X-5-14 F6 (7K3)

Pallid Sturgeon
Ref ID: 88469

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Post Office Box 986
Pierre, South Dakota 57501

January 27, 1989

MEMORANDUM

TO : ARD, Fish and Wildlife Enhancement
Denver, Colorado MAIL STOP 60120

FROM : Missouri River Coordinator, FWE
Pierre, South Dakota

SUBJECT: A Report on the Pallid Sturgeon

On June 16, 1988, the Fish and Wildlife Service (Service) received a petition to list the pallid sturgeon as endangered over its entire range. On August 24, 1988, a determination was made, under procedures outlined in 50 CFR 424, that the petition did have merit, which resulted in the Service initiating an effort to pull together all information on the status of the species. In October 1988, a computer printout, which represented all known sightings throughout the range of the pallid sturgeon, was sent to the 13 State wildlife agencies where historic sightings were known, with a request for corrections or additions. In November 1988, a coordinated mailing was sent to all parties presumed by the Service to have an interest, informally advising them that the petition had been received and determined to have merit, and inviting them to share any information they had on the pallid sturgeon that might be pertinent to the listing process or decision.

The attached report, which summarizes presently available biological data on the pallid, was prepared as an aid for Service field offices in answering questions that the letters to interested parties or other awareness of the status review for the pallid sturgeon may have generated.

This collection of data is not intended as a scientific report but, at the request of many, is provided for general orientation and, hopefully, shares some insights gleaned from various sources. It should be recognized that some broad conclusions were necessarily made, some of which may eventually be shown to be inaccurate as the status review proceeds. However, it is hoped that compiling what is known about the pallid (and what is presumed) into a single document will prove useful to the Service's field staff and other users.

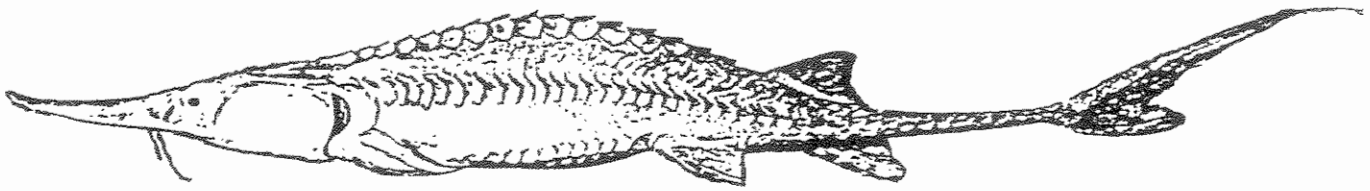
This summary will not be the final effort to present what is known about the species. Arrangements are underway to collaborate with the Research Division on a Biological Report on the pallid for eventual formal publication. This report will provide expanded information in a standard scientific format. A time frame for the Biological Report has not been set as yet, but it is intended to be completed as quickly as possible.

As previously agreed to, this report is being sent to the Enhancement field offices in Region 6, designated contacts in Regions 3 and 4, Fisheries in Region 6, and designated Cooperative Units in Regions 3 and 6.

Kent Hastings

Attachment

A Report on the Pallid Sturgeon



Prepared by

Kent D. Keenlyne
Missouri River Coordinator
U.S. Fish and Wildlife Service
Pierre, South Dakota

January 1989

MRC-89-1

List of Appendices

Table of Contents

STURGEONS IN NORTH AMERICA

Lee et al. (1980) recognizes seven species of sturgeon in North America. Both East Coast species, the shortnose sturgeon (Acipenser brevirostrum) and the Atlantic sturgeon (A. oxyrhynchus), are anadromous forms that return to fresh water to spawn. Both West Coast species, the green sturgeon (A. medirostris) and the white sturgeon (A. transmontanus), are also anadromous. The ranges of all three interior species, the lake sturgeon (A. fulvescens), the pallid sturgeon (Scaphirhynchus albus), and the shovelnose sturgeon (S. platorhynchus), overlap on parts of the Mississippi River drainage.

Much can be presumed about pallid sturgeons by reviewing what we know about sturgeons in general. As a group, they are ancient fish that have existed since long before the advent of man. Their rate of evolutionary change is very slow. Whether this is due to inherent rates in the genetics of the fish or because, until fairly recently, man lacked the ability to drastically alter river systems, thereby leaving their habitats fairly constant so that genetic change was not necessary, is not really known. They are morphologically suited for living close to stream or lake bottoms and, in most cases, in fairly swift currents. The exception, in North America, is the lake sturgeon which does well in lake situations as well as in large rivers. Even so, Lee et al. (1980) lists spawning requirements for the lake sturgeon, like other sturgeons, as requiring swift moving water.

As swift water spawners, all sturgeon have highly adhesive eggs. Spawning, where described for the species, occurs over small rocks, gravel, or hard surfaces. Day length, proper water temperature, and apparently an increased water flow (like the "June rise" on the Missouri and Mississippi Rivers) seem to trigger the fish to spawn when all conditions are right. Spawning at mouths of tributaries, along borders of the main channel, or in the main channel is commonly reported for sturgeon. It takes at least five to eight days for sturgeon eggs to hatch, and a moving bed load at this time creates hatching problems for the eggs. Flowing water produces a good oxygen supply and reduces fungal infections which are a common problem for sturgeons (Ted Dingley, Hatchery Manager, Orangeburg Federal Fish Hatchery, pers. comm.). Since the pallid sturgeon has rarely been found outside the Missouri and lower Mississippi main channels, one might guess that it spawns over gravel beds or other hard bottoms at the mouths of fairly substantial tributaries, in the main river channel, or along the boundary of the main channel when other necessary conditions are met. In addition to suitable day length, an adequate number of degree days may be important for egg development and, possibly, an increasing water flow. Stilled waters or a moving bed load between the time the eggs are deposited and the time they hatch would be expected to create problems.

Although the reproductive cycle of the pallid sturgeon is not well described, one can expect it to be similar in many ways to other North American sturgeon species, and especially similar to its close but smaller relative, the shovelnose, with which it can hybridize (Carlson et al. 1985). Gilbraith et al. (1988) cited references indicating that male

pallids mature at age three or four years, and ripe females could be found in June. In general, sturgeon do not reproduce until an advanced age (five to ten years of age), and females mature at an older age than males. Both males and females may go three to five years between spawnings. When they do spawn, small batches of eggs are periodically released over extended periods (10 to 12 hours) for many sturgeon species, which suggests an advantage for maximizing genetic mix with several males. Sturgeon are noted as long- lived, which also suggests a very conservative reproductive scenario (which also seems to fit a fairly slow evolutionary change rate). Speculation suggests that meeting reproduction needs may be a delicate but crucial strand in the success of any sturgeon species, including the pallid.

Another distinctive character of sturgeons are the barbels under the rostrum. These sensory organs are obviously important in the feeding process of the fish. Sturgeons are noted as opportunistic feeders that feed on aquatic insects, crustaceans, mollusks, annelids, eggs of other fish, and sometimes other fish. The pallid is noted as more inclined to feed on other fish (Carlson et al. 1985). The small eye of the pallid sturgeon and the fact that it is a fish of turbid rivers may also give us an important clue about its feeding habits. Its preferred habitat is often described as sand flats or gravel bars. One would expect it to feed on aquatic insect larvae, mollusks, and smaller fish that would inhabit the same areas. In murky waters, one could surmise that the pallid may float over unsuspecting prey, such as flathead chubs or sauger, which have been noted in its diet. When impoundment of a river occurs, the possible advantage of murky water for catching other fish would disappear or be reduced, as would the occurrence of many aquatic insects and most mollusk beds.

RANGE OF THE PALLID STURGEON

The range of the pallid sturgeon (see Appendix 1) is primarily the Missouri River, and the Mississippi River downstream of its junction with the Missouri (Gilbraith et al. 1988). Sightings have been reported from the mouth of the Mississippi to the mouth of the Missouri (1,154 miles), the lower 35 miles of the Big Sunflower and St. Francis Rivers (tributaries to the Mississippi), from the mouth of the Missouri to Fort Benton, Montana (2,065 miles), in the lower 40 miles on the Kansas River and lower 21 miles on the Platte River (tributaries to the Missouri), and in the lower 200 miles of the Yellowstone River (see Appendix 2). The total length of its range is approximately 3,550 miles of river.

One of the most obvious changes to the pallid sturgeon's historic habitat is the series of impoundments on the main stem of the upper Missouri River, and the locks and dams at St. Louis, Missouri, and Alton, Illinois, on the Mississippi. Approximately 990 miles of river, or 28 percent of the sturgeon's range, have been impounded. From just above Sioux City, Iowa, on the Missouri River, all the way to the mouth of the Mississippi, the river has been transformed into a barge canal. Approximately 1,810 miles of river, or 51 percent of the sturgeon's entire range, have been channelized for this purpose. The remaining 21 percent of its range lies

below dams, the construction of which has often drastically altered water quality (like greatly reducing silt loads), runoff patterns, and, probably equally as important, water temperatures. The dams also block passage of fish. This may have effectively eliminated the fishes use of many of the so-called "natural" sections between the dams. Of the approximately 3,550 miles of Mississippi and Missouri main stem river habitat for the pallid, virtually all of it has been drastically modified in one manner or another (see Appendix 3 for locations that will be mentioned).

The paper by Whitley and Campbell (1974) is highly recommended to anyone desiring to better understand the many physical, chemical, and biological changes that have occurred since the impoundment of the upper Missouri River and the effects of channelizing the lower Missouri River (the latter would generally apply to the Mississippi as well).

UTILIZATION

The pallid sturgeon is one of the largest freshwater fish in North America. Since it was not described as a separate species until 1905 (Forbes and Richardson 1905), many of the early reports of sturgeon catches during the heyday of commercial fishing in the late 1800's, during which many of the sturgeon populations were severely reduced, likely grouped it with the lake sturgeon or the shovelnose. Somewhat later, its large size made it a trophy fish in many parts of its range (see Appendix 4). However, researchers in the 1970's and early 1980's have generally considered the pallid sturgeon to be quite rare to uncommon, with some offering speculation that the fish was probably never very common. This general perception seems to persist today. However, discussions with both Federal and State research biologists who have studied changes in the upper Missouri River fishery as the reservoirs filled suggest that, though the pallid was not considered abundant (as were carp or buffalo, for example), neither was it considered uncommon. Correspondence and notes of several researchers as late as 1967 suggest that the pallid was still common in many parts of the Mississippi-Missouri system. In fact, biologists were often able to capture several pallids in a single net set, and commercial fishermen who worked the reservoirs as they filled took hundreds of pallid sturgeon. The commercial market still potentially exists, for sturgeon eggs are reported to be worth about $50 per pound.

DISEASE AND PREDATION

Virtually nothing is known regarding natural diseases or predation on the pallid sturgeon. No reports have been found of pallid sturgeon being eaten by other fish. Dr. James Schmulbach (pers. comm.), University of South Dakota, has worked extensively with shovelnose sturgeon and found them to be relatively parasite and disease free but knows of no published work on the pallid in this regard.

REGULATORY MECHANISMS

Eleven of the 13 states where the pallid sturgeon presumably may occur have instituted some form of recognition concerning its rarity. Kentucky still allows harvest of the species. Regulations in North Dakota and Montana are designed to protect the species with prohibitions against keeping any sturgeons over certain weight or length limits. The logic behind weight or length regulations is that any sturgeon over a certain reasoned weight or length would likely be a pallid sturgeon, as opposed to a shovelnose, and therefore should not be kept. Most other states prohibit keeping pallid sturgeons, if caught. Kallemeyn (1983) suggests that small pallids could be confused with the shovelnose and inadvertently kept by either sport or commercial fishermen.

OTHER FACTORS

Whitley and Campbell (1974) and Elser et al. (1977) raise some interesting long-term questions about the potential for recovery of sturgeon. Of particular concern is the general reduction of productivity of the river system and especially the changes in aquatic life existing on the river and lake bottoms that sturgeons would most likely utilize, resulting from river impounding and other physical habitat alterations (Hesse 1987). Another factor to consider is the potential for pollutants in the system to affect sturgeon life functions. Many areas on the Mississippi carry fairly high loads of a wide variety of pollutants. As a result, commercial fishing has either been shut down or restricted in many areas of both the Mississippi and Missouri Rivers. The Missouri River is reported to carry alarmingly high loads of chlordane in its lower third, which has led to multistate and multiagency studies to identify sources. Algal blooms are a concern in portions of the upper end of the Missouri, and especially in the upper reaches of Oahe and Sakakawea Reservoirs. Another concern is the potential to genetically swamp the pallid sturgeon through hybridization with the shovelnose. These species are very closely related, and hybridization has already been reported in South Dakota (Joe Elrod, former North Central Reservoir Investigations biologist, pers. comm.) and Missouri (Carlson et al. 1985) on the Missouri River, and in Missouri (Carlson et al. 1985) on the Mississippi River.

FROM THE DATA

When reviewing the available data, several things seem apparent. In general, pallid sturgeon sightings have become fewer and fewer in recent years with many sections of river where sightings were quite common in the past now having had no recent reports. Also, the average size of fish reported has increased, which probably suggests an older population. Recent reports may well suggest that remnant populations still exist in the Missouri River near the mouth of the Yellowstone below Fort Peck; in the upper end of Lake Sharpe near Pierre, South Dakota; and between the mouth of the Platte River in Nebraska and Gavins Point Dam, with occasional scattered fish also remaining in the Mississippi. A most striking observation is the relatively large size of the fish captured in that section of the Missouri River between Garrison Dam in North Dakota and Fort

Peck Dam in Montana (especially in the unimpounded section and including the lower Yellowstone). While fish from the channelized lower river sections seldom reach 15 pounds, pallids in the described upper section are seldom less than that in weight. This striking contrast may strongly suggest a potential food shortage in the channelized river, as postulated by Whitley and Campbell (1974) and Hesse (1987).

Although some fishery research and management efforts were occurring in the 1940's, the availability of Dingell-Johnson assistance to State fishery programs greatly spurred research in the 1950's. This was also about the same time that expanded Federal water projects were being built on the Missouri and Mississippi Rivers, which added impetus to follow the welfare of fish, especially in the reservoirs. A brief explanation of the river development in each reach, along with sturgeon sightings information, should help the reader in understanding the data.

THE MISSISSIPPI

Schnick et al. (1982) describe the development of the Mississippi River. The alteration of the Mississippi River for commercial navigation began in the early 1800's. Early work consisted of snag removal from the channel and along the riverbanks. In the 1870's, channel training was begun through the use of wing dams and revetments. In 1907, a six-foot channel was established by further restricting the channel by training and with the aid of dredges. In the 1930's, a nine-foot channel was constructed by further contracting the channel, closing off chutes, and additional dredging. From St. Louis north, the river was converted to a series of pools by building locks and dams. The lower river depth was increased by extending and heightening wing dams with further chute closures. Old, wooden pile dikes were gradually replaced with more efficient rock dikes. The most significant alterations of the system began in the 1930's and have continued into the present decade.

Also, to understand the data, an explanation of how the river mileage is listed will be useful. The "Lower Mississippi" starts at the Gulf, and mileage markings proceed upriver to the mouth of the Ohio River near Cairo, Illinois. The "Upper Mississippi" starts at the mouth of the Ohio and proceeds to the headwaters. Consequently, there is a break in river miles at the mouth of the Ohio where the river mile count starts over. Some references also mention the "Middle Mississippi," which usually refers to that reach between Cairo and St. Louis. This generally coincides from the mouth of the Ohio to the first impoundment, the locks at St. Louis.

A general word of caution is necessary when reviewing river mile locations. Whitley and Campbell (1974) document that the lower 750 miles of the Missouri River have been shortened by 60 miles as a result of converting it to a navigation channel. The Mississippi has also undergone a similar shortening over the years. In dealing with "river miles" as locations, one needs to be aware that mileage has changed considerably over the years. River miles have been used in this report, however, for convenience and as a means of identifying duplication of records, especially in shared boundary water situations. Most of the records have been located using

present mileage charts, but one must be aware that habitat conditions at specific locations are dynamic, and older records, particularly, need to be evaluated recognizing that the river may have changed.

