

GLOUCESTER'S TRAWL FISHERY FOR INDUSTRIAL FISH

By Robert L. Edwards*

DISCUSSION AND SUMMARY

The Gloucester trawl industrial fishery is based primarily on a whiting economy, in contrast to that of southern New England which is based on a flounder economy. Red hake are the principal species landed for reduction at Gloucester, with whiting ranking second in quantity. On southern New England grounds, skates make



Fig. 1 - The three principal areas fished by Gloucester trawl fleet fishing for industrial fish.

up a considerable portion of the trawl industrial landings, but in the Gulf of Maine, several species, depending on area and season, take third place. These include the angler, eelpout, and alewife. Only very small quantities of food fish are landed in the industrial catch at New Bedford and Pt. Judith from southern grounds while consistent small percentages of haddock, dab, and white hake show up in Gulf of Maine landings.

The term "industrial fish" as used here refers to those species commonly taken by trawlers and referred to as "trash fish." They are taken along with desired food species and sold separately for reduction to fishery byproducts or meal plants.

Menhaden are industrial fish in the strict sense of the word, but they are the object of a highly specialized purse-seine fishery

and they are not covered in this article. Because of their high oil content, reduction plants prefer menhaden since they yield both meal and oil. Industrial trawl fish are useful only as a source of meal because they contain only very small amounts of oil.

The trawl fishery for industrial fish started in Gloucester as elsewhere in New England in 1949. The Gloucester landings of this fishery have not been very consistent or large, although in recent years a slow but steady increase has occurred. As a result of the very poor landings of menhaden in 1957, the Gloucester landings of trawl industrial fish more than doubled, amount-

ing to over 37 million pounds (see table 1). During this same year, over 42 million pounds were landed at New Bedford and almost 100 million pounds landed at Pt. Judith.

Table 1 - Gloucester Trawl Industrial Fish and Menhaden Landings by Month, 1955 to 1957

Months	1957		1956		1955	
	Trawl Fish	Menhaden	Trawl Fish	Menhaden	Trawl Fish	Menhaden
	(1,000 Lbs.)					
January	127		100		421	
February	65		24		344	
March	25		54		66	
April	8		100		272	
May	1,762		735		2,110	
June	3,330	1,513	1,775	8,384	609	5,558
July	4,540	13,300	1,100	36,236	254	20,577
August	6,117	3,577	2,175	17,832	2,925	21,371
September	7,454	2,311	3,348	3,957	1,399	12,672
October	7,362		2,009		2,519	1,102
November	5,500		2,400		2,022	
December	1,351		2,163		1,290	
Totals	37,641	20,701	15,983	66,409	14,224	61,280

*Fishery Research Biologist, North Atlantic Fishery Investigations, Division of Biological Research, U. S. Bureau of Commercial Fisheries, Woods Hole, Mass.

The Gulf of Maine and southern New England trawl industrial fisheries differ in their emphasis on food species. In general, the southern New England fishery is based on a flounder economy, directing its effort toward the capture of yellowtail flounder, fluke, and blackback flounder, in addition to red hake and other "trash" species. The Gloucester whiting-industrial fishery is primarily for whiting with secondary interest in such groundfish as haddock, cod, white hake, and pollock. The Gloucester whiting-industrial fishery may be said to be based on a whiting economy.

FISHING AREAS

The trawl industrial fish landed at Gloucester are mainly taken from three grounds (see fig. 1), the Nauset area along Cape Cod's outer shore, Stellwagen Bank, and the local grounds around Cape Ann. The location of the fleet depends upon weather, the season, and the relative abundance of fish, especially whiting. Although the fleet is occasionally found concentrated on the local Gloucester grounds or Stellwagen Bank, the Nauset area contributes 80-90 percent of the total landings. Stellwagen Bank contributes the second largest share, and the local Gloucester grounds contribute the least.

If the demand for trawl industrial fish continues to increase, the amount of fishing on these various grounds will certainly change, and additional areas will be exploited to supply this demand. Concentrations of red hake will be sought in addition to whiting.

