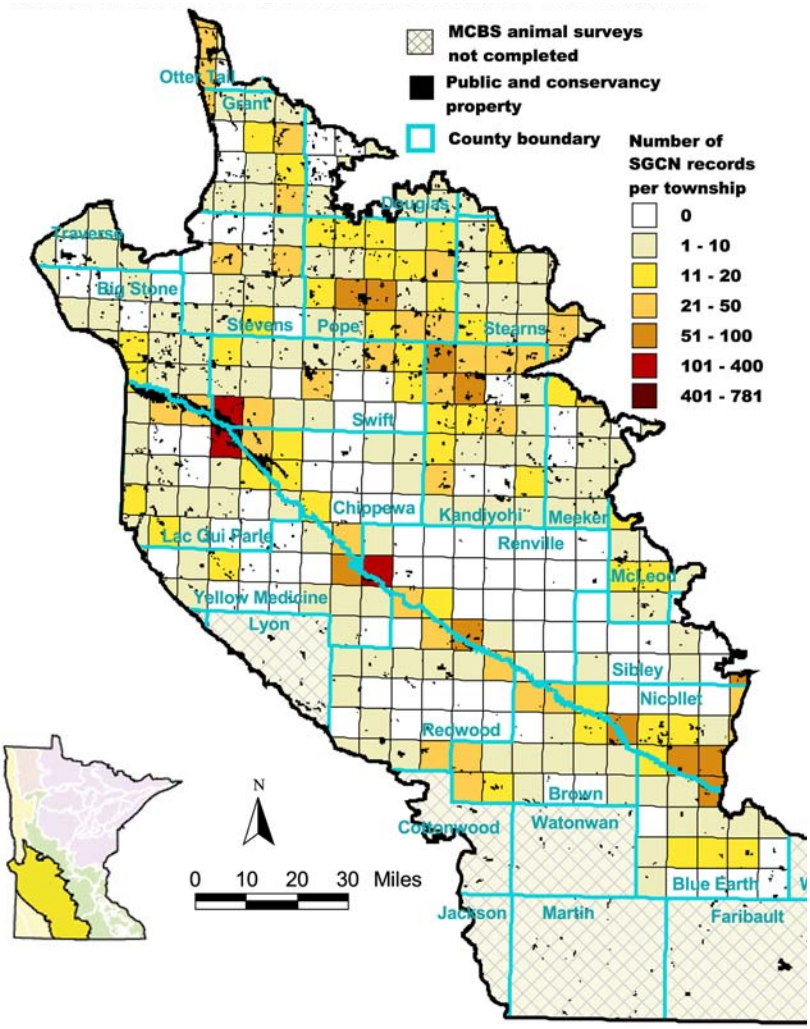
Overview Living Resources

Many diverse plant and animal communities occur within the basin. Out of the many possible indicators, an interagency team of researchers brainstormed the list of species explored here to provide some insight into broader ecosystem health. They can be organized into those primarily living in aquatic habitats (macroinvertebrates, mussels, frogs, fish, river otters) and terrestrial habitats (bald eagles, ring-necked pheasants, and ducks).

Species of Greatest Conservation Need Occurrences by Township since 1990



The map above shows the number of validated records of species in greatest conservation need since 1990 per township and public land/conservancy land. Townships in red and orange colors indicate areas with more species of greatest conservation need (SGCN) observations. Hatchmark areas display areas that have not been surveyed for rare animals by Minnesota County Biological Survey (DNR, 2006).

This DNR map from *Tomorrow's Habitat for the Wild and Rare: An Action Plan for Minnesota Wildlife*. depicts the distribution of rare species throughout the prairie portion of the Minnesota River Basin (see inset map). The Minnesota River Valley and lake-rich townships are conspicuous indicating the importance of these water resources and related habitats for rare species.

Rare Species in the Prairie Region

Once widespread, prairie remnants and floodplain forests are now rare. Still, the remaining wetlands and grasslands offer prime habitat for bald eagles, prairie chickens, marbled godwits, upland sandpipers, Richardson's ground squirrels, regal fritillaries, swainson's hawks, Forster's terns, and dickcissels. The dry grasslands provide habitat for bullsnakes and western hognose snakes, and foxsnakes occur in upland riparian forests. The area is a major migratory corridor in the Mississippi Flyway and an important nesting area for prairie ducks. Portions of the Minnesota River and/or tributaries provide habitat for paddlefish, mussels, and softshell turtles as well as the threatened mucket and elktoe mussels (DNR, 2006).

What are Some Factors Leading to Rare Species Decline?

Habitat Loss in Minnesota
Habitat Degradation in Minnesota
Habitat Loss/Degradation Outside Minnesota
Invasive Species and Competition
Pollution
Disease
Food Source Limitations

Macroinvertebrates

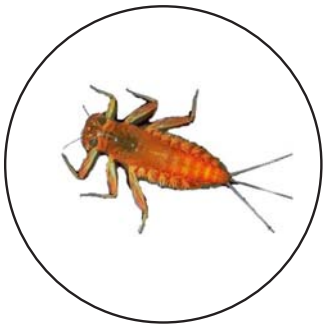
Biological indicators of stream health show mixed trends

Scott Kudelka

Paul Wymar from the Chippewa River Watershed Project collecting macroinvertebrates

Scott Matteson

Macroinvertebrates on underside of rock.



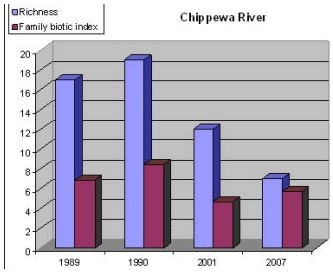
Macroinvertebrate: *Heptageneidae*
Photo: North American Benthological Society

Chippewa River Watershed

What are Macroinvertebrates?

Macroinvertebrates are animals without backbones that can be seen with the naked eye and live at least part of their life cycles in or on the bottom of a waterbody. Macroinvertebrates (macros) include aquatic insects like mayflies, stoneflies, caddisflies, midges, and beetles as well as crayfish, worms, mussels and snails. They spend most or all of their life cycle in water and inhabit all types of moving water from rushing mountain streams with rocky bottoms to sluggish, meandering streams with sand and mud bottoms. A community is classified as different types of macroinvertebrates living in the same habitat areas in a river.

Macroinvertebrate Collection



Macroinvertebrate communities and family richness can be affected by a number of factors including pollution along with changes in habitat and substrate. A decline of macroinvertebrate diversity and numbers in the Chippewa River could have been a result of major flooding in 1997 and lesser flooding in 2001. Deposition of silt and clay most likely has also impacted them in non-flood years. Macroinvertebrate sampling has been conducted in the Chippewa River Watershed by MPCA and the Chippewa River Watershed Project. Methods for sampling has evolved and changed over the years with no consistent protocol. Currently, no state standard has been set for sampling macroinvertebrates.

MN River Assessment Project Report

Published in January of 1994, this report offered the following findings on macroinvertebrate sampling in the basin:

- Macroinvertebrate communities were assessed at approximately 40 sites along the main stem of the MN River, its tributaries, and small-watershed streams. Most sites sampled had been adversely affected by pollution, and had fewer species than would be desirable.
- All macroinvertebrate communities at the sites studied on the main stem were judged as moderately to severely affected by pollution. Main stem sites at Henderson and Lac qui Parle were the most severely affected.
- Macroinvertebrate communities in the larger tributaries were considered moderately affected by pollution. Chippewa River was the most affected tributary.
- For the small to intermediate streams, physical characteristics and composition of bottom-dwelling communities varied greatly. Most of these sites are moderately affected and some severely affected by pollution.
- Habitat modification and excessive amounts of organic material were factors affecting macroinvertebrate communities.

