SLAT TRAP EFFICIENCY AS AFFECTED BY DESIGN

W. GUTHRIE PERRY, Louisiana Department of Wildlife and Fisheries, Grand Chenier, LA 70643

Abstract: This study contained 12 treatments consisting of 6 different trap designs; 6 were baited and 6 were not. A total of 2,770 catfish, blue (*Ictalurus furcatus*) and channel (*I. punctatus*) combined, weighing 984.9 kg was captured. Slat traps were highly selective for channel catfish. The highest individual catch was 40 kg by trap type E, a trap with 3.2 cm slat spacings on the rear portion of the sides and end. The sides around the front throats were solid. Highest total catch per trap day was in trap type F (2.5 cm spacing, closed sides around throats). Type F yielded 1.7 kg of channel catfish and 0.7 kg blue catfish per trap day. No statistical difference for total weight harvested was found when the 2 trap types B and E were compared to trap types C and F ($P > .05$). A highly significant difference existed between the catch of these traps for both species of catfish combined that were of a commercial size ($P < .01$). Trap type B had 3.2 cm slat spacings and types C and F each had 2.5 cm spacings. Type F, like type E, had solid sides around the front throats.

Proc. Ann. Conf. S.E. Assoc. Fish & Wildl. Agencies 32: 666-671

Slat traps, or fish baskets as they are known to some, have been subjected to controversy in Louisiana for many years. Laws pertaining to legality of this device in various parishes have bounced around in state legislature regardless of research conducted by the Louisiana Department of Wildlife and Fisheries. Davis and Posey (1959) demonstrated this device was selective for catfish and recommended its legalization to allow fishermen an efficient gear for the harvest of catfish. At the request of the state legislature, the Louisiana Department of Wildlife and Fisheries conducted another study evaluating the gear for commercial use in Louisiana. In this study, Posey and Schafer (1964) again demonstrated that slat traps were selective for catfish and indicated very few game fish were captured.

Slat traps are still not accepted as legal gear in 41 of Louisiana's 64 parishes. Some of the major objections voiced by critics are: (1) traps take gravid females in spawning season, (2) since traps are inexpensive and there are no licenses nor tag requirements, fishermen are careless in their placement and fish more traps than they can physically handle, often losing them with the trapped fish being wasted, and (3) slat traps catch mostly small fish which are under commercial size restrictions.

Louisiana presently has minimum size restrictions for its commercial fishes. All channel catfish must be 27.9 cm or above to be harvested commercially. Blue catfish must be 35.6 cm or larger.

Upon considering these objections, the last was selected for study. The objectives were to: (1) compare efficiency of catch of 6 different trap designs in an area never opened to commercial fishing and (2) determine the catch in baited versus unbaited traps.

The author wishes to express his gratitude to Louisiana State University Professor J. W. Avault and Department of Wildlife and Fisheries Biologist D. Carver for their critical review of this paper. Aid in data collection and tabulations by T. Joanen, L. McNease, J. Nunez, J. Whitehead, A. Nunez, B. Carter, and E. Baccigalopi is especially appreciated. V. Wright, Louisiana State University Statistician, is due thanks for his work on data analysis. Likewise, E. Bennett, Engineering Specialist, Louisiana Department of Wildlife and Fisheries deserves recognition for his time in preparation of figures.

MATERIALS AND METHODS

This study was conducted on the 34,000 ha Rockefeller Wildlife Refuge, a state-owned area in southwest Louisiana between the Grand Chenier-Pecan Island beach ridge complex and the Gulf of Mexico (Joanen 1969). Sample zones were established in the Superior Oil Company Canal system in the fall of 1977. The brackish, turbid waters of

this system extend for 26 km to Grand Lake and serve as a link of the Mermentau Basin with the Gulf of Mexico.

The 9,060 km^2 basin is known throughout Louisiana for its high value towards recreational and commercial utilization of wildlife resources. Many families in this area derive a major portion of their income from the sale of blue and channel catfish.

Twelve treatments were selected for the study. These consisted of 6 different trap designs; 6 were baited and 6 were not. Each was basically similar measuring 1.5 m in length, 27 cm square, and was constructed of 4 mm and 5 cm and 7.5 cm oak strips. The traps differed in slat spacings which were selected according to studies of Greenland et al. (1972) on horizontal grader bars used in catfish farming operations. All traps had 2 cone shaped throats. The first throat was constructed of flexible wooden strips and the second was made of a flexible plastic cone of the Kennedy^R design (Fig. 1).