Appendix 5 shows the distribution of pallid sturgeon sightings on the Mississippi River. The scarcity of observations in the Mississippi makes any analysis of data difficult. Nineteen pallids have been reported from the Lower Mississippi (see Appendix 2; to River Mile [R.M.] 951) which represents only one fish per 50 miles of river. Bailey and Cross (1954) report pallids taken near New Orleans in the early 1950's and presume an 1882 record in that area was also a pallid sturgeon. Of particular interest, this area contains brackish water. Pallids were also taken in this general vicinity in the 1970's, and another was taken about 20 miles downriver in 1977 in what would definitely be brackish water (Jim Stewart, Jackson, Mississippi, pers. comm.). The impression is given that the pallids move downriver until they engage the brackish water (in which they apparently can survive). Two upriver records came from tributaries to the Mississippi. One was in November and the other in April, which one might speculate as possible attempts at either pre-spawning runs or as possible overwintering areas. The vicinities near R.M. 410 and 485 have had multiple sightings over a period of years, which suggests future searches may be warranted for pallids in these areas. Interestingly, five of the sightings in the Lower Mississippi have occurred during the 1980's, suggesting the species, although scattered, may still be present in the Mississippi, and reproduction may possibly have occurred somewhere in the system within, at least, the last 20 years.

Pflieger (1975) describes the pallid sturgeon as a fish of turbid waters typical of the Missouri River main stem. He explains that the Mississippi above its confluence with the Missouri is a comparatively clear water river. Once the combined water reaches the mouth of the Ohio, it is further diluted with relatively clean water. Consequently, the Mississippi River is most like the Missouri between the mouth of the Missouri and the Ohio. This explains why some of the turbid Missouri River fishes will also occasionally be found in this section of the Mississippi. Indeed, 16 pallid sturgeon have been reported from this reach (see Appendix 2), which would equate to one for each 13 miles of river. Only one observation, however, has been obtained since 1980. Interestingly, the species was described by Forbes and Richardson in 1905 from seven specimens caught in the Mississippi near the mouth of the Missouri in 1904. This was before the most significant alterations of the river took place. The commercial fisherman that they obtained some of their specimens from observed that the species was much more abundant, however, in the lower Missouri.

THE MISSOURI

The Lower Missouri

If the pallid was originally more prevalent in the lower Missouri, present records do not substantiate it (see Appendix 6). One specimen in 1944 and another in 1978 are all that have been recorded in the lower 150 miles of the Missouri. Only 38 specimens have been recorded in the entire lower 810

miles (from Gavins Point Dam to the mouth). There have obviously been more relative sightings on the lower Missouri (one per 21 miles) than on the Mississippi in general, but hardly an abundance of sightings. Six sightings in this reach were from tributaries with five from the lower Kansas River in 1952 and one from the lower Platte River in 1979. However, eight sightings have been recorded in this reach since 1980 with the lowermost sighting being near Leavenworth, Kansas (about R.M. 397). Most of the 1980 or later sightings have come from the section starting near the mouth of the Platte and extending upriver to Gavins Point Dam.

The U.S. Army Corps of Engineers (1980) describes the work of the Missouri River Bank Stabilization and Navigation Project. Work began in 1912 to provide a six-foot channel from Kansas City to the mouth. Work consisted primarily of dikes, revetments, and cutoffs. In 1927 an extension of the project to Sioux City, Iowa, was begun. In 1945 the existing project was modified as a nine-foot channel, which brought greater constriction and cutoffs to eliminate sharp bends, chute closures, and dredging where necessary. In 1890, Rulo was at R.M. 538. Seventy years later, in 1960, it was at R.M. 498 (40 miles "closer" to the mouth). Appendix 7 is a series of photos of the river at Indian Cave Bend (R.M. 517) between 1934 and 1977. These photos graphically illustrate what physical changes have occurred on the lower river between Nebraska and Missouri as a result of alteration for the navigation project. The Appendix was taken from the Fish and Wildlife Coordination Act Report for the Missouri River Stabilization and Navigation Project (U.S. Fish and Wildlife Service 1980). The lower river has obviously changed greatly since 1904 when Forbes and Richardson were told that the pallid sturgeon was more prevalent there than in the Mississippi.

The approximately 60-mile section below the Gavins Point Dam remains in a relatively natural state. This section is the Missouri National Recreational River. However, it is not unaffected, for it has notable problems with degradation below the dam, which tends to drain side chutes and backwater areas. The problem has been recognized and studied for several years, and degradation has generally eroded the channel about eight feet. One might surmise that the pallid could possibly thrive in this area and possibly even reproduce. However, Kallemeyn and Novotny (1977) in 1976 and Hesse and Mestl (1988) have not been able to find a single pallid sturgeon larva in 13 years of study (1975 through 1987), either in this area or in areas both above and below this area. Their work has filtered over 106 million gallons of Missouri River water at 14 stations along the entire Nebraska border since 1975 without finding a single pallid sturgeon larva. Three pallid sturgeon have been reported from this reach since 1980: one was caught near Sioux City in 1987 (confiscated from fisherman), another was caught by a fisherman near Ponca, Nebraska, in 1987, and one was snagged and released by a paddlefish fisherman in 1988. Work done this summer by Fish and Wildlife Service (Service) Contaminant Specialists collecting sturgeon failed to capture any pallid sturgeon while working nine stations from Boyd County, Nebraska, to Kansas City. Five 24-hour sets at each station using 200-foot experimental mesh gill nets failed to produce any pallid sturgeon (Mark Wilson, U.S. Fish and Wildlife Service, Manhattan, Kansas, pers. comm.).

One of the most extensive studies done on sturgeon, including the pallid sturgeon, was done by the State of Missouri in 1978 and 1979 (Carlson et al. 1985). In two years of study, they examined 4,378 sturgeon, 11 of which were pallid sturgeon and 12 of which were hybrids between the pallid and shovelnose. The sampling was done from 12 stations along both the Missouri and Mississippi Rivers. It is interesting to note that this fairly extensive effort picked up only 11 pallid sturgeon in two years of work, even though the combined waters represent nearly a quarter of the entire range of the pallid. This was also one of the few studies where documentation of age exists for their specimens. Their youngest fish was four years old, which indicates that it was hatched in 1974. This is the last documentation of possible reproduction in the lower Missouri.

The Upper Missouri

A little background is needed to understand the Upper Missouri system. Appendix 3 shows the location of the main features on the Missouri. Although there are six Pick-Sloan dams (Fort Peck is included, even though it was already built when Pick-Sloan was authorized in 1944) in the system, each dam differs in function and operation. The uppermost dam, Fort Peck, was closed in 1938, and its original purpose was to supply water for the Federal navigation projects downstream (which starts at Sioux City, Iowa). The second dam on the river was the Fort Randall Dam on the South Dakota/Nebraska border (Lake Francis Case), which was closed in July 1952. Any fish downstream from that point at that time were then blocked from moving upstream after that date. Garrison Dam (Lake Sakakawea) near Bismarck, North Dakota, was closed in April 1953 (which is likely a significant factor in what appears to be the last remaining significant population of pallids). This closure trapped any sturgeon between it, Fort Peck, and the Yellowstone River and blocked any future movement upriver. Gavins Point, the lowermost dam (Lewis and Clark Lake), was closed in July 1955. This dam is the regulation structure for the navigation project which starts about 60 miles downriver. Oahe Dam, near Pierre, South Dakota, was closed in August 1958 and is the lowermost of the three high storage dams of the system. Fort Thompson Dam (Lake Sharpe) was the last dam, which was closed in November 1963 and backs water almost to Pierre. Construction of the system, then, took place over a period of 15 years.

The upper three dams are operated primarily for flood control and power production, since they are high dams (150 to 200 feet deep, i.e., "head"). About 80 miles of "natural" river remain between Garrison and Oahe. About five miles of "riverine" area remain below Oahe, although it is greatly influenced by the next dam. While the upper three reservoirs fluctuate annually by 20 feet or more, Lake Sharpe is the most stable in the system. Randall Dam impounds water all the way to Fort Thompson, the next upper dam. About 40 miles of "natural" river exist below Randall, but this area experiences great flow changes before coming to the re-regulatory function of the lowermost reservoir, Lewis and Clark Lake. The lower three reservoirs have turnover rates of about three to five days in the summer; that is, the volume of water entering a reservoir over a three- to five-day period equals what the reservoir holds. Locations of pallid sturgeon

sightings on the Missouri River are displayed in Appendix 6. A discussion of each section of the impounded river follows, beginning with the lowermost reservoir.

Lewis and Clark Lake - Gavins Point Dam, forming Lewis and Clark Lake, was closed in July of 1955 (Walburg 1976). The dam above it, Fort Randall Dam, was closed in July 1952. The U.S. Fish and Wildlife Service began studying the fish populations of the newly formed reservoir in 1956 out of its North Central Reservoir Investigations (North Central) Station at Yankton, South Dakota. During the first six years of study (first six years of the reservoir), 17 pallid sturgeon were captured in the lake (Walburg 1964). In 1957, commercial fishermen reported taking a pallid sturgeon near Springfield on the upper end of the reservoir (undated memo by Don Monroe, South Dakota Department of Game, Fish and Parks). Although studies would continue for 19 years, the last pallid sturgeon in this stretch was observed in 1975 in the Fort Randall tailwaters. The North Central team sampled for young-of-year fish throughout the reservoir but did not record a single pallid sturgeon fry in 19 years of study. While North Central's work ceased on Lewis and Clark in 1974, Hesse and Mestl's work (discussed above) began in 1975. In summary, adult pallid sturgeon were obviously trapped when the newly formed lake was closed, survived for at least 20 years, and eventually died out. No pallid reproduction has been documented in the 32 years since the lake was formed, nor has a pallid sturgeon been observed in this section for the last 13 years.

Lake Francis Case - Lake Francis Case was formed by the Fort Randall Dam, which was closed in July 1952. Oahe Dam was closed in August of 1958 and served as the uppermost limit of fish movement until the Big Bend Dam (Fort Thompson), built between the two, was closed in November of 1963. Fort Randall Dam now backs water all the way to the Big Bend Dam.

Lake Francis Case has a most interesting set of pallid data associated with it. It was the first dam in the system to block off the major section of the upriver system and block possible downriver movement of sturgeon from the headwater regions where sturgeon spawning runs might be expected to occur. Again, North Central personnel initiated extensive fishery studies, beginning in 1954. Pallid sturgeon were noted in the catch during the early years (Walburg 1977), and commercial catch records provided by Gasaway (1970) and Monroe (undated letter to South Dakota Department of Game, Fish and Parks) show that good numbers of pallid sturgeon once inhabited this section of the river.

Oahe was closed in August of 1958, which would block upriver movement of any sturgeon caught between the dams. Almost 90 miles of "natural" river would remain on the upper end of Lake Francis Case until the Big Bend Dam was closed in 1963. The commercial fishing records show the following removal of pallid sturgeons from the lake: 1959, 4; 1960, 4; 1961, 12; 1962, 78; 1963, 2; 1964, 60; 1965, 29; 1966, 31; 1967, 67; and 1968, 41. In the 10-year period after the closing of Oahe (and Big Bend in 1963), 328 pallid sturgeon were removed from the lake.

Even though adult fish were obviously present in the lake in good numbers, Walburg (1977) was unable to document any pallid sturgeon in his young-of-year studies from 1956 to 1961 or 1966 to 1975. In an October 19, 1967, letter to Al Fox, South Dakota Cooperative Fishery Unit Leader, Norm Benson, Chief, North Central Reservoir Investigations team, Yankton, reports capturing five pallid sturgeon in Platte Creek Bay in Lake Francis Case in 1967. He also notes, however, that the fish were all over 10 years old and "obviously we have no evidence of reproduction . . . of the pallid sturgeon." The last recorded pallid sturgeon in Lake Francis Case was 20 years ago in 1969.

Lake Sharpe - Lake Sharpe also has an interesting history. It was formed by the closing of the upper dam, Oahe, in August of 1958, and the closing of Big Bend Dam (Fort Thompson) in November of 1963. Fogle (1964) reported creel censusing pallid sturgeon below Oahe when doing studies between 1959 and 1963. He (1961b, 1963a, and 1963b) estimated 20, 34, and 7 pallids were taken by fishermen below Oahe Dam in 1960, 1961, and 1962, respectively. Since they were "estimates," they have not been included in Appendix 2, although apparently some pallids were observed. Obviously a number of sturgeon were trapped between Randall and Oahe, but Big Bend had also apparently trapped a few pallids between it and Oahe.

Divers have reported observing pallid sturgeon downstream of Oahe Dam as recently as the winter of 1986-87 (Mike Bucholz, Pierre, South Dakota, pers. comm.). Jim Riis, South Dakota Department of Game, Fish and Parks fishery biologist, reported catching two pallids below Pierre in 1988 (pers. comm.). Bucholz, while scuba diving below Oahe Dam in the winter, reports that pallids have been observed much less frequently in recent years (pers. comm.). He also gives an interesting account of their habits. He contends that they move to within about three to four miles of the dam in November onto a sandy and gravely flat. Staying on the bottom in slight currents, they can be approached and handled. Here they remain until about April when they move down a couple of miles to the headwater of the lake where they stay in deeper side channel holes and backwaters or along cutbanks next to the islands. A similar movement pattern would explain how fish could have been trapped in this section when Big Bend Dam was closed (in November).

As in the lower reservoirs, no pallid sturgeon reproduction has been documented from Lake Sharpe. In a November 1, 1967, memo from the Supervisory Fishery Biologist, North Central Reservoir Investigations team in Pierre, Fred June reported to Al Fox, "In reply to your recent inquiry concerning pallid sturgeon, we have taken no young-of-year in extensive and intensive trawling and seining in both Lake Sharpe and Oahe Reservoir." Nine pallids have been reported by divers, fishermen, and State biologists in this heavily fished reach since 1980.

Lake Oahe - Lake Oahe was formed by the closure of Oahe Dam in August 1958. The next upriver dam, Garrison, had been closed five years earlier in April 1953. The lake did not fill to full operating level until 1967 and, at full pool, influences flows almost to Bismarck, North Dakota (over 230 miles).

The State of South Dakota began fishery studies on Oahe as soon as the pool began to fill (Fogle 1961a, 1961b, 1963a, 1963b). In the fall of 1963, Federal staff picked up the work (Gabel 1974) with the North Central team which continued through 1974 (June 1976). The South Dakota Department of Game, Fish and Parks continued studies when North Central was phased out, and their reservoir research team occupies the old North Central building near Oahe Dam.

The presence of pallid sturgeon in this reach, however, is first documented by work done by North Dakota as a result of the Garrison Dam being closed in 1953. Shortly after closure, the State began taking creel census information in the tailwaters of Garrison. Carufel (1958a, 1958b) reported that tailrace fishermen caught one pallid sturgeon in 1957 and eight in 1958. As the reservoir filled, Fogle (1961a) reported capturing four pallid sturgeon in 1959, 22 in 1960 (Fogle 1961b), one in 1961 (Fogle 1963a), and 20 in 1962 (Fogle 1963b). As the reservoir advanced, Fogle moved one of his three sampling stations to the headwaters of the reservoir, and this is where most of the pallids were taken. The North Central team began studies in the fall of 1963 and reported taking three pallid sturgeon in Oahe in 1964 (Gabel 1974). In an October 27, 1967, letter to Al Fox, Fishery Coop Unit Leader at Brookings, Joseph Higham, Acting Chief of the Reservoir Research Program in Mobridge, South Dakota, reported 13 pallids were captured in 1964, five in 1965, one in 1966, and four in 1967. He went on to say that "pallid sturgeon may be endangered by impoundments but they are not exactly rare, at least in the river habitat of Oahe Reservoir. Our records indicate an absence of pallids south of Mobridge but fair numbers, plus some reproduction, in the upper portions of Oahe Reservoir which approach river habitat." Higham's optimism for the pallid was echoed by Dale Henegar, Chief of the Fisheries Division in North Dakota, in a brief November 7, 1967, memorandum to Fox in which he stated "there is a reasonably good population of pallid sturgeon in the Missouri River between Garrison and Oahe. We catch a number of them each year during test netting."

North Dakota began limited fishery surveys in the Oahe section of their State in 1962 and more extensive surveys in 1965 (Hill 1968), which have continued to the present. Hill (1966) reported catching one pallid sturgeon in this stretch during their 1965 studies. William Hill, who was District Fishery Manager in Riverdale, North Dakota, also reported, in a December 5, 1967, letter to Al Fox, that they had captured one pallid sturgeon in gill nets in 1966 and two in 1967. In a June 1968 report, Hill (1968) indicates that, in all, three pallids were taken in this reach in 1967 and, apparently, one was also taken in 1965, the first year of their expanded studies. No pallids were reported in the North Dakota section from 1968 through 1971, but six were caught in 1972 (Berard 1973), 120 in 1973 (Berard 1974), and one in 1974 (Berard 1975). Interestingly, the late 1960's and early 1970's reports coincide with the final filling of Oahe, which apparently pushed the pallid sturgeon into the remaining riverine habitat on the upper end where the reports come from. Although at least 215 pallid sturgeon were reported from Oahe between 1957 and 1974, there has been only one report since that time, and that was made in 1985.

