

*Jowell O'Meara*

**STRIPED BASS STUDIES  
ON COOS BAY, OREGON  
IN 1949 AND 1950**

ALFRED R. MORGAN, Oregon Fish Commission  
AND  
ARTHUR R. GERLACH, Oregon Game Commission



**OREGON FISH COMMISSION**

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**A Report to the Forty-Sixth Legislature**

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**OREGON FISH COMMISSION**

**and**

**OREGON GAME COMMISSION**

**In fulfillment of the directive of the Forty-Fifth Legislative Assembly to the State Fish Commission and the State Game Commission jointly to conduct a study of the striped bass of the Coos Bay area, the accompanying report is submitted to the Forty-Sixth Assembly.**

**December, 1950**

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# STRIPED BASS STUDIES ON COOS BAY IN 1949 AND 1950

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## INTRODUCTION

The striped bass [*Roccus saxatilis* (Walbaum)] was introduced to the Pacific Coast in 1879, when 132 small fish which had been shipped from New Jersey were planted in San Francisco Bay. In 1882 an additional plant of 300 small bass was made in the same waters. In 1889, ten years following the original planting, the United States Bureau of Fisheries reported a commercial catch in California of 16,296 pounds. Three years later the catch had increased to 56,209 pounds (Craig, 1930).

From these small plantings in San Francisco Bay the striped bass has spread along the Pacific Coast until at present its range extends from San Diego, California to the Columbia River. In Oregon the bass are most abundant in Coos Bay with small runs occurring in the Coquille and Umpqua Rivers. Occasionally bass are taken in some of the other rivers, including the Columbia. It has been reported that the first striped bass caught in Coos Bay was taken by a gill-netter in 1914. At the present time the bass is important as both a commercial and a sport fish in Coos Bay.

### *Personnel*

The investigation has been conducted from the Fish Commission laboratory at Charleston. The authors have devoted most of their time to the investigation and have received considerable help from other biologists of the Fish and Game Commissions. Messrs. C. G. Moody and R. E. Noble of the Game Commission and Messrs. R. L. Rulifson and C. R. Reerink of the Fish Commission assisted in various phases of the work. Mr. R. Willis of the Oregon Fish Commission has helped in the preparation of the figures.

### *Acknowledgments*

The commercial fishermen and dealers, moorage operators, business men of the Coos Bay area, Chambers of Commerce, local residents, and sportsmen have cooperated with the biologists in the collection of data concerning the striped bass.

## STRIPED BASS SPORT FISHERY

The Coos Bay area supports a large sport fishery for the "striper." The fishing area extends from the Coos River bar to the upper tidal reaches of the Coos and Millicoma Rivers. The region has four main areas each of which supports a large fishery at various times of the year. The complete region, with the four areas encircled by dotted lines and the main fishing locations shaded, comprises Figure 1. These areas support a year-long fishery with the main winter fishing occurring in Isthmus Slough and the late spring and summer areas in the Coos and Millicoma Rivers and in the lower bay.

Striped bass creel census data were obtained through personal interviews and through boat moorage log books which contained a record of the number of people fishing from a given dock. The data obtained in the census were composed of the number of people per party, the length of time spent in fishing, and the number of fish caught. The lengths, weights, and, when possible, the

sex and stomach contents were taken from all fish. Stomach analyses and sex determinations could not always be made since some anglers were reluctant to have their fish cleaned.

The main methods of angling for striped bass are either by boat or bank fishing. Of the total anglers checked 60.8 percent were bank fishermen. The reason for the lack of boat fishing was the scarcity of skiffs. There were seven boat liveries on the bay which could supply a total of 38 skiffs and 2 inboards,

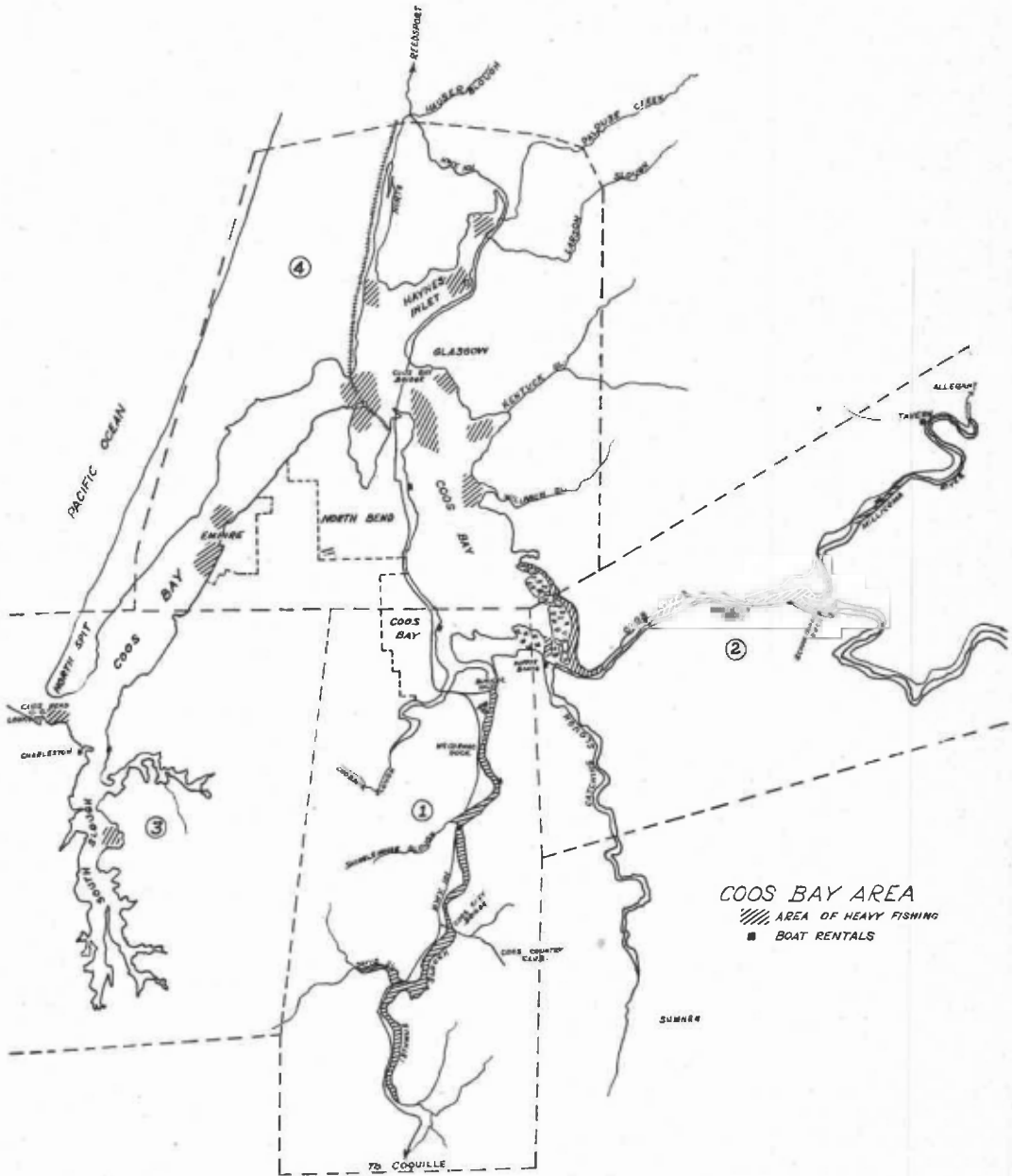


FIGURE 1. Principal Sport Fishing Areas, Coos Bay.

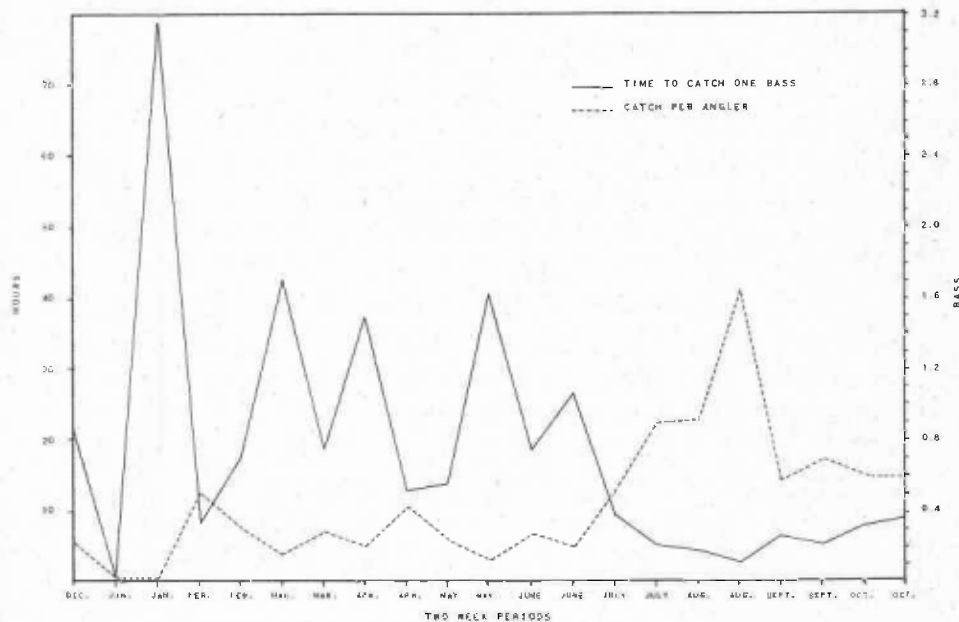
and 4 launches. Only one of these establishments is open during the full year; the others are seasonal.

Table 1 is a compilation of the creel census data for the total area. The information was gathered from December 18, 1949 to November 1, 1950.

**TABLE 1. Total Creel Census by Monthly Periods for the 1949-50 Coos Bay and Striped Bass Sport Fishery**

Month	No. of Anglers	Hours Fished	No. of Fish	Avg. Time Fished	Fish Per Angler	Fish Per Hour	Hours to Catch One Bass	Limits	Empty Creels
Dec. 18-Jan. 17...	191	967	44	5.06	0.23	0.046	21.98	0	163
Jan. 18-Feb. 17...	138	455	38	3.29	0.28	0.084	11.97	0	121
Feb. 18-Mar. 17...	439	2,479	82	5.62	0.19	0.033	30.23	0	389
Mar. 18-Apr. 17...	406	2,289	87	5.64	0.21	0.038	26.31	0	351
Apr. 18-May 17...	190	932	71	4.90	0.37	0.076	13.13	6	164
May 18-June 17...	326	1,586	62	4.87	0.19	0.039	25.48	2	292
June 18-July 17...	1,257	6,194	427	4.93	0.34	0.069	14.50	17	1,022
July 18-Aug. 17...	761	3,471	695	4.56	0.91	0.20	4.99	47	490
Aug. 18-Sept. 17...	460	1,760	533	3.83	1.16	0.302	3.30	60	236
Sept. 18-Oct. 17...	578	2,396	374	4.15	0.65	0.156	6.41	14	329
Oct. 18-Nov. 1...	233	1,322	150	5.67	0.68	0.113	8.81	11	162
Total.....	4,979	23,851	2,563	4.79	0.514	0.107	9.31	157	3,719

During this period, 4,979 anglers fished 23,851 hours to catch 2,563 fish weighing approximately 14,931 pounds. The sport-caught stripers averaged 5.8 pounds per fish. The hours spent in catching one fish is compared to the number of bass caught per angler in Figure 2. The figure depicts a period of good fishing during July, August, and September which coincides with the appearance of numerous small fish in Coos River. Bass fishing was good in Isthmus Slough in October because of a sudden influx of large fish. During the remainder of the year, striper fishing was generally mediocre.



**FIGURE 2. The Hours Per Bass and Catch Per Angler in Coos Bay During 1950.**

The length of time the angler spent fishing is small compared to the time required to catch one bass because the angling areas were so conveniently located that people could go fishing after work and would spend only two or three hours at it. Also during the summer months many people did incidental fishing while picnicking. The average "dyed in the wool" striper angler usually spent eight hours or more on each bass fishing trip.

#### *Bi-Weekly Summary*

Table 2 presents a summary of the data for the whole area in bi-weekly periods. It is presented to show the weekly variations as compared to the monthly variations. Owing to severe weather conditions an erratic catch resulted in the early part of the study. Variations were markedly reduced later in the period. The fishing intensity was greatest during the period June 18 through July 17, 1950. The usual Fourth of July holiday crowd was augmented by many anglers who recalled the large catch of bass taken at the same time in 1949. Many of these people were disappointed since there was no large run of fish in July of 1950.

