

Fish

The fishery of the Rock River is a diverse assemblage of species common to the Mississippi River drainage. As a wide spot of the Rock River, the fishery of Lake Koshkonong reflects the riverine species, pelagic species, and fish of the littoral zone. A changing, dynamic, and prolific fishery is the result of several forces. The earliest comprehensive fishery survey of the lake was conducted in response to concerns and complaints due to the fluctuations in the fishery (Threinen, 1952.).

The species list for fish known to be present in Lake Koshkonong and the Rock River between Indianford and Jefferson is presented in the Table 10. Sixty-seven fish species are represented. (DNR Fisheries Surveys and Distribution and Relative Abundance of Fishes in Wisconsin 1. Greater Rock River Basin. Technical Bulletin No. 136 WDNR 1982 Don Fago).

Migrations of fish in and out of the lake constantly reflect conditions above, below and within the system. A commercial harvest of over one million pounds of rough fish each year is the state's single largest biomanipulation. Restocking efforts are a management attempt to develop a fishery to satisfy the public demand for quality fishing while maintaining an ecological balance. Natural changes in the watershed such as drought and floods will enhance or hinder some fish populations. Flood events affect the fishery by enhancing reproduction of fish that spawn during the flood. April floods have produced walleye year classes, while May and June floods help carp. Fish kills have been documented in summer as well as winter, and from low oxygen as well as supersaturation.

Management efforts

One cannot discuss fish management of Lake Koshkonong without discussing carp. The warm, shallow and turbid waters of the lake are perfect habitat for this large benthivore. Additionally, carp have an inherent ability as a species to modify the environment to their advantage with great detriments to other species. They accomplish this by rooting up vegetation and eliminating the habitat for littoral species such as bluegills, bass and perch. Their rooting behavior further

Table 10. Fish Species list: Lake Koshkonong and Rock River (I-ford to Jefferson)

Common Name	Scientific Name	Family
American brook lamprey	<i>Lampetra appendix</i>	Petromyzontidae
American eel (uncertain)	<i>Anguilla rostrata</i>	Anguillidae
Banded killifish	<i>Fundulus diaphanus</i>	Fundulidae
Bigmouth buffalo	<i>Ictiobus cyprinellus</i>	Catostomidae
Black bullhead	<i>Ameiurus melas</i>	Ictaluridae
Black crappie	<i>Pomoxis nigromaculatus</i>	Centrarchidae
Blackchin shiner	<i>Notropis heterodon</i>	Cyprinidae
Bluegill	<i>Lepomis macrochirus</i>	Centrarchidae
Bluntnose minnow	<i>Pimephales notatus</i>	Cyprinidae
Bowfin	<i>Amia calva</i>	Amiidae
Brook silverside	<i>Labidesthes sicculus</i>	Atherinidae
Brook stickleback	<i>Culaea inconstans</i>	Gasterosteidae
Brown bullhead	<i>Ictalurus nebulosus</i>	Ictaluridae
Burbot	<i>Lota lota</i>	Gadidae
Central mudminnow	<i>Umbra limi</i>	Umbridae
Channel catfish	<i>Ictalurus punctatus</i>	Ictaluridae
Common carp	<i>Cyprinus carpio</i>	Cyprinidae
Common shiner	<i>Luxilus cornutus</i>	Cyprinidae
Creek chub	<i>Semolitis atromaculatus</i>	Cyprinidae
Emerald shiner	<i>Notropis atherinoides</i>	Cyprinidae
European rudd	<i>Scardinius erythrophthalmus</i>	Cyprinidae
Fathead minnow	<i>Pimephales promelas</i>	Cyprinidae
Flathead catfish	<i>Pylodictis olivaris</i>	Ictaluridae
Freshwater drum	<i>Aplodinotus grunniens</i>	Sciaenidae
Golden redbreast	<i>Moxostoma erythrurum</i>	Catostomidae
Golden shiner	<i>Notemigonus crysoleucas</i>	Cyprinidae
Goldfish	<i>Carassius auratus</i>	Cyprinidae
Greater Redhorse	<i>Moxostoma valenciennesi</i>	Catostomidae
Green sunfish	<i>Lepomis cyanellus</i>	Centrarchidae
Hornyhead chub	<i>Nocomis biguttatus</i>	Cyprinidae
Johnny darter	<i>Etheostoma nigrum</i>	Percidae
Largemouth bass	<i>Micropterus salmoides</i>	Centrarchidae
Least darter	<i>Etheostoma microperca</i>	Percidae
Logperch	<i>Percina caprodes</i>	Percidae
Longnose gar	<i>Lepisosteus osseus</i>	Lepisosteidae
Mississippi silvery minnow	<i>Hybognathus nuchalis</i>	Cyprinidae
Muskellunge	<i>Esox masquinongy</i>	Esocidae
Northern hog sucker	<i>Hypentelium nigricans</i>	Catostomidae
Northern pike	<i>Esox lucius</i>	Esocidae
Northern redbelly dace (uncertain)	<i>Phoxinus eos</i>	Cyprinidae
Orangespotted sunfish	<i>Lepomis humilis</i>	Centrarchidae
Pugnose minnow	<i>Opsopoeodus emiliae</i>	Cyprinidae
Pugnose shiner	<i>Notropis anogenus</i>	Cyprinidae
Pumpkinseed	<i>Lepomis gibbosus</i>	Centrarchidae
Rainbow trout	<i>Oncorhynchus mykiss</i>	Salmonidae
Redfin shiner	<i>Lythrurus umbratilis</i>	Cyprinidae
River Redhorse	<i>Moxostoma carinatum</i>	Catostomidae
Rock bass	<i>Ambloplites rupestris</i>	Centrarchidae
Sauger	<i>Sander canadensis</i>	Percidae
Shorthead redbreast	<i>Moxostoma macrolepidotum</i>	Catostomidae
Silver redbreast	<i>Moxostoma anisurum</i>	Catostomidae
Slender madtom	<i>Noturus exilis</i>	Ictaluridae
Slenderhead darter	<i>Percina phoxocephala</i>	Percidae
Smallmouth bass	<i>Micropterus dolomieu</i>	Centrarchidae
Spotfin shiner	<i>Cyprinella spiloptera</i>	Cyprinidae
Spottail shiner	<i>Notropis hudsonius</i>	Cyprinidae
Stonecat	<i>Noturus flavus</i>	Ictaluridae
Sturgeon unsp. (extirpated)		Acipenseridae
Tadpole madtom	<i>Noturus gyrinus</i>	Ictaluridae
Walleye	<i>Sander vitreus</i>	Percidae
Warmouth	<i>Lepomis gulosus</i>	Centrarchidae
White bass	<i>Morone chrysops</i>	Percichthyidae
White crappie	<i>Pomoxis annularis</i>	Centrarchidae
White sucker	<i>Catostomus commersoni</i>	Catostomidae
Yellow bass	<i>Morone mississippiensis</i>	Percichthyidae
Yellow bullhead	<i>Ameiurus natalis</i>	Ictaluridae
Yellow perch	<i>Perca flavescens</i>	Percidae

