THE 1960 SALT-WATER ANGLING SURVEY

United States Department of the Interior
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife
Circular 153

ERRATA

Page 4, Table 1, Total pounds of fish caught: Line 1 183,740,000
6 83,219,000
7 1,380,301,000

Page 13, Table 6, Item 9, Column V: 1.0

Page 15, Table 7

North Atlantic, Number of fish caught

62,904,000 13,469,000 11,055,000 9,955,000

All regions, Number of fish caught

292,367,000 183,592,000 84,471,000 72,442,000

Page 19, Table 8

Region V, item 6, column 4: Bonitos, 1,853

Circular 153

THE 1960 SALT-WATER ANGLING SURVEY

John R. Clark

Fishery Research Biologist

UNITED STATES DEPARTMENT OF THE INTERIOR
Stewart L. Udall, Secretary

FISH AND WILDLIFE SERVICE
Clarence F. Pautzke, Commissioner

BUREAU OF SPORT FISHERIES AND WILDLIFE
Daniel H. Janzen, Director

Circular 153

CONTENTS

FOREWORD

Statistics are essential to rational conservation action and reasonable public policies about fish and fishing. The quantities caught, the effort spent in the catching, and the geographic distribution of catches are necessary for diagnosing the condition of any fish population. Representing as they do the experience of thousands of people, these statistics provide the best yardstick yet devised for currently measuring abundance, for indicating trouble spots, and for evaluating the effects of remedial measures. Furthermore they can be enormously useful in geographic studies of species, particularly when supplemented by surveys of research vessels. However, catch statistics are worthy only to the extent that they are reasonably complete and continuous in space and time. So long as commercial fisheries accounted for the great bulk of the sea harvest or at least a constant proportion of it, as they probably did until recent years, these requirements have been fulfilled. But this condition may no longer hold true except in a few highly industrialized fisheries, for many accumulating bits and pieces of evidence indicate that the number of noncommercial salt-water fishermen has been increasing by leaps and bounds, and the total of their catches has reached proportions that can no longer be dismissed as inconsequential.

How significant are these changes? To answer that question we must ask others. How many salt-water anglers are there? Where do they fish? What kind of fishes do they take and in what quantities?

It is fortunate that the national marine game fish research program was established in time to take advantage of the 1960 National Survey of Fishing and Hunting which provided for a well-designed sampling of the population of the United States to estimate the magnitude of salt-water angling. The survey could cover only the year of the census, but for that one year could tell us with a high degree of accuracy the numbers of fishermen, the regions where they fished, and the total numbers of fish which they caught. It could give us a fairly good idea of the kinds of fish which they took, and with the help of friends in all of the maritime States we have attempted a rough approximation of the total weights.

The following report giving the results of this survey leaves no doubt that people fishing in the sea for recreation contribute very substantially to the nation's production of sea food. The portion of their catches in the total harvest (as compared with that of commercial fishermen) varies widely among the different species, and for any given species it varies from region to region. Between 1955 and 1960 the number of salt-water anglers increased by 2 million. As this trend continues, conservation problems become increasingly complex, and the necessity for a full accounting of the sea harvest grows ever more pressing. The task of making this accounting will be formidable. It will require a sampling program especially tailored to fit the peculiarities of the problem and a trained personnel to conduct it. Nevertheless, until these are available it will not be possible to maintain a current assessment of the total fishing effort and the total catch of the great majority of food and game seafishes living along the coasts of the United States.

L. A. Walford
Director
Sandy Hook Marine Laboratory

THE 1960 SALT-WATER ANGLING SURVEY

By John R. Clark, Fishery Research Biologist,
Sandy Hook Marine Laboratory, Highlands, New Jersey

Sportsmen take a large proportion of the total United States catch of many salt-water species of fish. Consequently, in determining man's effect on the seafish resources of the Nation, it is important to consider the sport catch as well as the commercial catch. Nearly complete records of the activities of U.S. commercial fishermen and their catches have been available for many years, but statistics for the sport catch are sparse. These statistics are difficult to obtain because salt-water anglers are dispersed along thousands of miles of shoreline, fishing from boats, jetties, piers, bridges, and the open beach. They fish night and day, 7 days a week, throughout the year. Seldom are their catches reported unless they are competing in contests, and then it is usually only the larger fish that are recorded.

California is the only State that continuously collects statistics for any substantial part of its salt-water sport fishery, i.e., the catches of party boats. Several other States have made full or partial surveys for certain years, but these efforts have been too sporadic to permit estimating the magnitude of salt-water angling on a national scale.

When the Bureau of Sport Fisheries and Wildlife began its national marine game fish research program in 1960,[1] some measure of the national harvest of salt-water sport fishes was needed to provide the basis for planning research.

An opportunity to obtain estimates of the sport catch of salt-water fishes for the whole country was provided by the 1960 National Survey of Fishing and Hunting, conducted by the Bureau of the Census for the Bureau of Sport Fisheries and Wildlife. This survey had as its purpose a determination of the economic significance of both sport fishing and hunting. A plan for estimating angler's catches was included by special arrangement with the Bureau of the Census. The information resulting from the supplementary salt-water survey is the subject of this report.

We are grateful for the generous assistance which we received from the many persons and agencies shown in appendix E in our efforts to obtain average weight data. Robert Wicklund assisted in assembling the statistics, making the calculations, and compiling the index of common names.

THE SURVEY

Survey technique

The survey consisted of household interviews of 45,000 persons in 18,000 homes, drawn by the method of area probability sampling to represent the population of persons 12 years of age and older in the continental United States. It was not possible to include Hawaii in the Survey because the population sample for that State was not large enough to provide for reliable catch estimates by species.

Of the 45,000 persons interviewed, 1,750 salt-water anglers were identified. The interviewers were able to obtain information from 92 percent of them. This information was used to obtain estimates of the total catch of all salt-water anglers. The proportion of the total number of anglers who were interviewed varied from sampling area to sampling area, but for the country as a whole each person interviewed represented about 3,350 anglers.

Each salt-water angler interviewed was asked to report the total number of fish which he had caught from tidal waters,

[1] Established by Public Law 86-359, which states that "the Secretary of the Interior is hereby directed to undertake a comprehensive continuing study of the migratory marine fish of interest to recreational fishermen of the United States, including species inhabiting the offshore waters of the United States and species which migrate through or spend a part of their lives in the inshore waters of the United States. The study shall include, but not be limited to research on migrations, identity of stocks, growth rates, mortality rates, variations in survival, environmental influences, both natural and artificial, including pollution, and effects of fishing on the species, for the purpose of development of wise conservation policies and constructive management activities."

bays, and the open sea during 1960, by species, area of fishing, and principal method of fishing. It was made clear to those interviewed that they should include only fish caught primarily for sport, not for sale. A sample of the interview record is given in appendix C. Because of the methodical, step-by-step interviewing procedure required for maximum stimulation of recall, the average interview lasted about 45 minutes.

The plan of the survey is given in detail in the report of the Bureau of the Census which appears in appendix C.

The regions

Because of the limitations of sampling permitted under the survey plan, we could allocate catches only to large geographical regions. The boundaries of the regions were based upon ecological rather than political considerations, i.e., they were chosen to coincide with generally accepted faunal breaks. On this basis, we established the following regions for reporting catches:

Region I, North Atlantic: Atlantic Coast from Maine to New York.

Region II, Middle Atlantic: Atlantic Coast from New Jersey to Cape Hatteras, North Carolina.

Region III, South Atlantic: Atlantic Coast from Cape Hatteras to Southern Florida, including the Florida Keys.

Region IV, Gulf of Mexico: Gulf Coast from Southern Florida to Texas.

Region V, South Pacific: Pacific Coast from Point Conception, California, to the Mexican border.

Region VI, North Pacific: Pacific Coast of the United States from Alaska to Point Conception.

Species grouping

The most perplexing problems in designing the interview procedure and in analyzing the survey results arose from lack of uniformity in the names which anglers use for fishes. For example, the species Cynoscion regalis is known as squeteague in New England, weakfish in the Middle Atlantic, and seatrout along the southern coast. Seatrout may refer also to Cynoscion nebulosis, a related species, or equally well to one of the sea-run fresh-water trouts, or on the Pacific coast to the greenling or to the white seabass; and the white seabass in turn may be called weakfish.

Anglers often identify fishes only in broad categories such as "flounder," "shark," or "mackerel." They also often use such catch-all designations as "shiner" or "perch," or any of a number of local names, such as sally-growler in northern New Jersey for the toadfish, Opsanus tau, or snowshoe flounder in Rhode Island for larger summer flounder, Paralichthys dentatus.

In preparing the interview form for each region, we chose the fish name that appeared to be in most common use for that region, and we occasionally added synonyms for clarification. But in preparing the tables for this report we have identified all fishes by the standard names listed in "A List of Common and Scientific Names of Fishes From the United States and Canada" (American Fisheries Society, Special Publication No. 2, 1960).

Because of limitations of the interview procedure and of processing of the data, only 20 species or groups of species could be listed on the interview form for each region. To determine which to include, first priority was given to those which appeared from such evidence as was available to be abundant in the catches of the region. Since these fishes numbered more than 20 in all regions except VI, it was necessary to shorten the list by combining fishes into categories of closely related species, or to arbitrarily eliminate names of species thought to be of lesser importance, or to do both. The final arrangement was based upon our judgment as to which of these choices would result in the most useful information.

We found it not practicable to confine the listings to uniform taxonomic levels. Thus the categories used for reporting catches, which we term "species groups," consist variously of orders, families, genera, and species. Some categories represent only part of a taxonomic grouping, e.g., several genera within a family. We usually combined into a single group those closely related fishes which fishermen do not readily recognize as separate species.

The decisions on species grouping were made separately for each region, and each decision was based primarily upon special circumstances affecting that region. But again, some compromises were necessary

to facilitate comparing catches between regions and summarizing catches for the Nation as a whole.

