish-stocking records for Lake Ripley

Year	Species	Strain (Stock)	Age Class	Number Fish Stocked	Average Fish Length (Inches)
1985	SMALLMOUTH BASS	UNSPECIFIED	FINGERLING	8,620	3.00
1985	WALLEYE	UNSPECIFIED	FINGERLING	28,104	2.00
1986	WALLEYE	UNSPECIFIED	FINGERLING	5,917	4.00
1987	WALLEYE	UNSPECIFIED	FINGERLING	63,270	2.00
1989	WALLEYE	UNSPECIFIED	FINGERLING	22,496	2.00
1995	WALLEYE	UNSPECIFIED	FINGERLING	3,808	5.00
1995	WALLEYE	UNSPECIFIED	YEARLING	400	5.60
1997	WALLEYE	UNSPECIFIED	LARGE FINGERLING	22,874	1.60
1997	WALLEYE	UNSPECIFIED	SMALL FINGERLING	45,748	1.60
1999	WALLEYE	UNSPECIFIED	SMALL FINGERLING	21,000	1.30
2000	WALLEYE	UNSPECIFIED	SMALL FINGERLING	21,000	1.40
2002	WALLEYE	MISSISSIPPI HEADWATERS	SMALL FINGERLING	21,000	1.40
2003	WALLEYE	ROCK-FOX	SMALL FINGERLING	23,784	1.30
2004	WALLEYE	MISSISSIPPI HEADWATERS	SMALL FINGERLING	10,250	1.20
2005	WALLEYE	ROCK-FOX	SMALL FINGERLING	1,350	2.70
2006	WALLEYE	ROCK-FOX	LARGE FINGERLING	4,180	7.70

(Get DNR stocking data for 2007-09; determine reason for stocking intervals and variations in fish numbers)

IV. Recent Trends and Current Status

Lake Ripley has long been considered one of Wisconsin's finest largemouth bass lakes, and is famous for producing the state record in 1940. In addition to largemouth bass, a 1982 Wisconsin fish distribution study found the lake to support as many as 33 other fish species (Fago, 1982). However, several of these species failed to turn up in seine-catch data between 1970 and 2005, indicating a possible loss in species richness over this timeframe (citation?). The threatened pugnose shiner (*Notropis anogenus*) and least darter (*Etheostoma microperca*) are among those species that appear to have disappeared from the lake.

More recent inventories have been performed through electrofishing methods by the Wisconsin Department of Natural Resources. Sampling was limited to waters four feet deep or less, and within three sampling areas, representing about 50% of the total lake shore. Areas sampled consisted of South Bay (from the scout camp to the marina, and including Vasby's Channel), East Bay (including the inlet), and the lake's northeast shore. Each area was representative of different bottom substrates and degrees of aquatic plant growth.

Between 1992 and 2008, fall electrofishing surveys revealed an average species-richness of 16.4. Species diversity was found to range from a low of 10 to a high of 22, but without any noticeable trends during the period of record (see Figure 1). Table 2 lists the 28 different species of fish that were documented during one or more of the fall surveys. The timing and method of capture of these surveys can affect results, leaving a reasonable probability that some species may have been present but overlooked during sampling.