**TABLE 2. Total Creel Census In Bi-Weekly Periods for the 1949-50 Coos Bay Area Striped Bass Sport Fishery**

Month	No. of Anglers	Hours Fished	No. of Fish	Avg. Time Fished	Fish Per Angler	Fish Per Hour	Hours to Catch One Bass	Limits	Empty Creels
Dec. 18-Jan. 2	183	943	44	5.15	0.24	0.047	21.43	0	155
Jan. 3-Jan. 17	8	24	0	2.88	0	0	0	0	8
Jan. 18-Feb. 2	70	157	2	2.24	0.029	0.012	78.50	0	68
Feb. 3-Feb. 17	68	298	36	4.39	0.52	0.12	8.28	0	53
Feb. 18-Mar. 2	127	664	39	5.23	0.31	0.054	17.02	0	111
Mar. 3-Mar. 17	312	1,815	45	5.82	0.14	0.024	24.20	0	278
Mar. 18-Apr. 2	183	928	49	5.07	0.27	0.053	18.94	0	151
Apr. 3-Apr. 17	223	1,361	37	6.10	0.17	0.027	36.78	0	200
Apr. 18-May 2	153	810	62	5.29	0.41	0.077	13.06	6	129
May 3-May 17	37	122	9	3.30	0.24	0.074	13.56	0	35
May 18-June 2	169	814	20	4.72	0.12	0.025	40.2	0	160
June 3-June 17	157	772	42	4.92	0.27	0.054	18.45	2	132
June 18-July 2	656	3,125	119	4.76	0.18	0.038	26.26	4	590
July 3-July 17	601	3,069	308	5.11	0.51	0.100	9.96	13	432
July 18-Aug. 2	352	1,688	318	4.79	0.90	0.188	5.30	20	204
Aug. 3-Aug. 17	409	1,783	377	4.36	0.92	0.211	4.73	27	286
Aug. 18-Sept. 2	251	926	412	3.69	1.64	0.44	2.49	41	126
Sept. 3-Sept. 17	209	834	121	3.99	0.58	0.145	6.89	19	110
Sept. 18-Oct. 2	376	1,347	248	3.58	0.67	0.109	5.43	12	209
Oct. 3-Oct. 17	202	1,049	126	5.19	0.64	0.12	8.33	2	120
Oct. 18-Nov. 1	233	1,322	150	5.67	0.64	0.11	8.81	11	162
Total	4,979	23,851	2,563	4.79	0.514	0.107	9.31	157	3,719

The hours per fish and catch per angler for bi-weekly periods are presented in Figure 3. The low fishing intensity during the first part of the year may be attributed to inclement weather.

The first part of the graph reflects the effect of the weather. Data for the month of June reflect the sudden increase of anglers during the holidays. In the first week of July the increase in catch was a result of the small fish which were taken in Coos River and, to some extent, of the large fish caught in the lower bay. The last week of August afforded the best fishing in terms of numbers of fish during the entire study period.

Fishing began to drop off as the small bass left the nursery grounds. The

shift took place during the last part of September at which time the fishing intensity moved back to Isthmus Slough. In October the fishing began to improve with scattered catches of large fish being made during the first part of the month. Towards the end of the month, fishing intensity increased and many anglers caught enough large mature fish to make the period the most successful of the year in terms of size of fish taken.

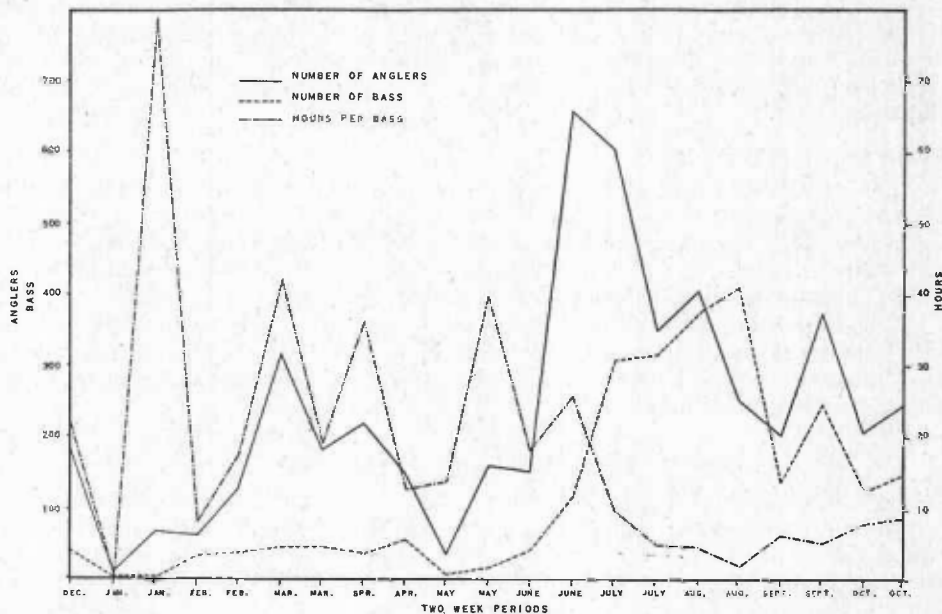


FIGURE 3. The Total Striped Bass Catch, Number of Anglers, and Hours Necessary to Capture a Bass in Bi-Weekly Periods, Coos Bay, 1950.

### Sport Fishery by Areas

The Isthmus Slough area extends nine miles to the south of the town of Coos Bay toward Coquille (Fig. 1, Region 1). Here, fishing was done mainly from September through the middle of May. Most of the fish were mature. Bank fishing was most popular, and frozen pilchard, herring, or sculpins were used for bait. The area is available to the public since it follows the coast highway. The area is fished by people from Coos Bay and North Bend for the most part with a few people from out of town using the area on week ends.

The main Coos River extends to the Coos River Creamery where it forks into the Millicoma River and the South Fork of Coos River as is shown in Figure 1, Region 2. There were many bank fishing spots in this section because it was accessible from the road. Bank fishing was most popular here and frozen pilchards or sculpins were used as bait. During the first part of the season, some trolling was done with artificial plugs. Fishing in this area occurred from March through September. The period between June and August was most popular with anglers as depicted in Tables 1 and 2. A total of 2,837 anglers caught 1,850 bass in this area during the season. Fishing was poor during the month of May, which was near the height of the main spawning season, and the bass were not actively feeding.

The main Coos area is important because of the large numbers of people on their vacations who hear of the bass fishing and wish to stop. Many people that were checked were fishing for bass for the first time. They were disappointed with their catches owing to the small average size of the fish. It has been found that the average size of bass in the same type of nursery environment in Cali-



fornia is usually small during the summer. This is not a sign of a declining population but indicates that a successful hatch probably occurred during the previous two or three years.

The lower bay includes all of the bay shown on Figure 1, Regions 3 and 4. South Slough was included in this section because it was a promising fishing area although it was not being utilized during the summer.

The bay was mainly a boat fishing area because of the lack of bank fishing spots. There were six places that people could fish from the bank by the use of artificial plugs, but the tides governed the fishing here. Skiff fishing was often dangerous because of a strong northeast wind that blew intermittently during the summer.

#### *Summary of 1949 Sport Fishery*

The 1949 sport fishery was exceptionally good during the summer months of July and August. It was estimated that 4,245 anglers fishing from skiffs caught 7,168 bass weighing 60,928 pounds. From all information that could be gathered it is believed that this was one of the best years that has ever been experienced in the area for sports fishing.

The remaining months of 1949 were very poor. An estimated 408 anglers fishing from skiffs caught only 168 bass weighing 1,428 pounds. During the period January to May, 1949, the sport fishery was not measured and as a result the above figures are minimal.

## COMMERCIAL FISHERY

### *History of Fishery*

During the period from 1931 to 1946, the open fishing season on Coos Bay was divided into three segments as follows: April 1 to June 30, July 15 to November 20, and December 10 to March 20. Both drift and set gill nets were permitted. Deadlines during the shad season, April to June, were the same as at present (Fig. 4); during the other two periods the deadline was located a short distance below the Coos River forks. Catching and Isthmus Sloughs were closed to all commercial fishing.

The commercial fishery for salmon was eliminated following 1946, and the gill net fishery restricted to the taking of shad and striped bass during the period of April 1 to June 30. However, legislation was enacted at this time which permitted the taking of striped bass commercially by means of set lines and hook and line the year around in 1947 and 1948. The poundage so taken was not large (the difference between total poundage and poundage landed in April-June in 1947 and 1948, Fig. 5). In 1949 legislation was enacted which prohibited the taking of striped bass commercially by hook and line and limited the fishery to gill net operations during the shad season of April through June.

From the information available, it appears that striped bass were first taken in commercial quantities on Coos Bay in 1922. Partial landings for 1928 were 8,200 pounds; for 1929, 8,300 pounds; and for 1930, 13,400 pounds. Statistics for the entire catch are available since 1931, in which year the catch was 18,000 pounds. Figure 5 gives the annual production of striped bass in the commercial fishery from 1931 to 1950. The largest catch was made in 1945 when 263,000 pounds were landed. Prior to 1949, the catch of bass during the shad season averaged about 70 percent of the year's total catch of bass.

### *Commercial Gear*

The commercial gillnet mesh regulations permit a minimum stretched mesh of  $4\frac{1}{2}$  inches and a maximum stretched mesh of  $6\frac{1}{2}$  inches. Gill nets used for catching shad are usually of three or four ply mesh. These will capture some bass; however, heavier nets of seven or eight ply mesh are generally used when

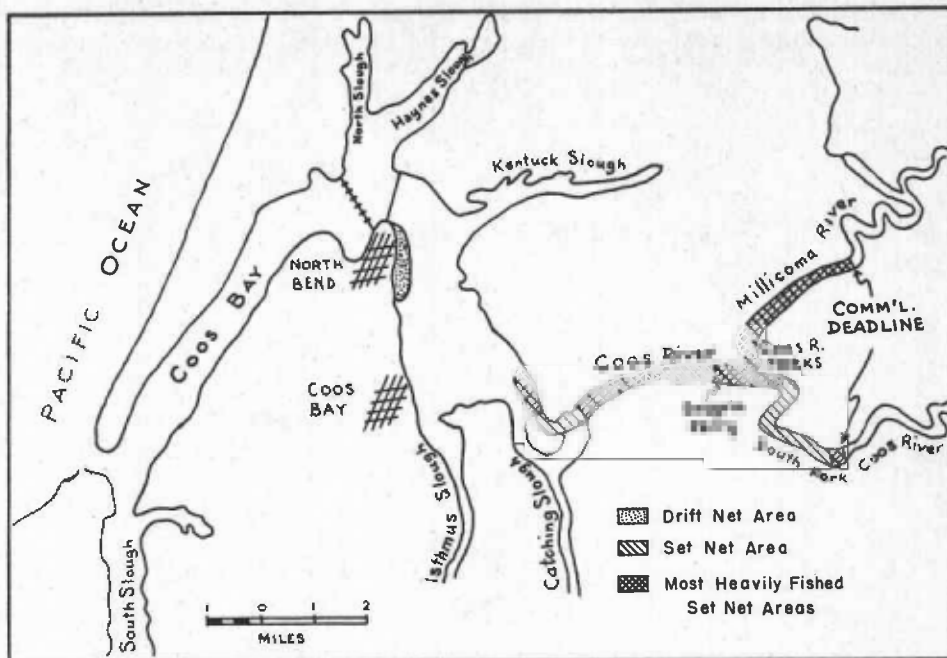


FIGURE 4. Commercial Fishing Areas for Striped Bass on Coos Bay.

fishing primarily for bass. Since gill nets exclude the very small and very large fish, with certain exceptions when fish tangle in the nets, fishermen use the size mesh which in their opinion will take the most fish available to them.

Table 3 gives the number of gill net and set net licenses issued for shad fishing and striped bass fishing on Coos Bay since 1947. Prior to 1947, the bay was open to salmon fishing, and, since the licensed period covered a year's fishing, it is not possible to separate out those licensees fishing only for shad and striped bass.

