

Pompano: Biology Fisheries and Farming Potential¹

FREDERICK BERRY
Tropical Atlantic Biological Laboratory
Bureau of Commercial Fisheries
Miami, Florida

and
E. S. IVERSEN
Institute of Marine Science
University of Miami
Miami, Florida

Abstract

The common pompano, one of the five species of *Trachinotus* of the east coast of the Americas, has for years comprised small but important fisheries in Florida.

Appreciable interest in the possibility of farming pompano has been generated in recent months, and farms have been started in central Florida that offer hope of success.

Unfortunately from the standpoint of farms, very little is known of the biology and ecology of the pompano. What little information is extant is summarized in this paper. Until research is conducted that will clarify many of the unknowns of the biology of the pompano, efforts at producing a profitable crop in ponds will be on a trial and error basis.

Research on the pompano's biology and farming potential is being inaugurated at the Virginia Key Marine Science complex at Miami. Results of this research will be made readily available, and we request that information on pompano from other areas be communicated to us.

INTRODUCTION

IN JUNE 1966 our laboratories at Miami began to receive inquiries about pond farming of pompano. Similar inquiries were directed to the U.S. Fish and Wildlife Service in Washington, D.C. and the Florida State Board of Conservation. This interest was generated in part by recent publicity about a pompano farm in St. Augustine, Florida.

The trial raising of pompano in commercial quantities and in a controlled environment offers one way of improving knowledge for increased use of the protein potential of the sea. Techniques developed in studies of pompano raising should be applicable to the controlled production of many other marine animals. Furthermore, the product would find a ready commercial market. Pompano is one of the most highly desired marine fishes; its flavor is excellent and its monetary value is high. The commercial catches are not large and are often unpredictable.

¹Contribution No. 51 — Tropical Atlantic Biological Laboratory, Bureau of Commercial Fisheries, Miami, Florida 33149.

Contribution No. 814 — Institute of Marine Sciences, University of Miami, Miami, Florida 33149.

In attempting to answer the inquiries about pompano farming, we began to collect information on the biology of pompano (which we knew was limited) and on the feasibility of pursuing additional research needed for successful farming.

Several trials at pompano farming have been made, but these have had little success. The trials have been too few, and the basic knowledge of the biology of the pompano is too meager. We consider the prospects promising and propose that the necessary research be pursued.

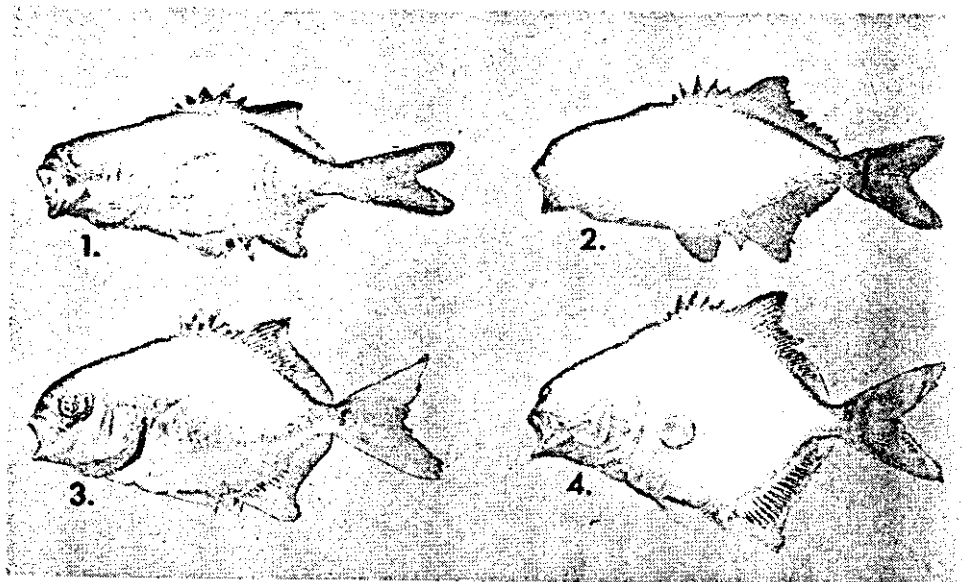
Interest in fish farming has been longstanding. Many persons along the eastern seaboard of the United States have considered raising lobsters, shrimp, and a variety of marine fishes. A few farms were started, but their success was small.

