AMENDMENTS TO APPENDICES I AND II OF THE CONVENTION

Other Proposals

A. PROPOSAL

Inclusion of *Polyodon spathula* in Appendix I.

B. PROPONENT

The United States of America.

C. SUPPORTING STATEMENT

1. Taxonomy

11. Class: Osteichthyes

12. Order: Acipenseriformes

13. Family: Polyodontidae

14. Species: *Polyodon spathula*

15. Common Names: English: spoonbill cat, duckbill cat, spadefish
French:
Spanish:

14. Code Numbers:

2. Biological Data

21. Distribution: Paddlefish were historically abundant in most of the large rivers of the Mississippi River drainage; specifically the Missouri, the Ohio, the Tennessee, the Cumberland, the White, the Arkansas, and the Red. They also were considered abundant in many of the Gulf Slope river drainages in Texas, Louisiana, Mississippi, and Alabama. Relict populations occurred in Lake Erie and other Great Lakes around the turn of the century, and paddlefish were known to exist in Ontario, Canada. They have been extirpated from the Great Lakes and Canada, and from some of the peripheral range States such as Pennsylvania, New York, Maryland, and North Carolina. The peripheral range of the paddlefish has continued to decline since the turn of the century; and today, even though paddlefish still occur in 22 States, only remnant populations remain in many of the major river systems and their tributaries where they once were considered to be abundant.

22. Population Biology: Paddlefish are found mostly in large river systems tributary to the Mississippi River basin along with some of the Gulf Coast rivers. They have been able to adapt to environmental alterations, such as the construction of reservoirs, when their very specific spawning requirements remain intact.

Paddlefish must have access to large, free-flowing rivers to spawn. Conditions necessary for successful spawning include: clean gravel substrate for egg attachment; water temperatures near 60 degrees Fahrenheit; and increasing water flows for several days at the proper time of year. The precise timing of these events is necessary to stimulate migration and ensure successful reproduction. Paddlefish are very sensitive to changes in water levels during the spawning season, and move downstream quickly into deep pools if water levels start to recede. If spawning conditions remain unfavourable, females may abandon the effort to reabsorb the eggs. The maintenance of high water following spawning also is important for successful hatching of eggs and dispersal of larvae to areas where there is sufficient quantities of zooplankton for the young to feed on.

Paddlefish are highly mobile and a long-lived fish, grow relatively rapidly, and reach large sizes. In established populations, 15 to 20 year old fish are common and some individuals may live 30 years. Individuals between 50 and 100 pounds also are common in older populations, but this size is unusual today throughout most of their present range. Most males reach sexual maturity at 7 to 9 years of age and females 10 to 12 years, but this can vary depending on the geographical location of populations. Missouri has reported that there is indirect evidence that mature females may make spawning runs only every 2 to 3 years. In Louisiana, age, at full recruitment into the population, tend to be earlier than throughout most of the range, and the adults tend to be considerably smaller at sexual maturity. Because paddlefish are highly mobile and long-lived, cumulative adverse impacts associated with environmental alterations of essential habitat (such as dams, channelization, gravel mining, irrigation), and overexploitation (especially illegal harvest), and contaminant effects often are not immediatley recognized. Its mobility, large size, and tendency to live in large rivers makes it a difficult species to obtain specific population status information on.

Paddlefish frequently occur in large groups on a seasonal basis. During spring spawning runs, they tend to congregate in relatively large numbers in deep pools of rivers or below dams. In the late fall and winter months, paddlefish also tend to school in deeper pools or in readily identifiable, deep locations within the reservoirs. These populations are particularly vulnerable to illegal gill net operations at this time of year. From the aspect of illegal harvest of paddlefish for their eggs in a growing caviar market, there are no reliable external characteristics for determining sex of paddlefish. Consequently, many more fish are sacrificed during illegal operations, especially during the fall concentrations, than would be necessary under a tightly controlled programme. The only precise method to determine sex is by examination of the gonads which requires that the fish be opened.