TABLE 3. Gill Net Licenses Issued for Shad and Striped Bass Fishing on Coos Bay, 1947-1950

Year	Drift Net	Set Net
1947 .....	34	245
1948 .....	21	179
1949 .....	10	140
1950 <sup>1</sup> .....	11	121

<sup>1</sup>Preliminary data.

#### Fishing Areas

In 1950 only three striped bass fishermen of the 11 holding licenses were known to use a drift gill net, and then only occasionally. Two of these fished from North Bend to the McCulloch bridge on highway 101 and the other in the vicinity of Enegrin Ferry (Fig. 4). Gill net sets are located from the mouth of Coos River in Cooston channel upstream to a point about three miles above the forks on both the South Fork of Coos River and the Millicoma River.

#### Relationship to Shad Fishery

No fishermen are known to fish solely for striped bass, although, when bass are observed in large numbers, the relatively fragile shad nets are pulled and

replaced with heavier gear. This probably does not happen more than two or three times during a season, but good catches of striped bass are made at such times.

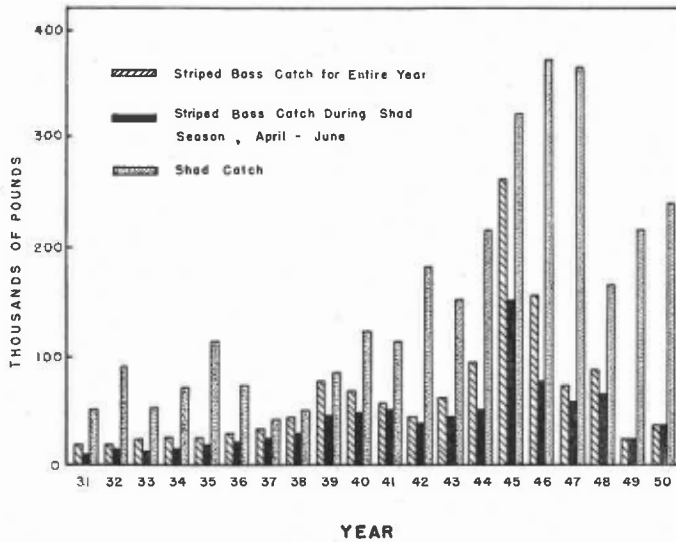


FIGURE 5. Annual Landings of Striped Bass and Shad on Coos Bay, 1931 to 1950.

When shad fishing is poor, a few fishermen, primarily at Coos River forks and on the Millicoma, fish heavy bass nets in conjunction with the lighter shad nets. Since the heavier nets will not fish shad efficiently, they are usually not used unless bass are observed in the area.

As pointed out previously, the striped bass fishery has been limited to the season of the shad fishery and is more or less incidental to it. The annual landings of both shad and striped bass on Coos Bay are shown in Figure 5. Peak landings of shad were made in 1946 and 1947 when over 350,000 pounds of this valuable food fish were landed. In 1950 the shad landings amounted to about 240,000 pounds.

#### *Catch Per Unit of Effort*

To arrive at a more suitable measure of abundance than the total catch, a catch per unit of effort has been calculated. The total catch is not a suitable yardstick since it is influenced by a number of factors other than abundance. For example, restriction of the fishery through regulations tends to reduce the size of the catch; on the other hand, increased demand for striped bass and resultant higher prices paid to the fishermen tends to increase the size of the catch. Thus the intensity of the fishery as well as the abundance of the fish plays an important part in the size of the total catch. In order to avoid the effect of changes in intensity the average daily landing of striped bass during the shad season only was determined. Since the shad fishery has been but slightly affected by changes in regulations and has been a somewhat stabilized fishery for some time, this would seem to be a more suitable period for comparison of the striped bass catches. Furthermore, the elimination of the striped bass fishery during all but the shad season makes it imperative to work within this short season in order to carry on comparisons in later years.

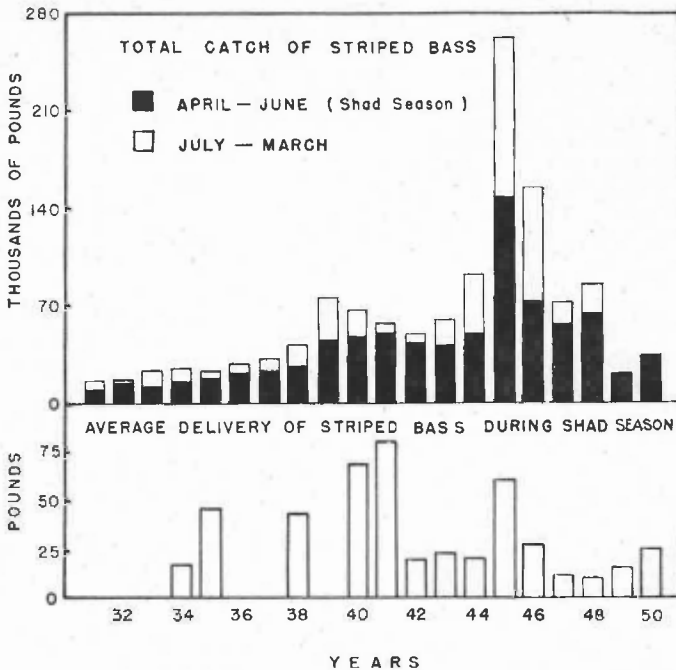


FIGURE 6. Annual Commercial Catch of Striped Bass and Average Daily Delivery During the Shad Season on Coos Bay.

The average catch of striped bass per delivery has been determined for 13 years and is plotted along with the total catch in Figure 6. Data were available for only three years prior to 1940. It can be seen that the largest average deliveries were made in 1940 and 1941. The average delivery was somewhat lower in 1945, the year of the largest total catch. The average delivery in 1950 was about 26 pounds compared to a mean delivery of 34 pounds for all years. With a species of fish such as striped bass where the catch consists of many age classes, it is expected that the abundance will fluctuate considerably. This may result, for example, from the entry into the fishery of one or more year classes in large numbers which boosts the size of the population temporarily. The large year classes result from unusually good spawning or survival conditions in certain years. In studies of striped bass on the east coast of the United States (Merri-man, 1941) it has been demonstrated that the production of dominant year classes is closely associated with below average temperatures before and after the spawning season.

#### *Rate of Fishing and Estimate of Population Size*

Although only a limited amount of tagging had been done prior to this past season, it has been possible through the use of fish tagged in 1950 to make a rough estimate of the rate at which the striped bass were removed from the population by the commercial fishery. To do this it must be assumed that tagged fish enter the fishery in the same proportion as untagged fish and that they suffer the same fishing and natural mortality.

The average weight of commercially caught fish was 10.46 pounds in 1950. Since the total catch for the season amounted to about 35,400 pounds, the number of fish in the catch can be calculated to be 3,384. During the commercial fishing season, April 20 to June 20, 189 bass were tagged which could have entered the fishery.

Cooperation from the two commercial buyers was excellent, and it is assumed that all tagged bass taken by the commercial fishery were returned. The total recovery of tagged striped bass was 36, or 19 percent of those tagged and released earlier in the 1950 season. Thus, for the purpose of this preliminary study it may be assumed that the total 1950 commercial catch represents approximately 19 percent of the commercially available population. The gill nets used in this fishery are highly selective for fish beyond the second year class. If the 3,384 fish taken by the commercial catch represents approximately 19 percent of this portion of the population, then the total population of striped bass in Coos Bay during the fishing season of a size large enough to be taken by the commercial fishery was approximately 18,000 fish.

Since some of the smaller tagged fish were reported to have been caught in the nets by the tags, the rate of fishing determined here is no doubt high. Mortality due to tagging is thought to be negligible because of the hardy nature of striped bass.

The population estimate is probably a minimum figure since the calculated fishing rate is probably high as pointed out above. Also these calculations are based only on the segment of the population available to the commercial fishery. Fish too small or too large to be taken by commercial gear would not be included.

#### *Average Weight Studies*

One of the first indications of overfishing in a fish population composed of several year classes is a decrease in the average size of the fish. As the older age classes are repeatedly subjected to the fishery each year, their numbers decline to the point where the population is composed largely of the young and smaller fish.

Records kept by one of the commercial dealers for the years 1928, 1929, and 1930 give the number of fish as well as the poundage. The average weight has been determined from these data and plotted along with data secured from this same buyer in 1949 and 1950. As can be seen in Figure 7, the average weights in 1928, 1929, and 1930 were 7.3, 6.6, and 6.8 pounds respectively. In 1949 and

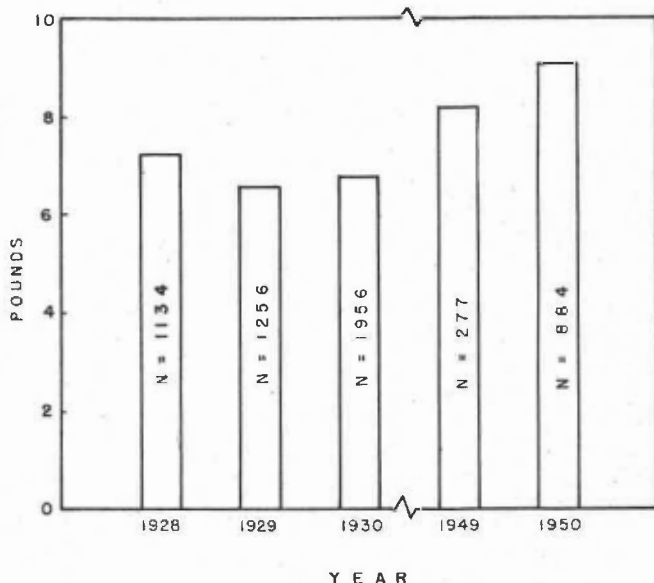


FIGURE 7. Average Weights of Striped Bass Taken During the Shad Season (April-June) as Determined From the Records of One Commercial Dealer.

1950 they were 8.2 and 9.1 pounds respectively. One thing which should be borne in mind here, however, is that the population in 1928 to 1930 probably was still growing in size and may have included relatively young fish. Also the size of the nets used in the earlier years is not completely known and also would affect the average size of the catch.

### LIFE HISTORY

#### *Spawning Areas and Spawning Habits*

Whenever possible observations of the spawning habits of striped bass were made. At the peak of the spawning season, usually a period of only one or two days, the fish can be observed in mating behavior throughout the day. They appear most abundantly in the late afternoon and early evening and spawn primarily on the flooding tide. From samples of commercially caught fish it appears that the males greatly outnumber the females. In the act of spawning a group of fish will appear on the surface milling around in a circle. The group may consist of only three or four fish or it may consist of many times that number. A few seconds after the fish appear on the surface they begin to splash the water with their tails. For about a minute all that can be seen are the tails of the fish and splashing water which flies four or five feet into the air. The fish stop splashing abruptly and submerge. During this spawning activity, it is often possible to approach the bass with a boat and even collide with them before they will submerge. Shad perform a similar spawning demonstration, but the striped bass are much more violent in their splashing and usually more fish are involved in a single group. In general the spawning area of the shad and striped bass spawning is the same, with the area used by the bass possibly extending a little farther downstream.

The area where striped bass have been observed spawning is shown in Figure 8. It extends from a short distance below the Enegrin Ferry on Coos River

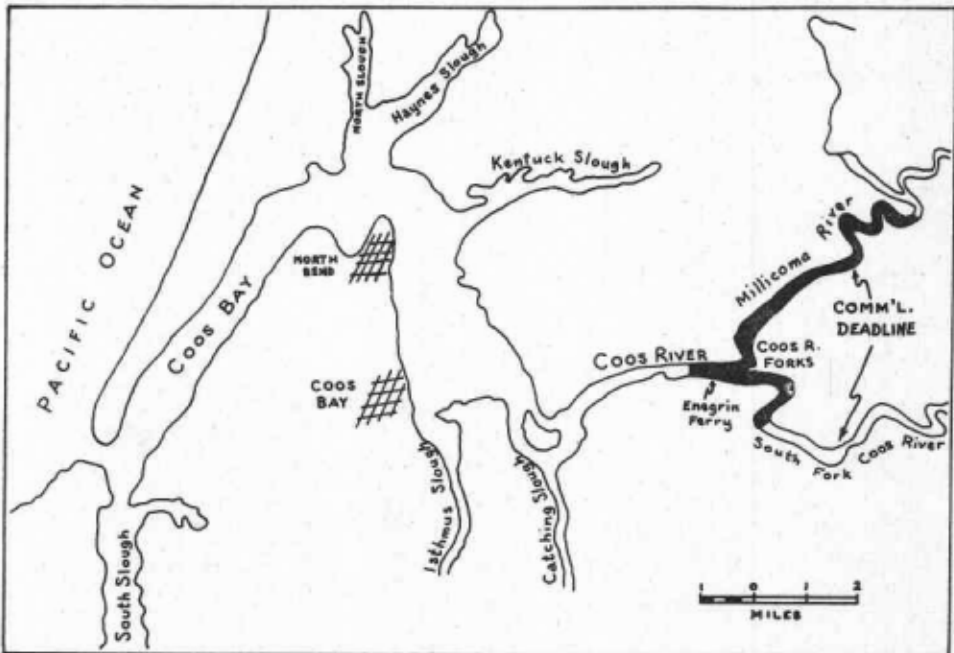


FIGURE 8. Striped Bass Spawning Area on Coos Bay (Darkened Portion Shows Area Where Bass Are Known to Spawn.)

upstream to the Coos River forks, a distance of about three-fourths of a mile, on the South Fork of Coos River from the forks upstream about 11½ miles, and on the Millicoma River from the forks upstream about 6½ miles.

