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TR EL-82-4

Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (North Atlantic)

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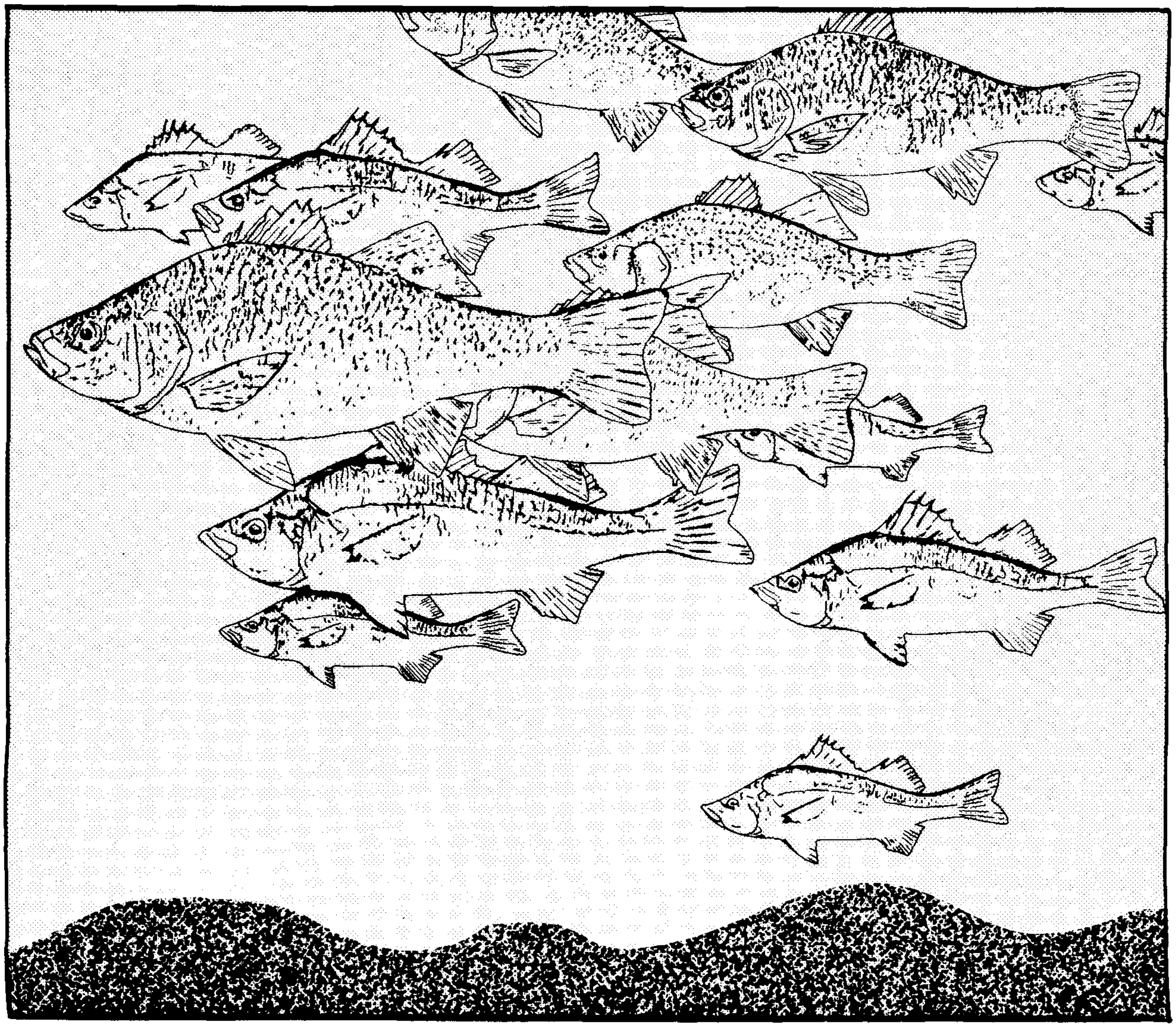

Coastal Ecology Group
Waterways Experiment Station
U.S. Army Corps of Engineers

Fish and Wildlife Service
U.S. Department of the Interior

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Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates .(North Atlantic)

WHITE PERCH

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Washington, DC 20240

CONVERSION FACTORS

Metric to U.S. Customary

Multiply	By	To Obtain
millimeters (mm)	0.03937	inches
centimeters (cm)	0.3937	inches
meters (m)	3.281	feet
kilometers (km)	0.6214	miles
square meters (m^2)	10.76	square feet
square kilometers (km')	0.3861	square miles
hectares (ha)'	2.471	acres
liters (1)	0.2642	gallons
cubic meters (m^3)	35.31	cubic feet
cubic meters	0.0008110	acre-feet
milligrams (mg)	0.00003527	ounces
grams (gm)	0.03527	ounces
kilograms (kg)	2.205	pounds
metric tons (mt)	2205.0	pounds
metric tons (mt)	1.102	short tons
kilocalories (kcal)	3.968	BTU
Celsius degrees	1.8(C°) + 32	Fahrenheit degrees

