

**Kennebec River Shortnose Sturgeon Population Study
August – December 1999**

By

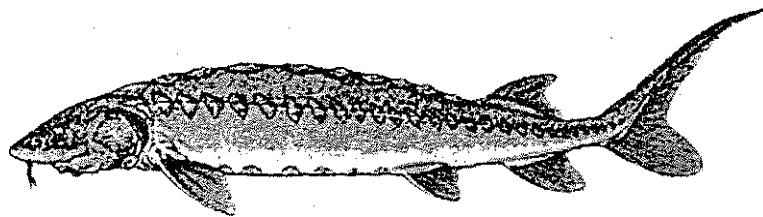
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***KENNEBEC RIVER
SHORTNOSE STURGEON POPULATION STUDY***

August , 1998 – December , 1999



- Graphics from NMFS, NE Fisheries Science Center

NMFS Contract 40EANF800053

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INTRODUCTION

Shortnose sturgeon occur in the estuarine complex of the Sheepscot, Kennebec, and Androscoggin Rivers. The Kennebec and Androscoggin Rivers flow into Merrymeeting Bay, a large tidal/freshwater bay that also receives inflow from several smaller drainages, i.e., the Eastern, Cathance, Abagadaset, and Muddy Rivers. The combined river systems exit Merrymeeting Bay through a narrow channel and flow approximately 20 miles to the Atlantic Ocean. The lower tidal segment is known as the "Kennebec River" and interconnects 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" for the remainder of the report; it supports the largest population of shortnose sturgeon in the United States north of the Hudson River.

The Maine Department of Marine Resources (DMR) has conducted studies in the past 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 locations 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 done from 1977 - 1981 was 7200, 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).

DMR tracked shortnose sturgeon that had been outfitted with sonic transmitters from the fall of 1996 through early 1998. Sonic transmitters were internally implanted in 15 shortnose in the fall of 1996 (and an additional five in 1997) to determine if adults overwintered in the Bath area where a new bridge is being built. In addition, DMR cooperated in an additional tracking study initiated in 1998 by Bath Iron Works (BIW) in the Bath region of the Kennebec River. The main objective of this latter study, which was conducted by Normandeau Associates for BIW, was to collect detailed information on the movements of both adult shortnose sturgeon and subadult Atlantic sturgeon in the vicinity of the BIW shipyard. Both studies provided valuable data about the feeding and overwintering areas for shortnose sturgeon. The tracking data and earlier gill net studies indicate that the majority of shortnose feed in the Bath region from mid-April through late November/early December, then migrate upriver to overwinter in Merrymeeting Bay.

The recently released *The Shortnose Sturgeon Recovery Plan* (NOAA, 1998) identified several priorities necessary to facilitate recovery of shortnose sturgeon in the Kennebec River, including recent population estimates, age structure, recruitment, growth rate, and reproductive success. The National Marine Fisheries Service (NMFS) has chosen to obtain updated population estimates and other population dynamics parameters for shortnose sturgeon in the Kennebec River to refine current management strategies to facilitate recovery or reclassify the population status, if warranted.

The primary objective of this study is to obtain revised population estimates for the federally listed endangered shortnose sturgeon populations in the Kennebec River. Secondary objectives include the collection and analysis of early life history data, including age/stage specific abundance and distribution; estimates of survival and annual variability and stock recruitment

relationships; seasonal habitat use; and collection of tissue samples for ongoing genetic analysis of shortnose sturgeon populations.

The following tasks were identified to meet the above objectives:

Primary Task:

1) Adult shortnose sturgeon will be captured and marked in the summer concentration areas utilizing anchored multifilament gill nets (30m X 2.4 m) with stretch mesh sizes of 15, 18, and 20cm. A minimum of two stations will be sampled weekly for adult shortnose sturgeon; all captured fish will be measured (mm) for fork (FL) and total (TL) lengths and weighed immediately upon retrieval. Passive integrated transponder (PIT) tags will be inserted in all shortnose sturgeon larger than 30cm (FL).

Secondary Tasks:

2) Juvenile shortnose sturgeon will be sampled using anchored gill nets (30m X 2.4m) with stretch mesh sizes of 5, 7.5, and 10cm; they will be set in the channel section of each station. A minimum of two stations will be sampled each week for juvenile shortnose sturgeon. All captured fish will be measured (mm) for fork (FL) and total (TL) lengths and weighed immediately upon retrieval. Passive integrated transponder (PIT) tags will be inserted in all shortnose sturgeon larger than 30cm (FL). Physical and chemical attributes will be collected at each station where juvenile shortnose are sampled and will include water depth, surface and bottom temperatures (C), salinity, and dissolved oxygen.

3) A triangular piece of tissue will be collected from the caudal fin of 50 sturgeon from the spawning run on the Androscoggin River, as well as 50 from the Kennebec spawning run.