Salinity readings were made with a hydrometer throughout the spawning season at the Coos River forks with occasional readings at Enegrin Ferry. Although spawning is confined to the tidal area, all readings showed an absence of salt water. Eight water samples taken from the bottom of the river in these same areas during the spawning season were analyzed chemically. The salinity was found to be zero.

Observations of the development of the gonads of striped bass have been made throughout the year to determine the spawning season. It has been observed that some male striped bass are ripe in the fall and that a few ripe males are present throughout most of the year. However, the bulk of the ripe males were found in the spring months. The majority of the ripe females were found in the spring, but some ripe females were observed as late as August. The sexual development of the bass was studied at the buying stations where commercially caught fish were landed and dressed. Figure 9 gives the percentage of maturing, ripe, and spent females in the commercial catch in 1950. No ripe or spent females were found previous to May 13. The greatest percentage of ripe females was found in the week ending June 10 when 41 percent were ripe, 43 percent were spent, and 16 per cent were maturing. In the week ending June 24, the percentage ripe had dropped to 38, while the percentage spent had increased to 52, and the percentage maturing had decreased to 10. The closure of the commercial season at the end of June precluded the gathering of data beyond this date. However, it is apparent that in 1950 the spawning season extended from about the middle of May through at least the end of June.

On June 28 several groups of bass were observed spawning in the Millicoma River. On July 2 a ripe, unspawned female which had been tagged nearly a

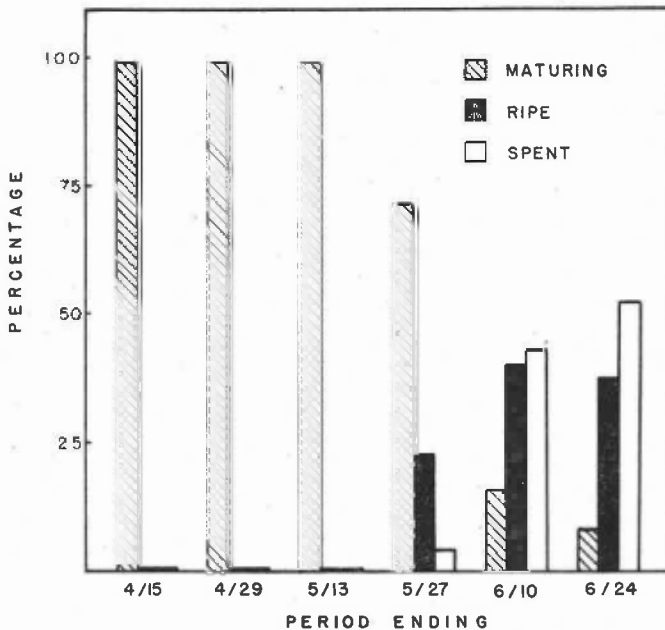


FIGURE 9. Gonad Condition of Female Striped Bass Taken Commercially on Coos Bay, 1950.

month previously was recovered about three miles below the head of tidewater in the Millicoma River.

Plankton hauls were made once a week at the forks of Coos River and occasionally below Allegany in order to obtain striped bass eggs and larvae. The greatest number of eggs and larvae were obtained on May 27.

### Migrations

In order to determine migration patterns, rate of growth, and fishing intensity, a tagging program was initiated in the spring of 1950. The majority of the fish tagged were purchased from commercial gill net fishermen. A few additional fish were obtained with a short gill net and a small number with hook and line. A total of 374 striped bass was tagged from April 20 until September 30, 1950. Figure 10 shows the size distribution of the 373 tagged fish as compared with the size of 49 recoveries. The tag used consisted of two celluloid discs, five-eighths inch in diameter, held together by a nickel pin. One tag was numbered to identify the fish. The tag was placed just below the dorsal fin (the large fin on the back), one disc being on each side of the body.

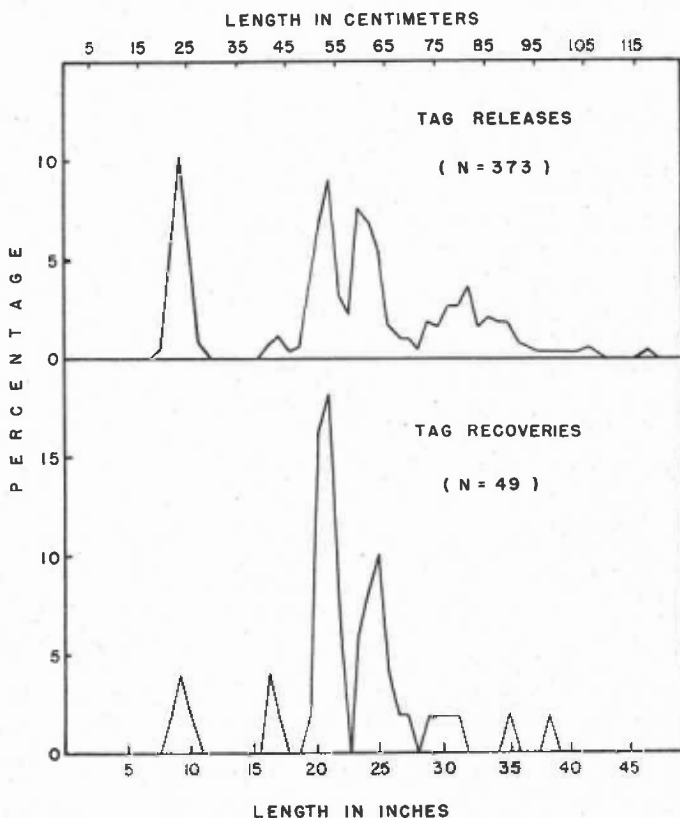


FIGURE 10. Size distribution of Striped Bass Tagged on Coos Bay, April to September, 1950. (Upper Section Shows Size Distribution of All Fish Tagged. Lower Section Shows Size Distribution of Tagged Fish Which Were Recovered.)

The tagging data have been analyzed by bimonthly periods as shown in Figure 11. Part A shows the place of release of fish tagged in April and May and the recoveries of these fish during this period. Part B shows the place of release



## PART A

### TAG RELEASES AND RECOVERIES IN APRIL AND MAY

- Ten Tags Released in April and May
- + One Recovery of Fish Tagged in April and May



## PART B

### TAG RELEASES AND RECOVERIES IN JUNE AND JULY

- Ten Tags Released in June and July
- One Recovery of Fish Tagged in June and July
- + One Recovery of Fish Tagged in April and May



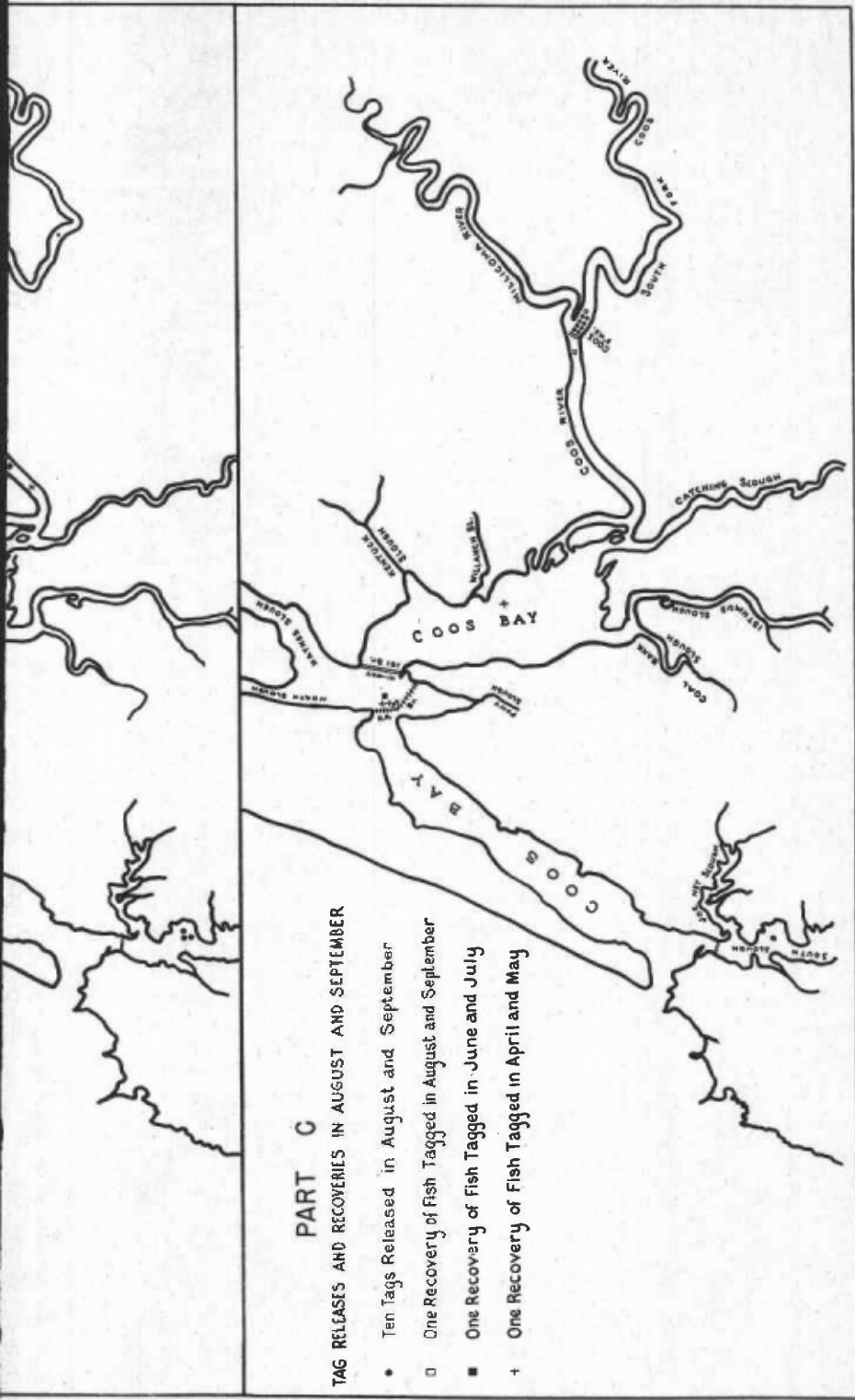


FIGURE 11. Striped Bass Tagging Operations and Tag Recoveries in Cooch's Bay in 1950.

of fish tagged in June and July and recoveries of these as well as fish tagged in the earlier period. Part C similarly summarizes activities in August and September. As can be seen from Figures 1 and 4, the sport and commercial fisheries are concentrated primarily in the upper reaches of the bay. Therefore, the migrations as shown by these tag returns are influenced by the location of the fishery.

Numerous attempts were made to capture fish in March and April with commercial gill net gear. All attempts were unsuccessful prior to April 20 when a small school of bass was located and three fish were captured and tagged.

#### *Tagging and Recoveries*

Recoveries made in April and May of tags put out in this period indicate an upstream migration of bass into Coos River at least as far as the commercial fishery dead-line on the Millicoma River (Fig. 11, Part A). Of 151 fish tagged, 19 were recovered. The greatest distance from point of release to point of capture was nine miles; the longest period between tagging and recovery was 32 days.