Space was also provided on the interview form for fishes which were not included in any of the designated species groups or which might not be recognized by the fishermen interviewed as being included in them. These entries were subsequently identified where possible and included in an appropriate species group. Some catches reported were not identified by the interviewee. These, together with catches of doubtful identity, and species for which reported catches were so low as to be statistically unreliable, were included in a miscellaneous group. A list of the 75 species groups under which the catches were tabulated is given in appendix A.

Fishing methods

Information on fishing method was categorized into four groups, according to whether fishing was conducted from a boat or from shore, and whether capture depended on motion of part or all of the equipment (i.e., by casting, trolling, jigging, or spearing) or whether it depended on a bait lying still in the water. The four categories are--

1. Still fishing from boats.
2. Motion fishing from boats.
3. Still fishing from shore.
4. Motion fishing from shore.

Catches were allocated by each person interviewed to the principal method used in catching each species reported, as shown on the sample interview form (fig. 1, app. C.)

Weight of the catch

The interview plan provided for obtaining only the numbers of the various species caught. After the survey was concluded and these data were tabulated, the totals were multiplied by appropriate factors to convert numbers to weights. The estimates upon which these factors were based were supplied by State conservation agencies, governmental and private marine laboratories, experienced sportsmen, editorial staffs of fishing magazines, outdoor writers, and charter and party boat operators. (A list of names and agencies of contributors is given in appendix E.) For the most part, the factors used for the various species represented simple averages of all the estimates supplied.

Since the fish comprising the miscellaneous groups in each region were of doubtful or unknown identity, our only basis for estimating their weight was to assign as their conversion factor the average weight of all the identified species groups.

Obviously, confidence limits cannot be placed on the estimated weights for the species groups. At best the estimates should be considered only a general indication of the order of size of the catches.

RESULTS

A summary of findings of the national survey of salt-water angling is presented in table 1.[2] These statistics are for the catches of salt-water anglers only and are based upon the activities of the 6,198,000 classed by the Bureau of the Census as "substantial participants." There were also an estimated 3,000,000 more "incidental participants," i.e., a group who fished very little and taken together accounted for no more than 5 percent of the total angling activity. Thus the catch of the substantial participants, as treated herein, can be taken to represent not less than 95 percent of the total continental U.S. catch by persons of age 12 or over who were not in institutions or in the Armed Forces. This matter is treated in more detail in appendix C.

According to statistical measures of reliability (see appendix D) the estimated number of anglers who fished in salt water during 1960 given in table 1 is a close approximation to the actual number. One possible source of error that cannot be treated statistically is the time-honored reputation that anglers have for exaggerating their catches. However, the survey was conducted in a manner to encourage people to treat the interviews seriously, and we have assumed that untruthful answers contribute a negligible amount to the total error.

[2] An economic and demographic analysis of salt-water angling is included in the 1960 National Survey of Fishing and Hunting (U.S. Fish and Wildlife Service, Circular 120). This report provides a detailed account of the $626 million spent by salt-water anglers on their sport in 1960. It also treats of other statistics such as the sex and age composition of anglers (table 14 of Circular 120).

The catch for each of the 75 species groups is given for each region in table 2. An explanation of the content of each species group is given in appendix A. A list of common names of species which may be included in these groups is given in appendix B. Each common name is indexed to indicate the species group to which it belongs.

Catches were reported for several species which are ordinarily thought of as fresh-water species, such as alligator gar, yellow perch, and fresh-water catfish. Since these do occur in brackish waters, they come within the scope of our survey. A review of the interview records confirmed the validity of these reports. For example, a large part of the catfish reported for region V were caught in low-salinity waters of the San Francisco Bay area.

Table 3 lists the estimated numbers of anglers who caught fish of each species group, and table 4 lists the average catch for each of the species groups. The average calculated for each species group is based only upon anglers who reported catches of that group, and not upon all anglers fishing in the region during the year. The expected error in these catch-per-angler figures will be highest where the number of anglers is lowest. For example, the average catch of 432 spadefish in region IV appears to be an overestimate. This is likely since the estimate is based upon only one interviewee who reported spadefish catches and in the sampling procedure represented 3,000 anglers. On the other hand, the average catch figure for croaker in the same region is much more reliable since it is based upon interviews of more than 100 anglers.

Table 5 lists the average weights used to estimate the total poundage caught, which is given in table 6. These data are based on expert opinion as well as on published information; nevertheless they can be taken only as rough approximations.

A summary of catches by fishing method for each region is given in table 7. The catch of each species group is shown for each of the four categories under which interviewees reported their catch according to the principal method they used. These four categories are defined in a previous section. Catches are given for each of the species groups by region in table 8.

TABLE 1.--Summary of catches of salt-water anglers in U.S. waters for 1960, by regions

Region[1]	Number of anglers[2]	Number of fish caught		Pounds of fish caught	
		Total	Average per angler	Total	Average per angler
I. North Atlantic..	1,160,000	97,383,000	84	183,840,000	158
II. Middle Atlantic.	1,344,000	114,502,000	85	178,000,000	132
III. South Atlantic..	1,024,000	156,942,000	153	370,112,000	361
IV. Gulf of Mexico..	1,412,000	184,582,000	131	411,110,000	291
V. South Pacific...	687,000	50,064,000	73	154,120,000	224
VI. North Pacific...	714,000	29,399,000	41	113,770,000	159
All regions.....	[3] 6,198,000	632,872,000	102	1,410,952,000	228

[1] Boundaries of the regions are described in the text.
[2] Includes only anglers 12 years of age and older who are considered "substantial" participants (see text for definition of "substantial").
[3] Excludes 94,000 salt-water anglers who fished Hawaiian waters only. This figure is less than the sum of individual regions because some fishermen fished in more than one region.

TABLE 2.--Number of fish caught by U.S. salt-water anglers in 1960, by species and by regions

[In thousands]

Species group	I North Atlantic	II Middle Atlantic	III South Atlantic	IV Gulf of Mexico	V South Pacific	VI North Pacific	All regions
1. Albacore, false	52	407	--	--	--	--	459
2. Alligator - gar	--	--	--	158	--	--	158
3. Barracudas	--	--	547	26	7,361	--	7,934
4. Basses, Pacific	--	--	--	--	5,315	--	5,315
5. Bluefish	4,831	11,748	7,181	54	--	--	23,814
6. Bonefish	--	--	305	--	--	--	305
7. Bonitos	179	398	26	47	12,079	--	12,729
8. Cabezon and Pacific sculpins[1]	--	--	--	--	217	8,450	8,667
9. California corbina	--	--	--	--	794	--	794
10. California sheephead	--	--	--	--	290	--	290
11. Catfishes	--	781	8,934	22,290	--	690	32,695
12. Cods, Atlantic	3,998	793	--	--	--	--	4,791
13. Cods, Pacific	--	--	--	--	--	1,652	1,652
14. Croakers	--	8,214	3,741	31,611	1,901	110	45,577
15. Cunner	707	--	--	--	--	--	707
16. Cusk	70	--	--	--	--	--	70
17. Dolphins	--	210	152	313	--	--	675
18. Drum, black	--	132	4,865	4,580	--	--	9,577
19. Drum, red	--	456	4,527	10,294	--	--	15,277
20. Eel, American	1,485	508	86	--	--	--	2,079
21. Flatfishes	28,794	12,382	202	3,517	2,633	3,118	50,646
22. Goosefish	--	18	--	--	--	--	18
23. Greenlings	--	--	--	--	--	1,900	1,900
24. Groupers	--	--	2,286	9,346	--	--	11,632
25. Grunts	--	--	19,032	1,877	--	--	20,909
26. Haddock	544	--	--	--	--	--	544
27. Hake, silver	1,641	1,961	--	--	--	--	3,602
28. Hake, squirrel	353	347	--	--	--	--	700
29. Halfmoon	--	--	--	--	94	--	94
30. Herring, Pacific	--	--	--	--	768	--	768
31. Jacks	--	10	8,241	4,324	--	--	12,575
32. Jack mackerel	--	--	--	--	4,352	--	4,352
33. Kingfishes	1,139	3,143	18,098	7,241	--	--	29,621
34. Ladyfish	--	--	55	777	--	--	832
35. Lingcod	--	--	--	--	--	540	540
36. Mackerels, Atlantic	10,097	750	--	--	--	--	10,847
37. Mackerel, Pacific	--	--	--	--	2,820	247	3,067
38. Mackerels, Spanish	--	--	7,380	5,149	--	--	12,529
39. Mullets	--	68	17,128	2,044	--	--	19,240
40. Ocean whitefish	--	--	--	--	134	--	134
41. Opaleye	--	--	--	--	1,479	--	1,479
42. Perch, white	1,413	13,162	948	191	--	--	15,714
43. Perch, yellow	180	79	--	--	--	--	259
44. Pigfish	--	282	426	--	--	--	708
45. Pollock	4,335	--	--	--	--	--	4,335

See footnotes at end of table.

TABLE 2.--Number of fish caught by U.S. salt-water anglers in 1960, by species and by regions--Continued

[In thousands]

Species group	I North Atlantic	II Middle Atlantic	III South Atlantic	IV Gulf of Mexico	V South Pacific	VI North Pacific	All regions
46. Porgies	14,909	3,177	10,553	8,550	--	--	37,189
47. Puffers	6,437	4,256	18	--	--	--	10,711
48. Rays	7	221	3	199	--	8	438
49. Rockfishes	--	--	--	--	3,825	1,239	5,064
50. Sablefish	--	--	--	--	--	104	104
51. Salmon, chinook	--	--	--	--	--	468	468
52. Salmon, coho	--	--	--	--	--	364	364
53. Sculpins	57	--	--	--	--	--	57
54. Sea bass, black	1,244	7,436	433	--	--	--	9,113
55. Sea bass, giant[2]	--	--	--	--	([2])	--	([2])
56. Seabass, white	--	--	--	--	260	--	260
57. Searobins	293	2,983	3	--	--	--	3,279
58. Seatrouts	295	3,308	15,352	64,881	--	--	83,836
59. Sharks	547	228	109	664	59	108	1,715
60. Smelts	6,135	--	--	--	--	3,245	9,380
61. Snappers[3]	--	--	9,433	3,414	--	--	12,847
62. Snapper, yellowtail[3]	--	--	3,231	20	--	--	3,251
63. Snook	--	--	602	547	--	--	1,149
64. Spadefish, Atlantic	--	--	--	1,296	--	--	1,296
65. Spearfishes	--	112	70	696	4	--	882
66. Spot	--	23,703	6,526	--	--	--	30,229
67. Steelhead	--	--	--	--	--	675	675
68. Striped bass	2,742	6,530	67	--	61	3,002	12,402
69. Surfperches	--	--	--	--	2,601	3,317	5,918
70. Tarpon	--	--	388	18	--	--	406
71. Tautog	3,910	5,168	240	--	--	--	9,318
72. Toadfish	--	441	3,733	--	--	--	4,174
73. Tunas	4	491	75	3	489	--	1,062
74. Yellowtail	--	--	--	--	2,370	--	2,370
75. Miscellaneous	985	599	1,946	455	158	162	4,305
Total	97,383	114,502	156,942	184,582	50,064	29,399	632,872

[1] The reported catches of cabezon appear to be higher than could reasonably be expected. The parenthetical inclusion of the synonym "bullhead" under the cabezon listing on the interview form apparently caused many interviewees to report catches of sculpins other than cabezon here.

