Mesh size analysis of fishing net gear for caught and landed measurements of sea bass, *Dicentrarchus labrax* 2016

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Glossary

ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authority
MCRS	Minimum Conservation Reference Size

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1 Introduction

Sea bass are primarily caught by commercial fishermen using a variety of methods in small boats close to the shore and by anglers operating from boats and the shore (Pawson *et al.,* 2007). The species of sea bass (herein referred to as bass), *Dicentrarchus labrax,* are particularly vulnerable to overfishing and have been in decline since the mid-2000s (Ares, 2016). International Council for the Exploration of the Sea (ICES) recommended management plans needed to be implemented urgently in 2014 and 2015 and warned of depleting bass stocks in 2015 (ICES 2014; ICES 2015). On the 1st September 2015 the European minimum conservation reference size (MCRS) for bass increased from 36 cm to 42 cm due to the scientific advice of declining abundance of large bass. The new European size also raised the minimum size within the Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA) district to 42 cm where it had previously been at 37.5 cm.

The relationship between net mesh size and fish selectivity is vital to enable managers to set appropriate minimum fish landing sizes (Revill *et al*., 2009). This information is crucial to minimise wasteful practices by reducing the likelihood of undersized/immature fish being caught in nets of certain mesh sizes (Revill *et al*., 2009). As a general rule, gillnets are selective to particular desired sizes of fish, often entangling fish of 'medium' length for each targeted species with the smaller and larger fish avoiding capture (Revill *et al*., 2009). The smaller the bass, the greater proportion will avoid entanglement and the larger the bass are less likely to become trapped because the gillnet will not readily entrap their body parts (Revill *et al*., 2009). The exact length range of fish that become entangled depends on the gillnet geometry such a mesh size, monofilament gauge and hanging ratio (Revill *et al*., 2009).

The survey was carried out by comparing catches of bass in nets with a mesh size of 3.625 inch, 3.75 inch and 4 inch gear during 2015 and 2016 by catch sampling and landings data from fishing vessel skippers and Cornwall IFCA scientific officers.

2 Aims and Objectives

2.1 Aims

The aim of this survey was to investigate how different fishing net mesh size can be used to target size classes of bass *(D. labrax*) at different times of year.

2.2 Objectives

- To compare the size of bass caught in different mesh size gear.
- To compare the size of bass caught at different times of year.
- To see if there is a relationship between the length and weight of bass

3 Methodology

The survey was carried out on catches from vessels working fishing grounds in Falmouth Bay and Mounts Bay in Cornwall, the south-west of the UK. The survey methodology was split into two parts – catch sampling and landings data.

3.1 Catch sampling

The catch sampling data was collected onboard fishing vessels by Cornwall IFCA scientific officers and by skippers of fishing vessels. Cornwall IFCA was approached by one skipper of a fishing vessel who was concerned that the rise in the MCRS for bass could lead to considerable quantities of undersized bass being caught in gears that were generally used to target bass of 36 cm length and larger. He was keen to help by providing a platform and nets of

different mesh size for officers to sample bass catches at sea. Another skipper volunteered to carry out self-sampling during his fishing operation. Both fishing vessels were less than 10 m in length worked inside Cornwall IFCA district (within 6 nm from the UK mainland). The skippers measured all bass that were enmeshed in their nets including the undersized individuals which had to be discarded. All individuals were measured to the nearest cm. The mesh size of the net was recorded but the amount (length and number) of fishing nets were not recorded. The weight of fish was only recorded by Cornwall IFCA officers and not by skippers.

3.2 Landings data

Cornwall IFCA officers measured length (to the nearest cm) and weight (kg) of bass from landings on chance occasions when fishermen were landing their catches and while officers were present. The landings data was collected at Mylor.

3.3 Data analysis

All data was entered into Microsoft Excel 2010. The data from both sources was entered into one spreadsheet and then split into catch sampling and landings data.

4 Results

The survey was completed over a total of 12 sampling at sea days; three days catch sampling by Cornwall IFCA officers aboard fishing vessels and nine days of self-sampling by the skipper of the second fishing vessel. There were also two days of landings data by Cornwall IFCA officers (two of the surveys were a combination of two of these data collection types). A summary of the dates is shown in Table 1.

A total of 769 bass were measured during the surveys which were caught from three different mesh sizes 3.625 inch, 3.75 inch and 4 inch. Of the fish recorded, 666 were from catch sampling data and 103 were from landings data. A summary of the survey dates, sampling method and total number of individuals and sizes of bass are shown in Table 1.

Of the total fish sampled, 159 were under 42 cm (21% of the total) and 610 were 42 cm and over (79% of the total).

Table 1: A summary of the dates, sampling method, mesh size of fishing gear used and numbers of individuals over and under the minimum landing size of 42cm.

Dates	Measured by	Mesh size (" inches)	Total number of individuals measured	Number of individuals <42cm measured	Number of individuals >42cm measured
26th August 2015	Cornwall IFCA officers catch sampling	3.625	11	4	7
		3.75	6	1	5
27th August 2015	Cornwall IFCA officers catch sampling	3.625	39	10	29
		4	28	0	28
13th December 2015	Cornwall IFCA officers catch sampling	3.75	12	2	10
		4	22	0	22
5th January 2016	Cornwall IFCA officers landings data	4	76	1	75
	Skipper of fishing vessel	4	26	26	0
6th January 2016	Skipper of fishing vessel	4	49	8	41
7th January 2016	Skipper of fishing vessel	4	192	26	166
8th January 2016	Cornwall IFCA officers landings data	4	27	0	27
	Skipper of fishing vessel	4	8	8	0
9th January	Skipper of fishing	4	27	8	19

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Dates	Measured by	Mesh size (“ inches)	Total number of individuals measured	Number of individuals <42cm measured	Number of individuals >42cm measured
2016	vessel				
10th January 2016	Skipper of fishing vessel	4	149	38	111
11th January 2016	Skipper of fishing vessel	4	72	16	56
12th January 2016	Skipper of fishing vessel	4	11	6	5
13th January 2016	Skipper of fishing vessel	4	14	5	9
		Totals	769	159	610

4.1 All data

4.1.1 Mesh size

The length frequency of all the bass recorded during the survey by mesh size (3.625 inch, 3.75 inch and 4 inch gear) is shown in Figure 1 and Figure 2. The distribution was uni-modal for the 3.75 and 4 inch datasets and bi-modal for the 3.625 inch dataset. The largest proportion of fish sampled were from the 4 inch net (701 individuals – 91% of the total number of fish) and bass selectivity peaked at 44 cm for this mesh size (13% of the total number of fish and 14% of the number of fish in the 4 inch net). The total number of fish recorded in the 3.625 inch net was 50 (7% of the total number) and bass selectivity peaked at 42 cm for this mesh size (1% of the total number of fish and 18% of the number of fish in the 3.625 inch net). The smallest proportion of fish sampled from the 3.75 inch net was 18% and bass selectivity peaked at 42cm in this size class (0.5% of the total number of fish and 22% of the number of fish in the 3.75 inch net.