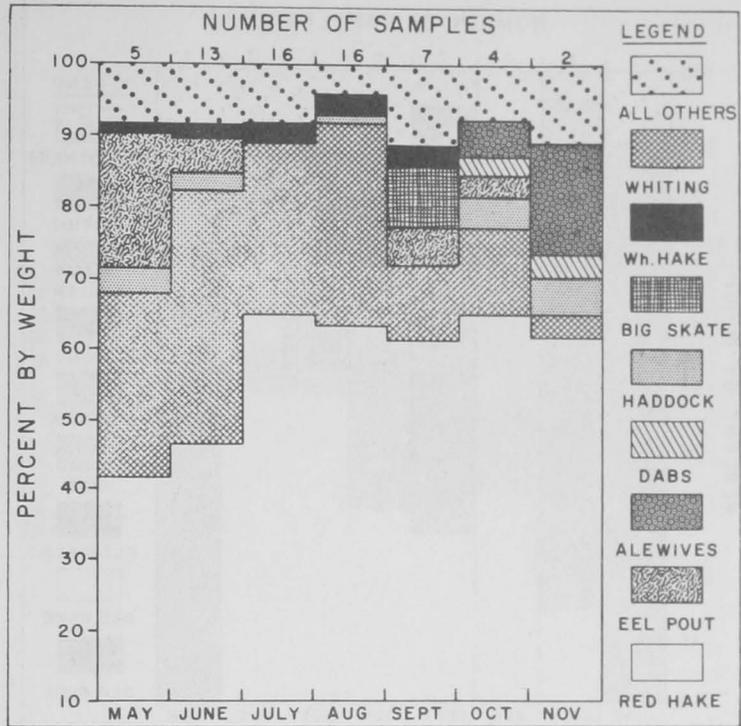


Fig. 2 - Percentage by weight species composition of trawl industrial fish landings at Gloucester from the Nauset area. Data for 1956 and 1957 have been combined.

Table 2 - Percentage by Weight of Species Composition of the Trawl Industrial Fish Landings at Gloucester from the Three Principal Areas for the Entire Period for Which Information is Available

Species	Area and Period Covered		
	Nauset (May-Nov.)	Stellwagen (June-Jan.)	Gloucester (May-Nov.)
Red hake	57.5	33.8	43.9
Whiting	21.7	39.1	13.3
Eelpout	5.1	1.6	2.6
Alewife	3.4	2.6	9.3
Haddock	2.7	1.8	2.9
Herring	2.7	2.2	2.0
White hake	1.7	1.0	0.8
Big skate	1.6	-	0.5
Spiny dogfish	1.5	1.9	3.0
Dab	1.1	5.1	3.7
Little skate	0.4	0.5	1.0
Longhorn sculpin	0.4	0.3	0.2
Shad	0.3	0.2	2.0
Sea raven	0.3	0.1	-
Barndoor	0.2	0.1	2.2
Fourspot flounder	0.1	-	-
Rockling	0.1	2.1	0.3
Yellowtail	0.1	-	-
Cod	0.1	0.1	0.3
Sea eel	0.1	0.6	-
Ocean perch	0.1	1.2	1.3
Pollock	0.1	0.1	-
All others	0.3	0.5	0.1
Angler	-	4.3	10.2
Blackback	-	0.1	0.2
Grey sole	-	0.5	0.2
Number of Samples	63	21	20

SPECIES COMPOSITION

The species composition of the landings is presented graphically for each fishing ground (figs. 2-4). Upwards of 20 species may be included in individual catches in significant quantities, depending on the season and the area fished. To keep the graphs reasonably simple, only those species that appear consistently and in some quantity are plotted. The "all others" category on the graphs does not include significant quantities of species of particular interest here.

Figure 2, the percentage by weight of species composition of landings from the Nauset area, indicates that the red hake (*Urophycis chuss*) makes up the bulk of the fish landed, being approximately 55 percent of the total for the entire period.

