

**Kennebec River Sturgeon Studies
Completion Report
(2000 - 2001)**

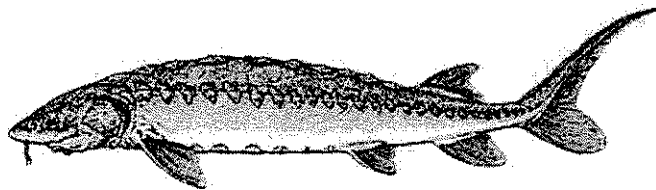
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Research Reference Document: 01/24

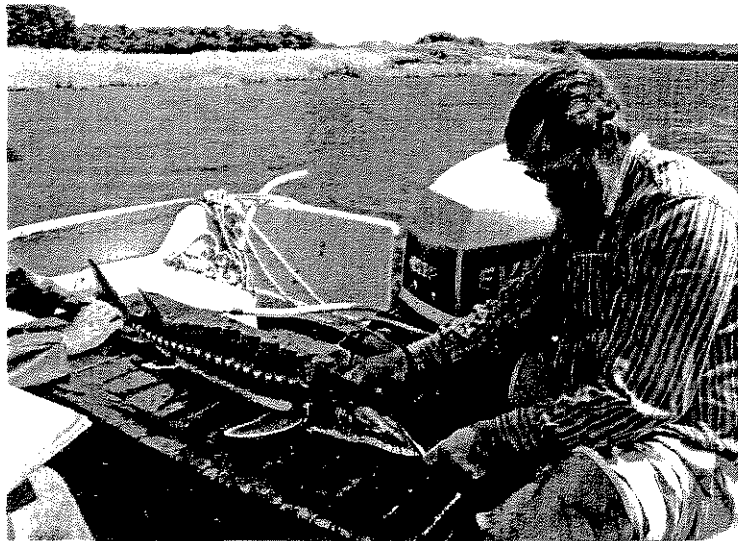
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COMPLETION REPORT
KENNEBEC RIVER STURGEON
STUDIES
2000 -2001
Maine Outdoor Heritage Fund
Project #991-3-2



Prepared by:
Thomas S. Squiers Jr.
Maine Department of Marine Resources
June 26, 2003

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Measuring the head length of a shortnose sturgeon

PROJECT OBJECTIVES To estimate the population size of shortnose sturgeon in the Kennebec River; to assess habitat use by adult shortnose sturgeon and subadult Atlantic sturgeon in the Kennebec River; and to obtain information on migratory movements of Atlantic sturgeon.

Shortnose and Atlantic sturgeon are found in the estuarine complex of the Sheepscot, Kennebec, and Androscoggin Rivers. The Kennebec and Androscoggin flow into Merrymeeting Bay, a large tidal freshwater bay that also receives inflow from several smaller river drainages: the Eastern, the Cathance, the Abagadasset, and the Muddy. The combined river systems exit Merrymeeting Bay through a narrow channel and flow approximately 20 miles to the Atlantic Ocean; this lower tidal segment is known as the "Kennebec River." The lower tidal section of the Kennebec connects with the Sheepscot River by means of the tidal Sasanoa River and several bays. This entire estuarine complex will be referred to as the "Kennebec River" (Figure 1). The Kennebec River supports the largest population of shortnose sturgeon in the United States north of the Hudson River; in addition, it supports the only known reproducing population of Atlantic sturgeon in the United States north of the Hudson River.

The Maine Department of Marine Resources (MDMR) has conducted studies to determine the distribution and abundance of shortnose sturgeon in the estuarine complex of the Kennebec, Androscoggin, and Sheepscot Rivers (Squiers and Smith, 1979; Squiers et al, 1982). Additional studies were conducted to determine the timing of the spawning run and location of spawning areas in the tidal section of the Androscoggin River (Squiers, 1982; Squiers, 1983; Squiers et al, 1993). The estimated size of the adult population

(>50cm TL) based on a tagging and recapture study performed from 1977 through 1981 was 7,200 with a 95% C.I. of 5000 - 10,800 (Squiers et al, 1982). The average density of adult shortnose sturgeon/hectare of habitat in the estuarine complex of the Kennebec River was the second highest of any population studied through 1983 (Dadswell et al, 1984). During these early studies, very few subadult Atlantic sturgeon were captured, indicating that only a remnant population of that species existed in the Kennebec River.