During the warmer months, paddlefish spend much of their time in quiet back-water areas or other slow-moving water habitat, feeding primarily on zooplankton and aquatic insect larvae which they filter from the water. Incidental harvest of paddlefish relative to commercial harvest of other warm water species such as carp, buffalo, or catfish has been reported by some of the southernmost States as a management problem. Fish often become easily injured and stressed in the nets during warm water conditions, and handling can severely stress fish during this time of year. Studies by Tennessee Valley Authority biologists at several reservoirs in Tennessee, Kentucky, and Alabama in the early 1980's found that it was possible to completely eliminate mature

paddlefish from a population within three seasons (Pasch and Alexander, 1986; Peterson and Alexander, 1984).

Management and regulation of the paddlefish have been conducted by the individuals States. More information is needed by most States to adequately assess population dynamics and appropriate exploitation rates based on statistically sound biological data. The States generally have had to rely on relative population indexes or on general observations by biologists or commercial fisherman in an attempt to determine the status of paddlefish populations. A few States rely on commercial catch statistics to determine population trends. Commercial catch statistics are usually considered as minimum estimates and may be valid only as trend analysis data (Gengerke, 1986). Most States have been unable to verify the precise location of suspected spawning sites. Only four States have been able to positively identify one or more specific spawning sites. A number of other States have verified the presence of paddlefish larvae during sampling efforts and know that reproduction is occurring. Because of their highly mobile nature, attempts at coordinated management approaches are difficult. Several States have initiated coordinated management attempts within the last few years.

The U.S. Fish and Wildlife Service (Service) in an attempt to define a population "trend," either within a given Sate throughout the range of the paddlefish, decided to rely on empirical data available from a number of different sources. The data were used to update information collected by Thomas W. Gengerke, Iowa Department of Natural Resources, in 1983 which addressed, in relative terms, the classification (commercial, sport, protected, endangered, threatened, etc.), the perceive status (stable, decline, extirpated, etc.), and whether or not a sport and/or a commercial paddlefish fishery existed within a given State. The Service's status review placed emphasis on what regulatory changes may have been initiated since 1983 in response to the recent expanding international trade in paddlefish caviar, and the extent to which these changes may reflect perceived changes in jointly utilized paddlefish populations as a result of adverse impacts caused by environmental alterations.

There have been some significant changes in the management and regulation of paddlefish populations throughout its range since the 1983 report. These changes have been prompted by a recognition of continued physical degradation of paddlefish habitat, threats posed by increased body burdens of industrial, commercial, or agricultural contaminants in paddlefish, and a noted increase in the demand for paddlefish eggs which are sold on the international caviar market. Since 1983, 19 of 22 States where paddlefish still occur have found it necessary to make changes in either the classification, status, and/or regulatory status of their sport and/or commercial paddlefish fishery. Several States, particularly in the South where paddlefish populations historically have provided the greatest sport and commercial harvest, have seen indications of excessive mortality (reflecting overexploitation of adults), a decrease in the average weight and length, reductions in the catch per unit effort including population densities, and a general decline in the availability and recruitment of adult fish.

Some of the more pertinent changes in the classification and status of paddlefish stocks since 1983 are as follows:

1. In Alabama, the paddlefish, once very abundant in the Tennessee and Alabama River systems, was listed as a commercial species. The paddelfish is now listed as "protected" in Alabama with no sport or commercial fishery. The restrictions are implemented to protect and restore the paddlefish to former densities. Paddlefish are no longer reported from the Alabama portion of the Tennessee River system.

2. In Louisiana, the commercial and sport fishery is now closed in continuance of a 3-year emergency moratorium to allow the State adequate time to reassess the status of paddlefish stocks. The state is concerned about the declines in populations that once existed in some of the western drainages such as the Calcasieu and the Boyao Nepique-Mermentau River systems. Indications of overexploitation of paddlefish populations were first discovered in Louisiana in the Mermentau River during the 1984-85 and 1985-86 seasons.