increases siltation, nutrient recycling and algae growths. This results in high biological oxygen demand, lower oxygen levels and a reduction in water quality that favors their survival over species requiring higher oxygen levels. Additionally, the habit of carp eating the eggs of other species can tip the balance in favor of the carp. Left to their own end, carp are capable of dominating an entire fishery.

Controlling carp with seining operations began in the 1920's and was conducted by state crews from 1936 until 1975. Since then, commercial contract fishermen have done all seining. Crews under the state program removed approximately one million pounds per year. Private contractors have increased the harvest to about 1.5 million pounds per year.

The original belief was that a carp population could be eliminated or at least controlled by seining. It was felt that if only carp could be reduced or eliminated, that the desirable species would be able to restore the fishery without further enhancements. Ironically, the process of harvesting carp has benefits to the remaining carp population. The survivors are healthier, more fecund and with less competition and ultimately can grow and survive better. Early criticisms of the state engaging in "carp farming" had merit in that seining alone did not control the population.

In the 1970's with rough fish stations being absorbed into other state operations, hatchery production increased. The state began intensive stocking programs with the intention of controlling carp with a combination of predator stocking and continued seining. The problem with this plan was that carp can grow exceedingly fast, reaching over nine inches in length in just one year. Therefore, only the largest of the pike or walleyes were capable of preying on yearling carp.

Shoreline seining data collected in the late 1970's and 1980's indicated that although carp populations were high, the numbers of juvenile carp in the lake were low. Additional data collected in tributary streams, especially below shallow impoundments, suggested that many of the carp in the Koshkonong system were the progeny of upstream carp populations. It became apparent that a high density of panfish notably white bass and crappies were able to help control carp recruitment by preying on carp eggs, fry and fingerling.

The current belief and management philosophy recognizes that carp cannot be eliminated from the system. But with intensive management, a level of control can be achieved to bring the balance back to provide good sport fishing. Efforts are focused on the following objectives:

- Reduce standing stocks of carp by mechanical removal.
 - issue contracts for carp removal
 - support infrastructure to aid removal program
 - encourage sport angling for carp
 - Restore gamefish populations
 - maintain strong populations of predators through stocking
 - support state stocking with Bark River Hatchery production
 - enhance panfish populations through field transfers and stocking
 - Habitat modifications and enhancements
 - remove dams from impoundments known to be "carp hatcheries"
 - utilize mechanical barriers to exclude carp
 - enhance habitat for panfish, forage fish and predators
- Continue to monitor, evaluate and make improvements the management system.

Other rough fish species in the harvest include white suckers, shorthead, silver and golden redhorse, bigmouth buffalo and freshwater drum. Combined catch of these species may exceed one hundred thousand pounds per year. These fish are not as detrimental as carp to the habitat of the lake and the river. A commercial harvest is allowed because anglers generally under utilize the species. High densities of juvenile rough fish are an important forage component of game fish.

