

# **Catch Composition of Pound Nets and Their Impact on Game Fish Populations in the St. Johns River, Florida**

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*Abstract:* From December 1981 through March 1983, 71 observations of pound nets were conducted. In 407 net days, commercially important species comprised 93.5% of the total pound net catch while game fish species comprised 4.4%. An average of 1.8 game fish were caught per net day. Harvestable-size game fish (that size retained by sport fishermen) represented 3.6% of the total catch and comprised 81.5% of all sizes of game fish caught. Initial mortality was 3.3% for game fish or 0.06 game fish deaths/net day. An estimated 68 game fish/km of shoreline/year were caught by the entire pound net fishery in 1981 and 1982, all of which were returned as required by law. Considering their limited use in extensive river area and the small number of game fish caught, it was determined that pound nets had no significant impact on game fish populations in the St. Johns River, Florida.

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Commercial fishing is an important industry in many of the counties bordering the St. Johns River in Florida. Based on 1981-1982 commercial landings data from major commercial fish houses on the river, approximately 4.14 million kg of commercially important species were harvested with an ex-vessel value of \$2.87 million (Hale et al. 1982). Total revenue returned to the local economy by this fishery amounted to nearly \$6 million. Pound

nets caught approximately 5% to 10% of the 1,238,575 kg of catfish harvested in 1981 and 1982.

For many years, commercial fishing has been a source of controversy between commercial and sport fishermen along the St. Johns River (Dequine 1952; Hale et al. 1981). Public pressure resulted in the prohibition in 1946 of all types of commercial fishing devices with the exception of trot lines. In early 1948, game fish by-catches in pound nets, wire traps, and haul seines operated by commercial fishermen were observed by Florida Game and Fresh Water Fish Commission personnel to determine what effect these fishing devices might have on game fish populations. Results indicated that these devices could be used to take catfish and other non-game fish with little or no impact on game fish populations (Dequine 1952).

Pound nets were first used at Westbrook, Connecticut, 1849 (Earll 1887). The first recorded controversy associated with pound nets occurred in 1870 at Mobjack Bay, Virginia, when local commercial fishermen, unfamiliar with this new device, sawed off the stakes of the pound at water level and carried the netting to the shore. This destruction did not occur until after the potential value of pound nets was discovered and by 1880, all available sites in Mobjack Bay were occupied with pound nets.

Declines in the catch of certain food species and destruction of undersized or immature fishes in North Carolina have been blamed on pound nets (Higgins and Pearson 1928). Meyer and Merriner (1976) studied pound nets fished in Chesapeake Bay and determined that 51 mm stretched mesh in poundheads reduced gilling. They also suggested the addition of an escape panel of larger size mesh to be located in the pound-head to allow escapement of small sciaenids.

Until the late 1940s, pound nets were permitted in several Florida lakes (Lakes George, Okeechobee, Istokpoga, and Doctor's Lake). Present regulations allow pound nets to be fished in the St. Johns River from Shands Bridge near Green Cove Springs upstream to the northeast corner of Lake George, encompassing approximately 240 km of river.

As of 1 January 1983, no more permits to fish pound nets were issued by the Florida Game and Fresh Water Fish Commission. All pound net sites authorized before this date were permitted indefinitely under a grandfather clause. Currently, 11 fishermen have been issued permits authorizing the use of a single pound net at each of 62 locations along the St. Johns River.

Although studies were conducted in the late 1940s to observe catch composition of pound nets (Dequine 1948, Dequine 1950), more recent data were needed to answer questions concerning the present impact of pound nets. The objectives of this study were to determine the present catch composition of pound nets and what effects, if any, those nets had on game fish populations.

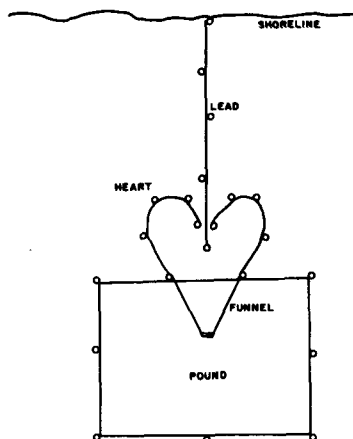


Figure 1. Diagram of the type of pound net observed on the St. Johns River, Florida.

## Methods

To document game fish by-catch, project personnel accompanied commercial fishermen during normal pound net fishing operations. Fishing effort was reported in net days with 1 net day equalling 1 pound net fished for a 24-hour period.

