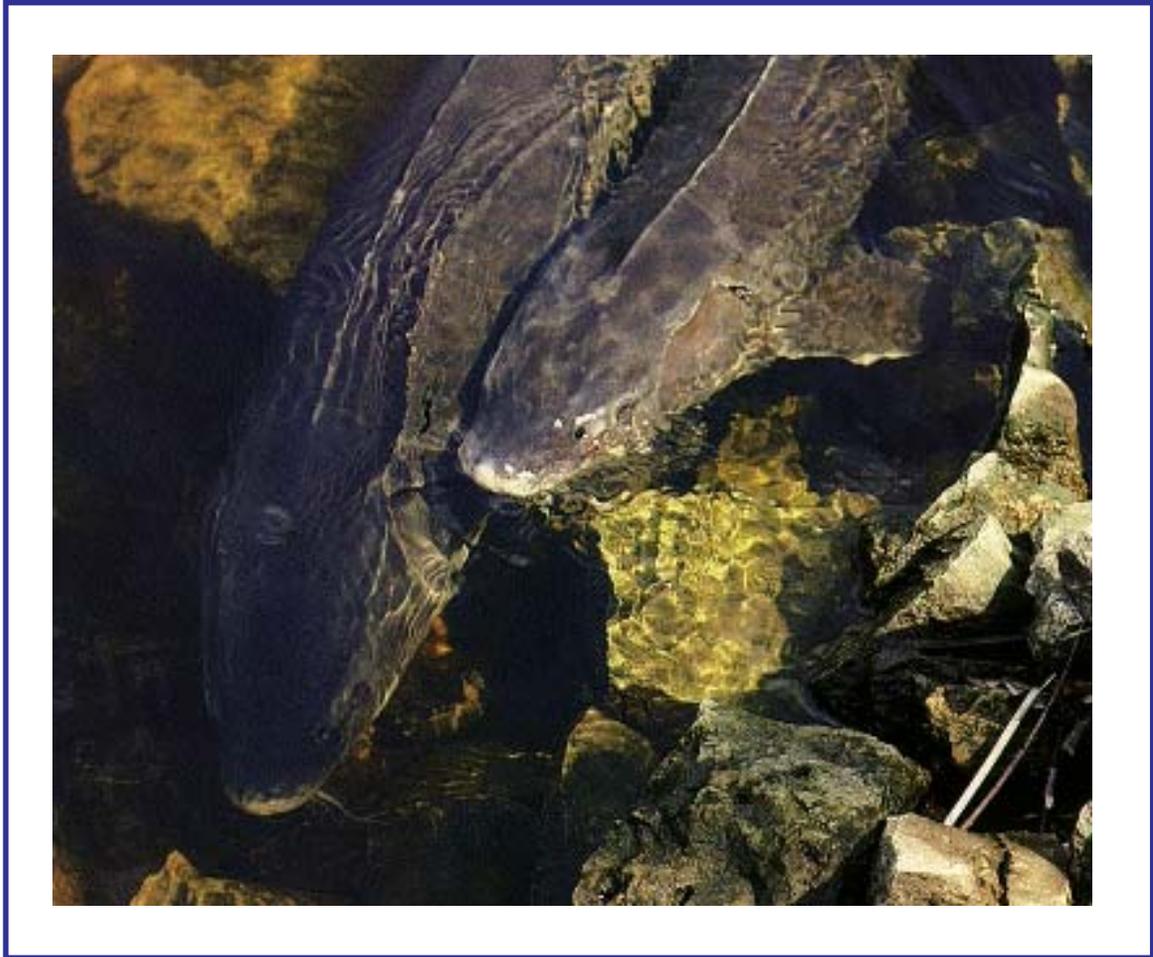


Wisconsin's Lake Sturgeon Management Plan



Wisconsin Department of Natural Resources
Bureau of Fisheries Management and Habitat Protection

October 2000

WISCONSIN'S LAKE STURGEON MANAGEMENT PLAN



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The waters of Wisconsin collectively possess one of the largest self-sustaining populations of lake sturgeon, *Acipenser fulvescens*, in the world. Because of the biological characteristics of lake sturgeon (e.g., slow growing, late-to-mature) and the ease in which a population may be negatively altered in an exploited fishery, it is critical that management strategies and philosophies be continually reviewed, refined and updated.

The Sturgeon Management Assessment Team (SMAT) was established in December, 1996 with the purpose of “reviewing, evaluating, and updating lake sturgeon management goals in Wisconsin.” By reviewing and updating management goals, a logical end-product of the SMAT’s deliberations would then be a revised management plan for lake sturgeon in the state of Wisconsin. Team members included a diverse group of individuals from the Wisconsin Department of Natural Resources (WDNR), the U.S. Fish and Wildlife Service (USFWS), the Great Lakes Indian Fish and Wildlife Commission (GLIFWC), the Menominee Tribe, the University System, the aquaculture industry, several private sporting organizations, the sport fishing industry, and the angling public. Members were invited to participate in the plan development process because of their specific interest in sturgeon biology and management.