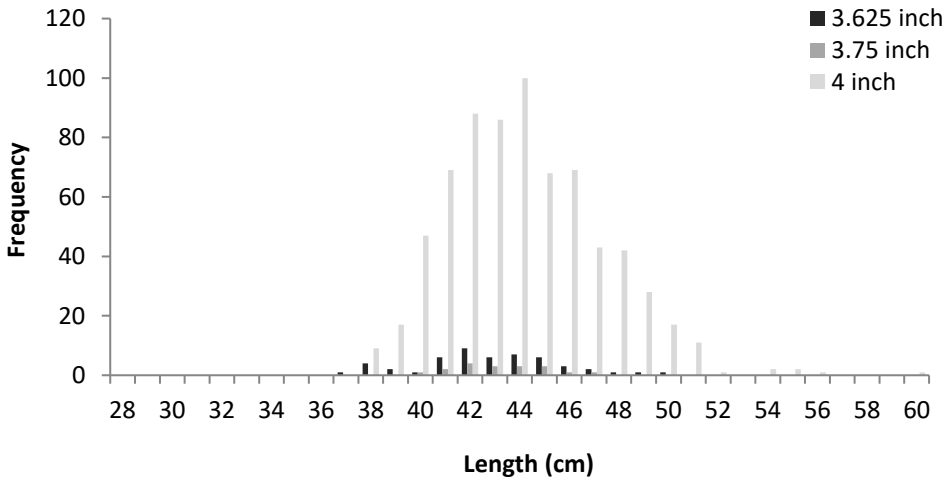

Figure 1: The frequency of sea bass (*Dicentrarchus labrax*) by length (cm) for three different sized fishing nets, 3.625 inch, 3.75 inch and 4 inch for all bass recorded during the survey (n=769).

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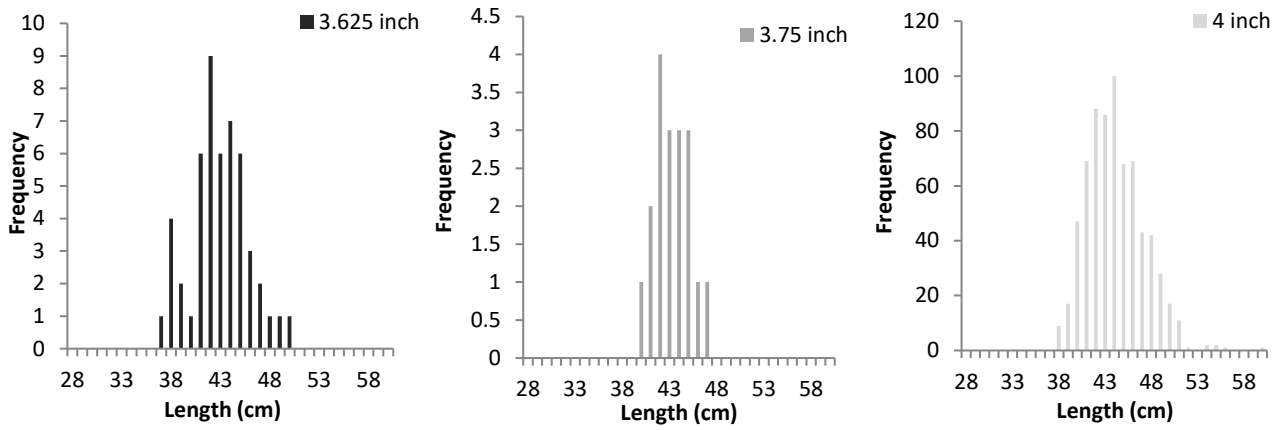


Figure 2: The frequency of sea bass (*Dicentrarchus labrax*) by length (cm) for three different sized fishing nets separately, 3.625 inch (n=50), 3.75 inch (n=18) and 4 inch (n=701) for all bass recorded during the survey (n=769). N.B. Different scale on Y axis.

A breakdown of the total number above and below 42 cm and the percentage for all three mesh sizes is shown in Table 2 and Figure 3. Care should be taken when interpreting this data as it included catch sampling and landings data.

Table 2: The total number of individual sea bass (*Dicentrarchus labrax*) under 42 cm and over 42 cm recorded for three different sized fishing nets (3.625 inch, 3.75 inch and 4 inch)

Net mesh size	<42cm	Percentage <42 cm of the total	>42cm	Percentage >42 cm of the total	Total	Percentage of the total
3.625 inch	14	1.8%	36	4.7%	50	6.5%
3.75 inch	3	0.4%	15	2.0%	18	2.3%
4 inch	142	18.5%	559	72.7%	701	91.2%

The percentage of bass over and under the MLS of 42cm per mesh size is shown in Figure 3.

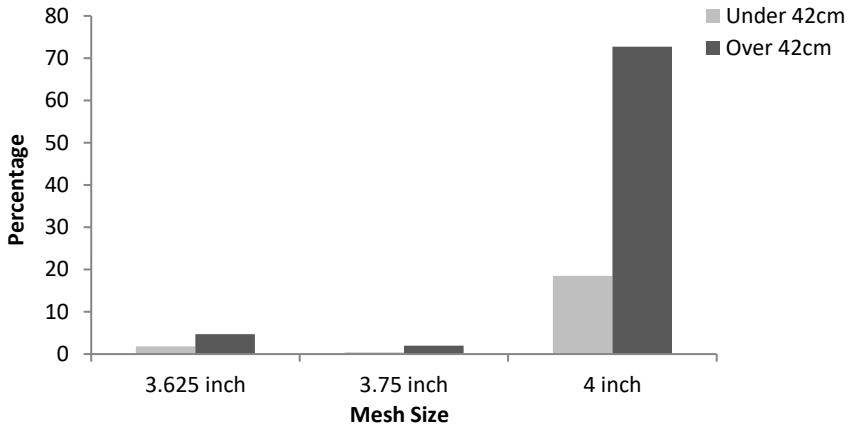


Figure 3: The percentage of sea bass (*Dicentrarchus labrax*) for each gear type for three different sized fishing nets, 3.625 inch, 3.75 inch and 4 inch for all bass recorded during the survey (n=769).

The number of bass by size class for each survey day is shown in Figure 4 and the percentage contribution of each size class for each survey day in shown in Figure 5. These two figures show that the size class contribution for both all survey days was fairly similar with the 36-37 cm, 38-41 cm and 46-55 cm size classes dominating.

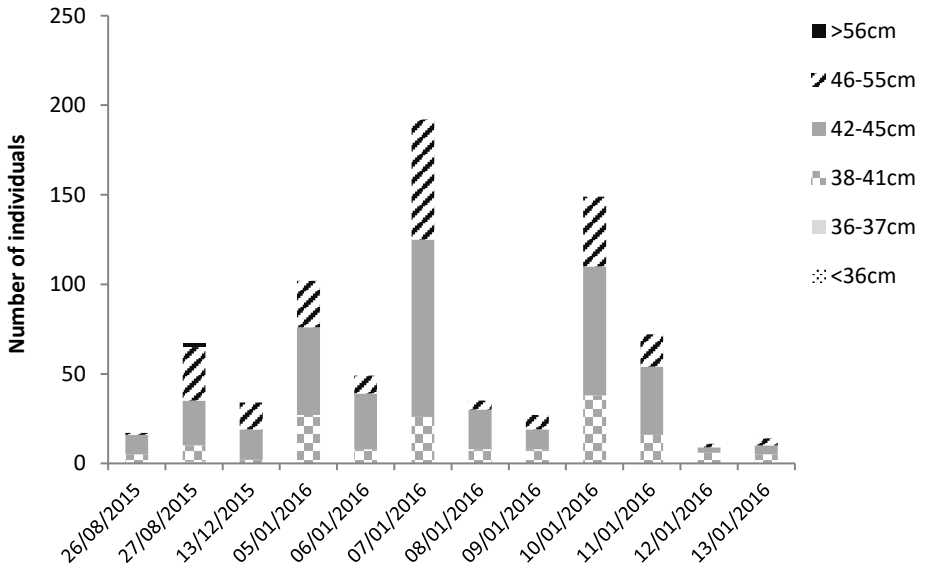


Figure 4: The number of sea bass (*Dicentrarchus labrax*) for size classes (<36 cm, 36-37 cm, 38-41 cm, 42-45 cm, 46-55 cm, >56 cm) for each survey day for data collected in 2015 and 2016 (n=769).