The whiting, or silver hake (*Merluccius eilinearis*), makes up about 22 percent of the landings, with the eelpout (*Macrozoarces americanus*) ranking as a poor third,

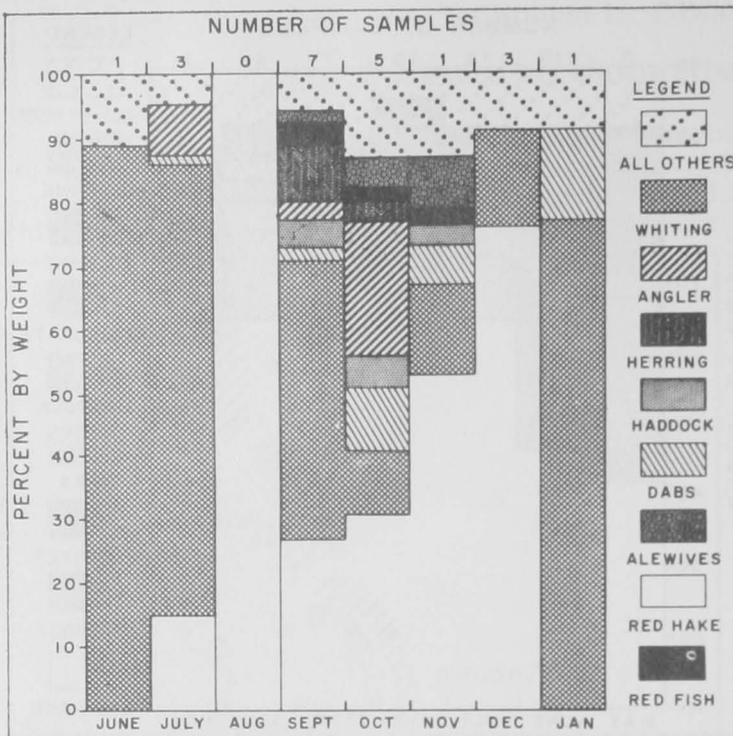


Fig. 3 - Percentage by weight species composition of trawl industrial fish landings at Gloucester from Stellwagen Bank. Data for 1956 and 1957 have been combined.

or about 5 percent of the total. It should be observed that only three food species (other than whiting), haddock (*Melanogrammus aeglefinus*), dab (*Hippoglossoides platessoides*), and white hake (*Urophycis tenuis*) appear in any number and constitute only a very small part of the landings, in all less than 6 percent.

The composition of the landings from Stellwagen Bank (fig. 3) is quite different. Red hake do not make up the bulk of the landings until fall and early winter in sharp contrast to the other areas. Whiting dominate the catch in the summer and fall. The red hake and whiting together make up approximately 73 percent of the total catch. Dabs are present in significant quantities, making up about 5 percent of the total landings. The white hake and haddock appear consistently but make up a very small part of the total catch.

The local Gloucester grounds, Ipswich Bay, Isle of Shoals, Thatchers (fig. 4), and other nearby fishing grounds present roughly the same picture as that of the Nauset area. Red hake predominate, making up about 45 percent of the total, whiting are second in quantity, contributing about 13 percent to the catch. Angler (*Lophius*

Table 3 - Catch per Hour of Trawl Industrial Fish, Round Whiting, and Other Food Fish by the Gloucester Fleet on Nauset Grounds. Data for 1956 and 1957 are Combined

Month	No. of Trips	Catch Per Hour			Average Catch per Trip and Percentage of Total Trip					
		Industrial	Round Whiting (Pounds)	All Other Food Species	Industrial		Round Whiting		All Other Food Species	
					Lbs.	Percent	Lbs.	Percent	Lbs.	Percent
May	34	1,600	1,450	120	30,900	50.4	27,900	45.5	2,500	4.6
June	31	4,080	2,130	100	46,200	64.6	24,200	33.8	1,100	1.6
July	35	7,720	360	240	78,700	92.4	3,700	4.3	2,800	3.3
August	36	4,930	1,170	50	56,600	80.2	13,400	19.0	600	0.9
September	71	3,050	1,590	180	39,000	63.4	20,300	33.0	2,300	3.7
October	26	2,180	1,130	370	31,300	63.2	14,500	29.4	3,700	7.5
November	38	1,440	890	330	24,600	54.4	15,200	33.5	5,500	12.2

americanus) are in third place, making up about 10 percent of the total. Dabs and haddock together make up a consistent but relatively small (about 6 percent) contribution to the total catch.

Table 2 lists the percentages by weight of all species landed as trawl industrial fish from each of the three areas discussed. These figures are based on all the samples available and are not weighted according to the landings of individual months. They represent only an approximation, therefore, of the actual breakdown in percentage by weight of the landings.