No mention is made of exactly what evidence of pallid sturgeon "reproduction" was noted before 1967 in Higham's letter (discussed earlier herein), but it is an interesting coincidence that this must also have occurred before Oahe finally filled. June's 1967 memo to Fox was not so optimistic about reproduction by the pallid in the lower reaches. Beckman and Elrod (1971), June (1976), and Nelson (1980) all failed to find pallid reproduction in Oahe from 1965 through 1975 (when North Central was closed).

Lake Sakakawea - Lake Sakakawea is the third oldest reservoir in the system, being formed by the closure of Garrison Dam in April 1953. Fort Peck Dam was closed in 1938 and forms the upper boundary of this section on the Missouri. Of the approximately 25 million acre-feet of average annual flow down the Missouri through Sioux City, 80 percent originates above Garrison Dam. Of that 80 percent, 32 percent originates above Peck and 48 percent between Peck and Garrison (mostly the Yellowstone River) (Chet Worm, Reservoir Control Center, Corps of Engineers, Omaha, pers. comm.). Kallemeyn (1983) comments that the Yellowstone is the only Missouri River tributary having multiple year observations of pallid sturgeons but also notes that where they join, the mean flow of the Yellowstone is 100 m^3/sec greater than the Missouri. There is a dam, however, that now effectively blocks sturgeon movement up the Yellowstone River at Forsyth, Montana, which is about 200 miles upriver of the mouth (Al Sandvol, U.S. Fish and Wildlife Service, Fishery Assistance Office, Valentine, Nebraska).

As happened during the early years of the main stem reservoirs in South Dakota, great expectations of an abundant commercial fishery occurred in North Dakota with the Garrison Dam. Commercial fishing occurred in the early 1950's, but any harvest of pallid sturgeon can not be gleaned from the records. Early records broke the harvest into "sport" or "rough" fish. Later records broke the harvest down more, but sturgeon were simply lumped as "shovelnose and lake sturgeon." An article by Carufel (1953) in the North Dakota Outdoors magazine contains pictures of some large sturgeon which were described as lake sturgeon (see Appendix 4). The fish are obviously pallid sturgeon and not the lake or rock sturgeon, Acipenser fulvescens. Obviously, some pallids were harvested commercially from Sakakawea in the early years, but no records have been found to document the level of harvest.

The North Central teams did not work on Garrison, but the State of North Dakota established surveys in 1956. Their reports show the following catch of pallid sturgeon: 1959, six (Van Wyhe 1960); 1963, one (Sprague 1964); 1965, one (Hill 1966); 1967, one (Hill 1968); 1968, two (Hill 1969); 1970, three (Ragan 1972); 1972, three (Berard 1973); 1974, four (Berard 1975); 1977, one (Berard 1978); 1978, four (Berard 1980); 1981, one (Berard 1982); 1982, one (Berard 1983); and 1984, three (Berard 1985). All other years, 1956 through 1985, no pallids were caught. In contacting their reservoir study group (Greg Powers, pers. comm.), they also have one report for 1986

and one for 1988. In total, 33 pallids have been caught in Garrison in the last 33 years. On an optimistic note, pallid sturgeons have been caught in five different years since 1980; however, this only represents seven specimens.

No young-of-year pallids have ever been reported in any of the North Dakota reports, even though extensive surveying for young fish has occurred. One would surmise that, for the fish to remain present for 35 years after impoundment, some reproduction must have occurred sometime in the interim. June (1981), however, found that pallid sturgeons can live at least to the age of 27, so one may, perhaps, not safely make the assumption that reproduction has occurred.

Montana biologists have also been conducting extensive fishery surveys in the Missouri River for a number of years. Nine pallids have been reported in the Fort Peck tailwaters, with eight of these coming since 1985. A call to Pat Clancey, Montana Fisheries Office, Helena, provided a bit of enthusiasm on the pallid. He reported that they had gill netted a pallid sturgeon below Fort Peck Dam in 1985 and had a report of a diver seeing one in 1987. This past winter, divers worked extensively below Garrison Dam and were able to identify at least five individual pallid sturgeons.

There have been periodic reports of pallids also being observed on the Yellowstone River. Several early reports locate pallids frequenting the Yellowstone near the mouth of the Tongue River. Recent reports (four since 1980) place most fish downriver of the diversion at Intake near R.M. 71.

Lest we become too optimistic about the sturgeon in Garrison (and the Yellowstone), we must review the likely movement pattern of the pallids. Studies over the years (along with diver observations) tend to demonstrate that pallids move upriver in the fall to flowing areas (likely over sandbars and in deeper holes) below the dams. In early spring, they move down to the riverine habitat at the upper end of the pools. In summer, they perhaps cruise currents in the reservoir. Tagging recently done through a cooperative effort in North Dakota should help to either confirm or alleviate the concern that the biologists may possibly be counting the same fish but in different places.

Fort Peck Reservoir - Fort Peck is the uppermost of the Pick-Sloan dams on the Missouri. However, another dam, Canyon Ferry, exists above Fort Peck; this would effectively block sturgeon movements further up the Missouri (about R.M. 2,290). Approximately 250 miles of "natural" river lie above Fort Peck, including another Wild and Scenic River section on the upper end of the reservoir. Pallids have been reported from this area since the late 1800's. Although only 12 reports exist in this entire reach of over 500 miles, a 1986 report provides hope that the species may still exist in this area, and perhaps a remnant population can be found.

STATUS AND POPULATION TRENDS

Deacon et al. (1979), for the American Fisheries Society, classified the pallid sturgeon as threatened over its entire range due to habitat alteration. No specific studies have been done to establish population numbers on the pallid, which would allow easy comparison of population trends. However, interviews with biologists who reported most of the pallid sturgeon reports and with a commercial fisherman who collected many of the reported commercially harvested pallids in the early years of reservoir filling on the Missouri (where most of the sightings have occurred) were helpful. Among those biologists who provided much insight were Lou Carufel, who worked in North Dakota as the dams were filling; Ned Fogel, who worked in South Dakota at the same time; and Fred June, Chuck Walburg, and Joe Elrod, who worked with the Service's North Central Reservoir Investigations teams in the 1960's and 1970's. According to these individuals, pallids were not particularly difficult to capture and were fairly easy to distinguish from the darker colored, rougher, and generally smaller shovelnose. Rich Holcom, a contract commercial fisherman who worked in South Dakota as the reservoirs filled, also indicated that the two species were readily identifiable and that many pallids were taken. All indicated a belief that construction of the Missouri River main stem reservoirs has had a major adverse impact on reproduction by the species. Reasons given were changing water temperatures, altering flow regimes, and flooding historic spawning areas (which resulted in the stilling of flowing water and silting over of the spawning beds). The observations of a number of other fishery experts agree with the general observations of the above, i.e., that the pallid has suffered a significant decline in population over many areas of its range (Pflieger 1975, Cross 1967, and Kallemeyn 1983).

The physical alteration of spawning habitat or alteration of water conditions may not be the only problem, however. Several researchers have documented the decline in body condition in the pallid sturgeon as the reservoirs filled, suggesting that feeding and/or food sources became a problem (Fogle 1961a, 1961b, 1963a, 1963b; Shields 1957, 1958; and Sprague 1959). The general decline in condition of both shovelnose and pallid sturgeons as the reservoirs filled suggests it may be incorrect to presume, purely on the basis of a small or intermediate-sized sturgeon being caught, that the specimen may necessarily represent a "young" fish. Similarly, finding the presence of a pallid which is presumed to be of adequate size for reproduction should not lead one to presume that reproduction is taking place.

The data shows a sharp decline in pallid sturgeon observations over the range of the species and especially so in the Missouri River from Gavins Point Dam to the Fort Peck Dam. In the 1960's there were 500 observations (i.e., average of 50 per year); in the 1970's there were 209 observations (i.e., an average of 21 per year); and in the 1980's 56 observations (i.e., about 6 per year) (see Appendix 8). Aging, remnant populations of few

individuals apparently exist in two or possibly three areas in the whole system. Otherwise, occurrence of the species appears uncertain. The last documented case of possible reproduction was in 1967 within the reservoir system and above, and in 1974 from Gavins Point Dam downriver.

Comparison of hours of effort to catch a pallid is difficult to make, using the data available. Of course, no amount of netting in some reservoirs is going to produce pallids if they no longer exist there. A comparison of effort, however, in areas where they still do exist might be helpful. The Garrison data shows the best comparison since information on equipment types and hours of fishing are available. The first such available data is for 1959 (Van Wyhe 1960), which shows it took 181 hours of variegated (i.e., "experimental net") gill net fishing (250-foot length) per pallid sturgeon caught as compared to 859 hours per pallid with the same equipment in 1984 (i.e., 25 years later). This would suggest that it took only 20 percent of the effort to catch a pallid sturgeon in 1959, as compared to 1984.

Apparently, one of the most effective means of catching pallid sturgeon is by hook and line (Gould and Schmulbach 1975). Indeed, this is one of the most common ways reports are obtained. Carufel (1958a, 1958b) gave two years of summer creel census data below Garrison Dam where pallids were caught. In 1957, one pallid was caught in 4,254 hours of fishing, while in 1958, eight pallids were caught in 6,659 hours of fishing. From this limited data, one would expect one pallid sturgeon for every 1,000 to 2,000 hours of fishing, if they are present. Contrasting this with the most recent figures on reported catches and fisherman use of the reservoirs may help put the situation into perspective, although such a comparison is certainly subject to many valid criticisms. Bob Kendrick, Corps of Engineers in Omaha (pers. comm.), provided me with the Corps' 1986 estimates of fisherman days on the reservoirs: Lewis and Clark, 525,430; Lake Francis Case, 744,484; Big Bend (Lake Sharpe), 450,000; Oahe, 1,496,272; Garrison, 1,389,463; and Fort Peck, 433,995. These, of course, are fisherman days which must be multiplied by several times to derive the actual hours of effort. Unkenholz (1982) found that from 66 to 85 percent of the fishermen in Oahe were fishing for walleye, which would mean that most of the fishermen were dragging worms, minnows, and leeches over the lake bottom. This should have occasionally produced a pallid sturgeon, if they were still present (since they are bottom feeders and feed on many of the same things as do walleye). If we conservatively estimate that the fishermen the Corps reported to be using the system in 1986 fished four hours per day, then nearly 20.2 million hours of angling yielded only two reports of pallid sturgeon being caught that year. This appears to contrast dramatically with the Carufel data from 30 years ago (roughly 10,000,000 hours per fish compared to a maximum of 2,000 hours per fish in the earlier period).

FINAL NOTE

Considerable effort was made to collate the sighting records for this report. However, other records (especially older ones) may still exist. If other records are known, please contact the author. If the field offices have trouble obtaining copies of references cited here that they may wish to review or have questions about the report, please call me at (605) 224-8693.

LITERATURE CITED

Bailey, R.M., and F.B. Cross. 1954. River sturgeons of the American genus Scaphirhynchus: Characters, distribution and synonymy. Pap. Mich. Acad. Sci. Arts Lett. 39:169-208.

Beckman, L.G., and J.H. Elrod. 1971. Apparent abundance and distribution of young-of-year fishes in Lake Oahe, 1965-69. Reservoir Fisheries and Limnology; Amer. Fish. Soc., Spec. Publ., (8):333-347.

Berard, E. 1973. Management surveys of the Missouri River and its main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-20, Job No. 1. 31 pp.

_____. 1974. Management surveys of the Missouri River and its main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-21, Job No. 1. 33 pp.

_____. 1975. Management surveys of the Missouri River and its main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-22, Study I, Jobs I-A, I-B, I-C. 35 pp.

_____. 1978. Ecological investigations of the Missouri main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-25, Study I.

_____. 1980. Ecological investigations of the Missouri main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-26, Study I.

_____. 1982. Ecological investigations of the Missouri main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-28, Study I.

_____. 1983. Ecological investigations of the Missouri main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-29, Study I.

_____. 1985. Ecological investigations of the Missouri main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-31, Study I.

Carlson, D.M., W.L. Pflieger, L. Trial, and P.S. Haverland. 1985. Distribution, biology and hybridization of Scaphirhynchus albus and S. platorynchus in the Missouri and Mississippi River. Environmental Biology of Fishes 14:51-59.

Carufel, L.H. 1953. Sturgeon. North Dakota Outdoors. 1953 (May):16-17, 33.

_____. 1958a. Creel census analysis tailrace fishing area of the Garrison Reservoir. North Dakota Game and Fish Department, Dingell-Johnson Project Report, F-3-R-5. 9 pp.

_____. 1958b. Test netting survey of the Garrison Reservoir. North Dakota Game and Fish Department, Dingell-Johnson Project Report, F-3-R-5. 12 pp.

Cross, F.B. 1967. Handbook of fishes of Kansas. Univ. Kans. Mus. Nat. Hist. Misc. Publ. No. 45. 357 pp.

Deacon, J.E., G. Kobetich, J.D. Williams, and S. Contreras. 1979. Fishes of North America, endangered, threatened, or of special concern. 1979. Fisheries 4(2):29-44.

Elser, A.A., R.C. McFarland, and D. Schwehr. 1977. The effect of altered streamflow on fish of the Yellowstone and Tongue Rivers, Montana. Tech. Rept. #8, Montana Dept. Fish & Game. 180 pp.

Fogle, N.E. 1961a. Report of the fisheries investigations during the second year of impoundment of Oahe Reservoir, South Dakota, 1960. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-9, Job 12-14.

_____. 1961b. Report of the fisheries investigations during the third year of impoundment of Oahe Reservoir, South Dakota, 1960. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-10, Job 9-12.

_____. 1963a. Report of the fisheries investigations during the fourth year of impoundment of Oahe Reservoir, South Dakota, 1961. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-11, Job 10-12.

_____. 1963b. Report of the fisheries investigations during the fourth year of impoundment of Oahe Reservoir, South Dakota, 1961. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-12, Job 10-12.

_____. 1964. Summation of four years of creel census, July 1959 through June 1963, on Oahe tailwater. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-3, Job 12-14. 18 pp.

Forbes, S.A., and R.E. Richardson. 1905. On a new shovelnose sturgeon from the Mississippi River. Bulletin of the Illinois State Laboratory of Natural History 7:37-44.

Gabel, J.A. 1974. Species and age composition of trap net catches in Lake Oahe, South Dakota, 1963-67. U.S. Fish and Wildlife Service. Technical Papers, No. 75. 13 pp. + app. (Abstr.)

Gasaway, C.R. 1970. Changes in the fish population in Lake Francis Case in South Dakota in the first 16 years of impoundment. U.S. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Technical Paper 56, Washington, D.C., USA.

Gilbraith, D.M., M.J. Schwalbach, and C.R. Berry. 1988. Preliminary report on the status of the pallid sturgeon, Scaphirhynchus albus, a candidate endangered species. S.D. State University, Brookings, SD. 76 pp.

Gould, G., and J. Schmulbach. 1975. Relative abundance and distribution of fishes in the Missouri River, Gavins Point Dam to Rulo, Nebraska. Mo. River Environ. Inven., Univ. South Dakota, Vermillion, SD. 59 pp.

Hesse, L.W. 1987. Taming the wildlife Missouri River: What has it cost? Fisheries 12(2)2-9.

Hesse, L.W., and G.E. Mestl. 1988. Paddlefish predicament. Nebraskaland. 1988 (July): 23-25, 44-46.

Hill, W.J. 1966. Progress and job completion report, test netting survey of Garrison Reservoir, Missouri River, and Oahe Reservoir investigations, Snake Creek Reservoir, commercial fishing in Garrison Reservoir. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-13, Job No. 1. 35 pp. (Abstr.)

_____. 1968. Management surveys of the Missouri River and its main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-15, Job No. 1. 44 pp. + app.

_____. 1969. Management surveys of the Missouri River and its main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-16, Job No. 1.