MDMR tracked shortnose sturgeon, which had been outfitted with sonic transmitters, from the fall of 1996 through early 1998. The transmitters were implanted internally in 15 shortnose sturgeon in the fall of 1996; an additional five shortnose were tagged in 1997 to help determine if adults over-wintered in the Bath area, where a new bridge was being built. MDMR also cooperated in an additional tracking study initiated in 1998 by Bath Iron Works (BIW) in the Bath region of the Kennebec River. The major objective of this latter study, which was conducted for BIW by Normandeau Associates, was to collect detailed information on the movements of both adult shortnose and subadult Atlantic sturgeon in the vicinity of the proposed expansion of the BIW shipyard. Both studies provided valuable data on the feeding and over-wintering areas of both species.

Assessment of the tracking data and earlier gill net studies indicates that the majority of shortnose sturgeon feed in the Bath region of the Kennebec from mid April through late November/early December and then migrate upriver to over-winter in Merry-meeting Bay. In addition, the MDMR/Normandeau sampling efforts from 1996 through 1998 indicated that the Atlantic sturgeon population has increased significantly since the late 1970s.

The *Shortnose Sturgeon Recovery Plan* (NOAA, 1998) identified several priorities necessary to facilitate recovery of shortnose sturgeon in the Kennebec River and included updating information on population estimates, age structure, recruitment, growth rate, and reproductive success. Another priority task was to restore spawning and nursery habitat. This latter task was accomplished with the removal of the Edwards Dam in 1999.

Priorities for Atlantic sturgeon recovery and management were established in *Amendment 1 To The Interstate Fishery Management Plan For Atlantic Sturgeon* (ASMFC, 1998). This management plan is essentially a recovery plan and its objectives included 1) closing the fishery for at least 20 years; 2) reducing or eliminating bycatch; 3) determining and protecting spawning sites; and 4) re-establishing access to historical habitat. The removal of the Edwards Dam restored Atlantic sturgeon access to their historical habitat in the Kennebec River.

The National Marine Fisheries Service (NMFS) chose to obtain updated population estimates and other population dynamics parameters for shortnose sturgeon in the Kennebec in order to refine current management strategies to facilitate recovery or reclassify the population status, if warranted. The NMFS contract for the population estimate for shortnose sturgeon provided an opportunity for MDMR to collect additional valuable information on shortnose and Atlantic sturgeon by tagging up to 500 shortnose and all Atlantic sturgeon captured. MDMR obtained additional funding in 2000 in order to have at least two years of data on which to base a new population estimate. Tagging an additional 500 shortnose would provide a more precise estimate in 2000; the PIT tags that were utilized should last the lifetimes of the fish, which could be an additional 30 years or more. The new PIT tags were injected into the musculature; long-term retention in other studies has been excellent. All Atlantic sturgeon were to be double-tagged with PIT and external tags. The external tag will allow MDMR to collect information on the commercial bycatch as well as on oceanic migratory movements.

The additional tagging of 500 shortnose sturgeon will allow MDMR to make a more precise estimate of the current population size in the Kennebec River. This information is necessary before any consideration can be given to down- or delisting. The implantation of sonic transmitters will allow MDMR to obtain additional information on habitat use in the feeding, spawning, and wintering areas. This information on habitat use will be of immediate value in improving the precision of the population estimate and be of long-term value in protecting critical habitat.

The purchase of tags and sonic transmitters through a grant from the Maine Outdoor Heritage Fund gave MDMR the opportunity to take advantage of the study funded by the NMFS, with very little increase in personal services and boat expense. The purchase of the necessary tags and transmitters will allow MDMR to obtain valuable data in a cost effective manner.

