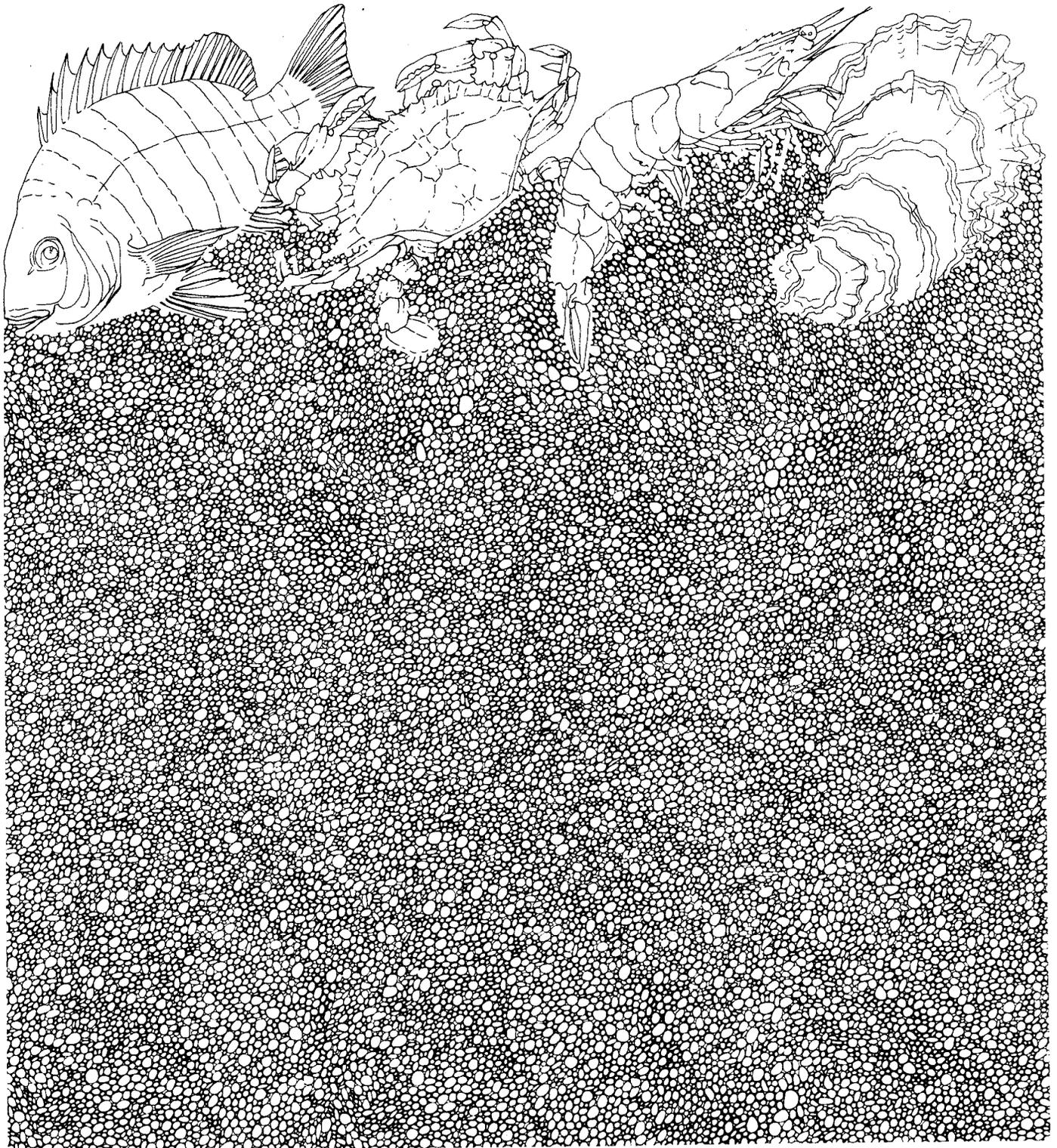


SURVIVAL OF HOOK-CAUGHT SPOTTED SEATROUT HELD IN CAGES

by Gary C. Matlock and James A. Dailey

Management Data Series Number 15
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INTRODUCTION