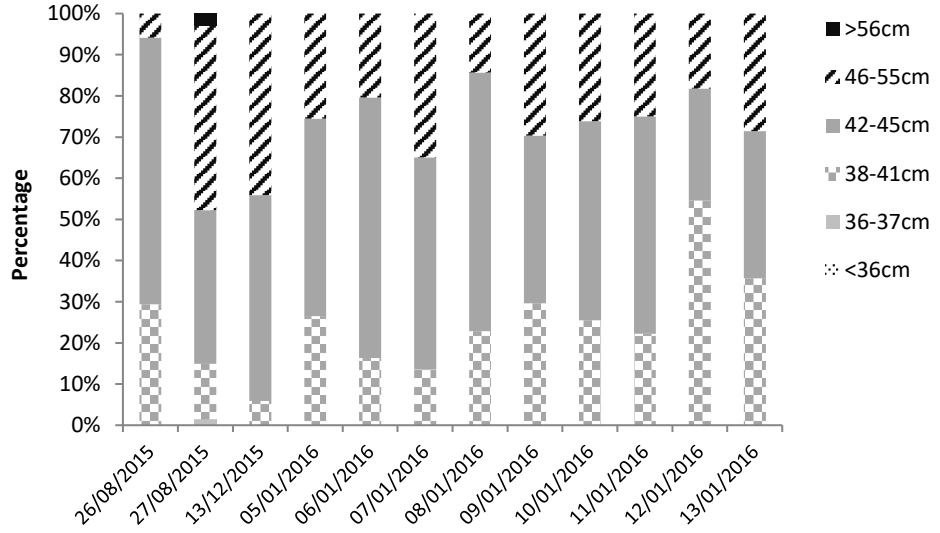


Figure 5: The percentage contribution of size classes (<36 cm, 36-37 cm, 38-41 cm, 42-45 cm, 46-55 cm, >56 cm) of sea bass (*Dicentrarchus labrax*) for each survey day for data collected in 2015 and 2016.

4.1.2 Season

The data was also split by 'season' – comparing data collected in the summer (two survey days in August) to winter (all other data collected from December to January). The length frequency of all the bass recorded during the survey is shown in Figure 6. The distribution was uni-modal for the winter data and bi-modal for the summer data. The largest proportion of fish were sampled during the winter, 685 fish compared to 84 during the summer therefore care should be taken when interpreting the data. The size class during the winter with the greatest number of fish was 44 cm (13% of the total number of fish and 14.6% of the total number of fish during the winter). The size classes during the summer with the greatest number of fish were 42 cm and 44 cm (both 1.3% of the total number of fish and 11.9% of the total number of fish during the summer).

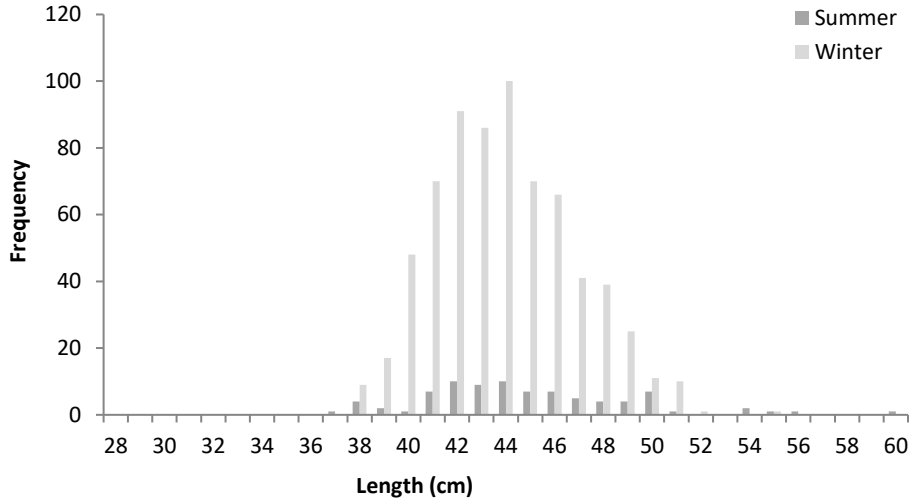


Figure 6: The frequency of sea bass (*Dicentrarchus labrax*) by length (cm) by season (summer and winter) for all bass recorded during the survey (n=769).

A breakdown of the total number above and below 42 cm and the percentage for both seasons is shown in Table 3 and Figure 7.

Table 3: The number of individual sea bass (*Dicentrarchus labrax*) under 42 cm and over 42 cm recorded for both seasons (summer and winter)

Season	<42 cm	Percentage <42 cm of the total	>42 cm	Percentage >42 cm of the total	Total	Percentage of the total
Summer	15	1.9%	69	9.0%	84	10.9%
Winter	144	18.7%	541	70.3%	685	89.1%

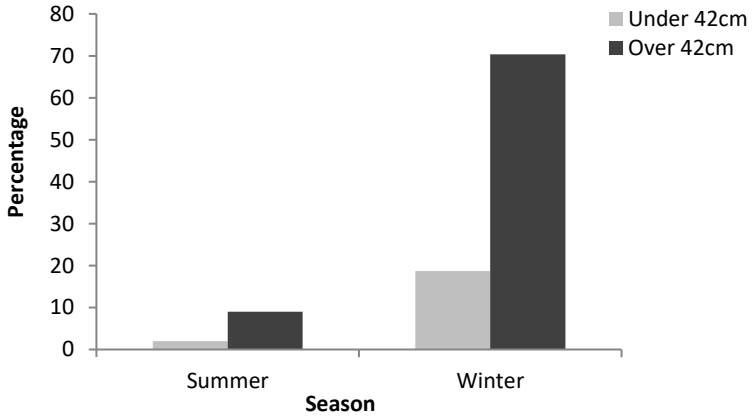


Figure 7: The percentage of sea bass (*Dicentrarchus labrax*) over and under the minimum landing by season (summer and winter) for all bass recorded during the survey (n=769).

The number of bass by size class for the winter and summer is shown in Figure 8 and the percentage contribution of each size class for both seasons in shown in Figure 9. These two figures show that the size class contribution for both seasons was fairly similar with the 36-37 cm, 38-41 cm and 46-55 cm size classes dominating.

