Enclosure (1)
Groundfish PDT report dated July 27, 2012

Length Frequency Analysis of Discards

The Groundfish Committee requested the PDT examine the established minimum sizes of the allocated groundfish (Table 1) following discussion of the large number of sub-legal yellowtail flounder (approximately 12" Total Length) being discarded. Some concern was raised about harvesting fish before they were able to reproduce. Fishermen are faced with paying for at sea monitoring from FY2013 and beyond. The reduction in regulatory discards could increase landings and reduce monitoring costs but may have unexpected impacts on a population if fishing behavior changes in response to markets developing for currently undersized fish.

ASM and NEFOP observer data from 2008 to 2012 were examined to determine the length distribution of discarded cod, haddock, Pollock, witch flounder, yellowtail flounder, American plaice, Atlantic halibut, winter flounder and redfish. This analysis focused on trawl gear, including variations such as the Ruhle trawl and the haddock separator trawl. A number of other parameters were looked at to detect any influences on the length frequency by statistical area, gear type, mesh size, mesh shape, depth, quarter and year. The observed numbers were not expanded to total catch.

It is not known what proportion newly mature fish contribute to each spawning population assuming their low fecundity at first spawning. For a number of species, fecundity and egg viability increases with size and age. The current minimum sizes were established to minimize the harvest of immature fish. The removal or reduction in the minimum size would result in a larger portion of immature fish being landed. The full impact on the population depends on changes in fishing behavior and the establishment of markets for small size fish. The short-term contribution of new spawners may be limited but their overall contribution may be substantial but difficult to estimate. By comparing current minimum sizes and size at maturity with observed discards, we can make inferences about these issues.

Cod

The majority of the total discards occurred just below the minimum size (Figure 1). The length at 50% maturity is below the minimum size suggesting a portion of these discards could be contributing to the spawning population. When examined proportionally a similar trend in discards is seen across years (Figure 2). Year appears to be an important factor in determining the number of discards in the raw data, however, the sample sizes vary greatly by year. The number of years used here are not long enough to determine any decadal trends or to compare to recruitment indices. To account for this, the observed numbers were expressed as a percentage of the total observed in that length class (Figure 3). This showed the percent contribution of a year to a particular length class. Both 2008 and 2009 contributed the highest percentages throughout the time series; the size classes differ with 2008 dominated by smaller sizes and 2009 with larger

sizes. The later years add consistently lower percentages to the discards. A weighted average across years also indicates the highest level of discards occurs just below the legal minimum size (Figure 4). Approximately 90 percent are mature by the minimum size (Figure 5). The magnitude of discards did vary with depth, with the fewest observed discards in depths less than 25m and between 50 and 75 m, the majority were found in depths greater than 75m (Figure 6).

Otter trawl discarded the most cod with modified gear showing greatly reduced numbers (Figure 7). There were few cod observed in unknown, square/wrapped and combo mesh (Figure 8). The length frequencies were similar for diamond and square mesh, with diamond discards largely outweighing square mesh (Figure 8). When examined proportionally, to account for sample sizes, these two mesh shapes are very similar (Figure 9). Smaller mesh size corresponds to more discards but observed trips using larger mesh are much lower (Figure 10). Again accounting for sample size, 5.5 to 6.49 and 6.5 to 6.99 mesh sizes have similar discards (Figure 11).

Cod are discarded across a broad range of statistical areas; SA 521 has the highest level of discards. A similar length frequency is observed across the statistical areas but the magnitude varies with location (Figure 12). Cod discards remain constant throughout the year with an increase apparent in the first quarter (Figure 13).

Haddock

The majority of the total discards occurred just below the minimum size (Figure 14). The length at 50% maturity is below the minimum size suggesting a portion of these discards could be contributing to the spawning population. There are two peaks in haddock discards; a peak occurs in the 20 – 30 cm size range from 2010 to 2012 that doesn't occur in earlier years, while all years show a high level of discards over 40cm. The peak at smaller sizes may indicate a large year class but this needs to be confirmed with recruitment data. When examined proportionally a similar trend in discards is seen across years; the peak at smaller sizes is driven by later years (Figure 15). The percent contribution by year follows a similar trend with 2010 to 2012 contributing the most to the smaller size classes and to the 50 cm and larger sizes (Figure 16). Both 2008 and 2009 contributed the highest percentages to the mid-range, 35 cm to 60 cm. A weighted average across years also indicates the highest level of discards occurs just below the legal minimum size with a lesser peak just below 30 cm. (Figure 17). Approximately 90 percent are mature by the minimum size (Figure 18). The bimodal discard distribution was maintained in all parameters examined. The magnitude of discards did vary with depth, with the fewest observed discards in depths less than 25m and between 50 and 75 m (Figure 19). Observed discards increased over 70 m; the majority was found in depths between 25m and 50m (Figure 19).

Otter trawl discarded the most haddock with modified gear showing greatly reduced numbers (Figure 20). There were few haddock observed in unknown, square/wrapped and combo mesh (Figures 21). The length frequencies were similar for diamond and square mesh, with diamond discards largely outweighing square mesh (Figure 21). When examined proportionally, to account for sample sizes, these two mesh shapes are very similar (Figure 22). Smaller mesh size corresponds to more discards but the number of observed trips using larger mesh are much lower (Figure 23). Again accounting for sample size, 5.5 to 6.49 and 6.5 to 6.99 mesh sizes have similar discards (Figure 24).

Haddock were discarded in 17 statistical areas but SA 522 dominated the discards. Multiple peaks at smaller sizes vary with location (Figure 25). Haddock discards remain constant throughout the year with an increase apparent in the second quarter (Figure 26). Discards over 40cm peaked in Quarter 2 but varied by quarter at smaller sizes.

Pollock

The majority of the total discards occurred within a couple of centimeters of the minimum size (Figure 27). The size at 50% maturity coincides with the peak in discards (Figure 27). When examined proportionally a similar trend in discards is seen across years (Figure 28). The percent contribution by year is well mixed across the years (Figure 29). A weighted average across years also indicates the highest level of discards occurs just below the legal minimum size and when half the population is maturing (Figure 30). The magnitude of discards increased with depth, with the fewest observed discards in depths less than 25m and the majority in depth 75 m and over (Figure 31).

Otter trawl discarded the most pollock with modified gear showing greatly reduced numbers (Figure 32); the otter trawl trend closely follows the overall trend in discards. There were few haddock observed in square/wrapped mesh and none found in unknown and combo mesh (Figure 33). The majority of discards occurred in diamond mesh with some caught in square mesh (Figures 34). When examined proportionally, to account for sample sizes, these two mesh shapes are very similar (Figure 35).Smaller mesh size corresponds to more discards but the number of observed trips using larger mesh are much lower (Figure 36). Again accounting for sample size, 5.5 to 6.49 and 6.5 to 6.99 mesh sizes have similar discards (Figure 37).

Pollock were observed in 13 statistical areas; SA 515 had the highest number of observed discards (Figure 38). Pollock discards remain generally constant throughout the year (Figure 39).

Witch Flounder

The majority of the total discards occurred just below the minimum size (Figure 40). The size at 50% maturity coincides with the peak in discards (Figure 40). When examined proportionally a similar trend in discards is seen across years (Figure 41). The percent contribution by year is well mixed across the years, with 2010 dominating lengths less than 10cm (Figure 42). A weighted average across years also indicates the highest level of discards occurs just between the length at 50% maturity and minimum size (Figure 43). Approximately 70% of the population is mature at the minimum size (Figure 44). The magnitude of discards increased with depth, with the majority in depth 75 m and over (Figures 45).

Otter trawl discarded the most witch flounder with modified gear showing greatly reduced numbers (Figure 46). There were few witch flounder observed in unknown, square/wrapped and combo mesh (Figure 47). The majority of discards occurred in both diamond mesh, closely followed by square mesh (Figure 47). When examined proportionally, to account for sample sizes, are mesh shapes are fairly similar (Figure 48). Smaller mesh size corresponds to more discards but the number of observed trips using larger mesh are much lower (Figure 49). Again accounting for sample size, all mesh sizes also have similar discards (Figure 50).

Witch flounder were observed in 24 statistical areas; SA 522 had the highest number of observed discards (Figure 51). Witch flounder discards remain constant throughout the year (Figure 52).

Yellowtail Flounder

The peak in total discards occurred at the minimum size (Figure 53). The size at 50% maturity is below the peak in discards (Figure 53). When examined proportionally a similar trend in discards is seen across years (Figure 54). The percent contribution by year is well mixed across the years, with 2010 dominating lengths less than 10cm and 2008 and 2009 above 10 cm (Figure 55). A weighted average across years also indicates the highest level of discards occurs at the minimum size; a large number of discards occur in the 5cm difference between the length at 50% maturity and minimum size (Figure 56). Approximately 90% of the population is mature at the minimum size for all 3 stocks (Figure 57). Discards decreased with depth, with the fewest observed discards in depths 75m and over; the majority occurred between 25m and 50m (Figure 58).

Otter trawl discarded the most yellowtail flounder; modified gear showed greatly reduced numbers (Figure 59). There were few yellowtail flounder observed in in unknown,

square/wrapped and combo mesh (Figure 60). The majority of discards occurred in square mesh; diamond mesh was less than half of the square mesh discards (Figure 60). When examined proportionally, to account for sample sizes, all mesh shapes are fairly similar (Figure 61).Smaller mesh size corresponds to more discards but the number of observed trips using larger mesh are much lower (Figure 62). Again accounting for sample size, all mesh sizes have similar discards (Figure 63).

Yellowtail flounder were observed in 17 statistical areas; SA 514 had the highest number of observed discards (Figure 64). Yellowtail flounder discards remain constant throughout the year with Quarter 3 being slightly higher (Figure 65).

American Plaice

The majority of the total discards occurred just below the minimum size; the peak occurred at the same size range across years (Figure 66). The size at 50% maturity is below the peak in discards (Figure 66). When examined proportionally a similar trend in discards is seen across years with one small peak in 2012 at around 15 cm (Figure 67). The percent contribution by year is mostly dominated by 2008 across the size range (Figure 68). A weighted average across years shows the highest level of discards occurs between the minimum size and the size at 50% maturity (Figure 69). Maturity ogives are unavailable for this species; an estimate of the percentage mature at the minimum size is unavailable. Discards generally increased with depth, with the fewest observed discards in depths less than 25m; the majority occurred over 75m (Figure 70).

Otter trawl discarded the most American plaice; modified gear showed greatly reduced numbers (Figure 71). There were few American plaice observed in unknown, square/wrapped and combo mesh (Figure 72). The majority of discards occurred in diamond followed by square mesh (Figure 73). When examined proportionally, to account for sample sizes, all mesh shapes are fairly similar (Figure 74). Smaller mesh size corresponds to more discards but the number of observed trips using larger mesh are much lower (Figure 75). Again accounting for sample size, smaller mesh sizes appear to peak at a slightly larger total length than larger mesh sizes (Figure 76).

American plaice were observed in 15 statistical areas; SA 522 had the highest number of observed discards (Figure 77). American plaice discards remain constant throughout the year (Figure 78).

Atlantic Halibut

The majority of the total discards occurred well below the minimum size, with a few occurring above it (Figure 79). When examined proportionally a similar trend in discards is seen across years (Figure 80). The percent contribution by year is well mixed across the years (Figure 81). A weighted average across years also indicates the highest level of discards occurs well below the minimum size; the length at 50% maturity is unknown (Figure 82). Maturity ogives are unavailable for this species; an estimate of the percentage mature at the minimum size is unavailable. Discards generally increased with depth, with the fewest observed discards in depths less than 25m; the majority occurred over 75m (Figure 83).

Otter trawl discarded the most Atlantic halibut; modified gear showed greatly reduced numbers (Figure 84). There were few Atlantic halibut observed in unknown, square/wrapped and combo mesh (Figure 85). The majority of discards appeared to occur in diamond mesh (Figure 85), however, when examined proportionally, to account for sample sizes, no clear trend appears (Figure 86).Smaller mesh size corresponds to more discards but the number of observed trips using larger mesh are much lower; no observed discards occurred in mesh larger than 7.5 (Figures 87). Again accounting for sample size, no clear trend mesh sizes is apparent (Figure 88).

Halibut were observed in 12 statistical areas but it was well mixed across strata (Figure 89). Halibut discards are well mixed throughout all quarters (Figures 90).

Winter Flounder

The majority of the total discards occurred just below the minimum size and corresponds to the size at 50% maturity (Figure 91). When examined proportionally a similar trend in discards is seen across years (Figure 92). The percent contribution by year is well mixed across the years (Figure 93). A weighted average across years also indicates the highest level of discards occurs just below the minimum size; the length at 50% maturity is close to the peak in discards (Figure 94). Winter flounder mature over a narrow size range. Approximately 80% are mature at the minimum size (Figure 95). Discards decreased with depth, with the fewest observed discards in depths 75m and over; the majority occurred in less than 25m (Figures 96).

Otter trawl discarded the most winter flounder; modified gear showed greatly reduced numbers (Figure 97). There were few winter flounder observed in unknown, square/wrapped and combo mesh (Figure 98). The majority of discards occurred in diamond and square mesh but the former has a broader length distribution (Figure 98). When examined proportionally, to account for

sample sizes, square caught slightly more discards than diamond and other mesh shapes appear to have caught even more (Figure 99). Smaller mesh size corresponded to more discards but the number of observed trips using larger mesh are much lower (Figure 100). Again accounting for sample size, larger mesh sizes are capable of catching more discards than smaller ones (Figure 101).

Winter flounder were observed in 19 statistical areas; SA 514 had the highest number of observed discards (Figure 102). Winter flounder discards are greater in Quarters 2 and 3 and are at a lower level for the rest of the year (Figure 103).

Redfish

The majority of the total discards occurred above the minimum size and the size at 50% maturity (Figure 104). When examined proportionally a similar trend in discards is seen across years (Figure 105). The percent contribution by year is well mixed across the years (Figure 106). A weighted average across years shifts the peak in discards to the minimum size (Figure 107). Approximately 60% are mature at the minimum size (Figure 108). Discards increased with depth, the majority occurred in more than 75m but the majority occurs above the minimum size which is different to other species (Figures 109).

Otter trawl discarded the most redfish; modified gear showed greatly reduced numbers (Figure 110). There were few Redfish observed in unknown and square/wrapped mesh (Figure 111). The majority of discards occurred in diamond mesh; discards in square mesh were an order of magnitude lower (Figure 111). When examined proportionally, to account for sample sizes, these two mesh shapes are very similar (Figure 112). Smaller mesh size corresponded to more discards but the number of observed trips using larger mesh are much lower; no observed discards occurred in mesh larger than 7.5 (Figures 113). Again accounting for sample size, all mesh sizes have similar discards (Figure 114)

Redfish were observed in 13 statistical areas; SA 521 had the highest number of observed discards (Figure 115). Redfish discards are greater in Quarters 1 and decreased to a lower level for the rest of the year (Figure 116).

Conclusions

Large numbers of sub-legal sized fish are being discarded for allocated groundfish. A reduction in the minimum size would reduce discards on some species but may not have a significant effect for others because factors other than the minimum size regulations are driving those discards. A

reduction in the minimum size, e.g. by an inch, is expected to reduce discards for cod, haddock, witch flounder, yellowtail flounder, plaice and winter flounder; reductions for pollock, halibut and redfish may not be as significant. Estimates of revised minimum sizes that would reduce a large portion of sub-legal discards are provided in Table 2. Some of these estimates are below the length at 50% maturity. For the species where estimates of size at 50% maturity are available, it is clear that the majority of the fish over the minimum size is mature and has a higher probability of having already contributed to the spawning population. The initial contribution of newly maturing fish to the spawning population may be small but their lifetime fecundity may contribute significantly. The reduction or removal of the minimum size regulations would alter the ratio of mature and immature fish. If the minimum size is reduced more mature fish would be removed. Potential impacts are explored in the full retention section but it is thought to decrease long-term yield if a shift in selectivity occurs. The amount of small sized fish that are kept would be market dependent.

The analysis also indicates that changes to trawl gear mesh size or configuration could also reduce discards.

Species	Size (inches)
Cod	22 (55.9 cm)
Haddock	18 (45.7 cm)
Pollock	19 (48.3 cm)
Witch Flounder (gray sole)	14 (35.6 cm)
Yellowtail Flounder	13 (33.0 cm)
American Plaice (dab)	14 (35.6 cm)
Atlantic Halibut	41 (104.1 cm)
Winter Flounder (blackback)	12 (30.5 cm)
Redfish	9 (22.9 cm)

Table 1 – No Action Minimum Fish Sizes (TL) for Commercial Vessels

Species	Discards affected by 1 inch reduction	Size (inches)	Minimum Size to reduce most discards
Cod	Yes	22 (55.9 cm)	18.9 in. (48 cm)
Haddock	Yes	18 (45.7 cm)	15.7 in (40 cm)
Pollock	No	19 (48.3 cm)	14.2 in. (36 cm)
Witch Flounder (gray sole)	Yes	14 (35.6 cm)	10.6 in. (27 cm)
Yellowtail Flounder	Yes	13 (33.0 cm)	11.8 in (30 cm)
American Plaice (dab)	Yes	14 (35.6 cm)	5.5 in. (25 cm)
Atlantic Halibut	No	41 (104.1 cm)	
Winter Flounder (blackback)	Yes	12 (30.5 cm)	7.5 in. (19 cm)
Redfish	No	9 (22.9 cm)	7.1 in. (18 cm)

Table 2 – Qualitative summary of impact on discards of changes in minimum size of one inch

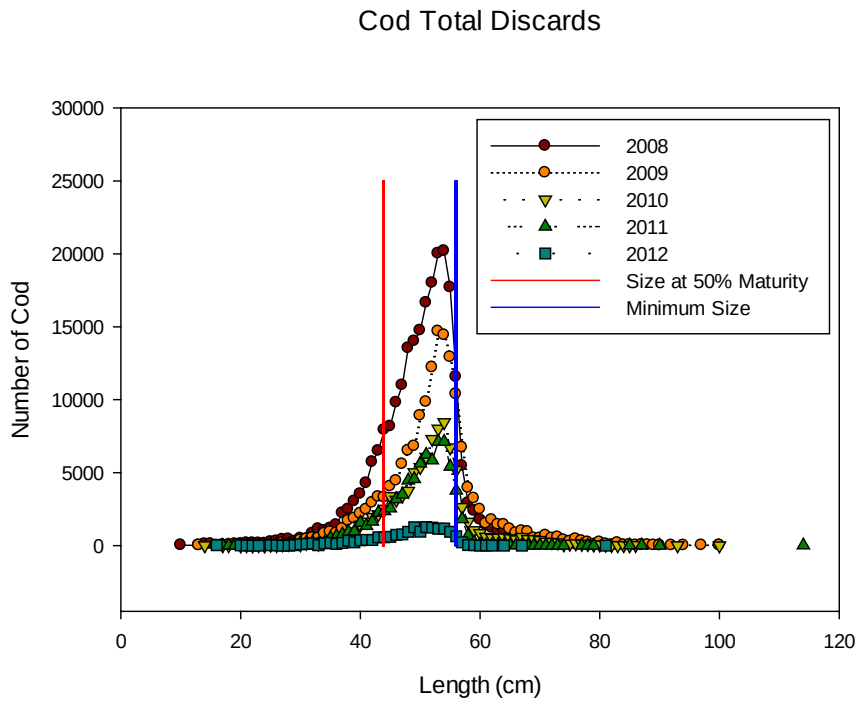

Figure 1: Total discards of cod from ASM and NEFOP data from 2008 – 2012.

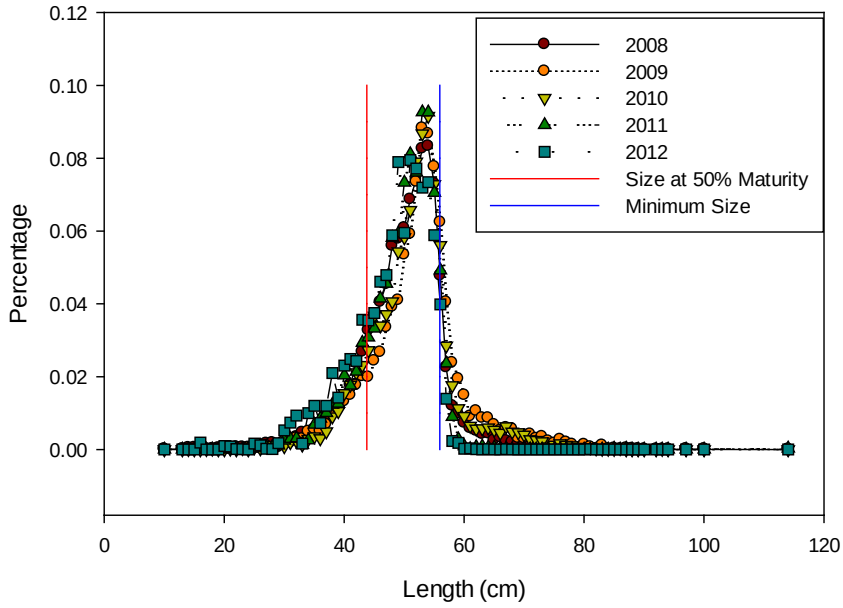

Figure 2: Proportional total discards of cod from ASM and NEFOP data from 2008 – 2012.

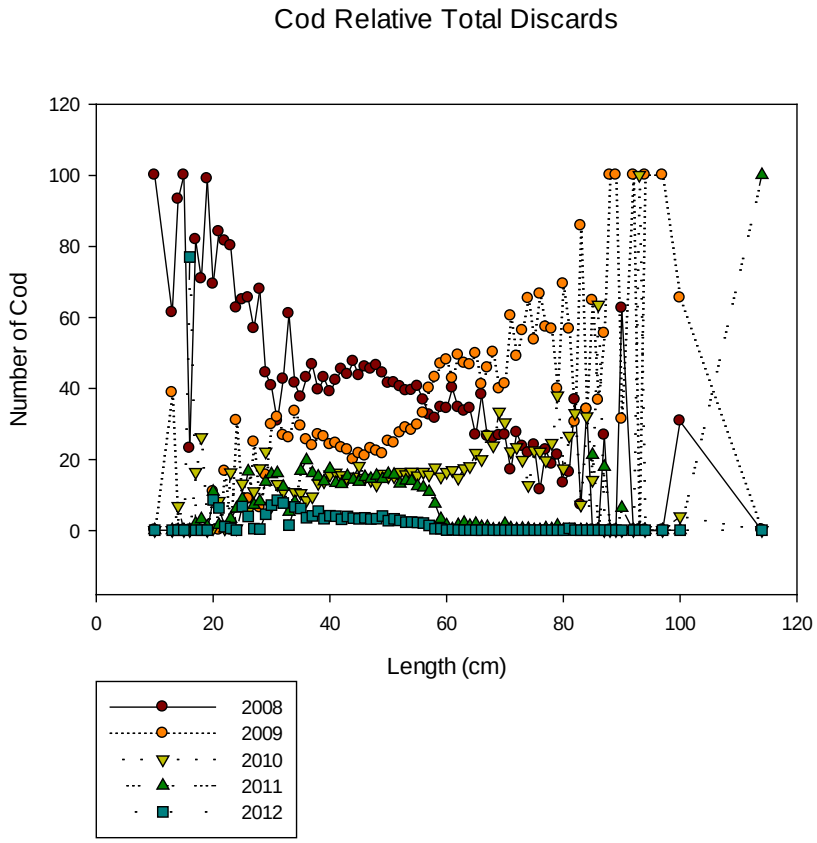

Figure 3: Relative total discards of cod expressed as a percentage of the total.

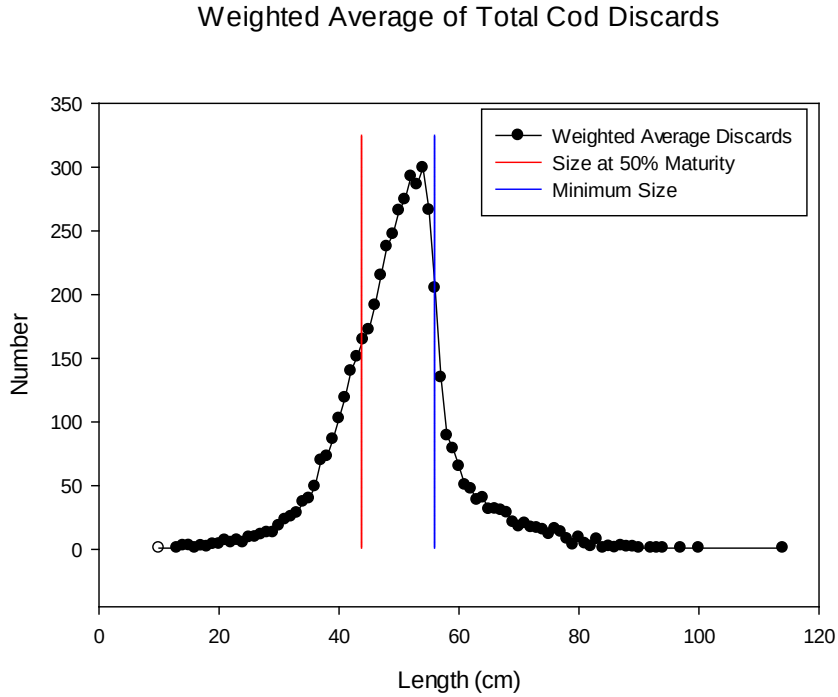

Figure 4: Weighted average total discards of cod.

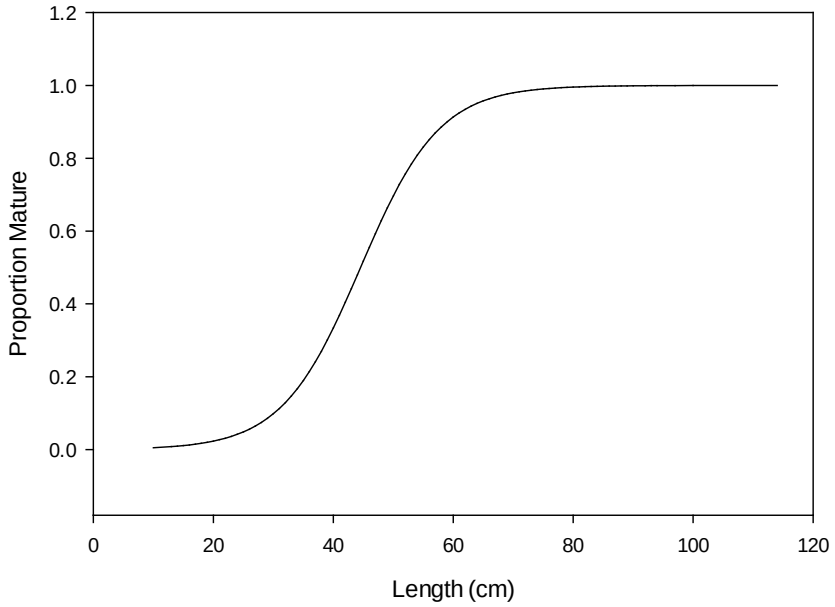

Figure 5: Maturity Ogive for Georges Bank cod.

