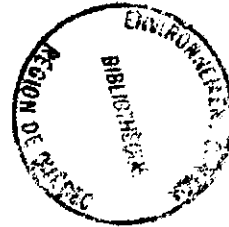


EL3601447J

STATUS REPORT ON ENDANGERED WILDLIFE IN CANADA



Shortnose sturgeon

COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE IN CANADA

COSEWIC

INTRODUCTION

The Committee on the Status of Endangered Wildlife in Canada, COSEWIC, is an organization of specialists from federal agencies, all provincial and territorial governments, and from nationally-based private conservation organizations. The Committee considers the best available information on wild species and subspecies whose survival in Canada may be in doubt. COSEWIC's job is threefold:

- to decide which species do not have a secure future in Canada,
- to agree on a category which best describes their situation,
- to publish the information on which this decision has been made.

COSEWIC does not act to remove adverse factors affecting wildlife; that is the responsibility of the agency which has legal jurisdiction over the species, under Canadian law.

Status Reports are the complete texts of scientific manuscripts used by Committee members in arriving at their decisions. They are available at cost-plus-handling from:

Canadian Nature Federation
75 Albert Street
Ottawa, Ontario
K1P 6G1

Summary Sheets are single pages of general information summarizing species classed as either "threatened" or "endangered". They are easily reproduced on photocopy machines and this is encouraged so that teachers and others may quickly produce copies for local needs. Summary sheets are free and may be obtained from provincial, territorial and federal wildlife agencies, and from nationally-based private conservation agencies. A central source where quantities may be obtained at cost is:

Canadian Wildlife Federation
1673 Carling Avenue
Ottawa, Ontario
K2A 1C4

The COSEWIC list reflects only those species which have been considered to date.

THE COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA

APPROVED DEFINITIONS

SPECIES: "Species" means any species, subspecies, or geographically separate population.

RARE SPECIES: Any indigenous species of fauna or flora that, because of its biological characteristics, or because it occurs at the fringe of its range, or for some other reason, exists in low numbers or in very restricted areas in Canada but is not a threatened species.

THREATENED SPECIES: Any indigenous species of fauna or flora that is likely to become endangered in Canada if the factors affecting its vulnerability do not become reversed.

ENDANGERED SPECIES: Any indigenous species of fauna or flora whose existence in Canada is threatened with immediate extinction through all or a significant portion of its range, owing to the action of man.

EXTIRPATED SPECIES: Any indigenous species of fauna or flora no longer existing in the wild in Canada but existing elsewhere.

EXTINCT SPECIES: Any species of fauna and flora formerly indigenous to Canada but no longer existing anywhere.

COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA

- COSEWIC -

Status Report on

SHORTNOSE STURGEON

in Canada
1980

Prepared by M.J. DADSWELL

For DEPT. FISHERIES & OCEANS

Status Assigned to the Species by COSEWIC on APRIL 1980:

RARE

NOTES

1. This is not an official publication. It is a working document used by COSEWIC in assigning status according to criteria listed below. This report is released in its original form, in the interests of making scientific information available to the public.
2. Anyone wishing to quote or cite unpublished information contained in this report should contact the author through the agency noted above.
3. This report is the property of COSEWIC and the author. It may not be presented as the work of any other person or agency. When quoted as a source, following clearances noted above, both the author and COSEWIC must be credited.
4. Additional copies of this report may be obtained at nominal cost, from Canadian Nature Federation, 75 Albert Street, Ottawa, Ontario, K1P 6G1.

Status Report on the Shortnose Sturgeon

(Acipenser brevirostrum LeSueur 1818)

to the National Committee on the Status of Endangered Wildlife in Canada.

M. J. Dadswell

Department of Fisheries and Oceans

Biological Station, St. Andrews, N. B.

ABSTRACT

The shortnose sturgeon is known from only one locality in Canada, the Saint John River, New Brunswick. The Saint John population, however, is the largest known for this species and is estimated to have 18,000 \pm 30% adults with a total population of perhaps 100,000. The species is widespread in eastern North America from Florida to New Brunswick and the populations in each river system are now known to be larger than formerly believed. There is no evidence to suggest that shortnose sturgeon populations are increasing or decreasing. Present known levels, which are higher than supposed former levels, are largely a reflection of new interest for this species prompted by its endangered status in the United States. If properly managed, certain shortnose sturgeon populations could support small, gourmet item fisheries.