Current opinion among economists concerned with food for the human population is that much of the protein needed by future generations will come from the ocean. Many who promote this thought are not aware that the basic knowledge of the biology of most marine animals and plants is fragmentary, often nonexistent; and that their views are based on little more than wishful speculation. Successful procedures for culturing most marine organisms have yet to be developed. Development of techniques will depend largely on adequate knowledge of the biology of the organisms concerned and their tolerances and needs.

TAXONOMY

Several species of fishes in various parts of the world have the common name pompano. We restrict this name to species of the genus *Trachinotus* of the family Carangidae. Five species live in marine waters of the eastern coasts of the Americas and in the West Indies, but only three of them occur along the coast of the United States:

- 1) *Trachinotus marginatus*, the pompano, of Argentina and Brazil.
- 2) *Trachinotus cayennensis*, the pompano zapatero of Venezuela to Brazil.
- 3) *Trachinotus goodei*, the palometa, also known as the longfin pompano (previously designated by the scientific name of *Trachinotus glaucus*) (Fig. 1). It ranges from Massachusetts to Argentina and occurs at Bermuda. It grows to a total length of at least 13 inches.
- 4) *Trachinotus falcatus*, the Atlantic permit, also called the great pompano and (when young) the round pompano (Figs. 3 and 4). This species ranges from Massachusetts to Brazil, and grows to a weight of about 50 pounds and a total length of about 3 feet.
- 5) *Trachinotus carolinus*, the pompano, also named common pompano, or Atlantic pompano, sometimes called sunfish, (Fig. 2). This most common and desired species ranges from Massachusetts to Brazil. The maximum total length and weight are uncertain, because smaller Atlantic permit have been confused with this species.



Figs. 1-4. Young of the three species of pompanos occurring on the Gulf and Atlantic coasts of the United States. (The measurements given are total lengths.) Fig. 1. Palometa (*Trachinotus goodei*), 2 inches. Fig. 2. Pompano (*T. carolinus*) 2-1/8 inches. Fig. 3. Permit (*T. falcatus*), shallow-bodied, 1-7/8 inches. Fig. 4. Permit, deep-bodied, 1-7/8 inches.

IDENTIFICATION

Softrays

The number of softrays in the dorsal and anal fin can be used to separate the pompano from the permit and the palometa:

	Dorsal Softrays	Anal Softrays
pompano	24-25	21-22
permit and palometa	17-21	16-19

Counts of 90% of the pompano examined are within these ranges, but higher and lower counts do occur (dorsal 22-26, anal 20-23). The distinction between spines and softrays in the dorsal and anal fins is shown in Fig. 5. With experience, larger specimens of permit and palometa can be distinguished from those of pompano by the relative spacing of the softrays, especially in the anal fin.

Body Depth

For specimens about 1 to 4 inches long the depth of the body (from the 7th dorsal to 1st anal spine) separates the permit from the pompano and the palometa: palometa (Fig. 1) and pompano (Fig. 2) — body depth 2 1/3 times or more in standard length; permit (Figs. 3 and 4) — body depth 2 1/4 times or less in standard length.

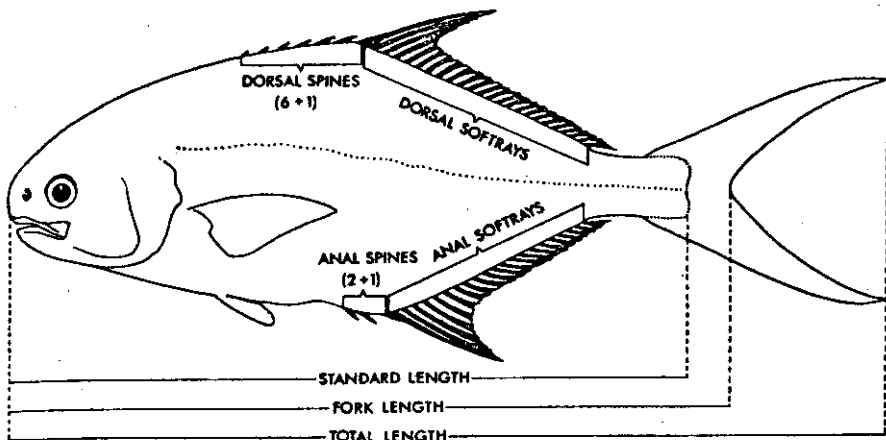


Fig. 5. Diagram of a young pompano showing the three lengths commonly used, (standard, fork, and total) and the distinction of spines and softrays in the dorsal and anal fins.