Current fishery status:

Continuing evaluation of the Koshkonong fishery falls into several efforts, but the most valuable data is from spring fyke netting and fall electrofishing. Spring fyke netting is a passive capture technique that is most successful when large numbers of fish are moving. Sets are made to capture northern pike as they move into spawning areas at ice out. Nets are then moved to collect walleyes moving up the Rock River as the waters warm. Generally fyke nets are operated continuously from around mid-March to mid-May. Figure 39 indicates the changing nature of the fish community of Lake Koshkonong. In 1984, carp populations were at a low level due to heavy commercial harvest and lack of recruitment. A major fish kill from supersaturated oxygen in the winter of 1989-1990 decimated the panfish community. This was followed by big year classes of channel catfish and carp. Consequently, the 1991 assemblage consists of only 10 percent panfish. Roughfish consisting primarily of carp went to 30 percent of the fishery. While gamefish numbers are 60 percent for 1991, these are nearly all channel catfish. After 1991, catfish recruitment was low in the system, but walleye had a banner year in 1993. By 1997, the gamefish assemblage was down a bit to 34 percent of the fishery, but 75 percent of the gamefish were walleyes and sauger. Panfish had improved to 43 percent of the fishery by 1997 due to good hatches of white bass.

Since 2000 the fishery has enjoyed an unprecedented period of stability. A panfish community, largely consisting of white bass and black crappie comprises around 50 percent of the fyke net catch (Figure 40). The rough fish portion of the catch is around 35 to 40 percent of the catch but is largely comprised of freshwater drum (Figure 41). The gamefish catch primarily consists of northern pike, walleye and sauger. In recent years, walleye are increasing and saugers are declining (Figure 42).