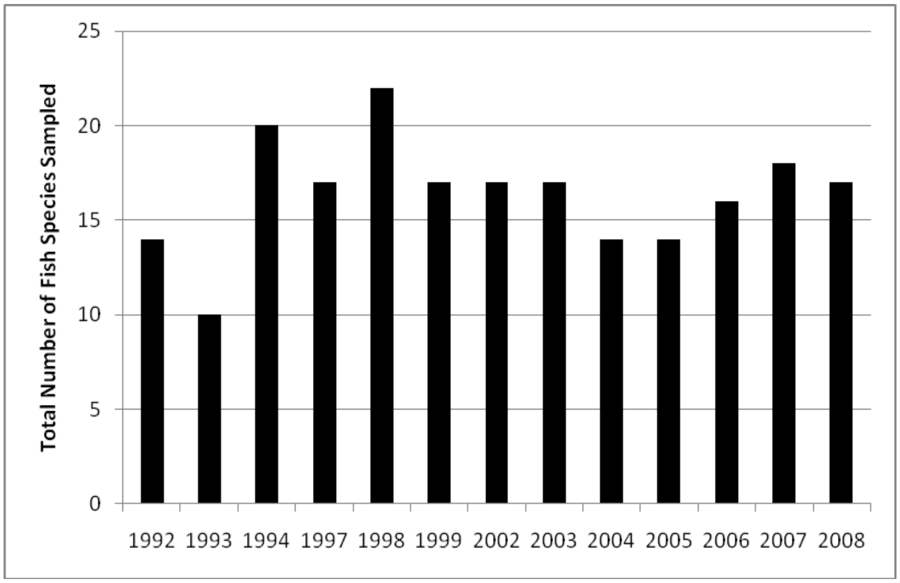

Figure 1: Species Richness as Determined by Fall Electrofishing Results (1992-2008)

Table 2: Fish species documented during fall electrofishing (1992-2008)

Fish Species	Common Name
Ambloplites rupestris	Rock bass
Ameiurus melas	Black bullhead
Ameiurus natalis	Yellow bullhead
Amia calva	Bowfin
Catostomus commersoni	White sucker
Cyprinus carpio	Carp
Erimyzon sucetta	Lake chubsucker
Esox americanus vermiculatus	Grass pickeral
Esox lucieus	Northern pike
Etheostoma nigrum	Johnny darter
Labidesthes sicculus	Brook silverside
Lepisosteus osseus	Longnose gar
Lepomis cyanellus	Green sunfish
Lepomis gibbosus	Pumpkinseed sunfish
Lepomis macrochirus	Bluegill
Lota lota	Burbot
Luxilus cornutus	Common shiner
Micropterus dolomieui	Smallmouth bass
Micropterus salmoides	Largemouth bass
Morone chrysops	White bass
Notemigonus crysoleucas	Golden shiner
Notropis atherinoides	Emerald shiner
Perca flavescens	Yellow perch
Pimephales notatus	Bluntnose minnow

Pomoxis annularus	White crappie
Pomoxis nigromaculatus	Black crappie
Stizostedion vitreum	Walleye
Umbra limi	Central mudminnow

Fall electrofishing survey results are summarized for largemouth bass, walleye, northern pike and bluegill in Figures 2-5 below. Graphs depict minimum, maximum and average lengths found during the 1992-2008 survey period, as well as the number of fish caught per hour of sampling, referred to as Catch Per Unit of Effort (CPUE, or CPE). Size-frequency distributions were representative of similar lakes found in Southern Wisconsin, and with no unusual trends evident.

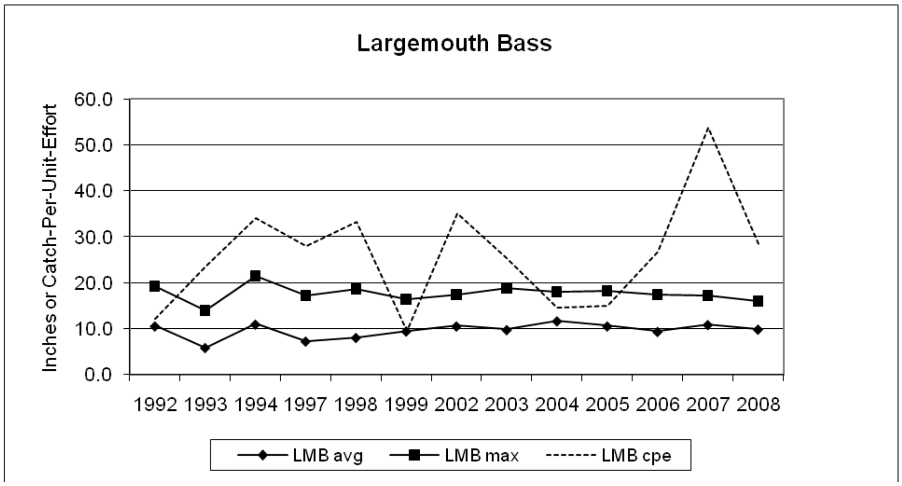

Figure 2: Fall Electrofishing Results for Largemouth Bass (1992-2008)