FINDINGS

The contract from the NMFS for population estimates of shortnose sturgeon in the Kennebec River was awarded to MDMR on July 25, 1998, and received by MDMR on July 28, 1998. The nets, tags, and tagging equipment were ordered soon after receiving the contract. Although a new contract was not awarded for the recapture effort in 1999, there were sufficient funds left from the 1998 contract to carry out the 1999 work; the PIT tags for 1999 were purchased through the MOHF grant. A new contract was awarded, effective September 28, 2000, to continue recapture efforts in 2000. Additional PIT tags were purchased with the MOHF grant for tagging in 2000. MDMR contracted with Normandeau Associates to perform the

sampling in 2000. MDMR was not able to borrow the stationary receivers used in the BIW sturgeon studies; therefore, no funds from the MOHF grant were expended on the purchase of sonic transmitters. The decision was made to tag Atlantic sturgeon with yellow dart tags provided by the U. S. Fish & Wildlife Service as part of a cooperative coastwide tagging program; thus, no PIT tags or MDMR floy tags were used on Atlantic sturgeon.

SHORTNOSE STURGEON TAGGING AND RECAPTURE DATA

A total of 346 shortnose sturgeon were captured from August 1, 1998 through November 19, 1998; of these, 308 were tagged with PIT tags (Avid 14mm microchip tags) and an additional 28 were tagged with Carlin tags. All captured shortnose sturgeon were scanned with an AVID Power Tracker II before and after tagging. The majority that were PIT tagged in 1998 were dual tagged with Carlins. The PIT tags were inserted in the fleshy base of the dorsal fin on the right side of the fish. Carlin tags were attached by means of a stainless steel wire bridle inserted through the base of the dorsal fin. Three shortnose sturgeon were released without tags. Twenty-five of the 346 shortnose captured were recaptures.

A total of 403 adult shortnose sturgeon were captured from July 7, 1999 through September 29, 1999; 355 were tagged with PIT tags. Forty-eight of the 403 fish were recaptures.

A total of 342 adult shortnose sturgeon were captured from October 12, 2000 through November 2, 2000; 303 were tagged with PIT tags. There were 39 recaptures in 2000, but 13 had lost the plastic pennant of the Carlin tag; therefore, only 26 tags were of use.



Injecting PIT tag in shortnose sturgeon

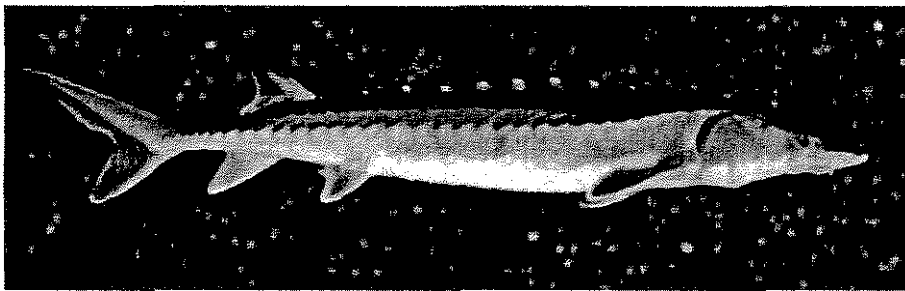
POPULATION ESTIMATE

All sampling occurred while shortnose sturgeon were in the summer feeding area (mid-Kennebec River estuary). The population estimate made utilizing the tagging and recapture data from 1998, 1999, and 2000 was 9,488 with a 95% confidence interval of 6,942 to 13,358. The population estimate made for the time period 1977 through 1981 was 7,222 with a confidence interval of 5,046 to 10,765 (Squiers et al, 1982).

ATLANTIC STURGEON TAGGING DATA

A total of 56 subadult Atlantic sturgeon were captured in 1999; 51 were tagged with Carlin tags and one was released untagged. Three were recaptures and there was one mortality.

A total of 100 subadult Atlantic sturgeon were captured in 2000; 79 were tagged with USFWS dart tags and 18 were released untagged. There was one recapture and two mortalities. Nine adult Atlantics were captured, tagged, and released with USFWS dart tags.