June, F.C. 1967. Changes in young-of-the-year fish stocks during and after filling of Lake Oahe, an Upper Missouri River Storage Reservoir, 1966-74. U.S. Fish and Wildlife Service, Technical Paper No. 87. 25 pp. (Abstr.)

_____. 1981. Adult fish stocks of Lake Sharpe, South Dakota, 1964-75. U.S. Fish and Wildlife Service Technical Paper.

Kallemeyn, L.W., and J.F. Novotny. 1977. Fish and fish food organisms in various habitats of the Missouri River in South Dakota, Nebraska, and Iowa. U.S. Fish and Wildlife Service, Office of Biological Services, National Stream Alteration Team, FWS/OBS-77/25, Columbia, MO, USA.

Kallemeyn, L.W. 1983. Status of the pallid sturgeon (Scaphirhynchus albus). Fisheries 8(1):3-9.

Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr. 1980. Atlas of North American freshwater fishes. North Carolina State Museum of Natural History, Raleigh, NC, USA.

Nelson, W.R. 1980. Ecology of larval fishes in Lake Oahe, South Dakota. U.S. Fish and Wildlife Service Technical Paper (101). 17 pp.

Pflieger, W.L. 1975. The fishes of Missouri. Mo. Dept. Cons., Jefferson City, MO. 343 pp.

Ragan, J. 1972. Management surveys of the Missouri River and its main stem reservoirs in North Dakota. North Dakota State Game and Fish Department, Dingell-Johnson Division. Project F-2-R-18, Job. No. 1.

Schnick, R.A., J.M. Morton, J.C. Mochalski, and J.T. Beall. 1982. Mitigation and enhancement techniques for the Upper Mississippi River system and other large river systems. Resource Pub. 149. U.S. Dept. Int., Fish and Wildlife Service, Fort Collins, CO. 714 pp.

Shields, J.T. 1957. Report of fisheries investigations during the second year of impoundment of Gavins Point Reservoir, 1956. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-6. 34 pp.

_____. 1958. Report of fisheries investigations during the third year of impoundment of Gavins Point Reservoir, South Dakota, 1957. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-7. 48 pp.

Sprague, J.W. 1959. Report of fisheries investigations during the fourth year of impoundment of Gavins Point Reservoir, South Dakota, 1958. SD Dept. Game, Fish and Parks, Dingell-Johnson Project Report, F-1-R-8. 42 pp.

_____. 1964. Test netting survey of Garrison Reservoir, creel census of Garrison tailrace, pre-impoundment survey of the Missouri River Snake Creek Reservoir, commercial fishing in Garrison Reservoir. North Dakota Game and Fish Department. Dingell-Johnson Division. Project F-2-R-11, Jobs 1 and 2.

U.S. Army Corps of Engineers. 1980. Potamology investigation Missouri River Rulo, Nebraska to mouth. MRD Sediment Series No. 22. U.S. Corps of Engineers, Omaha, NE. 105 pp.

U.S. Fish and Wildlife Service. 1980. Fish and Wildlife Coordination Act Report for the Missouri River Stabilization and Navigation Project. U.S. Fish and Wildlife Service, Kansas City, MO. 85 pp.

Unkenholz, D.G. 1982. Angler harvest survey on Lake Oahe, South Dakota, 1981. SD Dept. Game, Fish and Parks, Progress Report 82-7.

Van Wyhe, G.L. 1960. Test netting survey of the Garrison Reservoir. North Dakota Game and Fish Department. Dingell-Johnson Project F-3-R-7, Work Plans I, II, and III.

Walburg, C.H. 1964. Fish population studies, Lewis and Clark Lake, Missouri River, 1956 to 1962. U.S. Fish and Wildlife Service, Special Scientific Report-Fisheries No. 482. 27 pp.

_____. 1976. Changes in the fish population of Lewis and Clark Lake, 1956-1974, and their relation to water management and the environment. U.S. Bureau of Sport Fisheries and Wildlife, Research Report No. 79. 34 pp.

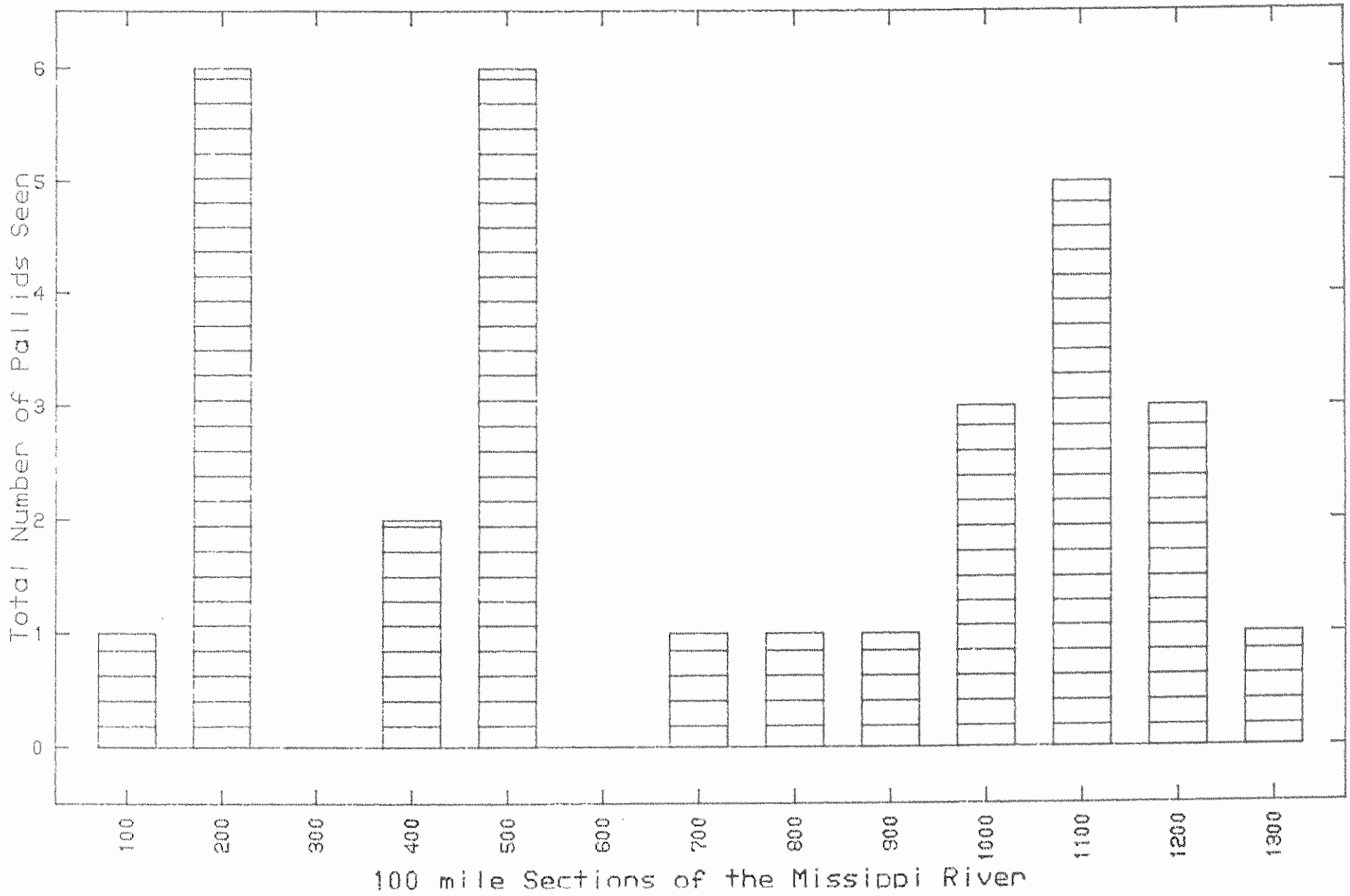
_____. 1977. Lake Francis Case, a Missouri River Reservoir: Changes in fish population in 1954-75, and suggestions for management. U.S. Fish and Wildlife Service Technical Paper, (95). 12 pp.

Whitley, J.R., and R.S. Campbell. 1974. Some aspects of water quality and biology of the Missouri River. Trans. Mo. Acad. Science, 7-8:60-70 pp.

