

Job Report

Joseph P. Breuer
Marine Biologist

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Analysis of Black Drum Harvest

Abstract: Data provided by contract drum netters on record of catch data forms and tag returns from a mass black drum tagging effort are used to statistically compute the black drum population for the two county area over a four month period. The actual contract net catch per unit of effort was also calculated and compared with the calculated populations. Population fluctuations are discussed and management recommendations, based on the calculated populations, are given.

Objectives: To determine the effects of contract drum netting on the total black drum population of the area and on other marine species of the area.

Procedures: This statistical analysis of the effects of the contract drum harvest for the 1961-62 season in the lower Laguna Madre was accomplished by the use of two data and information sources; the record of catch data forms submitted by each contract drum fisherman and tag returns from a mass drum tagging effort. Data and information available from other commercial and sports fishing sources and from biological samplings were found to be unreliable or insufficient and could not be used in this analysis.

Findings and

Discussion: Rules and regulations of the Game and Fish Commission require that each contract drum fisherman submit a monthly report of daily fishing activities. Data provided in these reports include the number of drum taken daily and the market weight of drum under and over five pounds in weight caught by each contract fisherman.

The mass fish tagging effort needed to provide the tagged drum necessary for this statistical analysis occurred in the waters of the lower Laguna Madre in Willacy County when 3,400 black drum were caught, tagged and released during the month of August 1961. An estimated 3,000 of these tagged fish survived the tagging operation.

Special efforts were made to advise all fishermen, especially holders of drum contracts and fish houses personnel, of this mass tagging effort and the importance of the tag returns. During the 16 months following the mass tagging effort (which corresponds to the period of duration of this job), 183 tags were returned from this single tagging effort. Of these, 35 were returned by sports fishermen. Of the remaining 148 tags returned, 80 were taken by non-contract commercial fishermen and 68 were taken by the contract

drum netters within the contract area and while operating under the terms of the contract. Seven of these 68 tags were taken in the 1962-63 season and were not included in the statistical analysis, leaving 61 tags which were used in the calculations in this report.

The black drum population was calculated for the contract area (the Laguna Madre in Cameron and Willacy Counties) during the period in which the contract drum netting program was in effect (December 1, 1961 to June 1, 1962). The six-month period was divided into 19 periods, each consisting of 10 calendar days beginning December 1, 1961. No calculations were possible for the 12th, 13th, 15th, 17th, 18th and 19th periods since no tags were returned during these periods.

Since all fish tagged in the mass tagging effort were in the one to three pound class, only those black drum taken by the contract fishermen under five pounds in weight were included in the calculations.

Drum populations were calculated by using the formula:

$$\text{Population (N)} = \frac{nX}{x} \quad \text{when,}$$

n = number of pounds caught
 x = number of tags returned
 X = number of tags at large

The probable maximum and minimum limits of the population (N) were calculated by using the formula:

$$\text{Limits of (N)} = \frac{nX}{x \pm \sqrt{x \left(1 - \frac{x}{n}\right)}}$$

The calculated population, by periods, and the probable maximum and minimum limits are given in Figure 1.

As a comparison to the calculated populations, a catch per unit of effort was derived from the record of catch data forms. In this instance, one net unit equals the number of pounds of heads-on (under five pounds) drum caught in one net (300 feet) in one consecutive 24-hour set. Net units for the 16 periods are given in Figure 2.

The calculated populations and the probable minimum limits of the calculated population are plotted against the actual catch per unit of effort or net units in Figure 3. The calculated population curve is adjusted at several points to correct obvious discrepancies. For example, actual black drum landings as well as the catch per unit of effort in the first period exceeded those for the second period, but the calculated population is based on only one tag return and is obviously too high. Also, population calculations past the 10th period are inaccurate due to the greatly reduced number of tag returns and were adjusted to conform more realistically to the catch per unit of effort.

While the calculated population in the fifth period needs no revision, the catch per unit of effort presents a false picture. At the beginning of this period, a severe cold spell killed a conservatively estimated 175,000 pounds of black drum within the contract area. Immediately following the kill, an extremely heavy drum recruitment from the Gulf through Brazos Santiago Pass at Port Isabel was heavily exploited by the contract fishermen where the population was concentrated. Both landings and catch per unit of effort were high as the majority of black drum population of the area was concentrated in this small area.