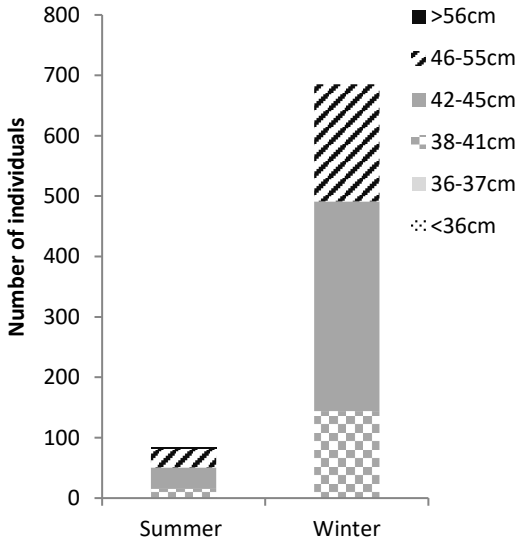
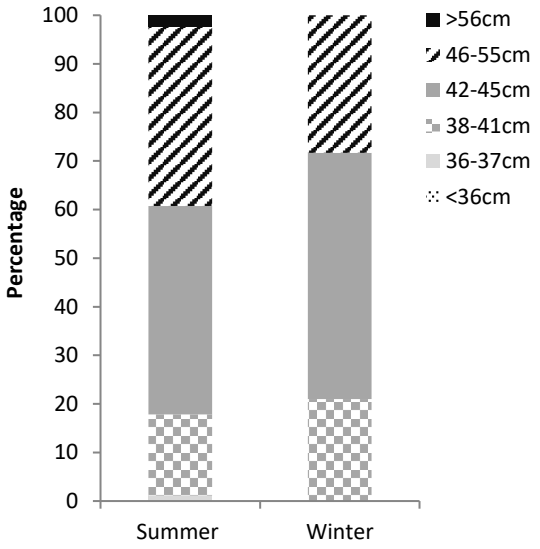


Figure 8: The number of sea bass (*Dicentrarchus labrax*) by size classes (<36 cm, 36-37 cm, 38-41 cm, 42-45 cm, 46-55 cm, >56 cm) for season (summer and winter) for each survey day for data collected in 2015 and 2016 (n=769).



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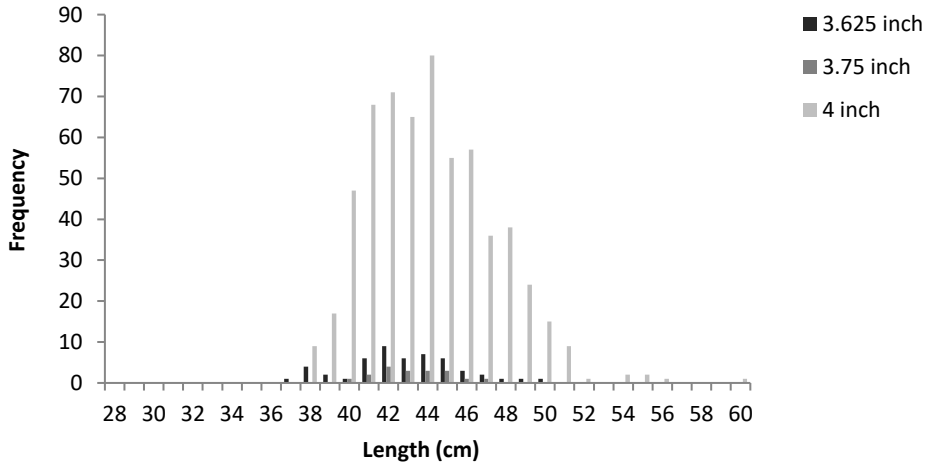
4.2 Catch data

4.2.1 Mesh size

A total of 666 individuals were recorded from data collected by catch sampling. These were caught via three different sized fishing nets, 3.625 inch, 3.75 inch and 4 inch. The length frequency of all the bass recorded by catch sampling during the survey is shown in Figure 10 and by size class separately in Figure 11. The distribution was uni-modal in the 3.75 and 4 inch datasets and bi-modal for the 3.625 inch dataset. The largest proportion of fish sampled were from the 4 inch net (598 individuals – 89.7% of the total number of fish) and the size class in this category within the greatest number of fish was 44 cm (12% of the total number of fish and 13% of the number of fish in the 4 inch net). The total number of fish recorded in the 3.625 inch net was 50 (7.5% of the total number) and the size class with the largest proportion was 42 cm (1% of the total number of fish and 18% of the number of fish in the 3.625 inch net). The smallest proportion of fish sampled from the 3.75 inch net was 18% and the size class in this category with the greatest number of fish was also 42 cm (0.6% of the total number of fish and 22% of the number of fish in the 3.75 inch net).



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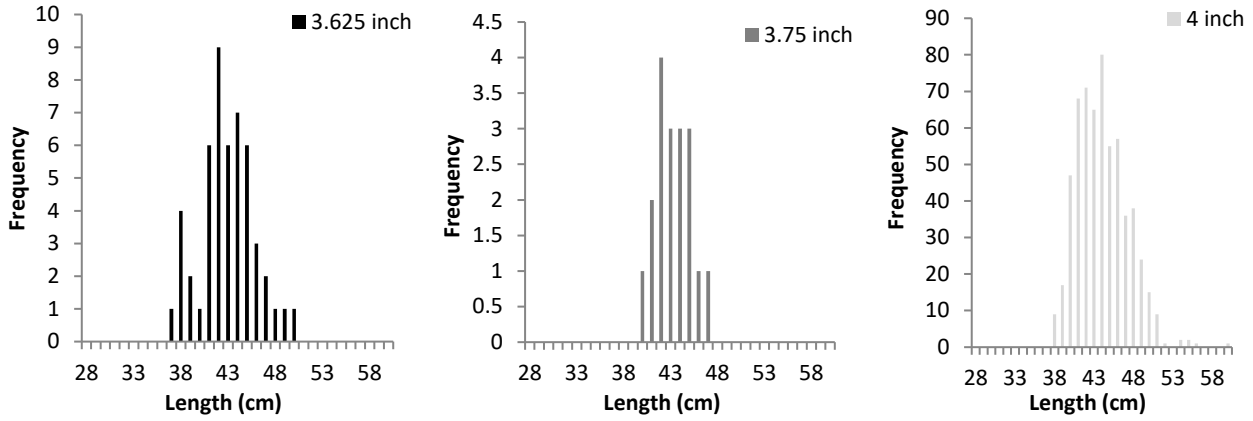

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A breakdown of the total number above and below 42 cm and the percentage for all three mesh sizes for catch sampled data is shown in Table 4 and Figure 12.

Table 4: The number of individual sea bass (*Dicentrarchus labrax*) under 42 cm and over 42 cm recorded for three different sized fishing nets (3.625 inch, 3.75 inch and 4 inch) for all bass collected by catch sampling

Net mesh size	<42cm	Percentage <42cm of the total	>42cm	Percentage >42cm of the total	Total	Percentage of the total
3.625 inch	14	2.1%	36	5.4%	50	7.5%
3.75 inch	3	0.5%	15	2.3%	18	2.7%
4 inch	141	21.2%	457	68.6%	598	89.8%

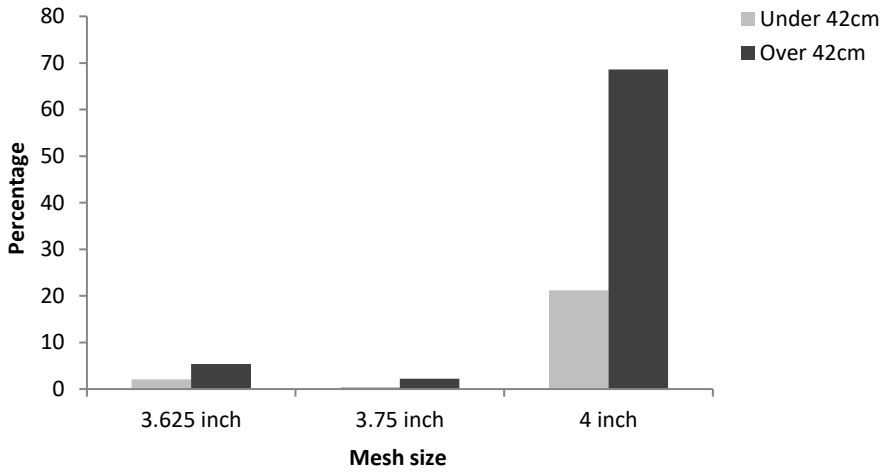

Figure 12: The percentage of sea bass (*Dicentrarchus labrax*) for each gear type for three different sized fishing nets, 3.625 inch, 3.75 inch and 4 inch for all bass collected by catch sampling during the survey in 2015 and 2016 (n=666).

