# BIOLOGICAL INVESTIGATION OF FLATHEAD CATFISH IN THE CAPE FEAR RIVER

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*Abstract:* Flathead catfish (*Pylodictis olivaris)* were introduced into the Cape Fear River in 1966 when 11 adult specimens weighing in a total of 107 kg were released near Fayetteville, North Carolina. The population has expanded from this initial release and now inhabits a 201-km section of the Cape Fear River.

Growth rates of flathead catfish during this expansion phase has exceeded rates of riverine populations as previously reported by other investigators. Fishes were found to be the dominant forage consumed by flathead catfish as measured by frequency of occurrence, total numbers and total weight. Species from the families Ictaluridae, Centrarchidae and Clupeidae were the most frequently utilized.

A comparison was made of fish population samples taken prior to the introduction of flathead catfish with samples collected during this study. This data comparison indicates that native ictalurid populations have declined, with the most severe decline being evident for native bullhead species.

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The natural range of flathead catfish extended from South Dakota to Pennsylvania, southward to the Mississippi Valley, to the Gulf Coastal Plain and in the Rio Grande to Mexico (Blair et al. 1968). Menhinick et al. (1974) reported the native range in North Carolina to be the New and Tennessee rivers, except in the Watauga and Pigeon river tributaries where they were not found. Flathead catfish were stocked in the Cape Fear River in 1966 by North Carolina Wildlife Resources Commission biologists. The original release of 11 sexually mature fish, weighing a total of 107 kg, represented the 1st and only known introduction of this species into a North Carolina coastal stream.

Establishment of flathead catfish in the Cape Fear River was first documented in 1976, when 5 flathead catfish were collected, representing several size classes (Guier and Nichols 1977). This sample indicated that a reproducing flathead catfish population existed in the river. In subsequent sampling (Oct 1977), 14 additional specimens were collected ranging in size from 10 g - 22.7 kg. The introduction and establishment of an additional predator fish in the river raised the question of possible detrimental impact on native fish populations and prompted an investigation of the growth and food habits of this introduced species.

## METHODS

### Study Area

The Cape Fear River is formed by the confluence of the Deep and Haw rivers near Moncure, North Carolina. The river flows southeasterly approximately 274

km until it discharges directly into the Atlantic Ocean at Cape Fear near Southport, North Carolina. The present study included only the mainstream of the Cape Fear River with sample stations located near Lillington (river km 238), Fayetteville (river km 196) and Riegelwood (river km 45). Ecological classification for the respective sample areas are Largemouth bass, Carp-catfish and Tidal. These classifications are patterned after Van Deusen (1953).

This study was completed with the use of Federal Aid in Fish Restoration funds under the North Carolina Wildlife Resources Commission's Coastal Fisheries Investigations Project (F22S).

## Flathead Catfish Collection

Morris and Novack (1968) employed a catfish capture technique using a telephone magneto as an electrofishing device. This was the primary method used to collect flathead catfish in this study. Collecting was completed by using a shocking boat and a pickup, or chase boat. Electrofishing was conducted by proceeding along the shoreline.

Additional methods utilized in the collection of flathead catfish were fyke nets, gill nets and a DC electrofishing unit modified from the Wisconsin design of Novotny and Priegel (1974). Fyke nets used in the study had a 1.1-m hoop diameter with 50-mm bar webbing and attached wings, 6.1 m long. All gill next were monofilament webbing and were 36 m in lenght, 3 m deep with bar mesh sizes ranging from 44 mm - 77 mm. All fish were collected during either a prespawn sample during May and June or a postspawn sample during August and September. Thus each of the 3 study areas was sampled twice.

## Species Composition

Electrofishing, fyke nets and gill nets described above were utilized to sample the fish species composition of the Cape Fear River. Six gill nets and 4 fyke nets were set at each sample site for a minimum of 2 gear-days during each sampling period. At least 2 hours of electrofishing effort were expended during each period at all sites. Sampling periods coincided with those conducted to capture flathead catfish. All fish captured were identified to species and total numbers were recorded in 2.5-cm length groups.

## Food Habits

Stomach contents were collected from flathead catfish $>$ 1 kg in weight by using the pulsed gastric lavage technique described by Foster (1977). The contents were washed into a apparatus modified after the one described by Crossman and Hamilton (1978). Stomach contents were flushed from the stomach into the collecting apparatus and then washed into a cloth sample bag. Each sample was labeled and preserved in a 10% formalin solution.