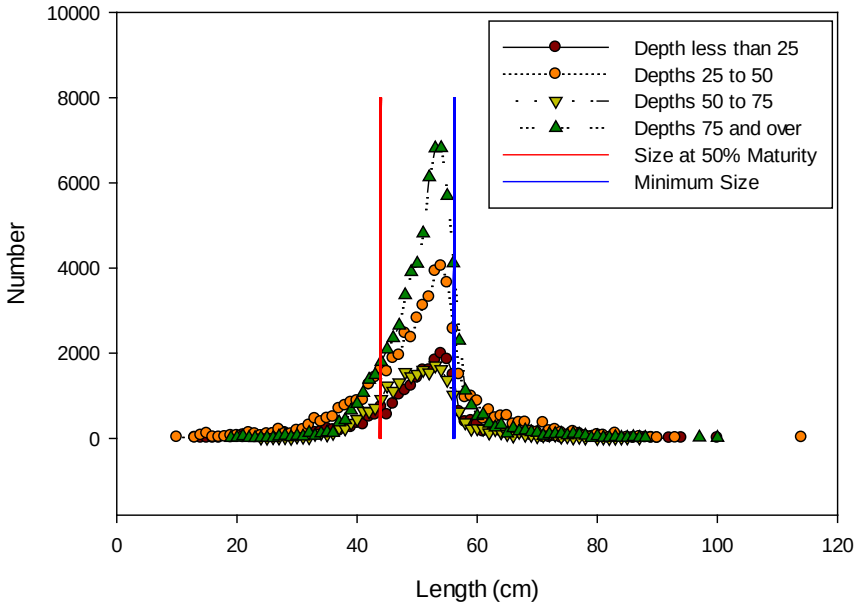

Figure 6: Observed cod discards by depth.

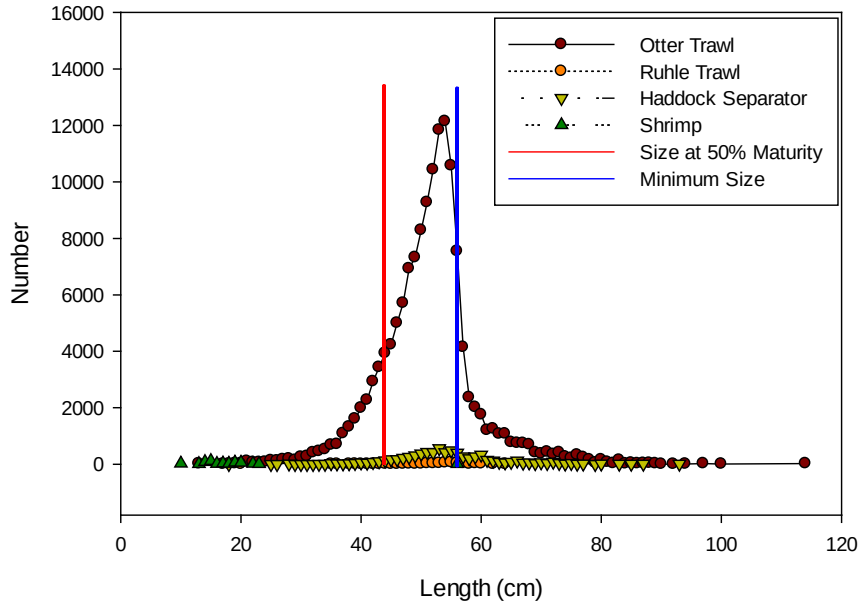

Figure 7: Observed cod discards by gear type.

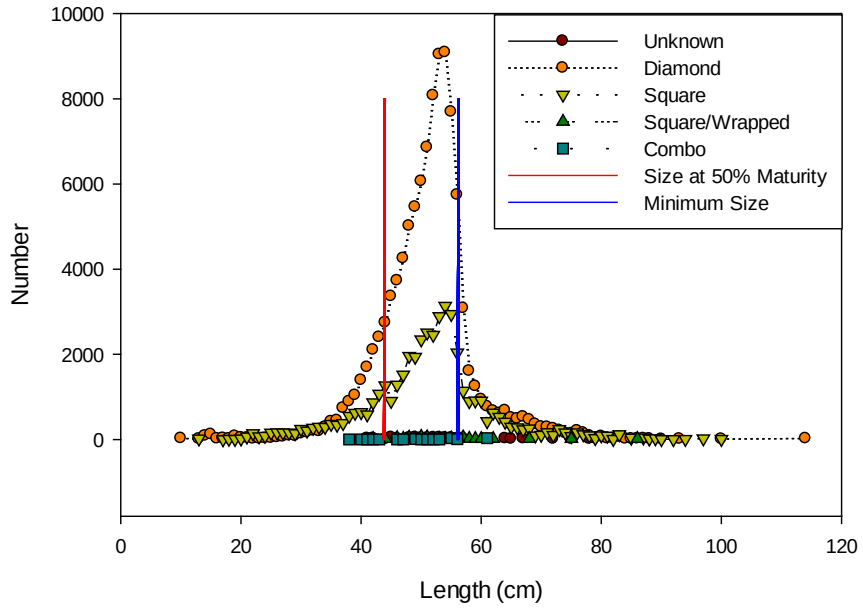

Figure 8: Observed cod discards by mesh shape.

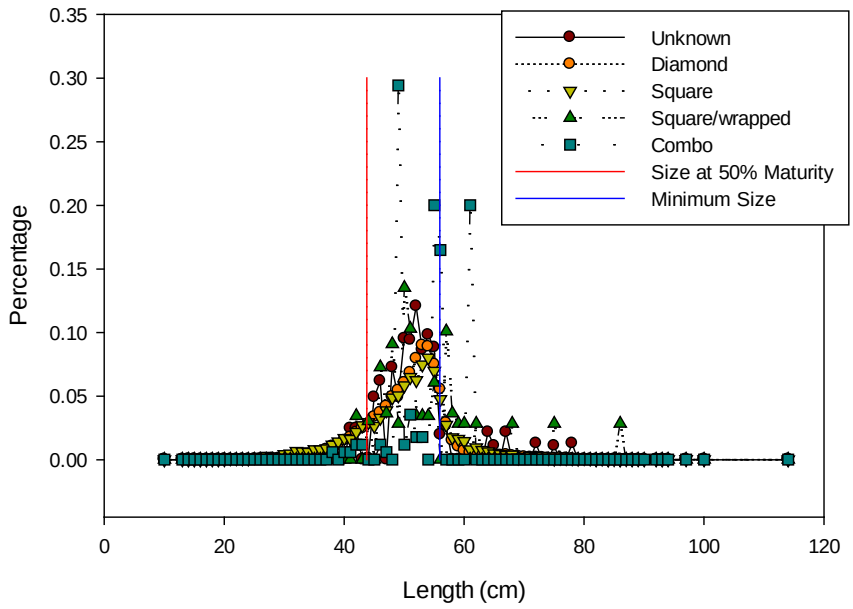

Figure 9: Proportional observed cod discards by mesh shape.

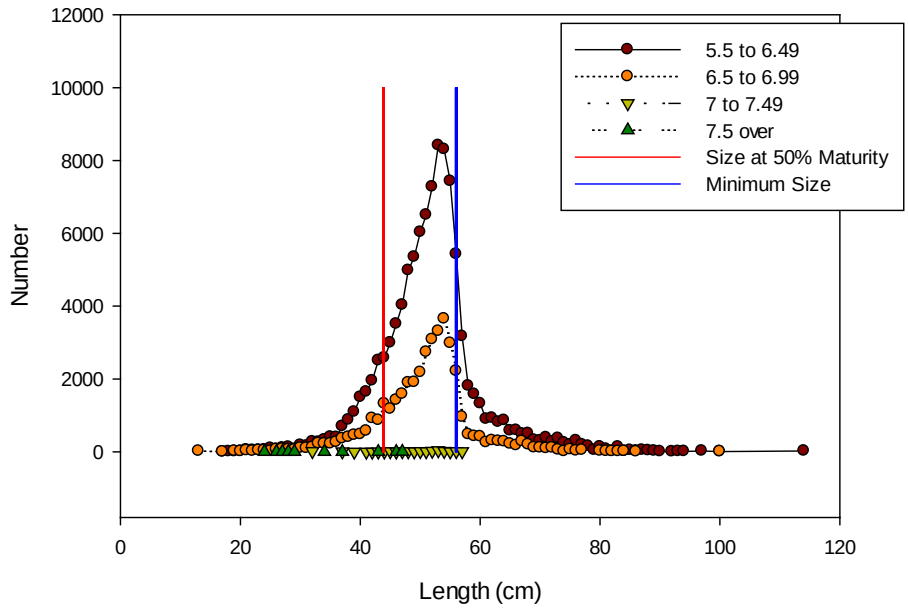

Figure 10: Observed cod discards by mesh size.

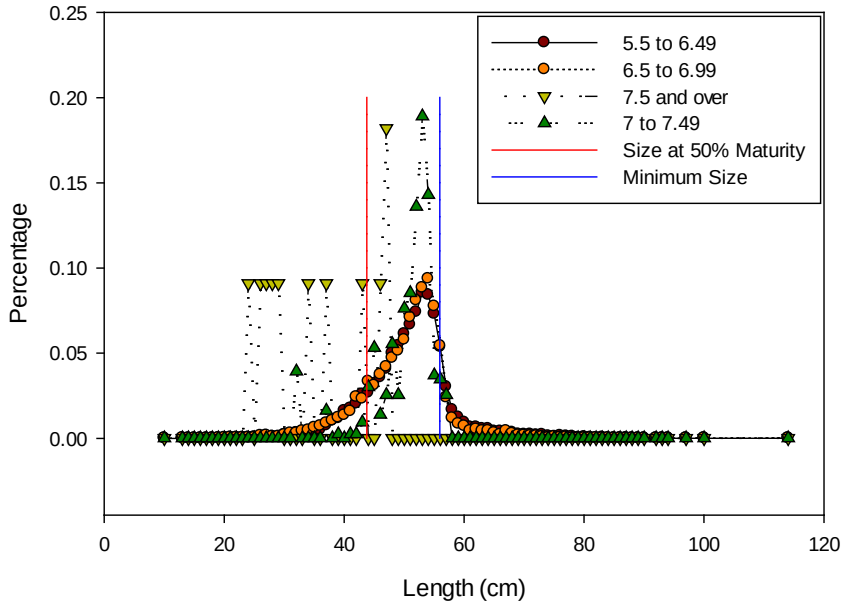

Figure 11: Proportional observed cod discards by mesh size.

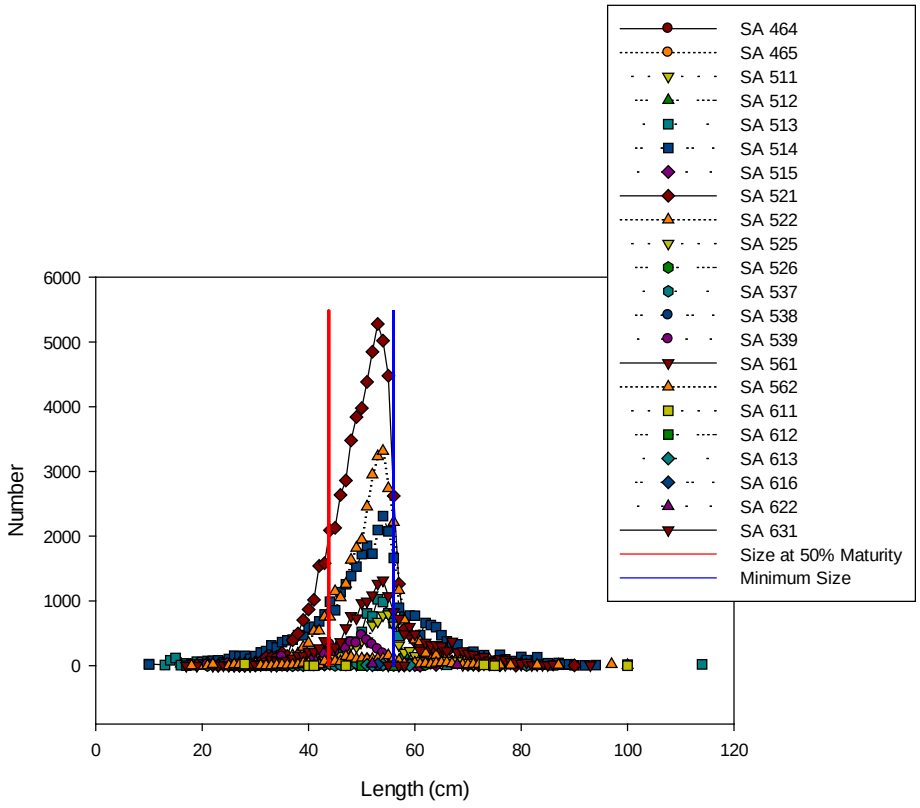

Figure 12: Observed cod discards by statistical area.

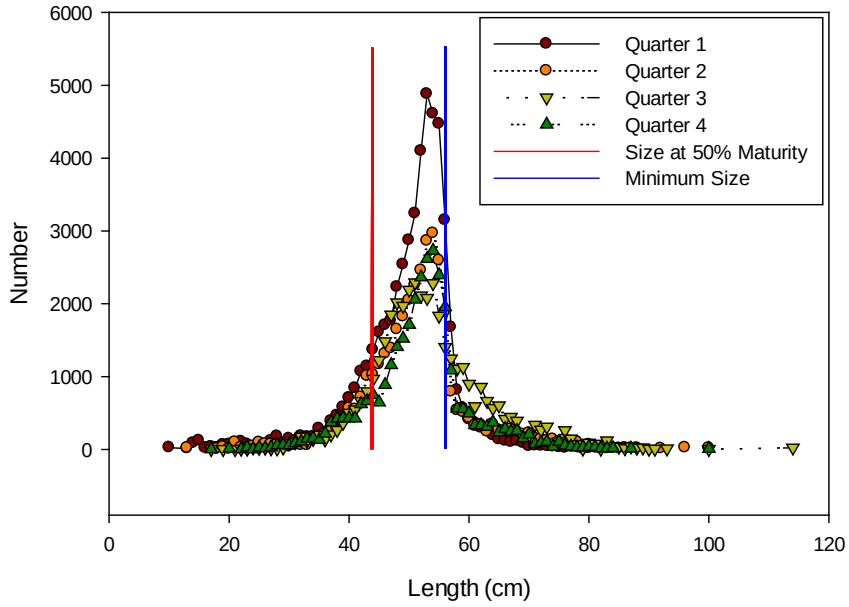

Figure 13: Observed cod discards by quarter.

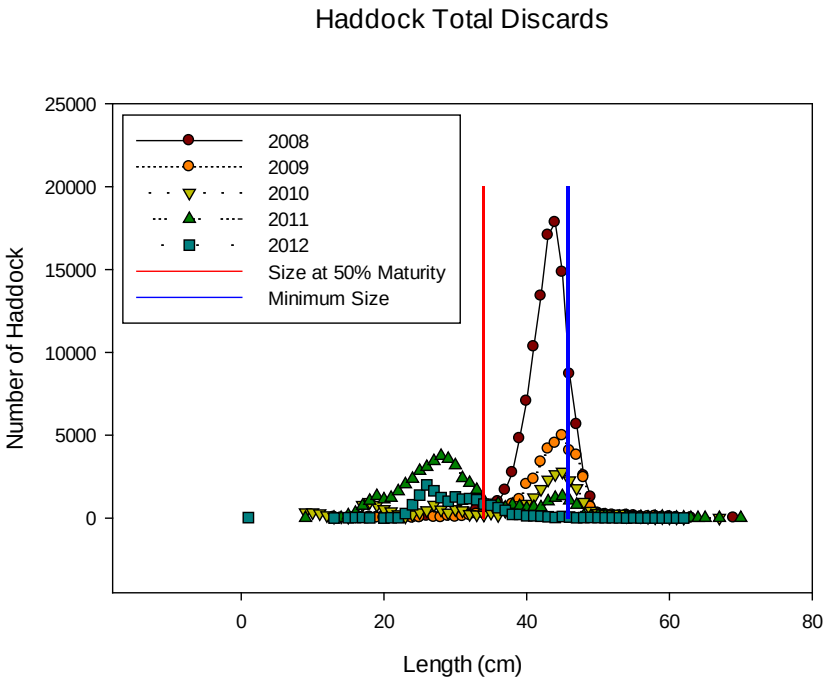

Figure 14: Total discards of haddock from ASM and NEFOP data from 2008 – 2012.

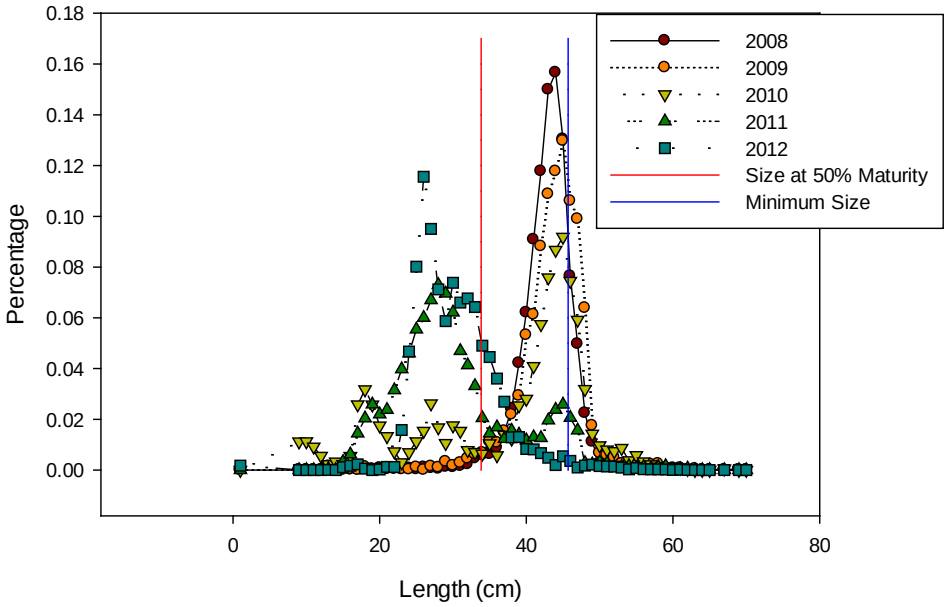

Figure 15: Proportional total discards of haddock from ASM and NEFOP data from 2008 – 2012.

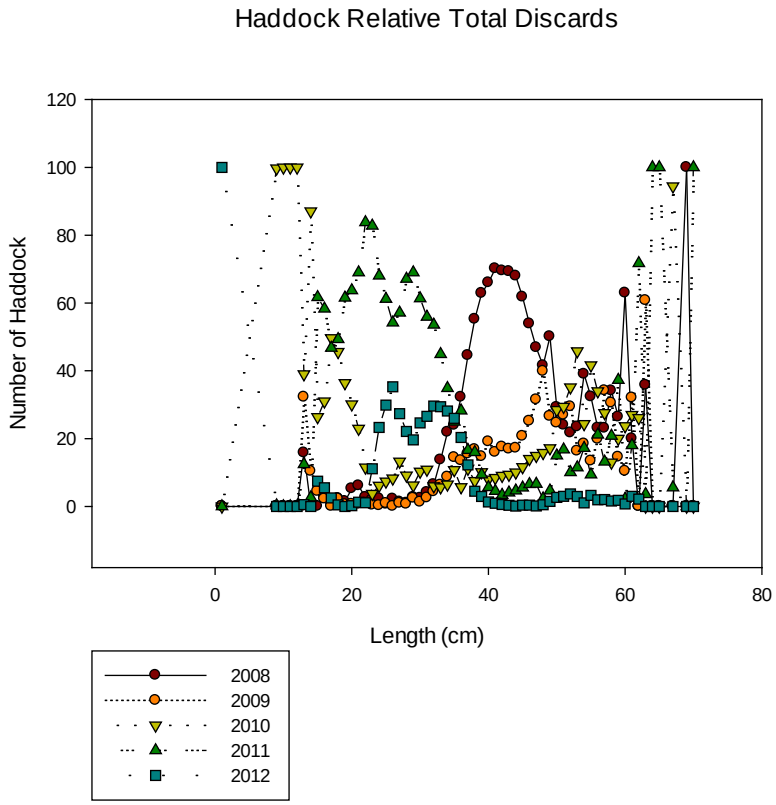

Figure 16: Relative total discards of haddock expressed as a percentage of the total.

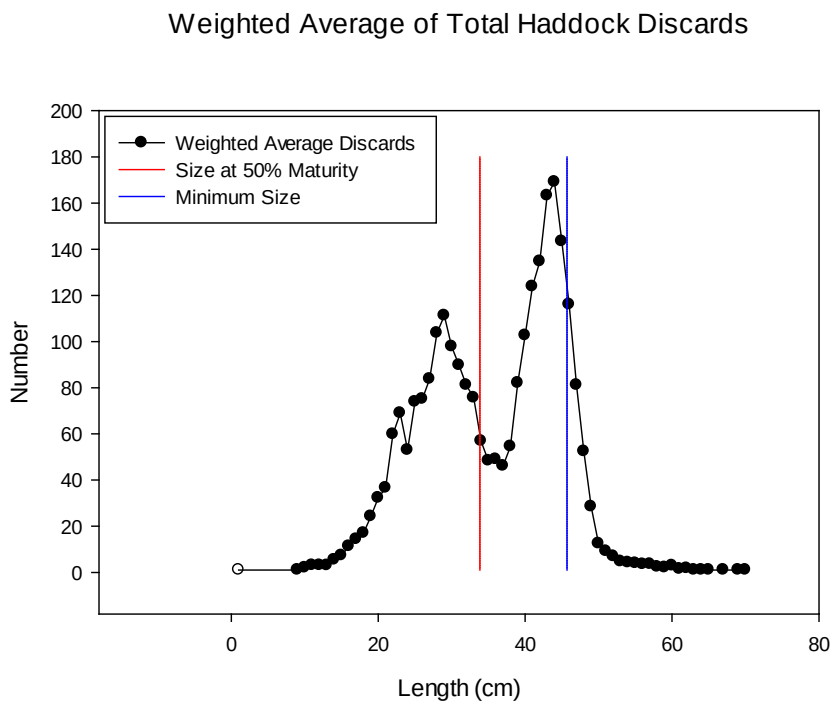

Figure 17: Weighted average total discards of haddock.

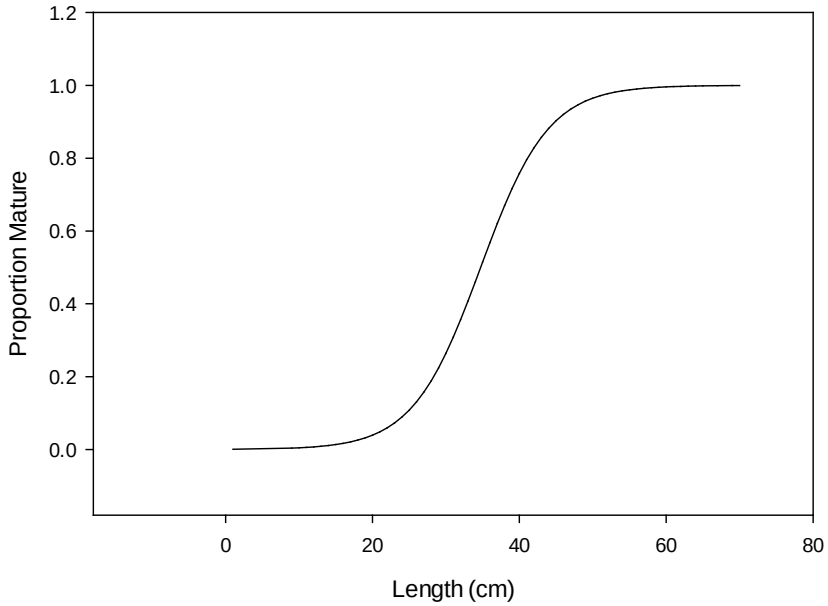

Figure 18: Maturity Ogive for Georges Bank Haddock.

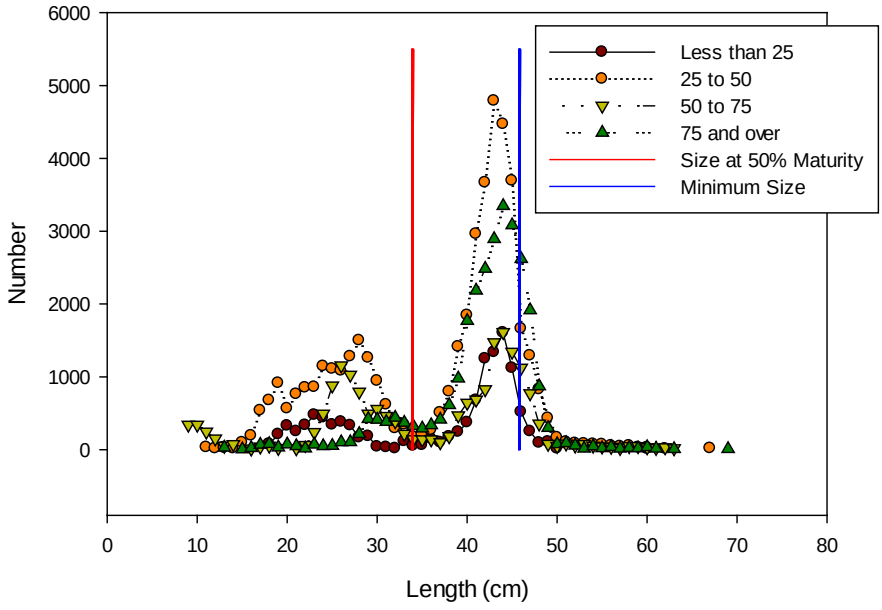

Figure 19: Observed haddock discards by depth.