Figure 39

Fisheries Assemblage - Lake Koshkonong / Rock River

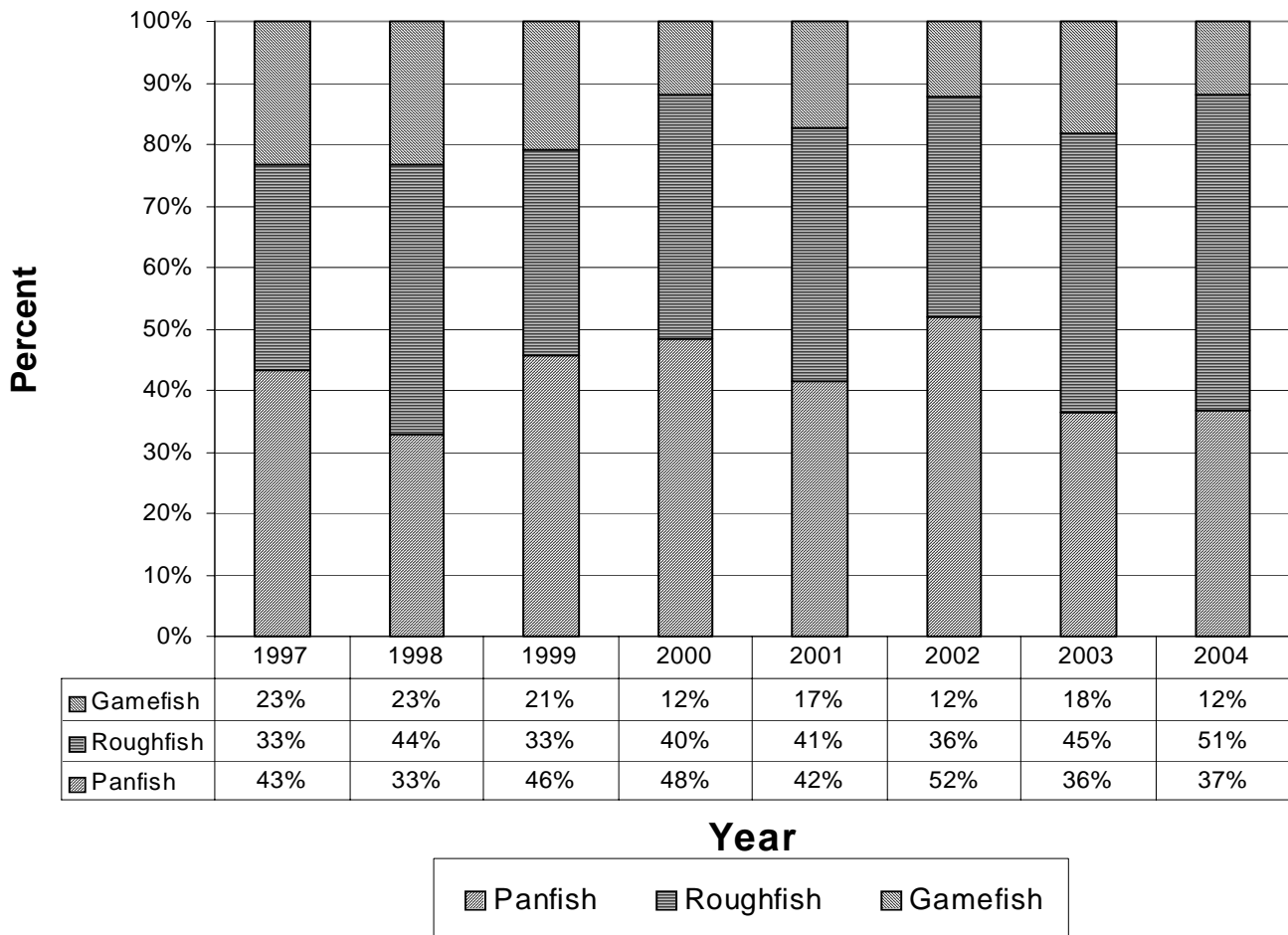


Figure 40. Panfish Composition. BH-Bull heads (black, brown, and yellow), YP-Yellow perch, YB-Yellow bass, WB-White bass, BG-Bluegill,BC-Black crappie

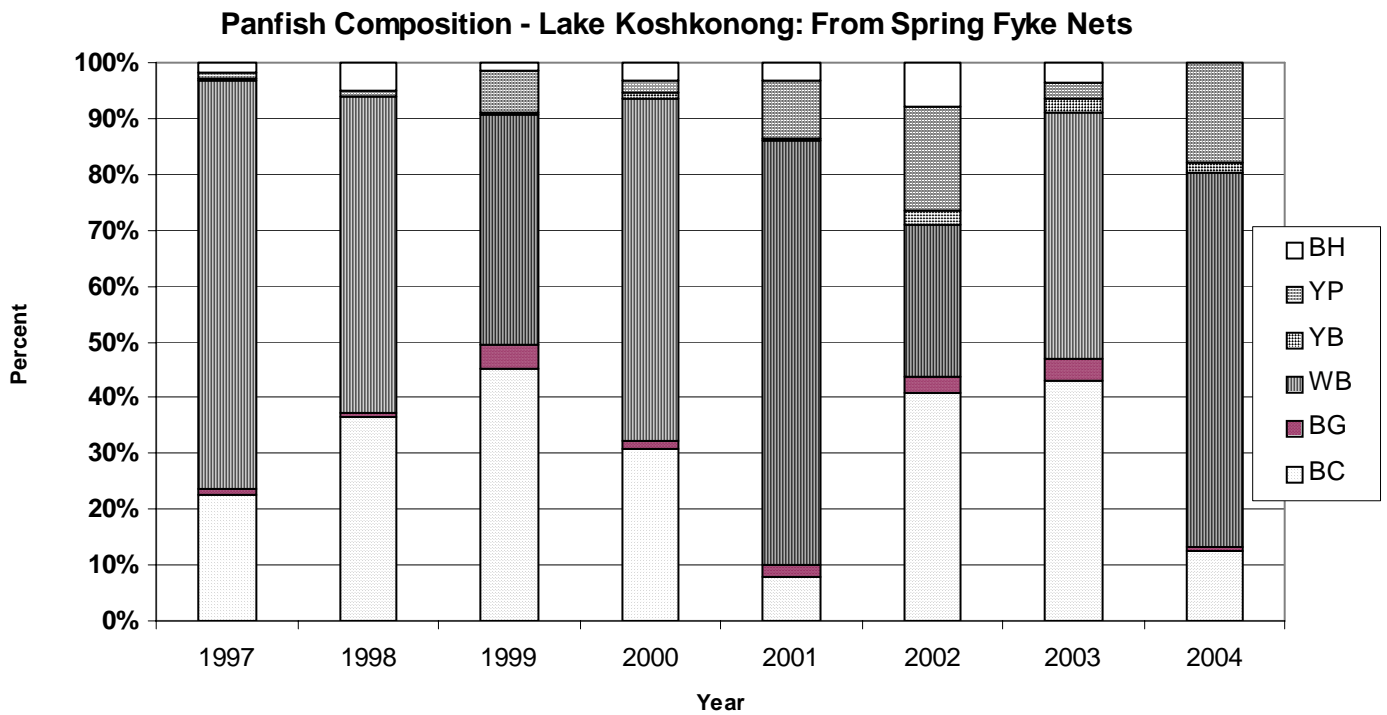


Figure 41. Roughfish Composition. Bowf-Bowfin, Buf-Largemouth buffalo, WS-White sucker, Redh.-Redhorse, Drum-Freshwater drum, Carp-Common Carp.