Through several facilitated workshops, the Sturgeon Management Assessment Team identified the following key statewide lake sturgeon management issues: the decline in abundance over the last century, the absence of comprehensive biological and/or harvest information with which to manage populations at a statewide or watershed level, the negative effect that habitat loss, modification, or inaccessibility has had on populations, the maintenance of genetic diversity and long-term health of rehabilitated populations, the importance of protection from illegal harvest or incidental catch, the absence of a mechanism to ensure that genetic variability and other population characteristics are maintained in commercial or private industry activities, the existence of antiquated policies and management goals, and the essential involvement of the general public in an effective management program. From the above list of management issues, the Team recommends the following actions:

- Develop standardized collection techniques for population, reintroduction, catch, and harvest assessments
- Identify critical seasonal habitats and habitat improvement opportunities
- Review stocking and reintroduction proposals to ensure genetic integrity is maintained
- Create a separate license fee for hook and line sturgeon fisheries
- Restrict all sturgeon species propagation to the state of Wisconsin and federal, tribal, and commercial aquaculture under a cooperative agreement for research and rehabilitation
- Implement the statewide Lake Sturgeon Management Plan

A draft management plan was presented to the public in a number of special meetings to give interested citizens the opportunity to provide input on the issues and concerns raised in the management plan. Comments from these meetings were incorporated into this final document.

This Lake Sturgeon Management Plan was created to preserve, protect, and restore lake sturgeon populations in Wisconsin for the benefit of the sturgeon resource and all its users.

LAKE STURGEON MANAGEMENT ISSUES

The following issues were identified by the Sturgeon Management Assessment Team as the most crucial to the future of sturgeon management in Wisconsin.

- A. *There is a need for biological information on sturgeon dynamics to effectively manage these species on a statewide or watershed basis.*

Information is often used to make a variety of management and regulatory decisions. Often times, the lack of sufficient population information hinders species-specific management goals. An information void currently exists on many sturgeon populations in Wisconsin. Population level information on the majority of our river systems is lacking and the importance of this species early life history requirements for successful recruitment is unclear. The perpetuation of self-sustaining stocks of sturgeon require a comprehensive understanding of their biology, population dynamics, habitat needs, movement and migration patterns, water quality requirements, fisheries interactions, and the short and long-term effects of human induced impacts. All aspects of target populations must be adequately assessed if this species is to be effectively managed in the future.

- B. *Habitat loss, modification, or inaccessibility have negatively affected sturgeon populations.*

The availability of critical habitats (e.g., spawning, nursery, overwinter) is often the most important factor in the success of any fish population. When these habitats are lost or modified in some way, the resulting impacts can have a direct effect on specific populations. The majority of Wisconsin's river systems have been modified by dam construction that has simplified and fragmented riverine habitats. Water level fluctuations no longer mimic the hydrography of natural river systems. Historical spawning runs no longer occur because of the barrier effect of dams. Riparian development and the resulting sediment deposition and water quality changes have significantly reduced habitat diversity. Fish species such as lake sturgeon have had their distributions dramatically altered by river modification. For this species to continue to exist and flourish, it will be necessary to mitigate current conditions by providing passage opportunities at dams, reducing the occurrence and intensity of unnatural water level fluctuations, or by sustaining or improving river habitats and wetlands that are conducive to reproduction, growth, and survival.

- C. *The genetic diversity and long-term health of rehabilitated sturgeon populations must be maintained.*

Interbasin transfers of fish stocks has undergone considerable scrutiny over the years because of concerns over genetic integrity. Recent assessments support the existence of several genetically distinct stocks of fish in Wisconsin. Individual strains or subpopulations may exhibit unique adaptations to their specific habitats so it is imperative that the complete realm of genetic implications are considered when proposing or implementing any propagation or stocking activity. Genetic diversity in hatchery reared fish must be maintained and maximized if at all possible.

- D. *There is a need for harvest and exploitation information on sturgeon to effectively manage this species on a statewide or watershed basis.*

Information is often used to make a variety of management and regulatory decisions. Often times, the lack of sufficient harvest and exploitation information hinders species-specific management goals. Information is lacking on several crucial aspects of the hook and line sturgeon fishery in Wisconsin

(e.g., catch statistics, exploitation rates, sex/age structure). Also the understanding of length limits and their impact on size, age, and sex structure of sturgeon fisheries with both hook and line and spearing is unclear. Because of the nature of the species (long-lived, late-to-mature) it is clear that management decisions must be based on as accurate and complete information as possible. Every opportunity to assess sturgeon fisheries must be taken.

E. *Sturgeon populations have been reduced in many Wisconsin waters over the last 100 years.*

Over the years, sturgeon populations (or portions of populations) have declined because of habitat degradation, dam construction, water quality problems, and possibly overharvest. In an effort to maintain viable populations and associated fisheries, sturgeon have been intensely managed in some areas and specifically reintroduced for restoration purposes in others. Although reintroduction efforts are satisfying the ultimate goal of “reestablishing sturgeon in waters within their original range where there is reasonable possibility of developing self-sustaining populations through natural reproductions,” the impacts to the aquatic community are unknown. Biologically sound population goals should be established for sturgeon populations.