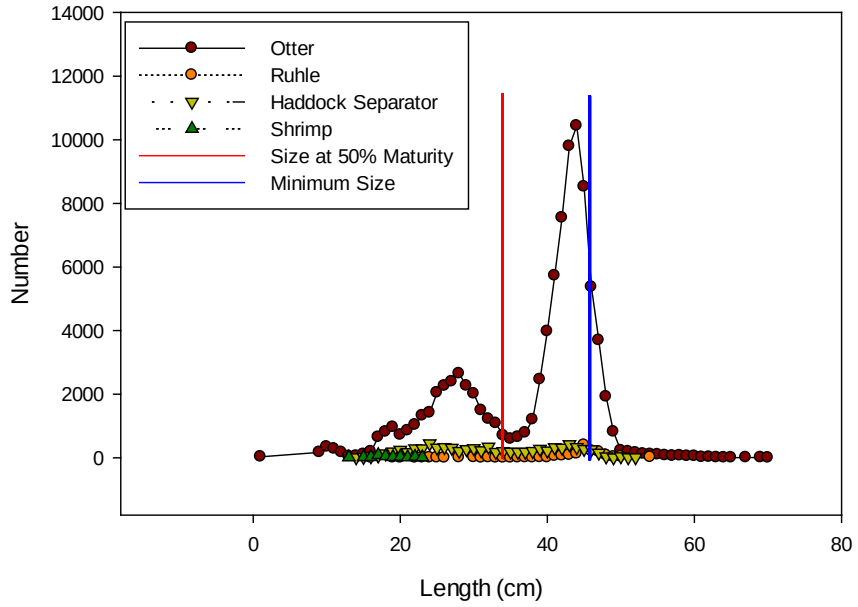

Figure 20: Observed haddock discards by gear type.

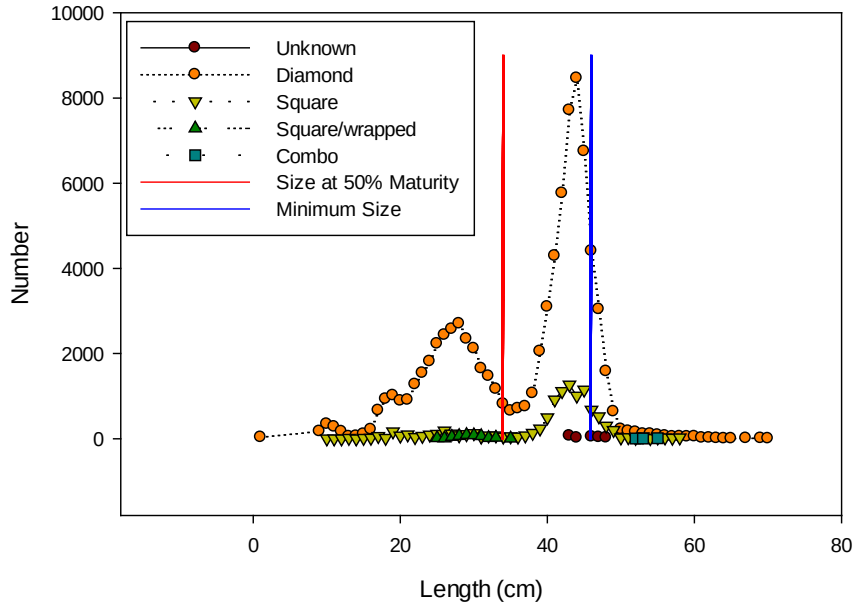

Figure 21: Observed haddock discards by mesh shape.

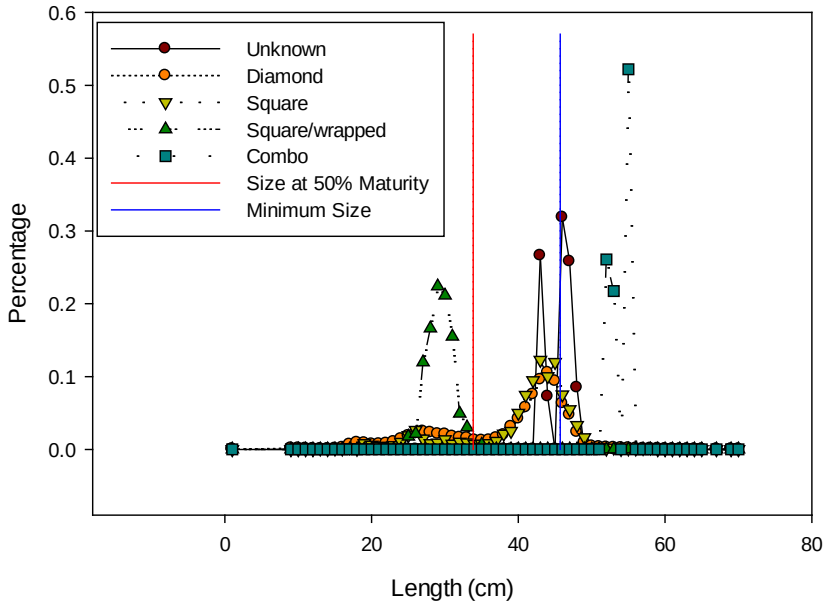

Figure 22: Proportional observed haddock discards by mesh shape.

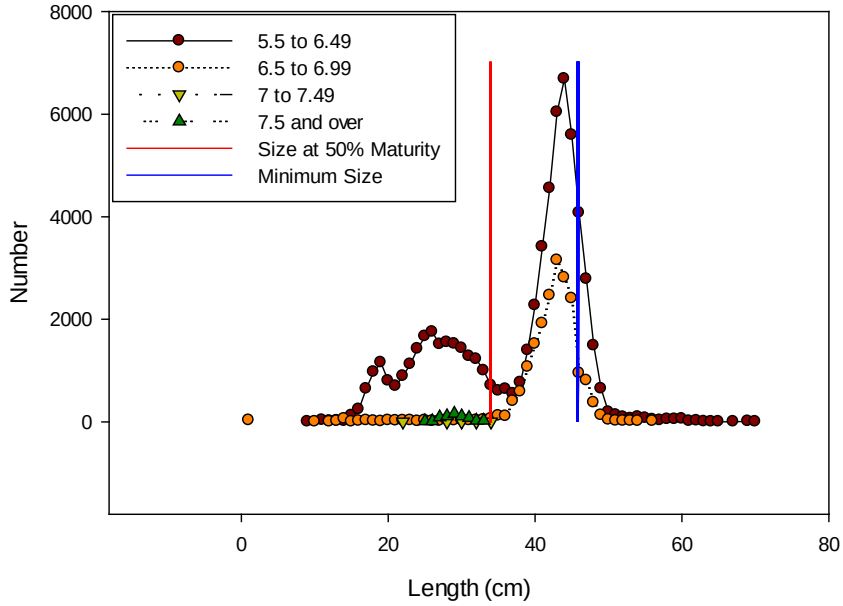

Figure 23: Observed haddock discards by mesh size.

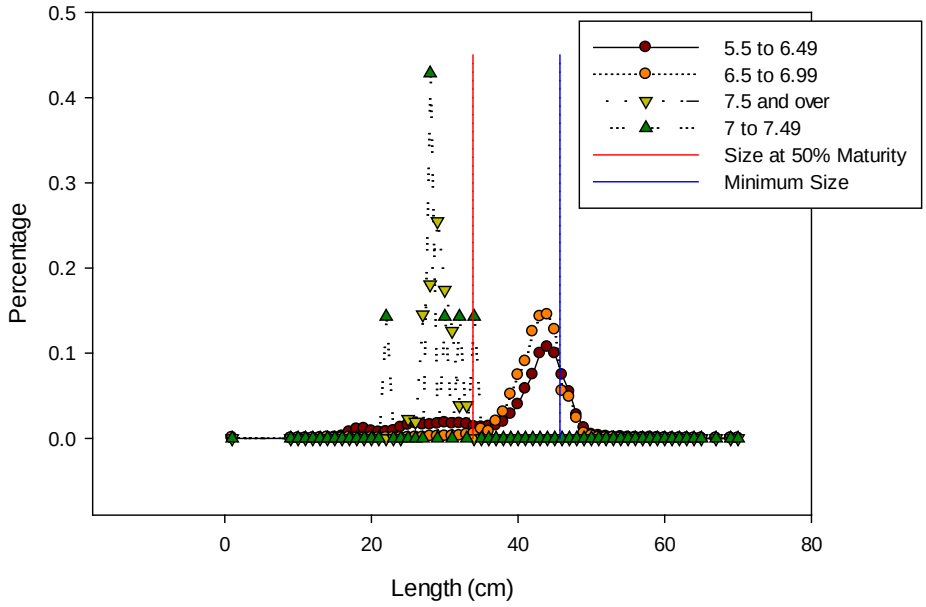

Figure 24: Proportional observed haddock discards by mesh size.

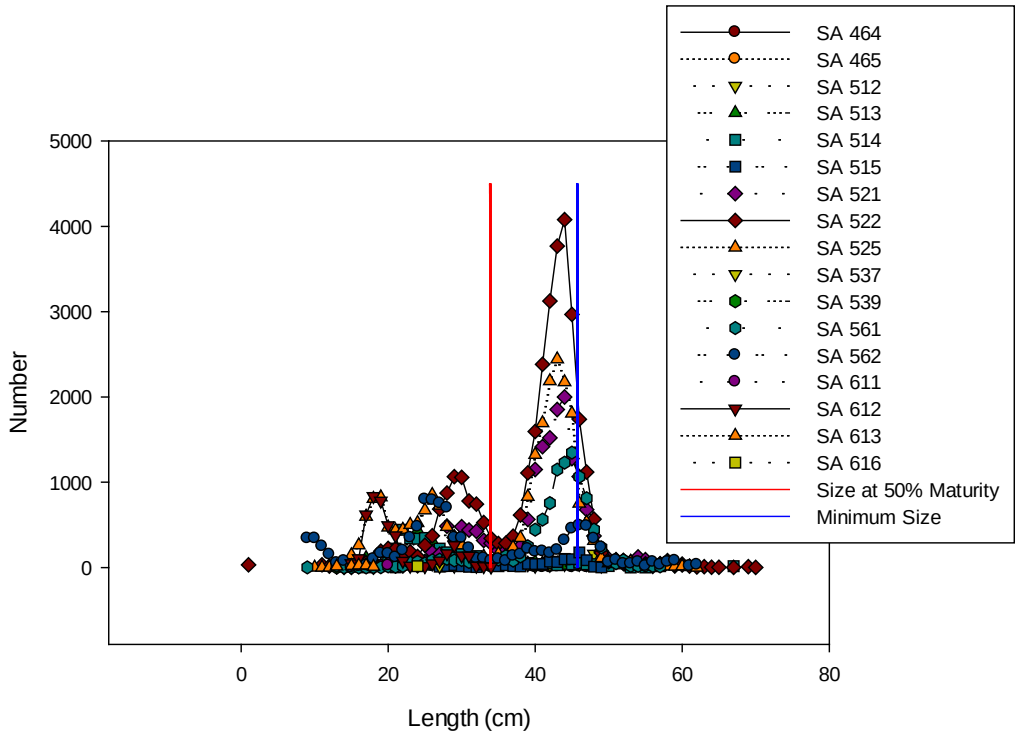

Figure 25: Observed haddock discards by statistical area.

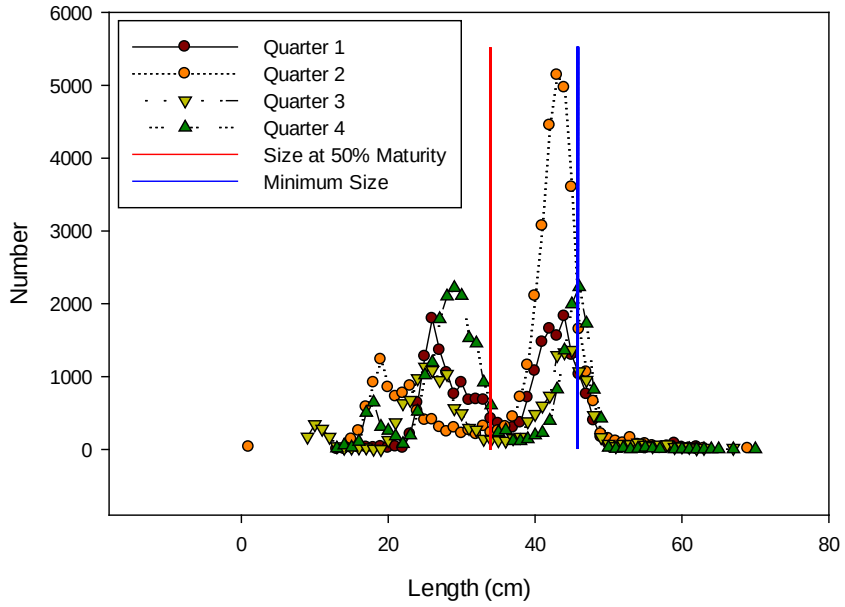

Figure 26: Observed haddock discards by quarter.

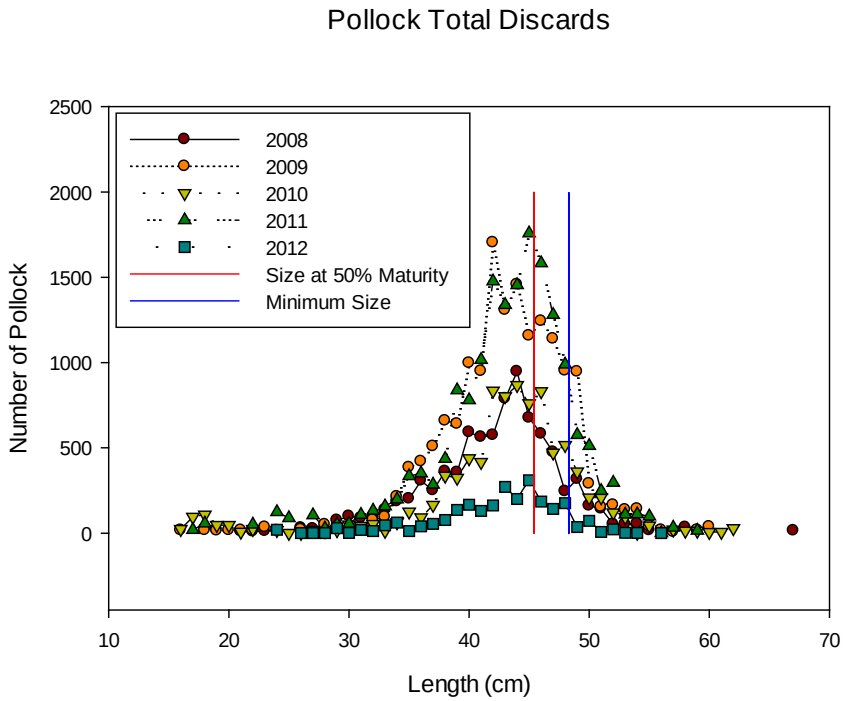

Figure 27: Total discards of pollock from ASM and NEFOP data from 2008 – 2012.

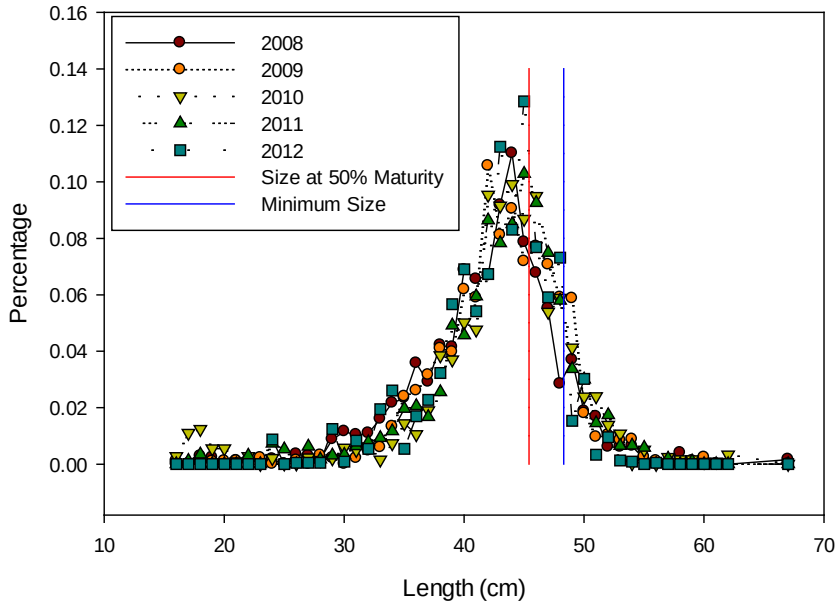

Figure 28: Proportional total discards of pollock from ASM and NEFOP data from 2008 – 2012.

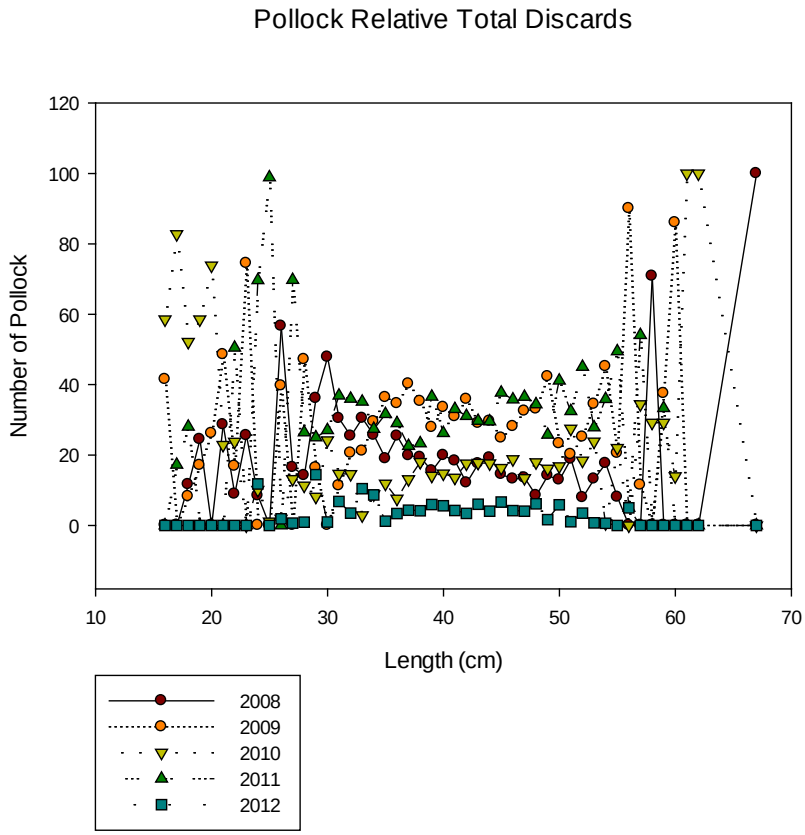

Figure 29: Relative total discards of pollock expressed as a percentage of the total.

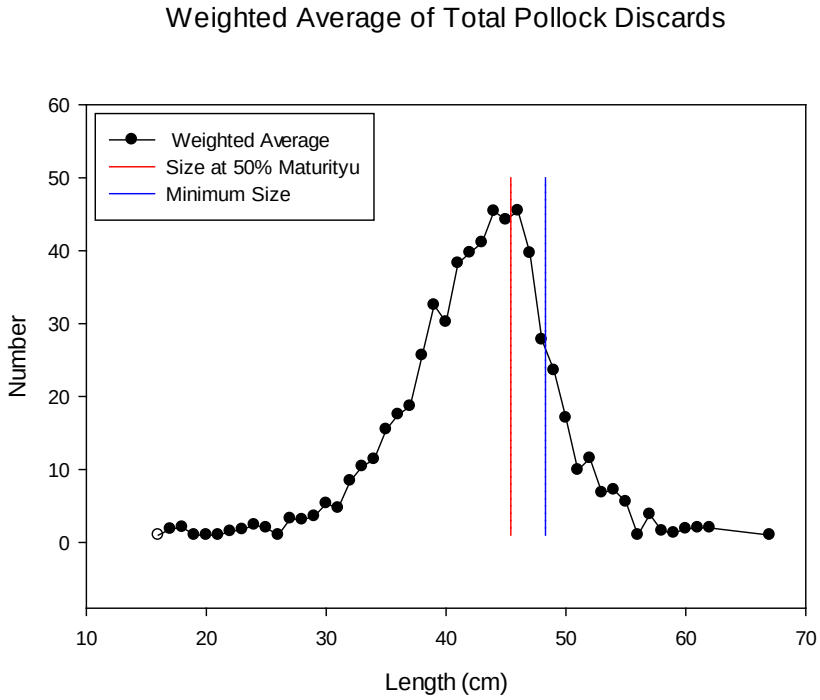

Figure 30: Weighted average total discards of pollock.

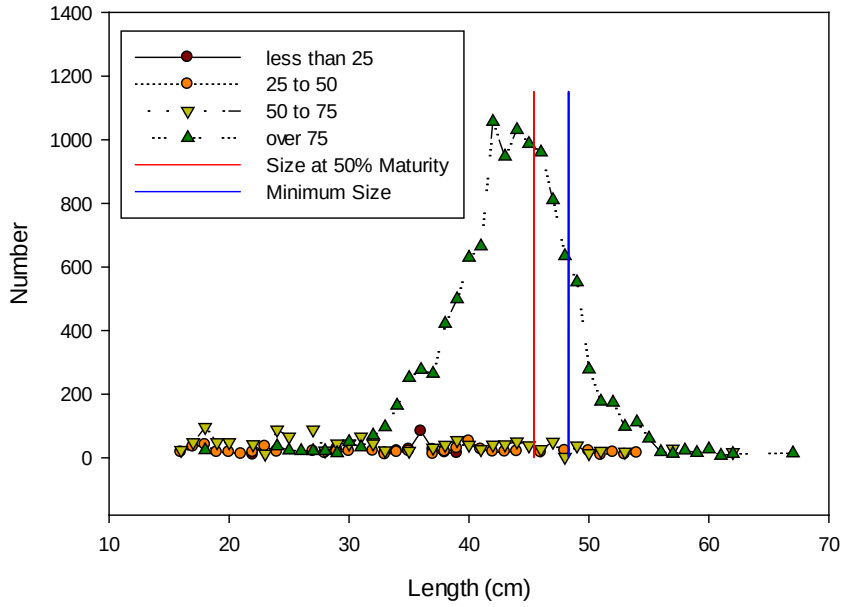

Figure 31: Observed pollock discards by depth.

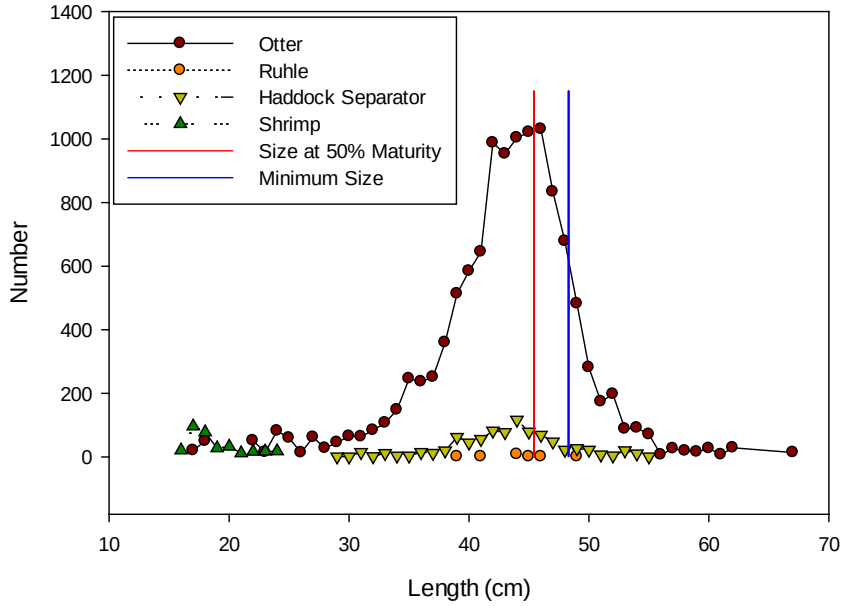

Figure 32: Observed pollock discards by gear type.

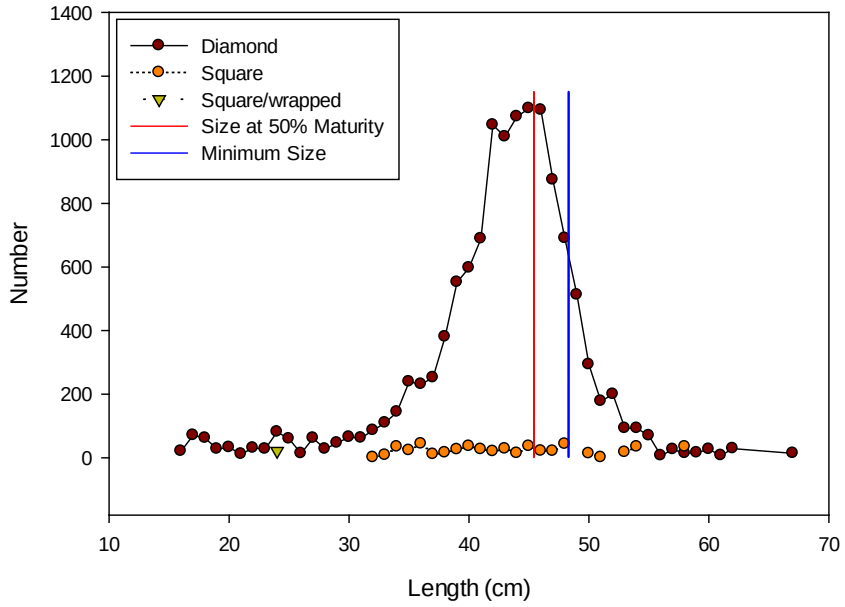

Figure 33: Observed pollock discards by mesh shape.