3. In Arkansas, the paddlefish is still classified as a commercial species. Its general status, regarded as "stable" in 1983, is still considered stable, but declining for some populations. Quotas have been placed on a once unlimited sport fishery, and restrictions now close the upper White River and border waters seasonally to protect remaining broodstock. Additional concerns of contaminants and irrigation water demands from the Arkansas River are seen as threats. The State already has closed fishing on some sections of major rivers because of high levels of dioxins and PCB's.

4. In Tennessee, paddlefish populations are still reported as stable, but at reduced population levels. There is concern about being able to maintain self-sustaining population levels, particularly in Kentucky Lake and Barkley Lake (Tennessee River and Cumberland River systems), where evidence indicates overexploitation (Timmons et al.,1986). Even though the commercial harvest of paddlefish from Tennessee waters was over 484,000 pounds in 1989, 56 percent of the commercial harvest came from Kentucky and Barkley Lakes, and 75 percent of the fish harvested by snagging were taken below Kentucky Lake Dam. Paddlefish populations are regarded as being in decline in Center Hill, Norris, and Cherokee Reservoirs and maintenance stocking is now required.

5. Kentucky considers the most significant paddlefish populations to be shared populations in the Ohio River and in Kentucky and Barkley Lakes. However, the State also is concerned about overexploitation, and the Kentucky and Barkley Lakes studies by Timmons et al. (1986) have shown high mortality rates for several years in a comparatively young population, and a low number of spawners. Contaminants are a major concern in the Ohio River. Kentucky is considering closing commercial fishing for paddlefish in their portion of the Ohio River.

6. Mississippi believes that they have several reproducing populations. In 1983, paddlefish populations were regarded as being stable to increasing, particularly in the Mississippi, Homochitto, Big Black, and Pearl Rivers. Currently, populations are regarded as "probably stable", but an overall decrease in the average size of paddlefish is recognized statewide. Populations are considered to be very low in the Pascagoula River (a Gulf Coast stream), and the Little Tallahatchie River (Yazoo River system) below Sardis Reservoir. The State has imposed seasonal, statewide closures on commercial fishing in order to deal with high incidental paddlefish mortality as a result of commercial fishing for rough fish.

7. In Texas, paddlefish are now rarely taken either by biologists, sport, or commercial fishermen. The species was listed as "endangered" by the State before the 1983 report. Although Texas is considered as "peripheral range", historically, paddlefish were regarded as being abundant in the Red River drainage and in the Sulphur River and big Cypress Creek/Bayou system. They also were regarded as abundant in at least four Gulf Coast rivers, the San Jacinto (where they are now regarded as extirpated), the Trinity, the Neches/Angelina, and Trinity Rivers. Primary threats to the paddlefish in Texas have been reservoir construction and commercial navigation programmes. Contaminants from nonpoint sources have been and continue to be a concern in portions of these rivers. Oil field runoff, pesticides, and high arsenic, manganese and mercury levels in some rivers also have been identified as potential threats in various waters throughout the State.

8. In Oklahoma, the status of paddlefish in 1983 was listed as "unknown." Currently, the assessment is that overall paddlefish numbers have declined or, at best, are stable. This is based on the extensive amount of spawning habitat that has been impounded and the fact that paddlefish are no longer being seen or caught from waters which historically supported populations. However, there is evidence that remnant populations exist above some reservoirs and tributaries of the Arkansas River and that they may be making a recovery as evidenced by the recent development of snag fisheries above the reservoirs. The Grand River/Grand Lake population is considered to be the only remaining viable population in the State. Despite the decline in the Grand River population, legal commercial activity continues in Oklahoma but is restricted to Grand Lake itself. Recent mark and recapture studies and data summarizing the sport and commercial harvest on the Grand Lake between 1983 and 1986 have indicated that this population is composed of immature fish. Historically, paddlefish were abundant in the Arkansas River system and several tributiaries, and in the Red River system. Paddlefish are believed to be extirpated from the Red River above Texoma Reservoir, none have been taken by researchers in 10 to 12 years. Other factors affecting paddlefish populations are channelization, navigation, gravel and sand mining operations, and water quality.