On 11 October 1978 the Texas Parks and Wildlife Commission adopted Rule 127.70.01.271 (e) which prohibited the retention of spotted seatrout (*Cynoscion nebulosus*) < 12 inches (305 mm) in length (Texas Parks and Wildlife Department 1979) by recreational fishermen in 12 of the 18 Texas coastal counties. This minimum size limit was already in effect in Cameron and Willacy Counties; the Commission's action did not apply to Chambers, Galveston, Harris and Victoria Counties. The rule was adopted to conserve the spotted seatrout by providing the fish an additional opportunity to spawn before being harvested. The survival of released fish < 305 mm was unknown. This study was conducted to estimate the survival of spotted seatrout (< 305 mm) caught and released by recreational fishermen.

MATERIALS AND METHODS

Spotted seatrout (250-305 mm) were caught with rod and reel in Matagorda Bay on 18 August and 11 September 1979 on No 6 treble hooks using live shrimp and artificial lures as bait. Each fish except those used as controls was handled as if it had been caught by a recreational fisherman. The hook was jerked from the mouth or small hemostats were used to remove the hook if it were embedded deep in the mouth. Control fish were handled as carefully as possible. On 18 August 1979, 27 fish were caught at the Texas Parks and Wildlife Department (TPWD) Marine Fisheries Research Station at Palacios, Texas. Each fish was measured to the nearest 1 mm total length as they died or at the end of the experiment. Nine fish (230-305 mm) were placed in each of three wire cages (two measured 0.6 x 0.6 x 0.9 m; one measured 0.5 x 0.5 x 0.6 m) and held without food for 7 days at the TPWD station. Adverse weather prevented the capture of fish to be used as controls. Fish in each cage were checked at least once daily and all dead fish were removed. Water temperature (to the nearest 1 C) and salinity (to the nearest 1 o/oo) were measured within 2 cm of surface; a stem thermometer and Goldberg refractometer were used.

On 11 September 1979, 20 trout (230-305 mm) were caught in the western part of Matagorda Bay and transported to Palacios in 147-liter containers. Five fish were used as controls and placed in a wire cage (1.2 x 1.2 x 0.4 m) for 9 days. Five fish were placed in each of the three cages used on 18 August and also held for 8 days. Each cage was shaded by an adjacent roof. Fish were not fed and were checked once daily. Water temperature and salinity were measured at the surface daily as before.

The heterogeneity G-test was used to determine significant ($P < 0.05$) differences in survival among the three cages used in August (Sokal and Rohlf 1969).

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ABSTRACT

The survival of spotted seatrout (Cynoscion nebulosus) < 305mm, total length, caught by rod and reel on No 6 treble hooks and released was determined in August and September 1979. Fish were handled without any special care and held for 7-9 days without food. The mean survival of 27 fish in August was $44 \pm 13\%$; in September the mean for 15 fish was $100 \pm 0\%$. The regulation requiring the release of trout < 305 mm (12 inches) by recreational fishermen should provide many fish an additional opportunity to spawn before being harvested.

RESULTS

Over 44% of the fish caught on 17 August 1979 were alive after 7 days (Table 1). Most of the deaths occurred during the first 5 days with the death rate about the same in 2 of the 3 holding pens. In cage 2, no fish died in the first 2 days after capture; three fish had died by the end of the study. The mean survival rate for fish in the three cages was $44 \pm 13\%$ with no significant difference in survival after 7 days ($G=5.991$, $df=2$, $P>0.05$).

None of the 20 fish caught on 11 September 1979 died during 9 days following capture (Table 2). The water temperature in September ranged from 20.0 to 25.0 C; in August it was 27.0 to 33.5 C. The salinity in September was 10.0-16.0 o/oo; in August it was 10.0-12.0 o/oo.