U.S. Customary to Metric

Multiply	By	To Obtain
inches	25.40	millimeters
inches	2.54	centimeters
feet (ft)	0.3048	meters
fathoms	1.829	meters
miles (mi)	1.609	kilometers
nautical miles (nmi)	1.852	kilometers
square feet (ft^2)	0.0929	square meters
acres	0.4047	hectares
square miles (mi^2)	2.590	square kilometers
gallons (gal)	3.785	liters
cubic feet (ft^3)	0.02831	cubic meters
acre-feet	1233.0	cubic meters
ounces (oz)	28.35	grams
pounds (lb)	0.4536	kilograms
short tons (ton)	0.9072	metric tons
BTU	0.2520	kilocalories
Fahrenheit degrees	0.5556(F° - 32)	Celsius degrees

CONTENTS

PREFACE

This species profile is one of a series on coastal aquatic organisms, principally fish, of sport, commercial, or ecological importance. The profiles are designed to provide coastal managers, engineers, and biologists with a brief comprehensive sketch of the biological characteristics and environmental requirements of the species and to describe how populations of the species may be expected to react to environmental changes caused by coastal development. Each profile has sections on taxonomy, life history, ecological role, environmental requirements, and economic importance, if applicable. A three-ring binder is used for this series so that new profiles can be added as they are prepared. This project is jointly planned and financed by the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service.

Suggestions or questions regarding this report should be directed to:

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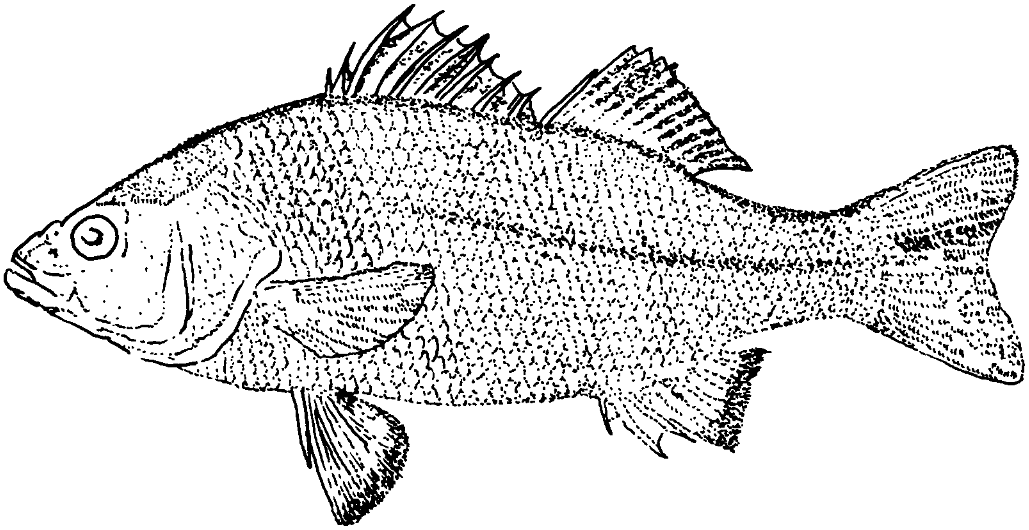

Figure 1. White perch.

WHITE PERCH

NOMENCLATURE/TAXONOMY/RANGE

Scientific name ... Morone americana (Gmelin)
Former scientific name . . . . Roccus americanus Jordon and Gilbert
Preferred common name ... White perch (Figure 1)
Other common names .. Narrow-mouthed bass, silver perch, perch, sea perch, bay perch, blue-nosed perch, grey perch, black perch, gatte.
French common name: bar-peche.
Class . . . . Osteichthyes
Order . . . . Perciformes
Family .... Percichthyidae

Geographic range: Coastal areas from New Brunswick, Nova Scotia, and Prince Edward Island south to South Carolina. Largest populations in coastal waters of New Jersey, Delaware, Maryland, and Virginia, throughout Chesapeake Bay and Delaware canals (Hardy 1978). Principal estuarine fishery areas for white perch in the North Atlantic region are noted in Figure 2. Introduced to lakes and ponds in New England, Nebraska (Hergenrader and Bliss 1980), and the Great Lakes (Busch et al. 1977; Scott and Christie 1963).