The species composition picture presented for these grounds differs considerably from that of the landings at New Bedford and Pt. Judith (Edwards and Lux 1938). In southern New England waters, red hake are clearly the predominant species for almost the entire year. On the average, they make up over 60 percent of the entire

catch. Whiting rank second, about 20 percent. Little skate (*Raja erinacea*) and its relatives, big skate (*R. ocellata*), and the barndoor skate (*R. laevis*), make up about 10 percent of the total, in sharp contrast to the Gloucester landings.

ABUNDANCE

Adequate interviewing for abundance studies began in Gloucester early in 1956. The interviewers obtained information for each trip, on the number of tows made and the average length of tow. The catch per unit of effort was obtained by simply dividing the landings by the actual number of hours that the net was fishing. The fleet is made up mostly of vessels with an average gross tonnage of about 50 tons, and no corrections were made (or were felt necessary at this stage) for individual boats, actual vessel size, or gear. Since most of the landings come from the Nauset area, the following discussions will be limited to that area.

Figure 5 shows the seasonal variation in abundance as measured by catch in pounds per hour for the period May through November. All data available for 1956 and 1957 have been combined to elicit the general seasonal pattern. A fisherman may expect to catch about 4,000 pounds per hour in May, with the catch increasing rapidly to over 8,000 pounds per hour in July. The decline in August and early September to about 6,000 pounds per hour is followed by a low level of 2,500 pounds per hour in October and November.

Figure 6 demonstrates that two species, red hake and whiting, account for most of the significant changes observed. The changes in the abundance of red hake are marked and reflect all of the general changes in figure 5. Red hake reach their peak of abundance in July (fig. 6), when the average vessel catch is about 5,000 pounds an hour. Whiting catches of over 3,000 pounds an hour were made in June. In general, whiting are present at levels of at least 1,000 pounds an hour, usually more.

The graph of the catch per hour of whiting (fig. 6) includes both the fish landed for reduction and as human food. Figure 6 also demonstrates that the proportion of whiting landed for reduction is directly related to the abundance of red hake rather than to the whiting's own level of abundance. In figure 6 the industrial portion of the whiting catch expressed in percentage of the total whiting catch is plotted against the catch per hour of red hake. As the catch of red hake increases, it is easier to get a full boatland more quickly, and a fisherman needs to do less culling of fish of higher value to have a successful trip. When "trash fish" are abundant a good trip can be made very quickly. Apparently, the price differential is not sufficient to make it worthwhile for the fishermen to cull out the whiting intensively for the food market under these conditions.

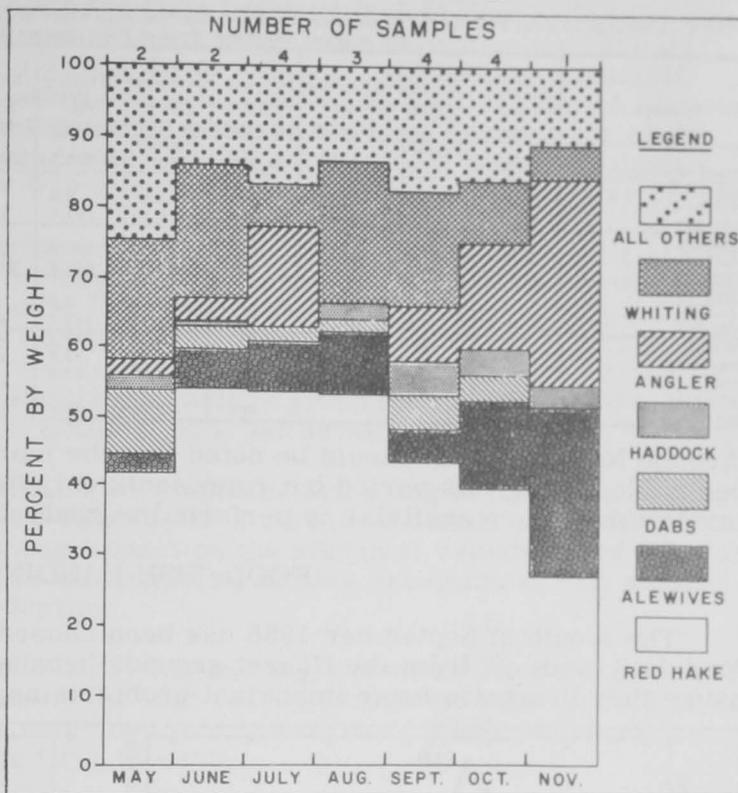


Fig. 4 - Percentage by weight species composition of trawl industrial fish landings at Gloucester from the local Gloucester grounds. Data for 1956 and 1957 have been combined.