The State of Montana, (with the past year), passed an Act that established regulations for collecting and marketing paddlefish eggs taken from the Yellowstone River. Some of the southern States also have developed legal marketing operations. There are reports that paddlefish roe is now selling for $500 dollars a pound on the western European market as opposed to $100 dollars in the United States.

Presently, there is no evidence that illegal harvest of paddlefish from the upper Missouri River above Fort Peck Reservoir in Montana or from the lower Yellowstone River and Missouri River (below Fort Peck Reservoir), is affecting the viability of those populations.

The State of Montana has assessed the status of both the upper Missouri River paddlefish populations above Fort Peck and the lower Yellowstone and Missouri River (Garrison Reservoir) population to be stable and "vigourous". There is evidence that both populations are successfully reproducing, and the State has positively identified four spawning sites and five additional unconfirmed sites. Exploitation rates are estimated to be sufficiently below the 15 to 20 percent annual harvest rate recommended by Pasch and Alexander (1986), but these estimates do not reflect the North Dakota harvest from the Yellowstone River

population. The State's assessment is based on several years of mark-and-recapture population estimates and extensive creel census data from the early 1970's to the present.

A cooperative North Dakota-Montana tagging study in the mid to late 1970's verified that paddlefish in Garrison Reservoir (Lake Sakakawea) move up the Yellowstone River to spawn. It also has been verified that paddlefish larvae, after hatching, are carried back to Garrison Reservoir and use the upper portions of this reservoir as a nursery area. North Dakota also has initiated a paddlefish stocking programme in Lake Sakakawea during the past 4 to 5 years.

Historically, paddlefish populations were found throughtout the entire reaches of the Missouri River, including some of the major tributaries in South Dakota. Today, the very specific spawning requirements of paddlefish may not exist in the Missouri River from Garrison Dam Reservoir in North Dakota to the confluence of the Missouri with the Mississippi River at St. Louis, Missouri (a distance of nearly 1,400 miles), suitable to maintain the species. Five major reservoirs along the Missouri River in North and South Dakota have segmented populations and alterd spawning and nursery habitat. Paddlefish are seldom seen or taken form Oahe Reservoir (either in North Dakota or South Dakota waters), or from Lake Sharp Reservoir above Big Bend Dam near Chamberlin, South Dakota; they may be extirpated from these sections of the Missouri River.

South Dakota has verified paddlefish spawning attempts in the White River (tributary to Lake Francis Case Reservoir). Biologists estimate that adequate spawning conditions may occur in the White River only once every 10 to 15 years. Also, limited spawning habitat is believed to exist in the White River. A stocking programme on this reservoir has been in effect for several years to provide broodstock in the White River.

Joint South Dakota and Nebraska studies on Lewis and Clark Lake Reservoir, indicate that successful spawning has occurred below Fort Randall Dam annually since 1965, but not at levels that would sustain this population. A stocking programme on Lewis and Clark Lake also has been in effect for several years, and the success of this stocking programme on existing paddlefish populations is still being studied. The once popular snag fishery below Fort Randall, Big Bend, and Oahe Dams in South Dakota has disappeared due to lack of recruitment.