Subadult Atlantic sturgeon

COLLECTION AND MARKING OF JUVENILE SHORTNOSE STURGEON

No sampling was done for juvenile shortnose sturgeon because of the brevity of the sampling season in 1998 and 1999. Sampling efforts in 2000 were dedicated to capturing and tagging adult shortnose sturgeon to assure a sufficient number of fish were examined for a valid population estimate.

TISSUE COLLECTION

MDMR had collected tissue samples from shortnose and Atlantic sturgeon prior to this study. For shortnose sturgeon, a small V-shaped wedge was taken from the caudal fin. Twenty-six samples were taken in 1996 and another 26 samples were taken in 1998; they were collected in and adjacent to the summer feeding areas in the lower Kennebec River and are preserved in 95% Reagent alcohol.

In 1999, 50 tissue samples were collected from adult shortnose sturgeon on the spawning runs of both the Androscoggin and Kennebec Rivers:

No tissue samples were collected in 2000.

MORPHOLOGICAL AND GENETIC VARIATION BETWEEN SHORTNOSE STURGEON FROM THE KENNEBEC AND ANDROSCOGGIN RIVERS

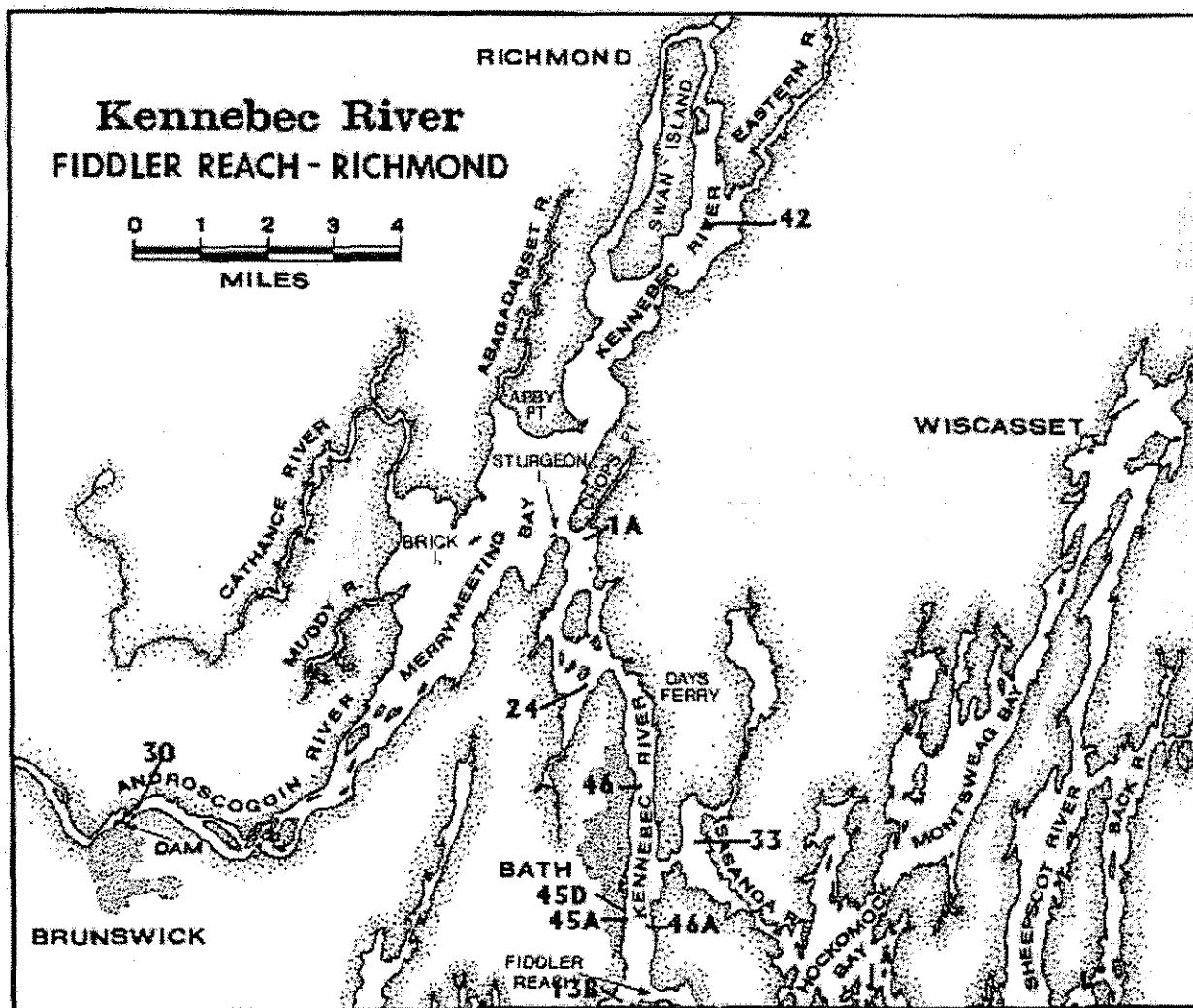
The *Shortnose Sturgeon Recovery Plan* (NOAA, 1998) defines the population(s) in the estuarial complex of the Kennebec River as one "Distinct Population Segment (DPS)." In a *Status Review of Shortnose Sturgeon in the Androscoggin and the Kennebec Rivers* (NOAA, 1996), it was noted that shortnose sturgeon spawned in both the Kennebec River and the Androscoggin River, but that there was not sufficient information available to determine if these two spawning components represented separate DPS's. A recent analysis of morphometric and meristic data collected from shortnose sturgeon captured in suspected spawning areas of both rivers found a significant difference in one morphometric measurement (interorbital width) and one meristic count (left lateral scutes) between sturgeon from these two rivers, indicating that two distinct populations may exist within the same estuarial complex. A portion of the mitochondrial DNA from 22 Kennebec River and 23 Androscoggin River shortnose specimens were sequenced by Drs. Isaac Wirgin (Nelson Institute of Environmental Medicine, New York University School of Medicine) and John Waldman (Hudson River Foundation for Science and Environmental Research). The mitochondrial DNA control region revealed 15 haplotypes among 73 total specimens from the Kennebec, Androscoggin, and Hudson Rivers. Shortnose sturgeon from the Kennebec and Androscoggin were significantly different from each other; both differed highly significantly from the Hudson River collection (Walch et al, 2001). The results of mtDNA analysis correspond well with the meristic and morphological analysis and provide further evidence that the two spawning components may represent two Distinct Population Segments.

