A COMPARISON OF TWO TRAMMEL NET SETTING METHODS

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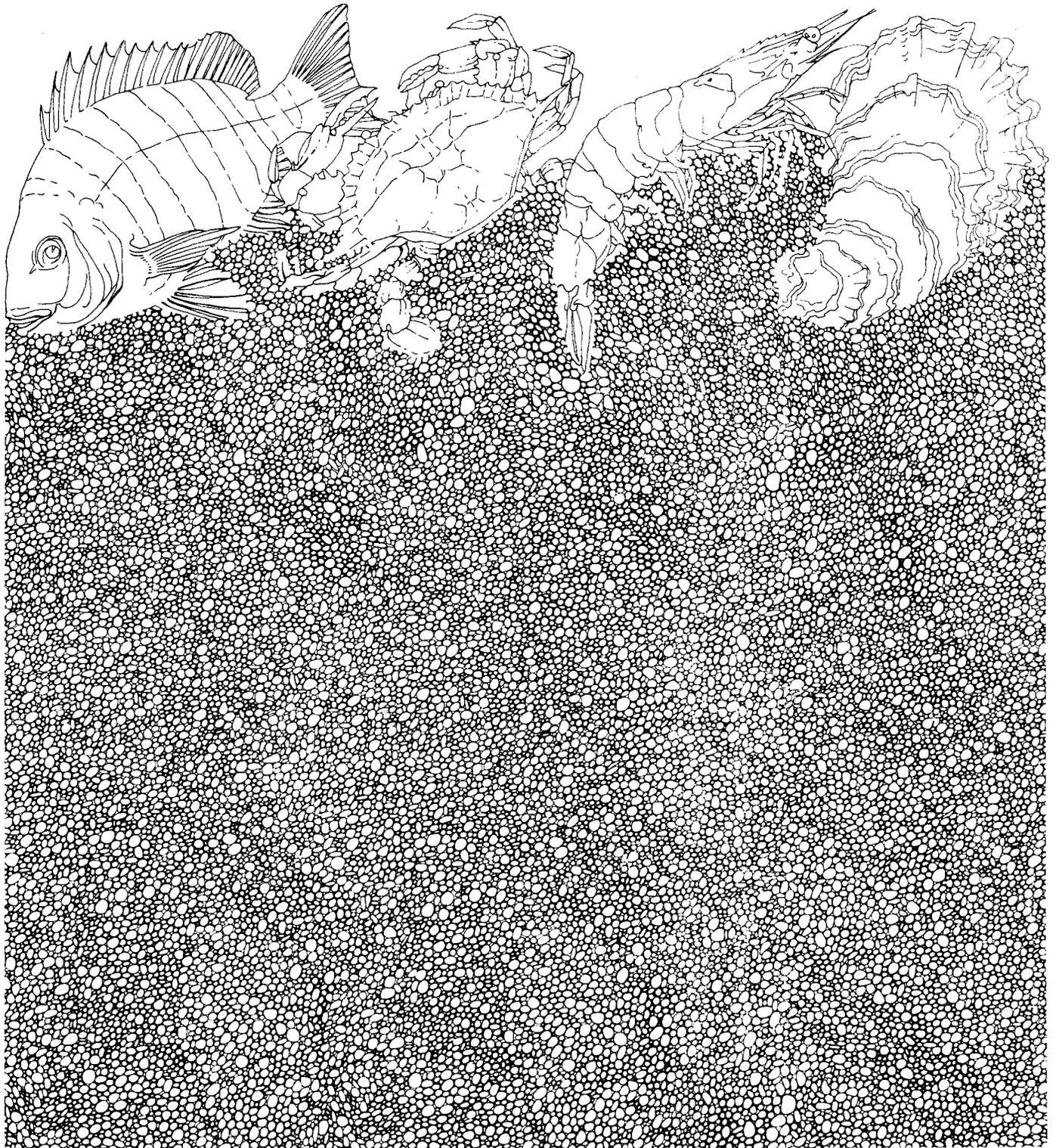
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ABSTRACT

The catches of fish with trammel nets set in a rectangular fashion with the shore as one side and 91 m (300 feet) as the length of each end were compared with those of trammel nets set in the same manner but with 61 m (200 feet) as the length of each end. No significant difference (at P=0.01) was found between fish catches with the two sampling methods. A routine monitoring program using trammel nets could employ either type of setting method, if necessary, without affecting the comparability of the total catch data. However, there is some indication that the two set methods did not yield the same number of red drum, spotted seatrout, sheepshead and total fish in the spring. If the level of significance had been 0.07 instead of 0.01, then the catch of these species would have been significantly higher in the 61-m type set than in the 91-m type set. If this apparent difference was real, then only one of the two methods should be used in a routine monitoring program.