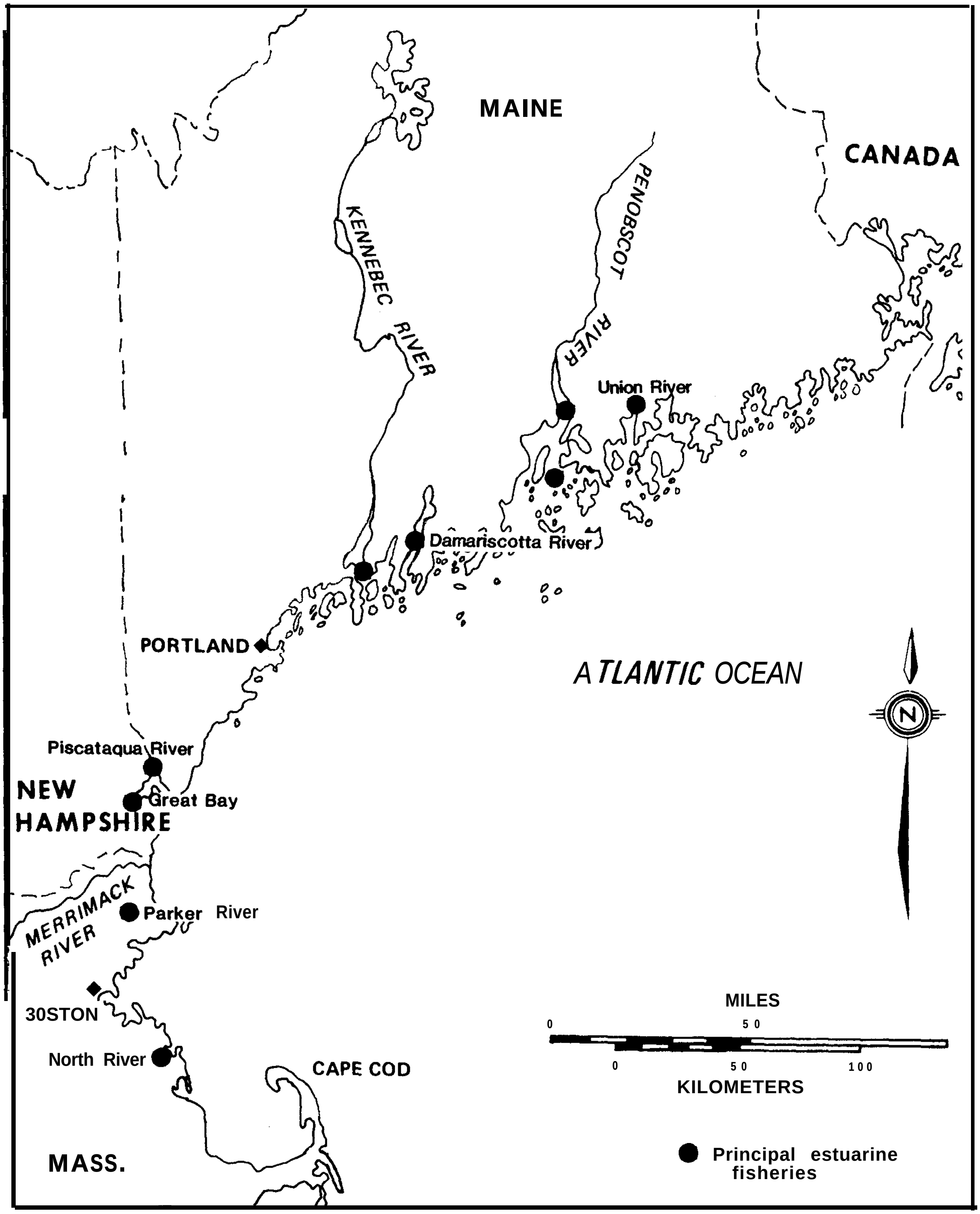

Figure 2. Principal rivers and bays in the North Atlantic region that support white perch fisheries.

MORPHOLOGY/IDENTIFICATION AIDS

Morphology (from Hardy 1978): D.1 VII-XI; D.2 I, 11-13; A. III, 9-10; C. 17; P. 10-18; V. I, 5; scales in lateral line, 44 to 55, in transverse series 20, above 6-10, below lateral line 9-14, around caudal peduncle 18-24; vertebrae 11-14; gill rakers 4 t 13-17, branchiostegals 7. Proportion as percent SL: body depth 28-41 (lacustrine perch may have conspicuously more elongate bodies than estuarine perch), HL 30-39, head depth 20-30. Proportions as percent of TL: depth 24.4-29.0, HL 26.3-29.7. Proportions as percent of HL; eye diameter 18.9-28.6, snout 28.6-30.9. Proportions as times in HL: interorbital width 4.2-5.2. Longest dorsal spine ca. 0.5.