PRELIMINARY FINDINGS

The NMFS contract for shortnose sturgeon population estimates in the Kennebec River was awarded to DMR on July 25, 1998 and received by DMR on July 28, 1998. The required nets, tags, and tagging equipment were ordered soon after the contract was received; 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 recapture effort.

1998 Collection/Marking of Adult Shortnose Sturgeon

Sampling was initiated on August 1, 1998, utilizing anchored gill nets which DMR had in stock. One net was 30m X 2.4m, with a stretch mesh (thread size of #9) of 20.3cm; the second net was 60m X 2.4m, with two panels of stretch mesh (thread size #277), 17.8cm and 20.3cm. Nets were set for three to four hours from early August through early September to reduce the chance of mortality due to high water temperatures (>22°C). Most sampling after this time was accomplished with 90m X 2.4m nets, with three panels of stretch mesh (thread size #277), 15.2cm, 17.8cm, and 20.3cm. Some overnight sets were made once the water temperatures fell below 20°C.

The majority of sampling sites were located in the summer concentration area, which extended from Winnegance Cove to Chops Point, including the Pleasant Cove area of the Sasanoa River (Figure 1; Table 1). A total of 346 shortnose sturgeon were captured from August 1 through November 19, 1998 (Table 2), 308 of which were marked with PIT tags (Avid 14mm microchip) and an additional 28 with Carlin tags. All shortnose sturgeon captured were scanned with an

AVID Power Tracker II before and after tagging; the majority that were PIT tagged were dual tagged with Carlins. PIT tags were inserted in the fleshy base of the dorsal fin on the right side; Carlin tags were attached with a stainless steel wire bridle inserted through the base of the dorsal fin. Three shortnose were released without tags. Twenty-five of the 346 were recaptures, many of which had been Carlin-tagged in previous studies, but had lost the plastic pennant. Eight of these recaptured sturgeon with just wire bridles were retagged with both PIT and Carlin tags; one, retagged with a Carlin tag; and one, released without being tagged. Eleven sturgeon with just Carlin tags (including the pennant) were recaptured; 10 were dual tagged with PIT tags and the other was released without being PIT tagged (Table 3). Four of the recaptures had been dual tagged during the ongoing study. Carlin Tag #1315, which was recaptured near Trufant Ledge in Bath on 10/21/98, was originally tagged over 16 years ago (5/19/92), near head-of-tide on the Androscoggin River, during spawning season.

1999 Mark and Recapture Effort

A total of 403 adult shortnose sturgeon were captured from July 7 through September 29, 1999 (Table 4). A total of 57 sets were made with 90-meter nets consisting of #277 multifilament nylon mesh (three 30m panels of 15.2cm, 17.8cm, and 20.3cm stretch measure) and 2.4m deep. The nets had a 1.27cm diameter float line and a lead core lead line (29.5kg/180m) and were fished from one hour, 45 minutes to 18 hours, 58 minutes, generally under six hours when temperatures exceeded 20°C, resulting in a total of 51 recaptures (Table 4). There were 20 recaptures, which satisfied the condition of being tagged while in the feeding area after July 1, 1998, and being recaptured in the feeding area after July 1, 1999 (Table 5). An additional 355 sturgeon were marked with PIT tags during this time period (Table 4).

Collection and Marking of Juvenile Shortnose Sturgeon

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

Tissue Collection

DMR had collected tissue samples from shortnose and Atlantic sturgeon prior to this study. A small V-shaped wedge was taken from the caudal fin of shortnose sturgeon; 26 samples were taken in both 1996 and 1998 and are preserved in 95% reagent alcohol. These samples were collected in, and adjacent to, the summer feeding areas in the lower Kennebec River. In 1999, 50 tissue samples were collected from adult shortnose sturgeon on the spawning run in both the Androscoggin and Kennebec Rivers.

Very large catches of shortnose sturgeon were made on both rivers: two 90-meter experimental gill nets were set on 5/5/98 in the Androscoggin River, with the intent of a four to six hour set. Retrieval of the first net was made after approximately four hours of soak time, but the sampling crew was only able to remove sturgeon from half of the first net before darkness set in. Eighty-four were captured (Table 6), 83 of which were PIT tagged. An additional 108 sturgeon were captured and released from the remaining half net. The other one and a half nets were left to fish overnight. A total of 66 shortnose were captured in the second net, from which 50 fin clips were collected from Androscoggin River fish captured on 5/5/99. Twenty-four of these fin clips were sent to Dr. Isaac Wirgin at New York Medical Center.

A total of 135 adult shortnose sturgeon were captured in an overnight set on the Kennebec River at a site approximately six miles below head-of-tide (Table 6). Fifty-one were PIT tagged and 50 fin clips were collected, 24 of which were sent to Dr. Isaac Wirgin at New York Medical Center.