The status of paddlefish populations in South Dakota and Nebraska portions of the Missouri River can be defined as stable at best, and may be in decline. However, the sport harvest has been reduced in the last year from an unlimited take to a maximum of 1,600 fish. This harvest, has been achieved in less than a week. Recent mark and recapture studies by Nebraska biologists indicted that this population was approximately 80,000 fish in 1978 to 1980 (Hesse, Nebraska Game and Parks, 1990, pers. comm.). South Dakota biologists believe that this population is stable based on the fact that the average mean weight of fish has not declined in several years. Biologists are seeing large numbers of what are believed to be young-of-year fish (1 to 1 1/2 pound weight class) and that many subadult fish (12 to 14 pound range - 15 to 20 years old) also are appearing (Unkenholz, South Dakota Game, Fish and Parks Department, 1990, pers. comm.).

Since 1983, Iowa and Missouri have closed commercial fishing on the Missouri River, and Kansas followed suit in January 1991. Since 1983, Iowa no longer allows for commercial paddlefish operations and has changed their paddlefish classification from "commercial" to "sport" Missouri only allows for commercial paddlefish operations on the Misssissippi River.

Paddlefish populations in Misssouri's portion of the Missouri, the Mississippi, and the Osage Rivers are regarded by State biologists as being stable. State biologists report paddlefish as being abundant in the vicinity of several Missouri River tributaries like the Lamine and the Moreau Rivers (based on sightings). Occasional spawning is believed to occur in the lower Osage River below Lake of the Ozarks. Although paddlefish are suspected of occurring in other Missouri River tributaries like the North Grand, the Chariton, and the Gasconade, there is no information available to confirm this. Missouri's primary paddlefish waters are reservoir fisheries located in Lake of the Ozarks, Truman Reservoir, and Table Rock Lake on the White River. These populations are supported entirely by an aggressive stocking programme. Spawning habitat above these reservoirs is regarded as marginal. In the past, overexploitation has been a major problem in Missouri. Contaminant problems also have recently surfaced at Table Rock Lake in Missouri.

The primary difficulty encountered in attempting to assess the current status and/or trends of paddlefish populations in States bordering the upper Mississippi and Ohio Rivers is a lack of any population data addressing population size, age structure, growth, or harvest rates. All of these States have labeled paddlefish populations as currently being stable. Biologists believe that there is an interchange of paddlefish between locks and dams. Some commercial and sport catch data are available on the Mississippi River for Illinois, Missouri, and Iowa. However, the concerns for paddlefish by some of these States are reflected in the State's current classification of the species or in regulatory changes that have been made since 1983. The paddlefsih is fully protected and no sport or commercial fishing is allowed in Minnesota (listed as protected), in Wisconsin (now listed as threatened) and in Ohio where the paddlefish was actually upgraded to "endangered" from "threatened".

In Virginia, in the eastern portion of its range, the paddlefish always has been considered as rare. It is occasionally found in the Powell and Clinch Rivers (tributaries of the Tennessee River system), but reservoirs now block potential spawning runs out of Tennessee waters. It is listed as a non game species in Virginia, and can be taken either by sport or commercial means. Most biologists believe that suitable spawning habitat and other conditions no longer exist in the State for successful maintenance of the paddlefish. The State is now considering placing the paddlefish under an "endangered" status. In West Virginia, adult paddlefish are found in the State's portion of the Ohio River and in the Kanawha River, a tributary to the Ohio. The species is listed as "threatened" in the State, but it is also classified as a sport fish. The State believes that paddlefish numbers may be increasing because of a general improvement in water quality.

Several summary points should be addressed. First, there is a general lack of good population data available on paddlefish populations throughout most of its range. The Service's present status review has relied primarily on empirical data and interviews with any State and Federal biologists. Analysisis of this information has indicated that, while there are paddlefish populations that appear

to be currently stable, the paddlefish, in much of its present range, is in decline because of continued habitat modification and degradation, an increase in contamination, and overexploitation.

Female paddlefish may live as long as 30 years, but sexual maturity is normally not attained until the age of 10 or 12. Upon reaching sexual maturation, females normally require intervals of two or more years to produce viable eggs and spawn. Under optimum conditions, a female paddlefish may spawn fewer than 10 times during her lifetime. Several States rely upon supplemental stocking to maintain sufficient numbers of paddlefish for commercial or sport harvest.