Body oblong, ovate, compressed; head depressed above eyes; snout pointed, mouth oblique, terminal, lower jaw slightly projected, posterior end of upper jaw beneath front of eye. Teeth small, pointed, and in bands on jaws, vomer, and palatines; no teeth on base of tongue, but small teeth at distal periphery of tongue. Gill rakers long. Opercle ends in two flat points; pre-opercle margin serrate. Scales extending onto base of ventral fins and forward on head to nostrils. The two dorsal fins barely connected, with their base lengths about equal; origin of D.1 just anterior to midpoint of body; C. forked. Maximum body length: 495 mm (19.5 inches).

Pigmentation: Silvery, greenish gray, silvery gray, olivaceous, dark green, or nearly black above, sometimes brassy. Large individuals with bluish luster on head. Sides paler with silvery or brassy cast and sometimes indistinct lateral stripes. Belly silvery white, immaculate. Underside of mandible bluish purple or pink, particularly during spawning season. Melanophores on rays and membranes of all fins; dorsals dusky, but with pigment of D.2 concentrated on interradial membranes of outer half of fin; anal sometimes rose colored at base; spines of A.1 and A.2 darkest distally; caudal darkest on posterior 2/3; pectorals essentially colorless, pelvics sometimes plain, sometimes with rose-colored bases.

White perch differ from the striped bass (Morone saxatilis) and the white bass (Morone chrysops) in a number of ways. The dorsal fins of white perch are slightly joined at base by a membrane. Anal spines are stout, not graduated in length; the second and third spines are subequal. Teeth are absent on base of tongue. Lateral stripes absent on body. These other Morone spp. have dorsal fins entirely separated at the base; anal spines graduated in length; fine teeth at base of tongue; and 4 to 7 lateral stripes. White perch have fewer rows of scales between gill cover and base of tail, about 48 compared to 60 in the striped bass.

Eggs, larvae, and young-of-the-year of white perch can be distinguished based on morphology (Mansueti 1964). Starch gel electrophoresis biochemically distinguishes the larval stages of these two species (Morgan 1975; Sidell and Otto 1978).

REASON FOR INCLUSION IN SERIES

White perch are widespread, abundant, and subject to various degrees of fishing pressure throughout their range. They have social and economic significance in fresh and brackish waters which are subject to varied habitat alterations. They are important on several trophic levels--as prey and predator--and fill many environmental niches.

LIFE HISTORY

Spawning

White perch spawn in estuaries, rivers, lakes, and marshes. Spawning is usually in freshwater, but may occur in brackish water at salinities up to 4.2 ppt (Hardy 1978). Preferred spawning habitats are waters that are tidal and nontidal, clear or turbid, fast or slow (Wang and Kernehan 1979). Spawning is in water less than 7 m (23 ft) deep; 0.9 to 6.1 m (3 to 20 ft) in estuaries, and 0 to 1.5 m (0 to 5 ft) in lakes (Hardy 1978). Mansueti (1964) stated that spawning was at similar depths in estuaries and lakes. Scott and Crossman (1973) reported spawning at depths of 0 to 3.7 m (0 to 12 ft) in marshes. Substrate may be clay, sand, pulverized shells, or gravel.

Rising temperatures stimulate spawning (Mansueti 1961). Northern populations begin spawning in late March to early April, whereas southern populations spawn slightly later (Hardy 1978). Freshwater populations spawn from April through May; estuarine stocks spawn from May through July. Wang and Kernehan (1979) recorded spawning from April through June for estuarine populations. Holsapple and Foster (1975) stated that spawning was most intense during June for freshwater white perch.

White perch may spawn in the same body of water where resident or migrate long distances. Migration to fresh or brackish water is required for marine populations. Migrations up to 90 km (56 mi) were recorded for the Patuxent River, Maryland (Mansueti 1961), and 104 km (65 mi) through Albemarle Sound in North Carolina (Kearson 1969). The ripe adults assemble in large groups containing hundreds of individuals. Wang and Kernehan (1979) describe ripe males preceding females to the spawning grounds in March.

Individual females are surrounded by several males, and eggs and sperm are spread randomly. The eggs attach immediately to substrate. With intensive spawning, eggs adhere to each other and may drift freely downstream where incubation is semipelagic. Egg release may span 10 to 21 days, with peaks at dusk (Hardy 1978) and after rainfall (Wang and Kernehan 1979). Mansueti (1964) noted that eggs ripen progressively and may be released during two or three separate spawnings. It was estimated that only 10% of the eggs were ripe at the height of the season.