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 Kennebec Rivers*** (NOAA, 1996), it was noted that shortnose sturgeon spawned in both the Kennebec and Androscoggin Rivers, but there was not sufficient information available to determine if these two spawning components represented separate DPS. A recent analysis of morphometric and meristic data collected from shortnose sturgeon captured in both Kennebec and Androscoggin suspected spawning areas found a significant difference in one morphometric measurement (interorbital width) and one meristic count (left lateral scutes) between sturgeon of these two rivers (Walch, Bain, and Squiers in review). These differences indicate that two distinct populations may exist within the same estuarial complex.

FIGURE 1.

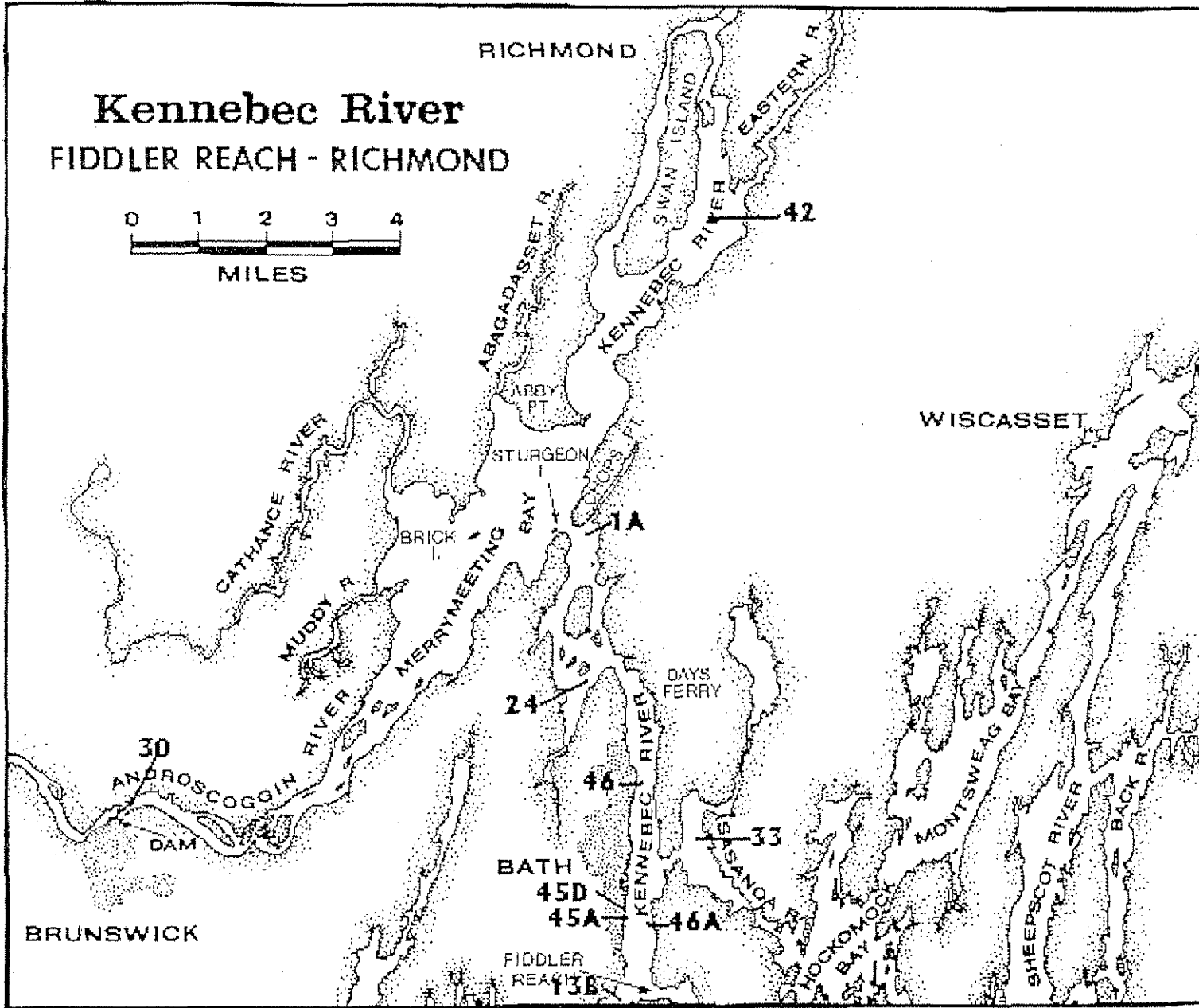


TABLE 1: Description of Sampling Sites for the 1998-99 Kennebec River Tagging/Recapture Study