Macroinvertebrates as Indicators

- Represent important links in the food chain as recyclers of nutrients and food for fish.
- Cannot swim from pollution like fish and can be affected by even subtle levels of pollution, showing the effects of both short- and long-term pollution events.
- Some are intolerant and others tolerant of pollution. Taken together, the presence or absence of tolerant and intolerant types can indicate the waterbodies' overall health.
- Because each has a different tolerance to pollution any alteration to a river may have an impact on their abundance and distribution and may show the cumulative impacts of pollution.
- They have short life cycles – usually one season or less in length – meaning a water quality problem could be detected quicker.
- May show the impacts from habitat loss not detected by traditional water quality assessments.
- Relatively easy to sample and identify to a level that provides meaningful information about a stream's health.

Mussels — Canaries of Water Quality

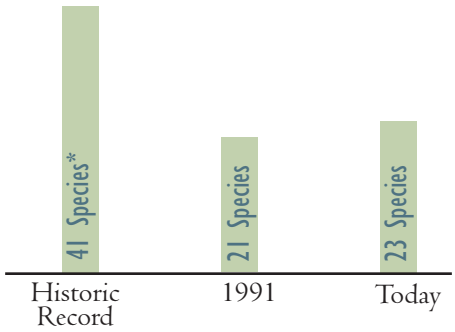
Despite declines in historic diversity, mussels now show static trends


Scott Kudelka


Scott Kudelka

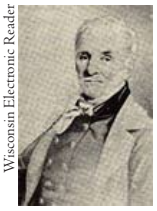
The presence or absence of mussels is a biological indicator of a river's health. This freshwater organism can be found in rivers and lakes on every continent except Antarctica. As a member of the second largest group of animals in the world—the Mollusks, mussels spend their entire life partially or wholly buried in mud, sand or gravel in permanent bodies of water. Of the almost 300 species found in North America (more than any other continent), 48 are considered native to Minnesota. Unfortunately, 25 of those species are listed as endangered, threatened, or of special concern, and two believed to be extirpated. Today only 23 can be found, some of which are critically imperiled in the system.


Scott Kudelka



* 40 species are confirmed with a historic record of scaleshell. There is an unresolved discovery of a Quadrula species.

Historic Account


Wisconsin Electronic Reader

George Featherstonhaugh was an Englishman who explored the Minnesota River from Fort Snelling to Lake Traverse in 1835.

Canoeing from the Blue Earth River confluence to Granite Falls, he remarked on a "great profusion of unios [mussels] lying on the sandy bottom."

Downstream from the Redwood River confluence, "We found the river diminish from two feet and a half to one foot, the water beautifully transparent, and the unios [mussels] stuck in countless numbers in the pure white sand, so that I could, by baring my arm, select them as we went along."

Did You Know? Mussels from Minnesota River for Buttons

Brown County Historical Society

In the late 1800s and early 1900s enormous numbers of freshwater mussels were harvested for button-making to make pearl buttons for clothing. This became a multi-million dollar business. New Ulm was a center for this industry in the Minnesota River. All mussels are now protected and it is illegal to kill any mussels in Minnesota.

Timeline

1916
A crew of clammers arrived in Granite Falls to dig for mussels. They used boats with rakes between Montevideo and Mankato to gather 10 tons of shells worth $30,000 to ship to the button factories in Iowa.

1917
The mussel harvest was a poor one with the beds worked over from the previous summer.

1921
Fourteen tons of shells were shipped from Granite Falls and 16 tons from Wegdahl to the Muscatine Button Factory.

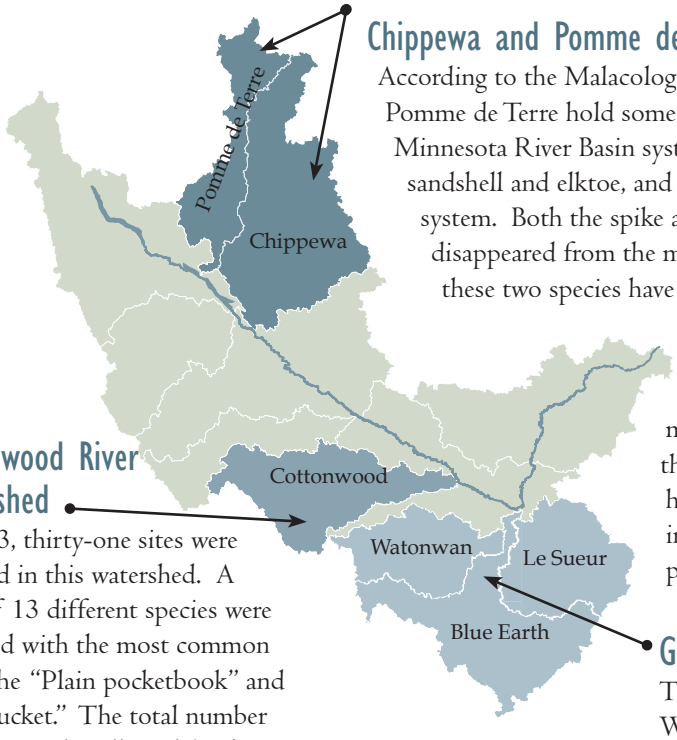
1926
Minnesota Conservation Department banned clamming on the Minnesota River between the Yellow Medicine and Lac qui Parle rivers.

1933
Twenty to thirty men were hired by the Smith Brothers of Granite Falls to dig mussels with 80 tons of shells shipped to button factories. The meat from the mussels were boiled and sold for hog feed.

Today
No live mussels may be collected in Minnesota without a special permit.
Source: http://www.karipearls.com/pearl-buttons.html

Chippewa and Pomme de Terre River Watersheds

According to the Malacologist specialists with the MN DNR, the Chippewa and Pomme de Terre hold some of the best remaining mussel assemblages in the entire Minnesota River Basin system. This includes reproducing populations of black sandshell and elktoe, and the only remaining population of spike within the entire system. Both the spike and black sandshell (each listed as special concern) have disappeared from the main stem of the Minnesota River. Juvenile mussels of these two species have also been found – evidence they are reproducing in the Chippewa River. The Chippewa and Pomme de Terre rivers retain a majority of the mussel species historically found in the two watersheds, compared to most of the other tributaries that have lost up to half of their original mussel species. Today, mussel abundance is higher in these two rivers than any other major tributaries in the MN River Basin and also contains healthy populations of some common species.



Cottonwood River Watershed

In 2003, thirty-one sites were sampled in this watershed. A total of 13 different species were recorded with the most common being the "Plain pocketbook" and "Fat mucket." The total number of live mussels collected (within 58 hours of sampling) was 646. During a citizen summary of the Cottonwood, a Lilliput shell was found—the first time for the watershed.