Fecundity and Eggs

White perch are fecund compared to similar-sized fish. The large numbers of eggs enable the white perch to propagate rapidly in introduced areas, outcompeting other species and becoming overpopulated. Fecundity estimates of 5,210 to 321,000 (mean of 40,000) were reported by Hardy (1978), and 20,000 to 300,000 by Scott and Crossman (1973). A single spawning by a 3-year-old fish had 20,676 eggs, whereas a g-year-old fish had 124,289 eggs (Holsapple and Foster 1975). AuClair (1956) estimated the release of 56,200 eggs/kg of fish during one spawning. Fecundity depends on size and age, exemplified by the fecundity of white perch from Lake Ontario (Table 1).

Ovarian eggs exist in two size groups in the South and three size groups in the North (Hardy 1978), suggesting two or three periods of egg deposition. The eggs are comparatively small, spherical, and translucent. Unfertilized eggs are soft (Hardy 1978), and 0.70 to 0.89 mm[1] in diameter (Mansueti 1964; Scott and Crossman 1973). Fertilized eggs are 0.65 to 1.09 mm in

Table 1. Fecundity of fork length (FL) classes of white perch in Lake Ontario (Sheri and Power 1968).

Size class FL (mm)	Average fecundity (numbers)
151-160	21,180
171-180	36,687
201-210	95,752
241-250	234,342

[1] 25.4 mm = 1 inch.

diameter, yellow-brown, and have a flat attachment disc (Hardy 1978). Mansueti (1964) stated that fertilized eggs range from 0.75 to 1.09 mm in diameter; Wang and Kernehan (1979) recorded a range of 0.8 to 1.0 mm. When shed, eggs are demersal and usually attach singly to detritus, although thin sheets are possible.

At maturity, eggs are slightly yellowish, granular, and translucent, with a large oil globule (Leim and Scott 1966). The eggs hatch in 30 hr at 20°C (68°F) (Thoits and Mullan 1973), 44 to 50 hr at 18°C (64°F) (Hardy 1978), and 60 to 72 hr (Schubel and Wang 1973) or 96 to 108 hr at 15°C (59°F) (Thoits and Mullan 1973).

Egg survival appears to be unaffected by silt levels; eggs tolerate 500-mg/l concentrations of particulate matter (Schubel and Wang 1973).

AuClair (1960) stated that temperature drops of 4° to 5°C (7° to 9°F) were lethal. Hardy (1978) found that sudden drops of 2° to 3°C (4° to 5°F) induced mortality; a minimum summer temperature of 7°C (45°F) was lethal. Extensive mortality occurred at 10°C (50°F).

Eggs are most sensitive to handling or disturbances during the first few minutes after spawning. Water hardening is complete within 15 to 20 min at 18°C (65°F) (Hardy 1978).

Larvae

Newly hatched prolarvae remain in the general spawning area during the first 4 to 13 days, growing from an initial size of 1.7 to 3.0 mm to a length of 3 to 4 mm (Mansueti 1964; Hardy 1978). Prolarvae have unpigmented eyes and limited mobility. As the larvae grow, they alternatively swim vertically or sink (Mansueti 1964; Wang and Kernehan 1979), resulting in downstream drift in rivers or planktonic drift in estuaries or lakes (Hardy 1978). Wang and Kernehan (1979) found prolarvae throughout the water column of streams, but suggested an increasingly demersal perference as size and age increase. Hardy (1978) described juveniles in lakes in depths of 2.4 to 3.6 m (8 to 12 ft).

Mansueti (1964) noted that prolarvae transformed to postlarvae when mouths and pigmented eyes developed at about 3.8 mm total length (TL). Postlarvae transformed to juveniles at 7 to 9 mm TL and developed fins. Temperature requirements of larvae are similar to that of the eggs; sudden drops may be fatal. Salinities up to 3 to 5 ppt are tolerated and 8 ppt may be lethal.

Juveniles and Adults

Wang and Kernehan (1979) suggested that inshore zones of estuaries and creeks are nurseries. Juveniles stay in these areas up to 1 year, until 20 to 30 mm in length. They inhabit waters with silt, mud, and plant substrate (Hardy 1978). Mansueti (1964) suggested that fry prefer a demersal habitat, although they often are found at depths of 2.4 to 3.6 m (8 to 12 ft). Hardy (1978) described large schools of fry moving downstream through brackish waters to beach and shoal areas. The schools occasionally venture to offshore waters during daylight, but return to protected beach and shoal areas at night and during rough water. In August, with decreasing temperatures, juveniles return to brackish waters to overwinter either in deep pools of tidal creeks and tributaries or deep waters of rivers and bays (Wang and Kernehan 1979).