Aquatic food organisms were identified to the lowest possible taxonomic level. Those food items which had undergone extensive digestion were identified as insect remains, fish remains or detritus.

## Age and Growth

flathead catfish were aged using techniques similar to those described by Sneed (1951), Marzolf (1955) and Carlander (1969). The left pectoral spine was clipped from the fish at the junction of spine and body with a large pair of nail nipper pliers. The spine was immediately stripped of flesh and placed in a properly labeled scale envelope.

Each spine was prepared for sectioning by placing them in a small glass vial that was filled with epoxy plastic resin. After curing, the spine became permanently embedded within the clear epoxy plastic. The glass vial was then removed from around the embedded spine, and a thin transverse section was cut, as closely as possible to the distal end of the basil groove by using a diamond saw. This results in a thin, round sectioning of clear plastic with the spine embedded in the center. These sections were then thinned and polished on each face using 600 grit Emery paper and water. Each spine cross-section was inspected under a Baush and Lomb dissecting microscope (Model #D-D2930) at 30× magnification. Light source was transmitted through the spine cross-section.

Body length-spine radius relationships were determined for 121 flathead catfish ranging from 47 mm - 980 mm in total length. Measurements were taken from the center of the lumen across the anterior lateral field to the interior edge of each translucent band. Ages of the fish were determined by counting the annuli. The Lee regression formula ($L = a + bS$), where L is the total length, S is spine radius and a and b are constants, was used for back calculations (Lagler 1956). Through log transformation of the data, various curvilinear relationships were also evaluated.

## Condition and Length-Weight Relationship

Condition factors and length-weight relationship were determined for 161 flathead catfish. Condition factors were expressed as

$$K = \frac{W \times 10^5}{L^3}$$

where L is total length in millimeters, W is weight in grams and K is the condition factor (Lagler 1956). The length-weight relationship is described by the formula $W = aL^b$; where W is weight, L is length and a and b are constants (Lagler 1956).

# RESULTS AND DISCUSSION

## Age Determination

Cross-sections of the pectoral spines revealed growth marks consisting of broad opaque bands and narrow translucent ones similar to those described by other investigators. The narrow translucent bands are considered to be annuli in flathead catfish (Jenkins 1952, Mayhew 1969, Edmundson 1974, and others), in channel catfish (Sneed 1951, Marzolf 1955) and in other catfish. Because of the enlargement of the central lumen, a part of an annulus or even complete annuli frequently were lost in the pectoral spines.

Morris et al. (1968) found that, in age-group I flathead catfish, a portion of the annulus frequently was lost, but in no case was the annulus missing along the radius used for back calculations. a similar condition occurred in the Cape Fear River flathead catfish. Portions of annuli, or complete annuli, were lost with increasing frequency in older fish. Fifty percent of age group II, 73% of age group III, 84% of age groups IV and I and 92% of age group VI were missing the 1st annulus. Flathead catfish in age group VII and above were all missing the 1st annulus. The 1st 3 annuli were missing in age group VIII fish. Morris et al. (1968) reported that 49% of age group II, 91% of age group III and 100% of age group IV flatheads in the Missouri River lose the 1st annulus along the axis used for measurement. Numerous other fishery workers have all reported this loss of annuli in older age groups. It is obvious that serious errors in aging would have occurred if loss of annuli were not taken into account. Therefore adjustments were made for the missing annulus prior to making any back calculation.

## Back Calculation of Total Length

Measurements of the spine radius were taken across both the anterior-lateral field and the posterior-lateral field (Fig 1). Scatter diagrams of body length-spine radius measurements across the anterior-lateral field and posterior-lateral field revealed that greater variation occurred in the measurements taken across the posterior-lateral field. Therefore the anterior-lateral measurements were used for all back calculations.