[2] There were 332,000 giant sea bass reported for region V. Black sea bass was used as the common name for this species on the interview form because it appeared to be more in conformance with common usage. Since only a few hundreds of them are thought to be taken each year, and since the name black sea bass is also used for black rockfish, it is assumed that this catch was actually rockfish, not giant sea bass, and all reported have been transferred to the rockfish group.

[3] Yellowtail snapper in the amount of 3,251,000 fish were listed separately as "yellowtail" by interviewees who did not realize this species should have been included in the "snappers" group. It is believed that this represents only part of the catch of yellowtail snapper, the balance having been reported in the snappers group.

TABLE 3.--Number of U.S. salt-water anglers in 1960, by species and by regions

[In thousands]

Species group	I North Atlantic	II Middle Atlantic	III South Atlantic	IV Gulf of Mexico	V South Pacific	VI North Pacific	All regions
1. Albacore, false.....	14	15	--	--	--	--	29
2. Alligator gar.....	--	--	--	28	--	--	28
3. Barracudas.....	--	--	76	16	299	--	391
4. Basses, Pacific.....	--	--	--	--	228	--	228
5. Bluefish.....	217	359	312	11	--	--	899
6. Bonefish.....	--	--	29	--	--	--	29
7. Bonitos.....	32	66	13	10	372	--	493
8. Cabezon and Pacific sculpins.....	--	--	--	--	32	150	182
9. California corbina.....	--	--	--	--	77	--	77
10. California sheephead...	--	--	--	--	66	--	66
11. Catfishes.....	--	45	260	465	--	33	803
12. Cods, Atlantic.....	235	48	--	--	--	--	283
13. Cods, Pacific.....	--	--	--	--	--	55	55
14. Croakers.....	--	292	70	480	72	19	933
15. Cunner.....	15	--	--	--	--	--	15
16. Cusk.....	3	--	--	--	--	--	3
17. Dolphins.....	--	29	61	30	--	--	120
18. Drum, black.....	--	16	207	242	--	--	465
19. Drum, red.....	--	35	157	447	--	--	639
20. Eel, American.....	99	48	12	--	--	--	159
21. Flatfishes.....	969	580	27	391	170	134	2,271
22. Goosefish.....	--	18	--	--	--	--	18
23. Greenlings.....	--	--	--	--	--	61	61
24. Groupers.....	--	--	231	238	--	--	469
25. Grunts.....	--	--	264	106	--	--	370
26. Haddock.....	40	--	--	--	--	--	40
27. Hake, silver.....	56	58	--	--	--	--	114
28. Hake, squirrel.....	48	18	--	--	--	--	66
29. Halfmoon.....	--	--	--	--	4	--	4
30. Herring, Pacific.....	--	--	--	--	35	--	35
31. Jacks.....	--	10	237	183	--	--	430
32. Jack mackerel.....	--	--	--	--	137	--	137
33. Kingfishes.....	53	149	259	257	--	--	718
34. Ladyfish.....	--	--	4	61	--	--	65
35. Lingcod.....	--	--	--	--	--	89	89
36. Mackerels, Atlantic....	186	49	--	--	--	--	235
37. Mackerel, Pacific.....	--	--	--	--	113	20	133
38. Mackerels, Spanish.....	--	--	242	190	--	--	432
39. Mullets.....	--	7	40	45	--	--	92
40. Ocean whitefish.....	--	--	--	--	20	--	20
41. Opaleye.....	--	--	--	--	53	--	53
42. Perch, white.....	57	199	20	11	--	--	287
43. Perch, yellow.....	3	11	--	--	--	--	14
44. Pigfish.....	--	18	3	--	--	--	21
45. Pollock.....	184	--	--	--	--	--	184

TABLE 3.--Number of U.S. salt-water anglers in 1960, by species and by regions--Continued

[In thousands]

Species group	I	II	III	IV	V	VI	All regions
	North Atlantic	Middle Atlantic	South Atlantic	Gulf of Mexico	South Pacific	North Pacific	
46. Porgies	256	148	262	317	--	--	983
47. Puffers	271	71	4	--	--	--	346
48. Rays	3	17	3	31	--	8	62
49. Rockfishes	--	--	--	--	180	153	333
50. Sablefish	--	--	--	--	--	17	17
51. Salmon, chinook	--	--	--	--	--	126	126
52. Salmon, coho	--	--	--	--	--	133	133
53. Sculpins	11	--	--	--	--	--	11
54. Sea bass, black	112	323	22	--	--	--	457
55. Sea bass, giant	--	--	--	--	--	--	--
56. Seabass, white	--	--	--	--	52	--	52
57. Searobins	24	44	3	--	--	--	71
58. Seatrouts	35	170	309	755	--	--	1,269
59. Sharks	73	28	31	51	13	33	229
60. Smelts	25	--	--	--	--	113	138
61. Snappers	--	--	245	183	--	--	428
62. Snapper, yellowtail	--	--	30	3	--	--	33
63. Snook	--	--	45	35	--	--	80
64. Spadefish	--	--	--	3	--	--	3
65. Spearfishes	--	13	20	21	4	--	58
66. Spot	--	410	131	--	--	--	541
67. Steelhead	--	--	--	--	--	66	66
68. Striped bass	180	298	9	--	8	192	687
69. Surfperches	--	--	--	--	158	171	329
70. Tarpon	--	--	18	11	--	--	29
71. Tautog	186	27	10	--	--	--	223
72. Toadfish	--	21	21	--	--	--	42
73. Tunas	4	36	14	3	41	--	98
74. Yellowtail	--	--	--	--	238	--	238
75. Miscellaneous	60	55	102	69	18	14	318

The sum of the entries for a region will exceed the total number of anglers for the region because most caught fish of more than one species group.

TABLE 4.--Average catch of salt-water anglers in 1960, by species and by regions

Species group	I North Atlantic	II Middle Atlantic	III South Atlantic	IV Gulf of Mexico	V South Pacific	VI North Pacific	All regions
1. Albacore, false.....	3.7	27.1	--	--	--	--	15.8
2. Alligator gar.....	--	--	--	5.6	--	--	5.6
3. Barracudas.....	--	--	7.2	1.6	24.6	--	20.3
4. Basses, Pacific.....	--	--	--	--	23.3	--	23.3
5. Bluefish.....	22.3	32.6	23.0	4.9	--	--	26.5
6. Bonefish.....	--	--	10.5	--	--	--	10.5
7. Bonitos.....	5.6	6.0	2.0	4.7	32.5	--	25.8
8. Cabezon and Pacific sculpins.....	--	--	--	--	6.8	56.3	47.6
9. California corbina.....	--	--	--	--	10.3	--	10.3
10. California sheephead...	--	--	--	--	4.4	--	4.4
11. Catfishes.....	--	17.4	34.4	47.9	--	20.9	40.7
12. Cods, Atlantic.....	17.0	16.5	--	--	--	--	16.9
13. Cods, Pacific.....	--	--	--	--	--	30.0	30.0
14. Croakers.....	--	28.1	53.4	65.9	26.4	5.8	48.8
15. Cunner.....	47.1	--	--	--	--	--	47.1
16. Cusk.....	23.3	--	--	--	--	--	23.3
17. Dolphins.....	--	7.2	2.5	10.4	--	--	5.6
18. Drum, black.....	--	8.3	23.5	18.9	--	--	20.6
19. Drum, red.....	--	13.0	28.8	23.0	--	--	23.9
20. Eel, American.....	15.0	10.6	7.2	--	--	--	13.1
21. Flatfishes.....	29.7	21.3	7.5	9.0	15.5	23.3	22.3
22. Goosefish.....	--	1.0	--	--	--	--	1.0
23. Greenlings.....	--	--	--	--	--	31.1	31.1
24. Groupers.....	--	--	9.9	39.3	--	--	24.8
25. Grunts.....	--	--	72.1	17.7	--	--	56.5
26. Haddock.....	13.6	--	--	--	--	--	13.6
27. Hake, silver.....	29.3	33.8	--	--	--	--	31.6
28. Hake, squirrel.....	7.4	19.3	--	--	--	--	10.6
29. Halfmoon.....	--	--	--	--	23.5	--	23.5
30. Herring, Pacific.....	--	--	--	--	21.9	--	21.9
31. Jacks.....	--	1.0	34.8	33.6	--	--	29.2
32. Jack mackerel.....	--	--	--	--	31.8	--	31.8
33. Kingfishes.....	21.5	21.1	69.9	28.2	--	--	41.3
34. Ladyfish.....	--	--	13.8	12.7	--	--	12.8
35. Lingcod.....	--	--	--	--	--	6.1	6.1
36. Mackerels, Atlantic....	54.3	15.3	--	--	--	--	46.2
37. Mackerel, Pacific.....	--	--	--	--	25.0	12.4	23.1
38. Mackerels, Spanish.....	--	--	30.5	27.1	--	--	29.0
39. Mullets.....	--	9.7	428.2	45.4	--	--	209.1
40. Ocean whitefish.....	--	--	--	--	6.7	--	6.7
41. Opaleye.....	--	--	--	--	27.9	--	27.9
42. Perch, white.....	24.8	66.2	47.4	--	17.4	--	54.8
43. Perch, yellow.....	60.0	7.2	--	--	--	--	18.5
44. Pigfish.....	--	15.7	142.0	--	--	--	33.7
45. Pollock.....	23.6	--	--	--	--	--	23.6