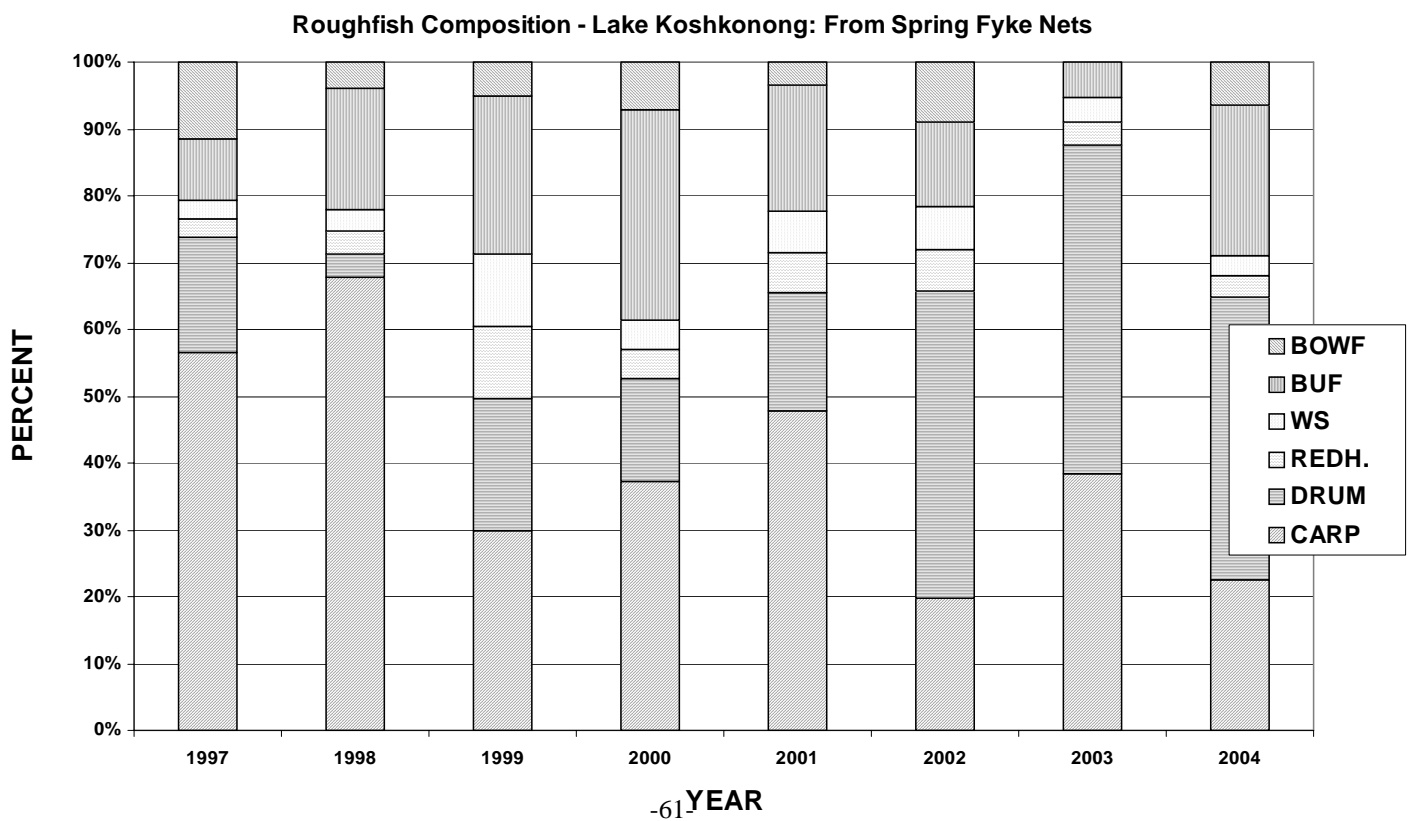
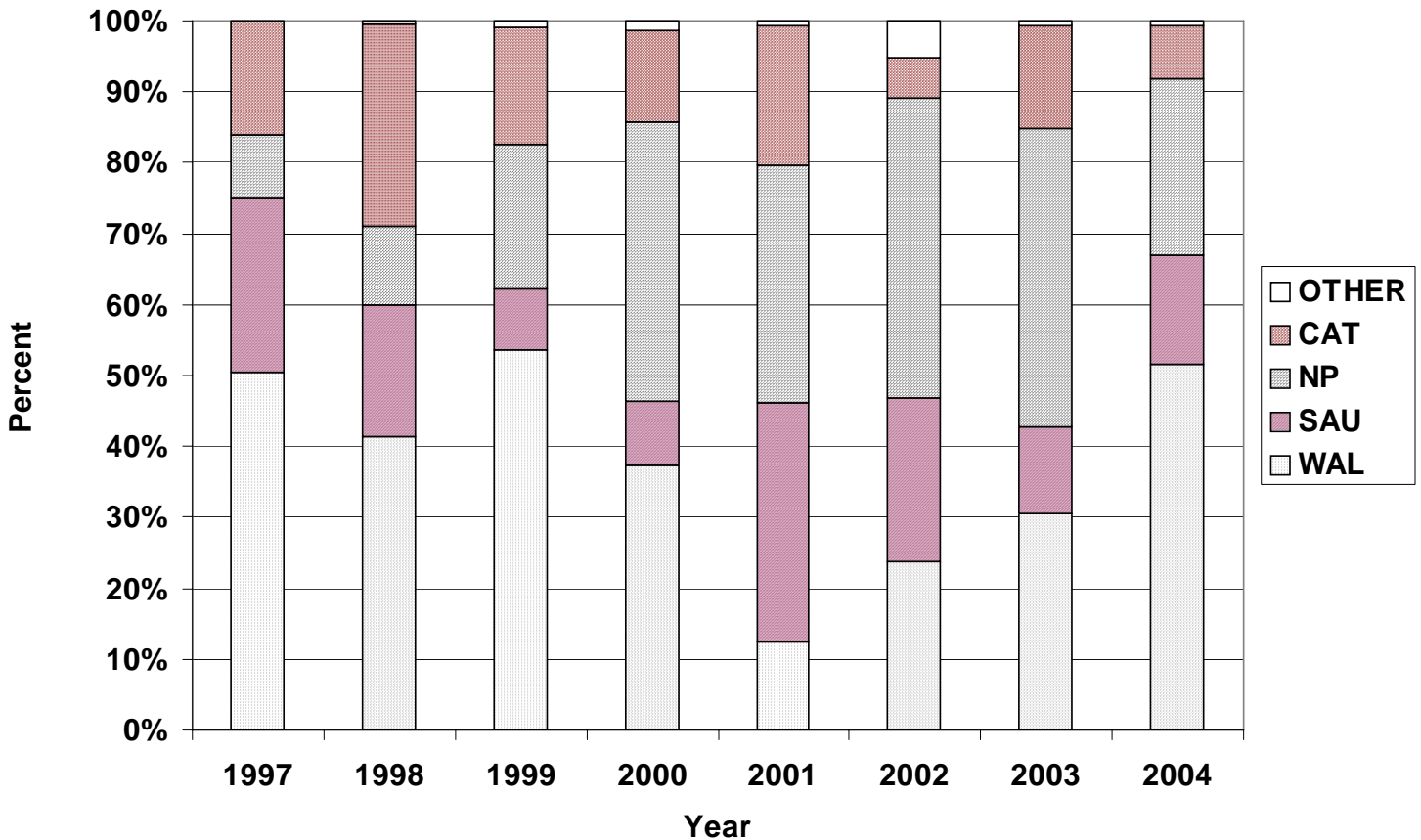