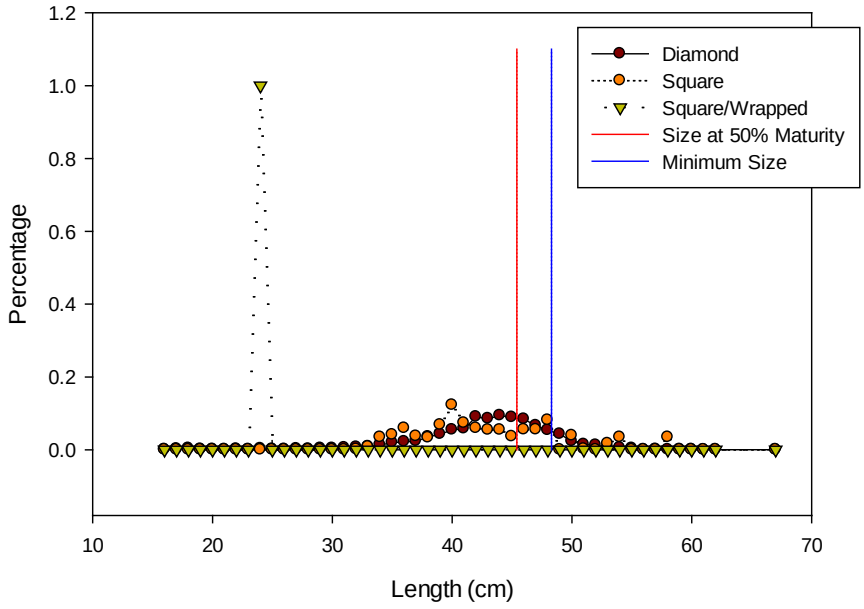

Figure 34: Proportional observed pollock discards by mesh shape.

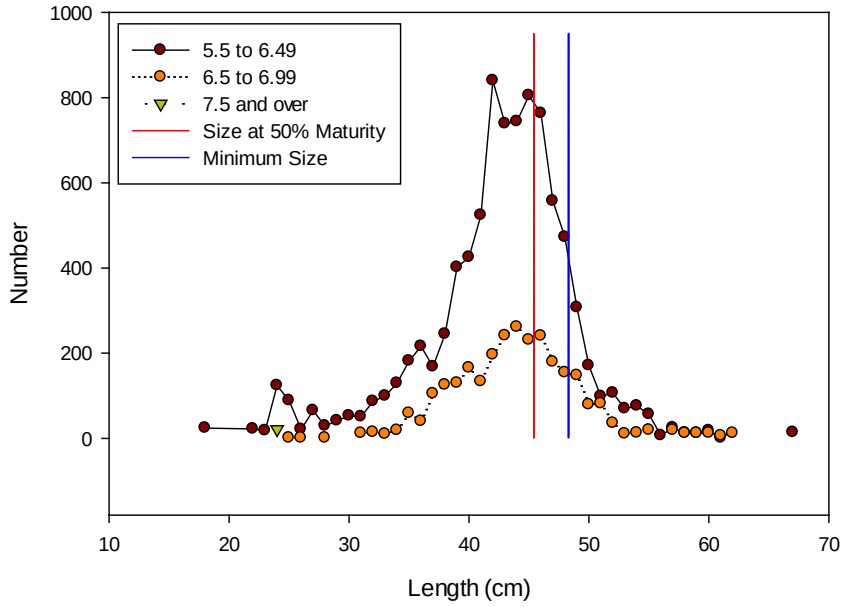

Figure 35: Observed pollock discards by mesh size.

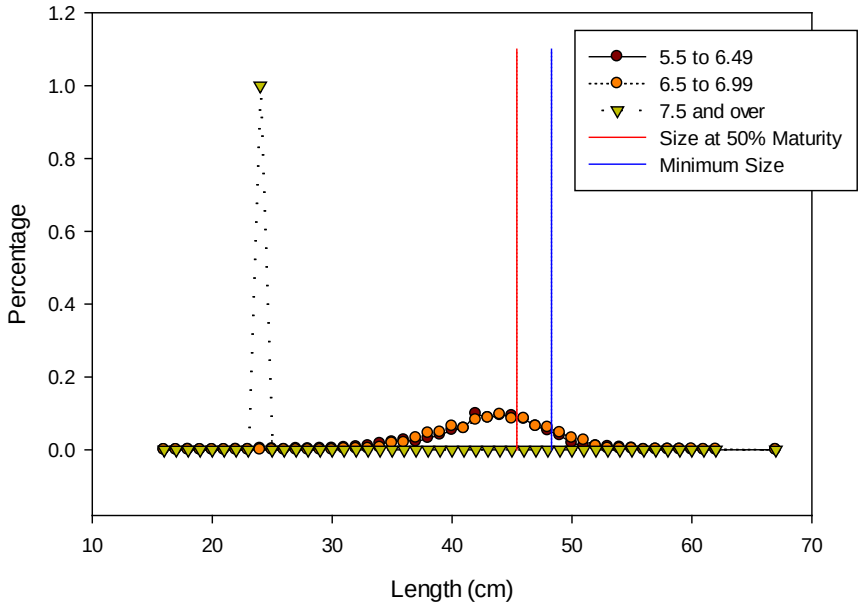

Figure 36: Proportional observed pollock discards by mesh size.

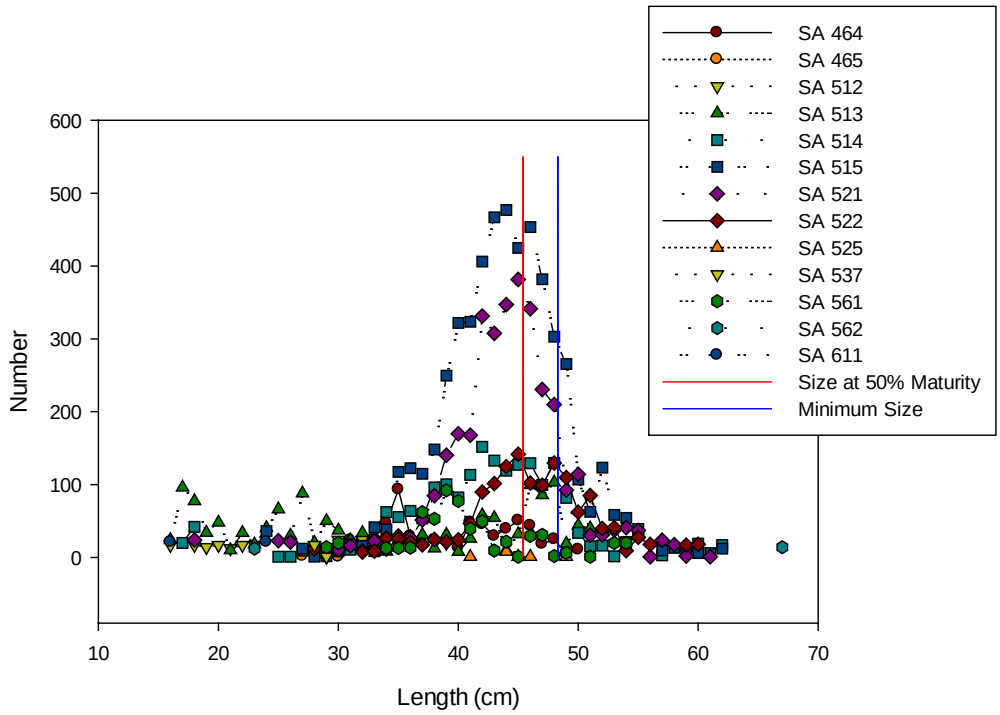

Figure 37: Observed pollock discards by statistical area.

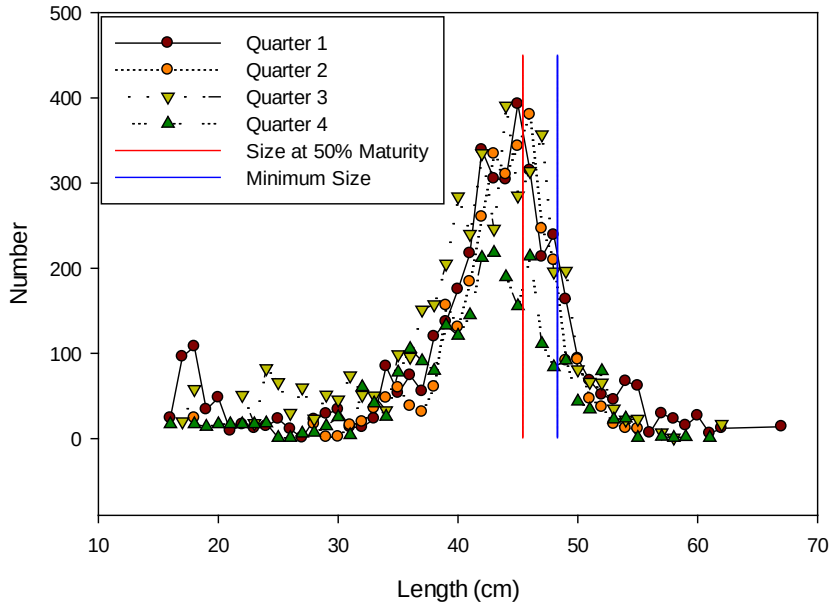

Figure 38: Observed pollock discards by quarter.

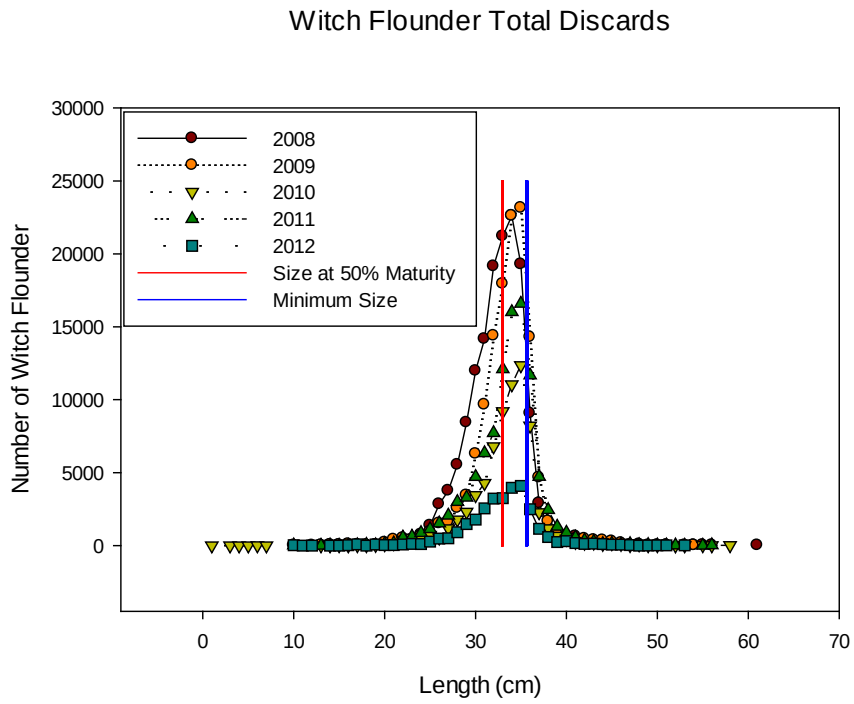

Figure 39: Total discards of witch flounder from ASM and NEFOP data from 2008 – 2012.

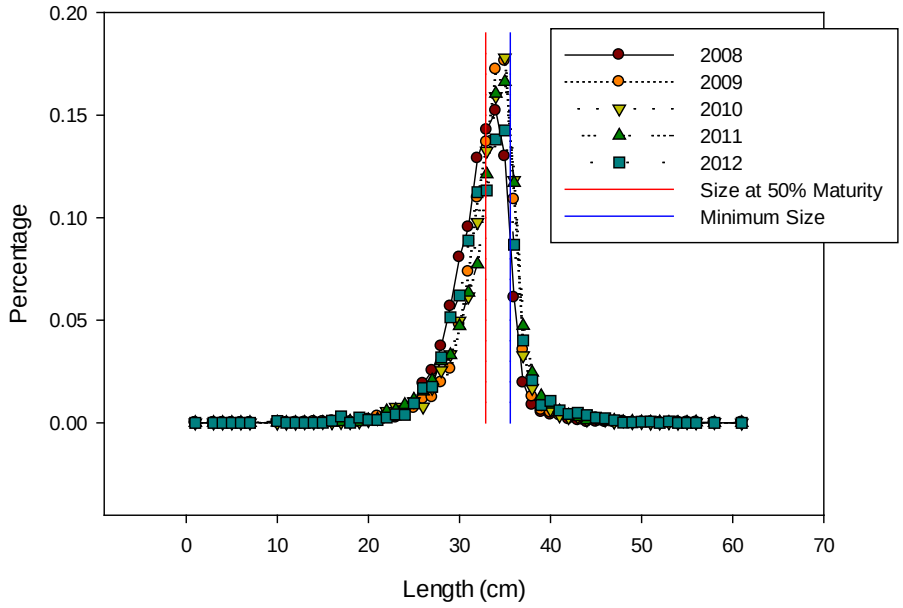

Figure 40: Proportional total discards of witch flounder from ASM and NEFOP data from 2008 – 2012.

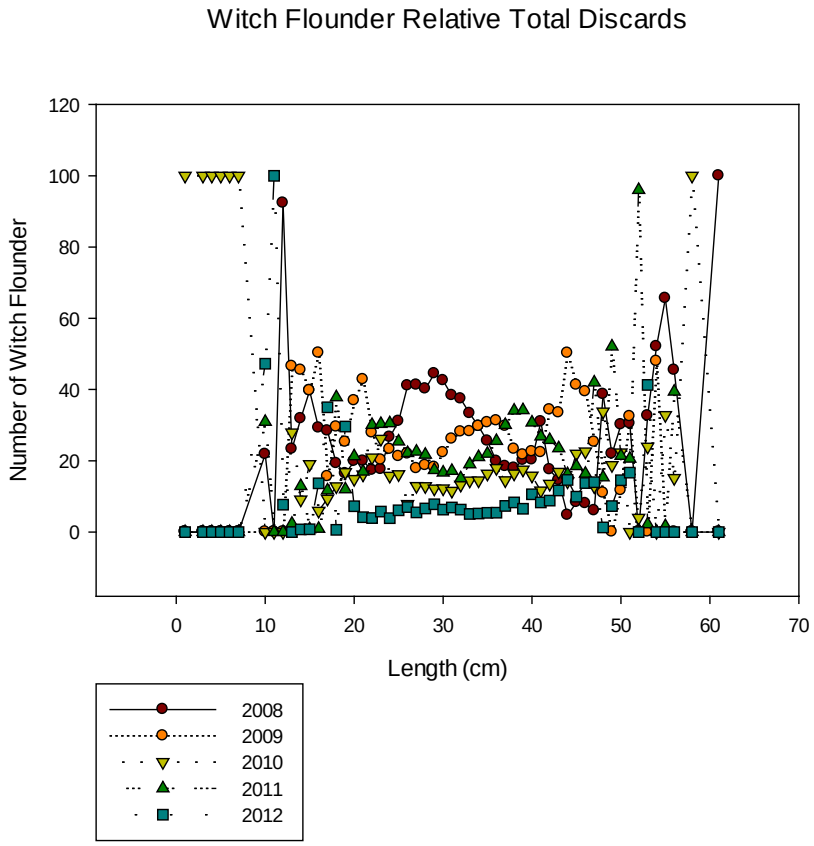

Figure 41: Relative total discards of witch flounder expressed as a percentage of the total.

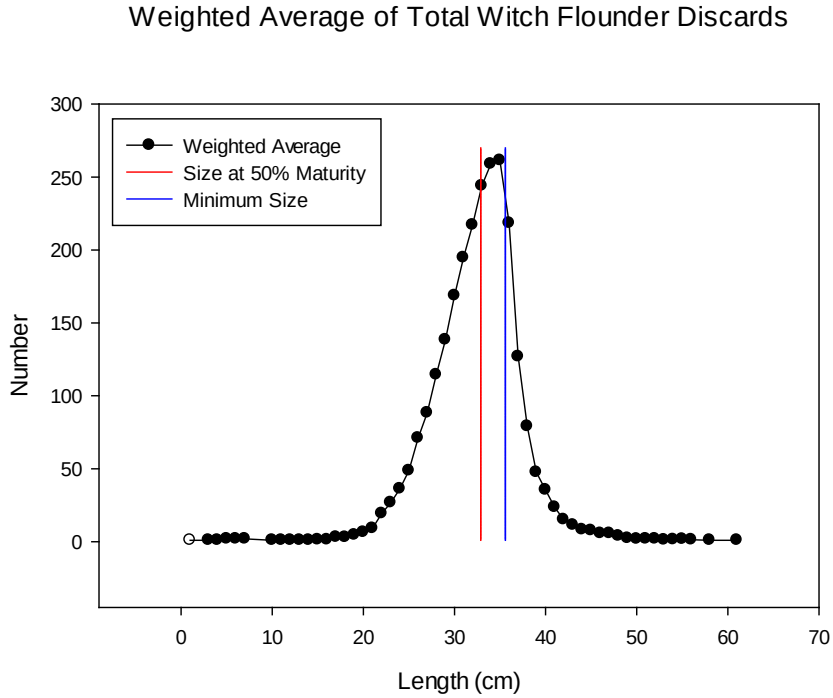

Figure 42: Weighted average total discards of witch flounder.

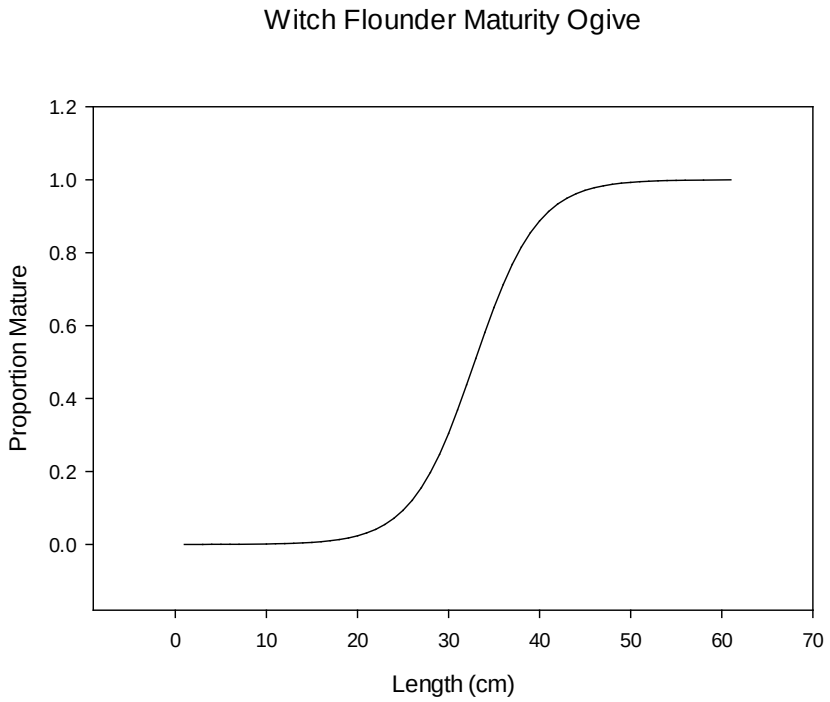

Figure 43: Maturity Ogive for witch flounder.

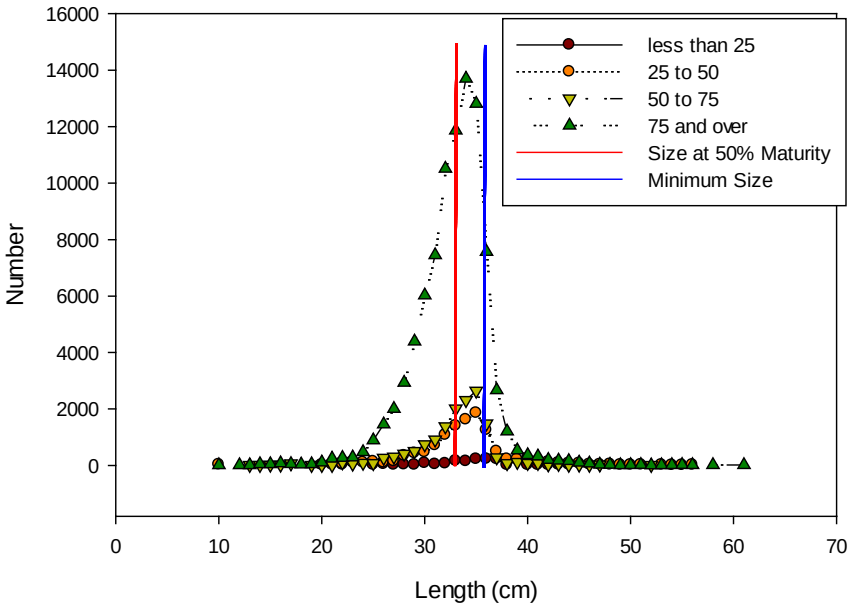

Figure 44: Observed witch flounder discards by depth.

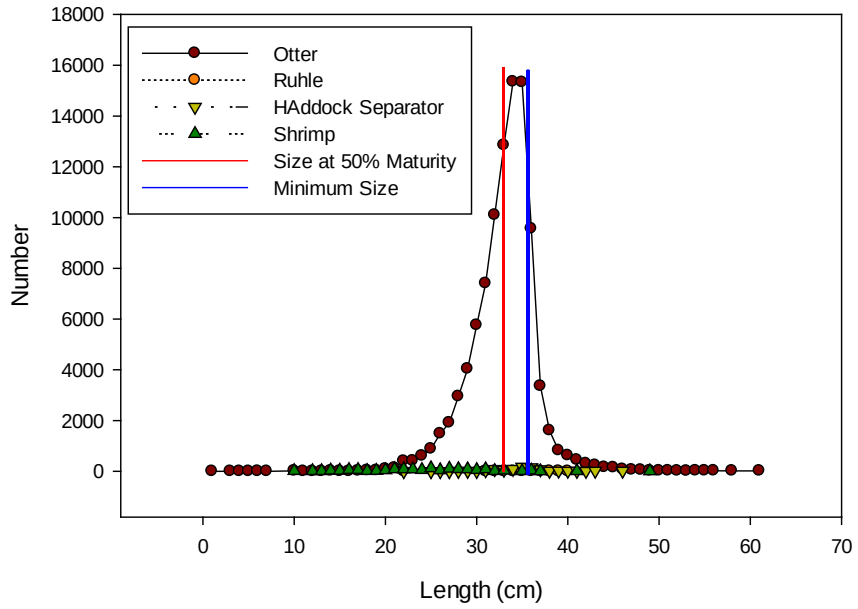

Figure 45: Observed witch flounder discards by gear type.

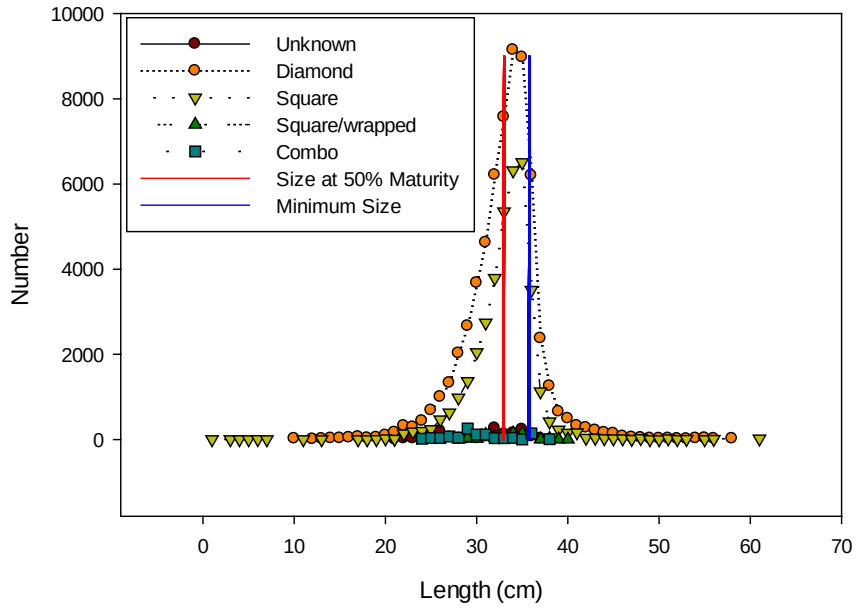

Figure 46: Observed witch flounder discards by mesh shape.

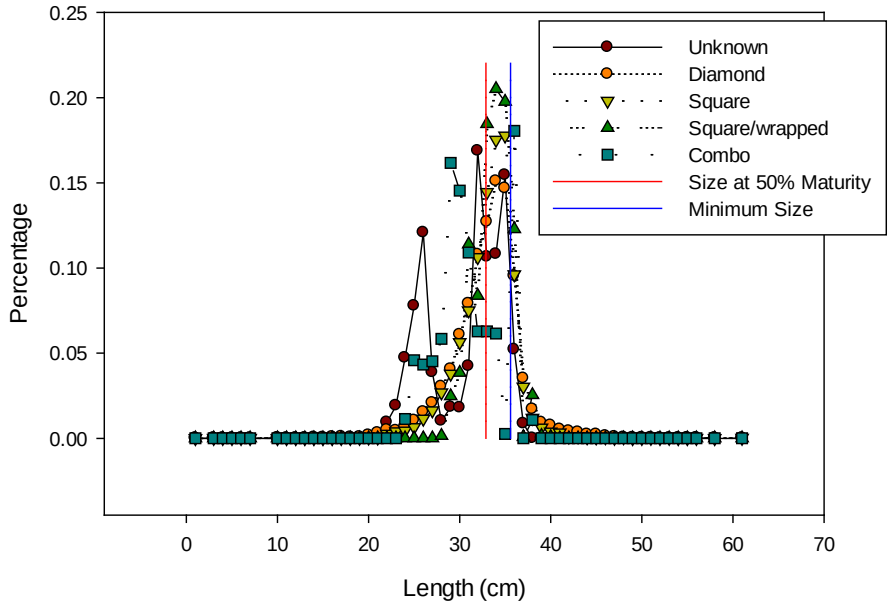

Figure 47: Proportional observed witch flounder discards by mesh shape.