A total of 135 bass was tagged in June and July, six of which were recovered during this period. In addition, 16 bass which had been tagged during April and May were recovered in June and July. In general, recoveries during this period indicated an upstream migration similar to that found in April and May (Fig. 11, Part B). Of the recoveries during June and July, the greatest distance from point of release to point of capture was nine miles; the longest period between tagging and recovery was 94 days.

No particular pattern of migration was apparent from the recoveries of tagged fish during August and September (Fig. 11, Part C). However, no fish tagged in Coos Bay were recovered in Coos River during this time. Of 88 bass tagged in August and September, only one was recovered. Three fish which had been tagged in April and May were recovered. The greatest distance from point of release to point of capture was three miles; the longest period between tagging and recovery was 128 days.

Observations to date seem to indicate that there are two migrations of striped bass into Coos Bay—the spawning migration upstream in the spring and a second migration into the sloughs in the fall. In the summer of 1950 it appeared that the majority of the adult striped bass left the bay within two or three weeks after the main spawning season in late May and early June. Immediately after the largest catches were made in the commercial fishery in Coos River, large schools of bass were observed in lower Coos Bay. Within two weeks very few fish could be found anywhere in Coos Bay and it seems likely that they had passed out to sea. It appears that there is a distinct fall migration from the ocean which supported the winter commercial fishery in the past and which now supports a fairly intensive sport fishery.

As far as is known at the present time, no striped bass have been captured in the ocean on otter trawls, on long lines, in shark nets, in crab pots, or on salmon trolls. On the Atlantic Ocean, studies have shown that striped bass make extensive coastwise migrations (Merriman, 1941). Tagging operations are being continued and will shed further light on the migration of striped bass.

Table 5, page 31, gives additional detailed information concerning the tagged fish which have been recovered.

#### *Age and Growth Studies*

During 1949 and 1950, scale samples were taken from striped bass for age analyses. Impressions of the scales were made in cellulose acetate with a hand press. The impressions were examined with a binocular microscope and the number of annuli on each scale was recorded. A total of 667 scales, taken from

bass ranging in size from seven inches to 49 inches, have been read to determine ages. The validity of the age readings has not been completely substantiated but has been accepted by workers in other parts of the country; studies are continuing to prove the authenticity of these readings. Having determined the percentage age composition of fish in each length group of one centimeter size and relating this to the random length frequency samples, it has been possible to arrive at the age composition of both the commercial and sport-caught bass. In the discussion of year classes that follows it should be remembered that fish are in the zero year class until they are one year of age. A fish of the first year class is in its second year of life, etc. Ages of fish beyond the tenth year class could not be accurately determined.

Figure 12 shows the age composition of fish in both the sport and commercial fisheries in 1949 and 1950. Most of the scale samples were taken in the spring at the time just before the new annulus is apparent on the edge of the scale. The actual age of the fish would thus be almost one year greater than the age class shown in Figure 12. It will be seen that the sport catch was made up of a larger percentage of small fish than the commercial catch. Large numbers of fish in the first and second year classes were taken by the sports fishermen with practically none taken by the commercial fishermen. Fish up to the tenth year class appeared in the catches of both fisheries in considerable numbers with a few fish being taken as old as the 16th year class.

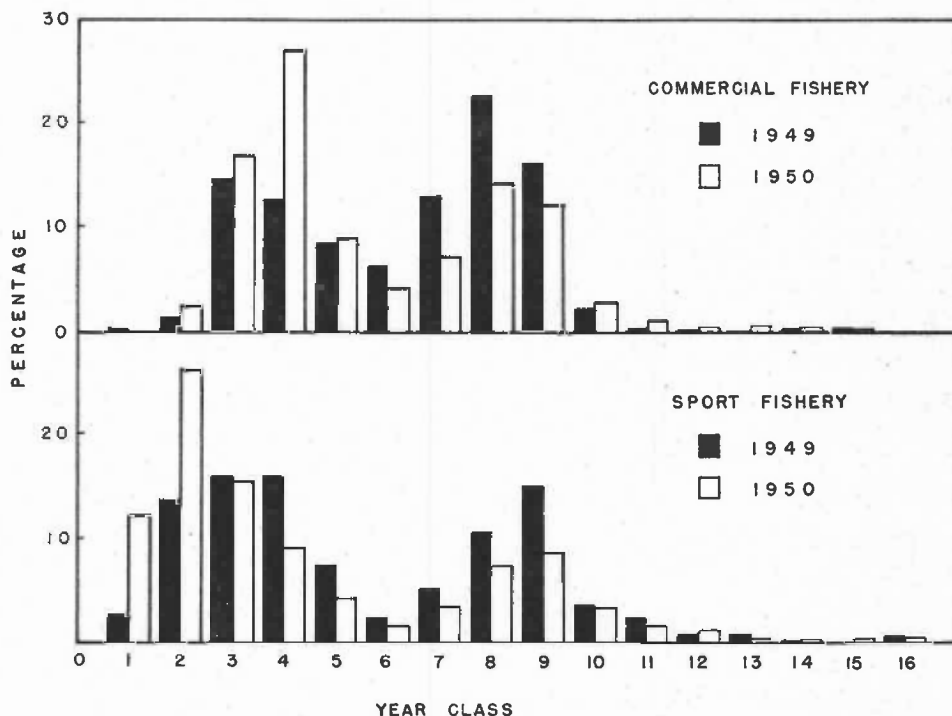


FIGURE 12. Age Composition of Striped Bass on the Commercial and Sport Fisheries of Coos Bay in 1949 and 1950 (the Actual Age of the Fish is About One Year Greater Than the Year-Class).

The mesh size used in the commercial fishery allows the escape of practically all fish younger than the third year class. The third, fourth, and fifth year classes probably always contribute considerably to the commercial fishery. The large catch of striped bass in 1945 might be explained on the basis of big third, fourth,

and fifth year classes in that year, resulting from good spawning conditions or better survival conditions during the war years. The large percentages of the seventh, eighth, and ninth year classes in the catches of 1949 and 1950 would also represent these same large year classes which had contributed heavily to the 1945 catch.

Since the sport fishery has access to striped bass throughout the year, and since the gear used is not as rigid in size selection as the commercial gear, more fish occur in the extremes of the age curve of the sport catch than in the commercial catch.

The average size of the various year classes was determined. These have been plotted in Figure 13 to illustrate the growth rate of the bass. Fish beyond the tenth year class have not been included because of the small number of fish involved and the difficulty in determining the ages of these older fish.

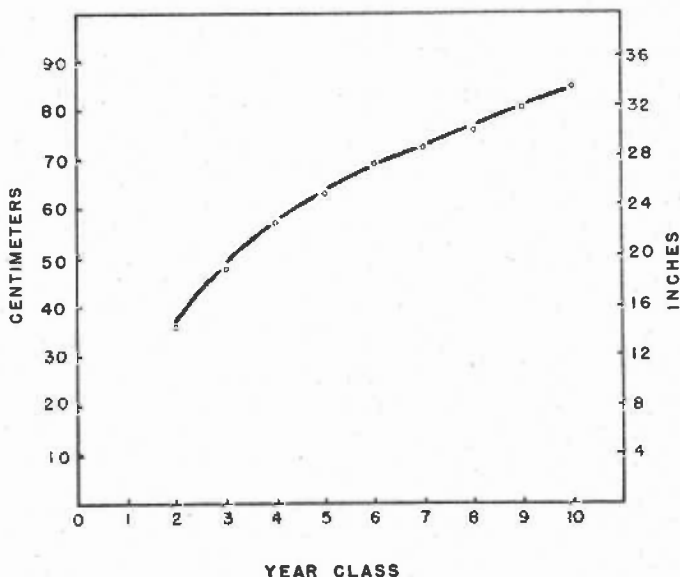


FIGURE 13. The Growth of Striped Bass as Determined From the Average Lengths of the Various Age Classes. (The Actual Age of the Fish is About One year Greater Than the Year-Class.)

#### *Age and Size at Maturity*

Table 4 gives the percentage of mature females in the various age classes. All females in the second year class were found to be immature, 18.2 percent of the third year class (average length 19.0 inches) and 67.9 percent of the fourth year class (average length 22.8 inches) were mature. All fish older were found to be mature.

TABLE 4. Percentage of Mature and Immature Female Striped Bass in the Various Age Classes at Coos Bay, 1949-1950

Year Class	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI
Number . . . .	0	3	22	28	13	4	2	8	34	9	4	3	3	1	2	0
Percent Immature . . .	0	100	81.8	32.1	0	0	0	0	0	0	0	0	0	0	0	0
Percent Mature . . . .	0	0	18.2	67.9	100	100	100	100	100	100	100	100	100	100	100	0

Mature males were found to be present in all year classes except possibly the zero year class. The majority of the males in the third year class (average length 19.0 inches) were found to be mature.

*Size Composition of the Catch*

Random length frequency samples of striped bass were first obtained in June of 1949 in both the sport and commercial fisheries with sampling continuing to date. Fork lengths have been used; that is, the length from the tip of the lower jaw to the fork of the tail. The commercial samples are summarized by bi-weekly periods in Figure 14. Sampling of the commercial fishery did not begin until June of 1949. Data for the period are shown in the bottom section

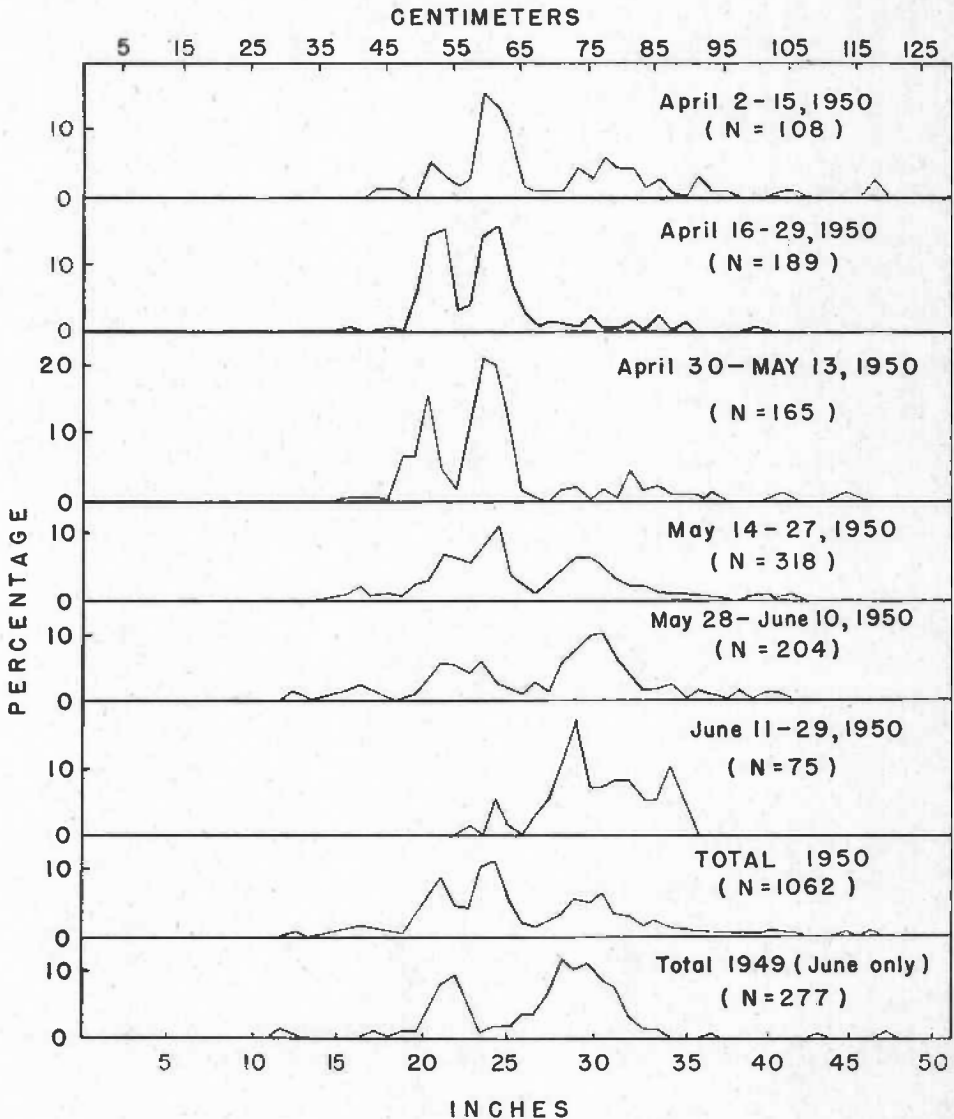


FIGURE 14. Random Length Frequencies Curves for the Striped Bass Commercial Fishery on Coos Bay in 1949 and 1950.

of the figure. Sampling in 1950 was continuous throughout the commercial season. The curves show the catch to be made up largely of two size groups, the smaller ranging in size from 18 to 25 inches, consisted primarily of fish in the third, fourth, and fifth year classes; and the larger group, ranging in size from 26 to 34 inches, were composed largely of fish in the seventh, eighth, and ninth year classes.