Color of Anal Fin Lobe

Recently caught fry or small juveniles can be distinguished by the color of the lobe of the anal fin: pompano: yellow or lemon yellow, shading in some to cinnamon near tip of lobe; permit: bright orange, or red, almost black in dark-bodied individuals; palometa: clear, black on anterior edge.

Lengths

The three lengths most commonly used in measuring fishes are diagrammed in Fig. 5. For small pompano, the approximate factors to convert from one length to another are (Standard Length, SL; Fork Length, FL; Total Length, TL):

$$\begin{aligned} \text{SL} &= \text{TL} \times 0.76 \\ \text{SL} &= \text{FL} \times 0.88 \\ \text{FL} &= \text{SL} \times 1.13 \\ \text{FL} &= \text{TL} \times 0.88 \\ \text{TL} &= \text{SL} \times 1.32 \\ \text{TL} &= \text{FL} \times 1.14 \end{aligned}$$

These factors apply best to pompano of 4 inches or less total length. For example, a factor of 1.40 is a better approximation than 1.32 for converting standard length to total length in larger palometa.

POMPANO BIOLOGY

No comprehensive research has been conducted on the biology of the pompanos. The most significant account of young pompano is by Fields (1962) but its coverage is limited. The following observations are from the available literature and from personal communications and observations.

Food

In nature, young pompano feed primarily on benthic and pelagic invertebrates, such as amphipods, bivalve mollusks, crab larvae, copepods, and isopods; at times they feed heavily on the young of other fishes, particularly clupeids. The adults appear to have similar food preferences. In captivity, the young grow well on a diet of mixed ground shrimp, fish, and frozen brine shrimp. Fish meal may be an adequate diet. Larger fish thrive on ground or chopped fish; they have also been fed ground scrap fish from trawl catches, chicken feed, and tankage from slaughter houses.

Growth Rate

Young pompano in nature probably grow about 1/2 to 1 1/4 inches per month (average slightly less than 1 inch per month). Fish in captivity have been raised from a length of about 1 inch to over 10 inches and a weight of about 1 pound within about one year.

Longevity

The life span of the pompano is unknown, but our guess is that under natural conditions it is 3 or 4 years.

Spawning

We speculate that most, if not all, spawning is in offshore oceanic waters, because the smallest pompano larvae so far identified have been taken offshore. We have no available accounts of the capture of running-ripe pompano, although we have heard reports of pompano from inshore waters containing enlarged ovaries with macroscopic eggs. It is possible that eggs of these fishes were not fully ripe. Spawning off the southeastern United States may begin as early as February and continue through August or September. A northward seasonal progression of spawning probably occurs, although spawning may occur throughout the year in the tropical Gulf of Mexico and the Caribbean Sea.

Movements and Migration

At least part of the population of pompano appears to move northward along the southeastern United States in the spring and summer. The young and adults appear off the New England States, usually from July to September or October. Presumably they return southward and nearer to warmer, offshore waters during the colder months.

Fry of the pompano are rare in our collections in the Miami area, but young of the permit and palometa are abundant. Pompano fry are the most abundant of the three species on the beaches of Georgia and northeast Florida.

Limited numbers of pompano have been tagged in Florida waters by the Florida State Board of Conservation (Topp, 1963; Beaumariage, 1964; Beaumariage and Wittich, 1966). Of 45 pompano reported tagged during 1962-1964; 3 were recaptured. One was taken near the location of tagging 25 days later, the second was taken 43 miles north of the tagging site 4 days after release, and the third was taken 164 miles south 284

days later. One palometa tagged at Fernandina, Florida, on July 19, 1965, was recaptured 65 days later in North Carolina. Two palometa tagged at Matansas Inlet, Florida, on July 7 and 8, 1965, were captured 78 and 10 days later at Jensen Beach and Miami Beach, Florida.