Greater Blue Earth River Watershed

The Greater Blue Earth River Watershed (including the Watonwan and Le Sueur Rivers) is one of the largest watersheds in the Minnesota River Basin and one of the most degraded. As of 2009, DNR biologists found only 3 of the 24 historic mussel species after sampling 124 sites. Even some of the most common mussel species–fat mucket, three ridge and Wabash pigtoe–found in other areas of the Basin are rare or have disappeared from the Greater Blue Earth River system. Similarly, a survey of 138 sites in 1972 by Dale Chelbars of the Science Museum of Minnesota found only 134 live mussels from 11 species.

Scott Kudelka

"The Blue Earth River, including the Watonwan and Le Sueur rivers, is the largest tributary of the Minnesota River. Sadly, the mussel fauna of the Blue Earth is also among the most degraded."

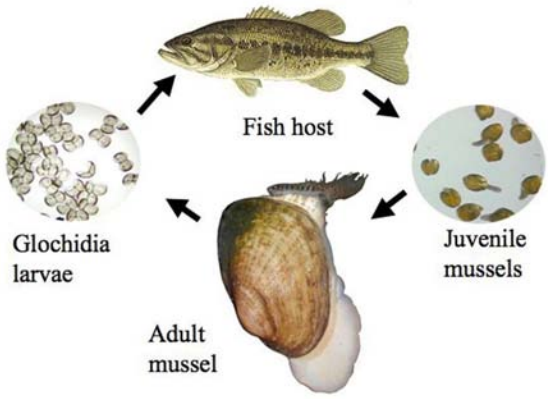
Bernard Sietman, MDNR

What is killing Mussels?

- Dredging,
- Chemical pollution,
- Sedimentation,
- Channelization,
- Wetland drainage,
- Overharvesting of mussels,
- Excessive tiling – causing rapid bounces in river levels,
- Dams - prevent fish migration,
- Industrial pollution,
- Competition from exotic species

Typical Mussel Reproduction Cycle

Source: Mike Davis



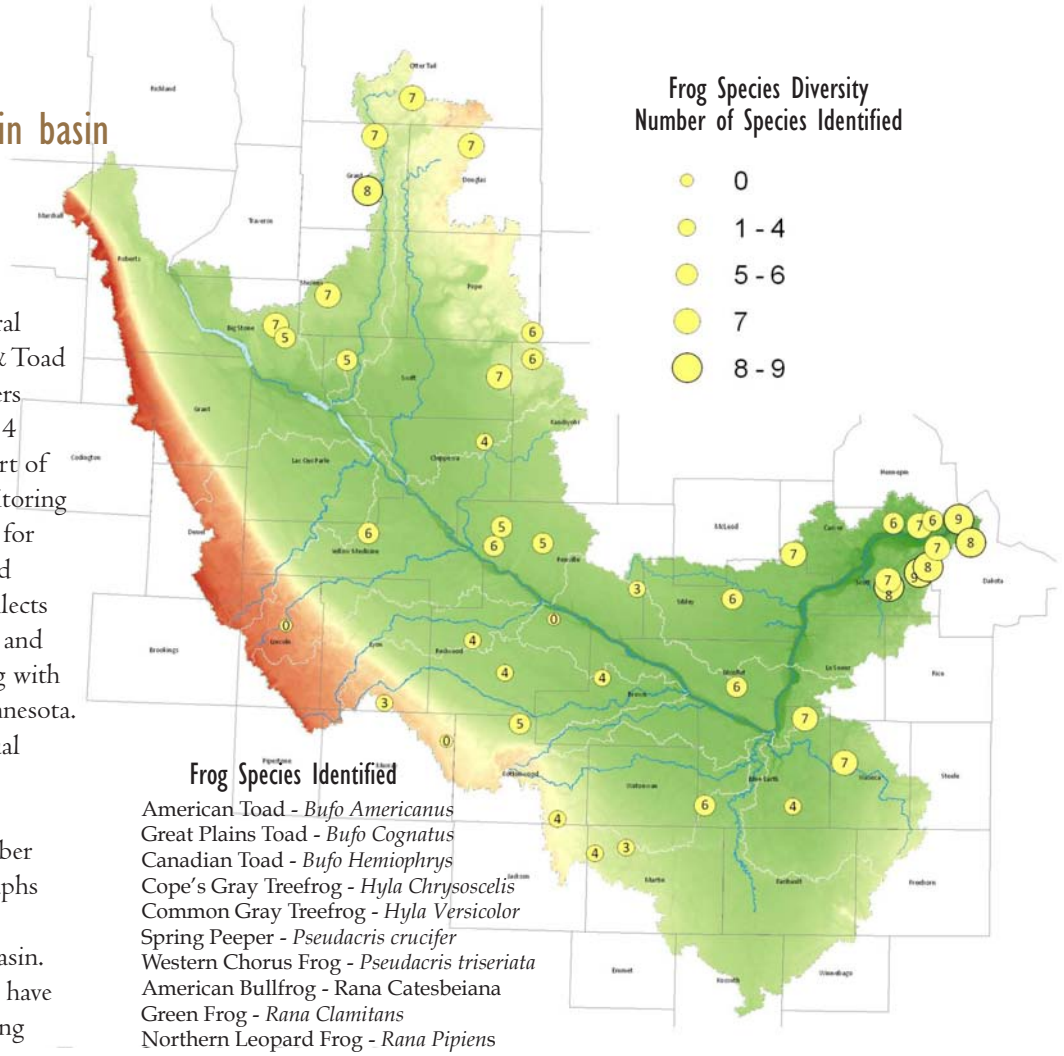
Frog Surveys

Frog abundance on the rise in basin

Minnesota Frog & Toad Calling Survey

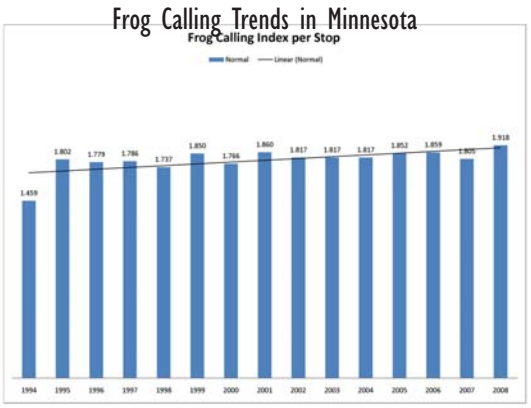
The Minnesota Department of Natural Resources (DNR) initiated a Frog & Toad Calling Survey in 1996 to use volunteers across the state to collect data on the 14 different frog and toad species. It is part of the North American Amphibian Monitoring Program (NAAMP). Volunteers listen for the sound of each species on a specified 10-stop route. This on-going study collects data to increase the knowledge of frog and toad abundance and distribution, along with monitoring population changes in Minnesota. All the results are presented in an annual report.

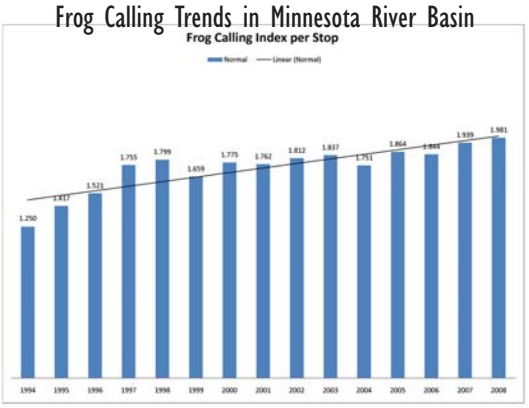
The map at right summarizes the number of species identified per route. The graphs below show the frog calling trends for Minnesota and the Minnesota River Basin. The Minnesota River Basin appears to have a stronger increasing trend in frog calling compared to the state.