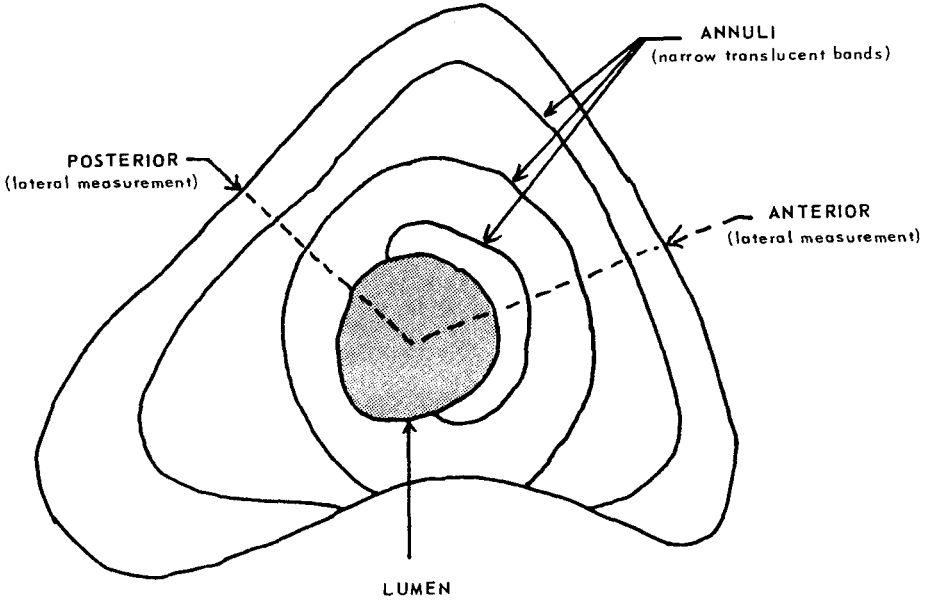



Fig. 1. Cross-section of pectoral spine of flathead catfish.

Upon inspection of the scatter diagram and trial efforts in back-calculation the straight line relationship was chosen over the curvilinear relationships because of its overall utility and better description of growth for fish exceeding 600 mm in length. The following relationship was determined:

$Y = b + mX$

$Y = 26.6723 + 118.9806X$

$r + 0.9505$

Evidence that the Cape Fear River population was a recently introduced, expanding population was supported by the fact that no fish greater than 8 years old were collected during this study. Inspection of these data suggests that fish in the Riegelwood area exhibited faster growth than those from the Fayetteville and Lillington areas (Table 1). The growth of Cape Fear River fish age I and II was exceeded only by the reservoir populations in Bluestone and Watts Bar reservoirs. Growth after age II exceeded that reported for all waters except age IV and greater in Boomer Lake and age V and greater in Watts Bar Reservoir.

## Length-Weight Relationship

The length-weight relationship for 161 flathead catfish in the Cape Fear River was calculated to be $\log_{10} W = -5.2100 + 3.0973 \log_{10} L$ (Fig 2). Length-weight relationships of flathead catfish from other bodies of water compare closely to the Cape Fear River data. The slope value of 3.0973 for the Cape Fear River compares closely with those reported for Kansas rivers, 3.004 (Minckley and Deacon 1959); the Des Moines River, Iowa, 3.138 (Muncy 1957) and Lake Carl Blackwell, Oklahoma, 3.189 (Turner and Summerfelt 1971). It is similar to those reported for the Missouri River, 3.1809 and 3.1759 (Morris, et al. 1968); Grand Lake, Oklahoma 3.233 (Jenkins 1957); Watts Bar Reservoir, Tennessee, 3.421 (Muncy 1957); and Bluestone Reservoir, West Virginia, 3.272 (Edmundson 1974).

Condition factors were calculated for 161 flathead catfish. Average condition factors for all fish were computed for 100-mm length classes. A general increase of condition factor with increasing size is shown in Table 2. These condition factors are similar to those recorded in the literature for flathead catfish (Turner and Summerfelt 1971, Edmundson 1974). Condition factors for flathead catfish of similar lengths as those in this study, ranged from 0.89 to 1.24 in Bluestone Reservoir (Edmundson 1974). The condition factors of Lake Carl Blackwell flathead catfish of similar lengths, ranged from 0.78 to 1.51 (Turner and Summerfelt 1971).

Comparison of other reported condition factors from the literature indicates that the fish in both the Cape Fear River and Lake Carl Blackwell represent outstanding levels of condition. Comparison of the mean condition factors from the individual study areas shows that the Lillington and Fayetteville area flatheads have very similar condition factors ($K + 1.16$ and $K = 1.15$, respectively), but the Riegelwood area flathead catfish have a higher level of condition ($K = 1.25$).