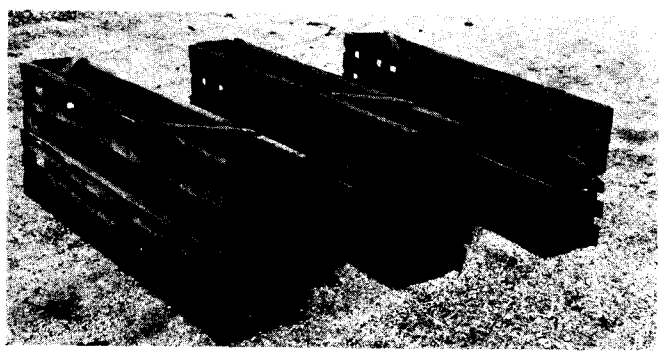

Fig. 1. Six slat trap designs used in this study. Illustrated on the left top to bottom are types D and A (3.8 cm spacing), middle are types F and C (2.5 cm spacing), and on the right are types E and B (3.2 cm spacing). The sides around the throats of trap types D, E, and F were solid extending back 2/3 the trap length (1 m) from the front throat.

The first trap type had 3.8 cm slat spacings on the sides and end and was designated type A. Slat trap types B and C had 3.2 cm and 2.5 cm slat spacings respectively. Type C trap had the smallest legal spacing accepted in Louisiana and served as a control. The fourth type trap designated as D was identical to type A except the 3.8 cm spacings were only on the ends and rear portion of the sides. The sides around the throats were solid extending back 2/3 the trap length (1 m) from the front throat. The design of trap type E was similar to type D but included 3.2 cm slat spacings on the rear portion and end. The sixth trap, type F was like D and E except it had 2.5 cm spacings on the end and rear portion of the sides. Trap types G through L were identical to A through F respectively, except they were not baited. Each trap had a removable top to facilitate baiting and removal of fish.

Five zones of similar size were selected in the study area. Four of the zones were segments of canals and each measured approximtely 76 m in width, 3.2 km in length, and ranged in depth from 1.2 to 2.7 m. The other zone was the 40 ha Grassy Lake which empties into Superior Oil Canal.

Only 1 zone was fished during each sample period. The order which zones were fished was selected at random and the traps randomly placed throughout each. To not bias the catch of a trap design, all zones except for Zone 5 were fished for 21 days each. At the end of this period, traps were moved to the next randomly selected zone. An abundance of blue crabs in the baited traps of Zone 5 ncessitated terminating the study after 15 days. Catfish catches were adversely influenced by the presence of crabs. Ninety-nine consecutive days were fished during the study.

To eliminate station difference with respect to time, all traps were harvested on simultaneous days on intervals of 3 to 7 days. Day of harvest depended upon catch and water temperature. Towards the end of the study, fish began dying in the traps due to warm water, necessitating traps to be checked more frequently. One baited trap and an unbaited trap of each design was fished in each zone for a comparison of catch. Scrap cheese was used throughout the study as bait.

At harvest, records were maintained for each trap on the weight of each fish and total length. Bait cheese was packed under the second throat and the trap returned to the water.

Apprehension by game agents of a commercial fisherman using slat traps near the study area afforded data which is included in the discussion. The agents seized 26 traps, 14 of which had not been run by the fisherman. The author determined total weight for each trap and recorded total lengths for each fish. The traps were almost identical to type C (2.5 cm slat spacings) used in this study and afforded catch data from traps fished by a person recognized as skilled in the use of this gear.

In data analysis it was necessary to convert catch to numbers and weight per trap day. One trap fished for 24 hours is 1 trap day. Data were subjected to statistical test of differences. In some comparisons, the differences were obvious. However, tests have been included to clarify those differences not so obvious. A statistical t-test for paired replications was computed for differences in selectivity of slat traps for channel and blue catfish. Analysis of variance supplemented with selected comparisons was used to test the various trap types. Treatment sum of squares were partitioned into linear and quadratic components for slat spacing after testing for interactions with the open and closed designs. Differences in catch for total numbers, total weight, and weight of legal size fish were compared.

RESULTS

The slat trap study which began 20 January 1978 continued for 1,188 trap days in the Superior Canal system, Grand Chenier, LA. A total of 2,770 catfish, channel and blue combined, weighing 984.9 kg was captured. Channel catfish were dominant, totaling 1,879 (Table 1). A total of 890 blue catfish and one flathead catfish (*Pylodictis olivaris*) made up the remainder of the catch. Unbaited traps caught so few fish, statistical data analysis was not practical.