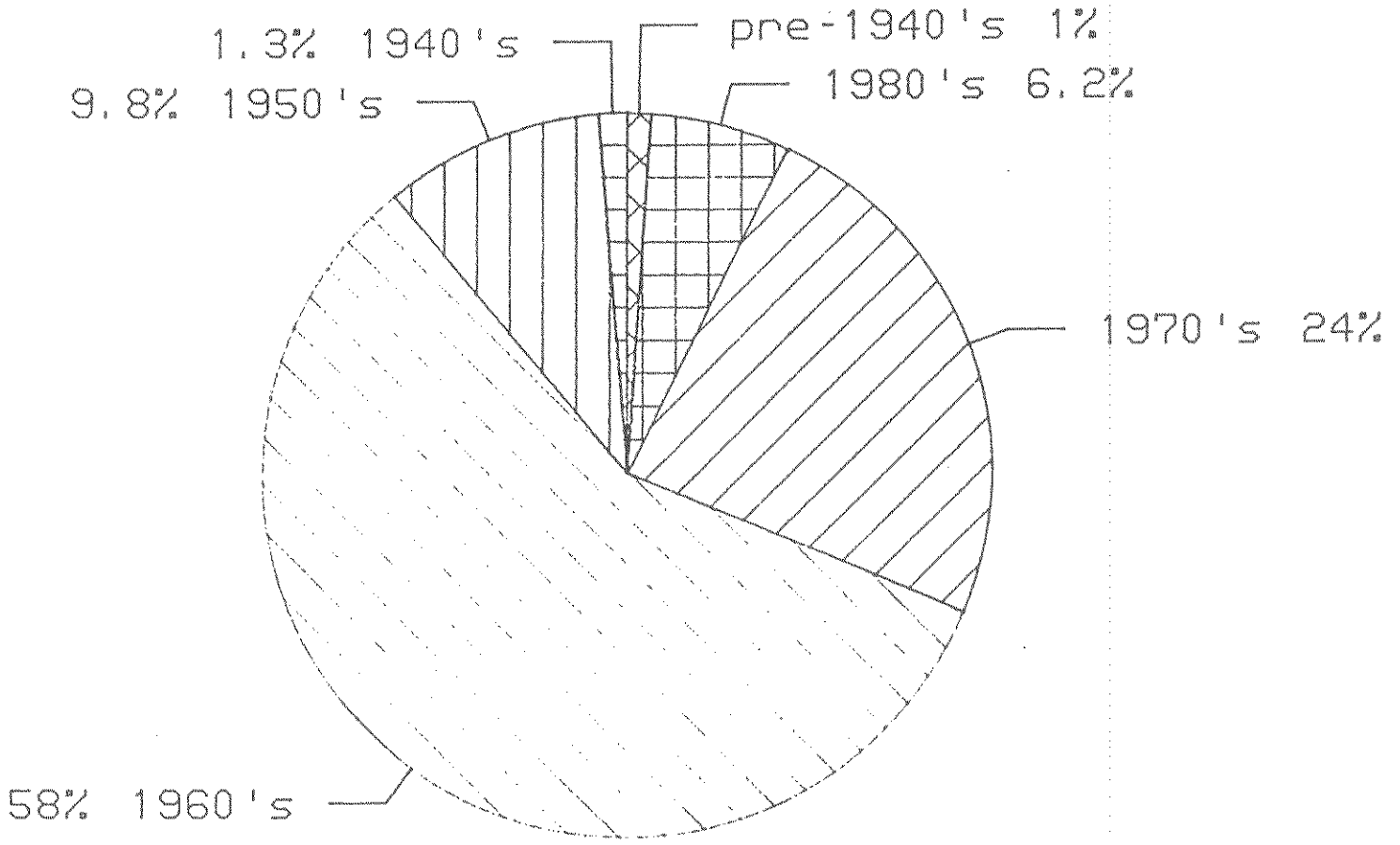
Appendix 1

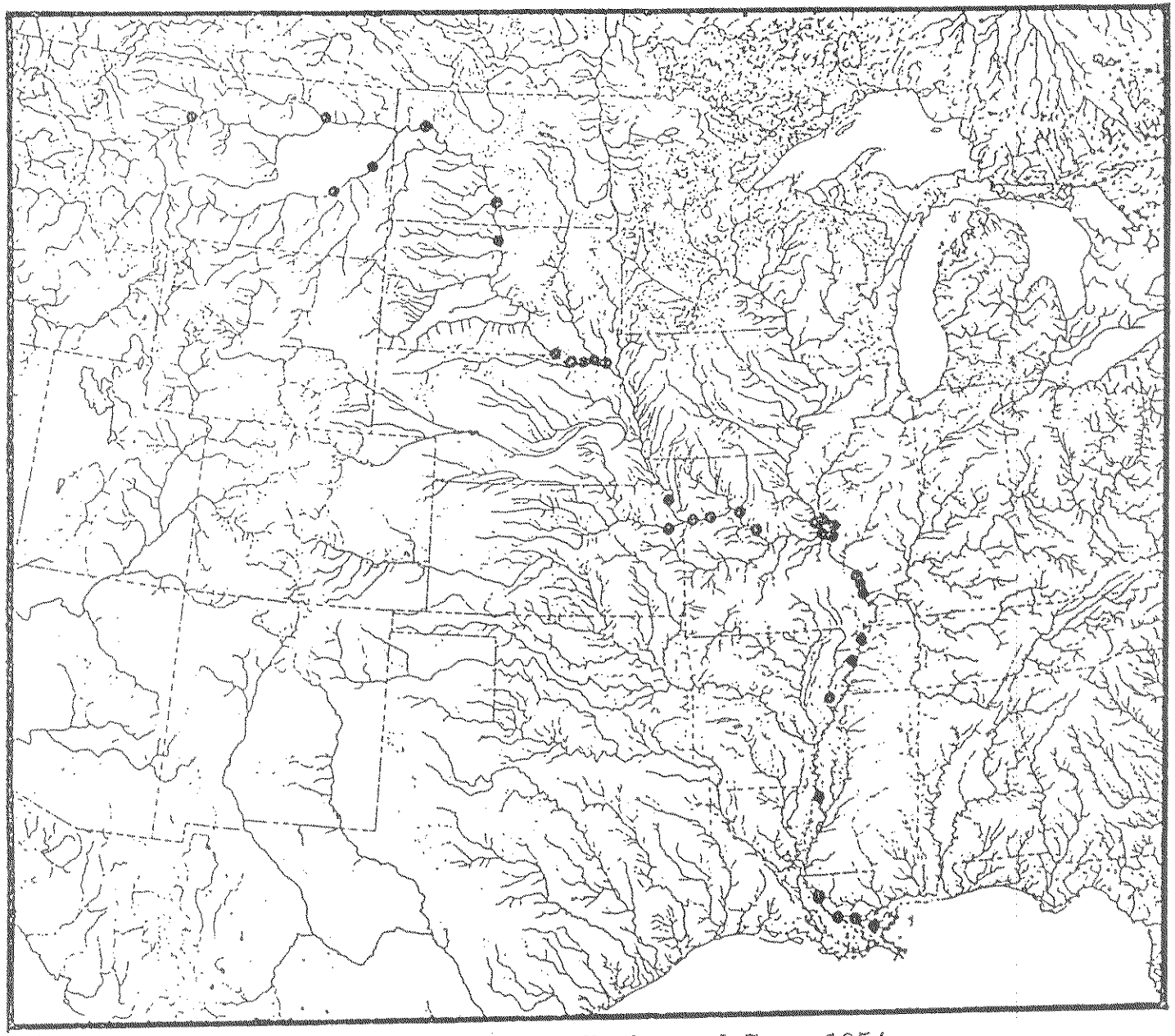
Range of the Pallid Sturgeon

Historical Distribution of Pallid Sturgeon Sightings on The Mississippi River



Pallid Sturgeon
Distribution of Historical Sightings Over Time





Map modified from Bailey and Cross 1954

Appendix 2

Pallid Sturgeon Sightings

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
			0.0	0/ 0/ 0		0.00	0.00
Mississippi River, Little Bayou Pierre	LA	St. Bernard	100.0	10/19/77	Neal Douglas	0.00	0.00
Mississippi River- New Orleans	LA	Orleans	120.0	11/17/50	Bailey and Cross	0.00	608.40
Mississippi River- New Orleans	LA	Orleans	120.0	4/21/52	Bailey and Cross	0.00	775.10
Mississippi River- New Orleans	LA	Orleans	120.0	0/ 0/ 0	Bailey and Cross (1882)	0.00	502.54
Mississippi River	LA	St. Charles	123.0	6/12/73	Neal Douglas-2 fish	0.00	0.00
Mississippi River	LA	St. Charles	126.0	3/26/76	Neal Douglas	0.00	0.00
Mississippi River	MS	Concordia	314.5	4/ 7/85	R. Gough	0.00	0.00
Mississippi River	MS	Claiborne	400.0	0/ 0/73	J. Stewart/B. Misso	0.00	0.00
Mississippi River	MS	Claiborne	408.2	12/13/72	L. M. Campbell	0.00	0.00
Mississippi River	MS	Claiborne	410.0	8/18/80	W.F. McConnel	0.00	0.00
Mississippi River	LA	East Carroll	485.0	11/ 2/68	O. D. Korn	700.00	0.00
Mississippi River- R.M. 35 Big Sunflower	MS	Sharkey	485.0	11/23/87	Fisherman-MHP	760.00	682.00
Mississippi River	LA	East Carroll	485.0	11/ 2/68	O. D. Korn	1400.00	0.00
Mississippi River	AR	Phillips	675.0	4/ 0/88	comm. fisherman- S. Barkley	3629.00	1000.00
Mississippi River- R.M. 35 St. Francis R	AR	St. Francis	725.0	4/ 0/66	comm. fisherman- S. Barkley	0.00	0.00
Mississippi River	AR	Mississippi	825.0	5/ 0/63	Commercial Fisherman	9142.86	0.00
Mississippi River	KY	Hickman	935.4	11/ 5/85	Brooks Burr	1800.00	850.00
Mississippi River- Cairo	MO	Mississippi	951.5	5/23/79	Carlson et. al	1390.00	744.82
Mississippi River- Cairo	MO	Mississippi	0.0	5/23/79	Carlson et. al	1810.00	811.60
Mississippi River- Cairo	MO	Mississippi	2.8	5/23/79	Carlson et. al	2360.00	0.00
Mississippi River- Cairo	MO	Mississippi	13.7	1/15/78	Carlson et. al	1830.00	828.56
Mississippi River	IL	Union	30.0	5/ 4/71	P. Kimmel	0.00	0.00
Mississippi River	IL	Union	73.0	3/20/72	P. Kimmel	0.00	0.00
Mississippi River	IL	Union	75.0	0/ 0/70	P. Kimmel	0.00	0.00
Mississippi River	MO	Perry	105.0	0/ 0/81	T. Grace	0.00	0.00
Mississippi River- St. Genevieve	MO	St. Genevieve	115.5	10/18/78	Carlson et. al	970.00	697.12
Mississippi River	MO	St. Charles	194.0	8/ 0/44	Barnickol and Starrett	0.00	0.00
Mississippi- Grafton	IL	Jersey	203.0	6/ 0/ 4	Forbes and Richardson-7 fish	0.00	0.00
Missouri River- near mouth	MO	St. Charles	1.0	7/12/44	Bailey and Cross	0.00	270.07
Missouri River- St. Charles	MO	St. Louis	1.5	6/28/78	Carlson et. al	1390.00	744.82
Missouri River	MO	Boone	164.0	0/ 0/72	MHP	0.00	0.00
Missouri River- Easley	MO	Boone	166.9	11/ 2/78	Carlson et. al	355.00	532.82
Missouri River- Easely	MO	Boone	169.0	10/27/48	H. Fisher	1860.00	899.86
Missouri River- Rocheport	MO	Boone	185.0	10/30/45	H. Fisher	0.00	598.80
Missouri River- near Rocheport	MO	Boone	186.0	10/20/45	Bailey and Cross	0.00	637.54
Missouri River- near Rocheport	MO	Boone	186.0	2/24/46	Bailey and Cross	0.00	389.61

PALLID STURGEON SITINGS UPDATED: 12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River	MO	Boone	186.0	6/ 3/63	W. Pflieger	0.00	0.00
Missouri River- Near Rocheport	MO	Boone	186.0	2/24/46	Bailey and Cross	0.00	475.94
Missouri River	MO	Chariton	227.0	5/ 0/45	H. Fisher	0.00	0.00
Missouri River	MO	Lafayette	324.0	8/15/45	H. Fisher	0.00	0.00
Missouri River- Kansas City	MO	Clay	367.0	0/ 0/79	Carlson et. al	0.00	0.00
Missouri River- Kansas River R.M. 40	KS	Douglas	367.5	4/ 1/52	Mrs. Bird	0.00	497.00
Missouri River- Kansas River R.M. 40	KS	Douglas	367.5	3/29/52	R. Miller	0.00	436.00
Missouri River- Kansas River R.M. 12	KS	Leavenworth	367.5	4/ 5/52	Cross et. al.	0.00	480.00
Missouri River- Kansas River R.M. 12	KS	Leavenworth	367.5	4/ 6/52	Cross et. al.	0.00	360.00
Missouri River- Kansas River R.M. 40	KS	Douglas	367.5	4/20/52	F. B. Cross	0.00	493.00
Missouri River	KS	Leavenworth	397.0	3/21/82	F. Cross	0.00	0.00
Missouri River- St. Joe	MO	Buchanan	444.0	8/ 0/45	H. Fisher	0.00	0.00
Missouri River- St. Joseph	MO	Buchanan	445.0	0/ 0/79	Carlson et. al	0.00	0.00
Missouri River	MO	Andrew	458.0	8/ 0/45	H. Fisher	0.00	0.00
Missouri River- Brownsville	MO	Andrew	459.6	10/27/78	Carlson et. al	550.00	594.30
Missouri River- Brownsville	MO	Atchison	530.5	10/ 5/78	Carlson et. al	2760.00	972.72
Auburn City Park Lake	NE	Nemaha	535.0	4/ 4/88	fisherman- D. Feit	10885.00	0.00
Missouri River	NE	Cass	594.0	6/ 0/82	fisherman- D. Feit	0.00	0.00
Missouri River	NE	Cass	594.0	5/29/84	D. Feit	3428.57	0.00
Missouri River- Platte River- R.M. 21	NE	Sarpy	595.0	5/10/79	Joe Vlasek, D. Feit	2857.14	925.00
Missouri River	NE	Sarpy	597.5	5/ 2/87	Fisherman, D. Feit	3428.57	0.00
Missouri River	NE	Dakota	621.0	5/ 7/77	Zeke D. Castro, R. Runge	8594.29	0.00
Missouri River	NE	Washington	647.0	6/29/85	David Bradley, D. Feit	4160.00	1100.00
Missouri River- Port Neal	MO	Woodbury	716.0	5/10/79	Fisherman	0.00	700.00
Missouri River	NE	Dakota	716.0	7/27/79	Rod Tondreau	2514.29	920.00
Missouri River	NE	Dakota	719.0	5/ 0/72	Rod Tondreau	685.71	570.00
Missouri River- Weedland Access	IA	Woodbury	725.0	4/ 5/87	T. Gengerke	4479.25	1112.00
Missouri River	SD	Clay	782.0	5/ 8/70	Schmulbach, J.C. and D. Moos	2530.00	945.00
Missouri River- Yankton	SD	Yankton	803.0	8/30/52	Allum and Bailey	0.00	202.55
Missouri River	NE	Cedar	810.5	4/ 2/69	N.H.P., Walburg	0.00	0.00
Missouri River- Gavins Point tailwater	NE	Cedar	811.0	11/ 2/88	fishermen- L. Hesse	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	8/28/57	Jim Shields-3 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	NE	Knox	823.0	0/ 0/58	NCRI-3 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	6/26/81	Bill Nelson	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	7/30/57	Jim Shields-3 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	7/ 1/58	Jim Sprague-3 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	6/26/61	Bill Nelson	0.00	0.00

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	7/13/59	Jim Sprague	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Yankton	823.0	7/ 3/57	Jim Shields-3 fish	0.00	0.00
Missouri River-Lewis and Clark Lake-C Ck	SD	Bon Homme	825.0	10/12/67	Norm Benson	0.00	920.00
Missouri River- Lewis and Clark Lake	SD	Bon Homme	825.0	0/ 0/57	NCRI-19 fish, NHP	0.00	0.00
Missouri River- Lewis and Clark Lake	NE	Knox	825.0	0/ 0/59	NCRI-2 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	NE	Knox	825.0	0/ 0/61	NCRI-3 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	NE	Knox	825.0	0/ 0/57	NCRI-9 fish	0.00	0.00
Missouri River-Lewis and Clark Lake-C.Ck	SD	Bon Homme	825.0	10/13/67	Norm Benson	0.00	1040.00
Missouri River- Lewis and Clark Lake	SD	Bon Homme	830.0	7/10/61	Bill Nelson	0.00	0.00
Missouri River- Lewis and Clark	SD	Bon Homme	830.0	0/ 0/57	Don Monroe-9 fish	0.00	0.00
Missouri River- Lewis and Clark Lake	SD	Bon Homme	830.0	8/10/59	Jim Sprague	0.00	0.00
Missouri River- Randall Tailwaters	SD	Gregory	862.0	6/21/76	Kallemeyn and Novotny	0.00	0.00
Missouri River- Randall Tailwaters	SD	Gregory	877.0	8/29/52	Allum and Bailey	0.00	330.95
Missouri River- Randall Tailwaters	SD	Gregory	879.0	1/14/75	Larry Kallemeyn	0.00	1079.00
Missouri River-Francis Case-Platte Cr By	SD	Charles Mix	912.0	6/26/67	Norm Benson/Gasaway	0.00	1040.00
Missouri River-Francis Case-Platte Cr By	SD	Charles Mix	912.0	6/26/67	Norm Benson/Gasaway	0.00	1160.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/60	Don Monroe-4 fish	0.00	0.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/65	Charles Gasaway-29 fish	0.00	0.00
Missouri River- Francis Case	SD	Brule	965.0	0/ 0/59	Don Monroe-4 fish	0.00	0.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/61	Don Monroe-12 fish	0.00	0.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/63	Don Monroe-2 fish	0.00	0.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/68	Charles Gasaway-41 fish	0.00	0.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/67	Charles Gasaway-67 fish	0.00	0.00
Missouri River- Francis Case	SD	Lyman	965.0	0/ 0/66	Charles Gasaway-31 fish	0.00	0.00
Missouri River-Francis Case-Chamberlain	SD	Brule	966.0	8/14/67	Benson/Gasaway	0.00	1260.00
Missouri River- Francis Case-Chamberlain	SD	Brule	966.0	8/16/67	Benson/Gasaway	0.00	1030.00
Missouri River-Francis Case-Chamberlain	SD	Brule	966.0	8/15/67	Benson/Gasaway	0.00	720.00
Missouri River- Francis Case	SD	Brule	968.0	0/ 0/69	Don Warnick- 6 fish	0.00	0.00
Missouri River- Francis Case	SD	Brule	968.0	0/ 0/70	Don Warnick- 4 fish	0.00	0.00
Missouri River- Francis Case	SD	Buffalo	981.0	0/ 0/64	Don Monroe-60 fish	0.00	0.00
Missouri River- Francis Case- Wolf Crk.	SD	Buffalo	981.0	0/ 0/62	Don Monroe-78 fish	0.00	0.00
Missouri River- L. Sharpe- Big Bend Dam	SD	Buffalo	987.0	8/ 3/72	NCRI, F. June	0.00	1296.11
Missouri River- L. Sharpe- West Bend	SD	Buffalo	987.0	9/20/66	NCRI	6490.00	1204.24
Missouri River- L. Sharpe- West Bend	SD	Hughes	1009.0	8/20/74	NCRI, F. June	0.00	767.04
Missouri River- L. Sharpe- West Bend	SD	Hughes	1009.0	7/17/70	NCRI, F. June	0.00	653.04
Missouri River- L. Sharpe- West Bend	SD	Hughes	1009.0	6/29/65	NCRI, F. June	5280.00	1151.11
Missouri River- L. Sharpe- West Bend	SD	Hughes	1009.0	6/20/68	NCRI, F. June	0.00	1184.32

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- West Bend	SD	Hughes	1009.0	9/ 4/69	NCRI, F. June	0.00	1153.33
Missouri River- West Bend	SD	Hughes	1009.0	8/26/70	NCRI, F. June	0.00	1328.21
Missouri River- L. Sharpe- Joe Creek	SD	Hughes	1025.0	8/31/67	NCRI, F. June	0.00	1084.70
Missouri River- L. Sharpe- Joe Creek	SD	Hughes	1025.0	6/16/65	NCRI, F. June	2120.00	846.73
Missouri River- L. Sharpe- Joe Creek	SD	Hughes	1025.0	6/21/68	NCRI, F. June	0.00	1095.77
Missouri River- L. Sharpe- Joe Cr	SD	Hughes	1025.0	6/16/65	NCRI, F. June	4850.00	1029.36
Missouri River- L. Sharpe- Joe Cr	SD	Hughes	1025.0	6/16/65	NCRI, F. June	5940.00	1151.11
Missouri River- L. Sharpe- Joe Cr	SD	Hughes	1025.0	6/16/65	NCRI, F. June	3460.00	990.62
Missouri River- L. Sharpe- Joe Cr	SD	Hughes	1025.0	6/25/65	NCRI, F. June	5410.00	1151.11
Missouri River- L. Sharpe- by DeGray	SD	Hughes	1042.0	8/23/88	Jim Riis	0.00	850.00
Missouri River- L. Sharpe- Chapelle Cr	SD	Hughes	1042.0	6/24/66	NCRI, F. June	4810.00	1095.77
Missouri River- L. Sharpe- Chapelle Cr	SD	Hughes	1042.0	9/ 2/66	NCRI, F. June	6490.00	1282.83
Missouri River- L. Sharpe- Chapelle Cr	SD	Hughes	1042.0	8/10/73	NCRI, F. June	0.00	739.37
Missouri River- L. Sharpe- across DeGra	SD	Stanley	1042.0	8/23/88	Jim Riis	0.00	690.00
Missouri River- L. Sharpe- Chapelle CR	SD	Hughes	1042.0	6/24/65	NCRI, F. June	9655.00	1272.87
Missouri River- L. Sharpe- Chapelle Cr	SD	Hughes	1042.0	9/18/75	NCRI	0.00	902.07
Missouri River- L. Sharpe- Chapelle Cr	SD	Hughes	1042.0	9/30/66	NCRI	1420.00	825.70
Missouri River- L. Sharpe- Chapelle Cr	SD	Hughes	1042.0	9/30/66	NCRI	840.00	691.78
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/29/66	NCRI, F. June	0.00	1372.78
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/29/66	NCRI, F. June	0.00	1196.49
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/25/74	NCRI, F. June	0.00	1136.72
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/18/73	NCRI, F. June	0.00	949.67
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/16/68	NCRI, F. June	0.00	724.98
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/ 6/67	NCRI, F. June	0.00	1178.78
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/ 7/65	NCRI, F. June	880.00	677.39
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/ 6/67	NCRI, F. June	0.00	946.35
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/23/71	NCRI, F. June	0.00	822.38
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/23/70	NCRI, F. June	0.00	789.18
Missouri River- L. Sharpe-Medicine Creek	SD	Hughes	1050.0	6/26/75	NCRI	0.00	1078.06
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/ 7/66	NCRI, F. June	2140.00	868.87
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/ 9/69	NCRI, F. June	0.00	835.66
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/25/69	NCRI, F. June	0.00	730.51
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/10/69	NCRI, F. June	0.00	957.42
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/10/69	NCRI, F. June	0.00	674.07
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/23/69	NCRI, F. June	0.00	711.70
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	10/ 1/69	NCRI, F. June	0.00	903.18
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	8/ 6/70	NCRI, F. June	0.00	922.00