## Food Habits

The gastric lavage technique worked very well in collecting nearly 100% of all materials present in the stomachs of captured flathead catfish exceeding 1.0 kg in total weight. Occasionally a larger particle would become lodged in the gullet and

Table 1. Comparison of average calculated total length (mm) at the end of each year of life for Cape Fear River, North Carolina, and selected waters.

| | Sample | Total length at age | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Size | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | XIII | IVX | XV | XVI | XVII | XVII | XIX |
| Cape Fear River, N.C. | 111 | 155 | 311 | 479 | 580 | 640 | 711 | 812 | 907 | | | | | | | | | | | |
| Cape Fear River, Lillington area, N.C. | 24 | 156 | 308 | 475 | 558 | 622 | 723 | | | | | | | | | | | | | |
| Cape Fear River, Riegelwood area, N.C. | 46 | 157 | 342 | 549 | 691 | 772 | 847 | 871 | | | | | | | | | | | | |
| Cape Fear River, Fayetteville area, N.C. | 41 | 144 | 299 | 439 | 561 | 605 | 674 | 794 | 907 | | | | | | | | | | | |
| Verdigris River, Ok.[a] | 28 | 91 | 155 | 206 | 274 | 320 | 373 | 419 | 523 | 584 | 615 | | | | | | | | | |
| Neosha River, Arm (Grand Lake), Ok.[b] | 86 | 140 | 259 | 381 | 490 | 584 | 655 | 719 | 785 | 879 | 945 | 1013 | 1074 | | | | | | | |
| Grand Lake, (Main Body), Ok.[b] | 221 | 86 | 160 | 241 | 323 | 384 | 439 | 485 | 518 | | | | | | | | | | | |
| Salt River, No.[c] | 52 | 76 | 155 | 231 | 300 | 348 | 422 | 452 | 503 | 599 | | | | | | | | | | |
| Missouri River, (unchannelized), Neb.[d] | 200 | 93 | 184 | 273 | 356 | 451 | 520 | 603 | 642 | 691 | 776 | 819 | 842 | | | | | | | |
| Boomer Lake, Ok.[b] | 75 | | 287 | 460 | 638 | 742 | 826 | 884 | 927 | 968 | 1003 | 1031 | 1072 | 1090 | 1092 | 1102 | 1077 | 1072 | 1085 | 1967 |
| Des Moines River, Iowa[e] | 208 | 142 | 269 | 393 | 469 | 550 | 600 | 674 | 714 | | | | | | | | | | | |
| Norris Reservoir, Tenn.[f] | 201 | 132 | 239 | 251 | 472 | 589 | 671 | 737 | 790 | 841 | 879 | 947 | 991 | 1008 | 1013 | 1036 | 1037 | | | |
| Watts Bar Reservoir, Tenn.[g] | 24 | 239 | 353 | 475 | 579 | 643 | 780 | 907 | 985 | 1021 | 1074 | 1100 | | | | | | | | |
| Bluestone Reservoir, W. Va.[h] | 122 | 216 | 351 | 478 | 571 | 626 | 680 | 730 | 744 | 762 | 786 | 798 | 751 | 675 | 682 | 635 | | | | |

[a] Jenkins and Finnell, 1957
[b] McCoy, 1953
[c] Purkett, 1957
[d] Morris, et al., 1968
[e] Mayhew, 1969
[f] Carrol and Hall, 1962
[g] Hargis, 1966
[h] Edmundson, 1974