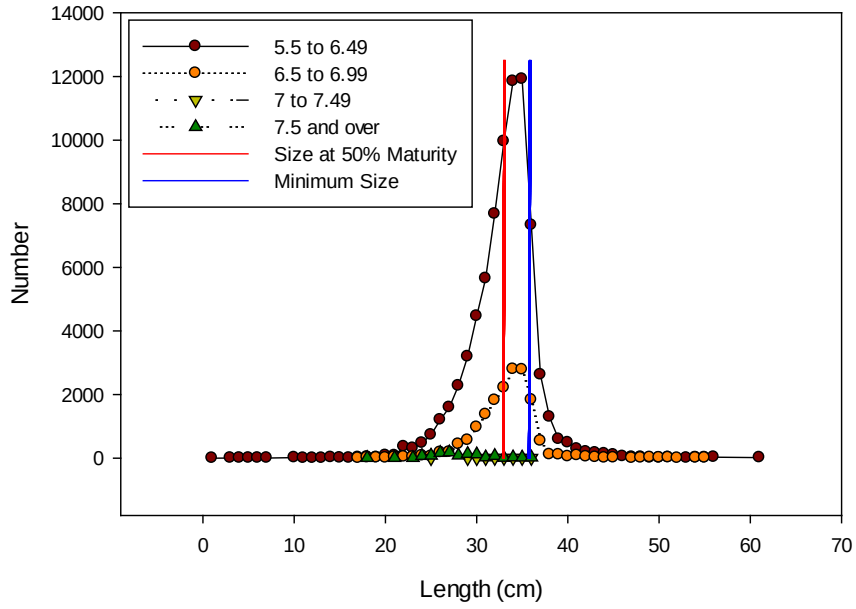

Figure 48: Observed witch flounder discards by mesh size.

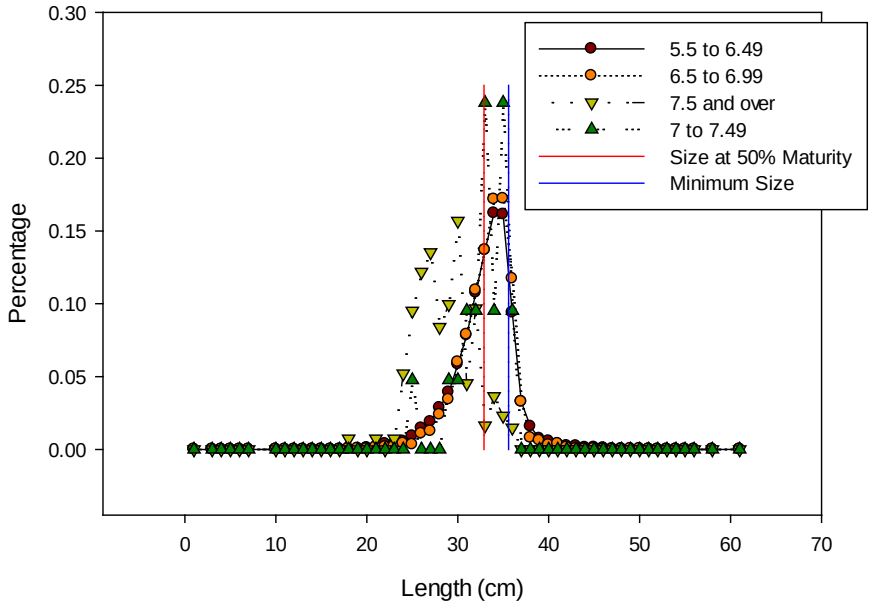

Figure 49: Proportional observed witch flounder discards by mesh size.

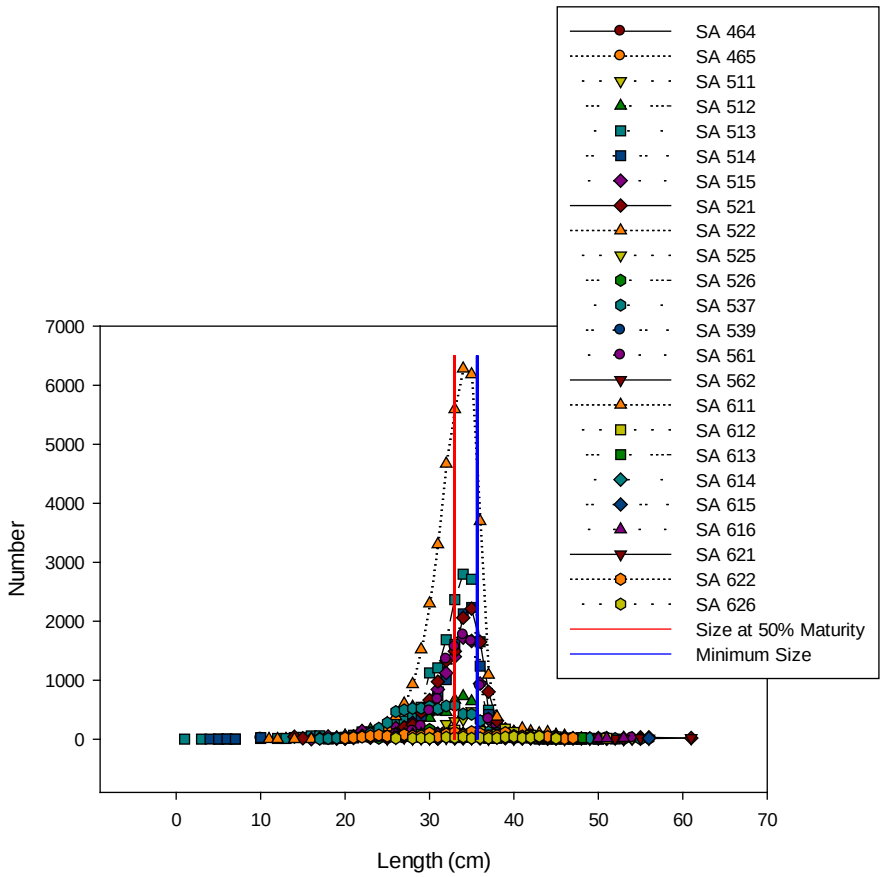

Figure 50: Observed witch flounder discards by statistical area.

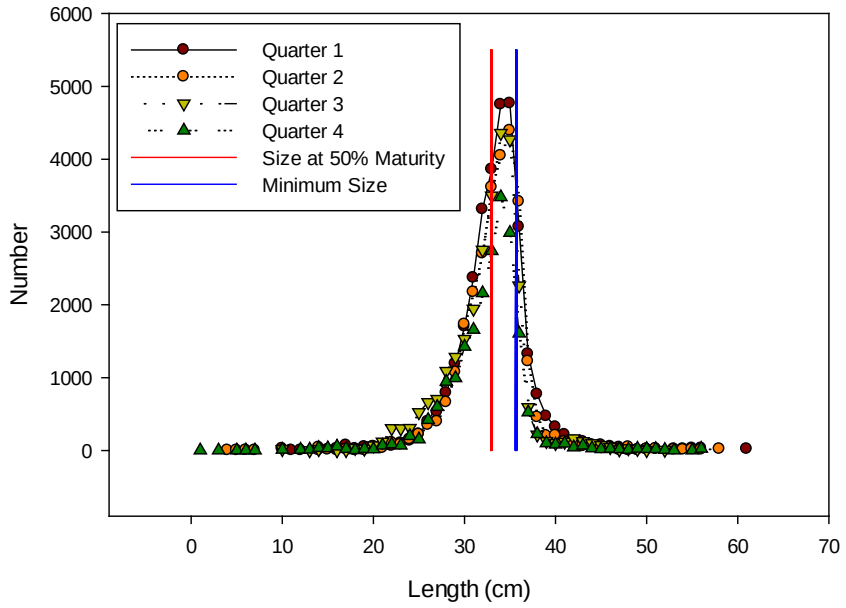

Figure 51: Observed witch flounder discards by quarter.

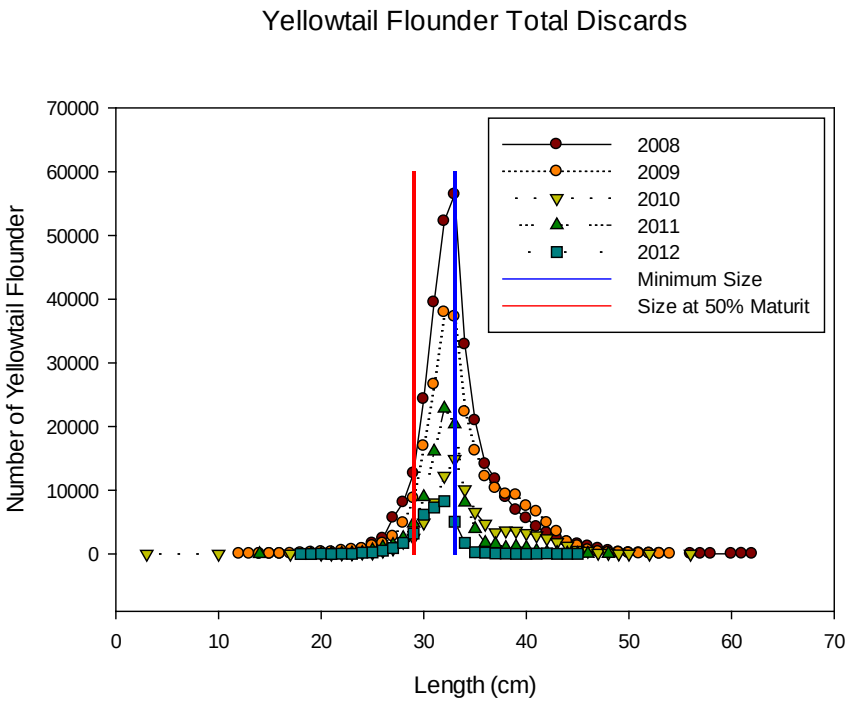

Figure 52: Total discards of yellowtail flounder from ASM and NEFOP data from 2008 – 2012.

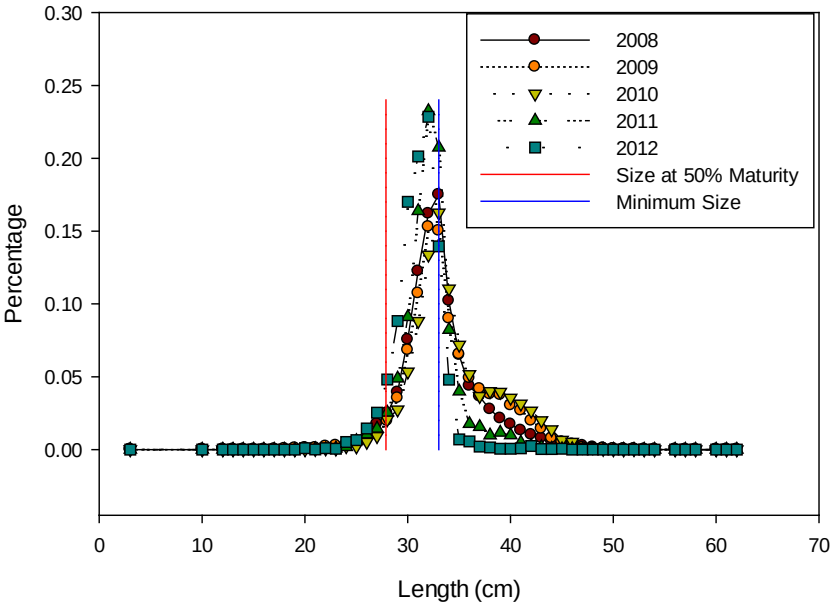

Figure 53: Proportional discards of yellowtail flounder from ASM and NEFOP data from 2008 – 2012.

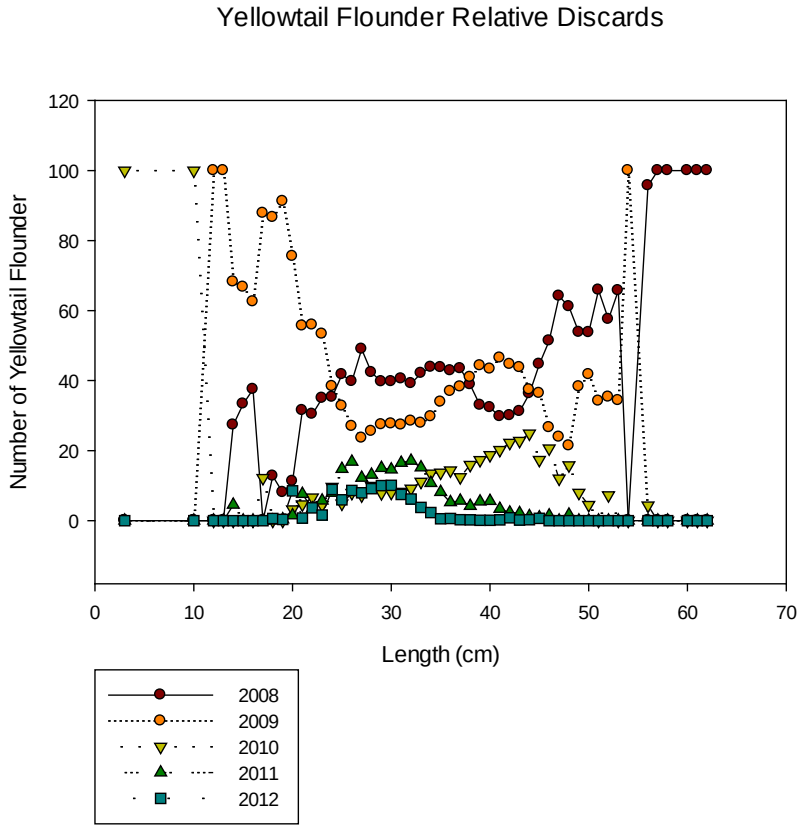

Figure 54: Relative total discards of yellowtail flounder expressed as a percentage of the total.

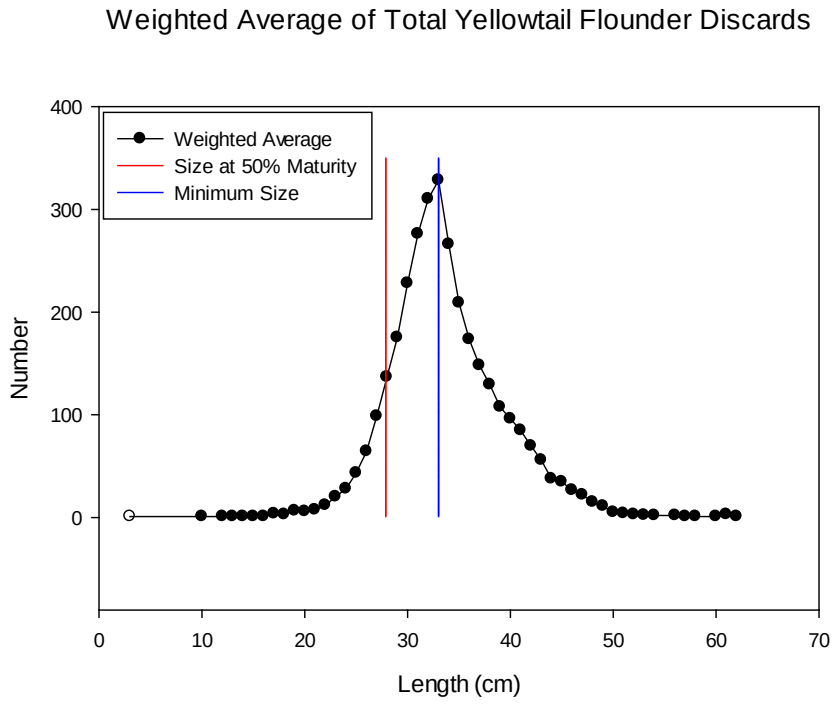

Figure 55: Weighted average total discards of yellowtail flounder.

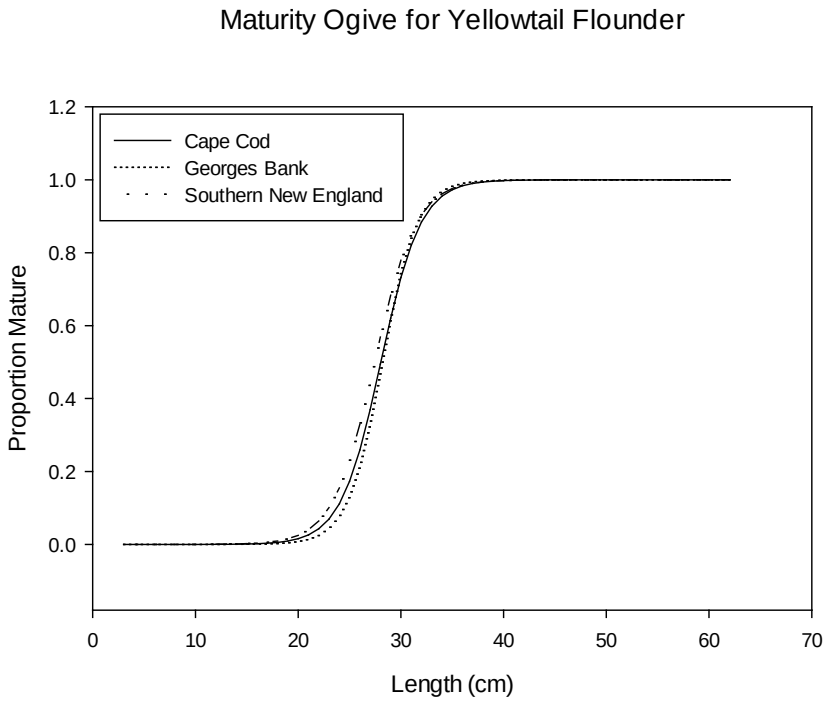

Figure 56: Maturity Ogive for Cape Cod, Georges Bank and Southern New England yellowtail flounder.

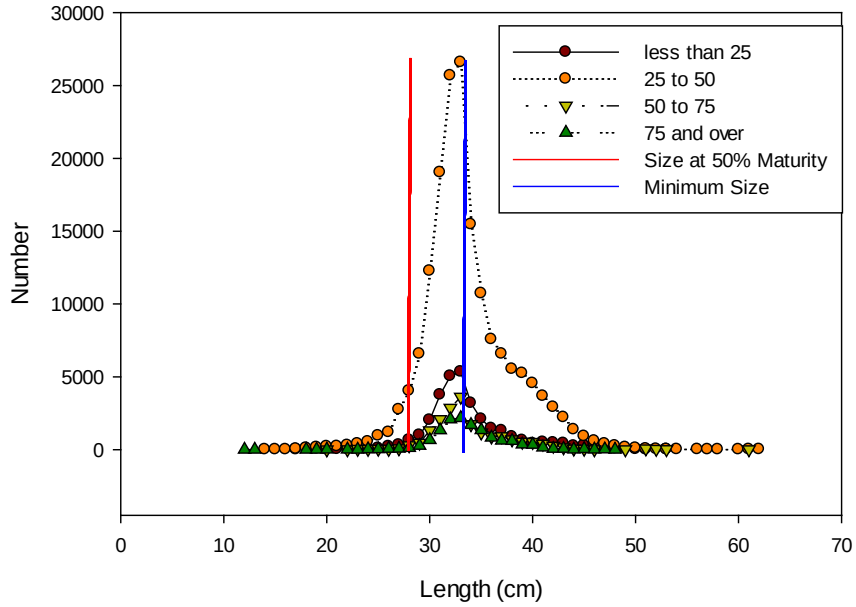

Figure 57: Observed yellowtail flounder discards by depth.

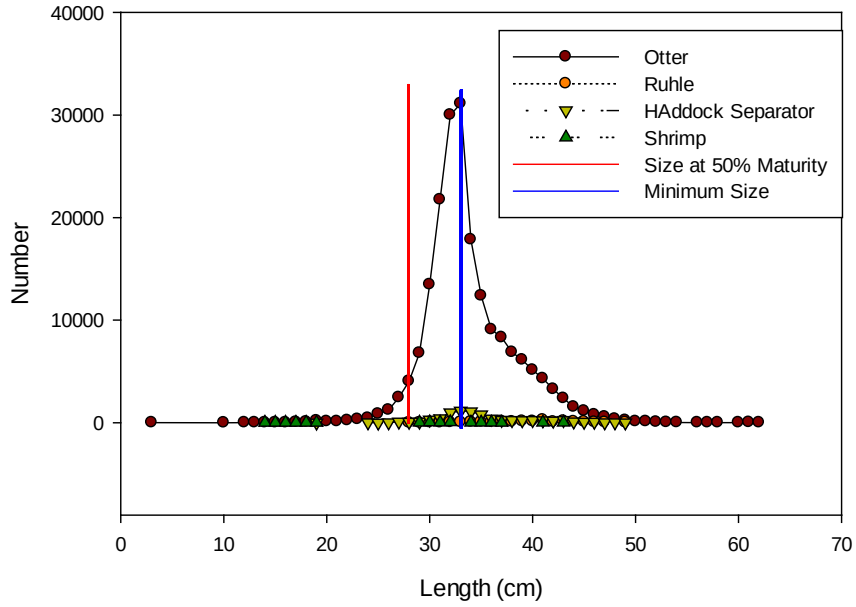

Figure 58: Observed yellowtail flounder discards by gear type.

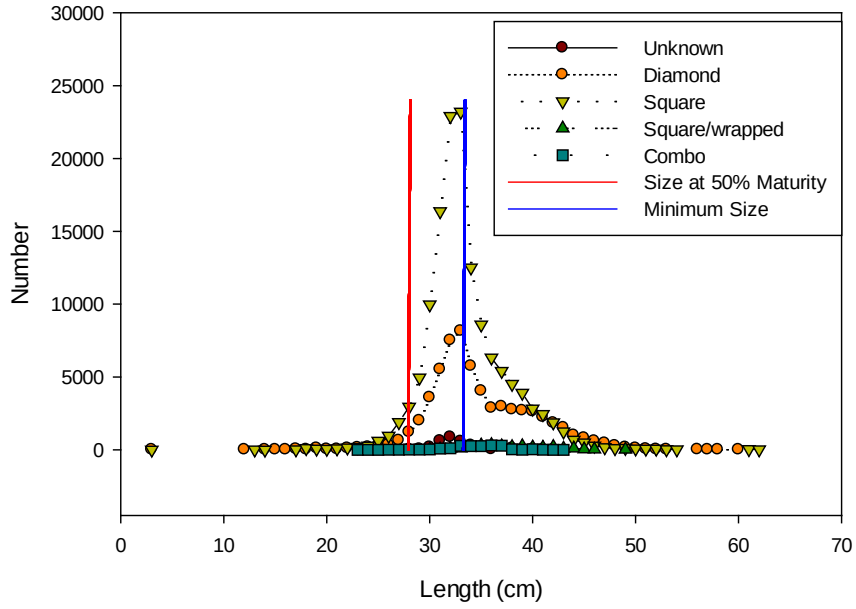

Figure 59: Observed yellowtail flounder discards by mesh shape.

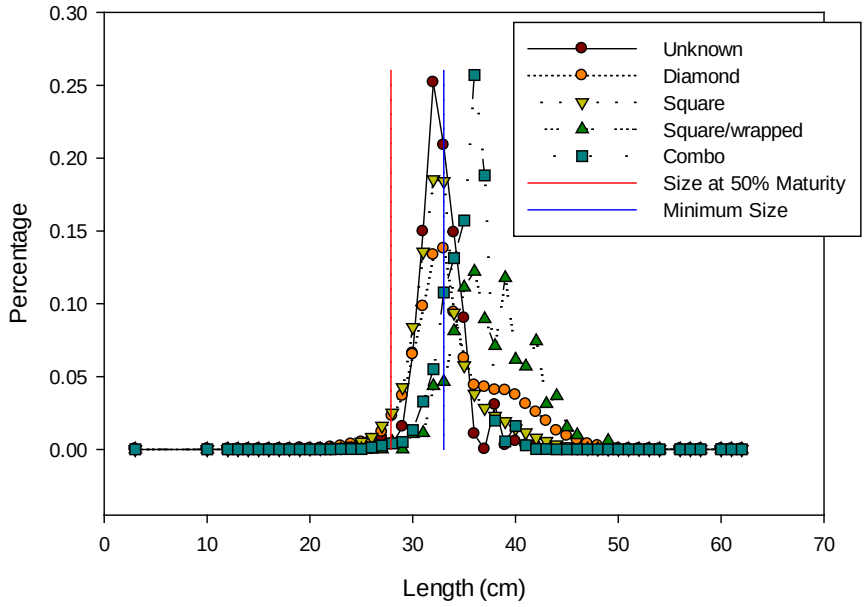

Figure 60: Proportional observed yellowtail flounder discards by mesh shape.

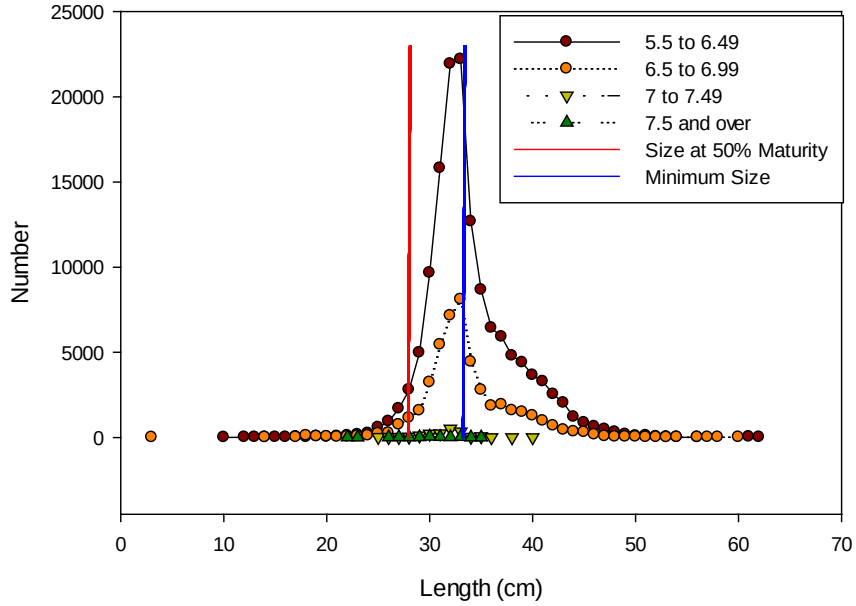

Figure 61: Observed yellowtail flounder discards by mesh size.