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	8/ 6/70	NCRI, F. June	0.00	857.80
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/17/70	NCRI, F. June	0.00	808.00
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/30/70	NCRI, F. June	0.00	711.70
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	8/27/71	NCRI-2 fish, F. June	0.00	0.00
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/10/71	NCRI, F. June	0.00	0.00
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	10/20/71	NCRI, F. June	0.00	974.02
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	10/20/71	NCRI, F. June	0.00	698.42
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	10/20/71	NCRI, F. June	0.00	1079.17
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	6/19/73	NCRI, F. June	0.00	906.50
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	8/14/73	NCRI, F. June	0.00	944.13
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/12/73	NCRI, F. June	0.00	1283.93
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/12/73	NCRI, F. June	0.00	1137.83
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	9/12/73	NCRI, F. June	0.00	1075.85
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	6/27/74	NCRI, F. June	0.00	854.48
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	6/27/74	NCRI, F. June	0.00	619.83
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	8/22/74	NCRI, F. June	0.00	1351.45
Missouri River- L. Sharpe- Medicine Cr	SD	Hughes	1050.0	7/24/75	NCRI, F. June	0.00	1009.44
Missouri River- L. Sharpe-Medicine Crk.	SD	Hughes	1050.7	8/28/79	Bob Krumm, Gasaway	5171.43	1062.50
Missouri River-L. Sharpe-Medicine Knoll	SD	Stanley	1051.0	8/14/83	Ted Kemery, S.D.H.P.	0.00	0.00
Missouri River- L. Sharpe- Antelope Is.	SD	Stanley	1054.0	8/31/68	D. Murphey	0.00	0.00
Missouri River- L. Sharpe- Antelope Is.	SD	Stanley	1054.0	8/19/88	Rick Swanson	0.00	0.00
Missouri River-L. Sharpe-Antelope Island	SD	Stanley	1055.0	3/19/88	Chuck Humphrey	17100.00	1500.00
Missouri River-L. Sharpe-Antelope Creek	SD	Stanley	1055.0	4/ 9/83	Fisherman, S.D.H.P.	0.00	0.00
Missouri River- L. Sharpe- Hipple Lake	SD	Hughes	1057.0	5/ 3/87	Trautman, D.	4876.00	0.00
Missouri River- L. Sharpe- Hipple Lake	SD	Hughes	1057.0	5/ 3/87	Trautman, D.	9072.00	0.00
Missouri River- L. Sharpe- Farm Island	SD	Stanley	1057.0	8/ 3/66	NCRI, F. June	3820.00	1090.24
Missouri River- L. Sharpe- Farm Island	SD	Stanley	1057.0	9/28/66	NCRI, F. June	620.00	649.72
Missouri River- L. Sharpe- Farm Island	SD	Stanley	1057.0	9/ 7/67	NCRI, F. June	0.00	1162.18
Missouri River- L. Sharpe- Farm Island	SD	Stanley	1057.0	9/ 7/67	NCRI, F. June	0.00	1250.73
Missouri River-L. Sharpe-Farm Island	SD	Hughes	1059.0	5/ 2/76	Jim Hicks	9142.86	1435.00
Missouri River- L. Sharpe- Farm Island	SD	Hughes	1059.0	8/27/79	Bob Krumm	4828.57	1000.00
Missouri River	SD	Hughes	1060.0	5/ 0/76	L. Lockhard	0.00	0.00
Missouri River- L. Sharpe- Oahe Tailwatr	SD	Stanley	1068.0	6/29/71	NCRI, F. June	0.00	723.87
Missouri River- L. Sharpe- Oahe Tailwatr	SD	Hughes	1068.0	8/ 2/66	NCRI, F. June	5320.00	1178.78
Missouri River- L. Sharpe- Oahe Tailwatr	SD	Stanley	1068.0	6/24/70	NCRI, F. June	0.00	730.51
Missouri River- L. Sharpe- Oahe Tailwatr	SD	Stanley	1068.0	7/11/72	NCRI, F. June	0.00	1110.16
Missouri River- Oahe Tailwater	SD	Stanley	1068.0	7/ 8/65	NCRI, F. June	3020.00	1014.97

PALLID STURGEON SITINGS -6- UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- Oahe Tailwater	SD	Hughes	1068.0	7/13/71	NCRI, F. June	0.00	712.80
Missouri River- L. Sharpe- Oahe Tailwatr	SD	Stanley	1070.0	7/ 8/65	NCRI	0.00	0.00
Missouri River-L. Oahe-Okobojo Creek	SD	Sully	1090.0	8/21/85	Jim Riis	13714.29	1500.00
Missouri River- L. Oahe- Agency Creek	SD	Stanley	1100.0	7/ 7/59	Ned Fogle	0.00	850.00
Missouri River- L. Oahe- Agency Creek	SD	Stanley	1100.0	8/18/59	Ned Fogle	0.00	1075.00
Missouri River- L. Oahe- Agency Creek	SD	Stanley	1100.0	8/18/59	Ned Fogle	0.00	850.00
Missouri River- L. Oahe- Agency Creek	SD	Stanley	1100.0	7/27/59	Ned Fogle	0.00	850.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	251.43	450.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle-2 fish	0.00	0.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	502.86	550.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	3963.43	1000.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle-4 fish	0.00	0.00
Missouri River- L. Oahe- Oak Creek	SD	Stanley	1110.0	6/19/69	NCRI	0.00	664.10
Missouri River- L. Oahe- Oak Creek	SD	Stanley	1110.0	9/ 5/64	NCRI	0.00	977.34
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	2180.57	850.00
Missouri River- L. Oahe- Oak Creek	SD	Stanley	1110.0	9/ 8/64	NCRI	0.00	1341.49
Missouri River- L. Oahe- Cheyenne	SD	Stanley	1110.0	6/18/70	NCRI	0.00	661.00
Missouri River- L. Oahe- Cheyenne Bay	SD	Stanley	1110.0	6/27/61	NCRI	1417.14	750.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	1933.71	825.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	2436.57	875.00
Missouri River- L. Oahe- Oak Creek	SD	Stanley	1110.0	10/20/64	NCRI	0.00	1203.14
Missouri River- L. Oahe- Oak Creek	SD	Stanley	1110.0	6/19/69	NCRI	0.00	949.67
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle-2 fish	0.00	0.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	859.43	650.00
Missouri River- L. Oahe- Oak Creek	SD	Stanley	1110.0	6/19/69	NCRI	0.00	722.77
Missouri River- L. Oahe- Foster Creek	SD	Stanley	1110.0	5/12/70	NCRI	0.00	1383.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	754.29	625.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	1225.14	725.00
MIssouri River- L. Oahe- Cheyenne River	SD	Stanley	1110.0	7/ 2/65	NCRI	0.00	1168.82
Missouri River- L. Oahe- Foster Creek	SD	Stanley	1110.0	5/16/68	NCRI	0.00	1143.37
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	6221.71	1125.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle	1714.29	800.00
Missouri River- L. Oahe	SD	Stanley	1110.0	0/ 0/60	Fogle-2 fish	0.00	0.00
Missouri River- L. Oahe- Suttons Bay	SD	Sully	1136.0	7/10/78	Don Warnick	4114.00	900.00
Missouri River- L. Oahe- Whitlocks	SD	Potter	1151.0	6/17/66	NCRI	0.00	937.49
Missouri River- L. Oahe- Whitlocks	SD	Potter	1151.0	7/19/66	NCRI	0.00	1026.04
Missouri River- L. Oahe- Whitlocks Cross	SD	Potter	1151.0	7/ 8/66	NCRI	0.00	838.98

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- L. Oahe- Whitlocks	SD	Potter	1151.0	7/12/66	NCRI	0.00	907.61
Missouri River- L. Oahe- Whitlocks	SD	Potter	1151.0	7/ 8/65	NCRI	0.00	1223.06
Missouri River- L. Oahe- Whitlocks	SD	Potter	1151.0	7/19/66	NCRI	0.00	1001.69
Missouri River- L. Oahe- Whitlocks	SD	Potter	1151.0	6/17/66	NCRI	0.00	1096.88
Missouri River- L. Oahe- Whitlock X-ing	SD	Potter	1152.0	8/ 0/65	Higham	2971.00	942.00
Missouri River- L. Oahe- Whitlocks	SD	Potter	1153.0	0/ 0/70	NCRI	0.00	0.00
Missouri River- L. Oahe- Whitlocks	SD	Potter	1153.0	8/12/64	NCRI (BCF)	0.00	1057.03
Missouri River- L. Oahe- West Whitlocks	SD	Dewey	1154.0	11/10/64	NCRI	0.00	1052.00
Missouri River- L. Oahe- Whitlocks	SD	Dewey	1154.0	11/ 4/64	NCRI	0.00	1024.00
Missouri River- L. Oahe- West Whitlocks	SD	Dewey	1154.0	11/10/64	NCRI	0.00	953.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle-3 fish	0.00	0.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle-3 fish	0.00	0.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle	2486.86	875.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle-2 fish	0.00	0.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle	1600.00	775.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle-2 fish	0.00	0.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle	822.86	650.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle	4228.57	1025.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle	4434.29	1050.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle-4 fish	0.00	0.00
Missouri River- L. Oahe	SD	Potter	1160.0	0/ 0/62	Fogle	2020.57	825.00
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	6/16/64	NCRI	0.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Walworth	1195.0	10/ 0/64	Higham/Gabel	4114.00	1045.00
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	8/20/64	NCRI (BCF)	0.00	1498.66
Missouri River- L. Oahe- Mobridge	SD	Walworth	1195.0	5/ 0/64	Higham/Gabel-9 fish	0.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	8/20/64	NCRI (BCF)	0.00	1358.09
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	8/ 6/64	NCRI (BCF)	0.00	1365.84
Missouri River- L. Oahe- Mobridge	SD	Walworth	1195.0	11/ 0/65	Higham	4114.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	10/ 2/64	NCRI	0.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	6/16/64	NCRI	0.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Walworth	1195.0	10/ 0/64	Higham/Gabel-3 fish	0.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	8/20/64	NCRI (BCF)	0.00	1644.76
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	8/14/64	NCRI (BCF)	0.00	1464.35
Missouri River- L. Oahe- Mobridge	SD	Corson	1195.0	6/16/64	NCRI	0.00	0.00
Missouri River- L. Oahe- Mobridge	SD	Walworth	1195.0	6/ 0/66	Higham	4571.00	0.00
Missouri River-L. Oahe-mouth Grand River	SD	Corson	1197.2	8/24/52	Allum, Bailey, Harris	0.00	742.69
Missouri River- L. Oahe- Grand River Bay	SD	Corson	1198.0	7/ 0/65	Higham	0.00	819.00

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- L. Oahe- Mobridge	SD	Corson	1198.0	6/15/64	NCRI (BCF)	0.00	1285.04
Missouri River- L. Oahe- Mobridge	SD	Corson	1198.0	6/ 3/64	NCRI (BCF)	0.00	1433.36
Missouri River- L. Oahe- Mobridge	SD	Corson	1198.0	6/15/64	NCRI (BCF)	0.00	843.41
Missouri River- L. Oahe- Grand River Bay	SD	Corson	1198.0	7/ 0/65	Higham	0.00	1442.00
Missouri River- L. Oahe- Bush Bay	ND	Emmons	1234.0	9/11/72		0.00	0.00
Missouri River- L. Oahe- Red Horse Bay	ND	Sioux	1239.0	9/16/74		0.00	0.00
Missouri River- L. Oahe- Fort Yates	ND	Sioux	1245.0	6/ 0/68	Tom Moen	0.00	0.00
Missouri River- L. Oahe- Fort Yates	ND	Sioux	1245.0	7/19/67		1142.85	700.00
Missouri River- L. Oahe	ND	Emmons	1245.0	6/ 0/64		2400.00	705.00
Missouri River- L. Oahe- Porcupine Bay	ND	Sioux	1248.0	7/18/67		3457.00	1035.00
Missouri River- L. Oahe- Porcupine Bay	ND	Sioux	1248.0	7/18/67		2914.28	982.50
Missouri River- L. Oahe- Porcupine Bay	ND	Grant	1248.0	6/29/73	NDGF-25 fish	516.00	566.00
Missouri River- L. Oahe- Porcupine Creek	ND	Grant	1248.0	7/19/66		0.00	0.00
Missouri River- L. Oahe- Beaver Bay	ND	Emmons	1255.0	8/17/73		0.00	0.00
Missouri River- L. Oahe- Beaver Bay	ND	Emmons	1255.0	6/30/73	NDGF-7 fish	443.00	561.00
Missouri River-L. Oahe-Horsehead Bay	ND	Emmons	1263.5	9/14/72		0.00	0.00
Missouri River- L. Oahe- Cannon Ball Bay	ND	Morton	1269.0	7/ 3/73	NDGF-34 fish	491.00	549.00
Missouri River-L. Oahe- Cannonball Bay	ND	Morton	1269.0	9/18/72	NDGF-3 fish	0.00	0.00
Missouri River-L. Oahe-Cannonball River	ND	Morton	1269.0	8/22/67	Tom Moen-4 fish	0.00	0.00
Missouri River- L. Oahe- Badger Bay	ND	Emmons	1275.0	7/ 2/73	NDGF-42 fish	430.00	545.00
Missouri River- Bismarck	ND	Morton	1315.0	0/ 0/84	Robert Carlson	22473.00	0.00
Missouri River- near Washburn	ND	McClean	1360.0	0/ 0/56	B. Hoyer, N.D. Outdoors	30872.00	0.00
Missouri River	ND	McClean	1360.0	0/ 0/60	B. Hoyer	19976.00	1676.00
Missouri River- Garrison Tailwaters	ND	McClean	1389.0	12/ 9/65	NCRI	0.00	0.00
Missouri River- Garrison Tailwaters	ND	Mercer	1389.0	12/ 0/65	Higham	0.00	0.00
Missouri River- Garrison Tailwaters	ND	Mercer	1389.0	0/ 0/58	Lou Carufel-8 fish	0.00	0.00
Missouri River- Garrison Tailwaters	ND	Mercer	1389.0	0/ 0/57	Lou Carufel	0.00	0.00
Missouri River- L. Sakakawea	ND	McClean	1390.0	0/ 0/63	N.D.S.U.	6628.57	1237.50
Missouri River-L. Sakakawea-Face of Dam	ND	Mercer	1390.0	8/ 2/84	NDGF	0.00	1525.00
Missouri River-L. Sakakawea-Wolf Creek	ND	McClean	1393.5	9/14/81	NDGF	0.00	0.00
Missouri River-L. Sakakawea-Wolf Creek	ND	McClean	1393.5	7/ 1/82	NDGF	15890.00	0.00
Missouri River-L. Sakakawea-Piek City By	ND	Mercer	1395.0	5/ 0/84	UND	0.00	0.00
Missouri River-L. Sakakawea-Piek City By	ND	Mercer	1395.0	8/ 2/84	NDGF	0.00	1525.00
Missouri River-L. Sakakawea-Douglas Bay	ND	McClean	1400.2	7/16/74		720.00	630.00
Missouri River-L. Sakakawea-Beaver Bay	ND	Mercer	1418.7	7/26/72		460.00	535.00
Missouri River-L. Sakakawea-Nishu Bay	ND	McClean	1419.0	7/ 6/84	NDGF	0.00	1375.00
Missouri River-L. Sakakawea-Nishu Bay	ND	McClean	1419.0	8/21/68		1929.00	827.00