| <u>SITE</u> | <u>SITE NAME</u> | <u>RIVER SYSTEM</u> | <u>SITE DESCRIPTION</u> |
|-------------|--------------------|---------------------|--|
| 1A | CHOPS CREEK | KENNEBEC RIVER | BELOW CHOPS PT. AT MOUTH OF CHOPS CREEK, LOWER KENNEBEC RIVER |
| 13B | WINNEGANCE CREEK | KENNEBEC RIVER | ON FLATS BY MOUTH OF WINNEGANCE CREEK |
| 15A | MONTSWEAG BAY | SHEEPSCOT RIVER | BETWEEN OAK ISLAND AND CHEWONKI POINT |
| 15B | MONTSWEAG BAY | SHEEPSCOT RIVER | BAILEY POINT AT MAINE YANKEE |
| 24 | WOOD ISLAND | KENNEBEC RIVER | ACROSS FROM THORNE ISLAND, JUST BELOW MERRYMEETING BAY |
| 30 | ZEKE'S | ANDROSCOGGIN RIVER | BRUNSWICK SHORE BELOW RTE 201 BRIDGE, INSHORE FROM BIG ROCK |
| 33 | PLEASANT COVE | SASANOVA RIVER | PLEASANT COVE, SASANOVA RIVER |
| 35C | FOGGY BOTTOM | KENNEBEC RIVER | JUST BELOW FOGGY BOTTOM MARINA, WEST SHORE-FARMINGDALE |
| 42 | RED SPAR | KENNEBEC RIVER | WEST SIDE OF SPAR AT LEDGES NEAR EASTERN RIVER |
| 45A | BIW | KENNEBEC RIVER | JUST INSIDE LOWER PIER AT BIW, IN FRONT OF BLUE BLDG; 13 FT AT LOW WATER |
| 45B | BIW, TRUFANT LEDGE | KENNEBEC RIVER | JUST DOWNSTREAM AND BETWEEN TRUFANT LEDGE AND TRUFANT MARSH; 7 TO 9 FT AT LOW WATER |
| 45D | BIW, WHITE SHED | KENNEBEC RIVER | WHITE SHED JUST UPRIVER FROM SITE 45A |
| 45E | ARROWSIC | KENNEBEC RIVER | EAST SHORE OPPOSITE LINCOLN LEDGE |
| 45T6 | BIW, HOSPITAL PT | KENNEBEC RIVER | TRAWL SITE; WEST SHORE DOWNRIVER OF BIW, JUST NORTH OF HOSPITAL PT.; NORMANDEAU'S T6 |
| 46 | SARDINE CANNERY | KENNEBEC RIVER | JUST BELOW SARDINE CANNERY, WEST SHORE-BATH |
| 46A | BIW, EAST SHORE | KENNEBEC RIVER | ACROSS FROM BIW, EAST SHORE |

Table 2: History for Shortnose Sturgeon Captured from August - November 1998, in the Kennebec River, Maine