TABLE 4.--Average catch of salt-water anglers in 1960, by species and by regions--Continued

Species group	I	II	III	IV	V	VI	All regions
	North Atlantic	Middle Atlantic	South Atlantic	Gulf of Mexico	South Pacific	North Pacific	
46. Porgies	58.2	21.3	40.3	27.0	--	--	37.8
47. Puffers	23.8	59.9	4.5	--	--	--	31.0
48. Rays	2.3	13.0	1.0	6.4	--	1.0	7.1
49. Rockfishes	--	--	--	--	21.3	8.1	15.2
50. Sablefish	--	--	--	--	--	6.1	6.1
51. Salmon, chinook	--	--	--	--	--	3.7	3.7
52. Salmon, coho	--	--	--	--	--	2.7	2.7
53. Sculpin	5.2	--	--	--	--	--	5.2
54. Sea bass, black	11.1	23.0	19.7	--	--	--	19.9
55. Sea bass, giant	--	--	--	--	--	--	--
56. Seabass, white	--	--	--	--	5.0	--	5.0
57. Searobins	12.2	67.8	1.0	--	--	--	46.8
58. Seatrouts	8.4	19.5	49.7	85.9	--	--	66.1
59. Sharks	7.5	8.2	3.5	13.0	4.5	3.3	7.5
60. Smelts	245.4	--	--	--	--	28.7	68.0
61. Snappers	--	--	38.5	18.7	--	--	30.1
62. Snapper, yellowtail	--	--	107.7	6.7	--	--	98.5
63. Snook	--	--	13.4	15.6	--	--	14.4
64. Spadefish	--	--	--	432.0	--	--	432.0
65. Spearfishes	--	8.6	3.5	33.1	1.0	--	15.2
66. Spot	--	57.8	49.8	--	--	--	55.9
67. Steelhead	--	--	--	--	--	10.2	10.2
68. Striped bass	15.2	21.9	7.4	--	7.6	15.6	18.1
69. Surfperches	--	--	--	--	16.5	19.4	18.0
70. Tarpon	--	--	21.6	1.6	--	--	14.0
71. Tautog	21.0	191.4	24.0	--	--	--	41.8
72. Toadfish	--	21.0	177.8	--	--	--	99.4
73. Tunas	1.0	13.6	5.4	1.0	11.9	--	10.8
74. Yellowtail	--	--	--	--	10.0	--	10.0
75. Miscellaneous	16.4	10.9	19.1	6.6	8.8	11.6	13.5
Total	84.0	85.2	153.3	130.7	72.9	41.2	102.1

TABLE 5.--Estimated weights of salt-water anglers' catches in 1960, by species and by regions

[In thousands of pounds]

Species group	I	II	III	IV	V	VI	All regions
	North Atlantic	Middle Atlantic	South Atlantic	Gulf of Mexico	South Pacific	North Pacific	
1. Albacore, false.....	310	3,260	--	--	--	--	3,570
2. Alligator gar.....	--	--	--	1,580	--	--	1,580
3. Barracudas.....	--	--	6,020	260	19,870	--	26,150
4. Basses, Pacific.....	--	--	--	--	6,910	--	6,910
5. Bluefish.....	11,110	25,850	13,640	80	--	--	50,680
6. Bonefish.....	--	--	1,220	--	--	--	1,220
7. Bonitos.....	720	1,030	180	210	42,280	--	44,420
8. Cabezon and Pacific sculpins.....	--	--	--	--	650	16,900	17,550
9. California corbina.....	--	--	--	--	790	--	790
10. California sheephead...	--	--	--	--	1,160	--	1,160
11. Catfishes.....	--	600	13,400	22,290	--	690	36,980
12. Cods, Atlantic.....	25,190	5,710	--	--	--	--	30,900
13. Cods, Pacific.....	--	--	--	--	--	8,260	8,260
14. Croakers.....	--	7,390	3,000	18,970	1,900	80	31,340
15. Cunner.....	280	--	--	--	--	--	280
16. Cusk.....	210	--	--	--	--	--	210
17. Dolphins.....	--	950	1,000	1,250	--	--	3,200
18. Drum, black.....	--	3,300	26,760	12,570	--	--	42,630
19. Drum, red.....	--	11,400	27,160	32,940	--	--	71,500
20. Eel, American.....	1,490	510	170	--	--	--	2,170
21. Flatfishes.....	40,310	12,380	300	6,330	6,580	7,800	73,700
22. Goosefish.....	--	450	--	--	--	--	450
23. Greenlings.....	--	--	--	--	--	2,660	2,660
24. Groupers.....	--	--	34,290	74,770	--	--	109,060
25. Grunts.....	--	--	20,940	1,310	--	--	22,250
26. Haddock.....	1,690	--	--	--	--	--	1,690
27. Hake, silver.....	1,810	2,160	--	--	--	--	3,970
28. Hake, squirrel.....	350	350	--	--	--	--	700
29. Halfmoon.....	--	--	--	--	90	--	90
30. Herring, Pacific.....	--	--	--	--	380	--	380
31. Jacks.....	--	10	41,200	24,200	--	--	65,410
32. Jack mackerel.....	--	--	--	--	8,700	--	8,700
33. Kingfishes.....	800	1,570	16,300	6,520	--	--	25,190
34. Ladyfish,.....	--	--	110	1,160	--	--	1,270
35. Lingcod.....	--	--	--	--	--	4,590	4,590
36. Mackerels, Atlantic....	10,100	830	--	--	--	--	10,930
37. Mackerel, Pacific.....	--	--	--	--	4,230	370	4,600
38. Mackerels, Spanish.....	--	--	24,830	11,330	--	--	36,160
39. Mullets.....	--	20	15,420	2,040	--	--	17,480
40. Ocean whitefish.....	--	--	--	--	400	--	400
41. Opaleye.....	--	--	--	--	1,630	--	1,630
42. Perch, white.....	850	6,580	280	100	--	--	7,810
43. Perch, yellow.....	110	50	--	--	--	--	160
44. Pigfish.....	--	340	720	--	--	--	1,060
45. Pollock.....	21,680	--	--	--	--	--	21,680

TABLE 5.--Estimated weights of salt-water anglers' catches in 1960, by species and by regions--Continued

[In thousands of pounds]

Species group	I	II	III	IV	V	VI	All regions
	North Atlantic	Middle Atlantic	South Atlantic	Gulf of Mexico	South Pacific	North Pacific	
46. Porgies	13,420	3,180	20,050	12,770	--	--	49,420
47. Puffers	3,220	1,700	10	--	--	--	4,930
48. Rays	50	1,220	12	1,930	--	100	3,312
49. Rockfishes	--	--	--	--	9,560	4,090	13,650
50. Sablefish	--	--	--	--	--	420	420
51. Salmon, chinook	--	--	--	--	--	5,800	5,800
52. Salmon, coho	--	--	--	--	--	2,690	2,690
53. Sculpin	20	--	--	--	--	--	20
54. Sea bass, black	1,490	10.410	650	--	--	--	12,550
55. Sea bass, giant	--	--	--	--	--	--	--
56. Sea bass, white	--	--	--	--	4,420	--	4,420
57. Searobins	180	2,090	--	--	--	--	2,270
58. Seatrouts	530	3,310	23,030	103,810	--	--	130,680
59. Sharks	21,880	3,420	10,900	16,600	2,070	1,080	55,950
60. Smelts	610	--	--	--	--	649	1,259
61. Snappers	--	--	26,410	9,560	--	--	35,970
62. Snapper, yellowtail	--	--	3,230	30	--	--	3,260
63. Snook	--	--	3,250	2,630	--	--	5,880
64. Spadefish	--	--	--	2,330	--	--	2,330
65. Spearfishes	--	6,720	5,600	41,760	600	--	54,680
66. Spot	--	7,110	3,260	--	--	--	10,370
67. Steelhead	--	--	--	--	--	4,590	4,590
68. Striped bass	12,340	24,810	360	--	240	19,510	57,260
69. Surfperches	--	--	--	--	1,560	2,320	3,880
70. Tarpon	--	--	16,020	690	--	--	16,710
71. Tautog	10,560	9,820	480	--	--	--	20,860
72. Toadfish	--	400	2,610	--	--	--	3,010
73. Tunas	560	18,170	2,630	90	8,800	--	30,250
74. Yellowtail	--	--	--	--	30,810	--	30,810
75. Miscellaneous	1,870	900	4,670	1,000	490	620	9,550
Total	183,740	178,000	370,112	411,110	154,120	83,219	1,380,301

TABLE 6.--Weight conversion factors used to estimate the weight of salt water anglers' catches in 1960, by species and by regions

[In pounds per fish]