Approved by The Sub-Committee on
Fish 17/3/80
Recommended Category - Rare.

L. K. Mumford

DISTRIBUTION

The shortnose sturgeon, Acipenser brevirostrum LeSueur 1818, occurs in rivers, estuaries and in the sea along the east coast of North America from the Indian River, Florida north to the Saint John River, New Brunswick (Fig. 1). This species lives mainly in estuarine or nearshore marine habitat about the mouths of large rivers. Populations migrate annually into freshwater for spawning and may remain there for extended periods (Dadswell 1979). One partially landlocked population is known in the Holyoke Pool of the Connecticut River, Massachusetts (Taulbert 1980). It is not known if movement of shortnose sturgeon occurs along the coast between rivers and at present each population is thought to be distinct. There is, however, considerable documentation of their occurrence at sea (Holland and Yelverton 1973; Fried and McCleave 1973; Wilk and Silverman 1979; Dadswell 1979) and some exchange between populations may occur.

PROTECTION

The Fisheries Act of Canada (1868) and the Amendment to the Act of 1976 requires protection and management of all commercial fish species and their habitat. In the Saint John River the "sturgeon" season is open all year except the month of June, but sturgeon are actively sought only during July-August (D. Gorham, pers. comm.). All "sturgeon" over 4 feet (122 cm) total length are legal. Since the Fisheries Act does not distinguish between shortnose and Atlantic sturgeon, the two species inhabiting the Saint John River, some shortnose sturgeon are landed annually (D. Gorham, pers. comm.). The present level of exploitation by the directed sturgeon fishery is sustainable by the population (Dadswell 1975).