The average length (cm) and the average weight (kg) of the total number of bass by mesh size are shown in Figure 13. The average length was greatest in the 4 inch mesh size class at 44.1 cm compared to 43.3 cm in the 3.75 inch gear and 42.9 cm in the 3.625 inch gear.

The average weight (kg) was also greatest in the 4 inch gear at 1.2 kg (Figure 13). The average weight of fish in the other two sizes of mesh was similar, 0.87 kg in the 3.75 inch gear and 0.88 kg in the 3.625 inch gear.

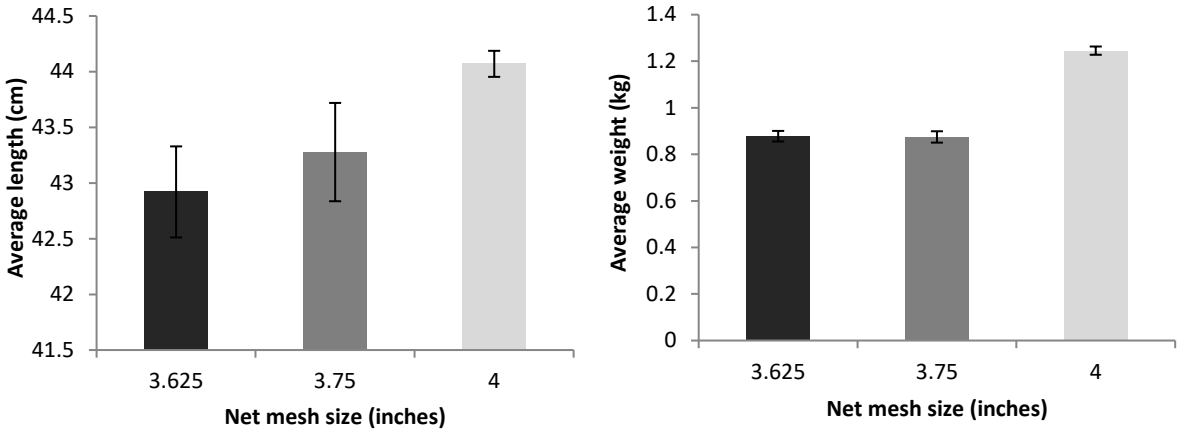

Figure 13: The average length (cm) (n=666) and average weight (kg) (n=113) for all sea bass (*Dicentrarchus labrax*) recorded during the survey by mesh size, 3.625 inch, 3.75 inch and 4 inch.

The length weight relationship by mesh size is shown in Figure 14. This shows that a number of longer heavier fish were caught by 4 inch gear, a number of smaller lighter fish were caught by 3.625 inch gear and that a number of fish were heavier for the same length when caught by 4 inch gear. There was a positive relationship for the length and weight for all three mesh size; 3.625 inch (r^2 = 0.88), 3.75 inch (r^2 = 0.615) and 4 inch (r^2 = 0.89).

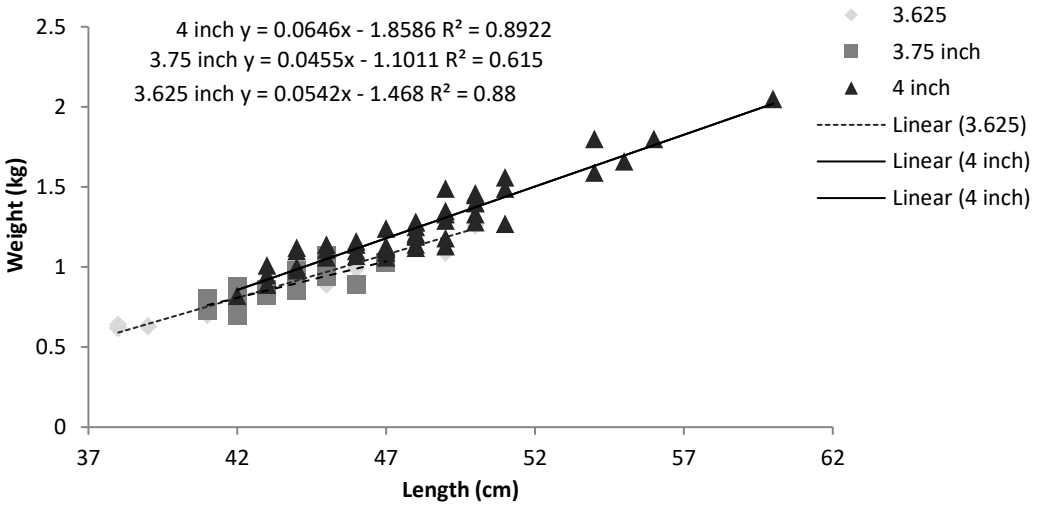

Figure 14: The length (cm) and weight (kg) of sea bass (*Dicentrarchus labrax*) for all bass collected by catch sampling during the survey in 2015 and 2016 (n=666).

4.2.2 Season

The catch data was also split by 'season' – comparing data collected in the summer (two survey days in August) to winter (all other data collected from December to January). The length frequency of all the bass recorded during the survey is shown in Figure 15. The distribution was uni-modal for the winter data and bi-modal for the summer data. The largest proportion of fish was sampled during the winter, 582 fish compared to 84 during the summer. The size class during the winter with the greatest number of fish was 44 cm (12% of the total number of fish and 13.7% of the total number of fish during the winter). The size classes during the summer with the greatest number of fish were 42 cm and 44 cm (both 1.5% of the total number of fish and 11.9% of the total number of fish during the summer).

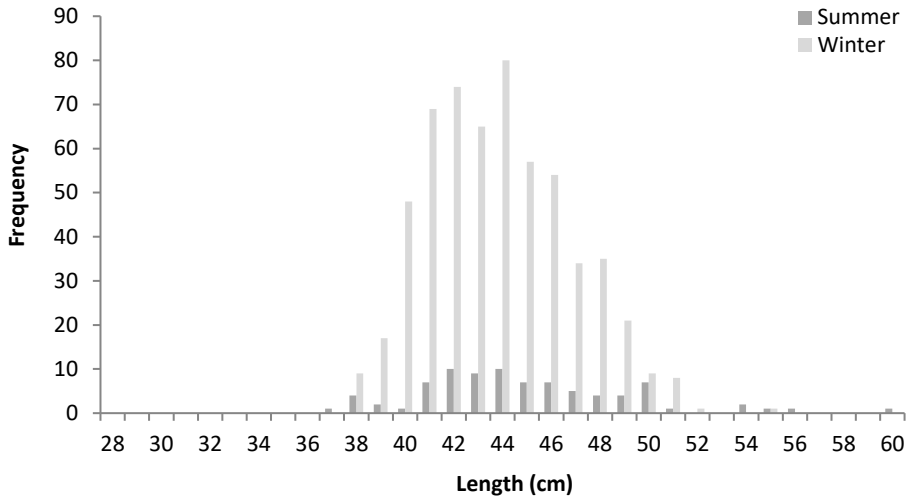

Figure 15: The frequency of sea bass (*Dicentrarchus labrax*) by length (cm) by season (summer and winter) for all bass recorded during the survey (n=666).

