# Evaluation of Wire Catfish Traps for Commercial Fishing in Central Florida Lakes

**J. E. Crumpton,** *Florida Game and Fresh Water Fish Commission, Fisheries Research Laboratory, P.O. Box 1903, Eustis, FL 32727–1903*

**M. M. Hale,** *Florida Game and Fresh Water Fish Commission, Fisheries Research Laboratory, P.O. Box 1903, Eustis, FL 32727–1903*

**D. J. Renfro,** *Florida Game and Fresh Water Fish Commission, Fisheries Research Laboratory, P.O. Box 1903, Eustis, FL 32727–1903*

*Abstract:* Two types of commercial wire catfish traps were fished in lakes Dora and Eustis between January and May 1984. Catches at shoreline and offshore fishing sites were evaluated for both trap types. Door throat traps harvested 4.1 catfish, 0.6 game fish, and 0.1 non-game fish per trap day. Open throat traps harvested 0.8 catfish, 0.6 game fish, and 0.2 non-game fish per day. Door throat traps were 5.7 times more efficient at harvesting catfish than open throat traps. Overall, shoreline fishing sites yielded more fish (catfish, game fish, and non-game fish) than offshore sites. Initial mortality was greatest among non-game species (97.8% for gizzard shad), followed by non-harvestable game fish, catfish, and harvestable game fish. Mortality was greatest in door traps and was correlated with density of fish in traps ($r = 66$).

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 41:237–243

Commercial fishing has been a way of life in Florida for more than a hundred years, and, according to the Organized Fishermen of Florida, is Florida's first industry. Probably since the first commercial net was pulled from the water, there has been controversy between sport and commercial fishermen. Sport fishermen have contended that commercial gear catches and kills large quantities of game fish. Dequine (1952) reported that as early as 1946, pressure was exerted by Florida sport fishermen, and that pressure resulted in the elimination of all commercial fishing devices from the St. Johns River, with the exception of trotlines. Dequine (1950) had observed wire traps, hoop nets, pound nets, and haul seines in the St. Johns River in the late 1940s and indicated little or no impact on game fish populations.

While hoop nets and pound nets are still restricted to the St. Johns River system, regulations on commercial fishing of wire traps for catfish have been somewhat relaxed. Wire traps are legally fished in the St. Johns and St. Marys river systems and in 33 lakes throughout Florida. These lakes vary from 40 to 181,305 ha in size and include some of Florida's historically famous sport fishing lakes (George, Istokpoga, Kissimmee, Monroe, and Okeechobee).

As the result of a request by the Organized Fishermen of Florida to fish wire catfish traps in the Oklawaha chain of lakes, the Commercial Fisheries Investigation Project of the Florida Game and Fresh Water Fish Commission initiated a study in January 1984. The study evaluated 2 types of commercial wire fish traps in lakes Dora and Eustis which are 2 Oklawaha chain lakes with relatively unexploited catfish populations. Objectives of the study were to evaluate catch of target species, by-catch (non-target species), and initial mortality of captured fish. Shoreline and offshore fishing sites were also compared.

## Methods

Two types of commercial wire catfish traps were fished from January to May 1984 in lakes Dora (4,475 ha) and Eustis (3,159 ha), Lake County, Florida. Traps