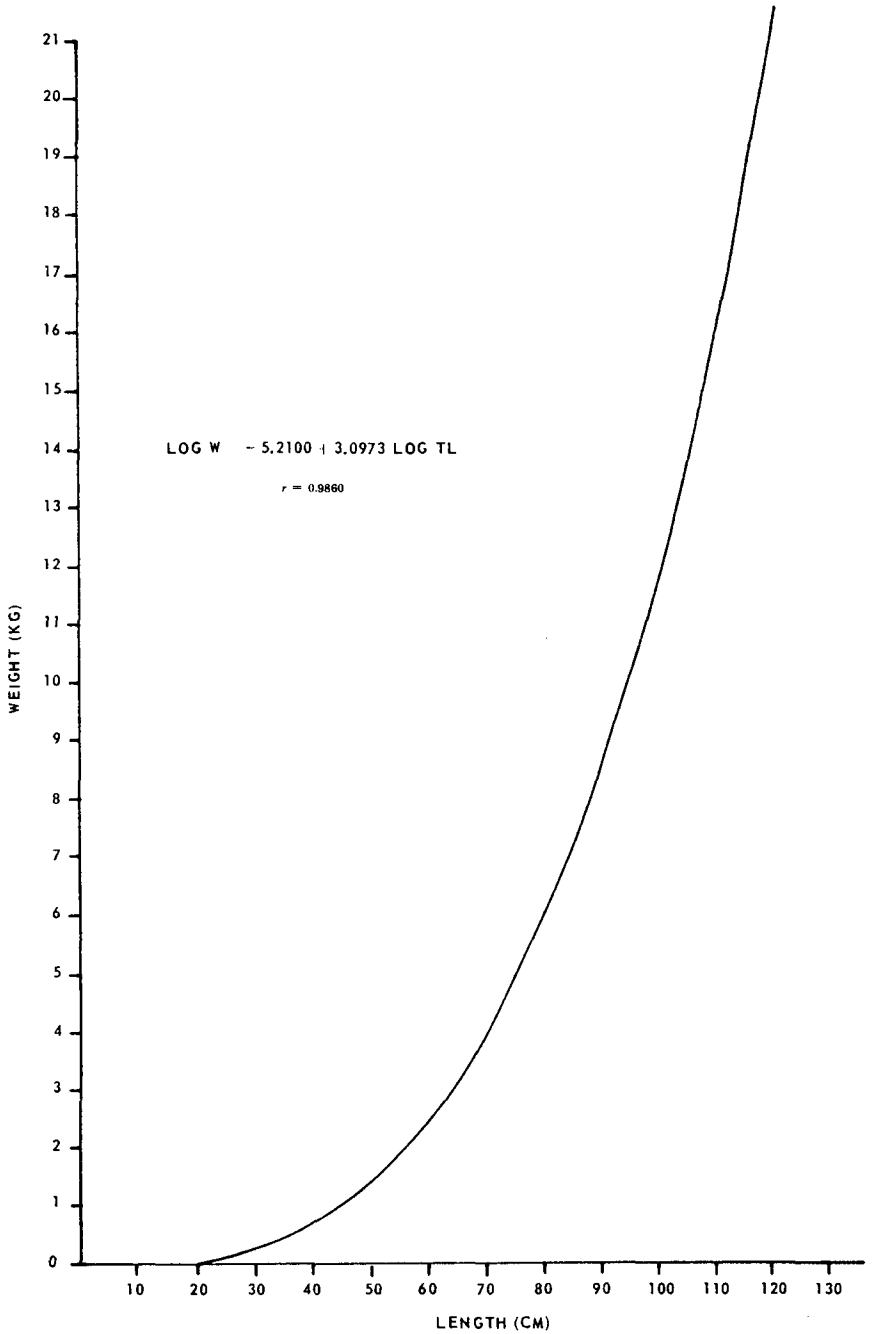



Fig. 2. Length-weight relationship of 161 flathead catfish from the Cape Fear River, N.C., 1979.

Table 2. Average condition factors for flathead catfish, both sexes combined.

| Length class (mm) | Cape Fear River | |
|---|---|---|
| | No. fish | Condition factor |
| 0 - 99 | 4 | 1.28 |
| 100 - 199 | 7 | 1.19 |
| 200 - 299 | 16 | 1.01 |
| 300 - 399 | 7 | 0.89 |
| 400 - 499 | 21 | 1.14 |
| 500 - 599 | 35 | 1.11 |
| 600 - 699 | 34 | 1.21 |
| 700 - 799 | 19 | 1.24 |
| 800 - 899 | 11 | 1.35 |
| 900 - 999 | 6 | 1.46 |
| 1000 - 1099 | 1 | 1.34 |

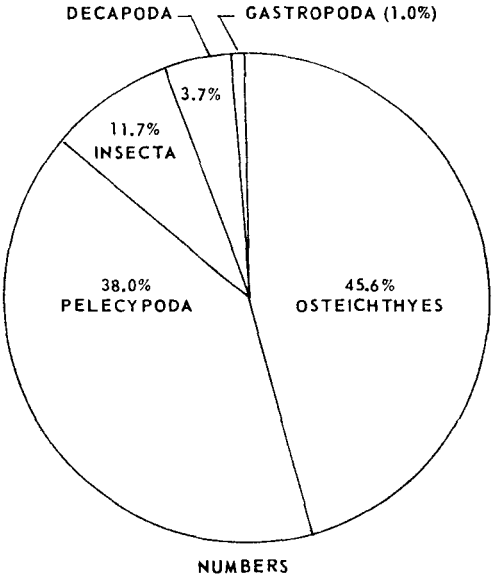
would require removal with forceps. Only 10% of the fish were sacrificed, which confirm the effectiveness of the gastric lavage technique.