Frog Species Identified

American Toad - *Bufo Americanus*
Great Plains Toad - *Bufo Cognatus*
Canadian Toad - *Bufo Hemiophrys*
Cope's Gray Treefrog - *Hyla Chrysoscelis*
Common Gray Treefrog - *Hyla Versicolor*
Spring Peeper - *Pseudacris crucifer*
Western Chorus Frog - *Pseudacris triseriata*
American Bullfrog - Rana Catesbeiana
Green Frog - *Rana Clamitans*
Northern Leopard Frog - *Rana Pipiens*
Mink Frog - *Rana Septentrionalis*
Wood Frog - *Rana Sylvatica*





Researchers identify local amphibian species by their unique breeding vocalizations or calls. At each stop on their routes, the volunteer listens for 5 minutes, and then records the amphibian calling index for each species heard and some environmental data:

1 - Individuals can be counted; there is space between calls
2 - Calls of individuals can be distinguished but there is some overlapping of calls
3 - Full chorus, calls are constant, continuous and overlapping

In the graphs above, all stops are combined for each year to get an average calling index for each year.

The results of the NAAMP ongoing study will provide information on where species are located throughout the state, and how their population change in abundance and distribution. Many frog and toad species are indicators of habitat quality. Their presence in, or disappearance from, an area may provide information on the condition of Minnesota's wetland habitats.

Northern Leopard Frogs – "A sentinel"

Northern Leopard frogs show population decline

About Northern Leopard Frogs

One of the most common frogs in the Minnesota River Watershed, the Northern Leopard Frog, can be found throughout the state and identified by two or three rows of dark spots on the back or a snoring sound made with grunts and squeaks. Northern Leopard Frogs live in a wide variety of habitats including wet meadows, open fields and grasslands near waterbodies, wetlands and forest edges. These frogs may move up to two miles from a water source in the summer.

Frogs begin their lives as eggs floating on the surface of still waters where they develop into swimming tadpoles, eventually becoming frogs. All of these changes in a frog's life occur under the control of hormones, which are chemical messengers that travel throughout the organism, turning on and off bodily processes. Because frogs live on both land and water along with breathing through their skin, they are particularly sensitive to chemical pollution.

www.highlevelwoodlands.com

Northern Leopard Frog Population Decline

According to the Minnesota Department of Natural Resources, Northern Leopard Frogs were once the most widespread species in North America. The population of this frog has been declining in Minnesota and throughout the United States since the 1960s. Common causes for this decline include: Red-leg disease, pollution, pesticides, loss of wetlands and other habitat, and killed by humans to be used as bait and for biology laboratories.

Frog Population Decline: Global & Local

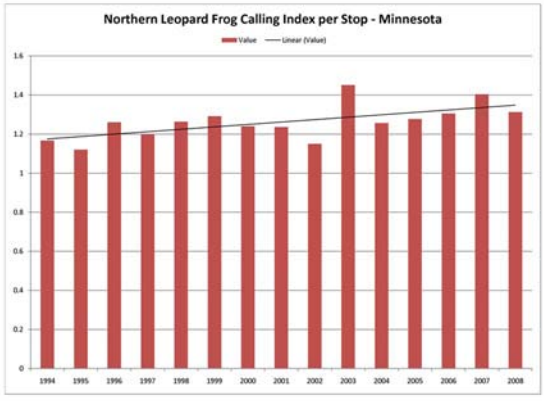
Over the last 10 years, the world population of frogs has seen an alarming decrease due to a number of factors:

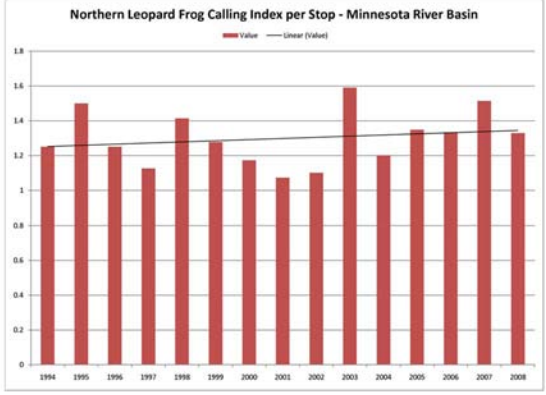
- habitat loss and fragmentation,
- ozone depletion (frog skin is sensitive to ultraviolet rays),
- acid rain or precipitation,
- chemical pollution, and
- increase in predators and non-native competitors.

In the early 1970s, harvesting of Northern Leopard Frogs yielded up to100,000 pounds before suffering a major population crash in 1973. This halted the commercial collection of the frog except for bait from 1974 to 1987. Today, Northern Leopard Frogs are still being collected heavily for fish bait and biological supply trade despite the significant decline of its population.

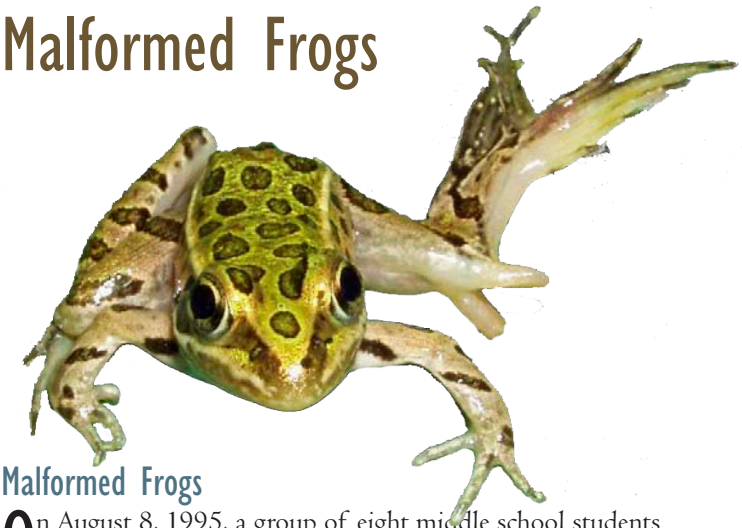
A petition to list the western population of the northern leopard frog as a threatened or endangered species by the Federal Government is currently under a scientific review by the U.S. Fish & Wildlife Service. Populations in nineteen states west of the Mississippi River and Great Lake including Minnesota would receive protection under the Endangered Species Act. According to the U.S. Fish and Wildlife Service, the northern leopard frog is experiencing threats from habitat loss, disease, non-native species, pollution and climate change that individually and cumulatively have resulted in population declines, local extinctions and disappearance from vast areas of its historical range in western U.S. and Canada.

The Minnesota County Biological Survey of the Native Plant Communities and Rare Species of the Minnesota River Valley Counties (September, 2007) conducted by the Minnesota Department of Natural Resources, found Northern Leopard Frogs in all but one of the 17 counties in the search area. Northern Leopard Frogs had been found in previous surveys from the 1990s in Ramsey County.