While the black drum population of the size specified is calculated for the two-county area for the six month period, contract netting was confined to Cameron County during the first three periods and to Willacy County only since the 10th period. Only during the fourth through the ninth periods were contract nets used in both counties. This means, in effect, that the calculated populations for periods 1 through 3 are for Cameron County only; for periods 4 through 9 for both Cameron and Willacy Counties and for periods 10 through 16 for Willacy County only.

Much of the black drum population of this area during the winter months is known to be recruitment from the Gulf through passes. With the arrival of warmer weather in the spring, drum migration is to the north. The steady decline in the drum population from the 10th period on is due to the migration of drum northward out of Willacy County.

Since the peak of the black drum population is present in the contract area at the start of the contract drum netting season, it would indicate the possible need for an earlier opening of the season. The steady decline of the drum population in March, due to migrations out of the contract area, indicates the need to extend the contract drum netting program into areas into which the drum have migrated. A comparison of the maximum black drum removal possible under existing laws (1,000,000 pounds of black drum per season) with the calculated black drum population which exists within the area definitely indicates the need for a greatly accelerated harvest to bring about a controlled black drum population. As of this date, no adverse or beneficial effects on the habitat or other marine species of the area has been noted which is directly and solely the result of the contract drum removal program.

It must be noted that the black drum population calculated in this report is only that portion of the total drum population which falls in the one to five pound class. This report does not indicate the extent of the population of drum under one or over five pounds in weight. Black drum over five pounds constituted from 11 to 60 per cent of the total contract drum landings for the period (Figure 4). Of the 706,000 pounds of drum harvested by contract netters during the 1961-62 season, 258,000 pounds, or 36 per cent of the total harvest was drum over five pounds in weight. The actual percentage of large drum is probably even higher than the 36 per cent indicated as most of the fishing effort is directed toward the more valuable smaller drum.

Prepared by: Joseph P. Breuer
Marine Biologist

Ernest G. Simmons
Regional Supervisor

Approved by


Coordinator

Figure 1
Calculated Populations (N) with Probable Limits
Black Drum-Lower Laguna Madre

<u>Period</u>	<u>Dates</u>	<u>Populations(N)</u>	<u>Probable Minimum Limits</u>	<u>Probable Maximum Limits</u>
1	December 1 to December 10, 1961	123,766,820	61,884,000	6,188,400,000,000
2	December 11 to December 20	22,768,760	15,162,860	45,484,360
3	December 21 to December 30	11,677,191	7,403,430	27,623,060
4	December 31 to January 9, 1962	11,864,000	8,905,423	17,766,394
5	January 10 to January 19	23,117,333	17,352,460	34,618,302
6	January 20 to January 29	10,303,175	7,610,840	15,943,017
7	January 30 to February 8	9,504,588	7,134,386	14,233,161
8	February 9 to February 18	14,602,089	10,786,400	22,595,108
9	February 19 to February 28	18,723,619	12,503,251	37,260,933
10	March 1 to March 10	47,865,066	27,991,266	165,151,951
11	March 11 to March 20	82,761,576	41,382,857	82,761,576,000
14	April 10 to April 19	8,693,649	5,513,942	20,536,179
16	April 30 to May 9	3,911,677	1,956,229	9,779,192,000

Figure 2
Net Units-Catch Per Unit of Effort
Black Drum--Lower Laguna Madre

Period	Total Days (24 hours)	Total Net Units (300 feet)	Total Pounds (under 5 lbs.)	Catch Per Net Unit (lbs./day/net)
1	124	970	41,706	43.0
2	122	1,002	30,683	30.6
3	55	423	11,827	27.9
4	127	948	36,183	38.2
5	91	628	71,009	114.6
6	115	856	28,286	33.4
7	122	934	29,497	31.5
8	128	1,003	40,449	40.3
9	112	866	25,996	30.0
10	96	699	33,402	47.7
11	94	715	28,968	40.5
12	92	618	22,116	35.8
13	59	428	8,332	19.5
14	68	506	9,148	18.1
15	56	422	5,173	12.2
16	18	135	1,373	10.2