| DATE | SITE # | SITE NAME | NET TYPE | LENGTH OF SET | WATER TEMP (C) | NUMBER CAPTURED | NUMBER RECAPTURES | NUMBER MORTALITIES | NUMBER RELEASED UNTAGGED | NUMBER TAGGED |
|----------------|--------|-------------------------------------|----------|---------------|----------------|-----------------|-------------------|--------------------|--------------------------|---------------|
| 08/01/98 | 13B | WINNEGANACE CREEK | I | 4 | 22 | 8 | 1 | 0 | 0 | 8 |
| 08/03/98 | 33 | PLEASANT COVE, SASANOA RIVER | S | 3.5 | 23 | 8 | 0 | 0 | 0 | 8 |
| 08/03/98 | 33 | PLEASANT COVE, SASANOA RIVER | T | 3.5 | 23.5 | 0 | 0 | 0 | 0 | 0 |
| 08/07/98 | 13B | WINNEGANACE CREEK | T | 4 | 22.5 | 3 | 0 | 0 | 0 | 3 |
| 08/07/98 | 33 | PLEASANT COVE, SASANOA RIVER | I | 3.5 | 24 | 0 | 0 | 0 | 0 | 0 |
| 08/13/98 | 13B | WINNEGANACE CREEK | I | 4 | 23 | 0 | 0 | 0 | 0 | 0 |
| 08/13/98 | 13B | WINNEGANACE CREEK | T | 3 | 23 | 11 | 1 | 0 | 0 | 10 |
| 08/20/98 | 13B | WINNEGANACE CREEK | I | 2 | 22.5 | 0 | 0 | 0 | 0 | 0 |
| 08/20/98 | 13B | WINNEGANACE CREEK | T | 3 | 22.5 | 4 | 1 | 0 | 0 | 3 |
| 08/26/98 | 13B | WINNEGANACE CREEK | T | 4.5 | | 4 | 0 | 0 | 0 | 4 |
| 09/02/98 | 1A | CHOPS CREEK, WOOLWICH | S | 4 | 23 | 1 | 0 | 0 | 0 | 1 |
| 09/02/98 | 24 | WOOD ISLAND, NORTH BATH | T | 3.5 | 23 | 0 | 0 | 0 | 0 | 0 |
| 09/03/98 | 45D | BIW, OFF WHITE SHED | I | 4 | 22 | 3 | 2 | 0 | 0 | 3 |
| 09/11/98 | 33 | PLEASANT COVE, SASANOA RIVER | S | 4 | 19 | 1 | 0 | 0 | 0 | 1 |
| 09/15/98 | 13B | WINNEGANACE CREEK | S | 4 | 18.9 | 7 | 1 | 0 | 0 | 6 |
| 09/15/98 | 13B | WINNEGANACE CREEK | S | 4 | 18.9 | 9 | 0 | 0 | 0 | 9 |
| 09/16/98 | 13B | WINNEGANACE CREEK | S | 19 | 18.9 | 25 | 5 | 0 | 3 | 20 |
| 09/24/98 | 33 | PLEASANT COVE, SASANOA RIVER | S | 23 | | 19 | 3 | 0 | 0 | 19 |
| 09/30/98 | 45A | BIW | S | 4 | 16 | 6 | 0 | 0 | 0 | 6 |
| 10/06/98 | 42 | RED SPAR, EAST CHANNEL, SWAN ISLAND | S | | 14 | 1 | 0 | 0 | 0 | 1 |
| 10/13/98 | 13B | WINNEGANACE CREEK | S | 4 | 13 | 15 | 2 | 0 | 0 | 14 |
| 10/14/98 | 46 | SARDINE CANNERY, BATH | S | 19 | 13 | 15 | 2 | 0 | 0 | 15 |
| 10/19/98 | 13B | WINNEGANACE CREEK | S | 4.5 | 12.5 | 6 | 0 | 0 | 0 | 6 |
| 10/20/98 | 13B | WINNEGANACE CREEK | S | 20.5 | 13.5 | 6 | 1 | 0 | 0 | 5 |
| 10/20/98 | 33 | PLEASANT COVE, SASANOA RIVER | S | 4 | 12.5 | 23 | 1 | 0 | 0 | 23 |
| 10/21/98 | 46 | SARDINE CANNERY, BATH | S | 19 | 13.5 | 148 | 6 | 0 | 0 | 148 |
| 10/22/98 | 46A | BIW, EAST SHORE | S | 43.5 | 13.5 | 21 | 0 | 0 | 0 | 21 |
| 10/26/98 | 42 | RED SPAR, EAST CHANNEL, SWAN ISLAND | S | 3.5 | 11 | 0 | 0 | 0 | 0 | 0 |
| 11/19/98 | 42 | RED SPAR, EAST CHANNEL, SWAN ISLAND | S | 15 | 5.5 | 2 | 0 | 0 | 0 | 2 |
| TOTALS: | | | | | | 346 | 26 | 0 | 3 | 336 |

NET TYPES:

- I 30m x 2.4m (20.5cm stretch mesh, #9 twine)
- T 60m x 2.4m (17.8cm, 20.3cm stretch mesh, #277 twine)
- S 90m x 2.4m (15.2cm, 17.8cm, 20.3cm stretch mesh, #277 twine)

RECAPTURES:

The recaptures consisted of 10 sturgeon with Carlin tags, which were also tagged with PIT tags; 8 with wire bridles and no pennants, which were tagged with Carlin and PIT tags; 1 with a wire bridle, retagged with a Carlin; 1 with a wire bridle and not retagged; 2 with Carlins, which were not PIT tagged; and 4 double tagged with Carlin and PIT tags.

Table 3 : Data for Shortnose Sturgeon Recaptured from August 1, 1998 - November 1998 in the Kennebec River