Malformed Frogs



Malformed Frogs

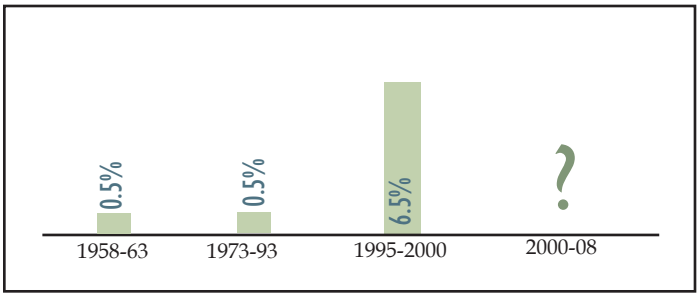
On August 8, 1995, a group of eight middle school students from the Le Sueur Community School discovered a large number of malformed Northern Leopard Frogs on a field trip to the Ney Nature Center overlooking the Minnesota River near Henderson. Out of the 22 frogs the students managed to catch, 11 had limb deformities.

From 1995 to 2000, frog surveys were conducted across the state of Minnesota. Approximately 6.5 percent of the 13,763 Northern Leopard Frogs found were malformed, including missing limbs, missing digits, extra limbs, partial limbs, skin webbing, malformed jaws, and missing or extra eyes. In previous studies (1958-63 and 1973-93) less than a ½ percent of Northern Leopard Frogs were found malformed.

Researchers who examined the malformed frogs found many with internal abnormalities including intestinal contents within the bladder or abnormal male gonads. Researchers also discovered normal bacterial, viral, and parasitic organisms in the frogs. Several common pesticides and heavy metals were detected within frog tissues.

Amphibians like frogs are excellent indicators of environmental stress because they live in both aquatic and terrestrial systems. Frogs have been called "sentinel" species because they have metabolic functions similar to humans and could be an early warning system for any potential troubles.

Percent of Malformed Northern Leopard Frogs found in Minnesota



Potential Causes

Malformations in amphibians, according to the U.S. Geological Survey's National Wildlife Health Center, that are caused by environmental factors affect individuals at the larval stage of development. Researchers point out that factors leading to malformations at a particular site may be different from those at another site. Four major environmental factors have been identified: contaminants, nutritional deficiencies, parasites, and injuries. A number of theories for malformations are being studied including the use of agricultural herbicides and natural causes like dragonfly predation. Some researchers feel it could be a combination of both man-made chemicals and natural predation.

Atrazine

One potential cause for malformed frogs has to do with the widely used agricultural herbicide Atrazine. According to research conducted by the University of Illinois, this popular weed killer increases the concentration of flatworms in waterbodies supporting amphibians and "also diminishes the ability of larval frogs to fight infection with these parasites."

In addition, phosphate fertilizer runoff flowing into a waterbody can increase the toxicity of atrazine. The fertilizer boosts the production of algae which in turn snails feed on. As a result, the frogs are stricken by an increase in snails because they serve as a primary but temporary host for the parasitic flatworms. These tiny flatworms can trigger debilitating limb deformities in frogs through infection and severe infection can kill the amphibians. A University of California study showed atrazine turned male frogs into hermaphrodites with eggs and ovaries, and can trigger human cancers. Since the 1990s, Atrazine has become a popular for farmers to use as herbicide especially in corn-growing regions.

Natural Predation

Two independent research studies (England and Oregon) discovered dragonfly nymphs were eating the legs of frogs (in some cases toads). The dragonfly nymphs at times would also eat a frog's eyes or tail but mostly went after the legs before releasing the injured amphibian. In lab tests the scientists found by amputating the hind limbs of a wood frog tadpole during different development stages either a full or partial leg would grow back.

Difference between Malformation & Deformation

- **Malformation:** process of disrupting a normally formed organ or body part during the original stages of development.
- **Deformation:** process of disfiguring a part of the body that already exists.

Fish Numbers Improving

Surveys show species diversity and abundance increasing since 1950s

Historical Perspective

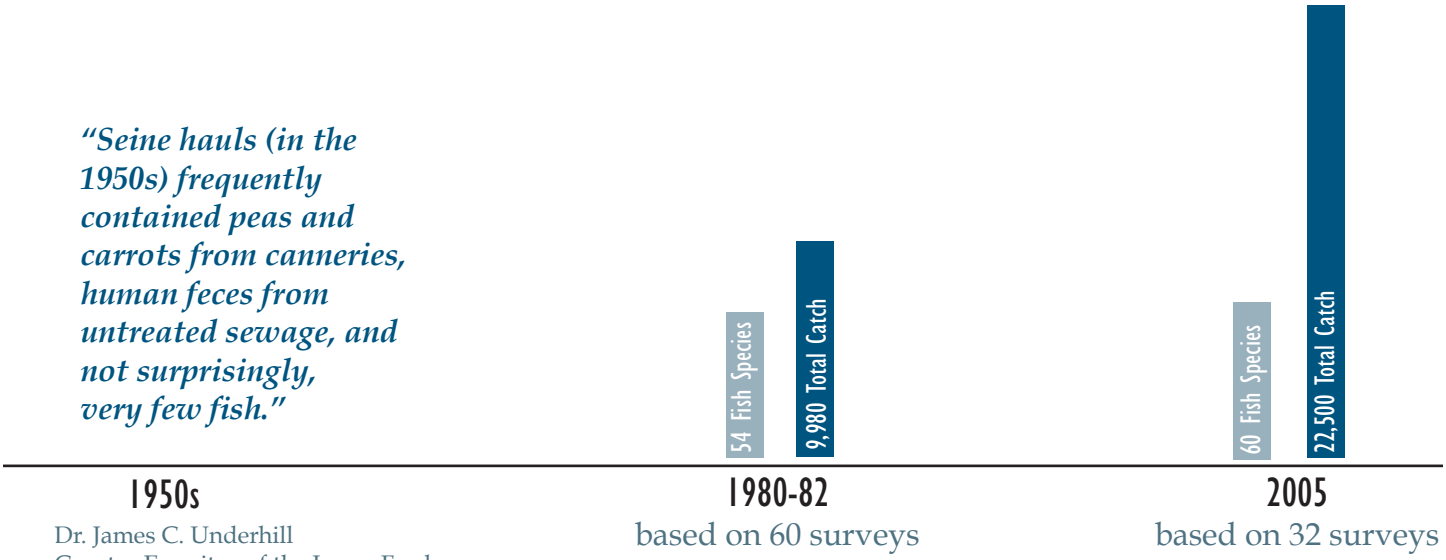
From the late 1800s to the present, surveys by the University of Minnesota, the Minnesota Department of Natural Resources and the Minnesota Pollution Control Agency have documented 104 fish species in 24 families in the counties adjacent to the Minnesota River. "As a result of stream degradation from turbidity and other sources such as chemical contaminants, populations of many species are likely much smaller than in the past, and twelve of the 104 species previously documented in the drainage have not been seen for 30 years and are likely extirpated" (MCBS, 2007).

Recent Trends

In recent decades, water quality has begun improving in the Minnesota River drainage. Likely in response to some improvements in water quality, species diversity and abundance are increasing the Minnesota River (MCBS, 2007).

"Seine hauls (in the 1950s) frequently contained peas and carrots from canneries, human feces from untreated sewage, and not surprisingly, very few fish."