Striped bass in the catches of fishermen who were known to fish only light shad gear seldom exceeded 25 inches. In the studies of the striped bass of California (Scofield, 1931), it was found that bass taken in 5½-inch mesh nets ranged in length from about 16 to 25 inches. Samples of bass taken from the catch of the heavier and larger bass nets in Coos Bay contained much larger

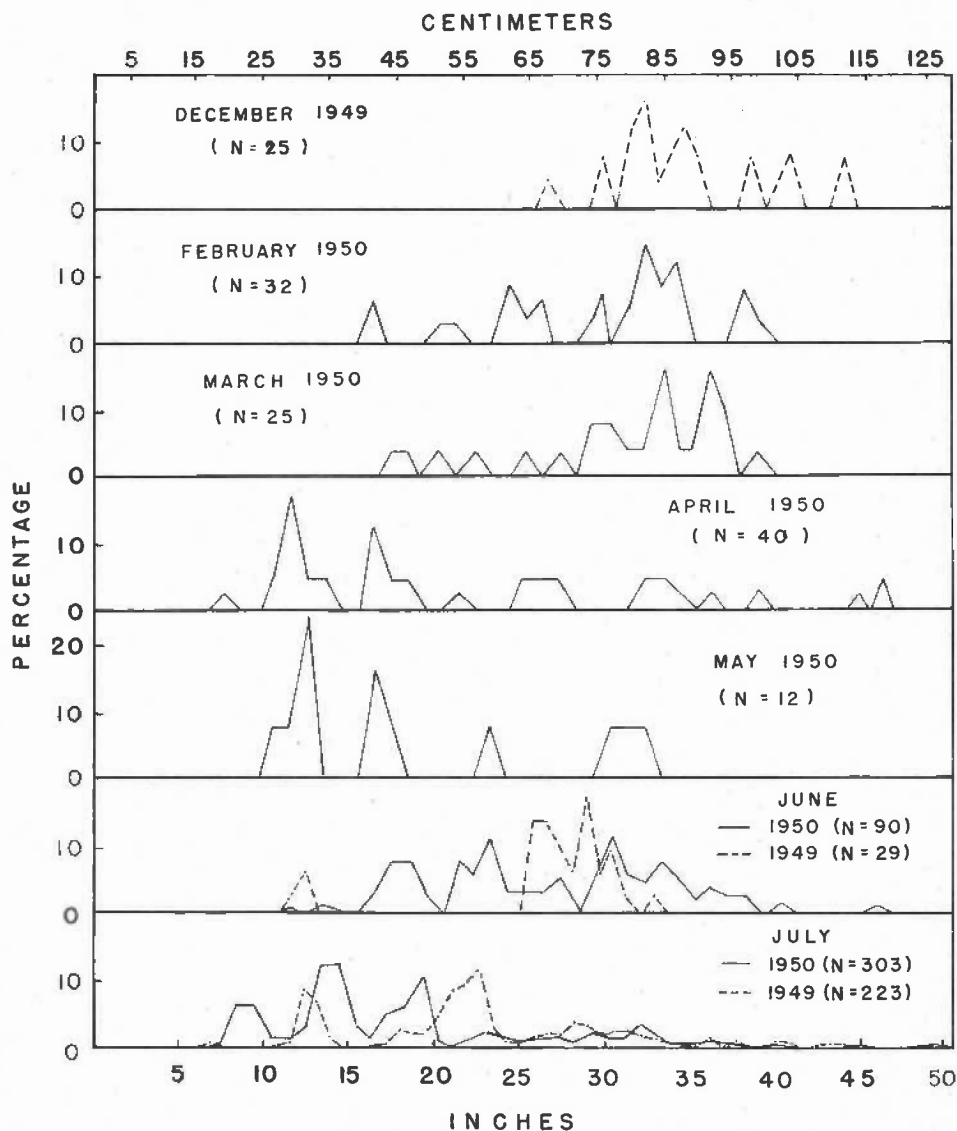


FIGURE 15. Random Length Frequency Curves for Striped Bass Taken by Sport Gear on Coos Bay During the Months of December to July, 1949 and 1950.

fish than the lighter shad nets. These larger fish were mature and predominately males.

Random length frequencies of sport caught bass have been summarized in monthly periods and are shown in Figures 15 and 16. A total of 1,788 fish were measured in 1949 and 1950. These ranged in length from six to 49 inches. It can be seen that the fall sport catch was made up primarily of large bass, ranging in length from 25 to 45 inches. No length samples were obtained in January of 1950 because of the lack of fishing effort resulting from adverse weather condi-

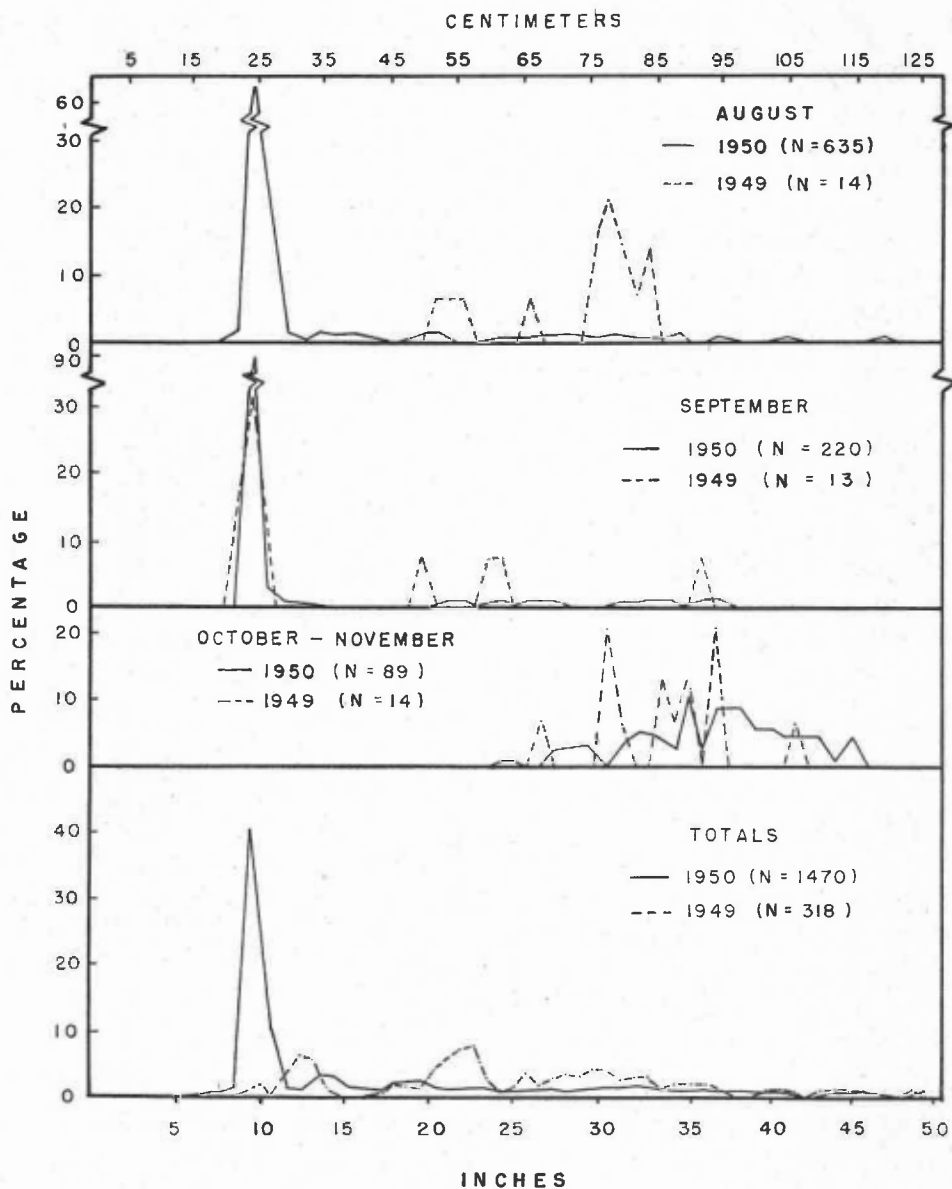


FIGURE 16. Random Length Frequency Curves for Striped Bass Taken by Sport Gear on Coos Bay During the Months of August to November in 1949 and 1950 and for Total Sport Catch in 1949 and 1950.



tions. The catches in February and March consisted of fish somewhat smaller in size, ranging in length from 15 to 38 inches. From April through July small fish were more abundant in the catches with a considerable number of fish from eight to 20 inches in length. Large fish, greater than 20 inches were still taken in some numbers, particularly in the month of June. Very few fish were sampled in August and September of 1949, but in the large samples of 1950 the catch was made up almost entirely of fish from nine to 11 inches in length.

#### *Length-Weight Relationship*

Lengths and weights were obtained for 1,329 fish in 1949 and 1950. These fish ranged in length from seven to 49 inches and in weight from one-tenth of a pound to 50 pounds. The length-weight curve has been calculated for both sexes combined and is shown in Figure 17. The formula for this curve is  $W = 0.00002581 L^{2.90679}$ , where  $W$  is the weight of the fish in pounds and  $L$  is the length in centimeters. From the curve it is possible to determine the length for any given weight of bass or the weight of the fish if given the length.

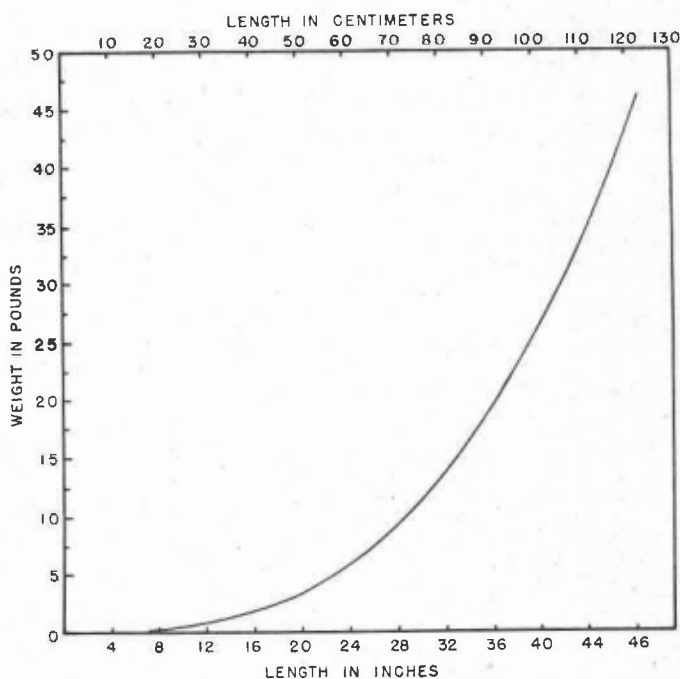
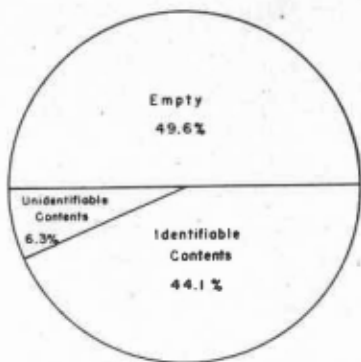


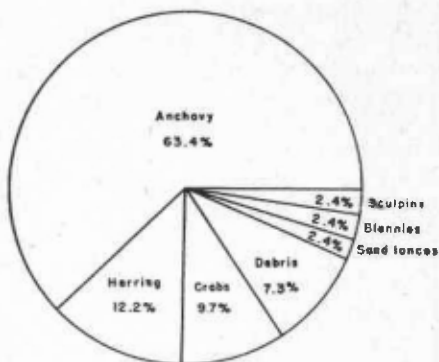
FIGURE 17. Length-Weight Relationship of Striped Bass in Coos Bay; Both Sexes Combined. Length Measurements Made to Fork of Tail.