Species group	I	II	III	IV	V	VI
	North Atlantic	Middle Atlantic	South Atlantic	Gulf of Mexico	South Pacific	North Pacific
1. Albacore, false	6.0	8.0	--	--	--	--
2. Alligator gar	--	--	--	10.0	--	--
3. Barracudas	--	--	11.0	10.0	2.7	--
4. Basses, Pacific	--	--	--	--	1.3	--
5. Bluefish	2.3	2.2	1.9	1.5	--	--
6. Bonefish	--	--	4.0	--	--	--
7. Bonitos	4.0	2.6	6.9	4.4	3.5	--
8. Cabezon and Pacific sculpins	--	--	--	--	3.0	2.0
9. California corbina	--	--	--	--	--	--
10. California sheephead	--	--	--	--	4.0	--
11. Catfishes	--	0.8	1.5	1.0	--	1.0
12. Cods, Atlantic	6.3	7.2	--	--	--	--
13. Cods, Pacific	--	--	--	--	--	5.0
14. Croakers	--	0.9	0.8	0.6	1.0	0.7
15. Cunner	0.4	--	--	--	--	--
16. Cusk	3.0	--	--	--	--	--
17. Dolphins	--	4.5	6.6	4.0	--	--
18. Drum, black	--	25.0	5.5	2.7	--	--
19. Drum, red	--	25.0	6.0	3.2	--	--
20. Eel, American	1.0	1.0	2.0	--	--	--
21. Flatfishes	1.4	1.0	1.5	1.8	2.5	2.5
22. Goosefish	--	25.0	--	--	--	--
23. Greenlings	--	--	--	--	--	1.4
24. Groupers	--	--	15.0	8.0	--	--
25. Grunts	--	--	1.1	0.7	--	--
26. Haddock	3.1	--	--	--	--	--
27. Hake, silver	1.1	1.1	--	--	--	--
28. Hake, squirrel	1.0	1.0	--	--	--	--
29. Halfmoon	--	--	--	--	1.0	--
30. Herring, Pacific	--	--	--	--	0.5	--
31. Jacks	--	0.8	5.0	5.6	--	--
32. Jack mackerel	--	--	--	--	2.0	--
33. Kingfishes	0.7	0.5	0.9	0.9	--	--
34. Ladyfish	--	--	2.0	1.5	--	--
35. Lingcod	--	--	--	--	--	8.5
36. Mackerels, Atlantic	1.0	1.1	--	--	--	--
37. Mackerel, Pacific	--	--	--	--	1.5	1.5
38. Mackerels, Spanish	--	--	3.5	2.2	--	--
39. Mullets	--	0.3	0.9	1.0	--	--
40. Ocean whitefish	--	--	--	--	3.0	--
41. Opaleye	--	--	--	--	1.1	--
42. Perch, white	0.6	0.5	0.3	0.5	--	--
43. Perch, yellow	0.6	0.6	--	--	--	--
44. Pigfish	--	1.2	1.7	--	--	--
45. Pollock	5.0	--	--	--	--	--

TABLE 6.--Weight conversion factors used to estimate the weight of salt water anglers' catches in 1960, by species and by regions--Continued

[In pounds per fish]

Species group	I	II	III	IV	V	VI
	North Atlantic	Middle Atlantic	South Atlantic	Gulf of Mexico	South Pacific	North Pacific
46. Porgies	0.9	1.0	1.9	1.4	--	--
47. Puffers	0.5	0.4	0.8	--	--	--
48. Rays	7.6	5.5	4.0	9.7	--	11.9
49. Rockfishes	--	--	--	--	2.5	3.3
50. Sablefish	--	--	--	--	--	4.0
51. Salmon, chinook	--	--	--	--	--	12.4
52. Salmon, coho	--	--	--	--	--	7.4
53. Sculpins	0.4	--	--	--	--	--
54. Sea bass, black	1.2	1.4	1.5	--	--	--
55. Sea bass, giant	--	--	--	--	--	--
56. Seabass, white	--	--	--	--	17.0	--
57. Searobins	0.6	0.7	0.7	--	--	--
58. Seatrouts	1.8	1.0	1.5	1.6	--	--
59. Sharks	40.0	15.0	100.0	25.0	35.0	10.0
60. Smelts	0.1	--	--	--	--	0.2
61. Snappers	--	--	2.8	2.8	--	--
62. Snapper, yellowtail	--	--	1.0	1.5	--	--
63. Snook	--	--	5.4	4.8	--	--
64. Spadefish	--	--	--	1.8	--	--
65. Spearfishes	--	60.0	80.0	60.0	150.0	--
66. Spot	--	0.3	0.5	--	--	--
67. Steelhead	--	--	--	--	--	6.8
68. Striped bass	4.5	3.8	5.3	--	4.0	6.5
69. Surfperches	--	--	--	--	0.6	0.7
70. Tarpon	--	--	41.3	38.1	--	--
71. Tautog	2.7	1.9	2.0	--	--	--
72. Toadfish	--	0.9	0.7	--	--	--
73. Tunas	140.0	37.0	35.0	30.0	18.0	--
74. Yellowtail	--	--	--	--	13.0	--
75. Miscellaneous	1.9	1.5	2.4	2.2	3.1	2.8

TABLE 7.--Salt water fishermen and their catches in 1960 by regions and by principal methods of fishing

Region	Principal method of fishing			
	From boat		From shore	
	Still	Motion	Still	Motion
I. North Atlantic:				
Number of fishermen	676,000	299,000	208,000	202,000
Number of fish caught	62,903,000	13,468,000	11,055,000	9,957,000
Catch per fisherman	93.1	45.0	53.1	49.3
II. Middle Atlantic:				
Number of fishermen	829,000	449,000	246,000	125,000
Number of fish caught	74,938,000	26,136,000	8,378,000	5,050,000
Catch per fisherman	90.4	58.2	34.1	40.4
III. South Atlantic:				
Number of fishermen	384,000	387,000	333,000	245,000
Number of fish caught	73,519,000	41,233,000	25,781,000	16,409,000
Catch per fisherman	191.5	106.5	77.5	67.0
IV. Gulf of Mexico:				
Number of fishermen	518,000	500,000	342,000	398,000
Number of fish caught	61,246,000	70,292,000	27,305,000	25,739,000
Catch per fisherman	118.2	140.6	79.8	64.7
V. South Pacific:				
Number of fishermen	222,000	321,000	110,000	168,000
Number of fish caught	11,826,000	28,631,000	1,932,000	7,675,000
Catch per fisherman	53.3	89.2	17.6	45.7
VI. North Pacific:				
Number of fishermen	167,000	244,000	126,000	267,000
Number of fish caught	7,934,000	3,831,000	10,020,000	7,614,000
Catch per fisherman	47.5	15.3	79.5	28.5
All regions:				
Number of fishermen	2,796,000	2,200,000	1,365,000	1,405,000
Number of fish caught	292,366,000	183,591,000	84,471,000	72,444,000
Catch per fisherman	104.6	83.5	61.9	51.6

TABLE 8.--Number of fish caught by U.S. salt-water anglers in 1960, by regions and species and by principal methods of fishing

[In thousands]

Region and species group	Principal method of fishing				
	From boat		From shore		All methods
	Still	Motion	Still	Motion	
REGION I, NORTH ATLANTIC:					
1. Albacore, false	--	52	--	--	52
5. Bluefish	2,355	1,217	602	657	4,831
7. Bonitos	--	78	86	15	179
12. Cods, Atlantic	3,563	112	245	78	3,998
15. Cunner	376	--	331	--	707
16. Cusk	70	--	--	--	70
20. Eel, American	637	348	443	57	1,485
21. Flatfishes	24,474	1,098	2,469	753	28,794
26. Haddock	541	3	--	--	544
27. Hake, silver	1,030	316	295	--	1,641
28. Hake, squirrel	225	42	83	3	353
33. Kingfishes	13	--	1,120	6	1,139
36. Mackerels, Atlantic	1,352	4,845	369	3,531	10,097
42. Perch, white	390	--	433	590	1,413
43. Perch, yellow	--	--	180	--	180
45. Pollock	1,550	2,596	76	113	4,335
46. Porgies	11,074	790	1,528	1,517	14,909
47. Puffers	4,359	207	1,820	51	6,437
48. Rays	7	--	--	--	7
53. Sculpins	14	--	43	--	57
54. Sea bass, black	894	162	160	28	1,244
57. Searobins	287	3	--	3	293
58. Seatrouts	60	210	11	14	295
59. Sharks	451	38	9	49	547
60. Smelts	6,135	--	--	--	6,135
68. Striped bass	194	904	147	1,497	2,742
71. Tautog	2,661	289	546	414	3,910
73. Tunas	--	4	--	--	4
75. Miscellaneous	192	155	59	579	985
Total	62,904	13,469	11,055	9,955	97,383
REGION II, MIDDLE ATLANTIC:					
1. Albacore, false	29	378	--	--	407
5. Bluefish	2,935	7,251	1,127	435	11,748
7. Bonitos	82	316	--	--	398
11. Catfishes	659	--	43	79	781
12. Cods, Atlantic	687	106	--	--	793
14. Croakers	7,319	65	708	122	8,214
17. Dolphins	--	210	--	--	210
18. Drum, black	34	--	98	--	132
19. Drum, red	260	196	--	--	456
20. Eel, American	220	--	275	13	508

TABLE 8.--Number of fish caught by U.S. salt-water anglers in 1960, by regions and species and by principal methods of fishing--Continued

[In thousands]

Region and species group	Principal method of fishing				All methods
	From boat		From shore		
	Still	Motion	Still	Motion	
REGION II, MIDDLE ATLANTIC--Cont.					
21. Flatfishes	11,507	278	449	148	12,382
22. Goosefish	18	--	--	--	18
27. Hake, silver	1,961	--	--	--	1,961
28. Hake, squirrel	336	--	11	--	347
31. Jacks	--	4	6	--	10
33. Kingfishes	2,459	284	113	287	3,143
36. Mackerels, Atlantic	128	622	--	--	750
39. Mullets	68	--	--	--	68
42. Perch, white	5,957	1,441	2,465	3,299	13,162
43. Perch, yellow	48	31	--	--	79
44. Pigfish	282	--	--	--	282
46. Porgies	2,794	257	106	20	3,177
47. Puffers	3,801	399	56	--	4,256
48. Rays	221	--	--	--	221
54. Sea bass, black	4,920	1,875	470	171	7,436
57. Searobins	2,747	--	236	--	2,983
58. Seatrouts	2,311	837	10	150	3,308
59. Sharks	228	--	--	--	228
65. Spearfishes	77	35	--	--	112
66. Spot	20,185	1,464	1,829	225	23,703
68. Striped bass	2,079	4,172	192	87	6,530
71. Tautog	--	5,157	11	--	5,168
72. Toadfish	441	--	--	--	441
73. Tunas	4	487	--	--	491
75. Miscellaneous	141	271	173	14	599
Total	74,938	26,136	8,378	5,050	114,502
REGION III, SOUTH ATLANTIC:					
3. Barracudas	--	525	--	22	547
5. Bluefish	3,716	1,396	1,103	966	7,181
6. Bonefish	277	28	--	--	305
7. Bonitos	--	26	--	--	26
11. Catfishes	4,280	1,491	2,462	701	8,934
14. Croakers	1,230	1,553	938	20	3,741
17. Dolphins	--	148	--	4	152
18. Drum, black	3,716	22	716	411	4,865
19. Drum, red	3,968	199	181	179	4,527
20. Eel, American	32	--	33	21	86
21. Flatfishes	17	3	--	182	202
24. Groupers	1,098	609	478	101	2,286
25. Grunts	14,927	2,346	1,512	247	19,032
31. Jacks	5,624	982	306	1,329	8,241
33. Kingfishes	13,758	145	3,365	830	18,098