Figure 42. Gamefish Composition. Other-Largemouth & Smallmouth bass, Cat-Channel & Flathead catfish, NP-Northern pike, Sau-Sauger, Wal-Walleye

Gamefish Composition - Lake Koshkonong: From Spring Fyke Nets



Fish consumption reports/advisories

As with most of the inland lakes of Wisconsin, the fish of Lake Koshkonong contain harbor contaminants in the form of PCBs (polychlorinated biphenyls) and mercury.

It is advised that children under the age of 15 years, nursing mothers and women of childbearing age should not eat more than 1 meal per week of the following species: white and black crappies, yellow perch, sunfish (bluegill, pumpkinseed, green sunfish etc.), bullheads. It is advised that no more than one meal per month for this group should be ingested of the following fish species: smallmouth and largemouth bass, white bass, rock bass, northern pike, walleye and sauger, channel and flathead catfish, white sucker, sheepshead (freshwater drum), carp or other species.

It is advised that women beyond childbearing years and men may eat unlimited amounts of the following species: white and black crappies, yellow perch, sunfish (bluegill, pumpkinseed, green sunfish etc.), bullheads. It is advised that this group eat no more than one meal per week of the following species: smallmouth and largemouth bass, white bass, rock bass, northern pike, walleye and sauger, channel and flathead catfish, white sucker, sheepshead (freshwater drum), carp or other species.

Amphibians and Reptiles

Of the 54 species of amphibians and reptiles present in Wisconsin, 21 are found in Lake Koshkonong. The more common species are: painted turtle, green frog, northern leopard frog, spring peeper, blue spotted salamander, and various snakes. Forested ephemeral ponds found near the lakeshore are significant habitat for breeding frogs and amphibians.

Waterfowl/Birds

Lake Koshkonong proper supports one of the state's largest concentrations of Ruddy Ducks during their spring and fall migration and staging periods. During winter of most years, it supports more than 1000 overwintering waterfowl.

See descriptions of following areas in next section:

Koshkonong Creek Floodplain Forest: supports Blue-winged Teal, Hooded Merganser, Wood Thrush and Veery, Black-billed Cuckoo, and Virginia Rail during the breeding season.

North Lake Koshkonong Marshes: Bird surveys found large numbers of Marsh Wren and Yellow-Headed Blackbird, plus Swamp Sparrow, Wood Duck, Great Blue Heron and numerous other marsh birds.

Koshkonong Wetland, Thiebeau Marsh & Fair Meadows Prairie: These areas along the south shore provide migratory or nesting habitat for a large number of waterfowl and other bird species including Blue-Winged Teal, American Black Duck, Bufflehead, Canvasback, Gadwall, Green-Winged Teal, Pie-billed Grebe, Yellow-headed Blackbird, Double-crested Cormorant, Cooper's Hawk, Great Blue Heron, Green Heron, Wood Thrush, and many others.