Environmental Tolerances

We have no information on tolerance to high temperatures, but temperatures as low as 50-60F have produced partial or complete kills in captive stocks, and 40F usually is fatal. Pompano less than 6 months old may be more tolerant of extremes of physical and chemical changes than older fish. Mortality in captive stocks has been attributed to low oxygen concentrations, especially in combination with high temperatures. Space can be a limiting factor in captive conditions, and fish maintained in relatively static small aquaria (even up to 500 gallons) have ceased to grow above a size of about 3 or 4 inches. Overcrowding might limit growth in an impoundment that has limited water exchange.

COMMERCIAL FISHERY

Commercial landings of pompano are made in all coastal states from Virginia to Texas, but about 90-95% of the total United States catches are landed in Florida. In 1965 about 833,000 pounds of the total U.S. landings of about 886,000 pounds were taken in Florida (Bureau of Commercial Fisheries Branch of Statistics). In Florida landings of marine food fishes in 1965, pompano made up more than 1% of the total weight and more than 5% of the total dollar value, and about 0.4% of the weight and about 1.6% of the value of the total Florida commercial catch of fish and shellfish. Values are based on ex-vessel prices, which are high in themselves (currently about \$0.65 per pound). Prices may be twice as high when the pompano reach the retail market. Estimates by Bureau of Commercial Fisheries personnel indicate that if the ex-vessel price averages \$0.65 per pound, the wholesale price might average \$0.90, and the retail price \$1.40 (with a usual retail price range of \$1.10 to \$1.85). This mark-up has considerable importance for fish farming because the farmer can sell directly to restaurants and retailers, taking advantage of the higher price.

Catches in Florida increased from about 400,000 pounds in 1955 to nearly 833,000 pounds in 1965 (Fig. 6). The price per pound was high in 1955-57, dropped in 1958, increased until 1962, and then dropped again. The high price of about \$0.80 to \$0.90 per pound in 1955-57 was probably due to considerable sales promotion of this species by governmental agencies. Most pompano are caught on the west coast of Florida from Monroe County including the Florida Keys, to Charlotte County at Fort Myers (Fig. 7, West Florida — Southern). The greatest catches on the east coast are made from Brevard County at Cape Kennedy south to Palm Beach County (Fig. 7, East Florida — South Central). Most of the pompano caught in Florida are from outside waters, although some are from the Indian and Banana Rivers near Cape Kennedy. Most pompano are taken in large trammel nets but a small proportion are taken by gill nets. Various types of nets or seines account for the remainder.