A breakdown of the total number above and below 42cm and the percentage for both seasons is shown in Table 5 and Figure 16.

Table 5: The number of individual sea bass (*Dicentrarchus labrax*) under 42 cm and over 42 cm recorded for both seasons (summer and winter)

Season	<42 cm	Percentage <42 cm of the total	>42 cm	Percentage >42 cm of the total	Total	Percentage of the total
Summer	15	2.3%	69	10.4%	84	12.6%
Winter	143	21.5%	439	65.9%	582	87.4%

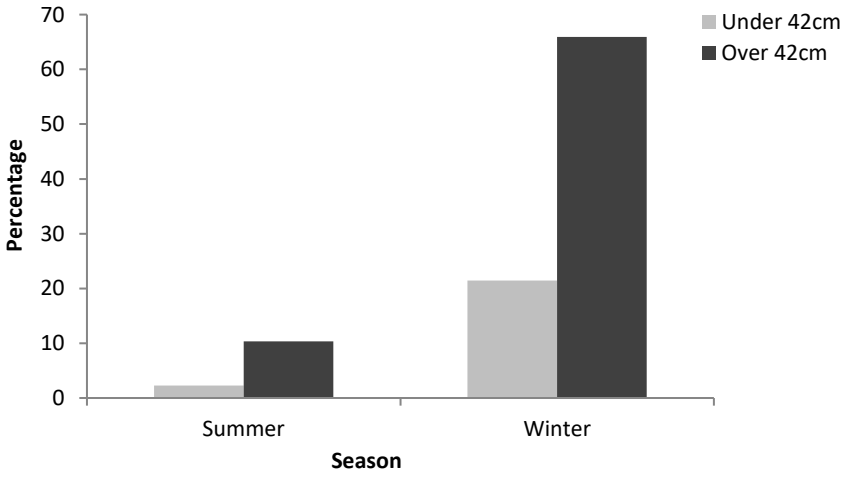

Figure 16: The percentage of sea bass (*Dicentrarchus labrax*) by season (summer and winter) for all bass recorded during the survey (n=666).

The average length (cm) and the average weight (kg) of the total number of bass by season are shown in Figure 17. A total of 84 fish were measured for length during the summer and 582 fish were measured during the winter. The average length was greatest during the summer with an average of 45.0 cm compared to 43.8 cm during the winter. A two sample t-Test assuming unequal variances was carried out and the results showed that there was a significant difference for the length (cm) of bass during the summer and winter, $t_{(84,582)} = 2.46$, $p = 0.02$, $p = <0.05$.

The average weight (kg) was greatest during the winter with an average of 1.0 kg compared to 1.1 kg during the summer (Figure 17). A total of 80 fish were measured for weight during the summer and 33 fish were measured during the winter. A two sample t-Test assuming unequal variances was carried out and the results showed that

there was a significant difference for the weight (kg) of bass during the summer and winter, $t_{(80,33)} = -0.4$, $p = 0.67$, $p = >0.05$. Care should be taken when interpreting this result as the number of samples during the winter was low (n=33).

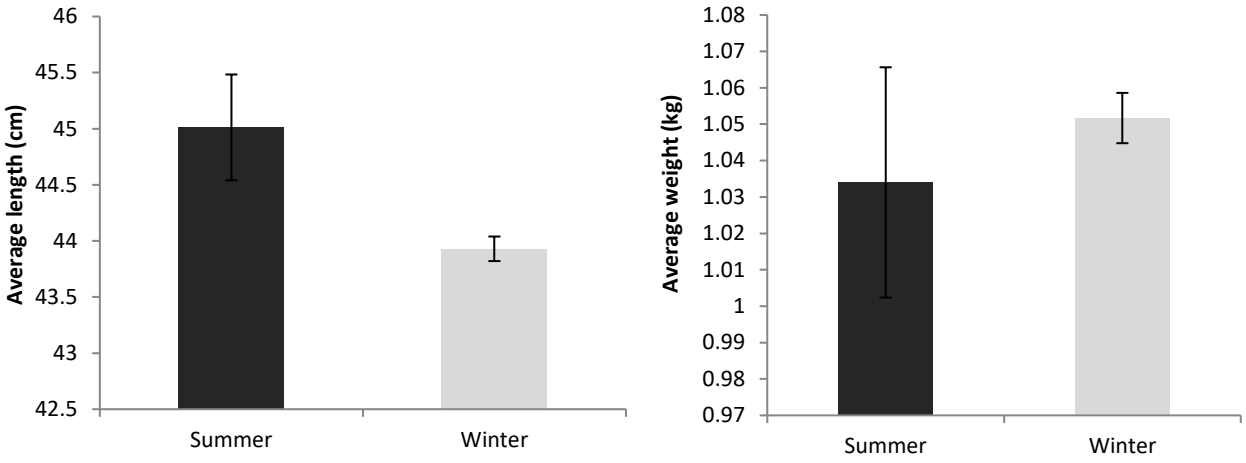

Figure 17: The average length (cm) (n=666) and average weight (kg) (n=113) for all sea bass (*Dicentrarchus labrax*) recorded during the survey by season (summer and winter).

The length weight relationship by season is shown in Figure 18. This shows that a number of longer heavier fish were measured during the summer and that during the winter fish of the same length were heavier.

A logistic regression showed that length had a positive relationship between the length (cm) and weight (kg) of bass for both the summer ($r^2 = 0.94$) and winter ($r^2 = 0.80$) (Figure 18).

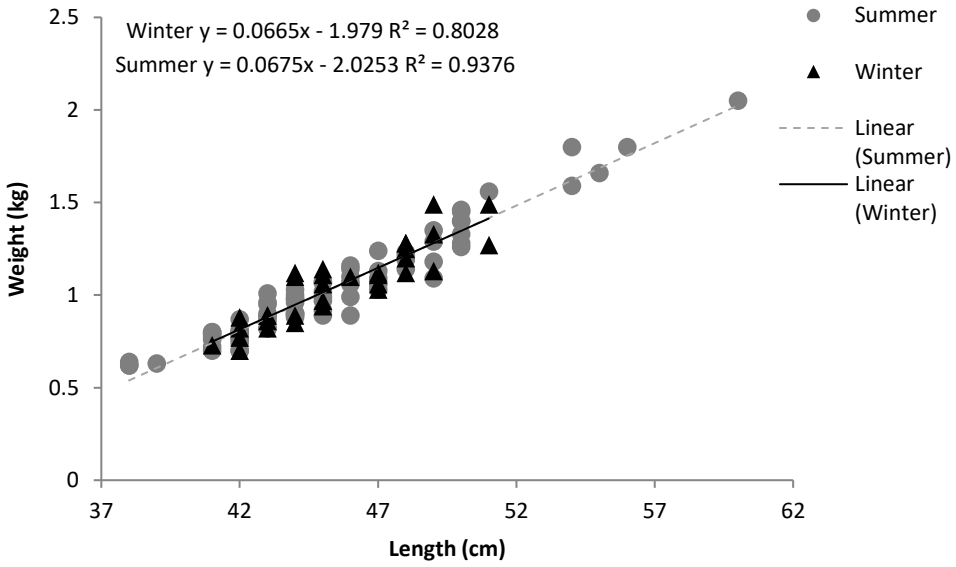

Figure 18: The length (cm) and weight (kg) of sea bass (*Dicentrarchus labrax*) by season for all bass collected during the survey in 2015 and 2016 (n=666).