Adults show similar seasonal movements, catalyzed by temperature (Mansueti 1964; Markle 1976; Hardy 1978). When temperatures increase in spring, white perch begin their spawning migration. They move shoreward and generally upstream, sometimes in large schools to shallow areas in tidal creeks and freshwater areas. After spawning, they may seek deeper water. Summer movements are local and random, rarely covering more than 19 km (12 mi) (Mansueti 1964; Hardy 1978).

Hardy (1978) stated that most males and females mature at 2 years, some females at 3, and all by 4. Holsapple and Foster (1975) stated that at age II 20% of the males and none of the females were mature; by age III all males and 75% of the females were mature. Mansueti (1964) believed that length was the determining factor for maturity with males maturing at 80 mm and females at 90 mm. Length at first maturity of 72 mm for males and 98 mm for females was given by Hardy (1978).

GROWTH CHARACTERISTICS

Scott and Crossman (1973) stated that the growth rates of white perch depended on the region and habitat. Landlocked populations in small oligotrophic lakes along coastal regions have a slower growth rate than newly expanding populations such as those in Lake Ontario. Growth is usually faster in newly established populations, and can continue for long periods, as Taub (1966) found in Quabbin Reservoir, Massachusetts. According to Bryant (1972), white perch grow relatively slowly and tend to stunt throughout their range. Mansueti (1961) compared a population in the upper Patuxent estuary (Maryland) that was stunted, with a fast-growing population in the lower Patuxent. Growth was affected by temperature, food supply, and population density. The greatest increment in length was during the first year of life. He believed that this increment alone would best indicate ecological effects on growth. The number of days in spring with water temperatures between 10° and 15°C (50° and 59°F), and the amount of solar radiation both were positively correlated with growth. Increased spring rainfall (which affects salinity) and population density both inversely correlate to growth. Hines (1981) suggested that stunted populations are often associated with eutrophic waters.

COMMERCIAL/SPORT FISHERY

Significant commercial harvests of white perch are made from Massachusetts to North Carolina with the bulk of the landings originating from the estuarine waters of the Chesapeake Bay. The total harvest in 1979 was 563 metric tons, with Maryland leading all other States in commercial harvests (Table 2). There is no commercial catch at the northern and southern extremes of the range.

The greatest landings were made at the turn of the century; afterwards, production decreased. In 1897 Delaware recorded landings of 180 tons; by 1940 they were down to 7 tons. Temporary upsurges in abundance periodically occur because of good year classes (McHugh 1981). Between 1960 and 1980 the commercial landings in the United States ranged from 272 to 1,412 metric tons (Table 3). The landings since 1973 were about half of those during the 1960's. Tables 2 and 3 do not agree for the catch in 1979.

White perch are caught year-round with largest catches in spring. Fishing is by trawl, haul seines, and

Table 2. The commercial catch of white perch in the United States during 1979 (from various issues of Current Fishery Statistics, National Oceanic and Atmospheric Administration).

State	Pounds	Value
Maine	0	0
New Hampshire	no data	
Massachusetts	3,698	$ 1,601
Rhode Island	145	39
New York	3,861	15,468
New Jersey	38,220	11,667
Delaware	no data	
Maryland	687,371	185,072
Virginia	147,095	40,795
North Carolina	361,032	94,557
South Carolina	0	0
Georgia	0	0
Total	1,241,422	$ 349,199
	= 563 metric tons	

drift gill nets in Chesapeake Bay. White perch are marketed as bay perch and sold fresh. The roe is occasionally sold for human consumption during winter and early spring (Mansueti 1964).

Table 3. The catch (in metric tons) of white perch in the United States between 1960 and 1980. The recreational catch is for saltwater only for years in which surveys are made (from McHugh 1977 and Food and Agriculture Organization 1981*).

Year	Commercial	Recreational
1960	836	3370
1961	1006	
1962	1333	
1963	980	
1964	696	
1965	1008	4716
1966	1395	
1967	1049	
1968	1257	
1969	1412	
1970	1109	5727
1971	1156	
1972	844	
1973	652	
1974	651*	
1975	605*	
1976	482*	
1977	559*	
1978	375*	
1979	272*	2267*
1980	593*	

White perch, although common in lakes throughout northern New England, New Brunwick, and Nova Scotia, occur in few estuaries north of Cape Cod. White perch have no commercial or recreational importance in the Gulf of Maine (Bigelow and Schroeder 1953). Maine recently proposed commercial fishing of freshwater populations for lobster bait.