Pounds nets fished in St. Johns River consist of 3 parts: the lead, the heart, and the pound (Fig. 1). The lead is a single wing of webbing, 22.9 to 61.0 m long, strung on poles between the heart and the shoreline. It guides fish into the heart of the net. The heart is composed of 2 leads, shaped literally like a heart, surrounding the entrance of the pound. The heart prevents fish from escaping and guides them toward the pound. The pound consists of a 4.6 to 5.5 m square holding area constructed of webbing and attached to poles. Fish are held in the pound until the fisherman loosens the bottom corners of the net, concentrates them into 1 end and removes them with a dip net. A 51-mm stretch-mesh webbing was used in all observed nets.

Harvestable-size game fish are defined as: bluegill (*Lepomis macrochirus*), warmouth (*L. gulosus*), redbreast sunfish (*L. auritis*), redear sunfish (*L. microlophus*) and spotted sunfish (*L. punctatus*)  $\geq 15.2$  cm total length (TL); black crappie (*Pomoxis nigromaculatus*)  $\geq 22.9$  cm TL; largemouth bass (*Micropterus salmoides*), striped bass (*Morone saxatilis*) and hybrid striped bass [white bass (*M. chrysops*)  $\times$  striped bass], an introduced game fish  $\geq 25.4$  cm TL; chain pickerel (*Esox niger*)  $\geq 35.6$  cm TL.

Commercial catch data including location of the set, amount of time fished, numbers of harvestable and non-harvestable size game fish caught, and initial mortality of netted fish were recorded for each pound net observed. All game fish caught in observed pound nets were immediately returned to the

water in compliance with present Florida Game and Fresh Water Fish Commission (FGFWFC) regulations. Initial mortality in non-commercial species was assumed to occur when the fish could not swim away before the fishing boat moved on to another site. Because commercially important species were kept and not returned, initial mortality was assumed to occur when the fish was either dead or in too poor condition to keep. Delayed mortality was not assessed in this study. Catfish harvest was estimated from subsamples of catfish measured later at fish houses.

Game fish by-catch, initial mortality and number caught/km of shoreline during 1 year were estimated for all pound nets fished on the St. Johns River. These values were calculated by utilizing estimated fishing pressure, area of allowed use and the game fish catch rate.

## Results and Discussion

Commercial fishermen were accompanied on 18 fishing trips on the St. Johns River from December 1981 through March 1983. Seventy-one observations of pound nets fished for 407 net-days were conducted. Pound nets caught a variety of fish, crustaceans, and 1 reptile. Thirty-three species of fish, blue crabs (*Callinectes sapidus*), 1 freshwater prawn (*Macrobrachium* sp.), and 1 chicken turtle (*Deirochelys reticularia*) were captured.

Commercially important species comprised 93.5% of all organisms harvested by pound nets (Table 1) as compared to 94.0% in wire traps, 66.1% in lake hoop nets, and 78.7% in river hoop nets (Hale et al. 1982). Four species of catfish comprised 62.2% of the commercially important species while gizzard shad (*Dorosoma cepedianum*) and blue crabs comprised 20.6% and 12.8%, respectively. Southern flounder (*Paralichthys lethostigma*) exhibited the highest initial mortality (35.8%) followed by red drum (*Sciaenops ocellata*) with 11.1% and gizzard shad at 8.3%. Overall initial mortality for commercially important fish was 2.2%.

Game fishes comprised 4.4% of the total pound net catch (Table 1) as compared to 5.9% in wire traps, 33.3% in lake hoop nets, and 19.7% in river hoop nets (Hale et al. 1982). In 407 net days, 736 game fish were caught, or 1.8 game fish/net day. Black crappie was the dominant species caught, comprising 37.9% of all game fish, followed by striped bass (23.4%), hybrid striped bass (16.4%), and bluegill (14.3%) (Table 1). Chain pickerel exhibited the highest initial mortality of all game fish species caught (50.0%), followed by largemouth bass (14.3%), bluegill (6.7%), black crappie (3.2%), striped bass (1.7%), and hybrid striped bass (1.6%). No initial mortality was observed for redbreast sunfish, redear sunfish, spotted sunfish, or war-mouth. Overall initial mortality for game fish was 0.06/net day (3.3%). This was comparable to the 2.0% initial mortality of game fish observed in hoop

**Table 1.** Catch composition of 71 pound nets fished in the St. Johns River, Florida, from December 1981 through March 1983.