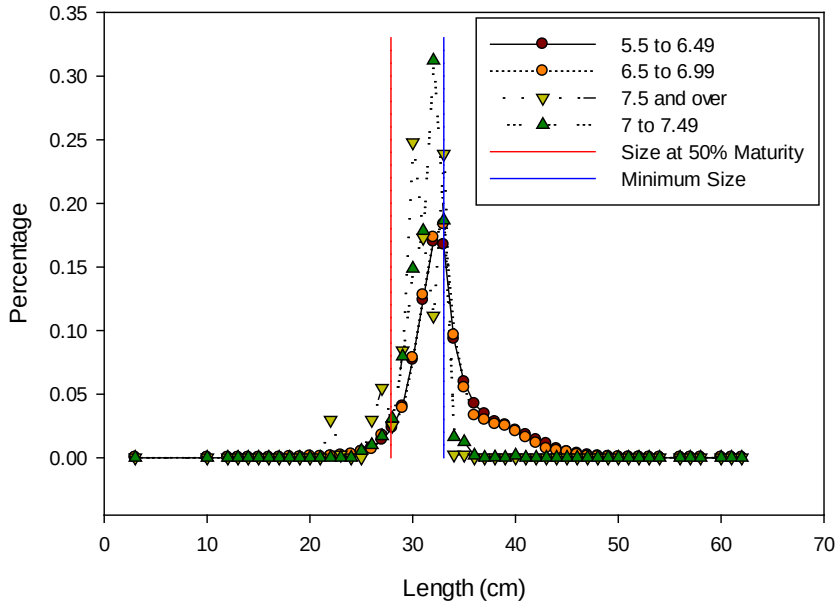

Figure 62: Proportional observed yellowtail flounder discards by mesh size.

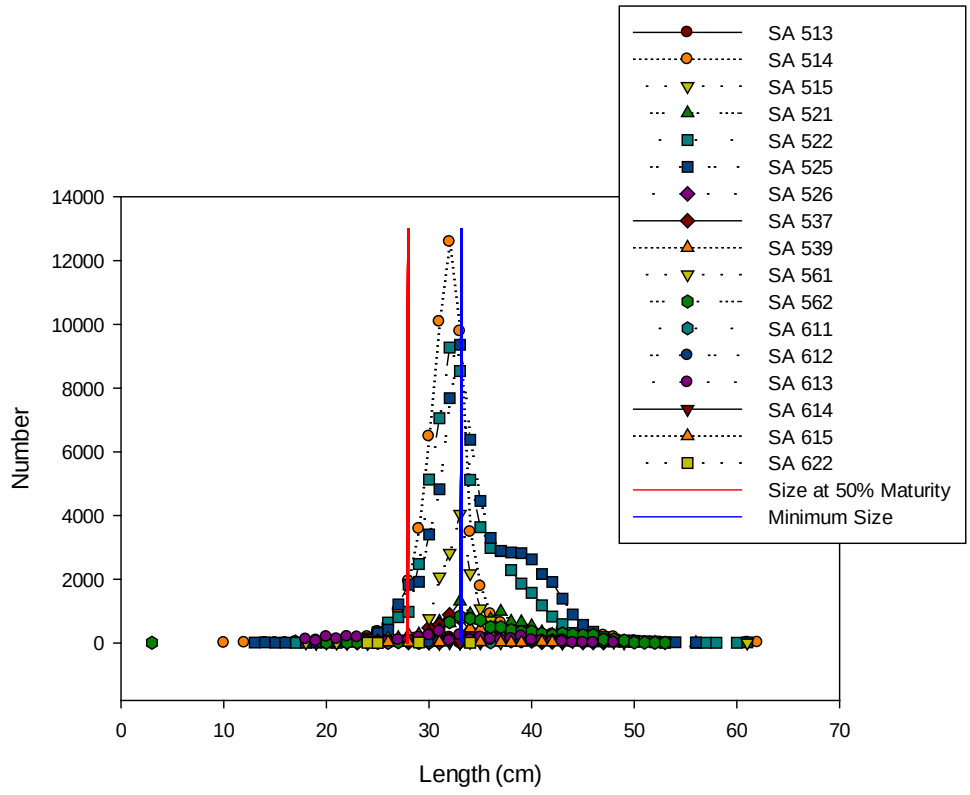

Figure 63: Observed yellowtail flounder discards by statistical area.

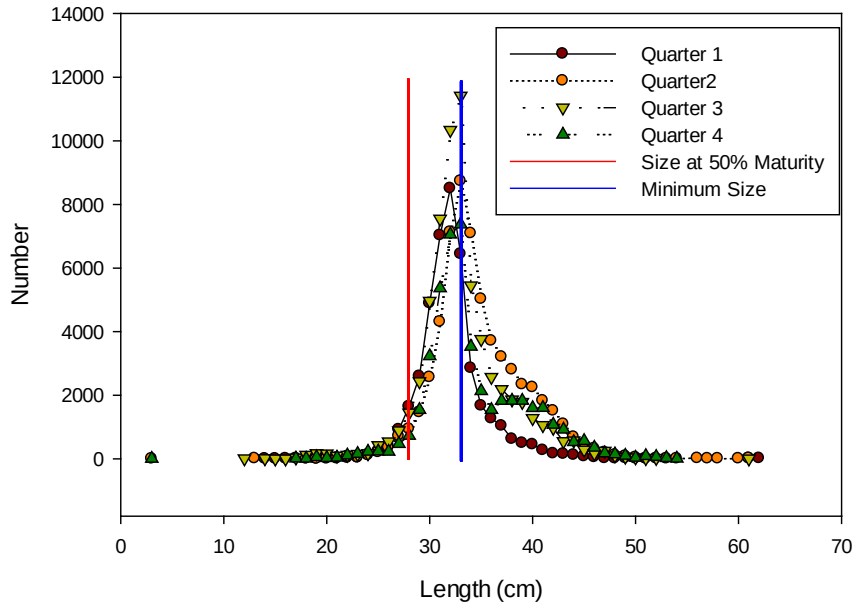

Figure 64: Observed yellowtail flounder discards by quarter.

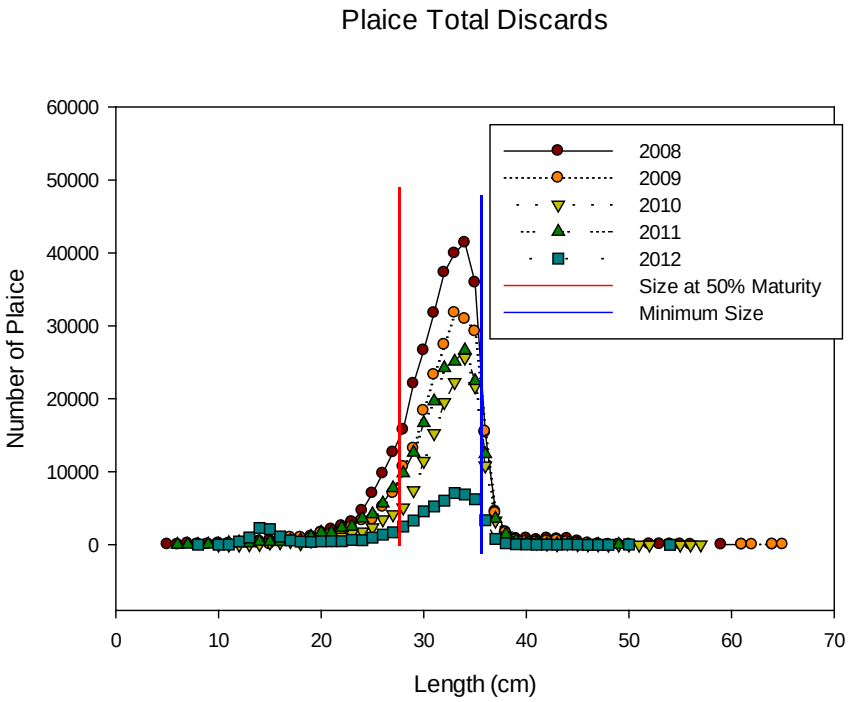

Figure 65: Total discards of plaice from ASM and NEFOP data from 2008 – 2012.

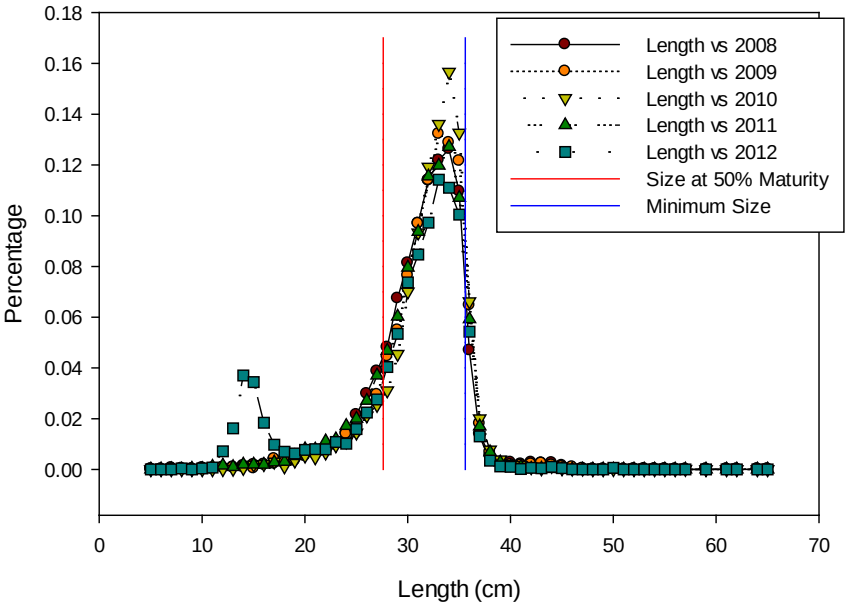

Figure 66: Proportional total discards of plaice from ASM and NEFOP data from 2008 – 2012.

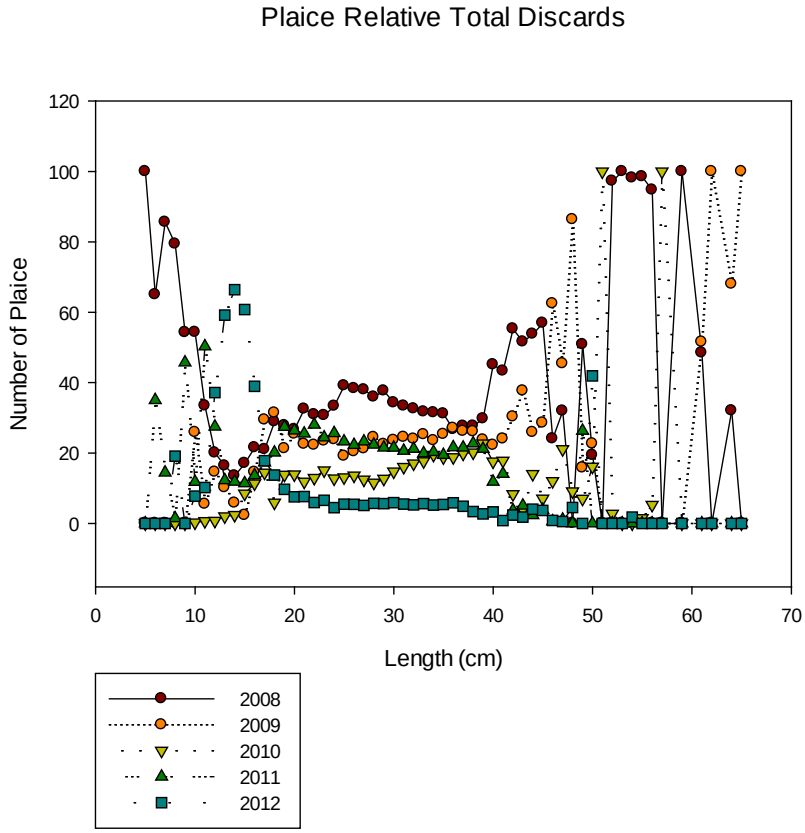

Figure 67: Relative total discards of plaice expressed as a percentage of the total.

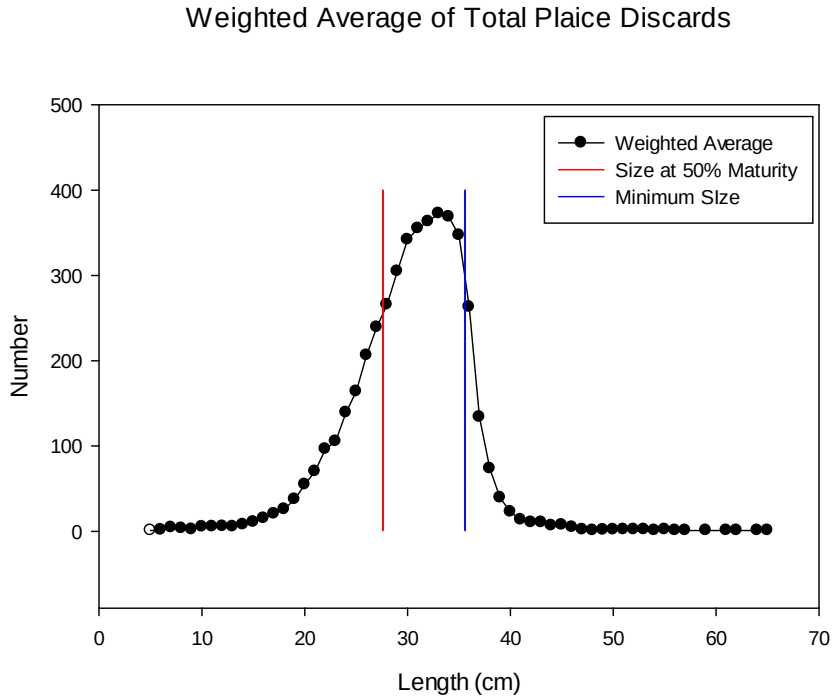

Figure 68: Weighted average total discards of plaice.

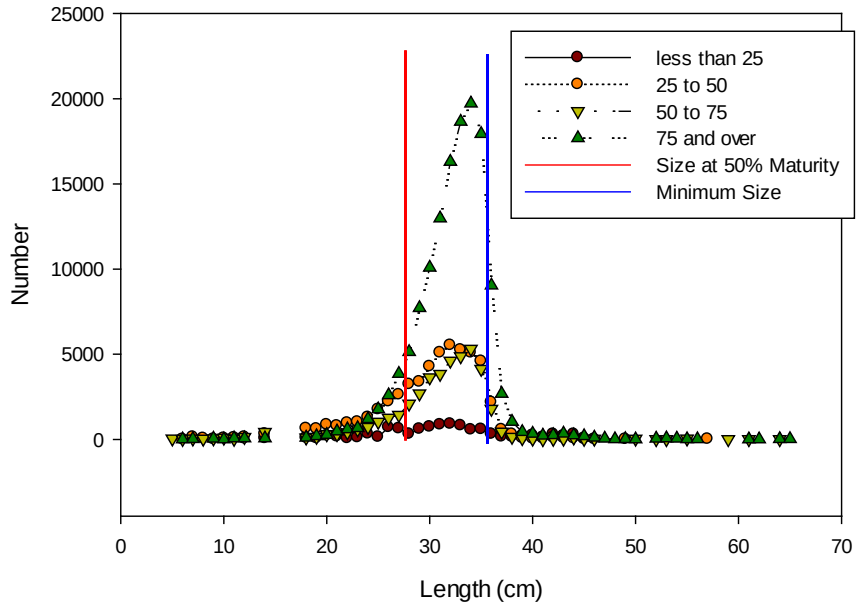

Figure 69: Observed plaice discards by depth.

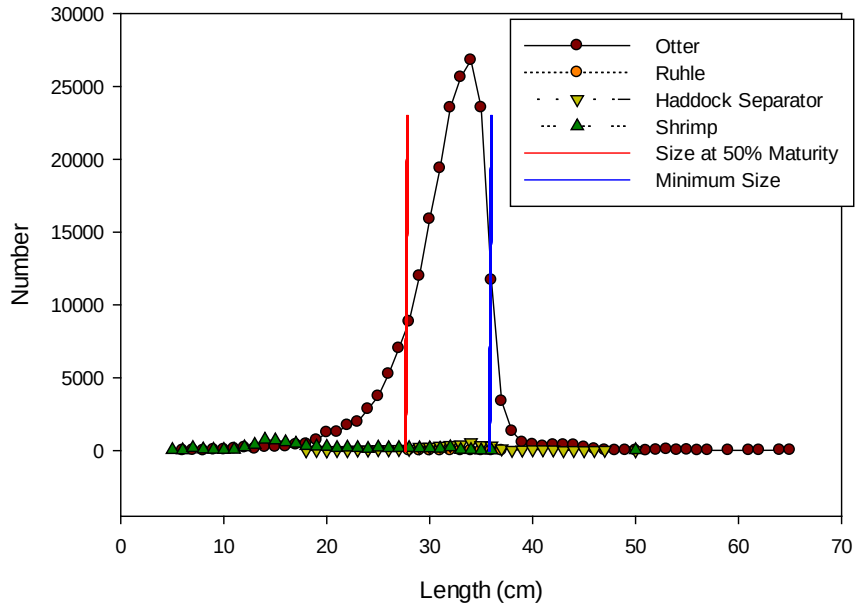

Figure 70: Observed plaice discards by gear type.

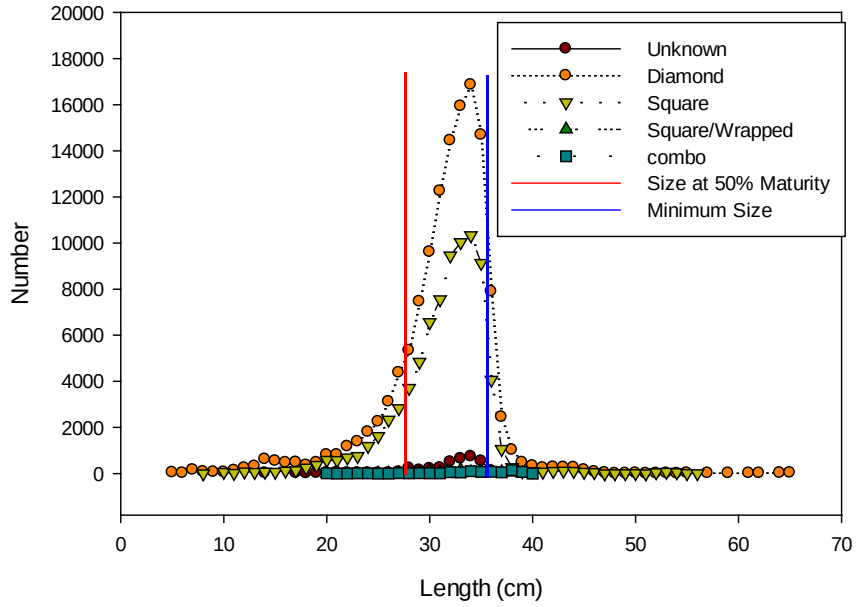

Figure 71: Observed plaice discards by mesh shape.

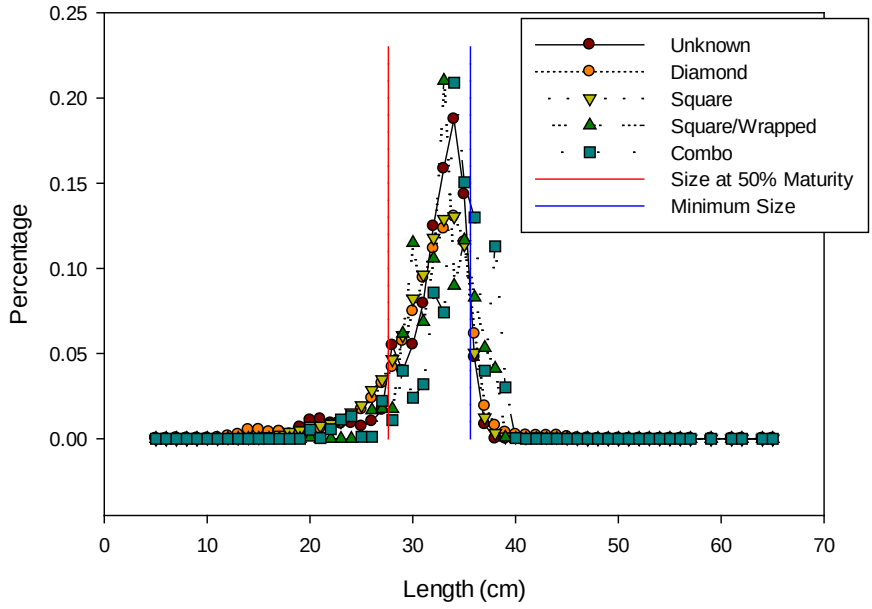

Figure 72: Proportional observed plaice discards by mesh shape.

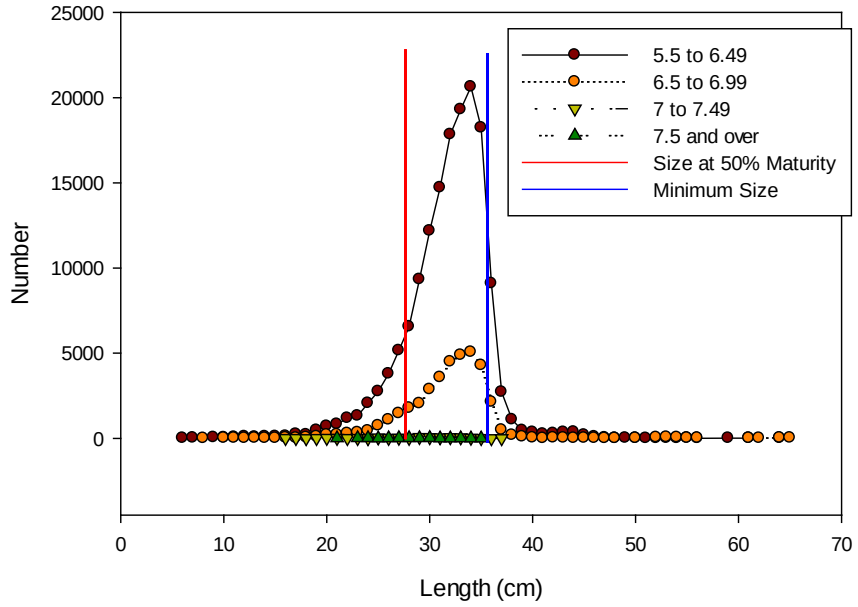

Figure 73: Observed plaice discards by mesh size.

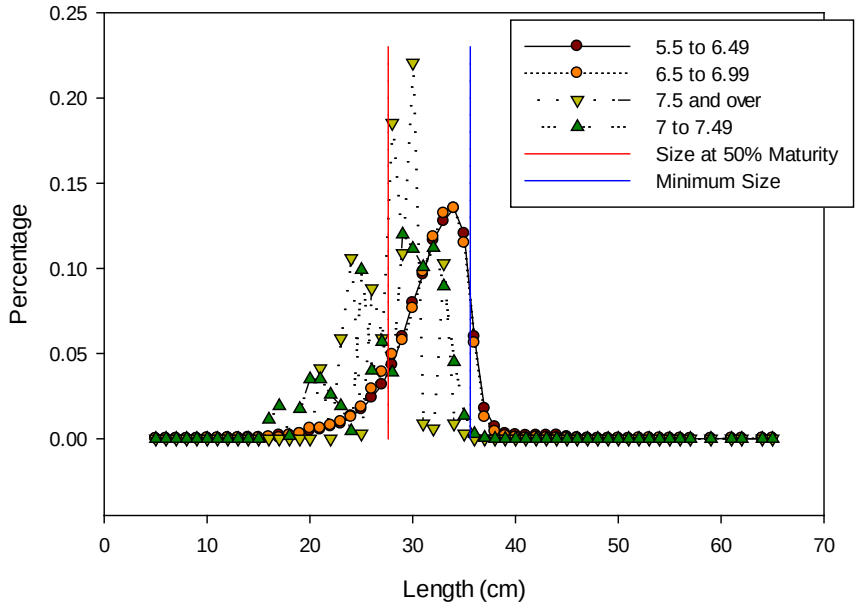

Figure 74: Proportional observed plaice discards by mesh size.

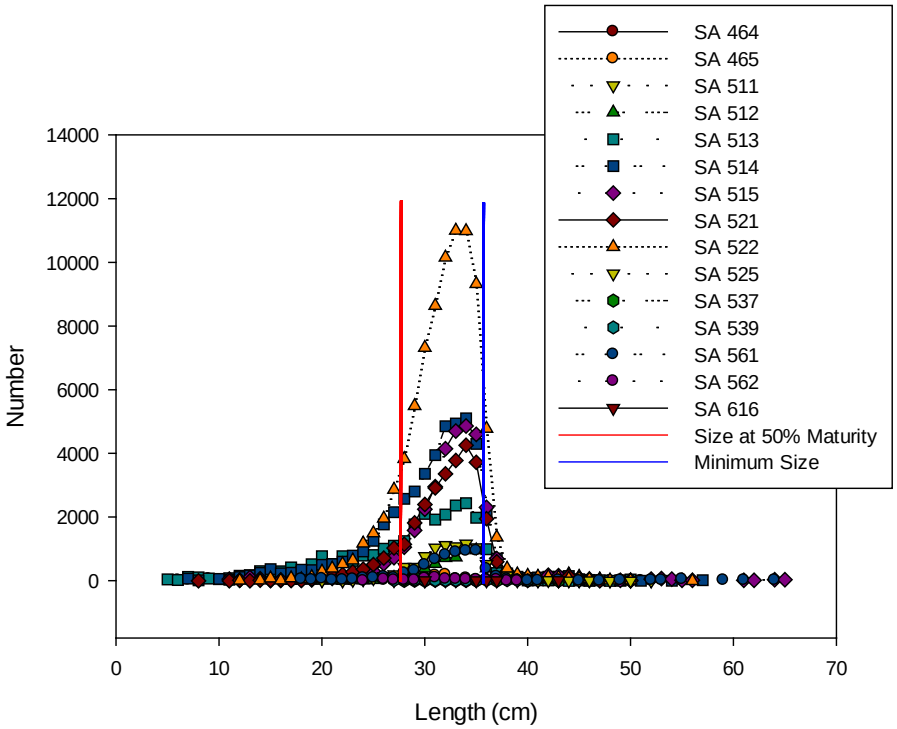

Figure 75: Observed plaice discards by statistical area.