F. *Sturgeon populations must receive adequate protection from illegal harvest or from incidental catch in commercial fisheries. Additionally, the current registration system is not a complete assessment tool and should be modified to provide additional information.*

Sturgeon management goals can never be realized without enforcement support. Because most sturgeon typically make extensive migrations, they may be exposed to illegal harvest at a variety of locations. Enforcement activity must remain strong if populations are to be adequately protected. Illegal harvest can have significant impacts on the remaining population. Because commercial fishing operations harvest hundreds of thousands of pounds of fish on an annual basis, incidental catch of sturgeon will always be of concern. Moreover, while the spearing registration system has been developed and modified over a number of years, the hook and line sturgeon registration process is in its infancy and may need to be reviewed and revised to provide additional harvest information.

G. *Understanding, support, and involvement by the general public is essential to an effective management program.*

Information, education, and public involvement is critically important when trying to gain the needed support for any proposed management activity. Knowledge of the uniqueness of sturgeon populations is necessary to the understanding of goals and the establishment of management priorities. Increased public awareness and knowledge also facilitates compliance of the current regulatory framework. Public involvement, understanding and support are critical components in the long-term success of sturgeon management in Wisconsin.

H. *There is no mechanism to fully evaluate or ensure that genetic variability and other population characteristics are maintained in commercial or private industry activities.*

Sturgeon are unique species with regards to longevity, spawning maturity, intolerance to pollution, etc. Consequently, genetic mixing, disease, and parasite infection, etc. could severely impact wild populations. Unlike most traditional species that may only require a few years to recover, recovery of a sturgeon population may take between one and two generations. Although private rearing and introductions may supplement existing populations and fisheries, it is imperative that the feasibility of such actions be completely evaluated before accepting this policy.

I. *The lack of adequate statewide management goals and policies have impaired the progress of sturgeon management in Wisconsin.*

Generally, the effective management of a particular species revolves around the presence and implementation of a concise management plan that identifies issues and problems and the associated strategies to address each of them. To date, such a complete management plan does not exist for sturgeon in Wisconsin. In some cases, the absence of a plan has impaired management of the species. A sturgeon management plan developed through a coordinated planning effort with agency, governmental, university, tribal, and private interests will elevate the concerns regarding sturgeon management to the appropriate administration and will provide a framework for decision making in the future.

OBJECTIVES AND MANAGEMENT RECOMMENDATIONS



Through several facilitated workshops, members of the Sturgeon Management Assessment Team identified several key objectives for successful sturgeon management and listed a variety of recommendations that would ultimately meet those objectives. The recommendations listed below have been given a priority order by being assigned either a high (H), medium (M), or low (L) designation.

1.0 Sturgeon Population and Life History Information Needs

Objectives	1.1	Maintain/enhance current sturgeon population assessments
	1.2	Develop and implement standardized population assessments on all existing populations
	1.3	Conduct life history research/assessments where needed
Recommendations	a.	Develop as standardized collection techniques as possible to conduct population studies (estimates, age/growth, size structure, etc.) (H)
	b.	Establish a priority list of waters that need assessment work (H)
	c.	Assess success of reintroductions by methods identified in Objective 1.2 (H)
	d.	Identify characteristics that correlate with successful reproduction and recruitment (e.g., fungus mortality of eggs, predation on various life stages, assessment of spawning grounds) (M)
	e.	Identify seasonal migration patterns (M)
	f.	Identify natural sex ratios (M)
	g.	Assess homing and imprinting behavior (M)
	h.	Identify other research needs as appropriate (M)
	I.	Search for remnant populations (L)

2.0 Habitat Protection and Enhancement

Objectives	2.1	Identify critical habitats and habitat requirements for various life stages
	2.2	Identify barriers and other factors within systems negatively affecting sturgeon populations
	2.3	Enhance habitat where possible
Recommendations	a.	Identify critical seasonal habitats and improvement opportunities (H)
	b.	Ensure the impacts of dams and habitat needs of species are considered during the FERC relicensing process (H)

- c. Work with dam owners to effectively manage or improve habitat in fragmented river systems. Consider dam removal, if warranted, to reconnect fragmented populations. Educate public on the impacts of dams and benefits of dam removal. (H)
- d. Use proper flow management at dams to benefit species (including development of appropriate HSI curves for various life stages) (H)
- e. Use washed rock riprap (>6") as material to create new or supplement existing spawning habitat (H)
- f. Provide passage at dams where feasible and where passage would benefit sturgeon populations (H)
- g. Discourage riparian uses that negatively affect populations (H)
- h. Encourage riparian uses that benefit populations (M)
- I. Evaluate habitat improvement projects (M)
- j. Complete Wolf River sturgeon spawning substrate and flow study report (M)
- k. Determine water quality needs for populations (L)

3.0 Genetics and Propagation, Transfers, and Reintroduction

- Objectives**
- 3.1 Define existing strains/ populations and role of genetics in management and rehabilitation or reintroduction
 - 3.2 Ensure statewide commitment and coordination of sturgeon propagation programs
 - 3.3 Maximize genetic variability in hatchery reared fish used for rehabilitation or reintroduction
 - 3.4 Establish best technical criteria and protocol for maximum quality assurance in propagation efforts