| Date | Carlin Tag # | PIT Tag # | Sonic T # | Site # | Site Name | River System | Total Length(cm) | Fork Length (cm) | Weight (kg) |
|----------|--------------|-------------|-----------|--------|--------------------|--------------------|------------------|------------------|-------------|
| 10/14/98 | 1201 | 030 368 539 | | 46 | SARDINE CANNERY | KENNEBEC RIVER | 92.4 | 84.1 | 4.5 |
| 05/14/98 | 1201 | | V16 | 45A | BIW | KENNEBEC RIVER | 96 | 85.5 | |
| 08/13/98 | 1257 | | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 87.2 | 78.5 | 3.5 |
| 08/07/98 | 1257 | | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 87.2 | 78.5 | 3.5 |
| 09/16/98 | 1264 | 029 808 084 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 87.3 | 79 | 3.5 |
| 05/21/98 | 1264 | | | 45AT | BIW | KENNEBEC RIVER | 85 | 76.5 | 3 |
| 10/21/98 | 1270 | 030 349 628 | | 46 | SARDINE CANNERY | KENNEBEC RIVER | 92 | 82 | 5.5 |
| 06/24/98 | 1270 | | V22 | 45A | BIW | KENNEBEC RIVER | 92 | 81.5 | 6 |
| 09/03/98 | 1294 | 029 829 802 | | 45A | BIW | KENNEBEC RIVER | 105.5 | 96.2 | |
| 07/14/97 | 1294 | | S2336 | 45B | BIW, TRUFANT LEDGE | KENNEBEC RIVER | 106 | 93 | |
| 10/21/98 | 1315 | 030 304 814 | | 46 | SARDINE CANNERY | KENNEBEC RIVER | 94.7 | 84.5 | 5.5 |
| 05/19/82 | 1315 | | | 30 | ZEKE'S | ANDROSCOGGIN RIVER | 79.3 | 69.2 | 4.75 |
| 10/21/98 | 1553 | 030 264 001 | | 46 | SARDINE CANNERY | KENNEBEC RIVER | 84.9 | 80 | 4.5 |
| 08/01/98 | 1553 | | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 84 | 77.5 | 3.75 |
| 10/21/98 | 1554 | 030 290 635 | | 46 | SARDINE CANNERY | KENNEBEC RIVER | 86.3 | 80.4 | 5 |
| 08/01/98 | 1554 | | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 82 | 78.5 | 4 |
| 10/13/98 | 1560 | 030 111 542 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 88.5 | 78.3 | 4 |
| 08/13/98 | 1560 | | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 88.9 | 77.1 | 4 |
| 09/03/98 | 1569 | 029 803 045 | | 45A | BIW | KENNEBEC RIVER | 105.4 | 96 | 6.25 |
| 08/26/98 | 1569 | | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 106.7 | 97 | 6.25 |
| 09/16/98 | 1583 | 029 621 315 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | | | |
| 09/15/98 | 1583 | 029 621 315 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 85.6 | 77.2 | 3.25 |
| 10/13/98 | 1593 | 029 801 779 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | | | |
| 09/15/98 | 1593 | 029 801 779 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 92.2 | 86.5 | 5 |
| 09/16/98 | 1597 | 029 559 786 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | | | |
| 09/15/98 | 1597 | 029 559 786 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 98.4 | 78.2 | 5.25 |
| 09/16/98 | 1639 | 029 807 785 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 94.2 | 84.4 | 5.5 |
| 05/13/93 | 1639 | | | 30 | ZEKE'S | ANDROSCOGGIN RIVER | 91.3 | 79.7 | 6 |
| 10/20/98 | 1801 | 030 576 073 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | | | |
| 10/13/98 | 1801 | 030 576 073 | | 13B | WINNEGANCE CREEK | KENNEBEC RIVER | 91.5 | 87.1 | 5 |

Note: Transmitter code numbers are listed under Sonic T #. Twenty shortnose sturgeon were implanted with pulse code transmitters from Sonotronics in 1996/1997 and 17 were implanted with digital code tags from Vemco in 1998.

TABLE 4: Sampling History of Shortnose Sturgeon in the Kennebec River July 1 - Sept 30, 1999