COST OF MOHF PROJECT

	<u>NMFS Contract</u>	<u>Estimated MOHF</u>	<u>Actual MOHF</u>
Personal Services	\$16,501	\$0	\$0
Travel	\$ 2,014	\$0	\$0
Contractual	\$ 100	\$0	\$0
Supplies	\$ 2,071		
PIT Tags (1000)		\$6,000	\$4,249.37
Floy Tags (1000)		\$ 400	\$0
Sonic Transmitters (20)		\$5,050	\$0
Capital Subtotal	\$20,686	\$11,450	\$4,249.37
Indirect	\$ 6,863	\$0	\$0
Total	\$27,549	\$11,450	\$4,249.37

Major funding came from the NMFS Contracts #40-EANF-8-00053 and #43-EANF-0-00147.

Figure 1: Location of Sampling Sites of the 1998-2000 Kennebec River Shortnose Sturgeon Tag/Recapture Study



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MAINE OUTDOOR HERITAGE FUND
 DEPARTMENT OF MARINE RESOURCES
 Kennebec River Sturgeon Studies
 MOHF Ref# 991-3-2
 Project Leader: Tom Squiers
 014-13A-3575-392

As of June 27, 2003

GRANT AWARDS		\$14,942.00		
				\$14,942.00
EXPENDITURES				
	As per Request	Actual		
SUPPLIES	11,450.00	4,186.50		
INDIRECT CHARGES	3,492.00	1,276.88		
	14,942.00	5,463.38		
TOTAL EXPENDITURES:				5,463.38
AWARD LESS EXPENDITURES:				\$9,478.62

Unexpended funds to be journaled back to IF&W on JV 13A0306030