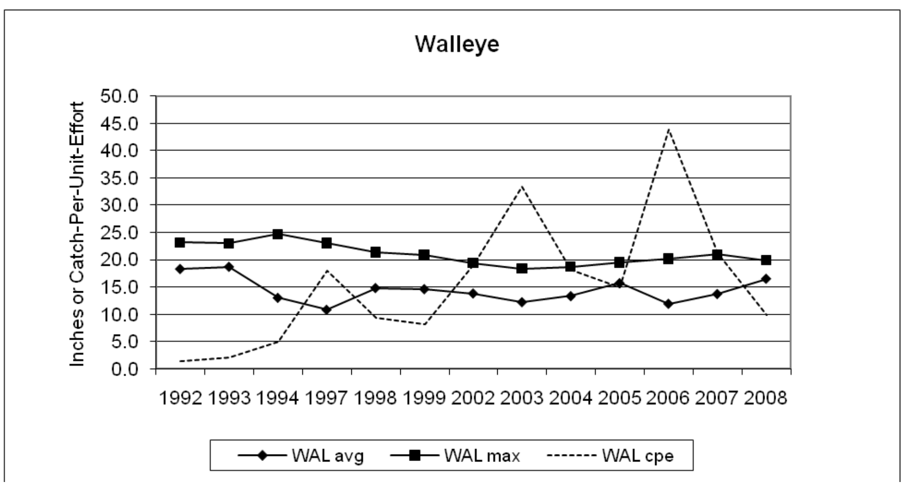

Figure 3: Fall Electrofishing Results for Walleye (1992-2008)

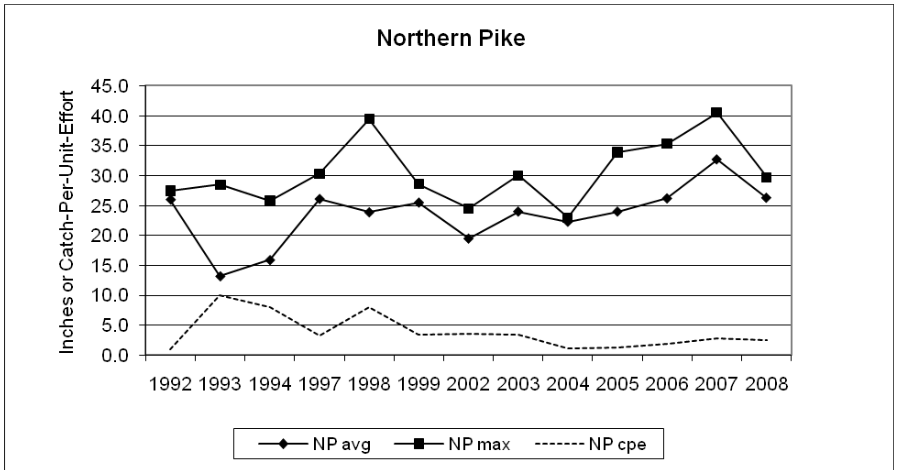

Figure 4: Fall Electrofishing Results for Northern Pike (1992-2008)

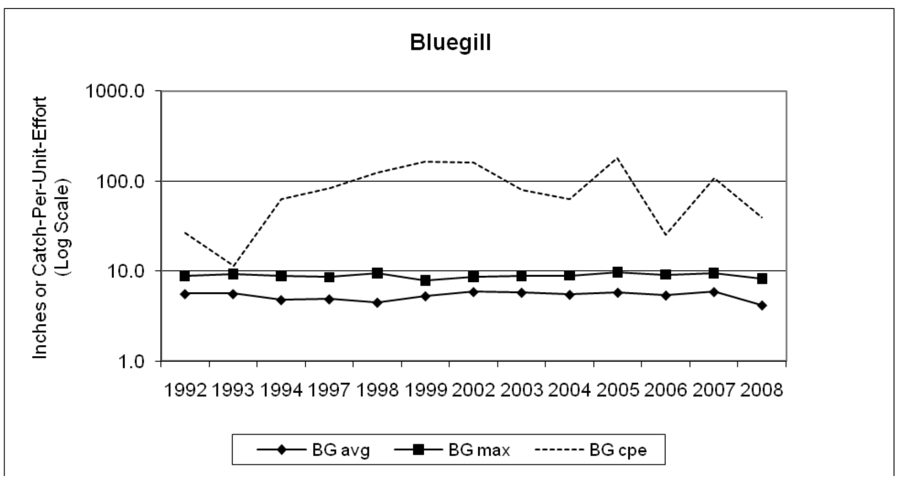

Figure 5: Fall Electrofishing Results for Bluegill (1992-2008)