- Recommendations**
- a. All stocking and reintroduction proposals be reviewed by Sturgeon Management Assessment Team (H)
 - b. Use similar strains within basin for stocking and transfers, unless extirpated in the basin (H)
 - c. Form a committee to establish genetic hatchery guidelines, standards, and technical criteria for the propagation of lake sturgeon. (follow existing guidelines until own guidelines can be developed) (H)
 - d. Acclimate fish to water body prior to release (H)
 - e. Annually stock at the suggested minimum densities for rehabilitation purposes for a recommended duration of 25 years of:

<u>Fry</u>	<u>Fingerlings</u>	<u>Yearlings</u>
Based on availability	River 80 per mile	40 per mile
and objectives	Lakes 1 per 2 acres	1 per 4 acres

These recommended rates were based upon estimated population densities of the Menominee River (for the river rates) and Lake Winnebago (for the lake rates). The historical estimated population densities in both waters were used as starting points from which the number of fingerlings and/or yearlings needed on an annual basis to effect a complete recovery of the stock, were estimated. The true effectiveness of the implementation of these rates has not been tested and will need to be evaluated as lake sturgeon rehabilitation projects proceed. For rehabilitation of extirpated or severely depressed stocks, it is recommended that annual stocking occur for at least 25 years or one generation of a lake sturgeon population. Well designed stocking evaluations conducted during that time period will provide the data necessary to adjust the stocking rates as needed to result in the ultimate densities desired for the target water.

Priority List of Wisconsin Lake Sturgeon Rehabilitation Waters - The Sturgeon Management Assessment Team categorized the following waters as priorities in the lake sturgeon rehabilitation process:

A. Waters with ongoing restoration efforts:

- The Wisconsin River from Stevens Point to Lake Du Bay
- The Menominee River below Sturgeon Falls
- The Upper Flambeau River - Manitowish River system
- The St. Louis River
- The Bad River
- Menominee Reservation Waters - Middle Wolf River System; Legend Lake
- St. Croix/Namekagon River System

B. Waters in which rehabilitation can begin:

- The Upper Fox River from Princeton to Lake Butte des Morts
- Green Bay and its tributaries

C. Other potential rehabilitation waters (will need more information, plan development, etc. before rehabilitation efforts can begin):

- Lake Michigan and its tributaries
- Lac du Flambeau Reservation waters
- Red Cedar River
- Mississippi River

4.0 Harvest and Fisheries Information Needs

Objectives 4.1 Develop and implement standardized exploitation assessments

- Recommendations**
- a. Develop standardized catch/harvest assessment techniques that include a measure of exploitation, effort, and age, size, and sex of fish (registrations, rotational creel surveys) (H)
 - b. Determine incidental catch and harvest of sturgeon in commercial fishing operations (identify areas open to commercial fishing contracts that may be closed in future) (H)
 - c. Continue Winnebago spearing assessment (H)
 - d. Examine impact of regulations (length limits, season, etc.) on spearing and hook and line fisheries (H)
 - e. Conduct literature review on exploitation of sturgeon fisheries (M)
 - f. Determine hooking mortality of sturgeon (M/L)
 - g. Determine impact of barriers that concentrate fish and increase harvest (L)
 - h. List chronology of sturgeon regulations (L)

5.0 Population Densities

Objectives 5.1 Manage lake sturgeon populations with biologically and conservationally sound goals.
5.2 Reestablish sturgeon throughout their former range

- Recommendations**
- a. Manage for densities of Age 2+ fish at 250 fish/mile in inland rivers and 1.5 fish/acre in lake systems. (combination in flowages). Populations should be ideally represented by males up to 40 years of age and females up to 70 years of age.

6.0 Regulations and Enforcement

- Objectives**
- 6.1 Manage average annual exploitation of populations at or near 5%
 - 6.2 Maintain strong enforcement of sturgeon regulations at all times
 - 6.3 Protect remnant and rehabilitating sturgeon populations

- Recommendations**
- a. Create separate licensing fee structure for H/L sturgeon fisheries (H)
 - b. Designate all monies collected from sturgeon licensing be used for sturgeon management and assessment work (H)
 - c. Standardize license and carcass tag procedures between spearing and hook and line (Tyvac tag, fee, registration procedure/information collection) (H)
 - d. Evaluate current minimum length limits and expand harvest assessment to make recommendations by 2002 (H)
 - e. Remove remnant populations from hook and line harvest opportunity (H)
 - f. Incorporate the hook and line sturgeon tag into the Automated License Issuance System (ALIS) (H)
 - g. Implement Oct. 1 license sale deadline for Winnebago spearing license (H)
 - h. Examine the possibility of requiring a "harvest" tag or quota system to manage harvest on hook and line fisheries (H/M)
 - i. Work with tribal interests to review and compare tribal and nontribal sturgeon harvest (H/M)
 - j. Develop one statewide sturgeon regulation and information pamphlet (tip card, etc.) (M)
 - k. Review boundary water regulations and promote regulation consistency (M)
 - l. Continue Fox/Wolf River "sturgeon patrol" and encourage other patrols on other waters (M)
 - m. Ensure and enhance FH/LE integration on sturgeon issues (M)