23. Habitat: Alteration and contamination of paddlefish habitats have been major factors contributing to significant population declines (Dillard et al.,1976). Dam and reservoir construction has altered most of the original paddlefish habitat in the United States. As man modified the large river systems with dam and reservoir construction, navigation and channelization, spawning and nursery sites were systematically eliminated. Concurrently, spawning behaviour and migration were also disrupted because of changes in flow patterns and temperature regimes.

Fishing success temporarily improved following dam closures as paddlefish during spawning runs congregated in the tailwaters below the dams. However, spawning did not occur and population declines followed because of lack of recruitment (Pasch and Alexander, 1986; Unkenholz, 1986). Even though reservoir construction did create specific problems over major portions of the species' range, some additional benefits were realized as certain reservoir systems provided greatly improved and expanded feeding areas (Russell, 1986; Graham, 1986).

Information available on paddlefish populations in the Mississippi River indicates that there has been an overall decline in paddlefish numbers since lock-and-dam construction (Carlson and Bonislawsky, 1981; Gengerke, 1986). Pool stabilization, along with dredging and flow manipulation, has decreased spawning habitat for paddlefish and reduced the habitat diversity of the entire Mississippi River. Similar changes have occurred on the Ohio River, and on many other large-river tributaries of the Mississippi River (Sparrowe, 1986).

3. Trade Data

31. National Utilization: The commercial catch of paddlefish has fluctuated since the late 1800's, varying with demand for roe and smoked flesh, which are often substituted for sturgeon caviar and smoked sturgeon. Harvest of paddlefish peaked around 1900. This peak was followed by a long period of declining harvest. During the 1940's, harvest increased temporarily due to reduced imports of sturgeon flesh, and then delcined throughtout the 1950's and 1960's. In the 1970's, the value of roe increased to over $20 per pound and paddlefish harvest again rose (Pasch and Alexander, 1986). Demand and price for paddlefish roe has continued to increase thoughout the 1980's and it is reported that premium quality eggs withing th United States retail at $50 to $70 per pound. Pasch and Alexander (1986), reported that during 1980, over 750,000 pounds of dressed paddlefish were harvested from impoundments on

the Cumberland and Tennessee Rivers alone. A leading supplier of paddlefish caviar in the United States has indicated that the demand has increased from about 12,000 pounds to 22,000 pounds per year.

32. Legal International Trade: The current volume of caviar entering European markets is unknown, but processed paddlefish caviar is reported to be selling for $500 per pound in western Europe and opposed to $100 per pound in the United States. The western European price for paddlefish roe (if correct) is now second only to the Beluga sturgeon whose roe sell for $600 per pound on the world market.

33. Illegal Trade:

34. Potential Trade Threats: There is the possibility that heavy demands for premium quality paddlefish roe both within the United States and in western European markets could impact existing populations.

341. Live Specimens:

342. Parts and Derivatives:

4. Protection Status

41. National: Paddlefish are protected (no sport or commercial harvest) in Alabama, Louisiana, Minnesota, Texas (listed as endangered), and Wisconsin (listed as threatened). Ohio lists the paddlefish as "threatened," but allows harvest by hook and line only. The paddlefish also is listed as "threatened" in West Virginia, but is classified as a "sport fish" (to hook and line fisherman). Virginia is now considering placing the paddlefish on its threatened list. Oklahoma is considering closing its remaining commercial paddlefish fishery.

42. International: None.

43. Additional Protection Needs:

5. Information on Similar Species

Only one other species is known from this family: the Chinese sturgeon, Psephurus gladius, which inhabits the Yangtze-Kiang River in the China lowlands (Becker, 1983).

6. Comments from Countries of Origin.

None.

7. Additional Remarks.

None.

8. References

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