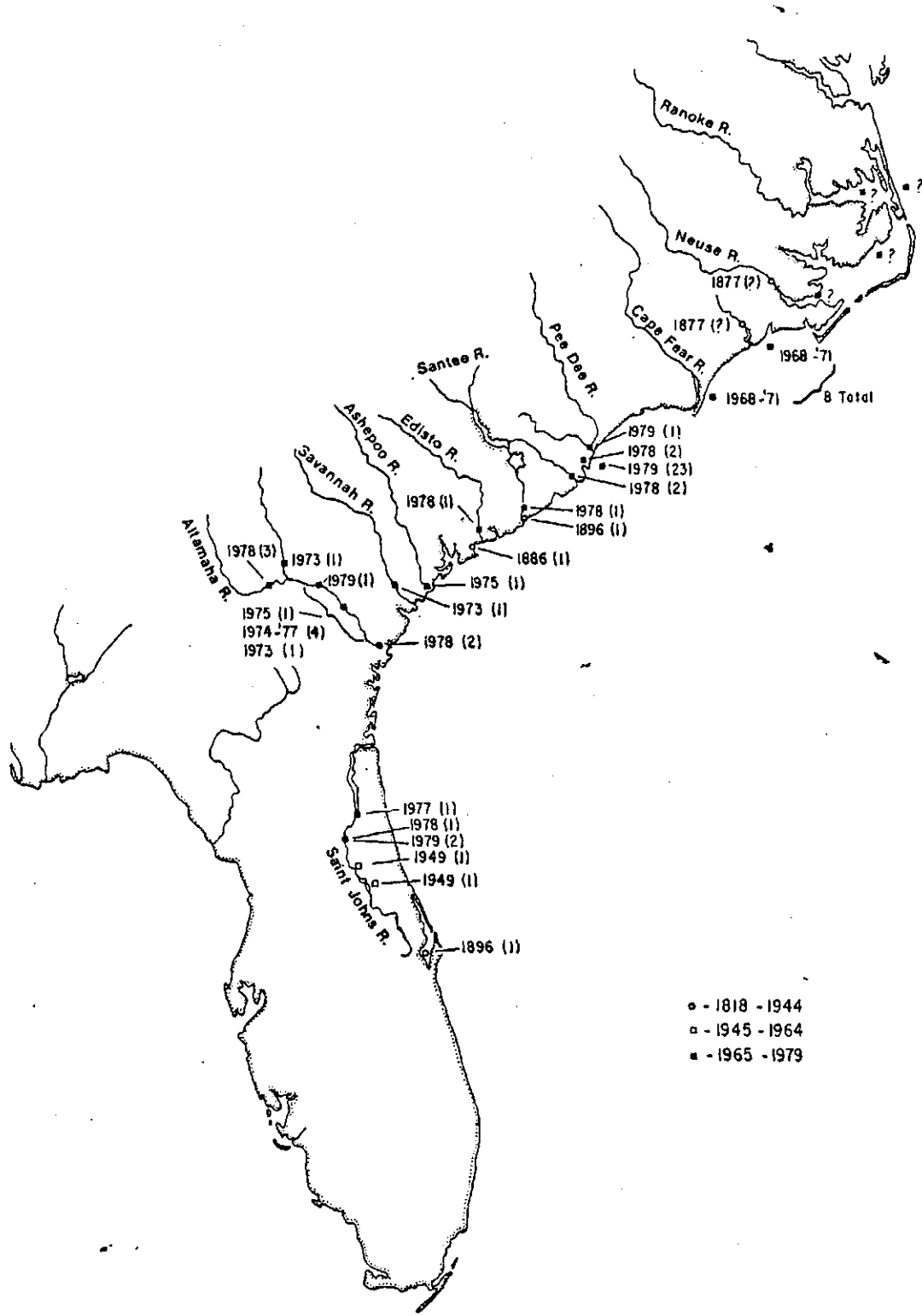


Fig. 1B. Southern portion of shortnose sturgeon distribution indicating known occurrences with date of capture and number captured.

At present the shortnose sturgeon is listed as endangered in the United States and is totally protected by the Endangered Species Act of 1973. As a result, no legal exploitation of the species is allowed.

POPULATION SIZE AND TREND

The adult shortnose sturgeon population in the Saint John River, New Brunswick was estimated as 18,000 \pm 30% (Tables 1 and 2; Dadswell 1979). The total population was estimated as approximately 100,000 by extrapolation of the mortality relationship (Dadswell 1979). During the course of a 4-year study, over 4000 adults were actually captured.

Population sizes in American rivers to the south are lately becoming known and some of them may be as large as the Saint John population (Table 3).

Since the size of shortnose sturgeon populations was previously unknown, trends in abundance cannot be accurately determined. For example, the presence of shortnose sturgeon in the Saint John River, N. B., the Kennebec River, Maine and the Altamaha River, Georgia was unknown until the last two decades, but these apparently are three of the larger populations. Also, Ryder (1890) described himself as fortunate when he obtained five shortnose sturgeon from the Delaware River and said the species had not been seen since LeSueur's day, but at the same time the Geological Survey of New Jersey (Anon. 1890) reported a 5:1 ratio of shortnose to Atlantic sturgeon and Meehan (1910) obtained over 100 shortnose sturgeon from the Delaware in April, 1908 with relative ease. In the last two decades, shortnose sturgeon have been captured regularly in the Delaware (Fig. 1). Similarly, Greely (1937) observed over 100 shortnose sturgeon as incidental captures in the Hudson River shad fishery during 1936 but stated the species was rare. Then Dovel (1978) observed about 100 shortnose sturgeon

Table 1. Adult shortnose sturgeon marked in the i^{th} sample and subsequently recaptured, percent recaptures/sample and percent marks of i^{th} sample/cycle. Recapture cycles divided in periods of approximately equal effort of 100 net-nights.

	Cycle									Total	%
	1	2	3	4	5	6	7	8	9		
	1973	18/7/74 ¹	14/8/74	11/9/74	17/6/75	18/7/75	3/8/75	27/6/76	25/6/77	4082	
	363	422 ²	399	267	393	566	423	692	557		
Cycle	329	381 ³	383	248	387	415	395	639	528	3705	Recaptures
1	-										
2	13	-								13	3.1
3	17	11	-							28	7.0
4	8	17	18	-						43	16.1
5	8	16	17	5	-					46	11.7
6	1	11	20	3	27	-				62	10.9
7	7	3	13	5	21	10	-			59	13.9
8	4	6	11	5	8	10	8	-		52	7.5
9	4	5	6	3	3	2	4	13	-	40	7.2
Total	62	69	85	21	59	22	12	13	-	343 ^a	9.7±0.5
%/cycle	2.3	2.6	3.7	1.7	3.8	1.8	1.4	1.3			

¹Date of termination of cycle

²Number of SNS captured during cycle

³Number of SNS marked during cycle

^aTotal recapture of marks includes tagged and caudal fin-clipped SNS.