Stomach contents of 105 flathead catfish were examined. Food, or evidence of food (fish scales), was found in 66 stomachs and 39 stomachs were empty. Fish was the dominant food item found in flathead stomachs examined from all 3 study areas by frequency of occurrence, numbers and weight.

Osteichthyes represented 45.6% of total numbers and 99.43% of total weight, of major food groups, indicating almost total reliance on fishes for forage by flatheads >1 kg in total weight (Fig 3). Previous studies also have reported that flatheads attaining 300 mm or greater in size become entirely piscivorous (Minckley and Deason 1959, Turner and Summerfelt 1970 and Edmundson 1974).

Crayfish serve as a mjor food item throughout much of the flathead's native range (Edmundson 1974, Morris et al. 1968). However in the Cape Fear River they represented only 3.75% of total numbers and 0.38% of total weight of all food items. Observations throughout the study area suggest that crayfish are not present in significant numbers. Pelecypods, as represented by freshwater clams, were the most numerous food item found (38.2%). However, they represented only a trace of the total weight and are considered insignificant as a forage item in the diet. Bluegill *(Lepomis macrochirus)*, black crappie *(Pomixis nigromaculatus)* and blue catfish *(Ictalurus furcatus)* were the dominant fish species identified in the stomach contents. Gizzard shad *(Dorosoma cepedianum)* was also a dominant food item; however, 8 of these were represented by the presence of undigested scales, which may have been ingested while the flatheads were confined in the holding tank during capture. Unidentified ictalurids represented by 8.06% of total numbers and 11.55% of total weight strongly indicates the importance of this group in the diet of Cape Fear River flathead catfish.

Fish were the dominant food item found by frequency of occurrence (Table 3). Members of 3 families, Ictaluridae, Centrarchidae and Clupeidae were the most frequently represented identifiable fishes in all stomachs. Flatheads occasionally fed on Catostomidae and Cyprinidae. Single representatives of Lepisostidae and guillidae were found, and in both cases there was evidence that they had been



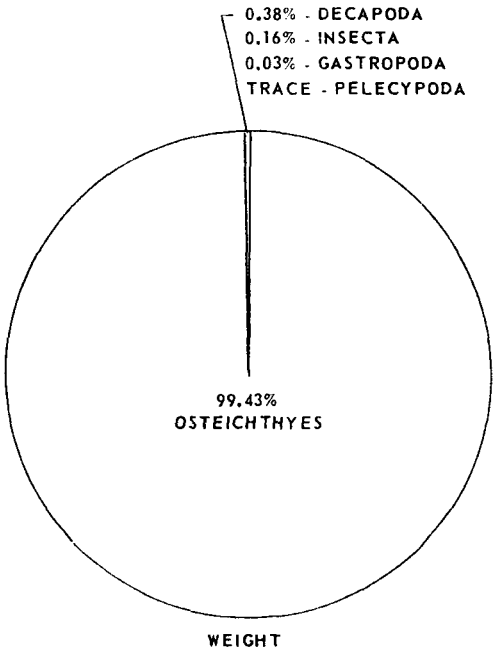




Fig. 3. Percent of total numbers and percent of total weight of major food items for all study areas combined on Cape Fear River, N.C., 1979.