TABLE 8.--Number of fish caught by U.S. salt-water anglers in 1960, by regions and species and by principal methods of fishing--Continued

[In thousands]

Region and species group	Principal method of fishing				All methods
	From boat		From shore		
	Still	Motion	Still	Motion	
REGION III, SOUTH ATLANTIC--Cont.					
34. Ladyfish	--	55	--	--	55
38. Mackerels, Spanish	97	6,510	78	695	7,380
39. Millets	2,401	8,063	3,189	3,475	17,128
42. Perch, white	867	--	70	11	948
44. Pigfish	426	--	--	--	426
46. Porgies	5,079	1,842	3,428	204	10,553
47. Puffers	--	--	--	18	18
48. Rays	--	--	3	--	3
54. Sea bass, black	136	297	--	--	433
57. Searobins	--	--	3	--	3
58. Seatrouts	2,666	10,150	536	2,000	15,352
59. Sharks	47	21	3	38	109
61. Snappers	7,111	1,059	541	722	9,433
62. Snapper, yellowtail	358	2,220	653	--	3,231
63. Snook	55	430	41	76	602
65. Spearfishes	4	13	--	53	70
66. Spot	362	97	2,328	3,739	6,526
68. Striped bass	64	--	--	3	67
70. Tarpon	388	--	--	--	388
71. Tautog	209	31	--	--	240
72. Toadfish	70	58	3,605	--	3,733
73. Tunas	--	61	--	14	75
75. Miscellaneous	536	853	209	348	1,946
Total	73,519	41,233	25,781	16,409	156,942
REGION IV, GULF OF MEXICO:					
2. Alligator gar	92	41	25	--	158
3. Barracudas	19	7	--	--	26
5. Bluefish	--	3	--	51	54
7. Bonitos	14	33	--	--	47
11. Catfishes	6,686	3,630	8,024	3,950	22,290
14. Croakers	17,977	4,528	5,340	3,766	31,611
17. Dolphins	270	43	--	--	313
18. Drum, black	1,996	917	1,373	294	4,580
19. Drum, red	4,131	3,799	1,504	860	10,294
21. Flatfishes	1,543	678	932	364	3,517
24. Groupers	7,435	1,312	72	527	9,346
25. Grunts	1,091	497	233	56	1,877
31. Jacks	69	1,695	1,405	1,155	4,324
33. Kingfishes	1,712	1,448	2,231	1,850	7,241
34. Ladyfish	53	556	62	106	777

TABLE 8.--Number of fish caught by U.S. salt-water anglers in 1960, by regions and species and by principal methods of fishing--Continued

[In thousands]

Region and species group	Principal method of fishing				All methods
	From boat		From shore		
	Still	Motion	Still	Motion	
REGION IV, GULF OF MEXICO--Cont.					
38. Mackerels, Spanish	475	4,174	--	500	5,149
39. Millets	295	--	753	996	2,044
42. Perch, white	107	--	--	84	191
46. Porgies	2,659	3,526	1,632	733	8,550
48. Rays	164	32	3	--	199
58. Seatrouts	11,678	40,652	3,275	9,276	64,881
59. Sharks	68	512	13	71	664
61. Snappers	2,443	709	233	29	3,414
62. Snapper, yellowtail	--	--	20	--	20
63. Snook	132	76	--	339	547
64. Spadefish, Atlantic	--	1,296	--	--	1,296
65. Spearfishes	--	20	--	676	696
70. Tarpon	8	10	--	--	18
73. Tunas	--	3	--	--	3
75. Miscellaneous	129	95	175	56	455
Total	61,246	70,292	27,305	25,739	184,582
REGION V, SOUTH PACIFIC:					
3. Barracudas	671	5,659	84	947	7,361
4. Basses, Pacific	2,171	2,812	138	194	5,315
6. Bonitos	300	9,724	202	1,843	12,079
8. Cabezon and Pacific sculpins	186	3	20	8	217
9. California corbina	144	332	73	245	794
10. California sheephead	235	20	35	--	290
14. Croakers	163	227	13	1,493	1,901
21. Flatfishes	2,191	213	138	91	2,633
29. Halfmoon	94	--	--	--	94
30. Herring, Pacific	307	407	19	35	768
32. Jack mackerel	962	2,832	47	511	4,352
37. Mackerel, Pacific	192	2,379	57	192	2,820
40. Ocean whitefish	3	131	--	--	134
41. Opaleye	1,271	79	3	126	1,479
49. Rockfishes	1,720	1,451	126	528	3,825
56. Sea bass, white	100	94	33	33	260
59. Sharks	11	45	3	--	59
65. Spearfishes	--	4	--	--	4
68. Striped bass	--	--	61	--	61
69. Surfperches	700	334	761	806	2,601
73. Tunas	42	247	--	200	489
74. Yellowtail	321	1,638	13	398	2,370
75. Miscellaneous	37	--	106	15	158
Total	11,826	28,631	1,932	7,675	50,064

TABLE 8.--Number of fish caught by U.S. salt-water anglers in 1960, by regions and species and by principal methods of fishing--Continued

[In thousands]

Region and species group	Principal method of fishing				
	From boat		From shore		All methods
	Still	Motion	Still	Motion	
REGION VI, NORTH PACIFIC:					
8. Cabezon and Pacific sculpins..	2,640	54	5,482	274	8,450
11. Catfishes.....	417	--	--	273	690
13. Cods, Pacific.....	1,372	244	3	33	1,652
14. Croakers.....	72	38	--	--	110
21. Flatfishes.....	854	820	1,393	51	3,118
23. Greenlings.....	169	46	83	1,602	1,900
35. Lingcod.....	400	71	69	--	540
37. Mackerel, Pacific.....	3	38	--	206	247
48. Rays.....	--	--	8	--	8
49. Rockfishes.....	839	165	73	162	1,239
50. Sablefish.....	97	7	--	--	104
51. Salmon, chinook.....	40	424	--	4	468
52. Salmon, coho.....	23	338	3	--	364
59. Sharks.....	18	14	72	4	108
60. Smelts.....	48	238	1,444	1,515	3,245
67. Steelhead.....	--	52	209	414	675
68. Striped bass.....	305	1,153	117	1,427	3,002
69. Surfperches.....	629	24	1,057	1,607	3,317
75. Miscellaneous.....	8	105	7	42	162
Total.....	7,934	3,831	10,020	7,614	29,399

APPENDIX A--DEFINITION OF SPECIES GROUPS

1. Albacore, false .....Includes only the species Euthynnus alletteratus.
2. Alligator gar .....Includes only the species Lepisosteus spatula.
3. Barracudas .....Includes members of the family Sphyraenidae, the barracudas.
4. Basses, Pacific.....Includes members of the genus Paralabrax, rock basses.
5. Bluefish.....Includes only the species Pomatomus saltatrix.
6. Bonefish .....Includes only the species Albula vulpes.
7. Bonitos.....Includes members of the genus Sarda, the bonitos.
8. Cabezon and Pacific sculpins.....Includes the species Scorpaenichthys marmoratus, and probably other Cottids (see footnote 1, table 2).
9. California corbina .....Includes only the species Menticirrhus undulatus.
10. California sheephead.....Includes only the species Pimelometopon pulchrum.
11. Catfishes .....Includes members of the family Ariidae, sea catfishes, and some fresh-water species, such as Ictalurus nebulosus, brown bullhead (which appears in region VI catches).
12. Cods, Atlantic.....Includes the species Gadus morhua, Atlantic cod, and Microgadus tomcod, Atlantic tomcod.
13. Cods, Pacific.....Includes the Pacific species of the genera Gadus, Pacific cod, Microgadus, Pacific tomcod, and Theragra, walleye pollock.
14. Croakers .....Includes those members of the family Sciaenidae which are commonly known as croakers.
15. Cunner .....Includes only the species Tautogolabrus adspersus.
16. Cusk .....Includes only the species Brosme brosme.
17. Dolphins .....Includes members of the family Coryphaenidae, the dolphin-fishes.
18. Drum, black .....Includes only the species Pogonias cromis.
19. Drum, red.....Includes only the species Sciaenops ocellata.
20. Eel, American .....Includes only the species Anguilla rostrata.
21. Flatfishes .....Includes members of the order Pleuronectiformes, the soles and flounders.
22. Goosefish.....Includes only the species Lophius americanus.
23. Greenlings .....Includes members of the family Hexagrammidae, the greenlings, except Ophiodon elongatus, the lingcod, which is listed separately.

24. Groupers .....Includes those Atlantic members of the family Serranidae which are commonly known as groupers.

25. Grunts.....Includes members of the family Pomadasyidae, the grunts, except Orthopristis chrysopterus, the pigfish, which is listed separately.

26. Haddock.....Includes only the species Melanogrammus aeglefinus.

27. Hake, silver .....Includes only the species Merluccius bilinearis.

28. Hake, squirrel .....Includes only the species Urophycis chuss.

29. Halfmoon .....Includes only the species Medialuna californiensis.

30. Herring, Pacific.....Includes only the subspecies Clupea harengus pallasi.

31. Jacks .....Includes Atlantic members of the family Carangidae known as crevalles, runners, jacks, pompanos and amberjacks; particularly of the following genera: Caranx, Seriola, and Trachinotus.