Table 2. Population estimates (Seber-Jolly method) for June 1973 through June 1977 of adult (+50 cm) SNS in the Saint John estuary.

Sampling cycle	Proportion marked	Total marked	Total number N	Survival probability PHI	Number joining	Standard Error of N \pm
1	-	0.00		0.8645		
2	.0308	283.57	9204.96	0.6654	80.40	2873.67
3	.0702	433.53	6177.79	2.0314	-2570.95	1339.16
4	.1610	1601.86	9946.42	0.4139	2280.32	2579.54
5	.1170	747.85	6389.22	1.8587	6611.15	1243.50
6	.1095	2023.82	18475.50	1.0371	-1331.51	4637.09
7	.1395	2464.91	17672.14	0.4748	9320.98	5923.02
8	.0751	1330.0	17699.23			6169.20
9	.0720					

Table 3.

Estimates of shortnose sturgeon populations of North American Atlantic coast.

Locality	Marked m	Captured c	Recaptured r	Population estimate N	$mc/4N$ [^]	Source
Saint John R., N. B.	3705	4082	343	18,000 ± 30%	>1	Dadsweil (1979)
Kennebec R., Maine						
Peterson 1977-78	248	72	1	17856	0.25* ⁴	Calculated by MJD
1977-79	248	57	2	7068	0.50*	"
1978-79	69	57	2	1966	0.50*	"
1977-78-79	317	57	4	4517 ± 64%	1.00*	Squiers (pers. comm.)
Schnabel 1977	317		4	6000		"
1977-78-79	317		5	7185 ± 3179		Calculated by MJD
Holyoke Pool						
Peterson 1976-77	51	162	16	516	>1	Taubert (pers. comm.)
1976-78	51	56	4	714	>1	"
1977-78	119	56	18	371	>1	"
1976-77-78	170	56	24	397	>1	"
mean N				498		
Joly-Serber				403		"
Hudson River, N.Y.						
1977	79 ¹	121 ²	1 ³	9511	0.25*	Calculated by MJD
1978	227	127	4	7207	1.00*	Dovel (1978)
1979 ⁵	350	544	7	23800	>1	Calculated by MJD

¹Shortnose sturgeon tagged by Dovel between April 1976 and June 13, 1977.²Shortnose sturgeon captured by Texas Instruments April 1976-June 13, 1977 (Hoff et al. 1977).³Shortnose sturgeon captured by TI that were tagged by Dovel.⁴*Peterson estimate is not valid.⁵After Pekovitch (1979).

per year as incidental catch in the same fishery during 1976 and 1977, but when directed effort for shortnose sturgeon with proper gear took place in the Hudson during the spring of 1979, 1594 adults were captured in two months (Pekovitch 1979). These data, although fragmentary, suggest good populations of shortnose sturgeon have been present in all these rivers over the last century but have remained largely undetected or unreported.

HABITAT

The shortnose sturgeon occurs in rivers, estuaries and the sea but reaches its greatest abundance in mesohaline regions of the upper estuaries of large rivers. Habitat preference and migratory behavior are influenced by latitude and the physical nature of each river system. In northern locations the majority of the population remain within the influence of the estuary and predominantly select salinities below 20 o/oo (Dadswell 1979). Southern shortnose sturgeon populations appear to enter rivers only during spring to spawn (Heidt and Gilbert 1978) and return to the sea for the remainder of the year (Holland and Yelverton 1973). In the Saint John River, N. B., shortnose sturgeon migrate to more saline portions of the lower estuary and into deep regions of the estuarine lakes to overwinter (Dadswell 1979). In spring, the reproductives of the population for that year migrate upstream to spawn in riverine regions of strong flow (60-120 cm/s) over sand, gravel or boulder substrate (Pekovitch 1979; Taubert 1980). In some rivers, spawning migration may be as far as 200-km upstream. In the Saint John River, one spawning site is the region of the river between Mactaquac Dam and Fredericton (Dadswell, pers. obser.).