Table 3. Frequency of occurrence, by family, of food items found in the stomachs of flathead catfish in Cape Fear River, North Carolina, 1979.

| | All areas combined | | Lillington area | | Fayetteville area | | Reigelwood area | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Ictaluridae | 22 | 33.4 | 3 | 16.7 | 6 | 21.4 | 13 | 65.0 |
| Centrarchidae | 15 | 22.7 | 6 | 33.3 | 5 | 17.9 | 4 | 20.0 |
| Clupeidae | 11 | 16.7 | 5 | 27.8 | 5 | 17.9 | 1 | 5.0 |
| Catostomidae | 2 | 3.0 | | | | | 2 | 10.0 |
| Cypinidae | 1 | 1.51 | | | 1 | 3.6 | | |
| Lepisostidae | 1 | 1.5 | 1 | 5.55 | | | | |
| Angullidae | 1 | 1.51 | 1 | 5.55 | | | | |
| Unidentified fish | 26 | 39.4 | 10 | 55.5 | 13 | 46.4 | 3 | 15.0 |
| Dcapoda | 7 | 10.6 | 2 | 11.1 | 3 | 10.7 | 2 | 10.0 |
| Insecta | 19 | 28.8 | 3 | 16.7 | 9 | 39.3 | 7 | 35.0 |
| Gastropoda | 2 | 3.0 | 2 | 11.1 | | | | |
| Pelecypoda | 2 | 3.0 | | | | | 2 | 10.0 |
| Stomachs with food | 66 | | 18 | | 28 | | 20 | |

consumed as a result of scavenging by individual flatheads. Ictalurids occurred in 33.4%, centrarchids in 22.7% and clupeids in 16.7% of all stomachs. In the Lillington area centrarchids, clupeids and ictalurids, respectively, were the dominant identifiable fishes. This was the only zone in which ictalurids were not the most frequently utilized. In the Fayetteville area, these same 3 families were again the most often found. The most significant difference occurred in the Riegelwood area where ictalurids occurred in 65% of all stomachs examined. Here centrarchids and catstomids were the 2nd and 3rd most utilized families, respectively.

Turner and Summerfelt (1970) found that flathead catfish showed a preference for gizzard shad, freshwater drum *(Aplodinotus grunniens)* and carp *(Cyprinus carpio)* in Oklahoma reservoirs. Edmunson (1974) reported that sunfish were the dominant group consumed in West Virginia's Bluestone Reservoir. Hackney (1965), in plastic pool studies, observed a preference for largemouth bass which seemed to indicate a preference for centrarchids over cyprinids, as was the case in Bluestone Reservoir. Morris et al. (1968) found the principal familites of fishes consumed in a riverine system were Ictaluridae and Cyprinidae followed to a lesser degree by Clupeidae, Sciaenidae and Percidae.

Osteichthyes, Insecta and Decapoda were food groups common to all 3 study areas. Gastropods, represented by freshwater snails, occurred only in the diet in the Lillington area and may be attributed to the stable substrate and shallow water habitat of the area. Pennack (1957) states that such habitat is ideal for their proliferation. Similarly the occurrence of freshwater clams, Pelecypoda, in the diet of fish only in the Riegelwood area is probably due to the unique habitat present only in that area. Flathead catfish are reported to be opportunistic feeders (Minckley and Deacon 1959, Turner and Summerfelt 1970). Although this study investigated only the food habits of fish >1 kg, the use of insects, snails and clams by these larger fish illustrates this opportunistic characteristic.

## Species Composition

Fish species composition data collected by rotenone sampling in 1963 (prior to the introduction of flathead catfish) was compared with fish population data collected during this study (after flathead stocking).

Six fish species, not found in the 1963 samples, were present in the 1979 samples (Table 4). One species, green sunfish *(Lepomis cyanellus)* was present in 1963 but absent in 1979. The absence of bowfin *(Amia calva)*, Atlantic sturgeon *(Acipenser oxyrhnchus)*, southern flounder *(Paralichthys lethostigma)* and striped mullet in the 1963 samples may be due to the collection method used, location of sample site, sample time or random distribution of the species. Two species, blue catfish and flathead catfish, introduced after the 1963 samples were taken and were present in the 1979 samples.

The precent by number and weight of all bullheads (*Ictalurus* Spp.), white catfish *(Ictalurus catus)* and channel catfish *(Ictalurus punctatus)* declines between 1963 and 1979. Brown bullheads *(Ictalurus nebulosus)* displayed the greatest reduction followed by flat bullheads *(Ictalurus platycephalus)*. Reported observations of North Carolina Wildlife Resources Commission fishery biologists indicated that various species of bullheads were common in undocumented samples collected during the period of 1968 and 1972. It appears that extensive utilization of these

Table 4. Percent of total weight and total numbers of fish in the Cape Fear River (rotenone 1963; gill nets, electrofishing and fyke nets 1979).