| DATE | SITE # | LENGTH OF SET | WATER TEMP C | NUMBER CAPTURED | NUMBER RECAPTURES | NUMBER MORTALITIES | NUMBER RELEASED UNTAGGED | NUMBER TAGGED |
|---------|--------|------------------|-----------------|--------------------|----------------------|-----------------------|--------------------------------|------------------|
| 7/7/99 | 13B | 6:50 | 24 | 7 | 2 | 0 | 0 | 7 |
| 7/7/99 | 33 | 5:05 | 23 | 7 | 1 | 0 | 0 | 6 |
| 7/7/99 | 13B | 5:30 | 24 | 23 | 1 | 0 | 0 | 22 |
| 7/8/99 | 46 | 4:25 | 21 | 3 | 0 | 0 | 0 | 3 |
| 7/8/99 | 4 | 4:00 | 24 | 0 | 0 | 0 | 0 | 0 |
| 7/9/99 | 46A | 1:45 | 22 | 28 | 1 | 0 | 0 | 27 |
| 7/9/99 | 45B | 3:40 | 22 | 2 | 0 | 0 | 0 | 2 |
| 7/27/99 | 13B | 3:00 | 24 | 11 | 2 | 0 | 0 | 9 |
| 7/27/99 | 33 | 3:00 | 24 | 1 | 0 | 0 | 0 | 1 |
| 7/28/99 | 13B | 3:10 | 24 | 0 | 0 | 0 | 0 | 0 |
| 7/29/99 | 13B | 2:25 | 25 | 10 | 1 | 0 | 0 | 9 |
| 7/29/99 | 45B | 1:50 | 25 | 6 | 1 | 0 | 0 | 5 |
| 7/29/99 | 46A | 3:10 | 24 | 1 | 0 | 0 | 0 | 1 |
| 8/9/99 | 24 | 2:00 | 22.5 | 0 | 0 | 0 | 0 | 0 |
| 8/9/99 | 33 | 2:00 | 20.5 | 6 | 0 | 0 | 0 | 6 |
| 8/10/99 | 15A | 2:00 | 20.5 | 3 | 0 | 0 | 0 | 3 |
| 8/10/99 | 15B | 2:00 | 17 | 1 | 0 | 0 | 0 | 1 |
| 8/11/99 | 8 | 2:00 | 21.5 | 0 | 0 | 0 | 0 | 0 |
| 8/11/99 | 14 | 3:30 | 21.5 | 0 | 0 | 0 | 0 | 0 |
| 8/12/99 | 46 | 3:00 | 21 | 0 | 0 | 0 | 0 | 0 |
| 8/12/99 | 46A | 3:00 | 21 | 2 | 0 | 0 | 0 | 2 |
| 8/17/99 | 42 | 2:00 | 22 | 0 | 0 | 0 | 0 | 0 |
| 8/24/99 | 46A | 3:00 | 19.5 | 0 | 0 | 0 | 0 | 0 |
| 8/24/99 | 13B | 3:15 | 19.5 | 13 | 0 | 0 | 0 | 13 |
| 8/25/99 | 13B | 3:45 | 21.5 | 6 | 1 | 0 | 0 | 5 |
| 8/25/99 | 33 | 2:25 | 22.5 | 2 | 0 | 0 | 0 | 2 |
| 8/27/99 | 13B | 2:55 | 21.5 | 4 | 0 | 0 | 0 | 4 |
| 8/27/99 | 45E | 2:00 | 22 | 0 | 0 | 0 | 0 | 0 |
| 9/7/99 | 33 | 2:45 | 22.7 | 1 | 0 | 0 | 0 | 1 |
| 9/7/99 | 13B | 3:12 | 20 | 8 | 1 | 0 | 0 | 7 |
| 9/8/99 | 13B | 3:05 | 21.2 | 1 | 0 | 0 | 0 | 1 |
| 9/8/99 | 13B | 3:05 | 21.2 | 1 | 0 | 0 | 0 | 1 |
| 9/9/99 | 46A | 2:00 | 22.5 | 1 | 0 | 0 | 0 | 1 |
| 9/9/99 | 13B | 2:00 | 22.5 | 4 | 0 | 0 | 0 | 4 |
| 9/20/99 | 13B | 15:30 | 15.7 | 26 | 6 | 0 | 0 | 20 |
| 9/20/99 | 13B | 4:35 | 15.7 | 10 | 0 | 0 | 0 | 10 |
| 9/20/99 | 33 | 4:37 | 17.9 | 5 | 0 | 0 | 0 | 5 |
| 9/21/99 | 33 | 3:00 | 0 | 3 | 0 | 0 | 0 | 3 |
| 9/21/99 | 13B | 3:00 | 16 | 6 | 1 | 0 | 0 | 5 |
| 9/22/99 | 33 | 17:00 | 0 | 29 | 3 | 1 | 0 | 25 |
| 9/22/99 | 45B | 15:30 | 17 | 19 | 0 | 0 | 0 | 19 |
| 9/23/99 | 13B | 18:58 | 17 | 33 | 4 | 1 | 0 | 28 |
| 9/23/99 | 45T6 | 16:40 | 0 | 8 | 0 | 0 | 0 | 8 |
| 9/23/99 | 45T6 | 4:09 | 17 | 4 | 0 | 0 | 0 | 4 |
| 9/23/99 | 13B | 4:00 | 17 | 5 | 1 | 0 | 0 | 4 |
| 9/24/99 | 13B | 2:00 | 17 | 4 | 2 | 0 | 0 | 2 |
| 9/27/99 | 45B | 5:24 | 17 | 8 | 1 | 0 | 0 | 7 |
| 9/27/99 | 45B | 16:00 | 17 | 4 | 1 | 0 | 0 | 3 |
| 9/27/99 | 33 | 16:33 | 17.6 | 18 | 4 | 0 | 0 | 14 |
| 9/27/99 | 33 | 3:57 | 16.7 | 7 | 1 | 0 | 0 | 6 |
| 9/28/99 | 33 | 17:00 | 16.8 | 11 | 1 | 0 | 0 | 10 |
| 9/28/99 | 45B | 4:00 | 16.9 | 1 | 0 | 0 | 0 | 1 |
| 9/28/99 | 33 | 5:43 | 15.7 | 5 | 2 | 0 | 0 | 3 |
| 9/28/99 | 13B | 16:00 | 17.5 | 25 | 4 | 0 | 0 | 21 |
| 9/28/99 | 13B | 17:00 | 0 | 17 | 6 | 0 | 0 | 11 |
| 9/29/99 | 45B | 2:54 | 0 | 3 | 0 | 0 | 0 | 3 |
| 9/29/99 | 33 | 5:28 | 16.8 | 0 | 0 | 0 | 0 | 0 |
| | | | | 403 | 48 | 2 | 0 | 355 |