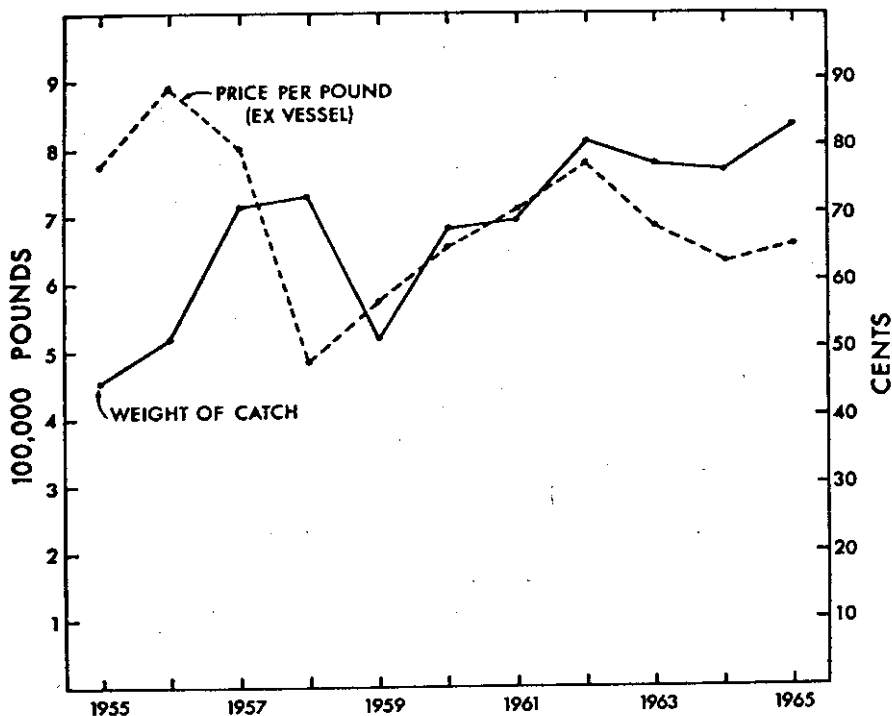


Fig. 6. Commercial landings of pompano in Florida, 1955-65, showing weight of catch and ex-vessel price per pound.

In the Florida Keys, airplane spotters' occasional assistance to fishermen in locating pompano has helped to increase the catches in recent years.

The seasonal trend in pompano landings on the west coast of Florida shows highest production during the winter (Fig. 7). The same trend is apparent on the east coast, but is not as striking. The greatest production of pompano from the inside waters of the Indian and Banana Rivers at Cape Kennedy was during May-September (Anderson and Gehringer, 1965). Of eight dominant species studied in the Cape Kennedy area, three (black mullet, blue crab, and pompano) are taken exclusively in inside waters. Pompano leave the relatively shallow waters during the winter and move offshore. This movement accounts for the difference in the trend in this fishery and the total fishery on the Florida east coast.

SPORT FISHERY

As with commercial fishing, sport fishing for pompano is relatively limited in comparison with many other species of marine fishes. Pompano, however, is a popular surf gamefish, and interest in sport fishing is increasing. They are good fighters when hooked on light tackle and are a highly prized food fish. Some fishermen pay for their trip by selling part of their excess catch to restaurants or retail fish markets. Fishermen catch