| | 1963 | | 1979 | |
|---|---|---|---|---|
| | Percent of total Numbers | Percent of total Weight | Percent of total Numbers | Percent of total Weight |
| Atlantic sturgeon | | | 0.21 | 0.09 |
| Longnose gar | 0.2 | 10.0 | 13.05 | 12.80 |
| Bowfin | | | 3.57 | 0.90 |
| Americn eel | 1.70 | 0.30 | 2.10 | 0.33 |
| *(Anguilla rostrata)* | 1.70 | 0.30 | 2.10 | 0.33 |
| *(Anguilla rostrata)* | | | | |
| Gizzard shad | 12.00 | 17.40 | 19.36 | 7.00 |
| Shiners sp. | 36.40 | 1.80 | 2.73 | 0.002 |
| Carp | 0.45 | 8.70 | 0.63 | 2.20 |
| Golden shiner | 0.20 | 0.03 | 0.84 | Tr[a] |
| *(Notemigonus crysoleucas)* | | | | |
| Suckers sp. | 0.50 | 0.80 | 7.98 | 2.10 |
| *(Moxostoma sp.)* | | | | |
| Flat bullhead | 1.40 | 14.90 | 0.21 | 0.06 |
| Brown bullhead | 2.60 | 7.80 | 0.00 | 0.00 |
| White catfish | 27.50 | 21.70 | 14.31 | 4.40 |
| Blue catfish | | | 1.05 | 0.04 |
| Channel catfish | 12.70 | 8.00 | 5.45 | 3.30 |
| Flathead catfish | | | 10.52 | 64.70 |
| Redbreast sunfish | 0.45 | 0.50 | 0.21 | Tr |
| *(Lepomus auritis)* | | | | |
| Pumpkinseed | | 0.20 | 0.42 | Tr |
| *(L. gibbousus)* | | | | |

Table 4. Continued.

| | 1963 | | 1979 | |
|---|---|---|---|---|
| | Percent of total Numbers | Percent of total Weight | Percent of total Numbers | Percent of total Weight |
| Warmouth *(L. gulosus)* | 0.30 | 0.20 | 0.84 | 0.04 |
| Bluegill | 3.20 | 3.50 | 5.47 | 0.10 |
| Largemouth bass *(Micropterus salmoides)* | 0.45 | 1.50 | 1.89 | 0.09 |
| Black crappie | 0.40 | 2.40 | 4.21 | 0.40 |
| Southern flounder | | | 1.05 | 0.20 |
| Striped mullet | | | 26.94 | 1.10 |
| Green sunfish | 0.30 | 0.10 | | |

[a] Tr <0.002%

species by the rapidly expanding flathead population has resulted in their decline. Centrarchids, also utilized by flatheads, have increased in total numbers, but have declined in percent by weight of the total population.

Flathead catfish were introduced into the Cape Fear River in 1966 and since that period the population has expanded to comprise 10.52% of the numbers and 64.7% of the total weight of fish collected from the Cape Fear River in the 1979 samples. Blue catfish also were introduced in 1966. However, this population has not rapidly expanded and does not appear to be impacting native fish populations as does the flathead catfish. Food habits information suggests that this introduced ictalurid species also is being utilized as forage by flathead catfish.

The flathead catfish, introduced into the Cape Rear River outside their native range, required only 10 years to expand into a significant population. In a 15-year period, their numbers have expanded to a level of being the dominant predator in the mainstream habitat.

Introductions from a single release point have expanded to encompass 230 km of the Cape Fear River. It is believed that further upstream migration has been hampered by a physical obstruction (lowhead dam) and downstream expansion is halted by the presence of saline water in the lower reaches of the Cape Fear. The extent of their expansion into, and potential impact upon, minor tributaries is unknown. Their expansion into major tributaries is considered to be inevitable.

Growth rates of flatheads, during the population expansion in the Cape Fear, exceeded those previously reported for riverine ecosystems within their native range. Growth rates were similar to that reported in reservoir ecosystems.

Fishes were found to be the dominant food item in flatheads examined from all 3 study areas. Ictalurids, centrarchids and clupeids were the most frequently utilized forage by the flathead catfish. There is strong evidence of a severe decline in the native bullhead populations and the previously introduced channel catfish population in the mainstream of the Cape Fear River, as a result of flathead predation.

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