PALLID STURGEON SITINGS UPDATED:12/15/88

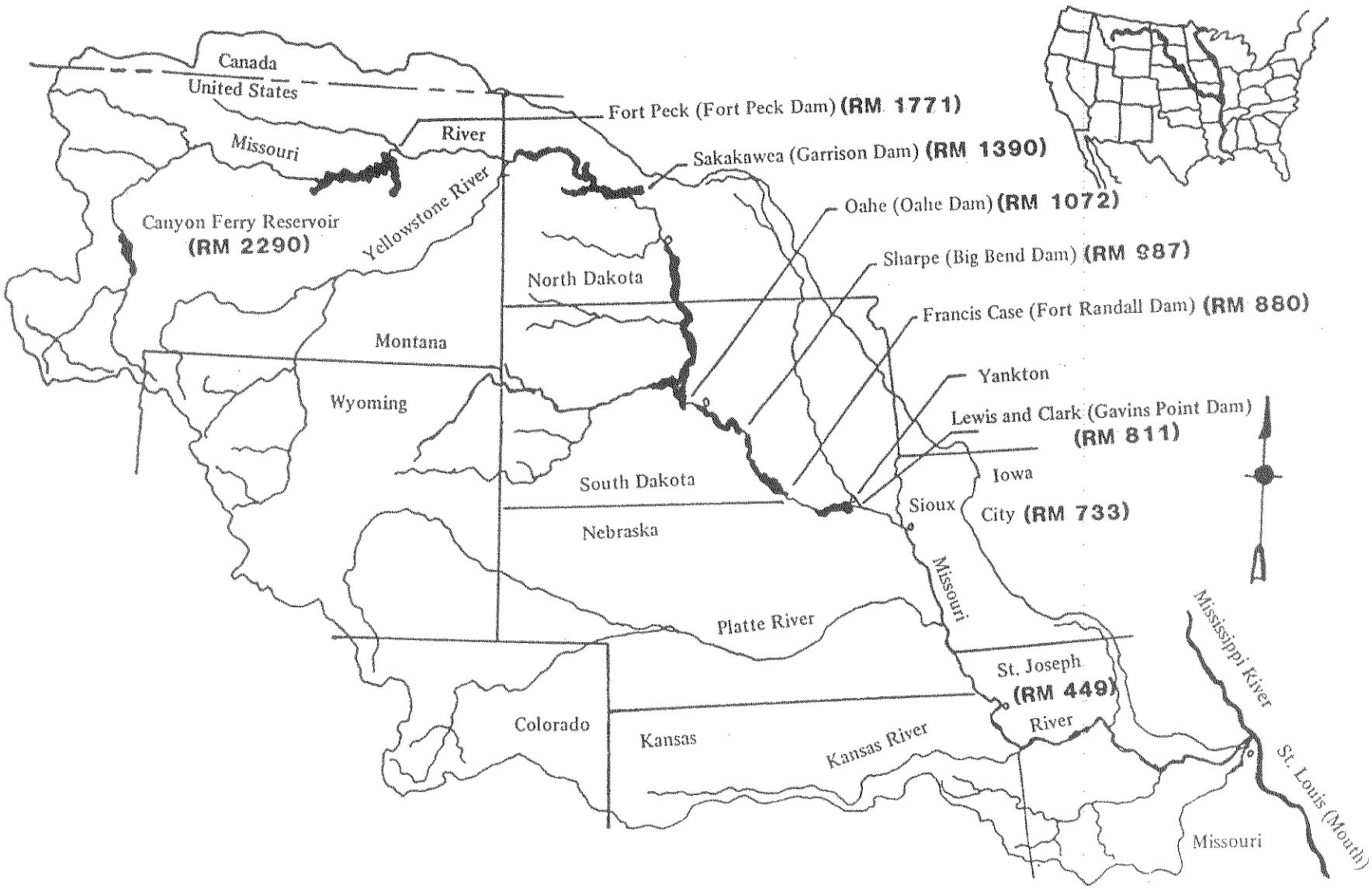
LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River-L. Sakakawea- Nishu Bay	ND	McClean	1419.0	7/ 6/88	NDGF	0.00	1370.00
Missouri River-L. Sakakawea-Red Butte By	ND	Mercer	1426.3	7/19/78	NDGF	390.00	570.00
Missouri River-L. Sakakawea-Charging Eag	ND	Dunn	1436.0	7/15/86		1200.00	700.00
Missouri River-L. Sakakawea-Charging Eag	ND	Dunn	1436.0	7/15/74		910.00	670.00
Missouri River-L. Sakakawea-Charging Eag	ND	Dunn	1436.0	7/17/84	NDGF	3500.00	900.00
Missouri River-L. Sakakawea-Deepwater Cr	ND	McClean	1444.0	8/ 5/65	NDGF	6514.29	1200.00
Missouri River-L. Sakakawea-Van Hook Arm	ND	McClean	1450.0	8/ 0/67		1078.00	657.00
Missouri River-L. Sakakawe-Bear Den Bay	ND	McKenzie	1466.8	7/14/78	NDFG	20672.00	1630.00
Missouri River-L. Sakakawea-Bear Den Bay	ND	McKenzie	1466.8	7/10/74		680.00	640.00
Missouri River-L. Sakakawea-Little Knife	ND	Mountrail	1482.0	7/10/74		995.00	695.00
Missouri River-L. Sakakawea-White Earth	ND	Mountrail	1493.0	8/ 0/68		936.00	672.00
Missouri River-L. Sakakawea-White Earth	ND	Mountrail	1493.0	7/11/84		2240.00	825.00
Missouri River-L. Sakakawea-White Earth	ND	Mountrail	1493.0	8/ 0/68		652.00	650.00
Missouri River-L. Sakakawea-Tobacco Gard	ND	McKenzie	1511.0	7/11/78		950.00	635.00
Missouri River-L. Sakakawea-Rough Creek	ND	McKenzie	1532.0	7/18/72		2040.00	840.00
Missouri River-L. Sakakawea-Rough Creek	ND	McKenzie	1532.0	7/18/72		780.00	620.00
Missouri River- L. Sakakawea- Williston	ND	McKenzie	1563.5	8/ 4/88	Mark Dryer	13028.57	1431.25
Missouri River- L. Sakakawea- Williston	ND	McKenzie	1563.5	0/ 0/65	H. Arends-6 fish	38590.00	1676.40
Missouri River- L. Sakakawea- Williston	ND	McKenzie	1563.5	8/ 4/88	Mark Dryer	11657.00	1431.25
Missouri River- L. Sakakawea- Williston	ND	McKenzie	1566.0	8/ 3/88	Mark Dryer	0.00	1550.00
Missouri River-1 mi below Yellowstone	ND	McKenzie	1577.0	5/28/88	Alan Sandvol	11339.75	1448.00
Missouri River-.5 mi below Yellowstone	ND	McKenzie	1577.5	5/26/88	Alan Sandvol	27215.40	1778.00
Missouri River- mouth Yellowstone	ND	McKenzie	1578.0	5/24/88	Alan Sandvol	10432.60	1397.00
Missouri River- mouth Yellowstone	ND	McKenzie	1578.0	5/11/78	E. Berard	19068.00	1570.00
Missouri River- mouth of Yellowstone	ND	McKenzie	1578.0	5/10/78		1362.00	740.00
Missouri River- Ft. Peck Tailwaters	MT	Valley	1770.0	3/ 5/88	Pat Clancey	0.00	0.00
Missouri River-Ft. Peck Tailwaters	MT	Valley	1770.0	2/20/88	SCUBA divers-3 fish	0.00	0.00
Missouri River- Ft. Peck Tailwaters	MT	Valley	1770.0	2/26/88	Pat Clancey	0.00	0.00
Missouri River- Ft. Peck Tailwaters	MT	Valley	1770.0	3/11/88	P. Clancey & M. Harberg-2 fish	0.00	0.00
Missouri River- Ft. Peck Tailwaters	MT	Valley	1770.5	6/12/85	Frazer	9072.00	1270.00
Missouri River- Ft. Peck Tailwaters	MT	Valley	1770.5	4/16/75	Bob Needham	19221.30	1651.00
Missouri River- Ft. Peck Res.- Rock Cr	MT	McCone	1775.0	6/12/49	Bailey and Cross	0.00	0.00
Missouri River-Ft. Peck Res.-Big Dry Arm	MT	Garfield	1775.0	0/ 0/79	Jim Liebelt	0.00	0.00
Missouri River- Ft. Peck Res.- Rock Cr.	MT	McCone	1775.0	0/ 0/68	Bob Needham	8845.00	0.00
Missouri River- Ft. Peck Res.	MT	Valley	1780.0	0/ 0/49	Brown- Newman (fisherman)	16330.00	1453.00
Missouri River- Ft. Peck Res.	MT	Garfield	1780.0	0/ 0/60	Brown	18160.00	1450.00
Missouri River- Ft. Peck Res.- The Pines	MT	Valley	1787.0	7/10/86	Bob Needham	14968.80	1422.40

PALLID STURGEON SITINGS UPDATED:12/15/88

LOCATION	STATE	COUNTY	R.M.	DATE	PERSON	WEIGHT	LENGTH
Missouri River- Kipp Park	MT	Phillips	1898.0	5/ 7/77	Bob Needham	21319.20	0.00
Missouri River	MT	Blaine	1930.0	6/18/77	Rod Berg	0.00	0.00
Missouri River- near Bullwhacker Creek	MT	Blaine	1950.0	8/ 3/77	Rod Berg	0.00	0.00
Missouri River- Boggs Island	MT	Chouteau	2038.0	11/ 3/78	Rod Berg	14515.20	1351.28
Missouri River- Great Falls	MT	Cascade	2040.0	0/ 0/64	Bob Needham	27442.80	0.00
Missouri River- Fort Benton	MT	Chouteau	2065.0	0/ 0/76	Brown- Cope (1876)	21485.71	0.00
Yellowstone River	MT	Richland	16.0	6/ 0/87	Vic Riggs	0.00	0.00
Yellowstone River	MT	Richland	39.0	6/ 1/88	Vic Riggs	0.00	0.00
Yellowstone River	MT	Dawson	66.0	5/24/88	Vic Riggs	0.00	0.00
Yellowstone River- Intake	MT	Dawson	71.0	6/21/84	fishermen	16000.00	0.00
Yellowstone River- Intake	MT	Dawson	71.0	5/22/55	M.H.P.	13074.29	1425.00
Yellowstone River- Intake	MT	Dawson	71.0	5/13/79	fisherman	27200.00	1505.00
Yellowstone River- Intake	MT	Dawson	71.0	6/ 0/75	Haddix and Estes	0.00	0.00
Yellowstone River- Intake	MT	Dawson	71.0	6/21/64	fishermen	9143.00	0.00
Yellowstone River- Intake	MT	Dawson	71.0	5/18/73	fisherman, M.H.P.	13074.29	1425.00
Yellowstone River- Tongue River mouth	MT	Custer	197.0	7/24/50	Brown- Knutson (fisherman)	17252.00	1676.00
Yellowstone River- Tongue River	MT	Custer	197.0	0/ 0/28	D. Parks- B. Green (fisherman)	15890.00	0.00
Yellowstone River- Miles City	MT	Custer	197.0	0/ 0/20	D. Parks	16344.00	0.00
Yellowstone River- Miles City	MT	Custer	197.0	0/ 0/22	D. Parks	21792.00	0.00
Yellowstone River- Miles City	MT	Custer	197.0	0/ 0/24	D. Parks	0.00	1600.00
Yellowstone River- Tongue River mouth	MT	Custer	197.0	6/ 0/37	D. Parks- 11 fish	0.00	0.00

Appendix 3

Map of Missouri River Locations


Canada
United States
Missouri River
Fort Peck (Fort Peck Dam) (RM 1771)
Sakakawea (Garrison Dam) (RM 1390)
Oahe (Oahe Dam) (RM 1072)
Sharpe (Big Bend Dam) (RM 987)
Francis Case (Fort Randall Dam) (RM 880)
Yankton
Lewis and Clark (Gavins Point Dam) (RM 811)
Sioux City (RM 733)
Iowa
Canyon Ferry Reservoir (RM 2290)
Yellowstone River
North Dakota
Montana
Wyoming
South Dakota
Nebraska
Missouri
Platte River
St. Joseph (RM 449)
Mississippi River
St. Louis (Mouth)
Colorado
Kansas
Kansas River
Missouri

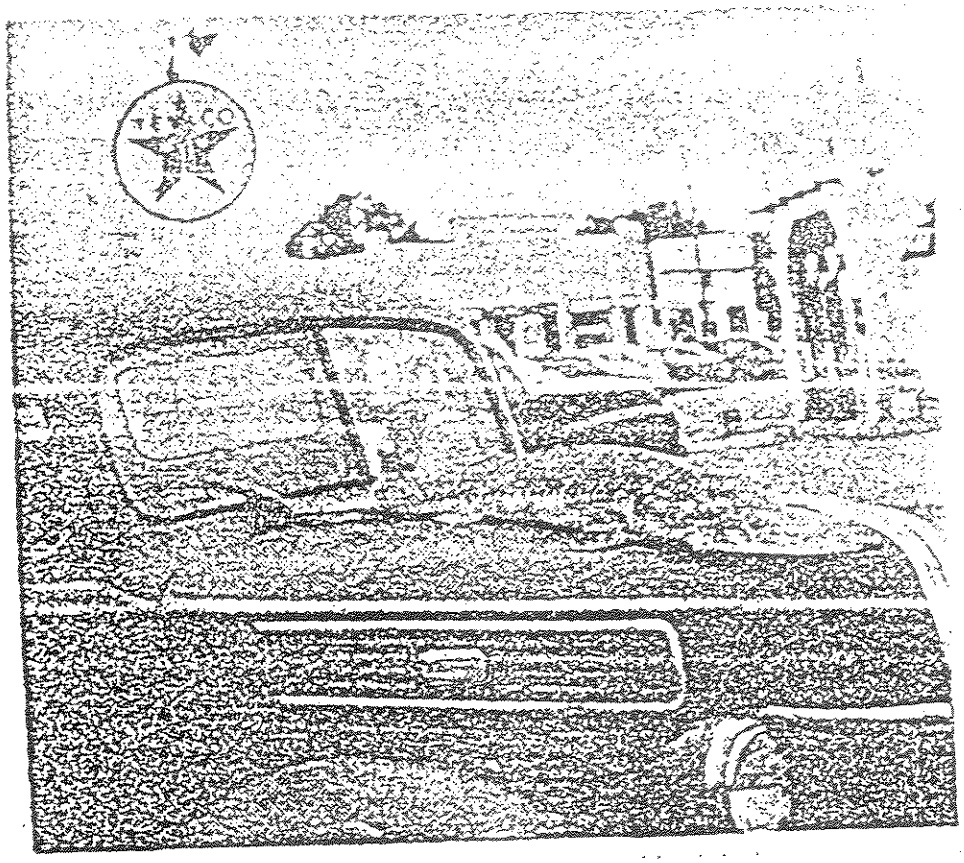
Appendix 4

Historical Photos of Pallid Sturgeon

PHOTO BY COURTESY OF STAR PRINTING, MILES CITY, MONTANA

A specimen of the pallid sturgeon held by Mr. Emil Knutson

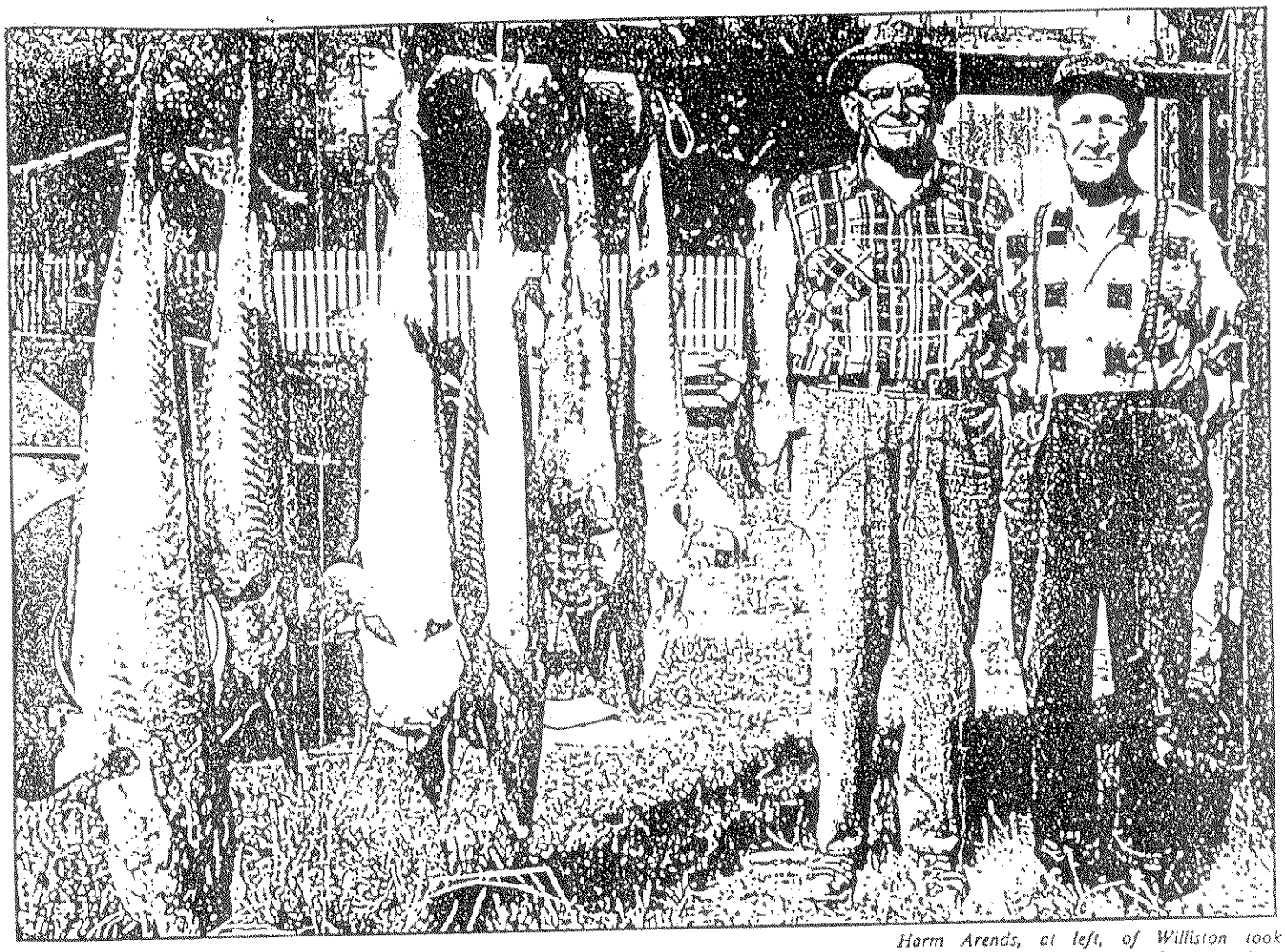
July 24, 1950
mouth of Tongue River in Yellowstone R.
66 inches long, 38 pounds



This sturgeon taken from the Missouri by Bruce Hoyer of Washburn is almost as long as the hood of the car it rests on.