INTRODUCTION

Trammel nets have been used in selected areas during the past 20 years by the Coastal Fisheries Branch of the Texas Parks and Wildlife Department to evaluate the status of finfish stocks in Texas bays. To obtain catch-per-area data, the nets were generally set in a rectangular configuration of 91 m by 183 m with the shoreline as one side. Fish were then frightened into the net by slapping the water with oars while driving an outboard-powered skiff through the area enclosed by the net. In October 1978 the Coastal Fisheries Branch of the Texas Parks and Wildlife Department incorporated trammel nets (366-m long) into the routine fish monitoring program. The technique used in this sampling was the same as that used in past trammel netting.

Each site established for possible sampling beginning October 1978 was required to have a water depth of $\leq$ 1.2 m at 91 m from shore. This restriction was required because of the depth of the nets and the decision to set each net in a rectangular configuration with 91 m sides. As a result, the inventory of sites or the efficiency of capture may have been unnecessarily low. If the sides of the rectangle could be adjusted without affecting the catch, then the number of inventoried sites could probably be expanded to achieve better coverage of each bay. This study was conducted to determine if the catch per area with trammel nets set with 91 m as the length of the rectangle's ends were different from that of nets set with 61 m as the length of the rectangle's ends.

MATERIALS AND METHODS

One sample with the 91-m sides was collected in each bay system (Galveston, Matagorda, San Antonio, Aransas, and Corpus Christi Bays and upper and lower Laguna Madre) during each month of November 1977, December 1977, April 1978 and May 1978 (28 samples). Sample stations were selected at random. At least 2 days after each 91-m set, the station was resampled using the 61-m set (28 samples). Each net was 366 m long and 1.2 m deep with a multifilament 7.6-cm stretched mesh inner wall and two multifilament 30.5-cm stretched mesh outer walls. The area sampled by the 91-m configuration was 1.67 ha; 1.48-ha areas were sampled with the 61-m configuration. After setting, the enclosed water was disturbed by driving an outboard motor-powered boat through the area and slapping the water with an oar.

Each fish caught was identified to species using Parker et al. (1972) and counted. The catch per area (no/ha) of each species was calculated for each sample. Catch per area estimates for fish caught in the 91-m samples were compared to those in the 61-m samples using the nonparametric sign test (Siegel 1956). Only those species caught in at least five samples were tested. The common names used for each species caught are those of Bailey et al. (1970).

RESULTS

A total of 1459 fish were caught representing 28 species (Appendix A). The probability that the total catch in the 91-m samples was different from that in the 61-m type sample was > 0.05 in each of the fall and spring samples and in all samples combined (Table 1), indicating no difference between the total catch in each of the two set types. The lack of significant (P=0.05) differences in catches in the two set types was consistent among all species in each season except sheepshead in the spring. More sheepshead were caught per area in the 61-m sets than in the 91-m sets. In addition, the probability that red drum and spotted seatrout catches in the spring were greater in the 61-m sets than in the 91-m sets approximated 0.05.

DISCUSSION

The number of fish caught in any fishing gear is determined by the number of fish available for capture and the efficiency of the gear used. Since the catch per area in the two set types were not significantly different from each other, either the number of fish per hectare available for capture was the same within the two areas, and the efficiencies of the two types of trammel net sampling methods were similar to each other; or, the number of available fish per hectare was not the same within the two areas but the efficiencies associated with each type of sampling method differed to such an extent that the net catches were not different in the two sampling methods.

From the data presented herein it is impossible to determine whether or not the efficiencies were different.

Since both trammel net sampling methods provide the same estimate for the abundance of fish, either method could be used in a routine monitoring program. This provides for increased flexibility in a routine fish monitoring program conducted in the estuarine environment. As the physical characteristics of a sample site change, the sampling method could be changed to use the 61-m method. Catches at this site could be compared directly with catches at sites where the 91-m method was used.

The data for red drum, spotted seatrout, sheepshead and total fish indicate that the catches in the 61-m type in the spring may have been greater than those in the 91-m type net; catches in the two set types were not different in the fall. Perhaps the distribution of these fishes within 91 m of shore was different in spring than in fall because of mortality and/or recruitment from fall to spring. A change in the total number of fish in the bays may have caused a change in the fish distribution along the shores. If the difference suggested in the spring data are real, then only one method should be used in a routine monitoring program.