7.0 Public Input and Involvement

- Objectives**
- 7.1 Maintain proactive public involvement in sturgeon management
 - 7.2 Develop and implement statewide public education program for sturgeon and sturgeon management

- Recommendations**
- a. Maintain Sturgeon Management Assessment Team to implement and update Sturgeon Management Plan and review ongoing management activities (H)
 - b. Develop and implement local public involvement where necessary (Sturgeon Advisory Committee, Sturgeon for Tomorrow, etc.) (H)
 - c. Identify target audiences for sturgeon information, type of information and exchange needed, and develop appropriate educational materials to meet identified needs (e.g., video, posters, curricula, exhibits) (H)
 - d. Create web page that will serve as a clearinghouse for sturgeon information and education in Wisconsin. (H)
 - e. Produce annual sturgeon harvest and management report that includes information on spearing, hook and line, and tribal harvest (H)
 - f. Draft fact sheet of Sturgeon Management Plan to distribute with hook and line tag applications and sturgeon spearing licenses. (H)
 - g. Work with local interests to create Sturgeon for Tomorrow chapters throughout the state (M)

8.0 Commercialization, Privatization, and Scientific Use of Sturgeon Resources

- Objectives**
- 8.1 Minimize/eliminate potential problems and threats from aquaculture operations and scientific users.
 - 8.2 Prohibit the importation and distribution of all sturgeon species as a hobby fish for aquaria.
 - 8.3 Establish a cooperative partnership agreement between the Department of Natural Resources, USFWS, Department of Agriculture, Trade, and Consumer Protection (DATCP), academia, tribes, other agencies, and the commercial aquaculture industry for the propagation of lake sturgeon, hereafter referred to as the Wisconsin Lake Sturgeon Aquaculture Agreement (WLSAA) using established technical criteria (from Objective 3.4) to assure the production of the highest quality product.

- Recommendations**
- a. Restrict all sturgeon species propagation to DNR, USFWS, DATCP, tribal, academia, and commercial aquaculture under a WLSAA agreement for research and rehabilitation (statute change) (H)
 - b. Prohibit live sturgeon and/or gametes on any license except under the WLSAA agreement (H)
 - c. Require a scientific collector permit application for those interested in collecting and conducting research on sturgeon. A complete study proposal or plan of work with the following sections should be submitted with the application: Background, Objectives, Approach, Expected Results, Application of Results, References, and Qualifications of Participants. Additionally, applicants will be required to submit annual reports on their progress and a complete report on their project results within 90 days of project completion. Applications will be reviewed by 1) the local fisheries biologist, and 2) the Sturgeon Management Assessment Team. Note: Research cooperators are expected to conform to above reporting standards (H)
 - d. Use technical criteria for propagation established in Objective 3.0 in the development of the WLSAA agreement. (H)
 - e. Determine current jurisdictions and authorities

9.0 Management Plans

- Objectives**
- 9.1 Develop, implement, and update as needed a statewide sturgeon management plan for Wisconsin

- Recommendations**
- a. Implement statewide sturgeon management plan (H)
 - b. Develop and implement drainage and water specific management plans (H)
 - c. Ensure sturgeon management recommendations are addressed in WDNR watershed or basin management plans (H)
 - d. The Sturgeon Management Assessment Team should meet annually to assess implementation of Plan and conduct plan updates when necessary (H)
 - e. Central Office fisheries liaison should be responsible for overseeing the implementation of the statewide sturgeon management plan and coordinating activities of the Sturgeon Management Assessment Team (M)

IMPLEMENTATION STRATEGY



Cooperative efforts between multiple agencies and interested publics will assist in implementing the Wisconsin Lake Sturgeon Management Plan. Ultimately, this plan will be administered by the Department of Natural Resources, through the Bureau of Fisheries Management and Habitat Protection, and through joint projects and partnerships with public and private groups and other individuals interested in sturgeon management.

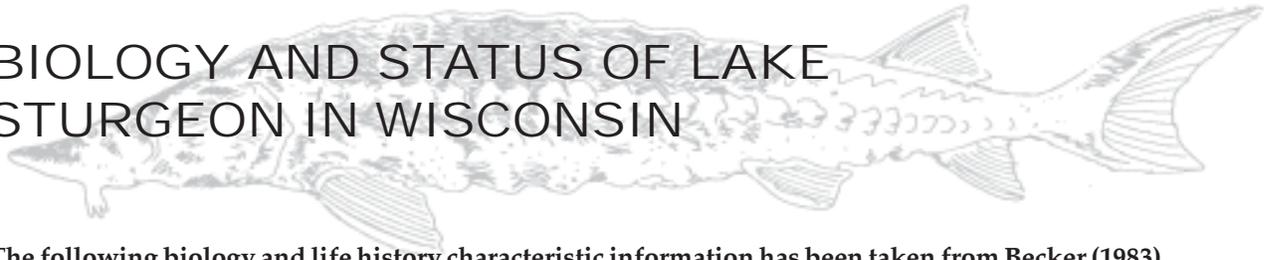
The Sturgeon Management Assessment Team will continue to function as a recognized team, representing a cross section of various sturgeon interests. The Department of Natural Resources or other responsible agencies, working with the public, will determine the feasibility of and develop cost estimates for implementation of various management options suggested in the Plan.