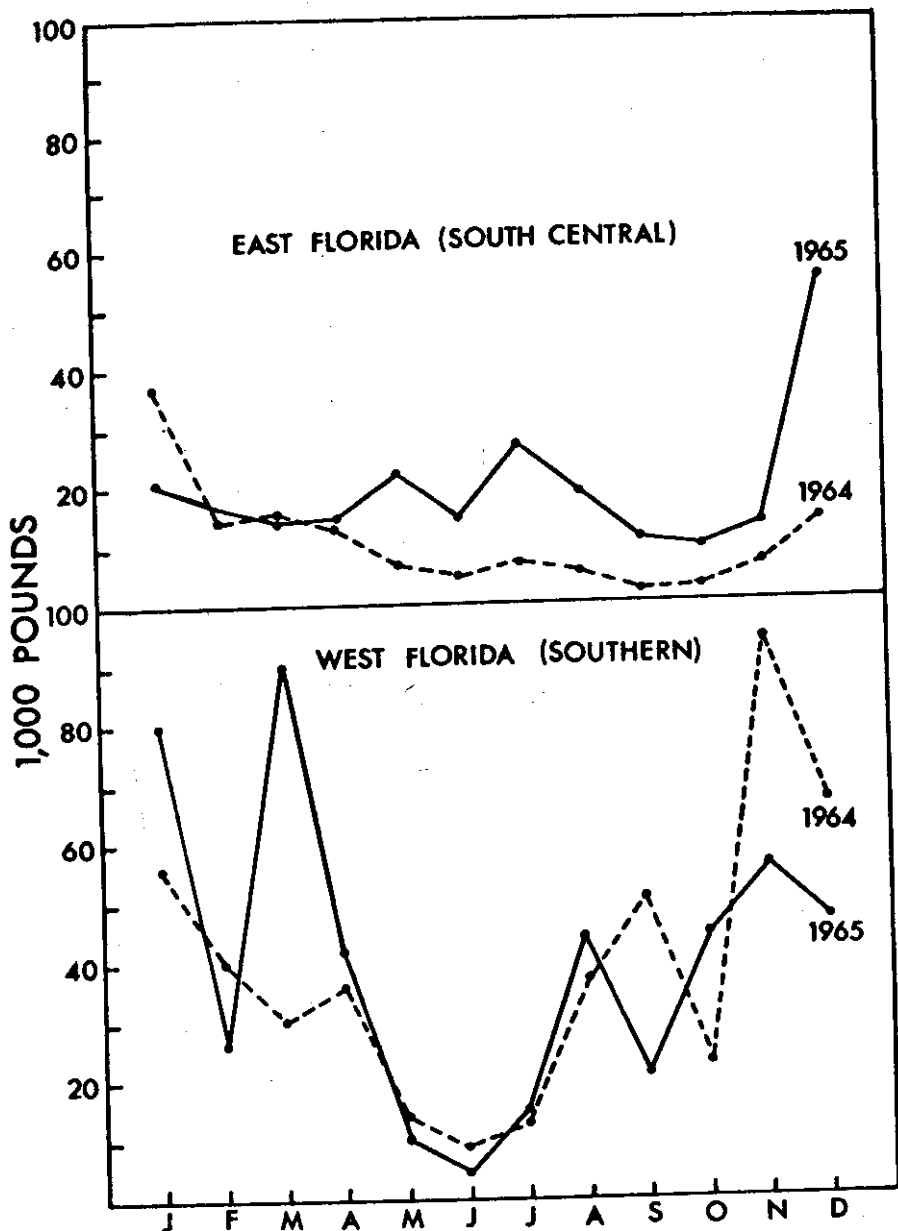


Fig. 7. Commercial landings of pompano, by month for 1964 and 1965, from the South-Central Florida East coast and the Southern Florida West coast.

pompano by bottom fishing offshore or by casting from boats or shore. The most ardent pompano fishermen often prefer to walk or ride along the ocean beaches and to cast in front of a school, using sand fleas for bait. A good account of pompano angling was given by E. C. Buckout in McClane (1965: 693-694).

POMPANO FARMING

Fresh-water fish farming for trout, catfish, bait species, and goldfish is successful in the United States, but few marine and brackish water species are raised. In many tropical countries fish are raised either as a profitable farming operation (milkfish, mullet, and *Tilapia*) or at the subsistence level of the people. In the temperate and subtropical waters of the world fewer fish are raised, although milkfish and mullet support large industries in some areas (especially in the Philippines, France, and Italy).

Pompano seems to be a suitable fish for farming, partly because of the current high price paid to fishermen. This price undoubtedly could be raised by promotion. In addition, the demand for pompano is high and apparently can be increased, especially with a predictable supply.

From a biological standpoint the pompano seems to be highly suitable for farming, but in this respect our information is meager. Pompano apparently grow rapidly, even in confinement. They can be fed on "trash fish" or fish that are discarded by shrimpers. Since cannibalism is unusual, different sizes can be placed in the same pounds.

The diseases of pompano have not been carefully investigated, but the presence of parasitic protozoans, roundworms, tapeworms, and flatworms has been reported (Linton, 1905, 1940). Sporozoan parasites that are present on the fins could, under conditions of impoundment, cause epidemics (epizootics). We must learn a great deal more about the diseases of pompano.

One disadvantage of pompano farming is that the stock for farms at present must be collected along sandy ocean beaches (Fig. 8), as young milkfish must be caught to supply farms in the Philippines. Pompano have been reported to spawn in ponds, but these reports are unauthenticated and doubtful.

The Beginnings of Pompano Farming in Florida

At least two attempts have recently been made at raising pompano in the Florida Keys. Pompano farming would seem to offer a better chance of success in this area than in more northern areas of the State, where freezing temperatures have frustrated other attempts. Other pompano farms recently started in Florida include one at Pensacola Beach (stocked in the spring of 1966) and operations at West Palm Beach and Bradenton.

Attempts at raising pompano fry in 1/2-acre ponds near St. Augustine were started between 1957 and 1962. Small pompano fry