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Table 1. Number of 61-m type trammel net samples with catches (no/ha) exceeding (+), equalling (0), or less than (-) catches (no/ha) in 91-m type trammel net samples. (Only those species which were caught in more than five sets are included.) (Blanks indicate insufficient number of samples with catches in the 61-m type net ≠ to catches in the 91-m type net.)

Species	Fall					Spring					All samples				
	+	-	0	Total	Proba-bility	+	-	0	Total	Proba-bility	+	-	0	Total	Proba-bility
Red drum	5	8	1	14	0.580	9	2	3	14	0.066	14	10	4	28	0.542
Black drum	6	5	3	14	1.000	7	3	4	14	0.344	13	8	7	28	0.384
Spotted seatrout	5	5	4	14	1.246	9	2	3	14	0.066	14	7	7	28	0.198
Southern flounder	0	3	11	14		7	2	5	14	0.180	7	5	16	28	0.774
Sheepshead	6	4	4	14	0.754	10	2	2	14	0.038	16	6	6	28	0.052
Striped mullet	6	8	0	14	0.790	6	6	2	14	1.226	12	14	2	28	0.842
Gizzard shad	3	1	10	14		1	4	9	14	1.938	4	5	19	28	1.000
Atlantic stingray	1	2	11	14		6	2	6	14	0.290	7	4	17	28	0.548
Striped burrfish	1	2	11	14		2	1	11	14		3	3	22	28	1.312
Atlantic croaker	1	1	12	14		5	2	7	14	0.454	6	3	19	28	0.508
Sea catfish	1	1	12	14		6	3	5	14	0.508	7	4	17	28	0.548
Spot	0	0	14	14		4	3	7	14	1.000	4	3	21	28	1.000
Gulf menhaden	0	0	14	14		5	2	7	14	0.454	5	2	21	28	0.454
All species	5	7	2	14	0.774	11	3	0	14	0.058	16	10	2	28	0.832

Appendix A. Number of fish caught in trammel nets.

Table 1. Number of fish caught in each bay system in each trammel net set in November 1977.

Species	Sample type (m)	Bay systems						
		Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Red drum	91	1	17	4	0	0	4	4
	61	4	24	1	0	6	1	1
Black drum	91	5	0	8	1	0	0	0
	61	1	83	1	6	1	1	0
Spotted seatrout	91	1	3	4	0	0	1	4
	61	0	6	1	0	0	1	3
Sheepshead	91	0	2	4	0	0	4	2
	61	0	6	0	0	2	0	0
Southern flounder	91	0	2	2	0	0	0	0
	61	0	1	0	0	0	0	0
Striped mullet	91	4	2	5	0	1	4	3
	61	4	1	1	3	3	9	0
Striped burrfish	91	0	0	0	0	2	0	3
	61	0	0	0	0	0	0	0
Atlantic stringray	91	0	0	2	0	0	0	1
	61	0	2	1	0	0	0	0
Gizzard shad	91	2	0	0	0	0	0	0
	61	4	0	0	0	0	0	0
Alligator gar	91	0	0	0	1	0	0	0
	61	0	0	0	0	0	0	0
All species	91	13	26	29	2	3	13	17
	61	13	123	5	9	12	12	4

Table 2. Number of fish caught in each bay system in each trammel net set in December 1977.

Species	Sample type (m)	Bay systems						
		Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Red drum	91	2	10	8	2	9	1	9
	61	5	4	4	18	0	0	1
Black drum	91	14	23	3	1	0	0	2
	61	1	16	14	5	0	0	1
Spotted seatrout	91	2	4	0	1	0	0	26
	61	0	40	1	1	0	0	3
Sheepshead	91	8	2	0	1	0	1	0
	61	14	3	0	4	5	0	0
Southern flounder	91	0	0	0	0	1	0	0
	61	0	0	0	0	0	0	0
Striped mullet	91	3	7	30	1	2	0	4
	61	1	0	9	24	1	1	2
Striped burrfish	91	0	0	0	0	0	0	0
	61	0	0	0	0	0	0	1
Gizzard shad	91	7	0	1	2	0	0	0
	61	0	0	4	16	0	0	0
White bass	91	0	0	0	0	0	0	0
	61	0	0	0	1	0	0	0
Atlantic croaker	91	1	0	0	0	0	0	0
	61	0	0	0	0	0	0	1
Sea catfish	91	0	0	0	0	0	0	1
	61	0	2	0	0	0	0	0
All species	91	37	46	42	8	12	2	42
	61	21	65	32	69	6	1	9

Table 3. Number of fish caught in each bay system in each trammel net set in April 1978.