Lake Koshkonong, being a part of the Rock River and resultantly a part of the Mississippi River drainage, is an important wetland in the Mississippi Flyway.

Historically, the lake provided a major migration staging location for a wide variety of species and large numbers of waterfowl with the main importance being for Canvasback (*Aythya valisneria*) and Redhead (*Aythya americana*) ducks. Many species of wading birds, double crested cormorant, gulls, pelicans, and other wetland associated species used Koshkonong and its attached marshes for both migration and production.

Important attractions to the migrating flocks of waterfowl were the lush, large beds of both submergent and emergent vegetation. The Koshkonong area provided a large area for the migrating flocks to both rest and feed. Important species of vegetation included smartweeds (*polygonum spp.*), wild celery (*Vallisneria spp.*), pondweeds (*Potamogeton spp.*), Wild rice (*Zizania aquatica*, and bulrushes (*Schoenoplectus spp.*). These species provided both cover and high energy foods.

Lake Koshkonong and its adjoining marshes also provided valuable cover for local waterfowl production. The main species of waterfowl utilizing these wetlands were Mallard (*Anas platyrhynchos*), Blue winged teal (*Anas discors*), and Wood duck (*Aix sponsa*).

The problems associated with the increased water levels brought about by construction of the Indianford dam and the introduction of carp (*Cyprinus carpio*) both worked to degrade the habitat value of the lake and its adjacent wetlands. Increased water levels decreased areas available to shallow water species of vegetation and increased wave action causing further habitat destruction. Carp activity results in the uprooting and loss of aquatic vegetation.

Presently, Lake Koshkonong and its associated wetlands still provide the same types of opportunities for waterfowl migration and production except to a far lesser degree. This loss in value is due to the long-term degradation of habitat that has occurred and is still in progress.

The WIDNR has acquired and manages Hunting Marsh #4 for habitat protection, waterfowl production, and public recreation (Figure 36). The highest priority management of this wetland is to protect the still existing native wetland vegetation. The higher water levels now present are threatening this marsh through increased wave action on the

lake and consequent shoreline erosion into the marsh itself, and the further invasion of carp. These same threats are present to the other privately owned marshes surrounding the lake. The WIDNR has also acquired and planted some adjacent upland sites to native prairie providing valuable nest cover for grassland nesting waterfowl.

Some construction of wave barriers has occurred with varying success. The objective of this management technique is to protect an area of the affected wetland from wave action with the result being improved aquatic vegetative growth. More such management is in the planning stages and awaiting funding.

As discussed in the Fish portion of this report, waterfowl management on Lake Koshkonong must include a strategy for carp reduction and control.

Waterfowl hunting on Lake Koshkonong has a long and famous history. There still exists a number of private hunt clubs surrounding lake which have existed many years and can trace their existence back to time when market hunting was very active on the lake. Most of the Hunting Marshes (Figure 36) are privately owned and are managed for the hunting benefits of their owners.

Threatened, Endangered, and Species of Special Concern

Source: NHI database, DNR staff, and Rock County Natural Area Survey, by Robert Baller, 2002

NOTE: This does not include all old, historical records, nor records for upland species and communities that are more than one mile away from the lake and unlikely to be impacted.

Natural Communities and Rare Species Excluding Fish, by Township:

JEFFERSON COUNTY

Sumner Township (5N13E)

Koshkonong Creek Floodplain Forest: (Secs. 17, 20): Lowland hardwood forest and shrub swamp bordering Koshkonong Creek as it enters Lake Koshkonong. In 1980s, was “undisturbed and rich in wildlife” and supported a Great Blue Heron Rookery near the lake shore. Many old records of rare plants from the area, such as Slenderleaf sundew (Thr.), Pale Green Orchid (Thr.), Swamp pink orchid (Special Concern). Was called “Busseyville Tamarack Swamp” in 1800s.

Rare Birds: This area supports several pairs of Cerulean Warbler (Threatened) and Acadian Flycatcher (Thr), both species found in larger forest tracts; many Prothonotary Warblers (Spec. Conc.); Yellow-Billed Cuckoo (Spec. Conc.), a Bald Eagle nest (Fed. Thr. And State Special Concern).

North Lake Koshkonong Marshes: (Sec. 10): Rare species include Forster’s Tern (End.), Virginia Rail (Spec. Conc.), Least Bittern (Spec. Conc.) and foraging Black Tern (Spec. Conc.)

Koshkonong Marsh: (Secs. 12, 13, 24): A large cattail-reed marsh on the east side of Lake Kosh. And bisected by the Rock River. Pockets of open water with submerged aquatics. Diverse wildlife populations; needs further inspection. Includes Mud Lake (shallow, hard, seepage lake) and Rock River.