32. Jack mackerel .....Includes only the species Trachurus symmetricus.

33. Kingfishes.....Includes Atlantic members of the genus Menticirrhus.

34. Ladyfish .....Includes only the species Elops saurus.

35. Lingcod .....Includes only the species Ophiodon elongatus.

36. Mackerels, Atlantic .....Includes only the species Scomber scombrus, the Atlantic mackerel and Scomber colias, the chub mackerel.

37. Mackerel, Pacific.....Includes only the species Scomber japonicus.

38. Mackerels, Spanish.....Includes members of the genus Scomberomorus, the Spanish and king mackerels and cero.

39. Mullets.....Includes members of the genus Mugil, the mullets.

40. Ocean whitefish.....Includes only the species Caulolatilus princeps.

41. Opaleye .....Includes only the species Girella nigricans.

42. Perch, white.....Includes only the species Roccus americanus.

43. Perch, yellow .....Includes only the species Perca flavescens.

44. Pigfish .....Includes only the species Orthopristis chrysopterus.

45. Pollock.....Includes only the species Pollachius virens.

46. Porgies .....Includes those members of the family Sparidae which are commonly known as porgies.

47. Puffers.....Includes members of the families Tetraodontidae, the puffers and Diodontidae, the porcupine-fishes.

48. Rays .....Includes members of the order Rajiformes, the skates and rays, mostly of the families Dasyatidae and Rajidae.

49. Rockfishes .....Includes Pacific members of the family Scorpaenidae, the rockfishes and scorpion-fishes.

50. Sablefish.....Includes only the species Anoplopoma fimbria.

51. Salmon, chinook .....Includes only the species Oncorhynchus tshawytscha.

52. Salmon, coho.....Includes only the species Oncorhynchus kisutch.

53. Sculpins.....Includes primarily the species Myoxocephalus octodecemspinosus, but including some other cottids.

54. Sea bass, black .....Includes only the species Centropristes striatus.

55. Sea bass, giant.....Includes only the species Stereolepis gigas, the giant or black sea-bass; (see footnote 2 of table 2 for explanation of confusion about this fish).

56. Seabass, white .....Includes only the species Cynoscion nobilis.

57. Searobins.....Includes members of the family Triglidae.

58. Seatrouts .....Includes Atlantic members of the genus Cynoscion.

59. Sharks.....Includes members of the order Squaliformes.

60. Smelts.....Includes members of the family Osmeridae and Pacific members of the family Atherinidae.

61. Snappers.....Includes members of the family Lutjanidae, the snappers, except part of the catch of Ocyurus chrysurus, yellowtail snapper, which is listed separately. (See footnote 3 of table 2).

62. Snapper, yellowtail .....Includes only the species Ocyurus chrysurus, the yellowtail snapper; however, some part of the catch of Ocyurus is undoubtedly included with the snappers. (See footnote 3 of table 2).

63. Snook .....Includes only the species Centropomus unidecimalis.

64. Spadefish, Atlantic .....Includes only the species Chaetodipterus faber.

65. Spearfishes .....Includes members of the families Istiophoridae and Xiphiidae, the marlins, spearfishes, swordfish and sailfish.

66. Spot .....Includes only the species Leiostomus xanthurus.

67. Steelhead .....Includes only the species Salmo gairdneri, primarily a fresh-water species and usually called rainbow trout, but called steelhead when sea run.

68. Striped bass .....Includes only the species Roccus saxatilis.

69. Surfperches.....Includes members of the family Embiotocidae, the surfperches and seaperches.

70. Tarpon.....Includes only the species Megalops atlantica.

71. Tautog.....Includes only the species Tautoga onitis.

72. Toadfish.....Includes only the species Opsanus tau.

73. Tunas.....Includes all members of the genus Thunnus, the tunas, and members of the genus Euthynnus except E. alletteratus.

74. Yellowtail.....Includes only the species Seriola dorsalis.

75. Miscellaneous.....Includes fishes of doubtful identity.

APPENDIX B--COMMON NAME INDEX

This index is based upon common fish names used by anglers and is meant to be used in locating the species group in which the catch of any fish appears if reported. We have listed only those fishes which occurred or are likely to have occurred under one of the species groups shown in appendix A. Individual common names are included in the index only where needed to locate them in the appropriate species group. Thus all the true rockfishes are shown to be in species group 49 (Scorpaenidae) and those whose name contains "rockfish" are not listed individually.

The number following each name indicates the species group under which it would most probably be reported in the survey if the fish in question were actually caught. For instance, we do not know whether catches of southern fluke specifically are included in the reporting category of "flatfishes" for regions III and IV; but if taken they will occur in species group 21, which includes all flatfishes. On the other hand, since headfish is a synonym only for goosefish, a single-species group, one may ascertain definitely the reported catch of that species by referring to species group 22, goosefish. Again, although sargo is a well-known California shorefish, none of the fishermen interviewed reported catching any; therefore, Pacific sargo is not included in this list.

The numbers given in the following listing refer to the numbers of the species groups defined in appendix A.

APPENDIX C--SURVEY METHODS[1]

At the request of the Bureau of Sport Fisheries and Wildlife of the U. S. Department of the Interior, a National Survey of Fishing and Hunting was conducted early in 1961 to bring up to date the results of an earlier survey on this subject.[2] Major emphasis was placed on obtaining a wide range of information on the number and characteristics of fishing and hunting participants in 1960, the extent and types of participation and the detailed expenditures for these activities.

As a special supplement to this survey, a series of questions was added to be asked directly of those identified as marine sport fishermen. The questions were designed to ascertain the areas in which salt-water fishing took place, the number and type of marine species caught, and the chief method used to catch each species. This survey represents the first attempt to obtain national data on this subject directly from the salt-water fishermen themselves.

The results relate to persons 12 years of age and older who were represented in the civilian noninstitutional population of the United States (excluding Hawaii) as of December 1960. Only those who actually engaged in salt-water sport fishing during the year 1960 were interviewed concerning the extent of their activity. The data refer to sport fishermen; that is, those who, for the most part, were the more substantial participants in terms of frequency of participation and expenditure. The results exclude many, if not most, highly incidental participants--those who engaged in this pastime on a very incidental basis, perhaps only once or twice during the year, with little or no expenditure for these purposes. Commercial fishermen, and their catch, also are excluded from the results. In addition to the persons covered by the survey, there may be a number of others who usually participate in these activities but did not do so during 1960. As indicated above, fishing by persons under 12 years of age and by persons in institutions or in the Armed Forces was excluded. Since the major interest of the survey was restricted to fishing in the coastal waters of the continental United States, the exclusion of salt-water fishing around Hawaii, necessitated by sampling limitations, is thought not to be a serious shortcoming.

The sample

In order to provide as accurate a cross section of the population as possible, it was decided to relate the sample for the National Survey of Fishing and Hunting, and for the additional series of questions on salt-water fishing, to another nationwide survey conducted monthly by the Bureau of the Census. As a result, the sample used was based on a subsample of persons previously selected for the Bureau's Current Population Survey. This survey is used to collect the official government statistics on total employment and unemployment. An area probability sample, it is distributed over 333 Primary Sampling Units (PSU's), each being a county or group of counties, in total comprising 641 counties and independent cities in the 50 states and the District of Columbia.[3]

Within each of the 333 sample PSU's, the sample consists of small land areas called segments, each containing approximately 6 housing units. In determining sample size within each sample PSU, a ratio rather than a fixed quota is employed. The sample is thus self-weighting; that is, each person has the same probability of being selected for the survey. This technique also is self-adjusting for changes in the size and distribution of the population.

[1] This section was prepared by the Demographic Surveys Division, U.S. Bureau of the Census, under the direction of Daniel B. Levine.

[2] National Survey of Fishing and Hunting, 1955, U.S. Fish and Wildlife Service, Circular 44.

[3] The sampling plan for the Current Population Survey is described in Current Population Reports, Series P-23, Number 5, May 1958, issued by the Bureau of the Census.

The interviewing

Approximately 18,000 households containing about 45,000 persons of 12 years of age and older were included in the sample for the Survey. Information was obtained in December 1960 in each household from a responsible adult as to whether each person in that household had fished or hunted during 1960. A sample page of the questionnaire used to obtain the information is shown in figure 1.

A sample of those identified as fishermen or hunters at the first stage, in December 1960, was selected for personal interview at a later visit. These visits, made in January and February 1961, yielded interviews with about 6,500 fishermen and 3,800 hunters, or about 93 percent of those selected for the detailed interviewing. The remainder had moved, were not at home after repeated calls, or were otherwise not available.

Following the completion of the interviewing for the national survey, additional questions were asked of the approximately 1,750 fishermen who had indicated they had engaged in salt-water fishing at some time during 1960, in answer to the basic interview. Specifically, each salt-water fisherman so identified was asked to indicate the areas in which he had engaged in salt-water fishing, the different species caught during 1960 in each of the areas, the total catch of each species, and, finally, the method used to catch each of the species. This information was provided by about 92 percent of those identified as salt-water fishermen.

The personnel used for the various phases of the survey were the experienced interviewers employed on the Current Population Survey and other regular programs of the Bureau of the Census. Field supervisors and interviewers received detailed personal training on the content of the survey. Interviewers also were provided complete manuals of instruction, both for training purposes and for assistance while interviewing. In order to assist the sportsman in providing the desired detail, calendars, lists of equipment items and booklets of license types were utilized. As each group of households was completed, the results were checked carefully, both for completeness and consistency. The same high degree of quality control was maintained in processing the results and preparing the data.

Differences between total participants and sport fishermen and hunters

According to special estimates prepared for the U. S. Fish and Wildlife Service, a total of 45 million persons fished at sometime in fresh and salt water for recreational purposes during 1960. A large proportion of these persons--around 40 percent--engaged in this pastime on a very incidental basis.

