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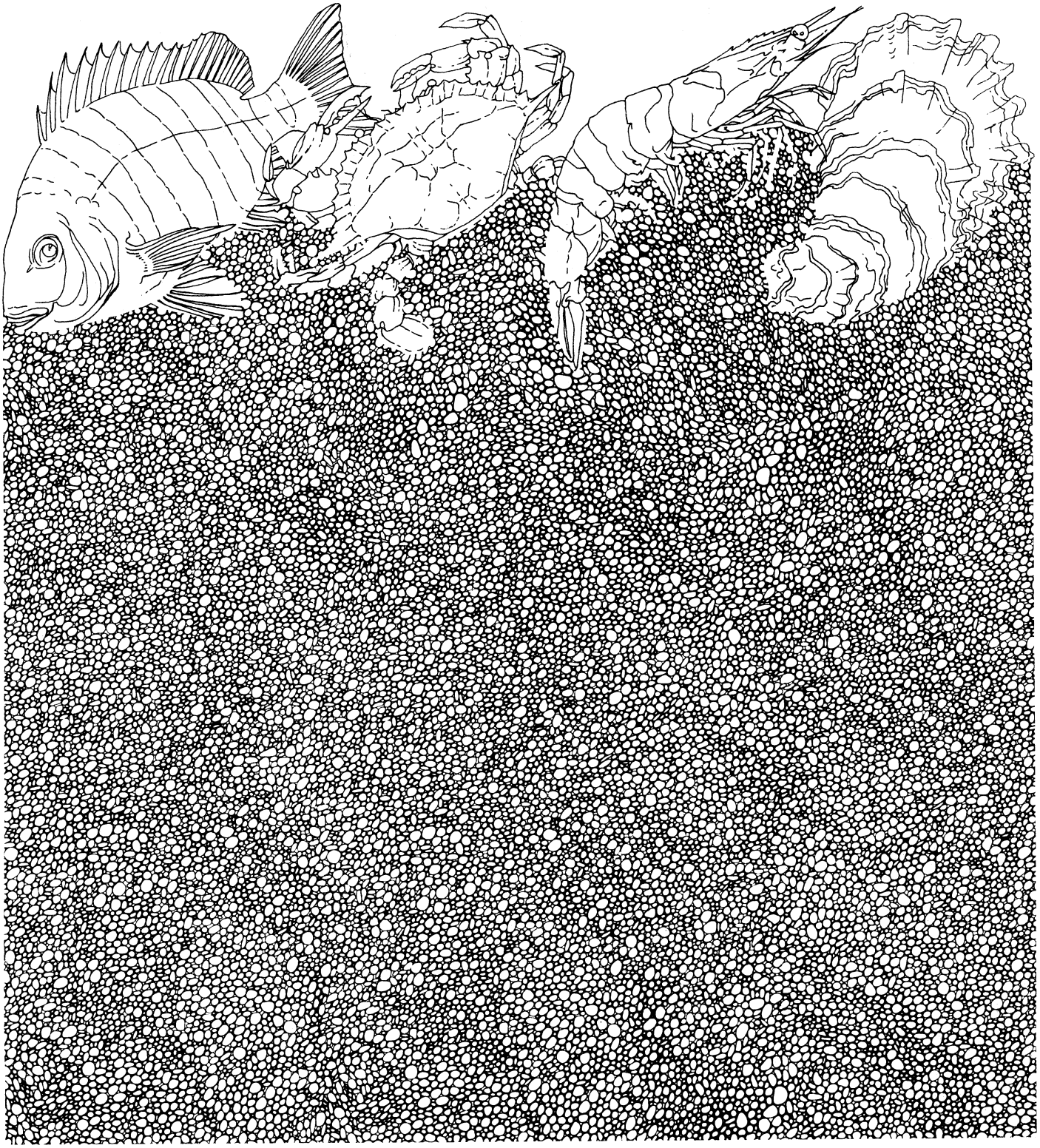

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INTRODUCTION

One of the most important variables used to evaluate success of pond culture techniques is survival from stocking to harvest. This variable requires the number of fish stocked and harvested be known. However, it is usually impractical to count the number being stocked or harvested; so these values are usually estimated, but their accuracies are ignored. If the estimates are biased, conclusions concerning the success of pond culture techniques can be incorrect. This study determines the accuracy of estimated numbers of red drum (Sciaenops ocellatus) fry stocked into earth ponds.