Juveniles spend their first years in deep riverine portions of the upper estuary, predominantly in fresh water (Dadswell 1979).

GENERAL BIOLOGY

Shortnose sturgeon spawn during early spring in the freshwater portions of estuaries or in rivers. Spawning occurs during flood conditions at water temperatures of 10-12°C (Dadswell 1979; Taubert 1980). Eggs are probably broadcast and fertilization external. Upon fertilization, the eggs become adhesive and attach to bottom materials (Meehan 1910). Hatching takes place in 13 d at 10°C (Meehan 1910). At hatching, larvae are 9-12 mm in length, grey-black and demersal (Taubert and Dadswell 1980). Growth is rapid during the first year of life (Pekovitch 1979).

Further growth varies greatly depending on latitude, the fastest growth occurring among southern populations but fish from northern populations attain a larger size. In the Saint John River, N. B., the species attains 50 cm fork length after 10 yr, 90 cm FL after 25 yr and 100 cm FL after 35 yr. Maximum known size of shortnose sturgeon in the Saint John River is 143 cm total length and 23 kg. Maximum age is 67 yr for females, but males seldom exceed 30 yr of age (Dadswell 1979). Sex ratio among young adults is 1:1 but changes to a predominance of females among fish greater than 90 cm FL. Total instantaneous mortality is in the range of 0.12-0.15 for the Saint John population.

Shortnose sturgeon are benthos feeders. The juvenile diet consists of insect larvae and crustaceans. Adult shortnose sturgeon eat predominantly molluscs.

Female shortnose sturgeon mature between 50 and 60 cm FL and spawn for the first time between 55 and 75 cm FL. In the Saint John, 50 percent maturity and age of first spawning corresponds with 15 and 18 yr of age. Males mature between 45 and 50 cm FL and spawn within a year of reaching maturity at a mean age of 10. The minimum duration between spawning of individual females is 3 yr but males spawn yearly or every other year. Fecundity of females is between 40,000 and 200,000 eggs and is directly correlated to total weight.

LIMITING FACTORS

The limiting factor for shortnose sturgeon in Canada is the availability of large rivers with warmwater estuaries. The shortnose sturgeon in this region is at the northern extent of its range and probably at the extreme thermal limit for a reproducing population. The species may occur in other estuaries around the Bay of Fundy or in the warmwater estuarine complex around the mouth of the Miramichi River, but has remained undetected either because of confusion with Atlantic sturgeon or because of limited sampling. Estuarine pollution may be detrimental but, even in a river as badly polluted as the Hudson, a considerable population has survived (Table 3).

The shortnose sturgeon is taken as incidental catch in the shad, salmon and striped bass gillnet fishery and by the alewife trapnet fishery. On the basis of tag returns, Dadswell (1979) estimated the fishing mortality (F) from this exploitation as 0.01 per year but this may be an underestimate. Much of the incidental catch from the gillnet fishery is returned to the river unharmed but some are sold locally. Shortnose sturgeon from the alewife trapnet fishery are often shipped with the alewives to be made into fish meal and this practice should stop.

Special significance of the species

The shortnose sturgeon is classified legally as "endangered" in the United States but since this status comes up for review every 3 yr and recent studies have shown the species may be as abundant as it always was, the status could be changed. The species is a significant component of the Saint John River benthic fish fauna and could be managed and exploited either through a sports fishery or as a gourmet item commercial fishery.

Recommendations

The number of shortnose sturgeon populations in the Maritimes is not known but there is one large population in the Saint John River, N. B. A few sturgeon of this population enter the commercial catch each year. The species should be placed under management of the Anadromous Fish Section, Maritimes Resource Branch and fishermen and the public should be informed of their presence.