The results obtained from the National Survey of Fishing and Hunting provide a detailed study of participation including, types of fishing and hunting, expenditures, and equipment purchases, by the more active sport fishermen and hunters, who for the most part, were either licensed or, if unlicensed, either indulged on several occasions or reported at least a modest expenditure for these activities. This study revealed an estimated 25,325,000 fresh-water and salt-water sport fishermen in 1960. These more substantial participants reported around 465 million man-days of fishing and an expenditure of close to 2-3/4 billion dollars on these pastimes.

As compared with a similar survey conducted in 1955, the number of these sport fishermen had increased by over 4-1/2 million and their expenditures by 700 million dollars.

The estimates of total participants were developed from the National Recreation Survey, a series of special studies conducted for the Outdoor Recreation Resources Review Commission supplemented by some follow-up surveys sponsored by Fish and Wildlife Service. These represent the only available figures on the total number who fish or hunt, whether incidental or substantial participants, but provide only limited information

Please enter the desired information for each of the areas in which YOU did SALT-WATER fishing in 1960

If you do not have exact figures, a careful estimate will be acceptable. If you do not recall some of the information, please enter "Don't know" in the appropriate column.

C. AREA III. - CAPE HATTERAS, NORTH CAROLINA, TO FLORIDA KEYS

1. Please check the kinds of salt-water fish you caught in 1960	(Check)	2. Total number caught in 1960	3. Method chiefly used (Check ONLY one)			
			Fishing from a boat		Fishing from shore	
			Bottom fishing	Casting, trolling, etc.	Bottom fishing	Casting, etc.
Tarpon	1		1	2	3	4
Bonefish	2		1	2	3	4
Barracuda	3		1	2	3	4
Tunas: Bluefin, Yellowfin, Blackfin, Big-eye	4		1	2	3	4
Mackerels: Spanish Mackerel, Cero, Kingfish	5		1	2	3	4
Spearfishes: Sailfish, Marlins, Swordfish	6		1	2	3	4
Sea Trouts: Gray Trout, Spotted Trout	7		1	2	3	4
Redfish (Channel Bass, Red Drum)	8		1	2	3	4
Whitings	9		1	2	3	4
Jacks: Crevalles, Runners, Amberjacks, Pompanos	10		1	2	3	4
Bluefish	11		1	2	3	4
Dolphin	12		1	2	3	4
Snook	13		1	2	3	4
Porgies: Sheepshead, Pinfish (Bream)	14		1	2	3	4
Drum (Black Drum)	15		1	2	3	4
Sea Catfishes	16		1	2	3	4
Cobia (Crab Eater)	17		1	2	3	4
Groupers: Sea Bass, Hinds, Jewfish	18		1	2	3	4
Snappers: Schoolmaster, Muttonfish	19		1	2	3	4
Grunts: Margates, Pigfish	20		1	2	3	4
Any others (Please list each kind)			1	2	3	4
			1	2	3	4
			1	2	3	4
			1	2	3	4
			1	2	3	4

FORM FH-5 (12-10-60) - 4 -

Figure 1.--Sample page of the questionnaire used in the national survey of salt-water angling.

about the details of fishing and hunting activity. From the standpoint of the main objective of the National Survey of Fishing and Hunting--the presentation of detailed information on type and scope of fishing and hunting and, for this report, detailed information on salt-water angling--the statistics for more substantial participants, as developed from the National Survey of Fishing and Hunting, are the more comprehensive. These sportsmen or substantial participants, while constituting only about 60 percent of all participants, account for close to 95 percent of man-days of fishing and hunting and around 99 percent of the expenditures for these activities. Although similar detail on marine activity is not available, these results suggest that the substantial participants represent by far the bulk of the salt-water fishermen and accounted for virtually all of the catch reported in 1961. Furthermore, valid comparisons with the 1955 results can be made only for the more substantial participants as measured by the National Survey of Fishing and Hunting. The detail presented in the report on salt-water angling relates only to the substantial participants identified in the National Survey of Fishing and Hunting.

Definitions

For the purposes of this survey, fishing was defined as the sport of catching or attempting to catch fish with a hook and line or with spearfishing equipment (including fishing with archery equipment). Excluded are commercial fishing, fishing with a net, and catching or gathering shellfish. Any fishing in the ocean, bays, estuaries, and below the tide limits in rivers was considered as salt-water fishing.

APPENDIX D--RELIABILITY OF ESTIMATES

Since the estimates from the national survey of salt-water fishing are based on a sample, they may differ somewhat from the figures that would have been obtained if a complete census of all U. S. fishermen had been taken using the same schedules, instructions, and enumerators. As in any survey work, the results are also subject to errors of response and nonreporting.

The standard error is primarily a measure of sampling variability, that is, the variations that might occur by chance because only a sample of the population is surveyed. The chances are about 2 out of 3 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are about 19 out of 20 that the differences would be less than twice the standard error and about 99 out of 100 that it would be less than 2-1/2 times as large.

The estimates of standard errors shown in tables D-1 and D-2 are based on standard error calculations for about 20 different characteristics and have been obtained from a regression function fitted to these 20 observations.

TABLE D-1.--Estimated standard error of number of salt-water fishermen for national survey of salt-water angling in 1960

[Thousands of fishermen]

Estimated number of fishermen	Estimated standard error
25	20
50	30
100	40
200	55
300	65
500	80
750	100
1,000	110
2,000	150
4,000	225
6,000	275

TABLE D-2.--Estimated standard errors of numbers of salt-water fish caught for national survey of salt-water angling in 1960

[Thousands of fish]

Estimated catch	Estimated standard error
1,000	650
5,000	2,000
10,000	3,100
20,000	5,100
30,000	6,700
50,000	9,500
75,000	12,500
100,000	15,000
200,000	24,000
400,000	40,000
600,000	53,000

The technique used in computing the standard errors requires the grouping or pairing of strata which are alike with respect to the characteristics being estimated. In estimating variance on salt-water fishermen and catch, the groupings used were those already established for estimation of variances for the Current Population Survey. Whereas these groupings are nearly optimum for variance estimates for labor force data, they may not necessarily be the best grouping one could use for estimating variances on salt-water fishermen. The method used to estimate the standard errors of these estimates, then, leads to a slight overstatement of the standard error.

The reliability of an estimated percentage, computed by using sampling data for both numerator and denominator, depends upon both the size of the percentage and the size of the total on which the percentage is based. Estimated percentages are relatively more reliable than the corresponding absolute estimates of the numerator of the percentage, particularly if the percentage is 50 percent or greater.[4]

[4] A more extensive explanation of the "Grouped Stratum" method is presented in Sample Survey Methods and Theory, Vol. 1, Chapter 9, Sections 15 and 28, by Hansen, Hurwitz, and Madow.

APPENDIX E--SOURCES OF AVERAGE WEIGHT DATA

The average weight data used to estimate catch volumes came from a variety of sources--state conservation agencies, governmental and private marine laboratories, experienced sportsmen, editorial staffs of fishing magazines, outdoor writers, and charter and party boat operators.

The following is a complete listing of contributors of average weight data.

1. U. S. Bureau of Commercial Fisheries, Biological Laboratory, Boothbay Harbor, Maine.
2. Maine Department of Sea and Shore Fisheries, Augusta, Maine.
3. New Hampshire Fish and Game Department, Concord, N. H.
4. Henry Lyman, Salt Water Sportsman, Boston, Mass.
5. Massachusetts Department of Natural Resources, Division of Marine Fisheries, Boston, Mass.
6. U. S. Bureau of Commercial Fisheries, Biological Laboratory, Woods Hole, Mass.
7. Frank J. Mather, III, Woods Hole Oceanographic Institute, Woods Hole, Mass.
8. Saul B. Saila, University of Rhode Island, Kingston, R. I.
9. Rhode Island Department of Agriculture and Conservation, Division of Fish and Game, Providence, R. I.
10. Connecticut State Board of Fisheries and Game, Hartford, Conn.
11. New York Conservation Department, Dingell-Johnson Fish Research Unit, Freeport, N. Y.
12. Atlantic Coast Marine Sportsmen's Association, Inc., Long Island City, N. Y.
13. Heinz Ulrich, Continental Village #3, Peekskill, N. Y.
14. Henry Schaefer, Fishing Editor, Newark News, Newark, N. J.
15. Arthur Cone, Jr., Fishing Editor, The Daily Record, Long Branch, N. J.
16. New Jersey Department of Conservation and Economic Development, Division of Fish and Game, Trenton, N. J.
17. Delaware Board of Game and Fish Commissioners, Dover, Del.
18. Virginia Institute of Marine Science, William and Mary College, Gloucester Point, Va.
19. South Carolina Wildlife Resources Department, Division of Commercial Fisheries, Bears Bluff Marine Laboratory (from "Common Marine Fishes of South Carolina", Contribution No. 34, July 1961).
20. William Hassler, North Carolina State College, Department of Zoology, Raleigh, N. C.
21. Captain Ottis Purifoy, Lucky Seven Sport Fishing Fleet, Morehead City, N. C.

22. Bob Simpson, Fishing Editor, Yacht Silver Spray, Morehead City, N. C.

23. International Game Fish Association, Miami, Fla.

24. The Marine Laboratory, University of Miami, Miami, Fla.

25. Louisiana Wildlife and Fisheries Commission, New Orleans, La.

26. Texas Game and Fish Commission, Austin, Tex.

27. U. S. Bureau of Commercial Fisheries, Biological Laboratory, San Diego, Calif.

28. U. S. Bureau of Sport Fisheries and Wildlife, Tiburon Marine Laboratory, Tiburon, Calif.

29. California Department of Fish and Game, Marine Resources Operations, Terminal Island, Calif.

30. Al Accardi, Weekend Fishing, Hunting and Boating News, Oakland, Calif.

31. Oregon Fish Commission, Clackamas, Oreg.

32. Washington Department of Game, Olympia, Wash.

33. Alaska Department of Fish and Game, Juneau, Alaska.

34. U. S. Bureau of Sport Fisheries and Wildlife, Sandy Hook Marine Laboratory, Sandy Hook, N. J.

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