#### *Food Habits*

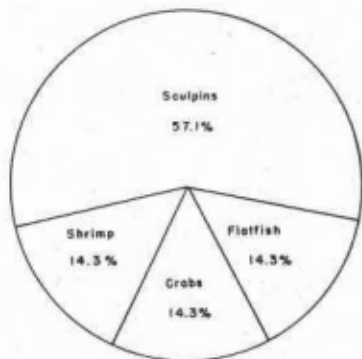
Observations of the food habits of the striped bass have been made wherever possible by examining the stomach contents. The butchering tables at the commercial dealers afforded a good opportunity for gathering these data. Considerable information was obtained from sportsmen who allowed the biologists to clean their fish. A total of 1,018 stomachs were examined during 1948, 1949, and 1950. Of these about 50 percent were empty, 6 percent had material which could not be identified, and 44 percent contained identifiable material (Fig. 18). The identifiable contents found in the stomachs have been summarized in two-month periods as shown in the remaining graphs of Figure 18. The items are given as a percentage of the total number of items present.



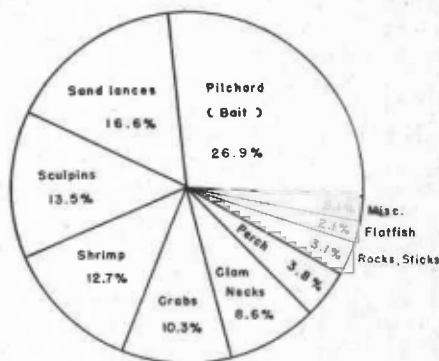
TOTAL SAMPLE  
1948 - 1950 ( N = 1018 )



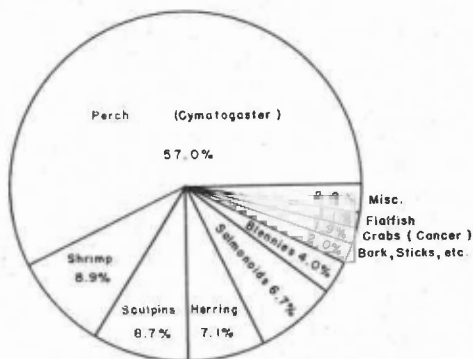
SUMMER 1948  
July - September  
( N = 10 )



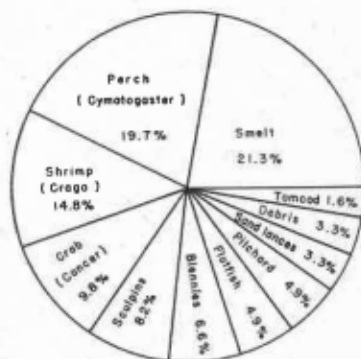
FALL 1949  
October - December ( N = 8 )



SUMMER 1949  
July - September ( N = 68 )



SPRING 1950  
April - June ( N = 261 )



SUMMER 1950  
July - September ( N = 62 )

FIGURE 18. Food Habits of Striped Bass in Coos Bay as Determined From Stomach Samples. (Except for the Total Sample chart, upper left, the graphs represent the stomach contents as percentages of the identifiable material.)

Striped bass are voracious feeders and appear to take nearly any object which draws their attention and which can be swallowed. During most of the year, fishes which occur in large schools are the predominant items found in the stomachs. These include viviparous perch, herring, anchovies, sand lances, and surf smelt. Sculpins (bullheads), shrimp, and crabs are important food items throughout the year. Blennies, sometimes called "eels," and flatfish also occur throughout the year, but only in small numbers.

Barks and sticks were frequently found in the stomachs. Bay smelt, tom cod, and various species of perch were not uncommon. An adult lamprey and the vertebral column and caudal fin of an adult shad were found in two stomachs in the spring. Another large striped bass contained what appeared to be the top of a tin can. In the summer of 1949, about 27 percent of the items in the stomachs were found to be pilchard which had been cut into sections and were being used as bait by the sport fishermen.

In April, May, and June numerous trout and salmon fry and fingerlings were found in striped bass stomachs. During this period, salmonoids formed almost seven percent of the items present, and nearly equalled shrimp, sculpins, and herring in importance as striped bass food. It is during these spring months, when the large schools of spawning bass are present, that the heavy downstream migration of young salmon and trout occurs. Food was found in the stomachs of maturing and spent female bass, but no females in the spawning condition were found to be feeding. Males were found to be feeding during all stages of development of the testes. Both males and females appear to feed heavily immediately after spawning. In former years when salmon were more abundant in the Coos Bay drainage, it is reported that salmonoids were very numerous in the stomachs of the striped bass.

Striped bass are capable of catching large trout as well as fingerlings. Two bass taken in the Coquille River in the spring of 1950 contained trout 12 inches in length. Another Coquille bass was found to contain 12 salmonoids, ranging in length from eight to 12 inches.

Striped bass have been reported to feed heavily on their own young; however, in this study no small striped bass were found in the stomachs of larger fish. In addition no shad fry or fingerling were found in the bass stomachs.

### Sex Ratios

Whenever possible observations were made of the number of male and fe-

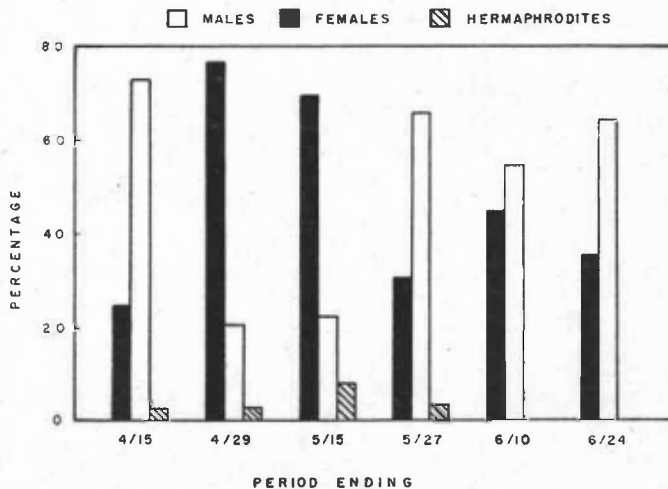


FIGURE 19. Sex Ratio of Striped Bass in the Commercial Catch of Coos Bay in 1950.

male bass occurring in the catch. Considerable data on commercially caught fish were obtained while the fish were being butchered by the dealers. Some data were also gathered from fish taken by sport gear.

Data on the sex ratio in the commercial catch in 1950 are given in Figure 19. Females predominated in the catches of late April and early May, and the males were more abundant in early April, the latter part of May, and throughout June. During the peak of the commercial landings on May 24 and 25 of 1950 the catch was predominately of males. A random sample of 54 fish on May 24 showed 81 percent to be males. On May 25, of 70 fish examined, 93 percent were males, ranging in length from 25 to 40 inches.

A considerable amount of hermaphroditism has been noted in the striped bass. Almost three percent of the bass sampled were found to be hermaphrodites. Occasionally both the ovaries and testes were ripe and in a spawning condition at the same time. In all cases examined the testes formed the anterior portion, and the ovaries formed the remaining or posterior portion of the sex organs. In some cases the testis formed the larger part of the gonad and in others the ovary was the largest (Fig. 20).

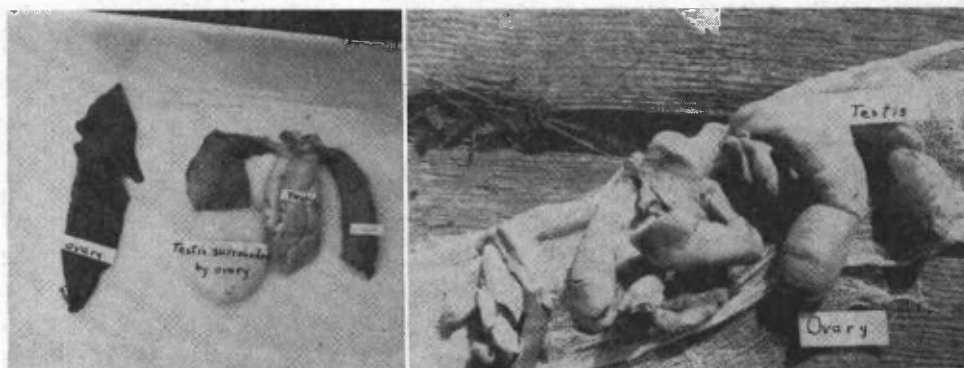


FIGURE 20. Gonads of Hermaphroditic Striped Bass Showing the Functional Male and Female Portion of the Gonad.

### *Fecundity*

The number of eggs contained in the ovaries of 15 female striped bass were counted to obtain the relation between the weight of the female and the number of eggs (Fig. 21). The number of eggs per gram was determined, and, when related to the total weight of the ovary, gave the calculated number of eggs per ovary. Additional ova counts will be made to add to these preliminary data on fecundity.

The number of eggs ranged from 900,000 in an 8.8 pound fish to 4,775,000 in a 50 pound fish. The ovaries of the 50 pound fish weighed 8.5 pounds.

## CONDITIONS AFFECTING SURVIVAL

### *Effects of Splash Dams*

In southwestern Oregon there exists a logging practice known as "splashing." It is a method of moving logs from log dumps in the upper river areas downstream to tidewater by means of water released from a series of dams. Logs are dumped below the splash dams and are flooded to tidewater where they are caught, made into log rafts, and towed to the mills. When water is plentiful, splashing is done whenever convenient for the operators. In seasons of low water, splashing is less frequent because of lack of water for the operation.

The effect of splashing operations on the eggs and larvae of striped bass and shad has not been fully determined. A sudden flood of muddy water may adversely affect the eggs and larvae. It has been observed that the striped bass do not spawn as far upstream in years when there is considerable splashing

being carried on. It is known that the eggs and larvae of many fish can stand wide variations in temperature providing the change is gradual. A sudden change, such as would be expected to take place when the flood of water reaches the tidal zone during splashing operations, probably is detrimental to the development of the eggs and larvae.

The splashing operations adversely affect fishing operations. Sport fishing becomes almost impossible owing to the swift, muddy water and the debris which fouls both lines and motors. Commercial fishing operations are curtailed because of the strong currents and the accompanying trash which damages the gill nets.

The most serious effect of splash dams has been their destruction of the salmon spawning areas. For the most part such dams have been complete barriers to the upstream migration of adult salmon. Practically all of the gravel in the rivers has been washed out by the splashing operations and for the most part only bedrock remains. The effect of thousands of logs grinding their way down the river bed is disastrous not only to fish life but to any food organisms produced in the river.

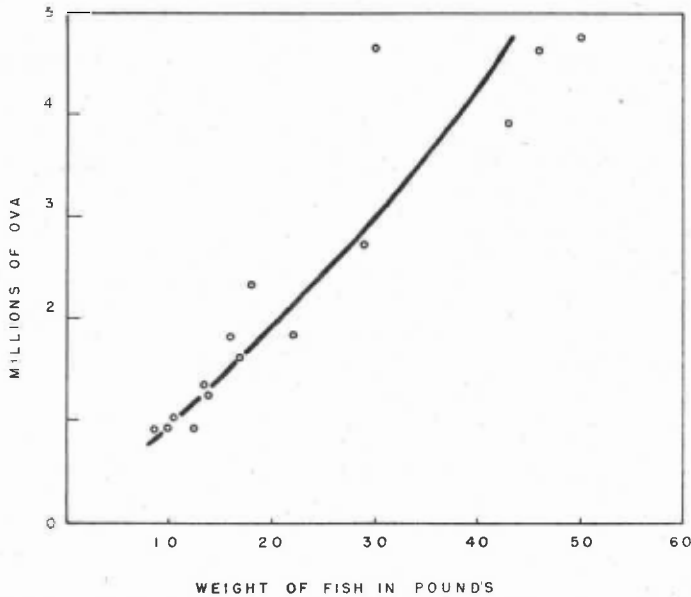


FIGURE 21. Relationship Between the Weight of Female Striped Bass and Number of Eggs in the Ovaries.