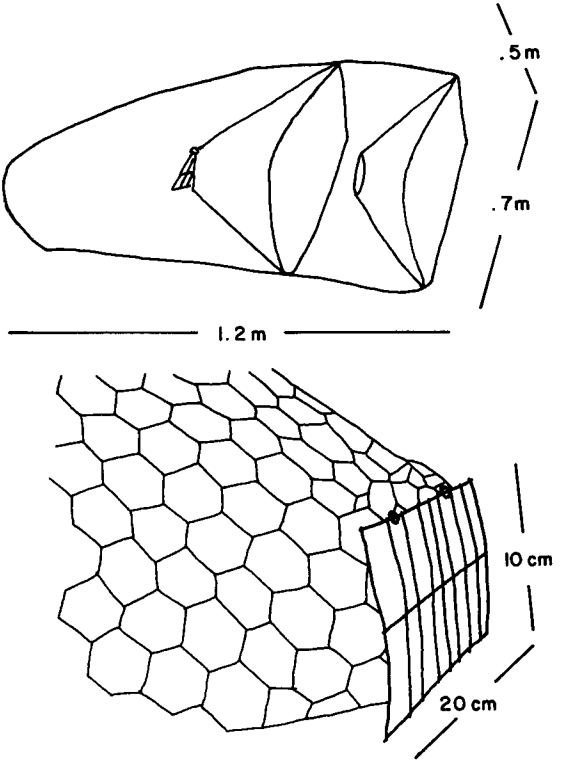


**Figure 1.** Full view of door throat type fish trap (top) and close-up of door in second funnel (bottom).

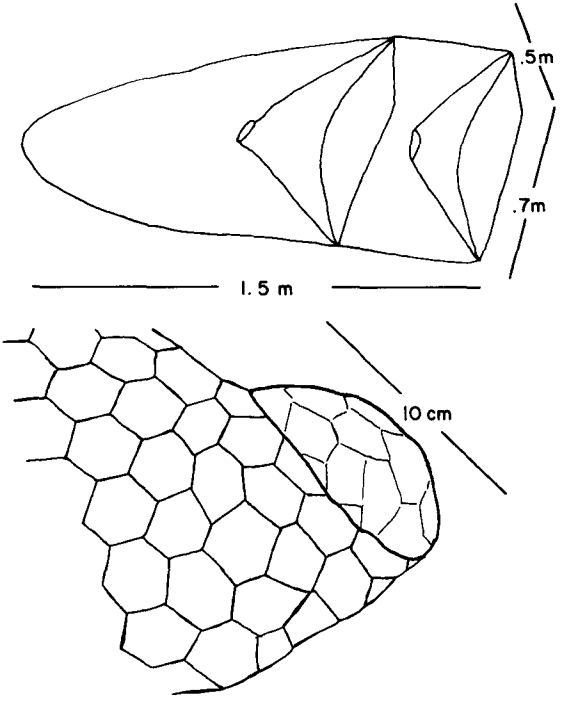


**Figure 2.** Full view of open throat type fish trap (top) and close-up of opening in second funnel (bottom).

utilized are illustrated in Figures 1 and 2, and were constructed within specifications listed in the 1983–84 Code Book of the Florida Game and Fresh Water Fish Commission. Door traps measured 0.7 m × 0.5 m × 1.2 m. Two funnels were located at 1 end of each trap. The mouth of the first funnel measured 0.7 m × 0.5 m and tapered to a hole 10 cm in diameter. The mouth of the second funnel also measured 0.7 m × 0.5 m and a door, 10 cm × 20 cm, was attached to the top of a corresponding hole at the rear of the second funnel by wire rings. Open throat traps measured 0.7 m × 0.5 m × 1.5 m. Two funnels were located at 1 end of each trap and funnel openings measured 0.7 m × 0.5 m. The front funnel tapered to a round opening 15 cm in diameter, and the second funnel tapered to an opening 10 cm in diameter. All traps were constructed of vinyl coated wire with 2.5 cm mesh.

Two shoreline oriented fishing sites located within 5 to 10 m of the outside edge of the littoral vegetation and 1 offshore site within 50 to 100 m of the edge of littoral vegetation were evaluated in each lake. Water depths at shoreline sites were from 2 to 3 m deep, and 4 to 5 m deep at offshore sites. Two traps of each trap type were fished at each fishing site. More emphasis was placed on shoreline oriented sites because it was believed that if problems with excessive by-catch existed, they would occur in traps set near littoral habitats. Fish from traps were dumped into the bottom of the boat and returned to the water after categorizing. The technique was similar to the technique of commercial fishermen observed in Lake Apopka, Flor-

ida, and on the St. Johns River. All traps were baited with approximately 3 kg of soybean chips and were fished an average of every 7 days.

Fish harvest was categorized by trap type and fishing site. By-catch was defined as any species other than target species. Fish were further categorized whether of harvestable or non-harvestable size and if alive or dead. Any fish not swimming away from the boat under its own power before moving to the next fishing site was considered dead. All catfish caught were considered to be harvestable. Harvestable categories for game fish were the same as described by Hale et al. (1981). Harvestable largemouth bass measured >254 mm total length (T.L.), black crappie >228 mm T.L., and all other bream species >152 mm T.L.