Recreational fishing is important for both marine and freshwater populations. According to the Marine Recreational Fishery Statistics Survey (1980) the total number of white perch caught by marine recreational anglers was 5,494,000 fish in 1979, 96% of which were from the mid-Atlantic States. Of the North Atlantic States, New Hampshire had none, Maine and Rhode Isl and each had less than 30,000, Massachusetts had 103,000 (72% of the North Atlantic catch), and Connecticut had 30,000 (21%).

Freshwater recreational fishing occurs throughout the range of the white perch, but is most important in the North. In a winter creel census in the Patuxent River, Maryland, white perch dominated the catch during all months sampled (Moore and Frisbie 1972). Jordan (1981) reported an average standing crop of white perch in Maine at 60,175,000 individuals (10,590,800 lb), most of which were in inland lakes and ponds. The annual catch was about 3.5 million fish, which was only 6% of the standing crop. The recreational catch in New Hampshire was estimated to be 664,000 fish (New Hampshire Fish and Game Department 1978).

Mansueti (1961) computed annual mortality for white perch in the Patuxent River to range from 0.37 to 0.59 for age groups IV and older. The average for males was about 0.50 and for females, about 0.56. These mortalities are similar to those reported by Cooper (1941) in surveys of lakes and ponds of the Androscoggin and Kennebec Rivers in Maine. Wallace (1971) calculated mortality of white perch in the Delaware River to range from 0.49 to 0.59 for males and 0.53 to 0.65 for females. St. Pierre and Davis (1972) calculated the mortality for white perch in the York River to be 0.59 for males and 0.57 for females. Wallace (1971) and Mansueti (1961) believed that the mortality rates for males were lower because females grew faster than males up to year V and entered the desirable size category for harvest at an earlier age.

ECOLOGICAL ROLE

The trophic niche of the white perch is broad. This species may be planktivorous, benthotivorous, or piscivorous depending on season, age, competition, and available food. White perch frequently play an important role in aquatic systems because of predacious and opportunistic feeding. They feed on zooplankton as fry and larger prey as juveniles. In freshwater, adults feed mainly on aquatic insects, but also take crustaceans and fishes, including their own young (Scott and Crossman 1973; Zuerlein 1981). Seasonality and food availability influence feeding habits (Hines 1981). Zooplankton and insects are eaten in spring and early summer; when these populations decrease, white perch eat fish fry, crustaceans, and detritus (Elrod et al. 1981). White perch also eat amphipods, snails, crayfish, and a variety of eggs. In estuaries, white perch eat shrimp, squid, crabs, and fish eggs. After white perch are 22 cm (9 inches, they eat fish almost exclusively.

As prey, white perch are consumed by larger predatory fish, such as Atlantic salmon, brook trout, chain pickerel, smallmouth and largemouth bass, and other piscivorous fish (Smith and Kernehan 1981). Terrestrial vertebrates also prey heavily on schooling white perch. The fry of white perch may be preyed on by copepods.

ENVIRONMENTAL REQUIREMENTS

Temperature

White perch live in waters with temperatures of 2.0°C to 32.5°C (36° to 90°F). They are found in Maine lakes where temperatures seldom rise above 15.5°C (60°F), and in Massachusetts lakes where summer water temperatures seldom go below 27°C (81°F). In other populations mortality may occur if the temperature attains 27°C (81°F) for several days (Hardy 1978).

Interactions of temperature, season, and physiology influence spawning. Spawning begins at 12° to 14°C (54" to 57°F) in the Chesapeake Bay (Morgan and Rasin 1982). Spawning temperatures ranged between 10° and 19°C (50" to 66°F) in the Delaware River Estuary and spawning began at 12.5°C (54°F) in North Carolina (Hardy 1978). The temperature must remain at 18° to 21°C (64" to 70°F) in Maine lakes for several days prior to spawning (AuClair 1956). In York River, Virginia, spawning peaked at 11° to 16°C (52" to 61°F) (Hardy 1978).

Hatching occurs in 24 hr at 16" to 20°C (61° to 68°F) and in 144 hr at 11° to 16°C (52" to 61°F) (Hardy 1978). Morgan and Rasin (1982) found that the optimum hatching temperature was 14°C (57°F) at a salinity of 0.0 ppt. The optimum hatching temperature was determined by highest point on the graph of:

$$H = -41.0 + 14.6\,T - 0.55\,T^2,$$

where H is the percent hatch at a given temperature T (°C). The size of the newly hatched larvae was related to temperature; the maximum length occurred at 16° to 18°C (61" to 64°F) at all salinities (0 to 10 ppt).