The Wisconsin Lake Sturgeon Management Plan is a management guide developed through the work of dedicated groups and individuals having a stake in the long-term management of sturgeon and other aquatic resources of the State of Wisconsin. This plan will be an ever-evolving one that will be implemented by people who enjoy and depend on the recreational, cultural, and commercial opportunities offered by Wisconsin's sturgeon resource.

THE STURGEON MANAGEMENT ASSESSMENT TEAM

Name	Affiliation
Ron Bruch	WDNR Fisheries and Habitat- Oshkosh
Fred Binkowski	UW-Milwaukee, Great Lakes Research
Gerry Bever	WDNR Fisheries and Habitat - Park Falls
Mark Brann	WDNR Law Enforcement - Eau Claire
Bill Casper	Sturgeon for Tomorrow
Doug Cox	Menominee Tribe
Larry Damman	WDNR Fisheries and Habitat - Spooner
Steve Fajfer	WDNR Fisheries and Habitat - Wild Rose
Tim Gollon	Gollon Bait Company, Dodgeville
Steve Hewett	WDNR Fisheries and Habitat - Madison
Dennis Jones	WDNR Law Enforcement - Oshkosh
Chuck Judd	Judd's Marina, Poynette
Harold Kachur	Wisconsin Wildlife Federation
Joe Kurz	WDNR Fisheries and Habitat - Chippewa Falls
Tim Larson	WDNR Fisheries and Habitat - Poynette
Glenn Miller	Great Lakes Indian Fish and Wildlife Commission
Jeremy Pyatskowitz	Menominee Tribe
Henry Quinlan	USFWS - Ashland FRO
Don Reiter	Menominee Tribe
Jeff Roth	WDNR Fisheries and Habitat - Mercer
Ann Runstrom	USFWS - La Crosse FRO
Butch St. Germain	Lac du Flambeau Tribe
Karl Scheidegger	WDNR Fisheries and Habitat- Madison
Steve Schlimgen	WDNR Law Enforcement - Poynette
Steve Schram	WDNR Fisheries and Habitat - Bayfield
Steve Thompson	Winnebago Sturgeon Advisory Committee
Tom Thuemler	WDNR Fisheries and Habitat - Peshtigo
Larry Wawronowicz	Lac du Flambeau Tribe
Jack Zimmerman	WDNR Fisheries and Habitat - WI Rapids

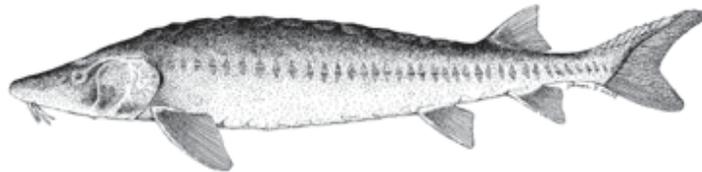
BIOLOGY AND STATUS OF LAKE STURGEON IN WISCONSIN



The following biology and life history characteristic information has been taken from Becker (1983).

LAKE STURGEON

Description - . Body heavy, torpedo-shaped, angular (5-sided) in young, but round in adults. Total length of adults around 45" or more. Snout short, conical. Spiracle present. Caudal peduncle short, stout, partly naked. Lower lip with 2 lobes. Barbels on lower snout, smooth (4). Upper lobe of tail fin pointed without threadlike (filamentous) extension (compare with shovelnose sturgeon). Young gray or brown dorsally with dusky dorsal and lateral blotches. Adults gray to olivaceous dorsally, white ventrally.

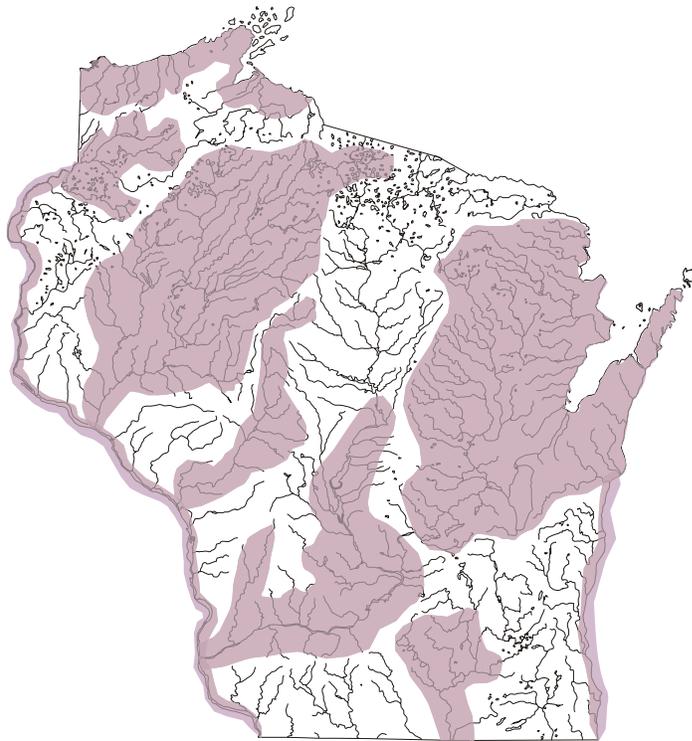


Lake sturgeon, *Acipenser fulvescens*

Distribution and Populations Status - The lake sturgeon occurs in the Mississippi, Lake Michigan, and Lake Superior drainage basins. In the Mississippi River drainage it occurs in the Mississippi, St. Croix, Chippewa (and major tributaries), and Wisconsin rivers. In the Wisconsin River, records place it upstream to the Castle Rock Flowage (Adams County).