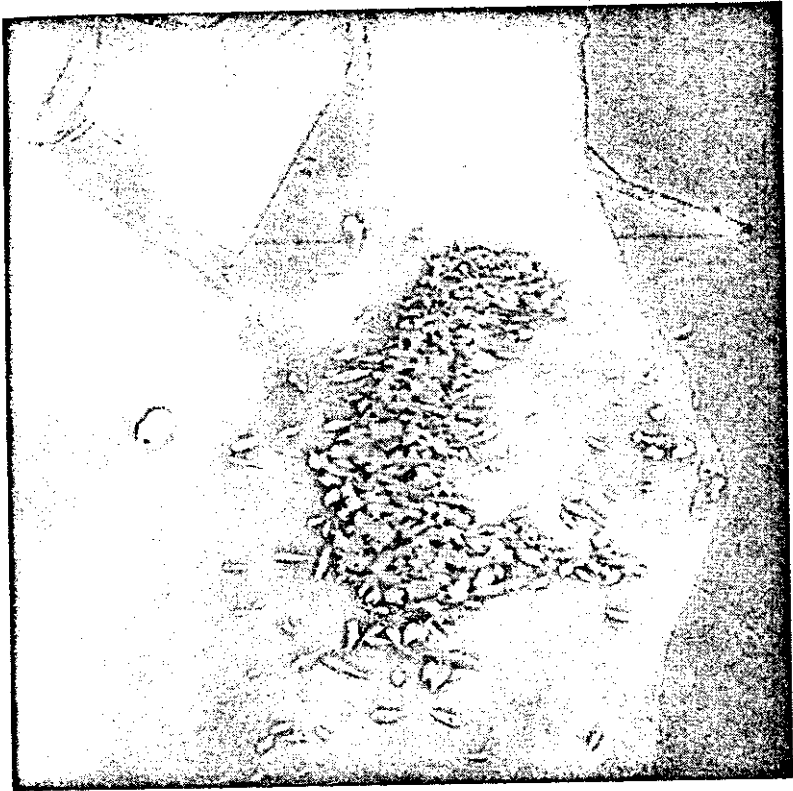


Fig. 8. Catch of young pompano from surf zone near St. Augustine pompano farm.

caught with seines on the open beach were placed in the ponds. In three of the early years (1957, 1959, and 1960) the young pompano were carried through the fall, but were killed by low temperatures. In 1958, all young pompano in a 1/8-acre pond were killed after a dam between the small pond and an adjoining larger pond containing an artesian well broke and flooded the smaller pond with fresh water. Another trial in this area failed when a dike separating a small pond from the Indian River breached and all the stock escaped.

In June 1960, the 1/8-acre pond near St. Augustine was stocked with about 2,500 pompano (all *Trachinotus carolinus*) about 3/4 to 1 inch long. They were fed six times daily, and grew to a length of about 7-8 inches in May 1961. Then a sudden, complete mortality occurred, which was attributed to oxygen depletion. A pipe allowing water exchange on high tide had become clogged by invertebrates (tunicates). The kill took place on a hot day with a small tidal fluctuation. This pond was restocked in June 1961 with an estimated 1,500 pompano about 1 inch long. In September 1962, about 700 of these fish, weighing about 1.1 pounds each, were marketed at \$1.25 per pound. The fish were reported