DISCUSSION

The release of spotted seatrout < 305 mm caught on treble hooks with rod and reel should provide many fish an additional opportunity to spawn before being harvested. Most of the trout harvest in Texas occurs in summer and fall (Heffernan et al. 1977, Breuer et al. 1977). Many of the fish < 305 mm caught are either sexually developing or developed; a second spawning peak occurs in summer (Perret et al. 1980). If the proportion of released fish surviving were similar to that found in this study, at least 44% of the fish caught by recreational fishermen in the summer would have an opportunity to spawn before being landed. Certainly, some of the fish released would die from natural causes so not all fish would actually spawn before dying. The survival of released fish could probably be increased by advising fishermen to handle fish < 305 mm with special care. However, it seems unlikely that all released fish would survive capture since some fish would swallow the hook. Hunsaker et al. (1970) found that hooking mortality of cutthroat trout (Salmo clarki) was 73% when the bait was swallowed but only 8% for fish caught on unswallowed bait. Warner and Johnson (1978) reported that about 72% of Atlantic salmon (Salmo salar) hooked in the esophagus died after hooking.

Most studies on salmonids have shown that most mortality after hooking occurs with 24 h, and that nearly all mortality occurs within 5 days (Warner and Johnson 1978). All but two of the spotted seatrout mortalities also occurred within 5 days, but only 5 of the 15 deaths occurred during the first 24 h after capture.

The apparently lower survival rate in August as compared to that in September may have been related to higher water temperatures, very low tides and restricted water circulation in August. In September fish were held in much less stressful conditions. Tides were of sufficient height to float the cages; in August cages were sat on the bottom.

Also in September, water temperatures were about 5 C cooler, and fish were held in the shade of an adjacent roof. Fish released by recreational fishermen in the wild may be able to reach less stressful environments in the bay. The lack of a control in the August study may also have resulted in the apparent differences in survival rates between the two studies. Additional research is needed to determine if the 44% survival obtained in August 1980 is representative of the survival of trout hooked and released in most summers.

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Table 1. Number of spotted seatrout alive in each cage on each of 7 days after capture on 17 August 1979 and associated hydrological data.

Date	Days after stocking	Time (CST)	Temperature (C)	Salinity (o/oo)	Cage number		
					1	2	3
8-17-79	0.0	1100	29.5	12.0	9	9	9
8-18-79	0.8	0600	27.0	12.0	6	9	7
8-18-79	1.3	1800	32.0	12.0	6	9	7
8-19-79	1.8	0700	28.0	12.0	5	9	4
8-19-79	2.2	1600	31.0	12.0	5	9	4
8-20-79	2.9	0900	29.0	12.0	5	8	4
8-20-79	3.3	1800	31.0	12.0	5	8	4
8-21-79	4.0	1045	33.5	12.0	5	7	4
8-22-79	4.8	0700	30.0	12.0	4	6	4
8-23-79	5.9	0900	27.0	10.0	4	6	4
8-24-79	7.0	1200	29.5	11.0	2	6	4

Table 2. Number of spotted seatrout alive in each cage on each of 9 days after capture on 11 September 1979 and associated hydrological data.

Date	Days after stocking	Time (CST)	Temperature (C)	Salinity (o/oo)	Cage number			
					1	2	3	Control
9-11-79	0.0	1030	25.0	10.0	5	5	5	5
9-12-79	0.9	0730	24.0	15.0	5	5	5	5
9-13-79	1.9	0730	25.0	16.0	5	5	5	5
9-15-79	3.9	0835	25.0	19.0	5	5	5	5
9-16-79	4.9	0800	20.0	19.0	5	5	5	5
9-17-79	5.9	0900	21.0	20.0	5	5	5	5
9-18-79	6.8	0630	20.0	16.0	5	5	5	5
9-19-79	8.0	1100	20.0	16.0	5	5	5	5
9-20-79	9.2	1430	20.0	16.0	5	5	5	5

PWD Report 3000-120
November 1981