Figure 3
 Calculated Population, Probable Minimum Limits and Catch Per Unit of Effort of the Black Drum Populations of
 Cameron and Willacy Counties during the Period December 1, 1961 to June 1, 1962

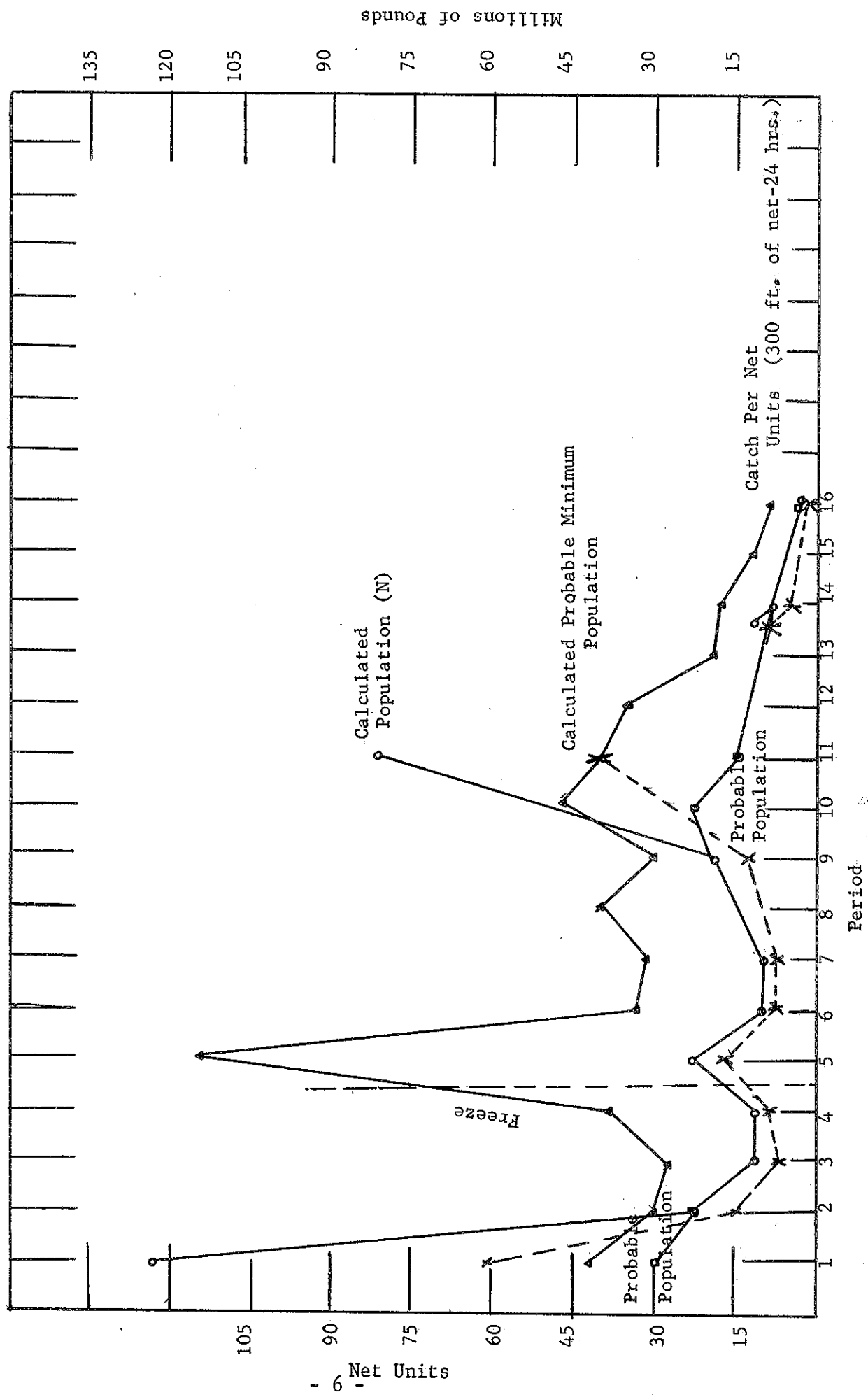


Figure 4
A Comparison of Small Drum (under 5 pounds) and Large Drum Landings