In Lake Superior it is found in the comparatively shallow water from the St. Louis River to Bark Point, in the vicinity of the Apostle Islands, and it is known to spawn in the Bad River (Ashland County). In the Lake Michigan basin it occurs in Green Bay, Lake Michigan, the Menominee River upstream to the White Rapids Dam, the Fox River upstream to Lake Puckaway, and the Wolf River upstream to Shawano. This system includes Lakes Winnebago, Butte des Morts, and Winneconne, and the Embarrass River. It has been introduced to lakes where natural reproduction did not occur, among them: Big Cedar Lake (Washington County), the Madison lakes (Dane County), Chain of Lakes (Waupaca County), and Pear Lake (Washburn County).

The lake sturgeon is listed as a rare species in the United States. Over most of its range in the United States, it appears to be threatened. In Wisconsin, it is common in the Menominee River, the lower Wolf River, Lakes Poygan and Winnebago, Lake Wisconsin, the St. Croix River to Gordon Dam, Namekagon River below Trego Dam, and the Chippewa and Flambeau rivers. It is uncommon to rare in the lower Wisconsin River, Mississippi River, the Madison lakes, and Lakes Michigan and Superior. The Wisconsin Department of Natural Resources has given the species "watch" status.



Distribution of lake sturgeon, Acipenser fulvescens, in Wisconsin as reported by Greene (1935)

Biology and Habitat. - The lake sturgeon is a typical inhabitant of large rivers and lakes. It lives in shoal water in the Great Lakes. Inland it shows a preference for the deepest midriver areas and pools.

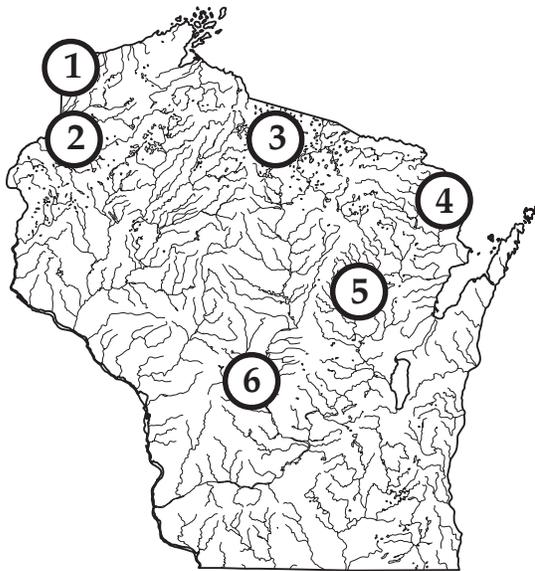
Biology. - Spawning takes place during late April and early May in central Wisconsin. In the St. Croix River, spawning migrations occur in May and early June. In the Wolf River, during seasons when water flow is high and water temperatures rise slowly, spawning begins when the water temperatures reach 53 F. During other times, spawning may not occur until water temperatures reach 58-59 F.

Males are observed at the spawning sites before the females. They cruise the spawning area in groups of eight or more fish, and are frequently so close to the bank that they can be readily captured. Spawning begins as soon as a ripe female enters the group. Several males attend one female by swimming along side her in the same direction, usually against the current. Once spawning takes place, one or more males vibrate simultaneously alongside a female. The average spawning act lasts about 5 seconds. The spawning activity of one female may last from 5 to 8 hours, but may extend over a period of a day or more. Males release milt at the same time the eggs are extruded. Spawning may occur in water from 1 foot up to 15 feet. The eggs are black in color and very adhesive (3 mm in diameter). There is variation in the number of eggs produced by females - anywhere from 50,000 to 700,000 eggs may be released.

Hatching time for the eggs is a function of water temperature. Hatching may occur in 8 days at temperatures of 55-57 F., or in as little as 5 days at water temperatures in the low 60's F. Young sturgeon are nearly 8 mm at hatching and up to 21 mm (almost an inch) at 16 days post hatch.

A female lake sturgeon reaches sexual maturity when she is 24-26 years old and about 55 inches long. Thereafter, instead of spawning every spring, females spawn once every 4-6 years. Few males mature before they are 45" long. Most males spawn every other year. In Wisconsin, male and female sturgeon grow at the same rate, but females live longer than males.

Lake sturgeon travel in loose aggregations, leaving them only at the time of spawning. Occasionally they will move downstream over a dam or a series of dams outside of their home basin.