Dr. James C. Underhill
Curator Emeritus of the James Ford Bell Museum Fish Collection
University of Minnesota



Fish Species Doing Well


Flathead catfish

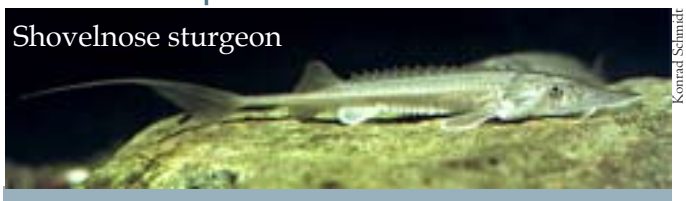
Konrad Schmidt

River supports healthy populations of:

- Flathead catfish
- Channel catfish
- Common Carp
- Walleye
- Sauger
- White bass

Ron Boldtan

Troubled Fish Species


Shovelnose sturgeon

Konrad Schmidt

Fish species in greatest conservation need:

- American brook lamprey
- American eel
- greater redhorse
- largescale stoneroller
- shovelnose sturgeon
- shoal chub

Fish Continued

Konrad Schmidt

The Blue Sucker Returns

One of the state's rarest fish, the blue sucker (*Cycleptus elongatus*), is reproducing once again in the Minnesota River. The blue sucker has been absent from the river for decades. Now the species has returned and is reproducing in the Minnesota River. Konrad Schmidt of the Minnesota Department of Natural Resources says sediment is a big problem for the blue sucker, so its return the Minnesota River is a signal of improved water quality. "The males, in the spring when they're spawning, become almost a sky blue in color," Schmidt says. "It really is a beautiful fish" (MPR, 2002).


Hawk Creek Watershed Project

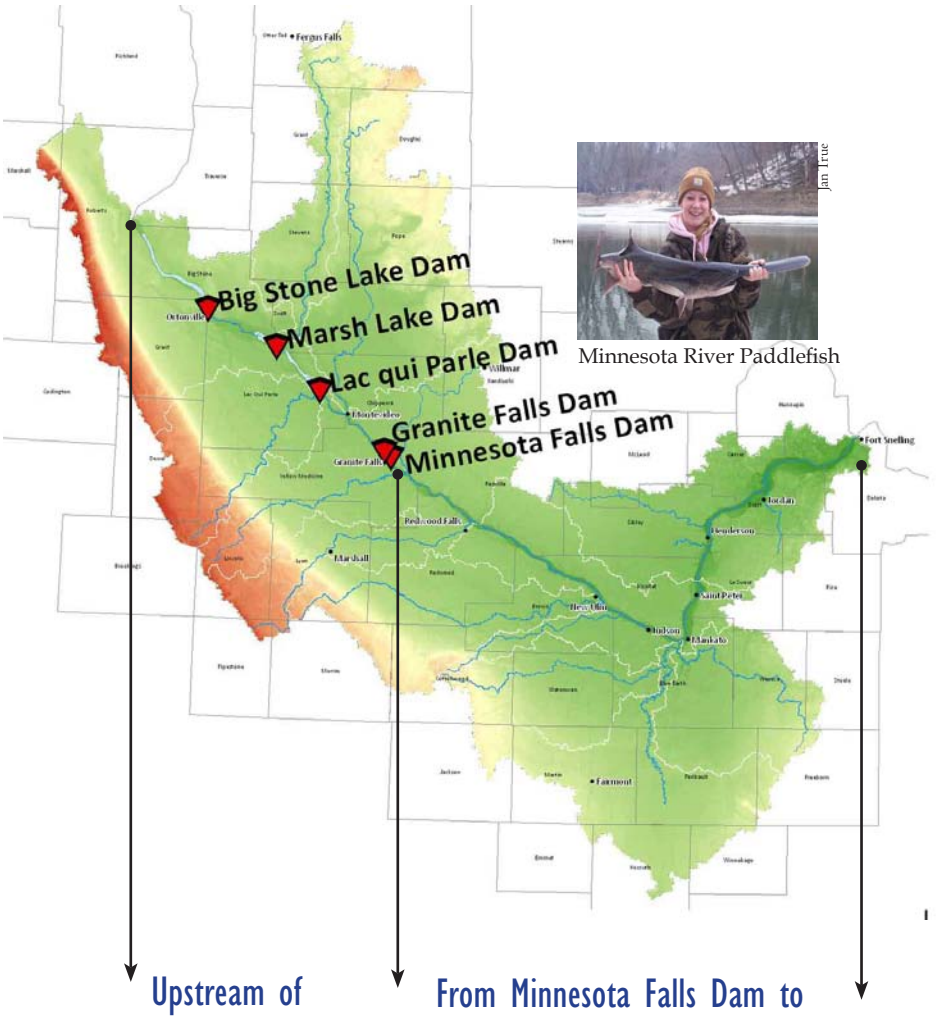
Excess Sediment and Fish

The mainstem of the Minnesota and many of its tributaries are extremely turbid, transporting enormous silt loads many miles downstream.

- Turbidity reduces light penetration which can eliminate submerged vegetation that provides fish habitat.
- Sediment deposits fill in the interstitial spaces in rocky substrates which are habitats for the invertebrate communities that feed many fish species.
- Some fishes require clean, exposed gravel and rubble to lay their eggs and develop. If the spaces are filled, the eggs suffocate.

Impacts of Dams

There are five dams on the Minnesota River mainstem. The first dam on the Minnesota River is at Minnesota Falls (near Granite Falls) about 250 miles upstream from the confluence with the Mississippi River. Except during floods, the five dams present barriers to fish migration. As a result, fish species diversity declines significantly from Minnesota Falls to the source of the river at Big Stone Lake. Prior to the dam era, at least two rare fishes (lake sturgeon and skipjack herring) were known to migrate annually up the Minnesota River to spawning areas in the lake.



Jan True

Minnesota River Paddlefish

Upstream of Minnesota Falls:

Five dams are barriers to fish migration (except during floods).

Fish species diversity declines significantly

From Minnesota Falls Dam to Mississippi River:

Longest free-flowing section of stream in Minnesota - 250 miles.

Richest fish species diversity.
Can find species such as:
Paddlefish (threatened)
Blue sucker (special concern)
Lake Sturgeon (rare)
Black buffalo (rare)

Bald Eagles

A success story—Bald Eagles have returned to the basin

Bald Eagle (*Haliaeetus leucocephalus*) populations in Minnesota have made a dramatic recovery since DDT was banned and they came under the protection of the federal Endangered Species Act in 1978.

The results of DNR's 2005 statewide bald eagle survey reflect a steady increase in Minnesota's bald eagle population over the past thirty years. The number of known active nests in the Minnesota River Basin have substantially increased. The growth of the state's bald eagle population appears to be slowing, but remains at a healthy level. Minnesota's bald eagle population appears large, healthy, and expanding.

Researchers are currently studying what baby eagles can tell us about environmental toxins. Along the St. Croix, Mississippi River, and Apostle Islands, National Park Service ecologist Bill Route has discovered DDT, PCBs, lead, mercury, flame retardants, and perfluorochemicals (PFCs) in baby eagle blood. Route said "the concentrations of PFCs found in a few nests have been among the highest measured in wildlife... but they don't seem to have slowed the eagles' population growth" (Route, 2009).

Bald Eagles and nest near the Blue Earth River.

Par Baskfield

"Eagles, once rare, are now commonly seen along the river."