Commercial fishermen for other species should be encouraged to return shortnose sturgeon to the water alive and the trapnet fishery should be monitored to prevent sturgeon from entering the bycatch landings. With caviar fetching \$80 a pound and smoked sturgeon selling at \$13 a pound in New York City, better utilization of sturgeon from Maritime rivers would be beneficial.

Evaluation

It appears the population of shortnose sturgeon in the Saint John River is at or near the carrying capacity for the habitat available

(Dadswell 1975). Incidental catch in other commercial fisheries and directed catch in the sturgeon fishery is not exceeding the sustainable yield for the population. Management could be undertaken which might increase yield in economic terms for this species.

Since the shortnose sturgeon is abundant in the Saint John River, and there is a good possibility the species may be found in other Maritime rivers; the species cannot be considered endangered in Canada. Because American populations are proving to be larger and more numerous than supposed in addition to its wide range in the United States, there is a distinct possibility the species could be removed from the endangered species list in the next five years. Because the Saint John has to date the only known population of this species in Canada, every effort to protect this river and its estuary from degradation or pollution should be undertaken. The species could be left in the "rare" category until evidence of either a decline of the Saint John population or the occurrence of other self-sustaining maritime populations is available. The species status could then be re-evaluated.

LITERATURE CITED

- Anon. 1890. Final report of the state geologist. Geological Survey of New Jersey. Vol. II. The John. L. Murphy Publ. Co. Trenton, N. J.: 668-669.
- Dadswell, M. J. 1975. The biology and resource potential of certain fishes in the Saint John estuary. In Baseline survey and living resource potential study of the Saint John estuary. Vol. III. Huntsman Marine Laboratory, St. Andrews, N. B.: 1-73.

- _____. 1979. Biology and population characteristics of the shortnose sturgeon, Acipenser brevirostrum LeSueur, 1818 (Osteichthyes: Acipenseridae), in the Saint John River estuary, New Brunswick, Canada. Can. J. Zool. 57: 2186-2210.
- Dovel, W. L. 1978. Sturgeons of the Hudson River, New York. Final and Performance Rep. for N. Y. Dept. Environ. Conserv., 181 p.
- Fried, S. M., and J. D. McLeave. 1973. Occurrence of the shortnose sturgeon (Acipenser brevirostrum), an endangered species, in Montsweag Bay, Maine. J. Fish. Res. Board Can. 30: 563-564.
- Greeley, J. R. 1937. Fishes of the area with annotated list. In A biological survey of the lower Hudson watershed. Rep. N. Y. State, Conserv. Dept. Suppl. 26: 45-103.
- Heidt, A. R., and R. J. Gilbert. 1978. The shortnose sturgeon in the Altamaha River drainage, Georgia. MS Rep., Contract 03-7-043-35-165, United States National Marine Fisheries Service, 16 p.
- Holland, B. F. Jr., and G. F. Yelverton. 1973. Distribution and biological studies of anadromous fishes offshore North Carolina. N.C. Dept. Nat. Econ. Res. S.S.R. 24: 132 p.
- Meehan, W. E. 1910. Experiments in sturgeon culture. Trans. Am. Fish. Soc. 39: 85-91.
- Pekovitch, A. W. 1979. Distribution and some life history aspects of the shortnose sturgeon (Acipenser brevirostrum) in the upper Hudson River estuary. Hazelton Environ. Sci. Corp., Illinois, 23 p.
- Ryder, R. A. 1890. The sturgeons and sturgeon industries of the eastern coast of the United States, with an account of experiments bearing upon sturgeon culture. Bull. U. S. Fish. Comm. 8: 231-328.

Taubert, B. D. 1980. Reproduction of shortnose sturgeon (Acipenser brevirostrum) in the Holyoke Pool of the Connecticut River, MA. Copeia 1980: (in press).

Taubert, B. D. and M. J. Dadswell. 1980. Description of shortnose sturgeon larvae (Acipenser brevirostrum) from the Holyoke Pool, Connecticut River, Massachusetts, USA and the Saint John River, New Brunswick, Canada. Can. J. Zool. 58: (in press).

Wilk, S. J., and M. J. Silverman. 1976. Summer benthic fish fauna of Sandy Hook Bay, New Jersey. NOAA Tech. Rep. NMFS-698, 16 p.