The over-all picture of the Nauset landings is summarized in table 3. Here listed are the statistics on the various portions of the catch for the months of May

Table 4 - Landings of Food Fish by the Gloucester Whiting-Industrial Fish Fleet in September 1956. Total Quantity Landed, Catch Per Hour, and Average Catch Per Trip of Food Species (by Market Category)

Species	Sept. 1-10 15 Trips, 195.5 Hours Fishing			Sept. 1-10 24 Trips, 299.5 Hours Fishing			Sept. 21-30 15 Trips, 242 Hours Fishing			Totals for Month 54 Trips, 737 Hours Fishing		
	Total Landings	Catch per Hour (Pounds)	Trip Average	Total Landings	Catch per Hour (Pounds)	Trip Average	Total Landings	Catch per Hour (Pounds)	Trip Average	Total Landings	Catch per Hour (Pounds)	Trip Average
Round whiting	148,900	761.6	9,900.0	734,200	2,364.5	30,600.0	357,000	1,477.3	23,800.0	1,240,600	1,683.3	21,700.0
Cod:												
Large	400	2.05	26.7	580	1.9	2.4	360	1.49	24.0	1,340	1.82	24.8
Market	2,675	13.68	178.4	2,425	8.10	101.0	1,850	7.64	123.3	6,950	9.43	128.7
Haddock:												
Large	1,720	8.80	114.7	7,218	24.10	300.8	12,865	53.16	857.7	21,803	29.58	403.8
Scrod	5,650	28.90	376.7	16,205	53.50	675.2	34,265	141.59	2,284.3	56,120	76.15	1,039.3
White hake:												
Large	315	1.61	21.0	30	0.10	1.2	-	-	-	345	0.47	6.4
Market	990	5.06	66.0	2,810	9.38	117.1	2,800	11.57	186.7	6,600	8.96	122.2
Pollock	1,355	6.93	90.3	2,810	9.38	117.1	3,125	12.91	208.3	6,660	9.04	123.3
Gray sole	-	-	-	330	1.10	13.8	3,470	14.34	231.3	3,800	5.16	70.4
Dabs	10	0.05	0.7	560	1.87	23.3	485	2.00	32.3	1,055	1.43	19.5
Yellowtail	125	0.64	8.3	-	-	-	-	-	-	125	0.17	2.3
Butterfish	-	-	-	600	2.00	25.0	250	1.03	16.7	850	1.15	15.7

through November. It should be noted that the number of trips is not the total number made during this period but represents only those trips for which adequate interview data were available to perform the analysis.

FOOD-FISH LANDINGS

The month of September 1956 has been chosen to illustrate the nature of the food-fish landings from the Nauset grounds because of an abundance of data and because they illustrate some important problems associated with this fishery. The

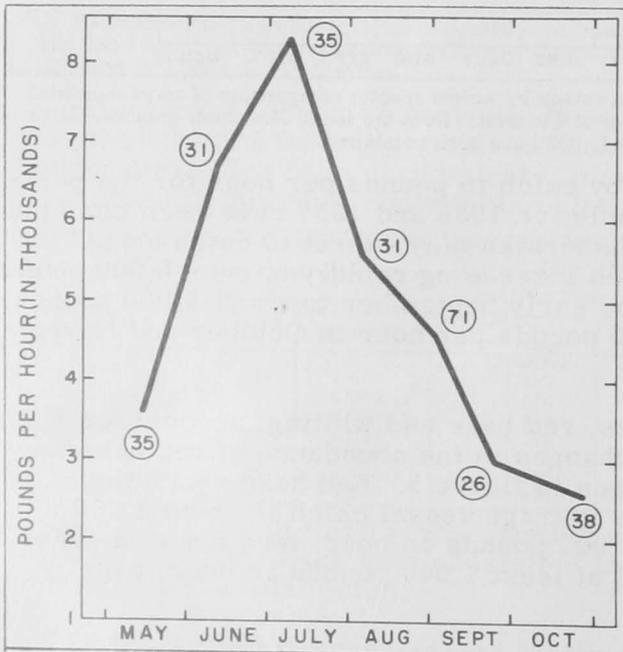


Fig. 5 - Catch per hour of all species on the Nauset grounds for May through November. Number of interviewed trips for each period is circled. Data for 1956 and 1957 have been combined.