— Art Straub, Teacher, birdwatcher

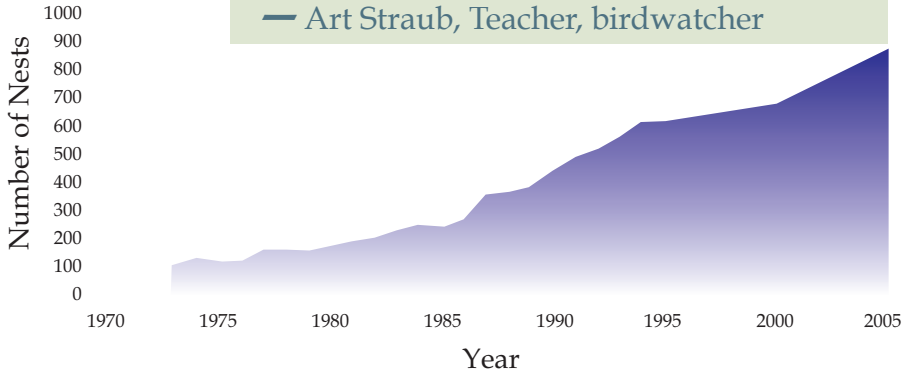


Chart illustrating the number of known Bald Eagle nests in Minnesota, 1973-2005. Source: DNR, 2005

The map below depicts change in the number of known active nests from 2000-2005, by county. Note concentration of more than 30 percent increase (shown in black) in the Minnesota River Basin. Source: DNR, 2005

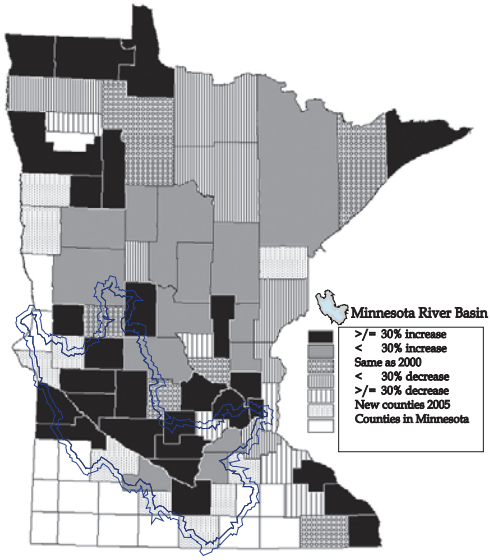


Figure 4. Change in number of known active nests from 2000 to 2005, by county.

Ring-necked Pheasants

One of Minnesota's most popular game birds, Pheasants, are rebounding

Originally imported from Asia, this hardy, wily game bird possesses a keen survival instinct and an uncanny ability to escape. Ring-necked pheasants are easily recognized by their colorful plumage and known for its delicious meat. In 1916, they were introduced in Minnesota They are primarily found in the southern two-thirds of Minnesota, occupying all or parts of 68 counties. Even though ring-necked pheasants are a hardy bird they experience a high turnover rate, especially among the young birds. Food and cover are key factors for their survival.

Chris Kayler Photography

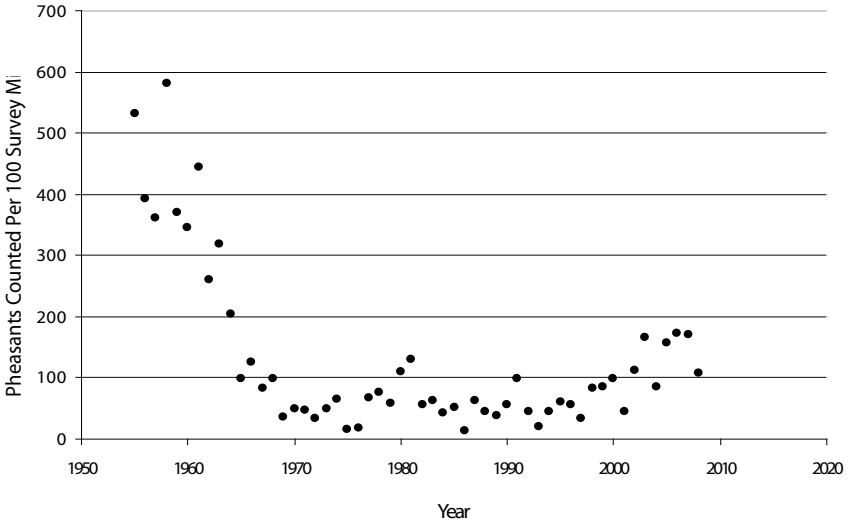
Intense farming practices including minimal small grain crops along with substantial use of pesticides and chemical fertilizers are hard on pheasants. According to resource managers, pesticides destroy weedy and woody cover needed for protection and destroy insects needed by young for rapid development. In addition, chemical fertilizers can cause nitrite poisoning.

Changes in Available Habitat

Habitat for pheasants continue to be affected by the loss of Conservation Reserve Program (CRP) acres. This loss isn't as great as states like South Dakota, but according to DNR officials it is still going backwards. Some of this decline has been offset by an increase of acres in Minnesota's State Wildlife Management Areas Program (WMA). DNR officials report around 5,000 acres are added each year in the state's pheasant range. Some counties in the Minnesota River Basin like Renville County have a large number of acres – nearly 16,000 – enrolled in RIM/CREP/WRP providing habitat for pheasants and other wildlife.

Pheasant populations respond to changes in grassland habitat abundance and weather. Our survey was not designed to detect changes in habitat alone. So the recent increase in pheasant abundance may be as much a function of less severe winters as more grass habitat."
Kurt J. Haroldson,
DNR Wildlife Research Biologist

Pheasant Population Trends: Minnesota River Basin



1955-70
Dramatic decline in pheasant counts

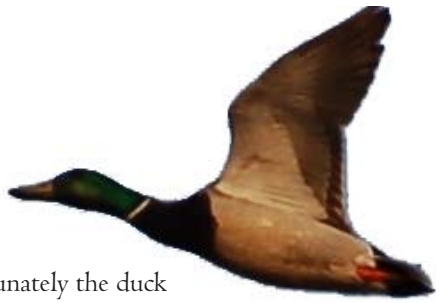
1970- mid-90s
Relatively low and stable numbers

2000-2010
Gradual increase

1980s
"You may expect to see an increase in pheasant abundance in the late 1980s when the Conservation Reserve Program (CRP) got started. But for every acre of CRP that was added to the pheasant range, 3 acres of pasture, hayland, and small grains (alternate grassy habitats) that pheasants use for nesting were lost." —Kurt Haroldson, DNR

Ducks

Swan Lake—a connection between water and upland habitat



The Minnesota River Basin is located in the so-called "duck factory," considered North America's best waterfowl breeding habitat and one of the most important duck breeding areas in the world. This area covers the southern part of Minnesota along with the Dakotas, Iowa and central Canada. Much of the prairie and wetlands originally found in the "duck factory" area have disappeared and what remains faces continued pressure to be broken up and drained for agricultural production. Ducks rely on upland areas around wetlands and shallow lakes for both nesting and as a food source.