MATERIALS AND METHODS

Red drum fry were obtained from adults induced to spawn during April through August 1983 at the John Wilson Marine Fish Hatchery in Corpus Christi, Texas. The process typically used at the hatchery to transfer fry from the laboratory to rearing ponds was followed (McCarty et al. 1986). Fry (36-48 hours post hatch) were concentrated from a 1893-liter cone bottom incubation tank into a 48.5-liter glass aquaria (1.02 x 0.25 x 0.30 m) fit with a covered standpipe drain. Water was constantly aerated by three airstones surrounding the drain. The number of fry/ml was estimated by counting the number of fry in each of ten 10-ml samples collected randomly from within the aquarium. A suitable volume was drained from the aquarium to obtain each of 50,000, 100,000, 150,000, and 200,000 fry. These fry were preserved in separate containers with 4-5% buffered formalin. The process was replicated twice more. All fry in each container were subsequently stained with Rose Bengal, placed in a petri dish and counted under a dissecting scope.

The accuracy of the estimates was examined by fitting a regression of the form $Y = a + b X$ (where Y = number estimated and X = number counted) following standard procedures (Sokal and Rohlf 1969) for single Y at each X. The standard error of the slope and correlation coefficient were calculated.

RESULTS

The estimated number of red drum fry stocked into rearing ponds overestimates the number actually stocked. Nine of the 12 estimates exceeded the actual number that would have been stocked by as much as 46.2% (Table 1). The amount of overestimation decreased as the number stocked increased according to the equation $Y = 13{,}285 + 1.02 X$ where Y = number estimated, and X = actual number stocked ($r^2 = 0.97$ and SE of slope = 0.06). For example, if 50,000 fry were stocked, the estimated number would be 64,285 (28.6% overestimated); if 350,000 fry were stocked, the estimate would be 370,285 (5.8% overestimated).

DISCUSSION

The survival of red drum reared in ponds at the John Wilson Marine Fish Hatchery may be underestimated. The amount of error depends on the number estimated to have been stocked into each pond in each bag. For example, if four bags of an estimated 150,000 fry per bag were stocked into a pond and survival was estimated to be 50%, the actual survival would have been 56%. This assumes no bias in the estimated number harvested. Additional research is needed to determine the validity of this assumption, and an approach similar to that used in this study should be taken. Future estimates could be improved by placing as many fry as possible in each bag.

LITERATURE CITED

McCarty, C.E., J.G. Geiger, L.N. Sturmer, B.A. Gregg, and W.P. Rutledge. 1986. Marine finfish culture in Texas: a model for the future. In R. H. Stroud (ed.) The Role of Fish Culture in Fishery Management, an International Symposium on the use of cultured fish in fishery management. Lake Ozark, Mo. March 31-April 3, 1985 (in press).

Sokal and Rohlf. 1969. Biometry. W. H. Freeman and Co., San Francisco, Calif., 776 p.

Table 1. Number of red drum fry counted and estimated in each of 12 containers after standard procedures were used to obtain fish for stocking at the John Wilson Marine Fish Hatchery.

Counted	Estimated	Difference	
		Number	%
45,159	53,350	+ 8,191	+18.1
50,415	49,327	- 1,088	- 2.2
56,945	48,000	- 8,934	-15.7
69,154	99,580	+30,426	+44.4
95,830	125,130	+29,300	+30.6
107,499	131,185	+23,686	+22.0
111,338	113,100	+ 1,762	+ 1.6
117,441	171,690	+54,249	+46.2
151,016	162,475	+11,459	+ 7.6
269,006	295,850	+26,844	+10.0
277,569	268,500	- 9,069	- 3.3
346,557	374,000	+27,443	+ 7.9