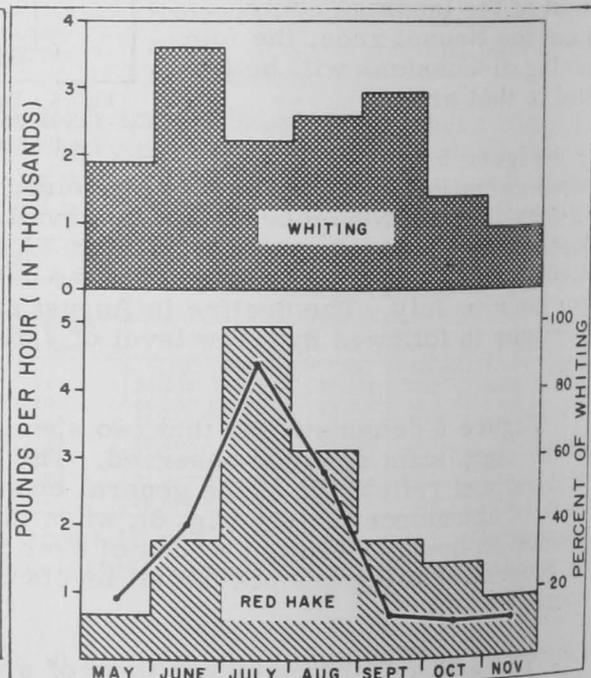


Fig. 6 - Catch in pounds per hour of red hake and whiting in Gloucester landings from the Nauset area. Whiting data are based on the amount landed for reduction plus that landed as food. Data are for May through November. Data for 1956 and 1957 have been combined. Superimposed on the red hake histogram is the graph of the percentage of the total whiting catch sold for reduction.

data were broken down into three periods and are summarized in table 4. The average boat, aside from its industrial catch, lands more whiting than anything else. Various gadoids, haddock, cod, white hake, and pollock make up most of the rest of the food-fish hauls. Flounders make up only a small percentage of the total.

Landings of both market categories of cod--large and market--decreased during September 1956. The average monthly catch per hour was 9.43 pounds for market, decreasing from 13.68 pounds for the first ten days to 7.64 pounds for the last ten days of the month. While landings of large white hake in September 1956 decreased from a catch per hour of 1.61 pounds to nothing, market hake substantially increased, in fact landings doubled from the first to the last period. A curious fact worthy of further study is the similarity between the catches per hour of the white hake and the pollock. The gray sole and dab catches both substantially increased, while yellowtail flounder was captured only during the first 10-day period.

The amount of whiting landed for reduction by the trawl industrial fleet at Gloucester is directly related to the abundance of red hake rather than to the abundance of whiting itself. This situation is probably caused by the relatively small price differential between whiting and industrial fish.

The trawl industrial fishery also lands various groundfish for the food market, including haddock, cod, white hake, pollock, dab, yellowtail, and gray sole.

Only small percentages of valuable food species are going to the reduction plants at this time. An expansion of Gloucester's trawl industrial fishery should be possible without foreseeable undue impact on the stocks of valuable food species, considering present practices. The whiting is a possible exception to this since it is in demand for both food and reduction.

The data for haddock are particularly interesting, the catch per hour increasing markedly for both categories. During the last 10-day period the average trip of the two market categories of haddock combined was in excess of 3,000 pounds, in contrast to only 500 pounds during the first 10 days.

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(Also Separate No. 509.)



NEW PACKAGING TECHNIQUE INVOLVES AROMATIC PACKING

Inasmuch as increased attention is being given to improving packaging techniques such as containers and wrappings, the fishery trade may be interested in a recent report concerning the development of aromatic packaging for foods. According to a prominent food trade journal, preliminary steps have been taken by at least two large food manufacturing corporations to develop aromatic packaging materials. Although this is still in the trial stage, it indicates another step toward customer appeal on the part of packaging manufacturers and food merchandisers.

While the report made no specific reference to the use of this new type of packaging as far as fishery products are concerned, it certainly is something that the fishery trade should watch for possible application.