Data was subjected to Bartlett's test for homogeneity of variances. Heterogeneous variances were evident and probability plots revealed non-normal distributions. As a result, the nonparametric Mann-Whitney *U*-test (Conover 1971) was used to compare differences in catches between fishing sites, trap types, and fish species. Linear and parabolic regression analysis (Snedecor 1957) was used to test if initial mortality might be density dependent. Commercial, game, and non-game fish catches were evaluated using trap days (1 trap fished for 24 hours).

## Results and Discussion

Door throat traps fished 1,224 trap days harvested 5,733 fish and open throat traps fished 1,122 trap days harvested 1,711 fish. Commercial target species included brown bullhead catfish (*Ictalurus nebulosus*), channel catfish (*I. catus*), and white catfish (*I. punctatus*). Game fish by-catch included black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), redbreast sunfish (*L. auritus*), redear sunfish (*L. microlophus*), and warmouth (*L. gulosus*). Non-game by-catch included gizzard shad (*Dorosoma cepedianum*) and golden shiner (*Notemigonus crysoleucas*).

The door throat trap harvest was composed of 84% catfish, 14% game fish, and 2% non-game fish species (Table 1). The open throat trap harvest was composed of 50% catfish, 37% game fish, and 13% non-game fish species.

Game fish by-catch (all species and sizes combined) comprised 19% of all fish harvested by both types of fish traps evaluated. Only 3.5% were of harvestable size. Game fish by-catch was greater than the 5.9% reported by Hale et al. (unpubl. rep., Fla. Game and Fresh Water Fish Comm., Tallahassee 1982) from St. Johns River wire traps. However, the majority of the game fish catch in St. Johns River traps, 87.2%, were of harvestable size.

Overall harvest rates compared between the 2 trap types indicated that door throat traps were 5.7 times more efficient at harvesting catfish than open throat traps. The difference was highly significant ($P < .001$). Open throat traps harvested significantly more non-game fish than door throat traps ($P < .005$), but harvest rates between door and open throat traps for game fish was not significantly different ($P > .791$).

Comparisons were made between shoreline and offshore fishing sites for num-

**Table 1.** Numbers of fish harvested, catch rates, and percentages of total numbers for 2 types of wire fish traps.

| Species | Number | Catch per trap day | % total number |
|---|---|---|---|
| Door throat traps | | | |
| Catfish | 4,823 | 4.1 | 84 |
| Game fish | 783 | 0.6 | 14 |
| Non-game fish | 127 | 0.1 | 2 |
| Totals | 5,733 | 4.8 | 100 |
| Open throat traps | | | |
| Catfish | 847 | 0.8 | 50 |
| Game fish | 640 | 0.6 | 37 |
| Non-game fish | 224 | 0.2 | 13 |
| Totals | 1,711 | 1.6 | 100 |

**Table 2.** Numbers of fish harvested, catch rates, and percentages of total numbers at shorline and offshore fishing sites for door and open throat traps.

| Species | Number | Catch per trap day | % total number |
|---|---|---|---|
| | Shoreline sites | | |
| Door throat traps | | | |
| Catfish | 3,268 | 4.1 | 82 |
| Game fish | 617 | 0.8 | 16 |
| Non-game fish | 96 | 0.1 | 2 |
| Totals | 3,981 | 5.0 | 100 |
| Open throat traps | | | |
| Catfish | 645 | 0.8 | 48 |
| Game fish | 518 | 0.6 | 38 |
| Non-game fish | 183 | 0.2 | 14 |
| Totals | 1,346 | 1.6 | 100 |
| | Offshore sites | | |
| Door throat traps | | | |
| Catfish | 1,555 | 3.7 | 89 |
| Game fish | 166 | 0.4 | 9 |
| Non-game fish | 31 | 0.1 | 2 |
| Totals | 1,752 | 4.2 | 100 |
| Open throat traps | | | |
| Catfish | 202 | 0.6 | 56 |
| Game fish | 122 | 0.4 | 33 |
| Non-game fish | 41 | 0.2 | 11 |
| Totals | 365 | 1.2 | 100 |

bers of fish harvested, catch rates and percentages (Table 2). Door throat traps harvested 3,981 fish at shoreline fishing sites and 1,752 fish at offshore sites. Open throat traps harvested 1,346 fish at shoreline fishing sites and 365 fish at offshore sites.

Catch of shoreline door traps was composed of 82% catfish, 16% game fish, and 2% non-game species, while open throat traps caught 48% catfish, 38% game

fish, and 14% non-game species. Catch of offshore door traps was composed of 89% catfish, 9% game fish, and 2% non-game species, while open throat traps caught 56% catfish, 33% game fish, and 11% non-game species.