Table 1. Composition of catches made in 1188 traps days of fishing with the various slat trap types. Rockefeller Wildlife Refuge, 1978.

			Channel Catfish					Blue Catfish					
Trap Type	Slat Spacing	Baited	Number Caught	Weight (kg)	Mean Weight (kg)	Weight of Legal Size (kg)	Mean Total Length (mm)	Number Caught	Weight (kg)	Mean Weight (kg)	Weight of Legal Size (kg)	Mean Total Length (mm)	Trap Selectivity for Species (t-test, 20 df)
A	3.8	Yes	52	31.2	0.6	31.1	350	9	4.4	0.5	1.4	339	-3.53**
B	3.2	Yes	441	180.9	0.4	166.9	320	68	26.1	0.4	10.2	300	-3.48**
C	2.5	Yes	347	105.6	0.3	78.8	292	248	71.8	0.3	8.7	299	-1.39
D	3.8-2. 3[a]	Yes	184	107.0	0.6	106.5	349	56	22.6	0.4	6.7	338	-2.68*
E	3.2-2 3[a]	Yes	296	98.8	0.3	83.2	287	262	86.1	0.3	18.7	307	-0.52
F	2.5-2 3[a]	Yes	535	168.4	0.3	128.8	297	246	69.5	0.3	5.1	288	-2.71*
G	3.8	No	1	0.9	0.9	0.9	410	0	0.0	0.0	0.0	0	---
H	3.2	No	6	3.1	0.5	3.1	348	0	0.0	0.0	0.0	0	---
I	2.5	No	5	1.2	0.2	0.5	279	0	0.0	0.0	0.0	0	---
J	3.8-2 3[a]	No	0	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0	---
K	3.2-2 3[a]	No	6	1.6	0.3	1.3	292	1	0.3	0.3	0.0	310	---
L	2.5-2 3[a]	No	6	1.5	0.2	0.4	204	0	0.0	0.0	0.0	0	---

**Highly significant ($P < .01$)

*Significant ($P < .05$)

[a] - Trap solid on sides for 2 3 length, around front throats.

Statistical evaluation of data determined a highly significant difference in numbers of channel and blue catfish taken by all slat traps ($t = -4.959$, $df = 125$, $P < .01$). Individual traps type C with a catch of 58% channel catfish and trap type E with 53% were the only baited traps recording non-significance for species selectivity ($P > .05$, Table 1). Trap type A only caught 61 fish. However, 85% were channel catfish and a highly significant difference ($P < .01$) in species catch was indicated. Also, highly significant ($P < .01$) was the catch of 87% channel catfish in trap type B. Of the unbaited traps fished, type H was best, catching 6 fish totaling 3.1 kg.

Statistical evaluation of catch by species revealed interactions between the open and closed designs and slat spacings for channel catfish but not for blue catfish. Examination of the data collected for channel catfish captured in the open trap designs showed quadratic relationships existed for the total number ($F = 13.72$, 1 & 101 df, $P < .01$), total weight ($F = 16.88$, 1 & 101 df, $P < .01$) and total legal weight ($F = 21.12$, 1 & 101 df, $P < .01$). In other words, in the open trap designs channel catfish were most vulnerable to the intermediate size trap B with 3.2 cm slat spacings. The closed trap designs caught more channel catfish as the slat spacings decreased ($F = 19.12$, 1 & 101 df, $P < .01$).

The total number and total weight of blue catfish increased as the slat spacings decreased ($F = 20.56$ and $F = 14.56$, 1 & 102 df, $P < .01$). But the weight of legal blue catfish was greatest in the 3.2 cm designs ($F = 9.29$, 1 & 102 df, $P < .01$). Closed trap designs caught significantly more blue catfish than the open traps ($F = 4.02$, 1 & 100 df, $P < .05$).

The highest individual trap catch was 40 kg by type E, 27 February 1978. Trap type C caught 34.7 kg, 13 March 1978 and trap type B recorded a harvest of 33.3 kg 17 February 1978.