Species	Sample type (m)	Bay systems						
		Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Red drum	91	7	0	0	0	0	0	0
	61	0	8	3	3	0	6	4
Black drum	91	4	4	0	2	0	0	0
	61	1	11	0	8	1	1	0
Spotted seatrout	91	0	2	1	2	0	3	4
	61	0	11	3	5	5	0	8
Sheepshead	91	1	2	0	1	0	0	0
	61	1	0	0	2	2	2	1
Southern flounder	91	2	0	0	0	0	1	0
	61	1	7	0	0	1	2	0
Striped mullet	91	3	5	0	2	2	8	0
	61	0	0	0	2	0	5	13
Sea catfish	91	7	9	0	0	1	8	0
	61	3	6	0	0	20	18	2
Spot	91	0	0	0	1	0	4	0
	61	1	0	0	0	1	2	0
Striped burrfish	91	0	0	0	0	1	0	0
	61	0	0	0	0	1	0	1
Bluefish	91	0	0	0	0	0	0	0
	61	0	0	0	0	1	0	0
Atlantic croaker	91	1	0	0	0	0	0	0
	61	2	0	0	0	3	2	0
Sand seatrout	91	0	0	0	0	0	0	0
	61	0	0	0	0	1	0	0
Cownose ray	91	0	0	0	0	0	1	0
	61	0	0	0	0	0	0	0
Pinfish	91	0	0	0	0	0	1	0
	61	0	0	0	0	0	0	0

Table 3. (Continued)

Species	Sample type (m)	Bay systems						
		Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Alligator gar	91	2	0	0	0	0	0	0
	61	0	0	0	0	0	0	0
Atlantic stingray	91	0	0	1	1	0	1	0
	61	0	0	0	2	0	0	1
Gizzard shad	91	25	3	0	7	0	0	0
	61	8	0	0	1	0	0	0
Harvestfish	91	0	0	0	0	0	0	0
	61	0	0	0	0	1	0	0
Pigfish	91	0	0	0	0	0	0	0
	61	0	0	0	0	1	0	0
Gulf toadfish	91	0	0	0	0	0	0	1
	61	0	0	0	0	0	0	2
Gulf menhaden	91	0	1	0	0	0	1	0
	61	0	2	0	0	0	1	0
Finescale menhaden	91	0	1	0	0	0	0	0
	61	0	0	0	0	0	0	0
Gulf flounder	91	0	0	0	0	0	1	0
	61	0	0	1	0	0	0	0
All species	91	52	27	2	16	4	29	5
	61	17	45	7	23	38	39	32

Table 4. Number of fish caught in each bay system in each trammel net set in May 1978.

Species	Sample type (m)	Bay systems						
		Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Red drum	91	2	0	8	1	0	0	0
	61	3	1	6	6	0	0	1
Black drum	91	3	1	0	3	1	0	0
	61	1	2	1	3	0	0	0
Spotted seatrout	91	0	0	10	12	0	0	2
	61	1	0	0	16	2	0	3
Sheepshead	91	0	0	1	1	2	0	0
	61	1	0	2	3	0	2	2
Southern flounder	91	0	1	0	0	0	0	0
	61	5	0	3	0	0	1	1
Gizzard shad	91	0	2	0	0	0	0	0
	61	0	0	0	1	0	0	0
Striped mullet	91	4	1	2	6	34	20	0
	61	9	0	6	8	11	29	0
Sea catfish	91	12	2	3	0	0	0	0
	61	12	0	6	0	0	0	4
Spot	91	0	0	0	1	0	0	1
	61	0	0	0	9	4	0	0
Striped burrfish	91	0	0	0	0	0	0	1
	61	0	0	0	0	0	0	0
Atlantic croaker	91	4	0	0	0	1	0	24
	61	12	0	0	1	0	0	20
Pinfish	91	0	0	0	0	0	0	0
	61	0	0	4	0	0	0	0
Alligator gar	91	1	0	0	1	0	0	0
	61	0	0	0	0	0	0	0

Table 4. (Continued)

Species	Sample type (m)	Bay systems						
		Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Atlantic stingray	91	0	0	20	0	0	0	1
	61	3	0	18	0	1	0	2
Southern stargazer	91	0	0	0	0	0	0	0
	61	0	0	0	0	2	0	0
Atlantic spadefish	91	1	0	0	0	1	0	0
	61	2	0	0	0	0	0	1
Southern kingfish	91	0	0	0	0	0	0	0
	61	0	0	1	0	0	0	0
Bull shark	91	0	0	0	0	0	0	0
	61	0	0	1	0	0	0	0
Gulf menhaden	91	3	1	0	0	0	0	4
	61	0	0	2	2	0	0	5
All species	91	30	8	44	25	39	20	33
	61	49	3	50	49	20	32	39