The average length (cm) and the average weight (kg) of the total number of bass or catch data per mesh size by season is shown in Figure 19. A total of 84 fish were measured for length during the summer and 582 fish were measured during the winter. A breakdown of the number of fish measured per mesh size by season is shown in Table 5. The average length was greatest during the summer for all three mesh sizes and highest in the 4 inch mesh size during the summer (49.07 cm). The average length was similar for the two mesh sizes used during the winter.

A total of 80 fish were measured for weight during the summer and 33 fish were measured during the winter. The average weight (kg) was fairly similar for the two mesh sizes where a comparison can be made; the 3.75 inch and 4

inch mesh size (0.91 kg during summer for the 3.75 inch mesh and 0.86 kg during the winter; 1.32 kg during summer for the 4 inch mesh and 1.15 kg during the winter).

Table 6: The number of individual sea bass (*Dicentrarchus labrax*) measured for each mesh size (3.625 inch, 3.75 inch and 4 inch) recorded for both seasons (summer and winter)

Season	Net mesh size	Length	Weight
		Number of fish measured	Number of fish measured
Summer	3.625	50	46
	3.75	6	6
	4	28	28
Winter	3.625	0	
	3.75	12	11
	4	570	22
	Total	666	113

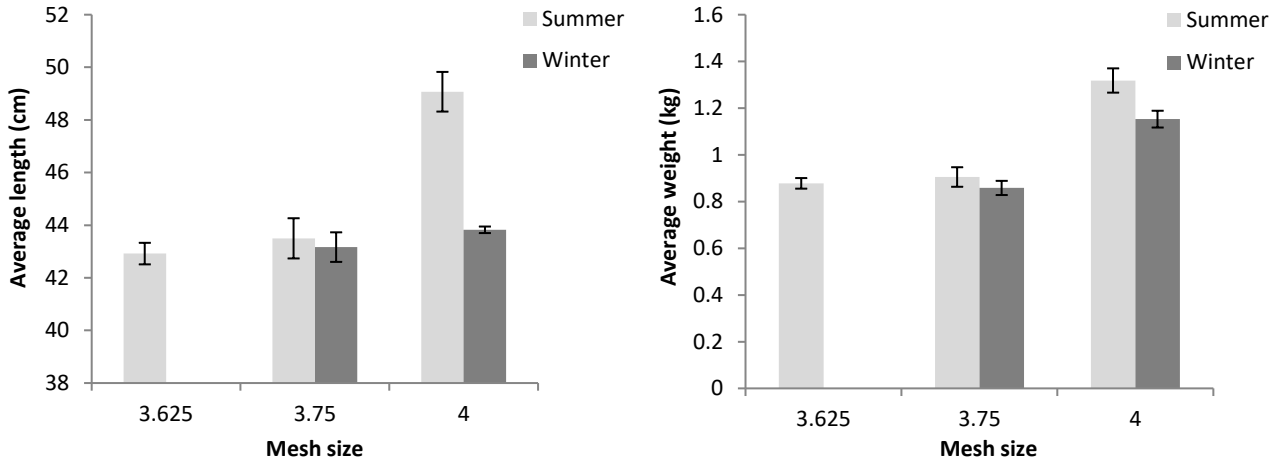

Figure 19: The average length (cm) (n=666) and average weight (kg) (n=113) for all sea bass (*Dicentrarchus labrax*) recorded during the survey for three mesh sizes (3.625 inch, 3.75 inch and 4 inch) and by season (summer and winter)

4.3 Landings data

4.3.1 Mesh size

A total of 103 individuals were recorded from data collected by landings data. These were caught via one gear size only, 4 inch gear. All fish were above the MLS of 42 cm (102 individuals) except one which was 41 cm. The distribution was uni-modal. The length frequency of all the bass recorded by landings data during the survey is shown in Figure 20. The size class in this category within the greatest number of fish was 43 cm (20% of the total number of fish and 20% of the number of fish in the 4 inch net).

Cornwall IFCA Mesh Size Analysis of fishing net gear for sea bass 2016

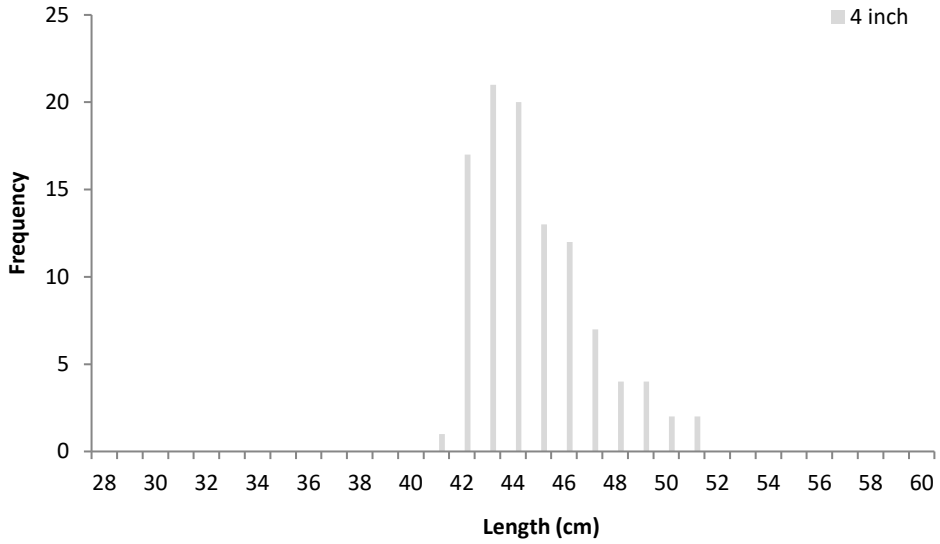

Figure 20: The frequency of sea bass (*Dicentrarchus labrax*) by length (cm) for 4 inch fishing gear for all bass collected by landings data recorded during the survey (n=103).

A breakdown of the total number above and below 42cm and the percentage for all three mesh sizes for catch sampled data is shown in Table 7 and Figure 12.