Algis Byla, fisheries biologist with the Wisconsin Department of Natural Resources, analyzed mean lengths, catch per unit of effort (an estimate of relative population abundances), and proportional stock density (a measure of species size structure) of the largemouth bass and bluegill populations in Lake Ripley using data from 1994-2004. Because fluctuations in the three statistical measures are natural and to be expected, Byla cautioned that only long-term trends should be used for analysis purposes. Fluctuations can be caused by such variables as type of sampling gear and methods employed, as well as the weather which can make capturing certain species more or less difficult. As a result of the analysis, Byla concluded that there were no significant trends in any of three metrics that would indicate a noteworthy change in the status of these two dominant populations.
(Insert data from spring 2009 survey when available; include map of lake showing survey locations)

V. Factors Affecting Management Decisions

Adding or removing species, instituting fish-harvest limits, and altering or enhancing habitat to benefit a particular fish community can all be used to manipulate fisheries. On Lake Ripley, one of the main objectives of management is to sustain a healthy largemouth bass population, which is considered the primary gamefish in the lake. Management efforts are also directed toward protecting shoreland wetlands to enhance northern pike spawning. In addition, mechanical harvesting is used by the District to control Eurasian water-milfoil and other invasive weeds that threaten to displace native plant beds. Harvesting activities predominantly target dense, monotypic stands of milfoil, and may be used to create edge habitat and fish-cruising lanes in approved locations (see Lake Ripley Aquatic Plant Management Plan).

According to past fishery inventories, the most diverse species assemblage is consistently found in Lake Ripley's South Bay area. This particular area is also believed to provide the best largemouth bass habitat in the lake (Bush, 1994). It is characterized by a relatively diverse native plant community and comparatively less shoreline development than other parts of the lake. It is also largely protected from motorboat disturbance through slow-no-wake and no-motor regulations. The presence of submersed, floating-leaved and emergent vegetation is a key element providing cover, spawning sites and structure for fish. Water lilies are particularly abundant within the bay, with rhizomes providing the firm substrate needed for bass nesting.

Due in part to these unique, high-quality habitat features, most of South Bay is designated as a Critical Habitat Area by the Wisconsin Department of Natural Resources. "Attempts to protect the plant community of [South Bay] and its attending fishery by limiting development and imposing 'no wake' ordinances etc. are justified. This justification is based on a judgment that a disruption of the fishery community of this bay may upset the balance in the bass population and ultimately change the fishery resource of the entire lake (Bush, 1994)." Similar designations can be found in East (Inlet) Bay, and along a small stretch of wetland-dominated shoreline on the lake's southwest side. Conversely, Lake Ripley's more developed and sparsely vegetated northeast shore was found to generally support fewer numbers of fish and at lower species diversity.

The condition of the landscape draining to the lake is another important factor affecting the condition of the fishery. Development and land-use activities have the potential of generating polluted runoff that can bury fish-spawning sites in sediment. Polluted runoff can also supply excess phosphorus to the lake that fuels algal blooms and nuisance weed growth. Studies show that watersheds with as little as 10-12% connected impervious surface (i.e., roads, parking lots, rooftops, etc.) generally start to experience fish species declines and other problems (Wang et al, 2001; Clausen et al, 2003). The urbanized portion of Lake Ripley's watershed currently approximates these threshold percentages.

Shoreline development, in particular, often results in the systematic removal of near-shore, aquatic vegetation—the same vegetation for which species like largemouth bass are intimately linked. In fact, the level of shoreline development largely dictates largemouth bass and black crappie nesting success. It also contributes to the proliferation of seawalls, patios, sand beaches, piers, swim rafts and boat-docking stations which can alter, fragment or eliminate natural fish habitat.