Comparisons between shoreline and offshore fishing sites indicated that shoreline open throat traps harvested significantly more game fish and non-game fish than offshore open throat traps ($P < .10$). Differences for catfish species were not significant ($P > .10$). Comparisons between shoreline and offshore door throat traps also indicated that significantly more game fish were harvested in shoreline traps than offshore ($P < .10$), but differences for catfish and non-game fish were not significant ($P > .10$).

Initial and percent mortality at shoreline and offshore fishing sites for door and open throat traps are shown in Table 3. Initial mortality ranged from 0.3% to 3.3% for catfish, 0.0% to 3.0% for game fish, and 1.7% to 10.8% for non-game fish. Initial mortality was highest among non-game species. However, 97.4% of the dead fish were gizzard shad. Shad mortality was comparable to that reported by Hale et al. (unpubl. rep. 1982) for gizzard shad fin St. Johns River wire traps, 81.9%. Overall initial mortality for game fish (3.1%) was less than the 3.8 reported from the St. Johns River, and catfish mortality (2.5%) was greater than the 0.4% reported.

Comparisons between door and open throat traps indicated that significantly more game fish died in door traps than open throat traps. The difference was highly significant ($P < .001$). Comparisons between shoreline and offshore fishing sites indicated significantly more non-harvestable size game fish died at shoreline sites than at offshore sites ($P < .10$), while differences for harvestable size game fish were not significant ($P > .10$).

Because highest game fish mortalities occurred in door throat traps and door

**Table 3.** Mortality and percent mortality at shoreline and offshore fishing sites for door and open throat traps.

| | Shoreline sites | | Offshore sites | |
|---|---|---|---|---|
| | Door traps ($N$ = 3,981) | Open throat traps ($N$ = 1,346) | Door traps ($N$ = 1,752) | Open throat traps ($N$ = 365) |
| Catfish | | | | |
| Harvestable mortality | 131 | 21 | 29 | 1 |
| % mortality | 3.3 | 1.6 | 1.7 | 0.3 |
| Game fish | | | | |
| Harvestable mortality | 17 | 6 | 6 | 0 |
| % mortality | 0.4 | 0.5 | 0.3 | 0.0 |
| Non-harvestable | 107 | 34 | 52 | 11 |
| % mortality | 2.7 | 2.5 | 3.0 | 3.0 |
| Non-game fish | | | | |
| Mortality | 73[a] | 145[a] | 30[a] | 29[a] |
| % mortality | 1.8 | 10.8 | 1.7 | 8.0 |

[a]Of the 277 non-game fish dead, 271 were gizzard shad.

throat traps harvested 3.4 times as many fish as open throat traps (5.7 times as many catfish), the mortality was considered to be density dependent. It was expected that mortality would, initially, correlate in a linear manner with density, but as density reached a certain point, would increase exponentially. Exponential morality was not evident when a parabolic regression was applied to the mortality data ($r = .46$). While the $r$ value from a linear regression was not extremely high ($r = .66$), data indicated that mortality was somewhat proportional to the density of numbers of fish in the fish traps.

## Conclusions

(1) Of the 2 types of traps evaluated, open throat traps were the least desirable. Door traps harvested significantly more fish than open throat traps (5.7 times as many target species), $P < .001$.

(2) Shoreline traps harvested significantly more game fish than offshore traps ($P < .10$).

(3) Overall mortality suffered by game fish and catfish in both types of traps ranged only from 0.3% to 3.3%. Initial mortality levels would not be detrimental to existing catfish or game fish populations.

## Literature Cited

Conover, W. V. 1971. Practical nonparametric statistics. J. Wiley and Sons, New York, New York. 462pp.

Dequine, J. F. 1950. Biennial Report. Fla. Game and Fresh Water Fish Comm., Tallahassee, pages 43–93.

———. 1952. Florida's controlled seining program. Fla. Game and Fresh Water Fish Comm., Tallahassee. Fish Manage. Bul. 1, 39pp.

Hale, M. M., J. E. Crumpton, and W. L. Godwin. 1981. Evaluation of incidental game fish catches in commercially fished hoop nets in the St. Johns River, Florida. Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies. 35:408–415.

Snedecor, G. W. 1957. Statistical Methods. Iowa State College Press, Ames. 534pp.