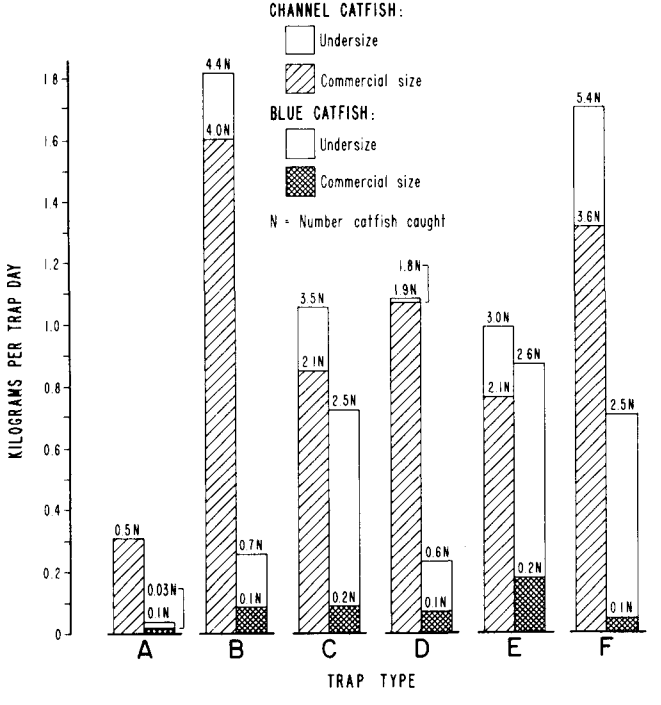

Fig. 2. Comparative weights of commercially legal size and undersize channel and blue catfish captured in each of the baited trap types per trap day, Rockefeller Wildlife Refuge, 1978.

A more detailed analysis of data revealed the highest total catch per trap day was in trap type F (Fig. 2). This trap yielded a total catfish catch per trap day of 1.7 kg of channel catfish and 0.7 kg blue catfish. The number of catfish harvested per trap day was 5.4 channel and 2.5 blue catfish. Next in catch was trap type B. Analysis of variance demonstrated a highly significant statistical difference between the number of fish caught by each trap type ($F = 9.24$, 5 & 20 df, $P < .01$).

Statistical evaluation of the difference in total weights caught by type B and type C proved non-significant ($F = 0.54$, 1 & 20 df, $P > .05$). Further analysis between total weight harvested per day of the B and E trap types against the C and F types also proved statistically non-significant ($F = 0.17$, 1 & 20 df, $P > .05$).

Mean weight of fish captured increased as slat spacings were widened. By comparing Fig. 2 with Fig. 3, which demonstrates legal catch per trap day, these differences are better demonstrated. Although the ranges are considerable, the mean and standard deviation

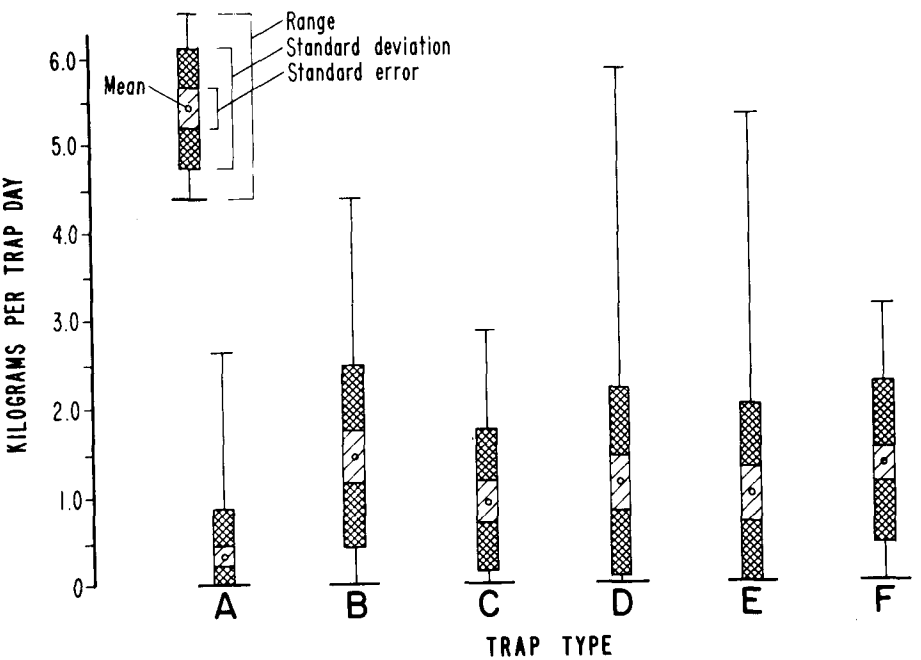

Fig. 3. Mean, standard deviation, standard error, and range of combined weight of legal size channel and blue catfish harvested from each type baited trap. Rockefeller Wildlife Refuge, 1978.

indicate trap type B to have the highest sustained legal harvest. Trap type B and E demonstrated no statistical difference for total weight harvested with C and F ($F = 0.17$, 1 & 20 df, $P > .05$).