Unlike bass, carp are frequently associated with a relative absence of vegetation. Carp are known to negatively impact water clarity and native aquatic plant growth, namely through their feeding habits that stir up the lake bottom and recycle nutrients for algae growth. As a lake's Trophic State Index (TSI) increases, due in part to carp activity, total number of species (and particularly fish species sensitive to water quality changes) eventually declines after an initial increase. The percentage of gamefish also decreases with increasing TSI, while carp abundance actually increases. The occurrence of northern pike, largemouth bass, walleye and yellow perch all decline starting at a TSI of about 50 (Schupp, 1992). These findings are of concern for Lake Ripley, which has a mean summer TSI holding at this very level.

VI. Recommendations

Monitoring

- Support the continuation of long-term trends monitoring on Lake Ripley by the Wisconsin Department of Natural Resources. This includes regular monitoring of water quality, fishery and aquatic plant conditions.
- Continue tracking the status of the lake chubsucker (*Erimyzon sucetta*), a Wisconsin Species of Special Concern. In addition, continue monitoring for the pugnose shiner (*Notropis anogenus*) and least darter (*Etheostoma microperca*), two Wisconsin Threatened Species that appear to have disappeared from the lake. Rediscovery of these species could be an early indicator of water quality improvements or successful habitat recovery.
- Examine length-frequency trends for northern pike using spring fyke netting to determine the effect of 1995 length limit changes (Byla, 2005).
- Assess the resident carp population and determine if the Koshkonong Creek outlet is a source of recruitment (Byla, 2005).
- Evaluate the smallmouth bass population to see if it is increasing in size, to identify the conditioning factor in these fish, and to learn if the fish are affecting the forage base (Byla, 2005).
- Monitor changes to the lake's aquatic plant community, particularly with respect to problem species like milfoil and curly-leaf pondweed.
- Continue monitoring shoreline development activities, especially those that could impact Critical Habitat Areas. Use video documentation to track changes over time and to support necessary enforcement actions.

Management Intervention

- If the Koshkonong Creek outlet is determined to be a source of carp recruitment, investigate the feasibility of installing a carp gate. Possible locations are where the outlet crosses through the Ripley Road or STH 18 culverts.
- Continue working with lakefront property owners to restore native shoreline and aquatic vegetation, and to install "treefalls" at the lake edge to serve as coarse woody habitat. Utilize outreach programs, cost-sharing incentives, demonstration projects, and technical/permitting guidance to encourage landowner participation.

- Continue conducting erosion- and pollution-control projects within the watershed in accordance with approved management plans.
- Continue using mechanical weed harvesting in accordance with state permit conditions and approved management plans. Harvesting should target dense stands of Eurasian water-milfoil and other non-native, invasive species, while avoiding high-quality native plant beds.
- Continue the walleye-stocking program sponsored by the Wisconsin Department of Natural Resources (Byla, 2005).
- Protect designated Sensitive Areas, now called Critical Habitat Areas, by supporting the Town of Oakland's pier and boating ordinances that affect these locations.

Public Outreach

- Use multiple media outlets (i.e., newsletters, e-mail bulletins, newspaper articles, signs, website, local cable TV, etc.) to raise awareness about lake and fishery-related issues.
- Utilize public meetings and opinion surveys to assess public perceptions and concerns pertaining to the lake and its fishery.
- Educate boaters and other lake users about aquatic invasive species through postings at the boat landings, and by using the media outlets referenced above. When possible, train and coordinate volunteer groups to monitor the boat landings and conduct watercraft inspections.
- Educate residents and lake users about fish-harvest limits, Critical Habitat Areas, mechanical weed-cutting objectives, shore restorations, fish stocking, aquatic invasive species, and other issues that affect the health of the fishery.
- Inform residents and lake users of any fish-consumption advisories due to mercury (if applicable). There are currently no lake-specific advisories in effect for Lake Ripley. However, statewide testing has shown that most of Wisconsin's fish contain at least 0.05 ppm of mercury which has prompted general consumption advisories for at-risk populations. Consumption advice will vary with the species and age of fish, and the person eating the fish.