One of the most important breeding areas for ducks in the Minnesota River Basin is Swan Lake located in Nicollet County. Swan Lake is over 10,000 acres and called the largest prairie pothole marsh in North America and home to many migratory birds and waterfowl including mallard ducks. From the turn of the century into the 1950s, a large number of market hunters traveled to Swan Lake to harvest waterfowl for restaurants as far away as Chicago. Swan Lake remains a favorite designation for duck hunters with the duck opener attracting over a thousand hunters.

In the 1950s, a dramatic transformation occurred on the landscape surrounding Swan Lake when pasture and hayfield used for dairy farming were plowed under and planted for row crops. This transformation also included the installation of field drain tile and digging of a countywide ditch network to help increase yields of corn and other crops, effectively changing the watershed's hydrology. All of this new drainage reduced the size of the Swan Lake Watershed from 27,000 acres to 16,500 acres. Duck production fell from 18,000 in 1947 to less than 100 in 1984. Two years later the MN DNR initiated a ten-year Swan Lake Area Wildlife Project to increase upland habitat and develop an effective water management plan.

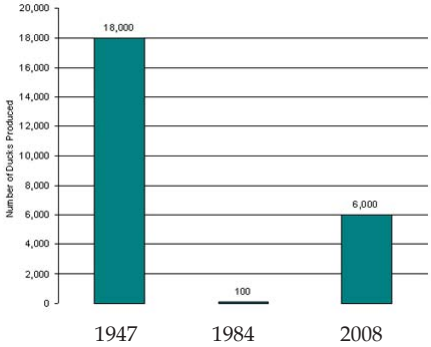
According to the Swan Lake Restoration Project Final Report, it has nearly accomplished its goal of producing 10,000 ducks per year; estimates suggest that the lake annually produces between 6,000-8,000 ducks. Large numbers of ducks use the lake as staging area during their fall migration. Improvements of the water control and drainage systems have allowed the water level of Swan Lake to be managed in a timely fashion. The project did fall short of its goal for acquiring and restoring 8,000 acres of high quality upland acres. Today, Swan Lake faces another crisis for its duck population—the unexpected release of carp into the lake. Carp can drastically reduce a duck's food source that includes invertebrates, fish, amphibians and a variety of plants.

Unfortunately the duck population across the Minnesota River Basin generally isn't as healthy as that found in the Swan Lake Watershed. With the elimination of nearly 95 percent of wetlands in the basin over the last 80 years, there is less habitat and food sources for ducks. Many of the remaining wetlands have degraded water quality and quantity. The immense drainage system put in place across the basin has significantly decreased the duck population capability.

Brown Nicollet Cottonwood Water Quality Board

Swan Lake—Largest prairie pothole marsh in North America. Home to many migratory birds and waterfowl.

Number of ducks produced at Swan Lake



Historical Accounts of Ducks in the Minnesota River Basin

Danny Martin

Blue-winged Teal

George Featherstonhaugh paddled the entire Minnesota River in 1835 and recorded some observations of ducks on this trip:

- "The banks [are] flat and abounding in ziziania [wild rice] and wild ducks and teal, that flew up in clouds as we advanced" (September 29, 1835).
- "As we advanced the quantity of wild ducks and geese became enormous, but they were shy, and generally rose before we could get within shot . . . all of them were fast, and many of them had the most beautiful plumage, especially the gaudy-crested wood-duck, which is a common bird here" (September 28, 1835).
- "As we advanced through these low rice—grounds, clouds of wild ducks rose on the wing, and we killed them at our leisure from our canoes" (September 30, 1835).

River Otters

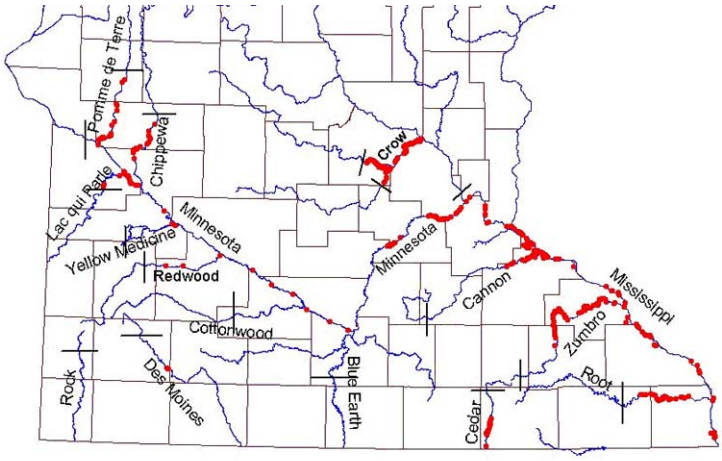
Minnesota's largest aquatic carnivores are rebounding


National Park Service

2000 & 2001 MDNR
River Otter Survey of the Minnesota River Basin

On the Minnesota River, activity was most abundant on the upper and lower portions of the river, with few and scattered observations on the middle portion of the river. Lower activity on the middle Minnesota River likely illustrates the increased time it takes for a species with fairly low reproductive output to naturally disperse and repopulate distance areas, rather than reduced habitat quality in this section of the river. However, for some tributaries of the Minnesota River, water depths and fish populations may be inadequate to support otter populations year-around. Nevertheless, such tributaries may represent important seasonal habitat, for example during offspring rearing. Further evaluation would be necessary to determine the seasonal suitability of these areas.

Source: John Erb and Chris DePerno of the MN DNR, "Distribution and Relative Abundance of River Otters in southern Minnesota."



Distribution of otter sign detections from winter aerial surveys

River Otter Timeline

Pre-settlement – Widespread

River Otters are present or at least occasionally used most waterways including the Minnesota River .

Early 1900s – Decline

River Otter range is greatly reduced because of wetland drainage and destruction of habitat, as well as unregulated harvest, particularly in the southern half of Minnesota.

1977 – CITES Protection

MN DNR mandates registration of otter pelts after the Convention on International Trade of Endangered Species (CITES) determines the river otter resembles many endangered otter species worldwide and falls under the CITES rules.

Early 1980s – Reintroduction

In the early 1980s, 21 otters are released in the upper Minnesota River basin in west-central Minnesota.

2000 & 2001 – MDNR Survey

MN DNR conducts winter aerial surveys across the state's southern part including the Minnesota River Watershed.

Today – Rebounding

There are an estimated 11,000 otters in the state (mostly in the northern half of the state but with increasing numbers and distribution in the south).

River Otter Mortality Factors

- Draining of wetlands,
- Regulated trapping,
- Susceptibility to pollutants – mercury, DDT and PCBs,
- Loss of habitat,
- Vehicle collisions

About River Otters

This social mammal is known for its child-like personality and often appears to spend time playing. While many of these behaviors appear "play" to humans, they likely evolved as practical behaviors related to hunting sucess, grooming, and efficient travel. River Otters have been observed to slide down snow or mud covered stream banks, tag each other and drop pebbles into the water to retrieve them. They are well adapted for swimming with webbed toes, long tail and a torpedo-shaped body that allows them to move up to seven miles per hour in the water. A river otter will eat fish, frogs, insects, mussels, crayfish, turtles, and small mammals like muskrats, chipmunks, mice, and young rabbits. In the water, otters are usually safe from predators but on land they can be killed by bobcats, coyotes and wolves. Otters are also known for being "tireless travelers" – moving up to 25 miles in a week's time. In the spring, a female will give birth up to five cubs, which remain with the parents during the first winter before going off on their own.