Table 7: The number of individual sea bass (*Dicentrarchus labrax*) under 42 cm and over 42 cm recorded for 4 inch gear)

	<42 cm	Percentage <42 cm of the total	>42 cm	Percentage >42 cm of the total	Total
4 inch	1	1%	102	99%	103

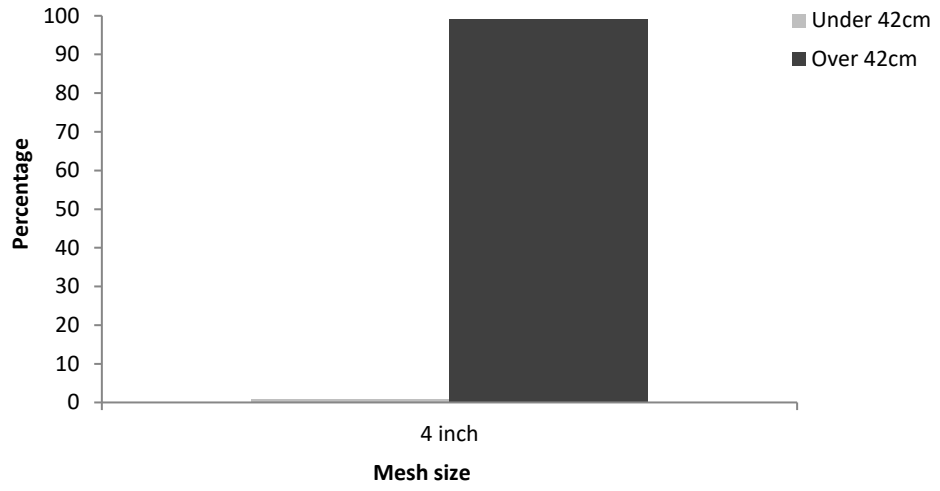

Figure 21: The percentage of sea bass (*Dicentrarchus labrax*) for each gear type for 4 inch gear for all bass collected by landings data recorded during the survey (n=103).

The length weight relationship by season is shown in Figure 22. This shows that for some size classes the weight of fish varied and for some weights the size class varied which could be due to time of year and seasonality of the time the fish were measured.

Cornwall IFCA Mesh Size Analysis of fishing net gear for sea bass 2016

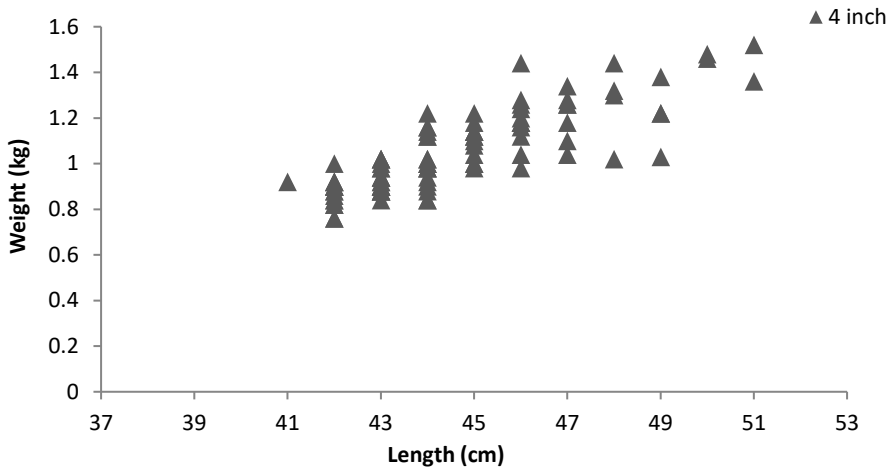

Figure 22: The length (cm) and weight (kg) of sea bass (*Dicentrarchus labrax*) for all bass collected in 4 inch fishing gear by landings data during the survey in 2015 and 2016 (n=103).

No analysis by season was carried for the landings data because the data was all collected during the winter.

5 Discussion

The greatest proportion of size class for all three mesh sizes was very similar (42 cm, 42 cm and 44 cm), all of which are above the MRCS. Only one fish less than 37.5cm, the Cornwall IFCA minimum size prior to 1st September 2015, was caught. Previous studies have shown that sea bass <32 cm in length tend to remain in the inshore nursery areas for up to five years depending on growth (Seafish, 2015; Jennings and Pawson, 1992; Pawson *et al*., 1987), whereas fish >36cm tend to emigrate from these areas and disperse around the coast (Pickett *et al*., 2004). Once the bass are mature (aged between four to five years) they tend to migrate between summer feeding grounds often inshore (Seafish, 2015) and offshore pre-spawning and spawning areas to the south and west (Pawson *et al.,* 2007). The breeding season for the Atlantic population typically takes place between January and June (peaking in April) (Seafish, 2015). Bass mature at about 32-36 cm for males and 42 cm for females (Kennedy and Fitzmaurice, 1972; Pawson and Pickett, 1996), although ambient water temperatures in winter may influence the onset of maturity in female bass (Pawson *et al*., 2000). The life cycle of bass determines what size bass will be inshore at what times of year and what weight the fish will be.

The largest proportion of undersize bass (<42 cm) was caught in the 4 inch gear. This could be misinterpreted because of the low numbers of fish caught by catch sampling in the 3.625 inch and 3.75 inch gear compared to the large number of fish caught in the 4 inch gear.

The average length (cm) and weight (kg) of fish caught by gear increased by mesh size implying that larger (heavier and longer) fish were caught in gear with larger mesh sizes. Another factor when looking at the length and weight of fish is the season which the fish were caught. As mentioned previously, the time of year plays a large role in determining the feeding and breeding status of bass. The average length of catch data was higher during the summer compared to winter and the average weight was higher during the winter compared to the summer. This coincides with findings observed in the field by fishermen and Cornwall IFCA scientific officers; that bass were visually fatter during the winter compared to summer meaning that shorter individuals are more susceptible to capture in the winter than in the summer. Other studies have also found that the fat reserves were higher and there was more food in bass caught in the English Channel during the winter (Pawson and Pickett, 1996). The length of bass was significantly different during the summer and winter however the weight of bass was not significantly different between the two seasons. When comparing seasons, the data should be interpreted carefully. Three mesh sizes were used during the summer but during the winter only 4 inch mesh was used for all survey days except one when 3.75 inch gear was used. The results found could be due to the low sample size collected during the winter.

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A disproportionate amount of different mesh size nets were sampled and therefore comparisons between the numbers of fish caught in different mesh size should be interpreted with caution. The 3.625 inch and 3.75 inch mesh was only used for two of the survey days each and the number of nets and length of net were not recorded.

The bass were noticeably heavier for similar length fish in the landings data collected in January 2016 than the bass recorded in the summer 2015. The landings data proved useful to provide an insight into the length weight relationship for bass collected during the winter period. However, due to the differences in weight of fish during the summer compared to the winter it is not possible to use the data to work out the length weight relationship for the population of bass found in Cornwall.

This survey has shown that mesh selectivity is an important tool to target fish above the MRCS but biological variables, such as the weight/shape of fish which is attributed to season and temperature due to feeding patterns, cannot be controlled and has an important role in determining the size classes of fish that will be caught in fishing nets. The report provides a preliminary scope of the mesh selectivity for nets targeting bass.

5.1 Limitations

A number of limitations were observed during the survey, which included the following;

- The methodology in this survey was limited due to feasibility of data collection.
- The sample size was limited and data was only collected from one vessel per surveyed day.
- The number of different mesh sizes recorded in the survey and the number of nets per mesh size was dictated by what the fishermen had chosen to use rather then what was chosen to be surveyed.
- The location of set nets was not recorded and this might have affected the size composition and quantity of catches recorded.

6 Recommendations

A larger sample size would provide further information on the length weight relationship year round when bass are and are not feeding and a larger data set would provide further information on the size classes of bass caught in various mesh sizes.

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