Species	Number caught	Percent of total	Percent initial mortality
<b>Commercially important species</b>			
Catfish <sup>a</sup>	9,810	58.1	0.6
Gizzard shad	3,245	19.2	8.3
Blue crab	2,028	12.0	0.1
American eel	476	2.8	0.2
Blueback herring	58	0.3	1.7
Southern flounder	53	0.3	35.8
Striped mullet	44	0.3	4.5
American shad	32	0.2	0.0
Longnose gar	28	0.2	0.0
Red drum	9	< 0.1	11.1
Gafftopsail catfish	1	< 0.1	0.0
Total	15,784	93.5	
Mean			2.2
<b>Game fish species</b>			
Black crappie	279 (200) <sup>b</sup>	1.6	3.2
Striped bass	172 (172)	1.0	1.7
Sunshine bass	121 (118)	0.7	1.6
Bluegill	105 (74)	0.6	6.7
Redbreast sunfish	25 (13)	0.1	0.0
Redear sunfish	15 (5)	0.1	0.0
Warmouth	7 (7)	< 0.1	0.0
Largemouth bass	7 (7)	< 0.1	14.3
Chain pickerel	4 (4)	< 0.1	50.0
Spotted sunfish	1 (1)	< 0.1	0.0
Total	736 (600)	4.4	
Mean			3.3
<b>Other non-game fish species</b>			
Atlantic stingray	135	0.8	5.9
Spot	123	0.7	4.9
Atlantic croaker	69	0.4	5.8
Hogchoaker	12	0.1	16.7
Bowfin	7	< 0.1	0.0
Lake chubsucker	6	< 0.1	16.7
Atlantic needlefish	3	< 0.1	100.0
Blue tilapia	2	< 0.1	0.0
Tarpon	1	< 0.1	0.0
Hybrid grass carp	1	< 0.1	0.0
Total	359	2.1	
Mean			6.6
<b>Miscellaneous</b>			
Chicken turtle	1	< 0.1	0.0
Prawn	1	< 0.1	0.0
Total	2	< 0.1	
Mean			0.0

<sup>a</sup> White catfish, channel catfish, brown bullhead, and yellow bullhead.

<sup>b</sup> Number in parentheses indicates number caught that were considered harvestable size to sport fishermen.

nets (Hale et al. 1981). One pound net would have to fish 16.7 days to cause the initial mortality of 1 game fish.

Of the 4 most frequently captured game fish species, 100% of the striped bass were of harvestable size, while 97.5% of the hybrid striped bass, 71.7% of the black crappie, and 70.5% of the bluegill were of harvestable size (Table 1). Harvestable-size fish comprised 81.5% (600) of the total game fish catch. This was considerably larger than the 10.9% harvestable size game fish caught in hoop nets (Hale et al. 1981).

Non-game fish species of little commercial value comprised 2.1% of the total pound net catch (Table 1). Atlantic stingray (*Dasyatis sabina*) represented 37.4% of this category, while spot (*Leiostomus xanthurus*) and Atlantic croaker (*Micropogon undulatus*) comprised 34.1% and 19.1%, respectively. Initial mortality of fish in this category was 6.6%.

Pound nets were fished or emptied every 2 to 14 days (mean 5.7 days) in the St. Johns River. The catch of 1 pound net fished 5.7 days averaged 221.6 commercially important organisms (121.6 catfish, 45.0 blue crabs, 28.5 gizzard shad, and 16.4 other species) and 10.3 game fish (3.9 black crappie, 2.4 striped bass, 1.7 hybrid striped bass, 1.5 bluegill, 0.1 largemouth bass, and 0.7 other game fish species).

Previous studies of pound nets on the St. Johns River reported that 6.5 game fish were caught per net day in 1948 and 5.1 game fish were caught per net day in 1949 (Dequine 1948, 1950). Dequine (1948) determined that a catch rate of 6.5 game fish per net day was not detrimental to game fish populations. By comparison, pound nets observed from 1981 to 1983 caught 1.8 game fish/net day. We also considered the 1981–1983 game fish catch rate to be insignificant.

We estimated that approximately 25 pound nets were fished in 240 km of shoreline during a 12-month period from 1981 to 1982. These nets caught an estimated 16,370 game fish, of which 3.3% (540) suffered initial mortality. About 68 game fish/shoreline km were caught annually, all of which were required to be returned. This value appears quite small when compared to the 3,482 game fish caught/shoreline km by sport fishermen in the Suwanee River in just the 1983 spring quarter (Krummrich et al. 1982). Based on standing crop data from other Florida lakes and rivers and because of their limited use over an extensive area of the river and small number of game fish caught, pound nets were not considered to have a significant impact on game fish populations in the St. Johns River.

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