Rare Birds: A nesting pair of Forster’s Terns (End.) was observed here in ... Three Special Concern birds occur in the emergent marsh and floodplain forest at the east end of the lake: Least Bittern, American Bittern, and large numbers of Black Tern use the area. More than 100 white pelicans were observed here on a single day in August 2004. Bald Eagles were also observed nesting near the lake.

Thiebeau Marsh (Secs. 33, 34) Large wetland complex, mainly cattail-bulrush, along SE shoreline of Lake Koshkonong. Significant portion owned by hunting club, which has planted wild rice. Some areas of wet prairie. Significant wildlife include Osprey, Sandhill Cranes (probably rails, etc.) and abundant migratory waterfowl.

Koshkonong Township (5N14E)

Koshkonong Marsh (Secs. 7, 18) See description above

ROCK CO.

Milton Township (4N13E)

A very large population of a *Federally listed plant* occurs in wetlands along the south side of Lake Koshkonong. It is one of the largest populations of this very rare plant in the state.

Blanding's Turtle (Threatened), Secs. 3, 4 and 13; several have been observed every year since 1992.

Small yellow lady's slipper orchid (Special Concern), Sec. 4, on peat mounds surrounded by lowland hardwood forest

Small white lady's slipper orchid (Thr), Sec. 2

Koshkonong Wetland (Secs. 2, 3) Wet- to wet-mesic prairie, sedge meadow, and wildlife scrapes in area under active restoration.

Fair Meadows Prairie (Sec. 4): Sand prairie with wet and dry elements on active restoration project. Supports State-Threatened kittentails plant.

Thiebeau Marsh (Sec. 4): See description above, extends north into Jeff. Co

The following rare birds and plants have been documented in the three areas described above, Secs. 2, 3 and 4:

- Purple milkweed (End.)
- Sedge Wren (Spec. Conc.)
- Red-shouldered Hawk (Thr.)
- Red-headed Woodpecker (Spec. Conc)
- Cerulean Warbler (Thr.)
- Black Tern (Spec. Conc)
- American Bittern (Spec. Conc.)
- Least Bittern (Spec. Conc)

An Osprey platform has attracted osprey in 2003 and 2004, which constructed a nest but have not yet used it; this species would be expected to begin nesting here any year. This species is listed as Threatened in Wisconsin.

Great Egrets (Thr) have been observed using the marsh during non-nesting periods.

Koshkonong Lake Access (Sec. 6): Very high quality floodplain forest, which includes a small county park, with large swamp white oak and silver maple, mostly native understory. This site rated among the top 9 sites for preservation in the Rock County Natural Area Inventory of 2001.

Newville Carr (Sec. 7): Springy and uncommon wetland type along Lake with very old organic peat deposits (mounds rising at least 10 feet above shoreline) alternating with low, water-filled basins, unusual mosses and lichens, and good native flora in openings among shrub-carr community. There is a high probability of rare plants here.

Otter Creek Springs (Sec. 11) Artesian springs complex, somewhat degraded by invasives, at SW corner of STH 26 and CTH N.

Rare Fish

Slender madtom (*Noturus exilis*) – Found in the Upper Rock River and the Upper Bark River. Endangered.

This fish prefers clear and moderate to swift water (Becker 1983). However remote, there is a chance that an individual might wind up in the vicinity of Lake Koshkonong.

River redbhorse (*Moxostoma carinatum*) - Found in the Upper Rock River. Threatened.

Found in fast flowing large rivers over silt-free bottom (Becker 1983). This condition just does not occur in the Lower Rock River basin.

Greater redbhorse (*Moxostoma valenciennesi*) - Found in the Upper Bark River. Threatened.

This fish prefers clear and moderate to swift water (Becker 1983). However remote, there is a chance that an individual might wind up in the vicinity of Lake Koshkonong.

Pugnose shiner (*Notropis anogenus*) - Found in the Upper Bark River, Koshkonong Creek and the Crawfish River. Threatened.

Extremely intolerant of turbid water (Becker 1983).

Banded killifish, (*Fundulus diaphanous*) Found in Lake Koshkonong and Rock River. Special Concern.

This species is rare in Lake Koshkonong but several individuals were collected in 2004 with a beach seine.

Pugnose minnow (*Opsopoeodus emiliae*) Sampled from Rock River as enters the lake. Special Concern.

The Lower Rock River may be near the northern most extent of their range (Becker 1983).

Least darter (*Etheostoma microperca*), Allen Creek. Special Concern.

Once found throughout the state this species numbers have been greatly lowered due to changes in land use (Becker 1983). They prefer clear water at moderate temperatures.

Redfin shiner (*Lythrurus umbratilis*), Rock River. Threatened

Statewide, this species has been devastated due to toxins employed in rough fish control programs (Becker 1983).

American eel (*Anguilla rostrata*), Special concern.

This species is in trouble world-wide and the existence of numerous dams and problems with water quality contribute to the decline in numbers.

Historical records exist for redfin shiner (Threatened), American eel (Spec. Concern) in Lake Koshkonong system.