All traps recorded at least 1 fishing period with no fish. Poorest catches occurred early in the study when water temperature ranged between 4.7 C and 6.7 C. Best catches were observed in water temperatures between 8.3 C and 16.2 C. Traps had to be checked more often once temperature exceeded 20 C due to presence of mutilated and dead fish.

DISCUSSION

Results of this study indicated that slat traps are highly selective gear for catfish. Starrett and Barnickol (1955), Davis and Posey (1959), and Posey and Schafer (1964) had adequately documented this fact. The present study supports their findings. The only species of fish captured were 1,879 channel catfish, 890 blue catfish and 1 flathead catfish. Furthermore, empirical data supported by statistical comparisons strongly suggest they are selective for channel catfish. Population samples were not conducted at the stations during the study but past works have documented dominance of blue catfish in the study area (Perry 1967, 1976).

Trap type C patterned after traps currently accepted as legal in several parts of the state, caught 595 fish totaling 177.4 kg of which 87.4 kg were of legal size. However, this trap was second in total numbers caught to 781 for type F. Type F had the same 2.5 cm slat spacings as type C but was closed on the sides around the throats. Type F ranked second in weight of legal fish caught, 133.9 kg, to trap type B, 177.1 kg, which has 3.2 cm openings and is not closed around the throat. Type E, also with 3.2 cm openings but solid on the sides up front, had a few more smaller fish ranking it fourth in weight of legal fish harvested. The control, type C, ranked fifth in weight of legal sized fish.

Catfish longer than 38.0 cm were rarely taken in traps. This is the approximate size at which catfish begin feeding on small fish. The shift in food habits could result in fewer of the larger fish being taken.

This study was supported by data obtained from 14 confiscated traps with 2.5 cm slat spacings. Average catch per trap for these traps was 23.6 kg. The average numbers of channel and blue catfish combined per trap were 74 and 17, respectively. Averages of 46% of the channel catfish and 73% of the blue catfish were smaller than legal size. In addition to what was in the traps, the fisherman had 111.7 kg of fish in possession. Of this, 52% of the channel catfish and 100% of the blue catfish were undersize.

Commercial fishermen need more assistance now than ever due to pressures exerted by various groups. Development and acceptance of gear that adequately harvests the available fish are needed. Limitations should be imposed if they are destructive to the resource, but not because they are efficient. The slat trap is an efficient gear highly selective for catfish, mainly channel catfish. This study has pointed out that if the harvest of undersize fish is a concern, slat spacings could be increased to 3.2 cm without loss of trap efficiency.

LITERATURE CITED

Davis, J. T., and L. Posey. 1959. Relative selectivity of freshwater and commercial fishing devices used in Louisiana. La. Wildl. and Fish. Comm., D. J. Proj. F-5-R. 27 pp.

Greenland, D. C., J. E. Ellis and R. L. Gill. 1972. Operating and design criteria of an adjustable horizontal bar grader for sorting channel catfish. Prog. Fish-Cult. 34:186-190.

Joanen, T. 1969. Rockefeller Refuge haven for wildlife. La. Wildl. and Fish. Comm., Bull. 105. 10 pp.

Perry, W. G. 1967. Distribution and relative abundance of blue catfish, *Ictalurus furcatus*, and channel catfish, *Ictalurus punctatus*, with relation to salinity. Proc. Annu. Conf. S.E. Assoc. Game Fish Comm. 21:436-444.

_____. 1976. Standing crops of fishes of an estuarine area in southwest Louisiana. Proc. Annu. Conf. Assoc. Fish Wildl. Agencies. 30:71-81.

Posey, L., and H. Schafer. 1964. Evaluation of slat traps as commercial fishing gear in Louisiana. Proc. Annu. conf. Southeast. Assoc. Game Fish Comm. 18:517-522.

Starrett, W. C., and P. G. Barnickol. 1955. Efficiency and selectivity of commercial fishing devices used in the Mississippi River. Bull. Ill.Nat. Hist. Surv. 26:325-366.