Otto Schmittke, Bismarck, North Dakota took this whopper out of the Missouri near the Capitol City.

Pictured here are Bruce Hoyer and Ray Yunker of Washburn with a 68 pound sturgeon Bruce caught in the Missouri River near Washburn. Bruce has fished commercially in the Missouri for quite a few years, but he claims this is the first year that he has taken any number of sturgeon. He says that he usually catches between six and eight of these fish each season, but this year he has already taken 70. Just a week before taking this monster Bruce snagged one weighing about 36 pounds. He fishes with a setline using cut bait.



Williston Herald

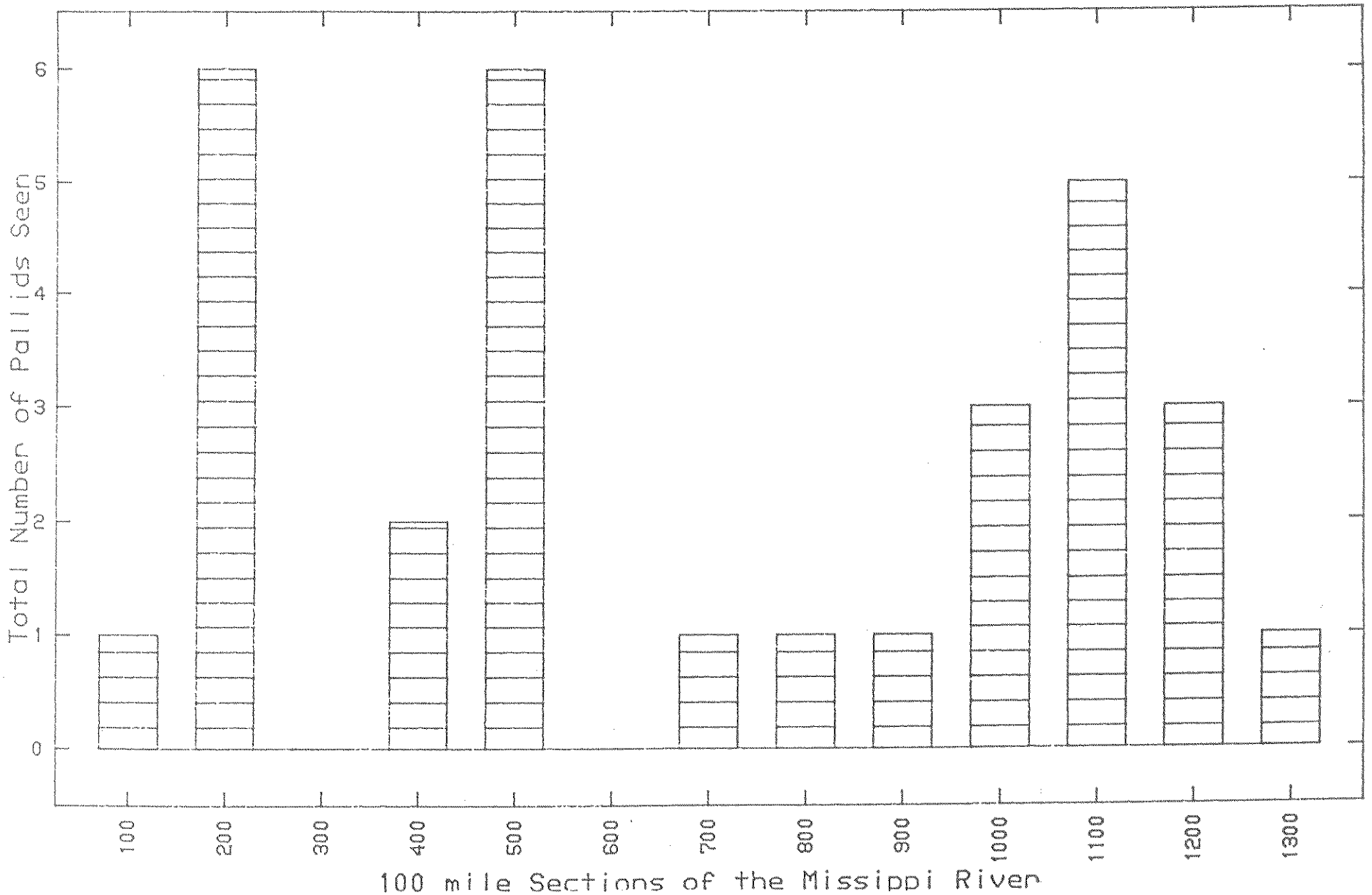
Harm Arends, at left, of Williston took these sturgeon and a catfish on setlines near Williston in 1965. The largest was 85 lbs. and measured 5 ft., 6 in.

PALLID STURGEON: ONCE A TROPHY, RECREATIONAL FISH

Appendix 5

Distribution of Sightings on Mississippi River

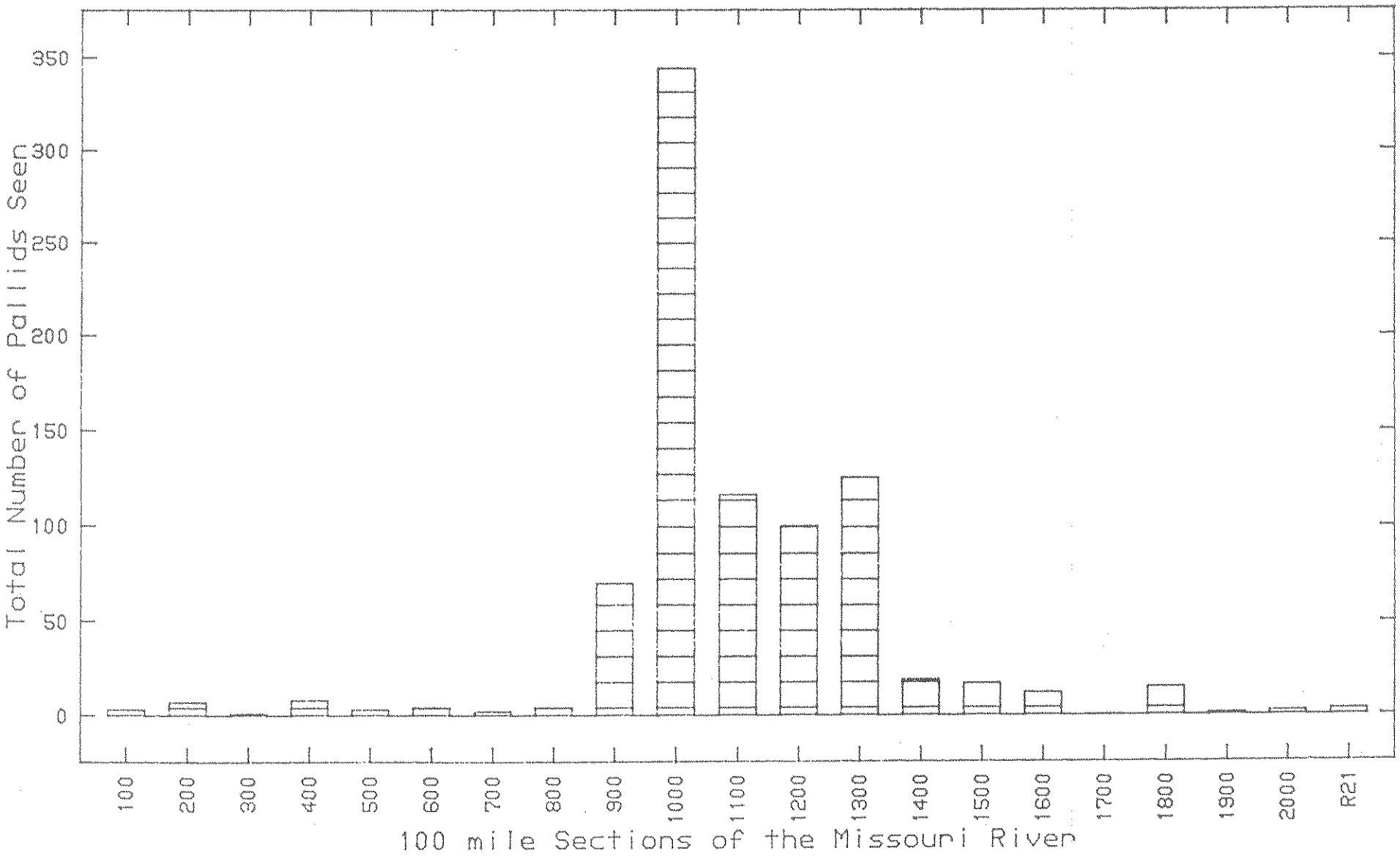
Historical Distribution of Pallid Sturgeon Sightings on The Mississippi River



Appendix 6

Distribution of Sightings on Missouri River

Historical Distribution of Pallid Sturgeon Sightings on The Missouri River



Appendix 7

Series of Photos on Lower Missouri River

This series of changes at Indian Cave Bend vividly illustrates how dikes lead to silt collection which in turn develop the river into a defined flowing navigation channel. In the process, three valuable habitat components have been destroyed along this bend; sandbar, shallow water and riparian woodland. In this case, state law allows the riparian landowner to claim title to accreted areas and, as in so many instances, the vegetation has been cleared to the water's edge. The cleared areas adjoining the deep, swift-flowing channel have minimal wildlife values. (Corps of Engineers photos through November, 1964. March, 1977 photo taken by Nebraska Game and Parks Commission.

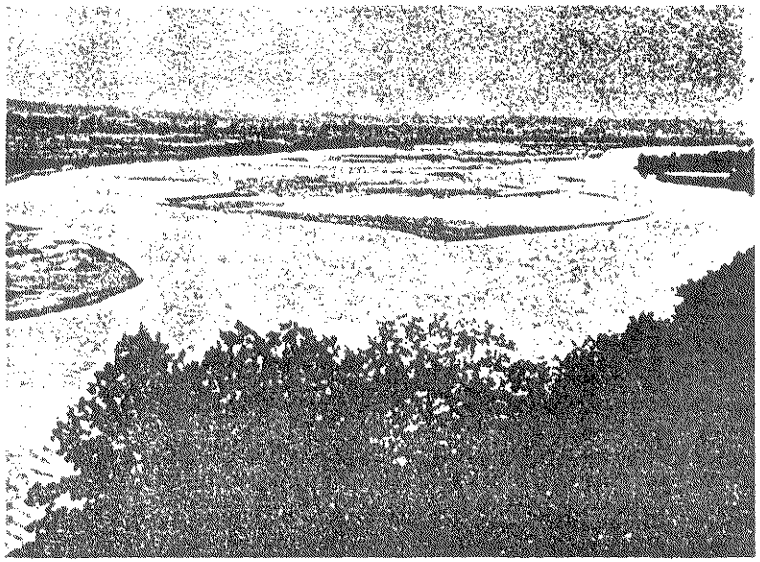


Photo 7. September 1934 - River in relatively natural condition. Note the sandbars, riparian vegetation and shallow waters.

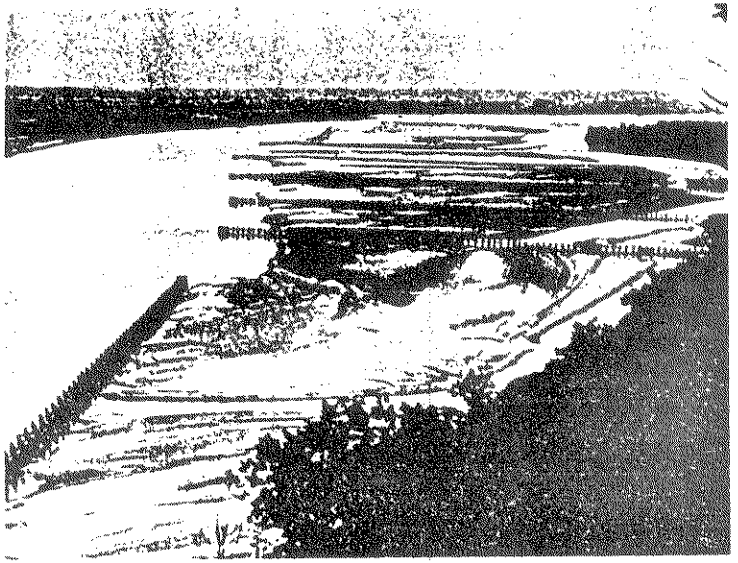


Photo 8. September 1935 - Silt collecting behind wood pilings; constricted river has washed away the sandbars and destroyed shallow water.

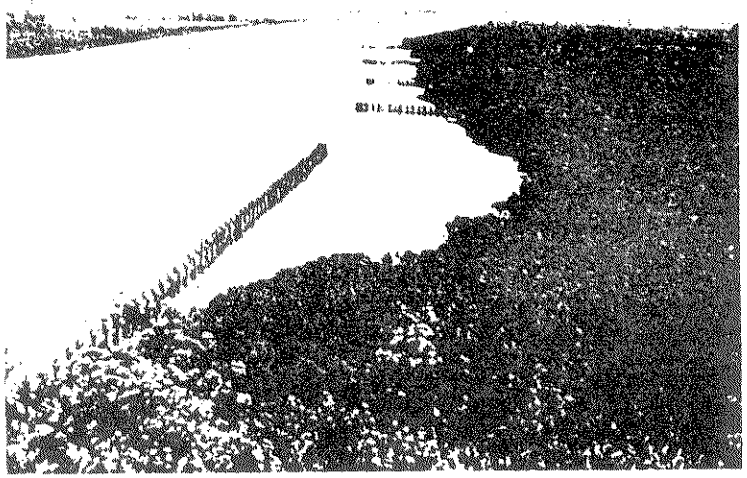


Photo 9. May 1946 - Riparian vegetation has developed on accreted land.

Photo 10. November 1954 - Most of the riparian vegetation has been cleared and accreted land is in cropland.

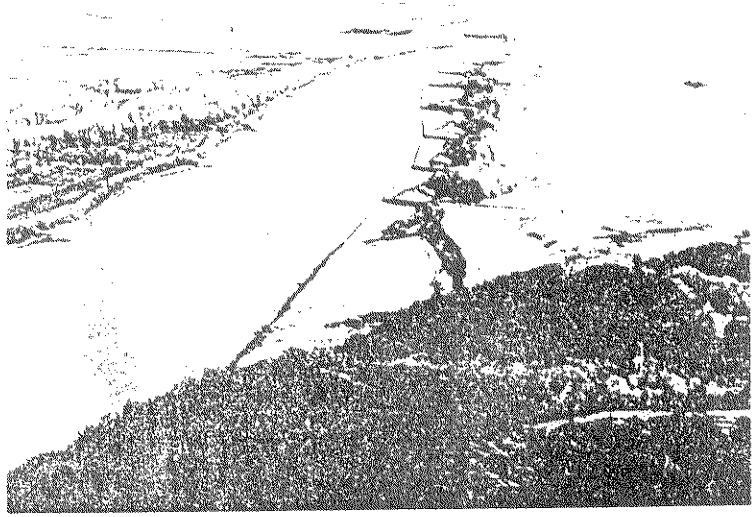


Photo 11. November 1964 - Trail dikes constructed-additional woodland clearing.

Photo 12. The water areas behind trail dikes have silted in and land is farmed nearly to the water's edge.

Appendix 8

Pallid Sturgeon Sightings by Decades

Pallid Sturgeon
Distribution of Historical Sightings Over Time