## ECONOMIC EVALUATION

### *Sport Fishery*

An economic evaluation of the striped bass sport fishery was started in December, 1949, and conducted in connection with the sport census. Two hundred and one individuals were interviewed in order to learn what was spent for striped bass fishing. Expenditures were determined for tackle, boat, motor, bait, lodging, travel and miscellaneous items. Annual costs for capital goods such as boats were calculated as if the owner had used a rental, since the cost of renting or owning is fairly similar. The 201 interviewed anglers made 4.1 trips per year. If items were used for other types of fishing as well as for bass, an attempt was made to pro-rate the cost for bass use. Boat and motor evaluation was particularly difficult and special care was taken to make sure that only the boat anglers (40 percent of all) figured in the total outlay. Bait purchases were separated into local and out-of-town categories and the local fishermen

surprisingly spent about twice as much each year for bait. It was thought that the relative inexperience of the out-of-town anglers would lead them to purchase excessive quantities of bait. Only out-of-town anglers who spent money for lodging were considered in determining the average lodging cost assessed to the sport fishery. About 20 percent of all anglers were out-of-town, and nearly half of them stayed with friends, camped out or made one day trips. Only 125 striped bass anglers spent money for lodging in the Coos Bay area. Other members of their families add to the increased revenues brought to the community by the sport fishery, however, an item not brought out in this analysis. All anglers checked were asked to state their point of origin in relation to making the trip for bass fishing. The mileage reported was 120,933. At an operating cost of \$0.06 a mile, travel money spent primarily for the recreational fishery amounted to \$7,256. Miscellaneous items such as torn clothing, beer, liquor, things left at home and needed for the trip such as toothbrushes and similar articles added \$1,347.54 to the bill for bass fishing at an average pocket withdrawal of \$1.11 per year. Food was not considered a legitimate charge against the sport fishery since anglers eat no matter where they may be or what they are doing.

It may be stated that 1,214 anglers spent an average of \$54.05 a year in the pursuit of striped bass in the Coos Bay area. Bass fishermen spent approximately \$65,722 in 1950. The cost per fish was \$25.64 or \$4.42 a pound for the average 5.8 pound specimen caught. The average angler took 2.1 fish per year.

**TABLE 5. The Annual Cost Per Person and Cost for 1,214 Anglers Checked During the 1949-1950 Striped Bass Sport Fishery**

Item	Per Person	Total Spent
Tackle . . . . .	\$19.05	\$23,126.70
Boat . . . . .	9.42	11,439.28
Motor . . . . .	11.23	13,677.88
Bait . . . . .	5.89	7,158.43
Lodging . . . . .	1.37	1,666.25
Travel . . . . .	5.98	7,255.98
Miscellaneous . . . . .	1.11	1,347.54
Total (1214 anglers) . . . . .	\$54.05	\$65,722.06

*Commercial Fishery*

The average commercial catch for the past ten years, 1941 to 1950, was 90,530 pounds. At an average weight of ten pounds per fish, about 9,000 fish have been landed annually by the commercial fishery. At the 1950 retail value of between 40 and 45 cents per pound the average value of the commercial fishery is about \$38,500. The 1950 catch was less, being only 35,000 pounds or 3,500 fish. The 1950 yield was valued on the retail market at about \$15,000.

The two fisheries for striped bass are of considerable value as may be seen from the above-mentioned figures. It is believed that the value of the resource will greatly increase as larger and larger segments of the citizenry realize both the recreational and food value of these fish.

**SUMMARY**

1. There is no evidence of a decline in the striped bass population of Coos Bay.
2. The striped bass, a species introduced to the West Coast of North America, has been important as a recreational and commercial fish in Coos Bay since the late 1920s. The catch has ranged from 18,000 pounds in 1931 to 263,000 pounds in 1945.
3. A total of 4,979 angler-days and 23,851 hours were fished in 1950 and 2,563 fish were caught. The fish weighed an estimated 14,931 pounds with an average of

5.8 pounds per fish. In 1949, more than 7,170 bass were taken in the sport fishery, weighing over 61,000 pounds.

4. Two-hundred anglers were interviewed to determine their expenditures during a yearly period. It was found that they spent an average of \$54.05 a year. Using this figure it was determined that the total expenditure for striped bass fishing in Coos Bay during 1950 amounted to \$65,722.

5. The commercial fishery lands approximately 90,500 pounds annually; the fish average slightly over ten pounds each. In 1950, the catch was 35,400 pounds, or 3,400 fish. At a retail price of 40 to 45 cents per pound, the average annual value of the commercial catch is \$38,000. The 1950 catch was valued at \$15,000.

6. It was calculated that the commercial fishery in 1950 removed a maximum of 19 percent of the bass population in the fishing area at that time and within the size range selected by the gear. The total population of available fish in the bay during the fishing season was estimated to number 18,000 bass of which the commercial fishery took 3,400; this is not the total population of bass inhabiting Coos Bay.

7. Fish taken by sport fishermen ranged in size from 6 to 45 inches; fish taken in commercial gear ranged in size from 12 to 48 inches. Fish in the second, third, fourth, seventh, and eighth year classes were abundant in the catches of the sport and commercial fisheries. Few fish younger than the third year class were taken by commercial gear while the second year class contributed the largest number of fish to the sport fishery in 1950.

8. Food studies indicate that fish such as herring, anchovies, viviparous perch, sand lance, and smelt are the major items in the striped bass diet. Bottom forms such as sculpins, crabs, and shrimp are found in considerable numbers throughout the year. Salmon and trout form an important part of the diet in April, May, and June when the schools of bass migrate into the Coos River spawning areas and meet the young salmon and trout migrating downstream to the sea.

9. Sex ratio studies in 1950 indicate that male bass predominate in the commercial catch. Almost three percent of all bass sampled were hermaphroditic.

10. Preliminary work on fecundity of striped bass showed the number of eggs per female to range from 900,000 in an 8.8 pound individual to 4,775,000 in a 50 pound fish.

### RECOMMENDATIONS

1. It is recommended that observations of both the striped bass commercial and sport fisheries at Coos Bay be continued in order that changes in the conditions of the stocks may be observed as they occur, and that any corrections may be made in the fishing intensity that might be needed.

2. No restrictive regulations appear necessary now. The striped bass populations at Coos Bay do not show symptoms of being over-fished.

### LITERATURE CITED

CRAIG, J. A.

1930 An analysis of the catch statistics of the striped bass (*Roccus lineatus*) fishery of California. Division of Fish and Game, Fish Bull. (24):1-41, Sacramento.

MERRIMAN, DANIEL

1941 Studies on the striped bass (*Roccus saxatilis*) of the Atlantic coast. Fish and Wildlife Service, 50 (35): 1-77, 36 Figs., Washington.

SCOFIELD, EUGENE C.

1931 The striped bass of California. Div. of Fish and Game, Fish Bull. (29): 1-82, Sacramento.



TABLE 5. RETURNS OF STRIPED BASS TAGGED IN THE SPRING AND SUMMER OF 1950

Tag No.	Length at Tagging in Cm.	Date Tagged	Date Recovered	Time Released in Days	Area Tagged	Area Recovered	Distance Traveled in Miles	Direction
7	62	4/21/50	6/17/50	57	Cooston Point	Kentuck Inlet	1.75	Downstream
10	62	4/21/50	4/29/50	8	Cooston Point	Kentuck Inlet	1.75	Downstream
13	60	4/21/50	4/29/50	8	Cooston Point	Kentuck Inlet	1.75	Downstream
17	50	4/21/50	5/23/50	32	Cooston Point	Lower Coos River	4.0	Upstream
27	64	4/24/50	5/24/50	30	Cooston Point	Coos River Forks	6.0	Upstream
38	61	4/24/50	7/23/50	90	Cooston Point	Lower Coos River	4.0	Upstream
41	53	4/24/50	6/2/50	39	Cooston Point	Coos River Forks	6.0	Upstream
44	64	4/24/50	7/27/50	94	Cooston Point	Cooston Point	0.0	.....
48	51	4/25/50	6/4/50	41	Cooston Point	Lower Coos River	4.0	Upstream
49	51	4/25/50	6/2/50	38	Cooston Point	Lower Coos River	4.0	Upstream
51	62	4/25/50	5/26/50	31	Cooston Point	Coos River Forks	6.0	Upstream
59	60	4/26/50	8/24/50	120	Cooston Point	Railroad Bridge	4.0	Downstream
62	53	4/26/50	5/24/50	28	Cooston Point	Lower Coos River	4.0	Upstream
70	53	4/27/50	6/30/50	64	Cooston Point	Kentuck Inlet	1.75	Downstream
77	51	4/29/50	5/13/50	14	Cooston Point	Lower Coos River	4.0	Upstream
79	41	4/29/50	6/1/50	33	Cooston Point	Lower Coos River	4.0	Upstream
80	55	4/29/50	6/8/50	40	Cooston Point	Coos River Forks	6.0	Upstream
82	65	4/29/50	5/20/50	21	Cooston Point	Mouth Coos River	1.25	Upstream
83	55	4/29/50	6/20/50	32	Cooston Point	Deadline—So. Fk. Coos River	9.0	Upstream
87	51	4/29/50	5/4/50	5	Cooston Point	Willanch Slough	0.5	Upstream
88	53	4/25/50	5/25/50	30	Cooston Point	Coos River Forks	6.0	Upstream
91	62	4/29/50	5/20/50	21	Cooston Point	Coos River Forks	6.0	Upstream
93	69	4/29/50	9/4/50	128	Cooston Point	Railroad Bridge	4.0	Downstream
98	74	5/2/50	5/25/50	23	Cooston Point	Coos River Forks	6.0	Upstream
99	53	5/2/50	5/24/50	22	Cooston Point	Lower Coos River	4.0	Upstream
103	51	5/2/50	6/1/50	30	Cooston Point	Coos River Forks	6.0	Upstream
104	52	5/2/50	5/23/50	21	Cooston Point	Lower Coos River	4.0	Upstream
109	59	5/3/50	5/23/50	20	Cooston Point	Lower Coos River	4.0	Upstream
118	43	5/8/50	5/20/50	12	Cooston Point	Lower Coos River	4.0	Upstream
123	53	5/8/50	6/28/50	32	Cooston Point	Kentuck Slough	1.75	Downstream
125	50	5/8/50	6/30/50	52	Cooston Point	Willanch Slough	1.5	Upstream
132	64	5/9/50	6/4/50	26	Cooston Point	Coos River Forks	6.0	Upstream
135	53	5/10/50	6/23/50	44	Cooston Point	Lower Coos River	4.0	Upstream
139	54	5/10/50	5/25/50	15	Cooston Point	Lower Coos River	4.0	Upstream
140	53	5/10/50	6/21/50	41	Cooston Point	Kentuck Slough	1.75	Downstream
143	62	5/10/50	5/20/50	10	Cooston Point	Mouth Coos River	1.25	Upstream
154	63	5/10/50	5/23/50	13	Cooston Point	Coos River Forks	6.0	Upstream
163	56	5/10/50	8/7/50	89	Cooston Point	Cooston Point	0.0	.....
164	42	6/1/50	6/13/50	12	Millicoma River	Coos River Forks	4.0	Downstream
166	78	6/2/50	6/2/50	0	Millicoma River	Coos River Forks	4.0	Downstream
170	97	6/5/50	6/7/50	2	Millicoma River	Lower Coos River	4.0	Downstream
191	80	6/6/50	7/3/50	27	Millicoma River	Below Allegany	0.25	Upstream
192	87	6/6/50	6/7/50	1	Millicoma River	Coos River Forks	4.0	Downstream
248	82	7/12/50	10/13/50	82	Kentuck Slough	Isthmus Slough	6.0	Up-bay
249	76	7/12/50	7/14/50	2	Kentuck Slough	Kentuck Slough	0.0	.....
265	62	7/13/50	10/18/50	97	Kentuck Slough	Isthmus Slough	6.0	Up-bay
280	67	7/14/50	9/11/50	58	Kentuck Slough	Railroad Bridge	2.0	Downstream
327	24	8/18/50	9/3/50	16	Coos River Forks	Coos River Forks	0.0	.....
337	22	9/1/50	9/3/50	2	Coos River Forks	Coos River Forks	0.0	.....
353	23	9/2/50	9/15/50	13	Coos River Forks	Coos River Forks	0.0	.....
363	25	9/2/50	9/7/50	5	Coos River Forks	Coos River Forks	0.0	.....