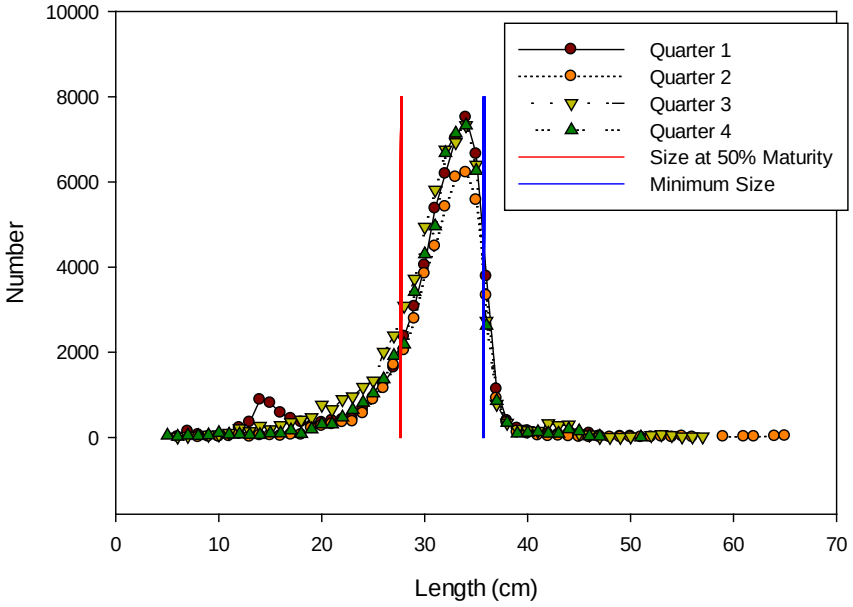

Figure 76: Observed plaice discards by quarter.

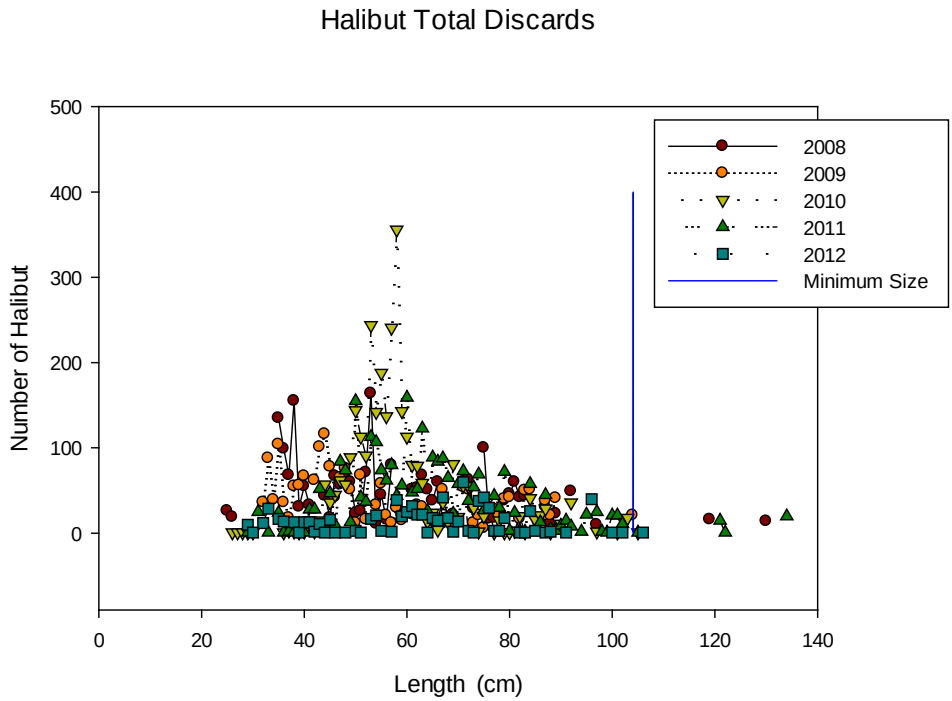

Figure 77: Total discards of halibut from ASM and NEFOP data from 2008 – 2012.

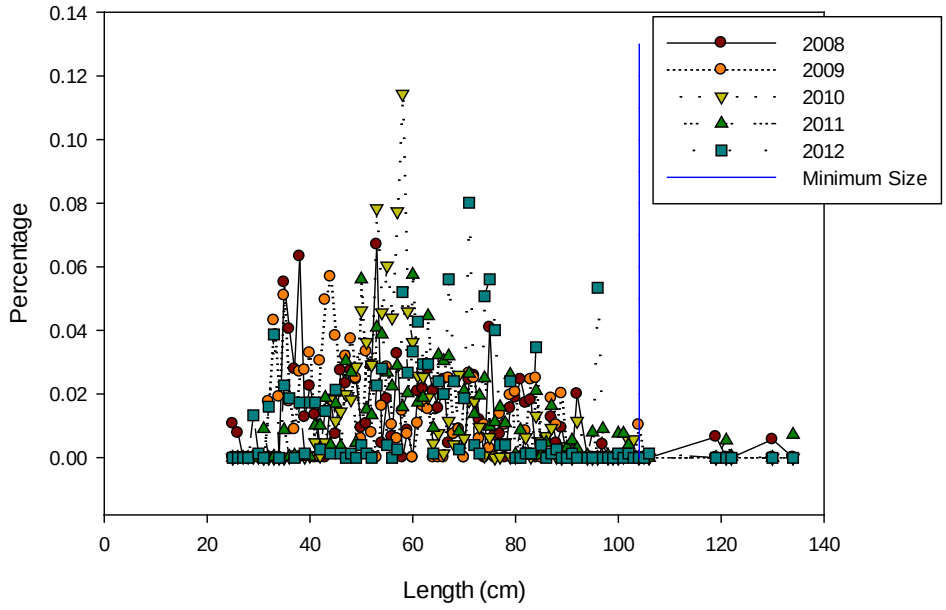

Figure 78: Proportional total discards of halibut from ASM and NEFOP data from 2008 – 2012.

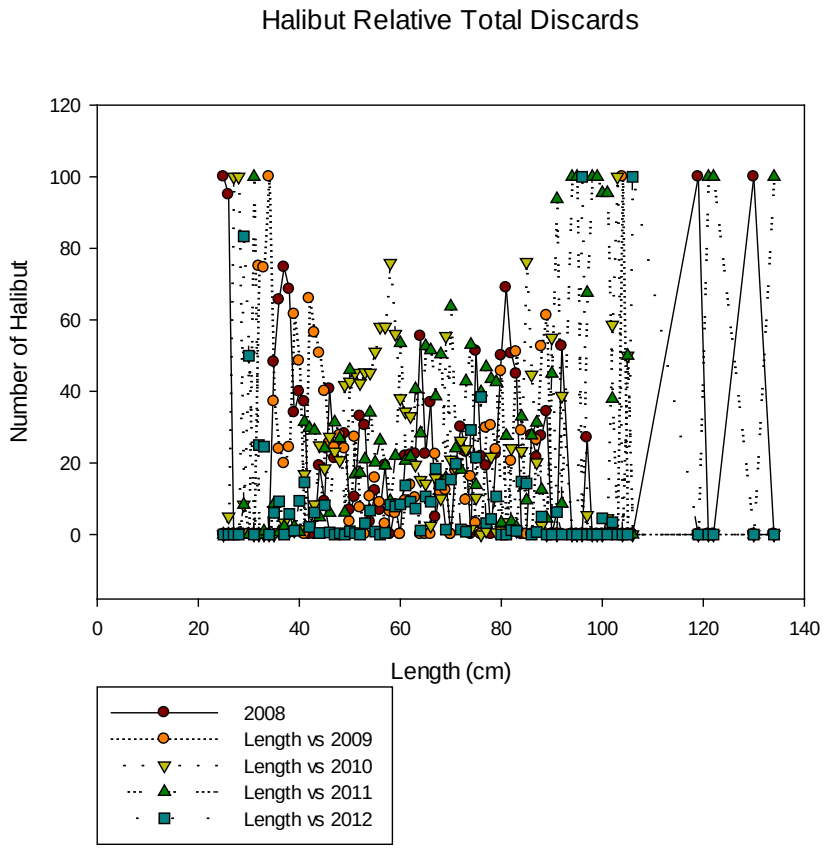

Figure 79: Relative total discards of halibut expressed as a percentage of the total.

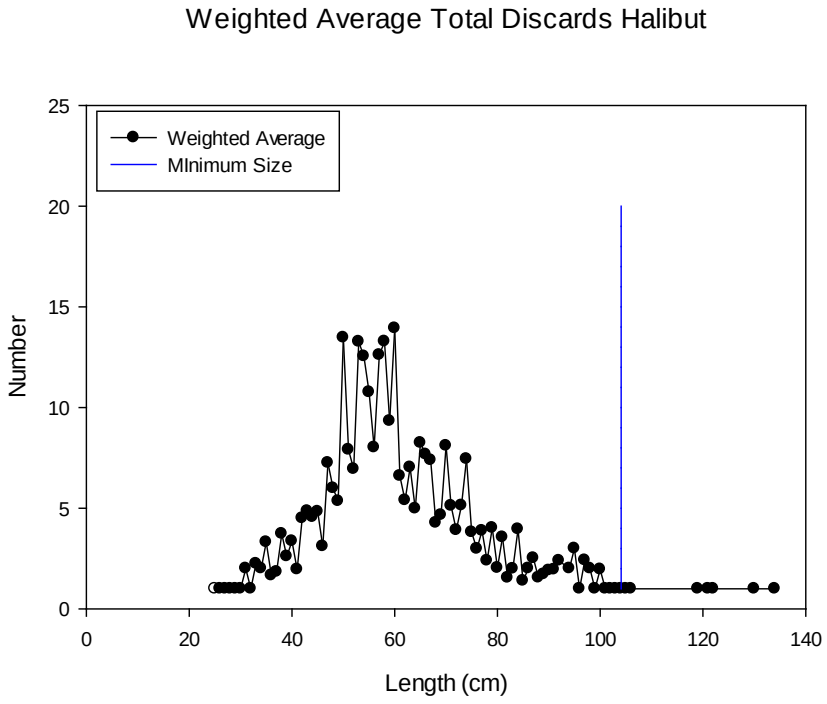

Figure 80: Weighted average total discards of halibut.

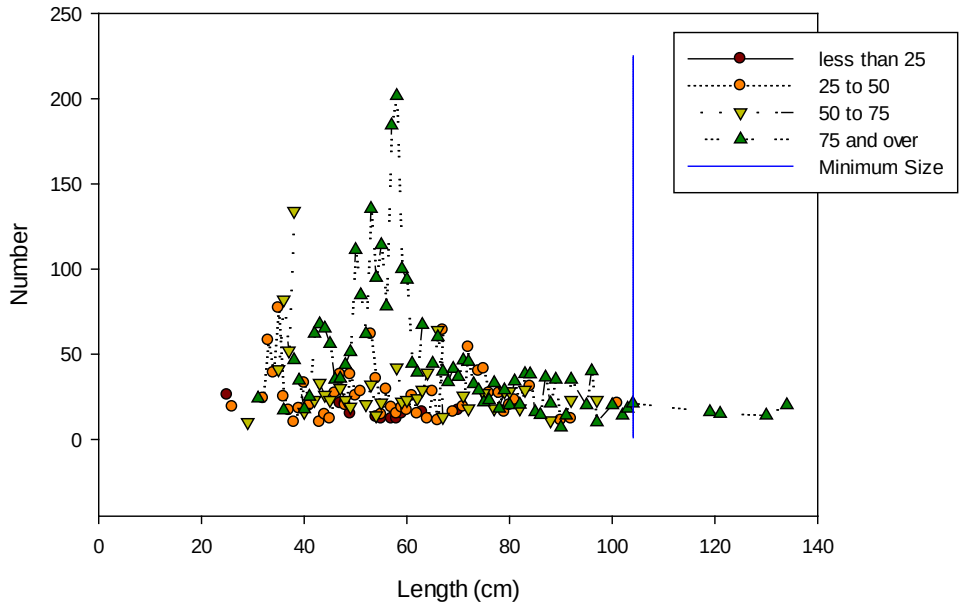

Figure 81: Observed halibut discards by depth.

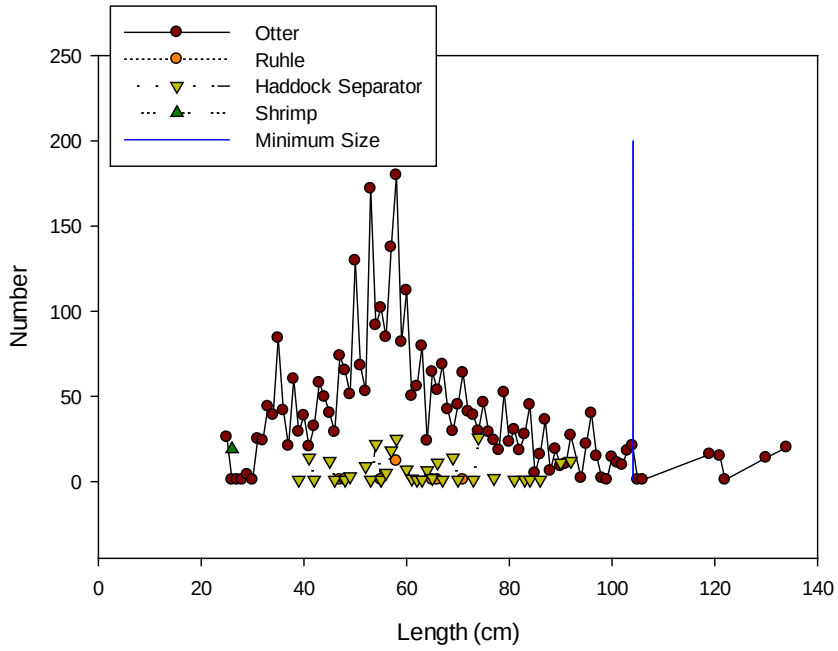

Figure 82: Observed halibut discards by gear type.

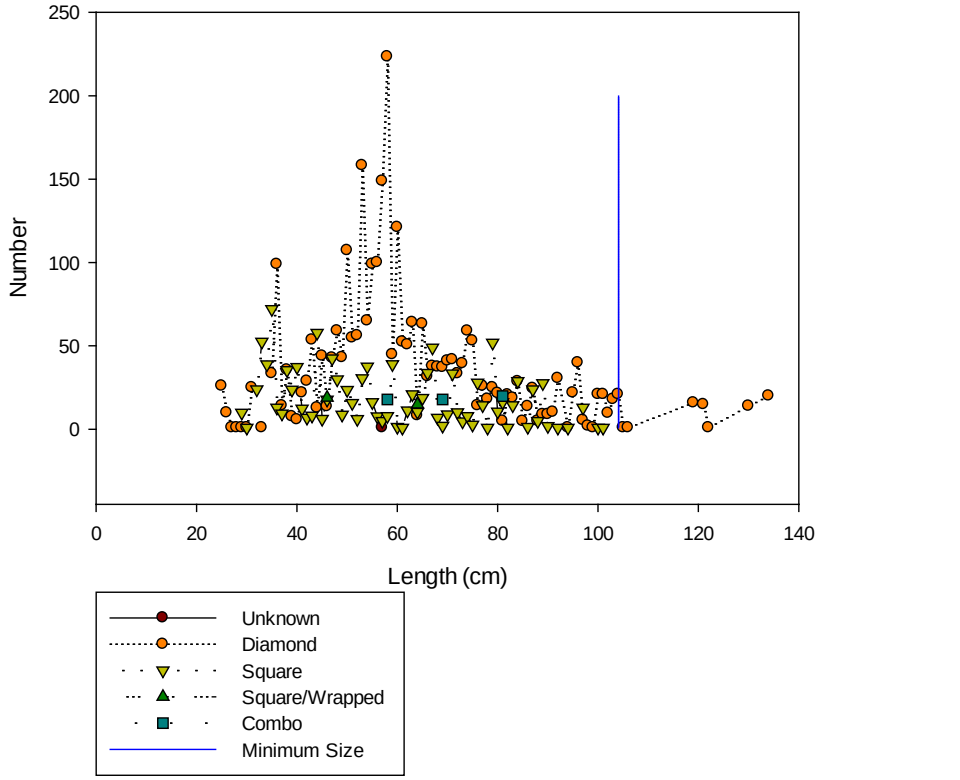

Figure 83: Observed halibut discards by mesh shape.

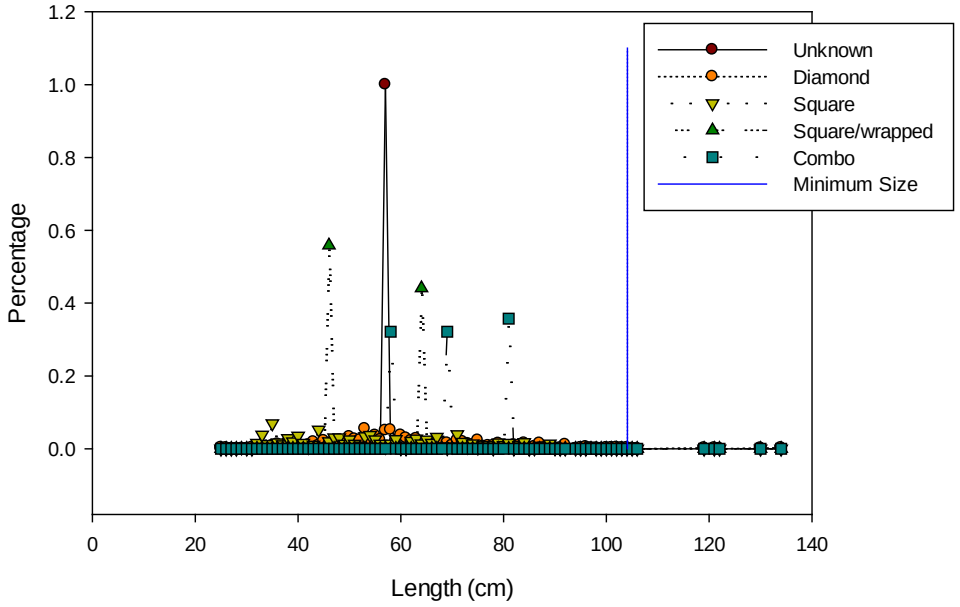

Figure 84: Proportional observed halibut discards by mesh shape.

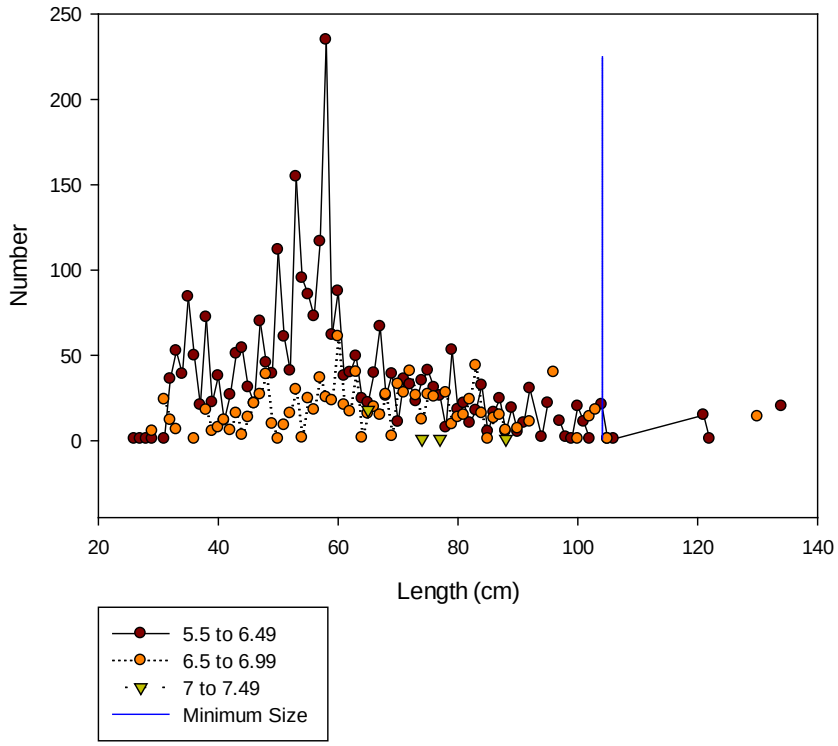

Figure 85: Observed halibut discards by mesh size.

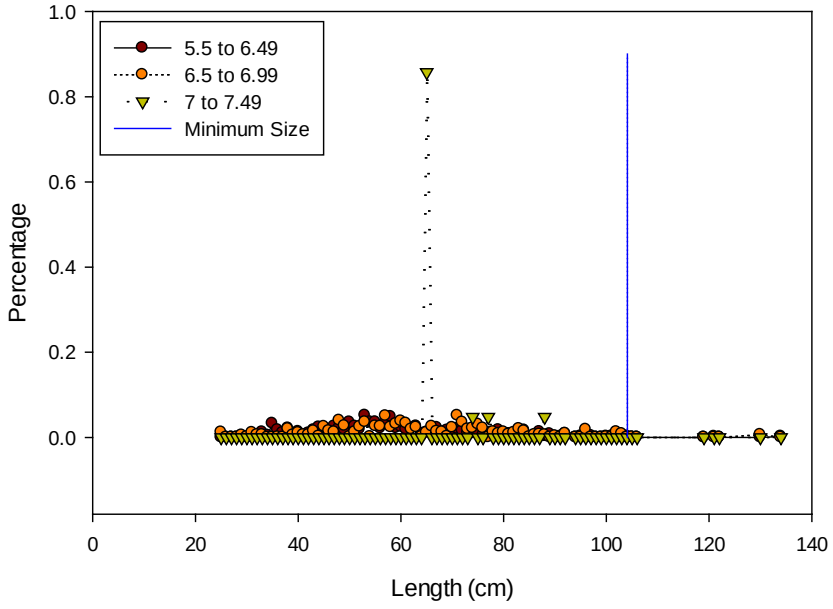

Figure 86: Proportional observed halibut discards by mesh size.

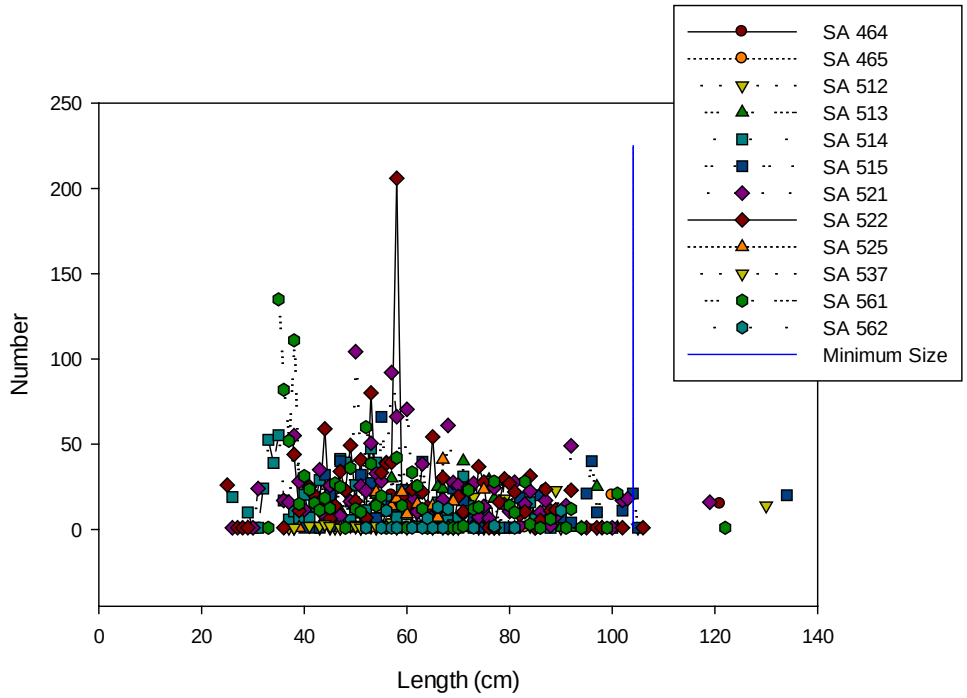

Figure 87: Observed halibut discards by statistical area.

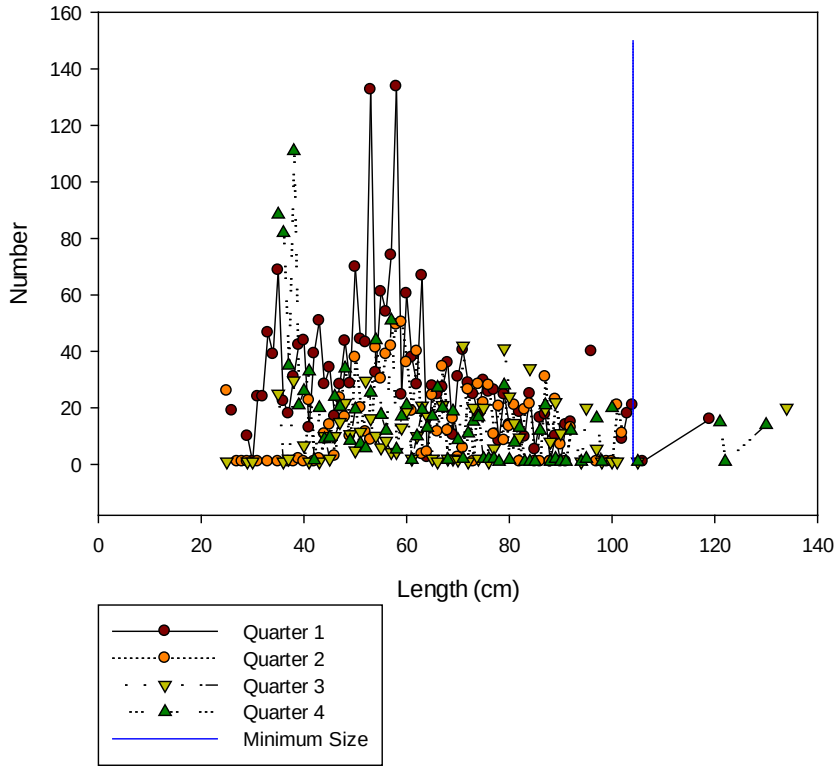

Figure 88: Observed halibut discards by quarter.