Adults acclimated to 18°C (64°F) lost equilibrium at 34°C (93°F) and fish acclimated to 27°C (81°F) functioned until 35.5°C (96°F) (Dorfman 1970). The upper lethal (LD_{50}) depends on the season (McErlean and Brinkley 1971). Fish collected in March at 2.9°C (37°F), then acclimated to 10°C (50°F), had an LD_{50} of 26°C (79°F). Fish collected in September at 24.5°C (76°F), then acclimated to 28.5°C (83°F), had an LD_{50} of 33°C (91°F). Preferred temperatures are equal to or higher than those to which the fish are acclimated, ranging from 5° to 32°C (41° to 90°F); fish acclimated to cold preferred a cool temperature and fish acclimated to a warm temperature preferred hot water.

Salinitv

White perch live in waters ranging in salinity from zero to full-strength seawater. They spawn in nature generally at salinities less than 4.2 ppt (Hardy 1978), but fish have been observed spawning at salinities up to 30 ppt. Salinity affects the water balance of deposited eggs. Morgan and Rasin (1982) observed that egg diameter in freshwater was 0.86 mm and in brackish water, 0.80 mm. Eggs tolerate salinities higher than those in which they normally occur, up to 10 ppt, in tests (higher salinities were not tested) (Morgan and Rasin 1982). Larvae are usually in waters with salinities of 0 to 8 ppt, although they have been found at 13 ppt. Juveniles are found from 3 to 8 ppt, rarely to 13 ppt. The normal salinities for adults are between 5 and 18 ppt (Hardy 1978).

Habitat

White perch are ubiquitous in estuaries and freshwater ecosystems between South Carolina and the Canadian Maritimes. This species was essentially estuarine in its original range. They exhibit semianadromous migrations in tidewater and spawning runs in lakes and ponds. White perch tolerate a wide range of salinities; hence they become easily acclimated in freshwater ponds and other impoundments. They have extended their range northward in historical times and into the Great Lakes more recently (Busch et al. 1977). They were inadvertently introduced and established in Nebraska and the Missouri River system (Hergenrader and Bliss 1980; Zuerlein 1981).

White perch prefer areas with fairly level bottoms composed of compact silt. Mud, sand, and clay are also preferred substrates. Soft muck, decomposing organic substrate, or gravel and rocks were found by AuClair (1956) to be less utilized by white perch. In shallow water they spawn with no preference for bottom type (Scott and Crossman 1973). White perch do not depend on vegetation, rocks, debris, or manmade structures for shelter, since they are commonly found in open water. Water depth may provide daytime shelter, in both estuarine and freshwater habitats. Daily vertical migrations from shallow water (0.9 to 1.2 m or 3 to 4 ft) at night, to deeper water (4.0 to 9.0 m or 13 to 30 ft) during daylight in the summer have been observed. White perch overwinter at depths to 40 m (131 ft), but usually at 12.2 to 18.3 m or 40 to 60 ft (AuClair 1956; Sheri and Power 1969). Similar movements in marine environments, onshore at night and offshore at dawn, occur.

Other Environmental Factors

Neumann et al. (1981) calculated that the oxygen consumption rate of a 50-g white perch was 17.6 mg/hr when swimming at 8.6 cm/sec, and 25.5 mg/hr at 31.7 cm/sec. The rate for a 150-g white perch was 23.5 mg/hr when swimming at 8.6 cm/sec and 39.0 mg/hr at 31.7 cm/sec. They concluded that white perch are better adapted for swimming efficiently at low speeds, which reflects a more sedentary existence in estuaries.

White perch adults tolerate pH's between 6.0 and 9.0 in freshwater. Turbidity has little effect during any life stage, but may limit food production and thus secondarily restrict populations (Hardy 1978).

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16. Abstract (Limit: 200 words)

Species profiles are literature summaries on the taxonomy, morphology, range, life history and environmental requirements of coastal and anadromous species. They are designed to assist in environmental impact assessment. The white perch, Morone americana, is a major sport and commercial species in Chesapeake Bay and a major sport fish in New England. It occurs between South Carolina and the Canadian Maritimes, and inhabits water that is salt or fresh, clear or turbid, fast or still. Spawning takes place in freshwater in spring. Juvenile nurseries are inshore areas of lakes, estuaries, or creeks. High reproductive potential and scarcity of predators often lead to stunted populations. Adults are important predators and young serve as forage for economically important species.

17. Document Analysis a. Descriptors

Estuaries
Fishes
Growth
Feeding

b. Identifiers/Open-Ended Terms

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Morone americana
Fishery
Life history
Salinity requirements
Temperature requirements
Habitat requirements
Spawning

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