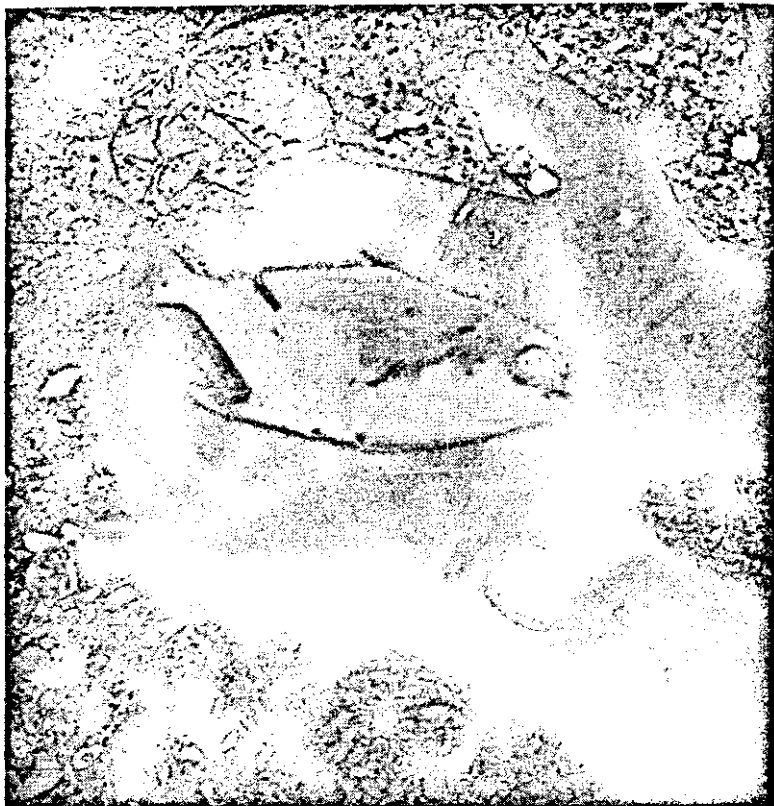


Fig. 9. Seven-month old pompano raised at St. Augustine farm.

to be choice, plump, and in good condition. Attempts to raise pompano in this pond were terminated in 1962, after the pond had been restocked and another die-off had occurred.

A pond was constructed in 1963 at Matansas, a short distance south of St. Augustine, and stocked with pompano fry in the spring of 1964; a hurricane in September 1964 broke the dike and all fish were lost. In 1965 two ponds, 1/8 acre and 3 acres in area, were constructed at Matansas, and were stocked with fry in June and August, 1965. Two extensive mortalities occurred in the larger pond, but the fish in the smaller pond lasted through the winter and were put into the larger pond early in 1966. The larger pond was also restocked with fry in May 1966. Several thousand pompano in this pond are now reported to be at or near a marketable size (Fig. 9).

Results of experimental pompano raising at Marineland near St. Augustine were reported by Fielding (1966). Ponds were stocked with small pompano (weighing about 1/70 to 1/3 ounce) at rates of 3,200 to 12,200 fish per acre. The experiments were terminated between 65 and 133 days later with production ranging from about 1,500 to 2,400

pounds per acre. The fish averaged about 10 inches total length and 0.6 pound.

Preliminary Recommendations on Pompano Farming

In view of the limited knowledge of the biological requirements and tolerances of the pompano, the following recommendations must be tentative:

- 1) After the fry are netted on the beach, they should be moved carefully and rapidly to a carrying tank, and transferred as quickly as possible to their first growing pond or aquarium. Use of compressed oxygen or air may be needed to transport the fry long distances.
- 2) Only one species of *Trachinotus* should be stocked; by popular preference it should be the common pompano, *Trachinotus carolinus*.
- 3) Larvae and fry of other fishes and invertebrates that could compete with the pompano for food and space should be excluded from the pond if possible.
- 4) The young pompano should be fed several times each day. We have been told that the very young may require a daily ration of about 1/10 of their body weight.
- 5) A finely ground food of frozen adult brine shrimp, fish filets, and whole shrimp has proved satisfactory for young pompano in the first 2 months or so after capture. Ground shrimp heads and ground or cut whole scrap fish are good when the pompanos are 3 to 4 inches long and larger. Fish meal suffices for fish of all sizes, but small pellets of fish meal are more economical for larger fish.
- 6) Newly-caught fry should be placed in an aquarium or small pond for a few days or weeks for observation of food requirements. More efficient use of the food offered and the culling of sickly or diseased fish and of other fish species can be accomplished.
- 7) Young pompano should not be retained too long in aquaria or small ponds, because it has been demonstrated that growth of fish often slows when they are crowded.
- 8) Pompano probably grow better at a nearly constant temperature. Extremes of temperature, especially below about 50F are usually injurious or fatal.

Among the problems that need to be investigated are the following:

- 1) Optimum salinity and temperature for holding pompano.
- 2) Diseases of pompano which could affect production.
- 3) Amounts and kinds of food which should be fed to pompano of various sizes.
- 4) Optimum sizes of ponds and stocking rates.
- 5) Important biological factors such as growth rates and life span.

Anyone considering pompano farming should consult the Conservation Department in his state to determine if there are closed seasons, minimum size limits, or other restrictions on the capture, confinement, and sale of pompano.

Considerable information is necessary before pompano farming can be on a secure, profitable basis. Farmers can begin without this

information, but their operations at present must be trial and error. A guarantee of investment can be assured only after research and controlled experiments have provided needed information on the biology of pompano and the practicality of farming them. The promise of success for farming this species is great enough to justify the needed research.

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