Table 5: Data for Shortnose Sturgeon Tagged in 1998 and Recaptured after July 1, 1999

| Date Recaptured | Site Recaptured | Pit Tag # | Carlin Tag # | Date Recaptured | Site Tagged | Total Length (cm) | Fork Length (cm) | Weight (kg) | NOTES |
|-----------------|-----------------|-----------|--------------|-----------------|-------------|-------------------|------------------|-------------|---|
| 9/21/99 | 13B | 035862019 | 1279 | 5/14/98 | 45A | 94.3 | 81.1 | 10.6 | |
| 7/7/99 | 13B | 021058874 | 1547 | 8/1/98 | 13B | 86.1 | 77.8 | 4.75 | |
| 9/27/99 | 33 | 029802594 | 1578 | 8/3/98 | 33 | 102.4 | 90.7 | 15.5 | |
| 9/27/99 | 33 | 029830356 | 1575 | 8/3/98 | 33 | 89.3 | 78.1 | 10.5 | |
| 9/28/99 | 33 | 029807322 | 1576 | 8/3/98 | 33 | 93.4 | 87.8 | 11.5 | |
| 7/27/99 | 13B | 011855860 | 1559 | 8/13/98 | 13B | 100 | 91 | 7 | |
| 9/23/99 | 13B | 030111542 | 1560 | 8/13/98 | 13B | 90.4 | 77.8 | 10.25 | |
| 9/27/99 | 45B | 036293342 | 1563 | 8/20/98 | 13B | 94.9 | 88.8 | 12 | |
| 7/7/99 | 33 | 028853845 | 1568 | 8/26/98 | 13B | 91.2 | 80 | 4 | |
| 7/7/99 | 13B | 029625018 | 1594 | 9/15/98 | 13B | 75.5 | 67.2 | 3 | |
| 7/27/99 | 13B | 029802046 | 1589 | 9/15/98 | 13B | 92.5 | 82.5 | 6 | |
| 7/29/99 | 13B | 029581580 | 1586 | 9/15/98 | 13B | 87.5 | 76 | 5.5 | |
| 9/20/99 | 33 | 029807785 | | 9/16/98 | 13B | 93.2 | 84.3 | 12.75 | When tagged in 1998, it had Carlin #1639 (Site 30 on 5/13/93) |
| 9/21/99 | 13B | 036301053 | 1842 | 9/24/98 | 33 | 74.1 | 66.4 | 8.5 | Previously tagged with PIT #030371841 |
| 9/21/99 | 33 | 021786895 | | 9/24/98 | 33 | 94 | 85.3 | 11.75 | Was also tagged with Carlin #1854 on this date |
| 9/21/99 | 33 | 030263329 | 1845 | 9/24/98 | 33 | 86.1 | 76.6 | 9.25 | |
| 9/27/99 | 33 | 030116124 | | 9/24/98 | 33 | 95 | 83.9 | 11.5 | Also tagged with Carlin #1874 on this date; had wire from previous tagging. |
| 9/23/99 | 13B | 030335096 | | 10/13/98 | 13B | 86 | 77.5 | 11.75 | Also tagged with Carlin #1888. Recap at Site 30 with #1888 on 5/6/99; recap 9/23/99 at 13B; recap 9/28/99 at Site 1 |
| 9/28/99 | 13B | 030335096 | | 10/13/98 | 13B | 84.7 | 74.8 | 11.25 | Also tagged with Carlin #1888. Recap at Site 30 with #1888 on 5/6/99; recap 9/23/99 at 13B; recap 9/28/99 at Site 1 |
| 9/28/99 | 13B | 030293569 | | 10/13/98 | 13B | 90.4 | 83.5 | 11.25 | |
| 9/21/99 | 33 | 030361520 | 1694 | 10/20/98 | 33 | 89.1 | 81.9 | 12 | |

All data associated with the date recaptured.

The study called for sturgeon to be tagged after 7/1/98 and recapped after 7/1/99; 20 recaptures met this condition.

TABLE 6: Sampling History of Shortnose Sturgeon Captured in the Androscoggin Kennebec Rivers, May 1999

| <u>Date</u> | <u>Site</u> | <u>Length set</u> | <u>Water temp</u> | <u>Number SN Tagged</u> | <u>Number SN Recaptured</u> | <u>Number SN Released Untagged</u> | <u>Number SN Morts</u> |
|-------------|-------------|-------------------|-------------------|-------------------------|-----------------------------|------------------------------------|------------------------|
| 5/5/99 | 30 | 8:00 | 13 | 83 | 0 | 1 | 0 |
| 5/6/99 | 30 | 23:00 | 13.9 | 0 | 1 | 107 | 0 |
| 5/6/99 | 30 | 23:59 | 13.9 | 0 | 5 | 61 | 0 |
| 5/11/99 | 35C | 22:50 | 14 | 51 | 1 | 83 | 0 |

Gillnets = 90-meter multifilament sinking, 2.4m deep, with 3 panels of 15.2cm, 17.8cm, 20.3cm stretch mesh, thread size #277
 Two nets were set at Site 30 on 5/5/99. Only 1/2 of the first net was retrieved on 5/5/99 because of time limitation.
 The remaining 1 and 1/2 nets were pulled on 5/6/99.