Lake Sturgeon Restoration Areas

1. St. Louis River
2. Yellow River
3. Upper Flambeau/
Manitowish River
4. Menominee River
5. Wolf River
6. Middle Wisconsin River

Restoration Opportunities. - Over the years, sturgeon populations have declined due to habitat degradation, dam construction, water quality problems, and possibly overexploitation. Efforts to manage, conserve, and restore sturgeon populations have been conducted by the U.S. Fish and Wildlife Service, individual States, Tribes, interstate fisheries commissions, public agencies, universities, and private aquaculture interests. Wisconsin's current lake sturgeon management guidelines call for the "reestablishment of lake sturgeon in waters within their original range where there is a reasonable possibility of developing self-sustaining populations through natural reproduction", and to "cooperate with other states in their efforts to reestablish lake sturgeon populations in appropriate waters within their original range."

Currently, there are a number of ongoing restoration efforts involving lake sturgeon populations in Wisconsin:

- **St. Louis River.** - The St. Louis River has received either lake sturgeon fry, fingerlings, and yearlings from the WDNR and Minnesota Department of Natural Resources since the mid 1980's. Because of genetic concerns with the stocking of fish from outside the Lake Superior basin (Wolf River fish, in this case), the restoration efforts were curtailed for several years. Since 1998, sturgeon have been propagated in cooperation with the Michigan Department of Natural Resources from the Sturgeon River, an intrabasin source. In 1998, almost 7,000 fingerling sturgeon were stocked with an additional 7,000 fingerlings given to Michigan for their restoration efforts. In 1999, lake sturgeon were once again propagated and the resultant fry were stocked into the St. Louis River.
- **Yellow River.** - The Yellow River is a tributary to the St. Croix River that flows into Yellow Lake, the current location of the state hook and line record lake sturgeon (170 lbs. 10 oz. caught in 1979). In 1995, the Department reared and stocked 10,000 fry and 13,400 fingerlings into the Yellow River. Efforts are still ongoing to supplement the Yellow River/Yellow Lake population.
- **Upper Flambeau/Manitowish River system.** - Limited spawning by lake sturgeon has been documented in the Manitowish River. Consequently, attempts are being made to collect and spawn fish from the North Fork of the Flambeau River and stock the fry and fingerlings into the Manitowish River. Brood stock were collected from the Manitowish River in 1998 and 24,000 fingerlings were stocked back into the river.
- **Menominee River.** - The Menominee River has been fragmented by dam construction thereby effectively separating and isolating sturgeon populations. There is a 21-mile section of the river from Sturgeon Falls to the Chalk Hill Flowage that historically had lake sturgeon, but have since been extirpated

because of upstream pollution problems. The water quality has been restored in this section of the river but lake sturgeon have not been able to repopulate the section because of downstream dams. Restoration efforts in cooperation with the Michigan Department of Natural Resources have been ongoing in this section since 1982. Over the last five years, about 25,000 fingerlings and yearlings have been reared and stocked (9,900 fingerlings in 1995, 2,400 fingerlings in 1997, 5,000 fingerlings and 600 yearlings in 1998, and 8,000 fingerlings in 1999).

- **Wolf River.** - The Department is currently cooperating with the U.S. Fish and Wildlife Service and the Menominee Indian Tribe on implementing a lake sturgeon management plan for Menominee Reservation waters. The plan is an attempt to establish and maintain quality habitat and a viable lake sturgeon population on the reservation. Juvenile and adult sturgeon have been transferred since the mid 1990's.
- **Middle Wisconsin River.** - Efforts to reestablish lake sturgeon in the middle Wisconsin River (Castle Rock and Stevens Point flowages) have been underway since 1991. About 200 juvenile and adult sturgeon (27" - 44") were initially transferred from Lake Wisconsin during 1991-1992. Adult transfers were suspended in 1993 because of concern over the population in Lake Wisconsin. Recently, WDNR crews have been able to collect and spawn sturgeon from the lower Wisconsin River, rear the fry at the Wild Rose Hatchery, and stock them back into the flowages.



LAKE STURGEON IN WISCONSIN: A NATIVE AMERICAN PERSPECTIVE

Lake sturgeon has been utilized by Native American peoples in Wisconsin for centuries prior to European settlement. Many tribes in northern and eastern Wisconsin held lake sturgeon in high esteem as an important source food each spring, and, as such, the fish also became quite religiously significant.

The Menominee Tribe of Wisconsin specifically has a long history of lake sturgeon utilization for various cultural and spiritual purposes. Each spring the Tribe would celebrate the return of Wolf River lake sturgeon to spawning grounds on the Reservation near Keshena Falls by holding a special ceremony to mark the beginning of new life. The building of hydropower dams on the Wolf River below the Reservation in the late 1800's prevented the sturgeon from reaching Keshena Falls and throughout the 20th century few if any sturgeon were seen in the Wolf River on the Menominee Reservation. In the early 1990's the Menominee Tribe, along with the WI DNR and the USFWS developed and implemented the Menominee Reservation Lake Sturgeon Management Plan, which has since re-established sturgeon in most reservation waters and has re-established the connection between the lake sturgeon and the Menominee Tribe. This plan embodies many of the principles of the Wisconsin Lake Sturgeon Management Plan and will be a good complement to recovery efforts initiated elsewhere in Wisconsin through the statewide plan.