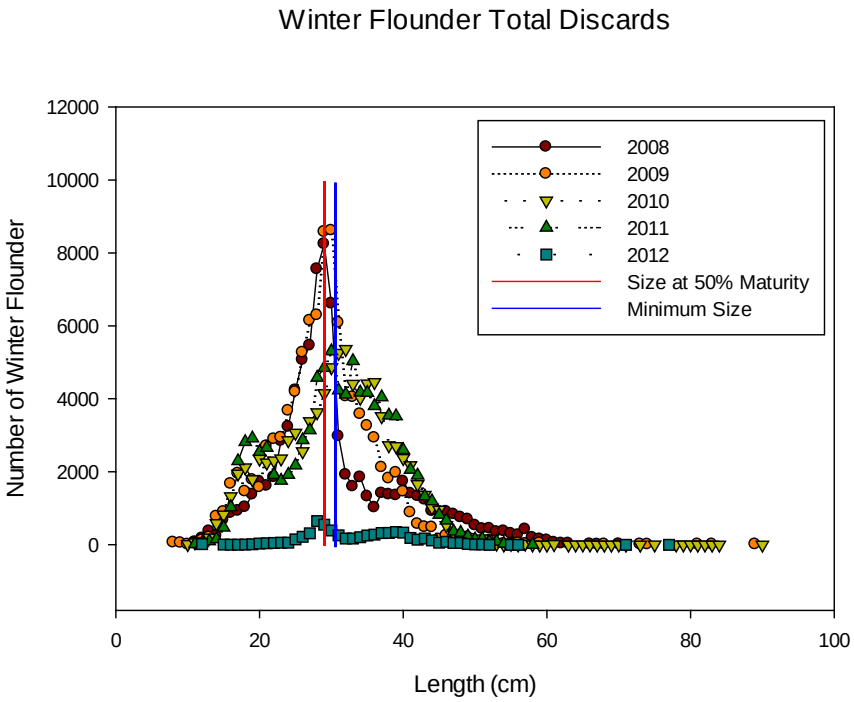

Figure 89: Total discards of winter flounder from ASM and NEFOP data from 2008 – 2012.

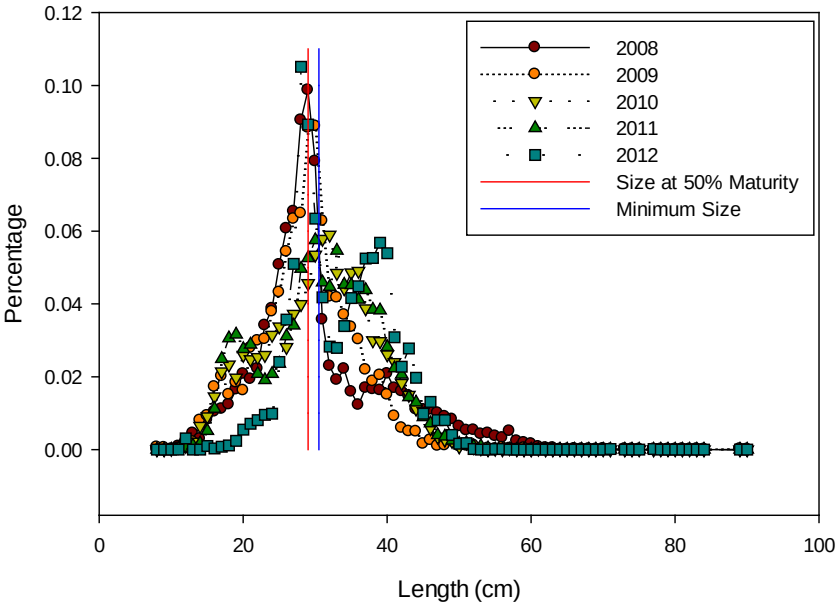

Figure 90: Proportional total discards of winter flounder from ASM and NEFOP data from 2008 – 2012.

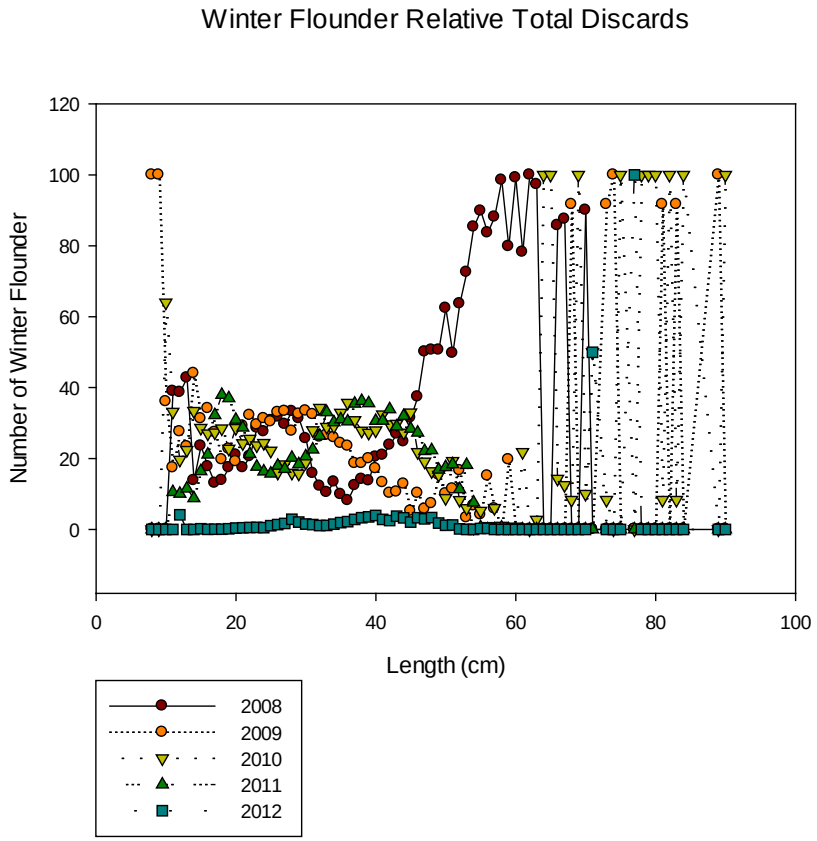

Figure 91: Relative total discards of winter flounder expressed as a percentage of the total.

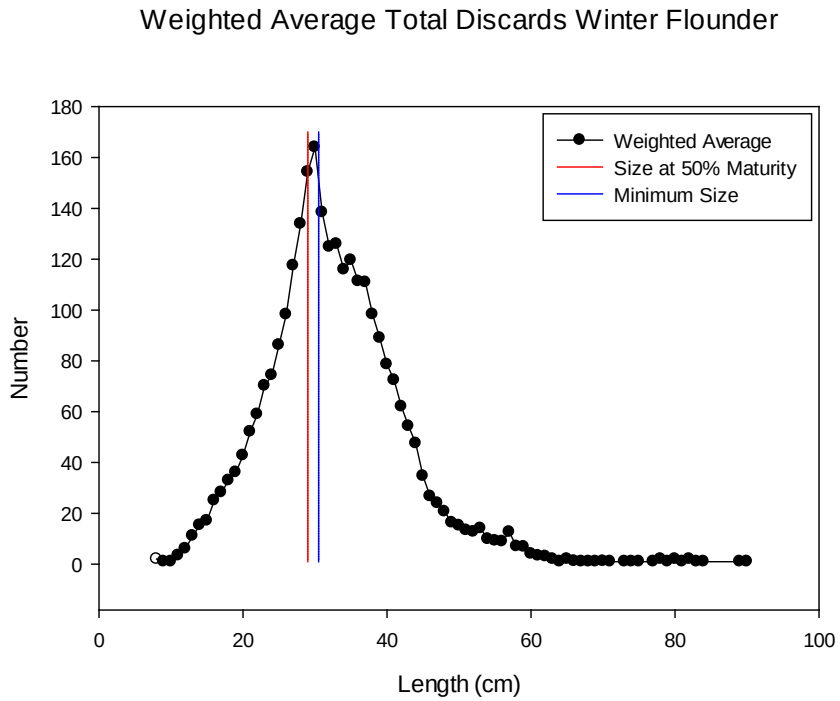

Figure 92: Weighted average total discards of winter flounder.

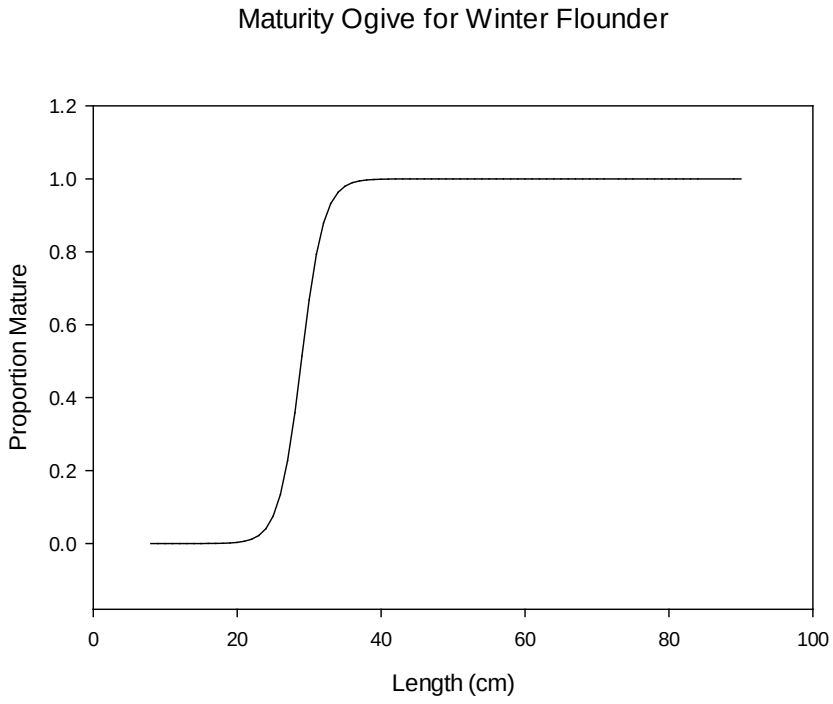

Figure 93: Maturity Ogive for winter flounder.

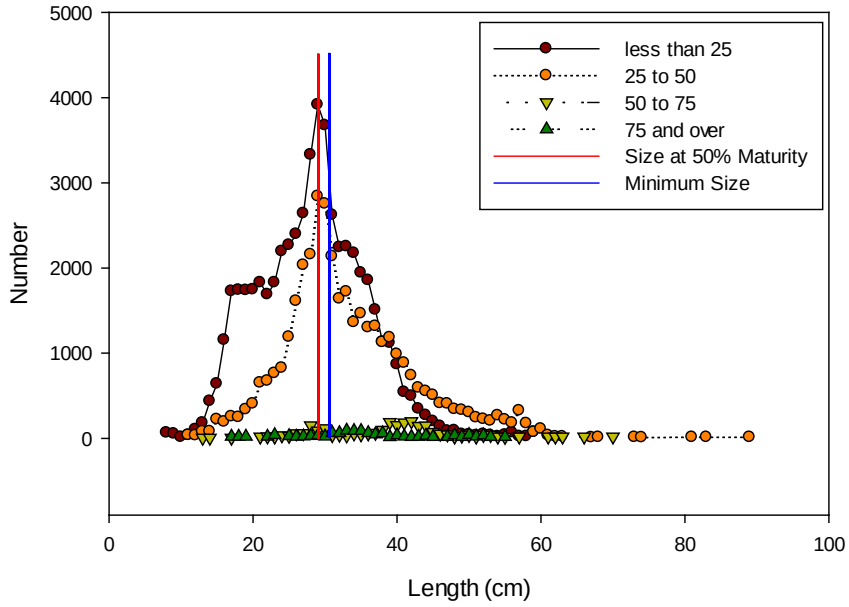

Figure 94: Observed winter flounder discards by depth.

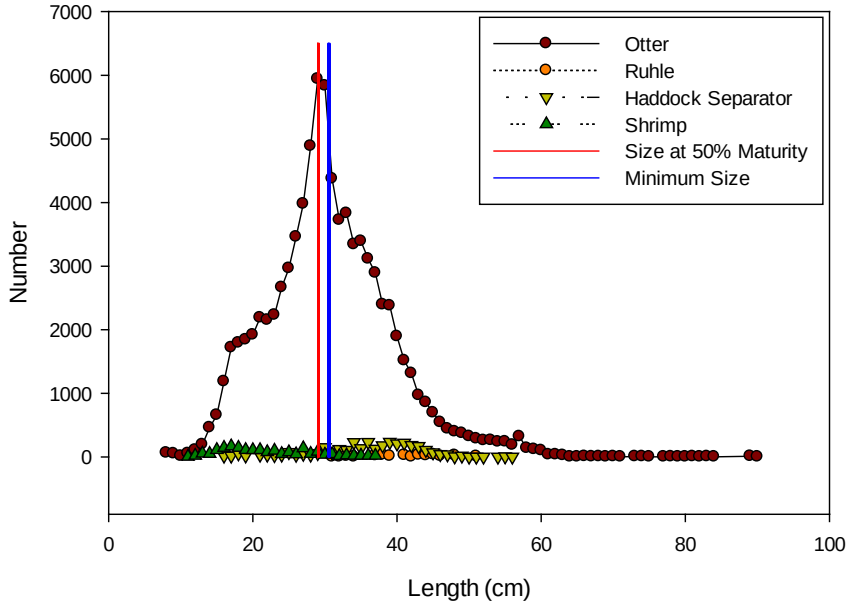

Figure 95: Observed winter flounder discards by gear type.

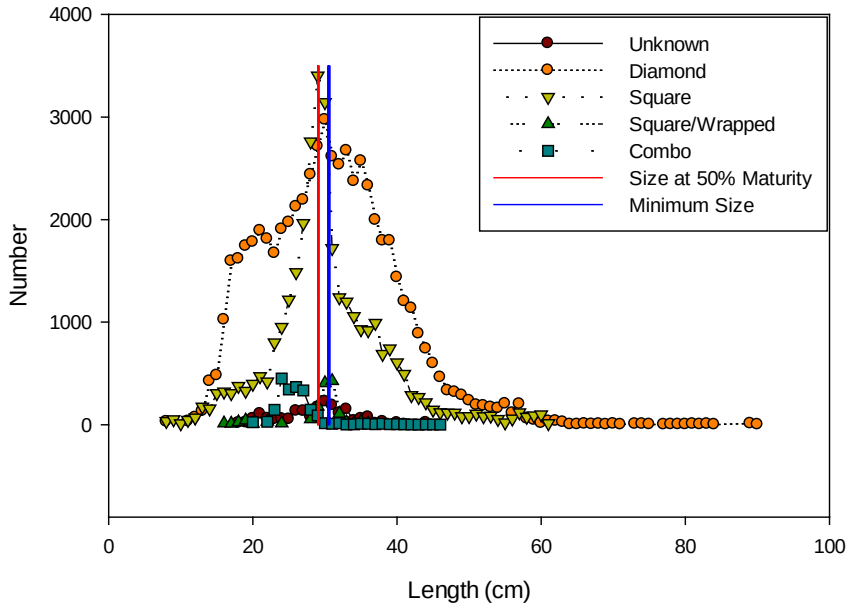

Figure 96: Observed winter flounder discards by mesh shape.

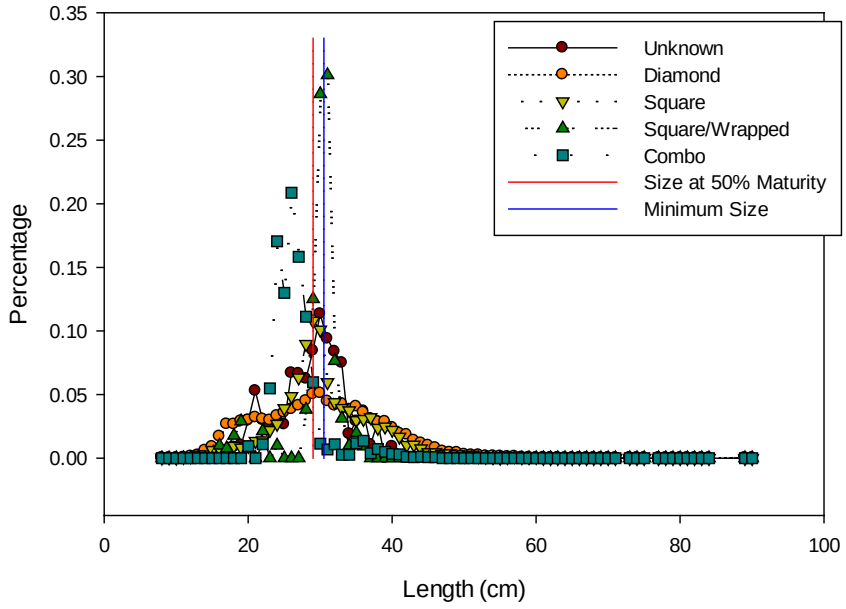

Figure 97: Proportional observed winter flounder discards by mesh shape.

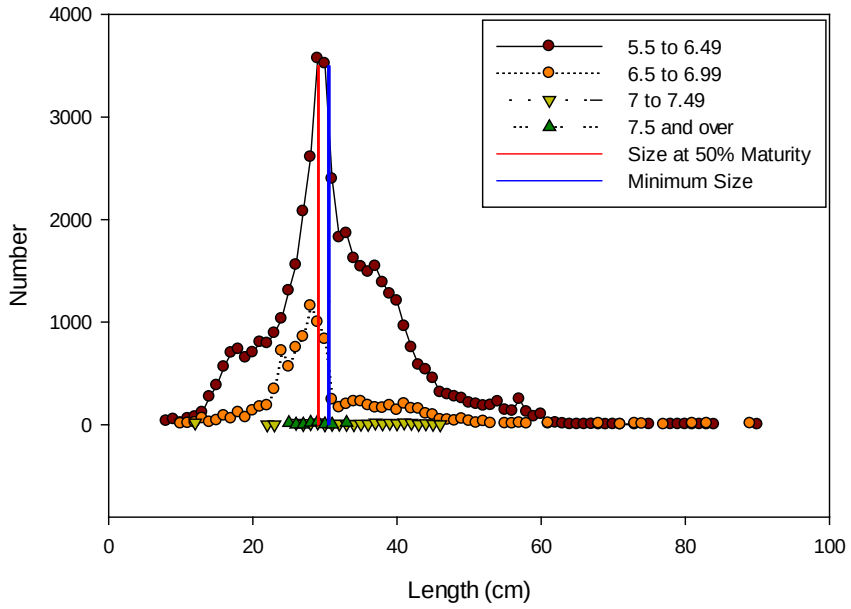

Figure 98: Observed winter flounder discards by mesh size.

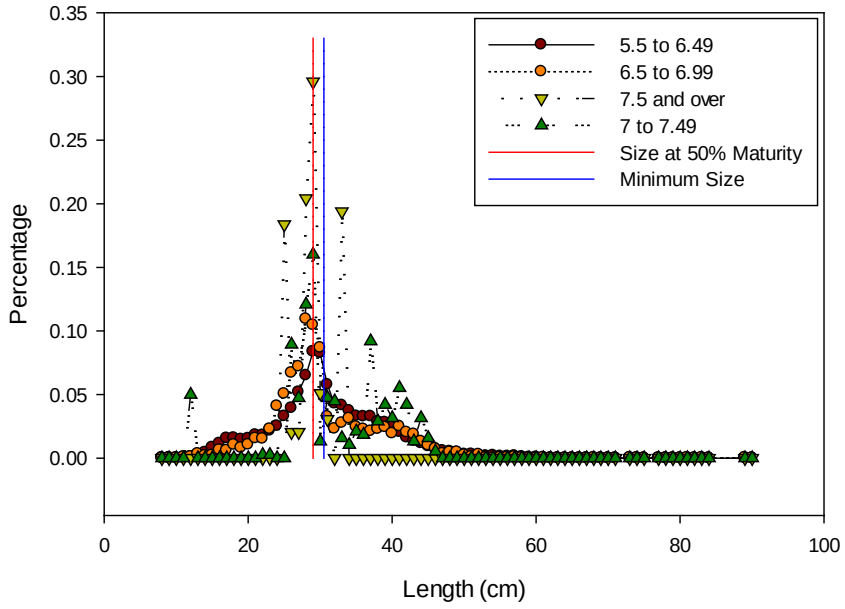

Figure 99: Proportional observed winter flounder discards by mesh size.

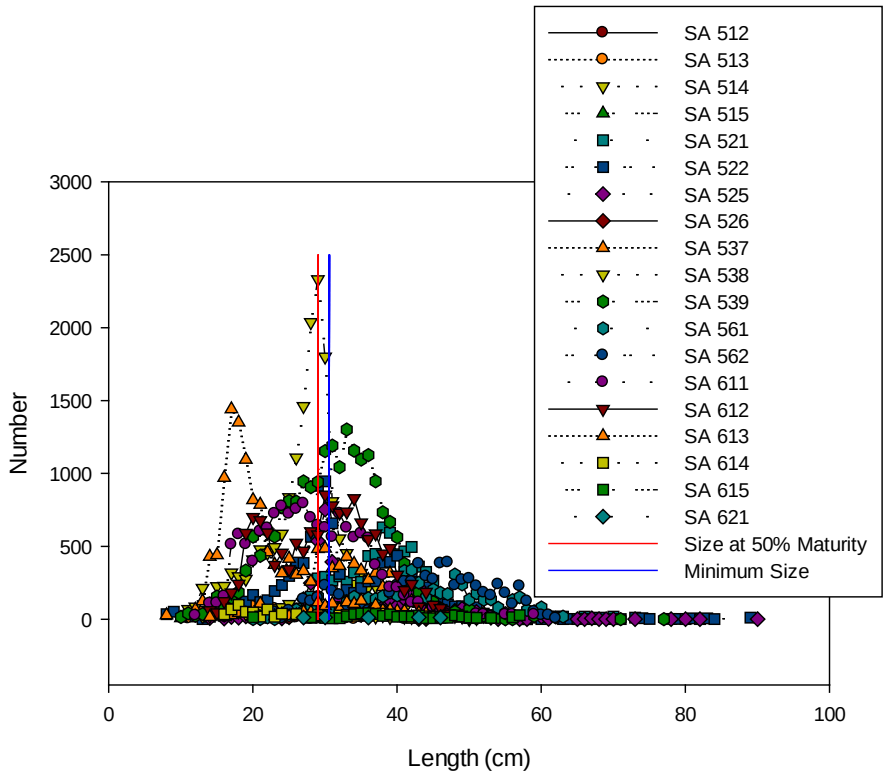

Figure 100: Observed winter flounder discards by statistical area.

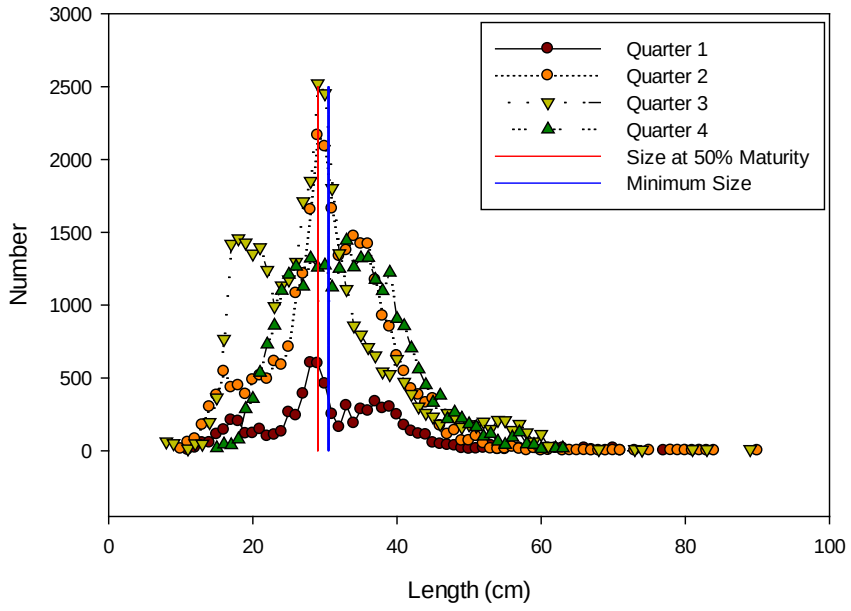

Figure 101: Observed winter flounder discards by quarter.

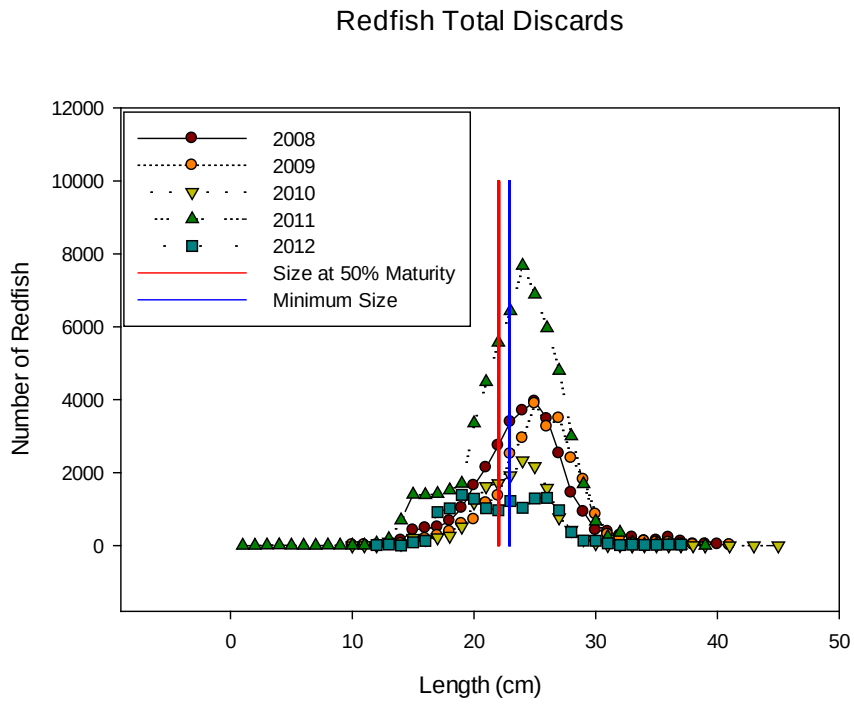

Figure 102: Total discards of redfish from ASM and NEFOP data from 2008 – 2012.

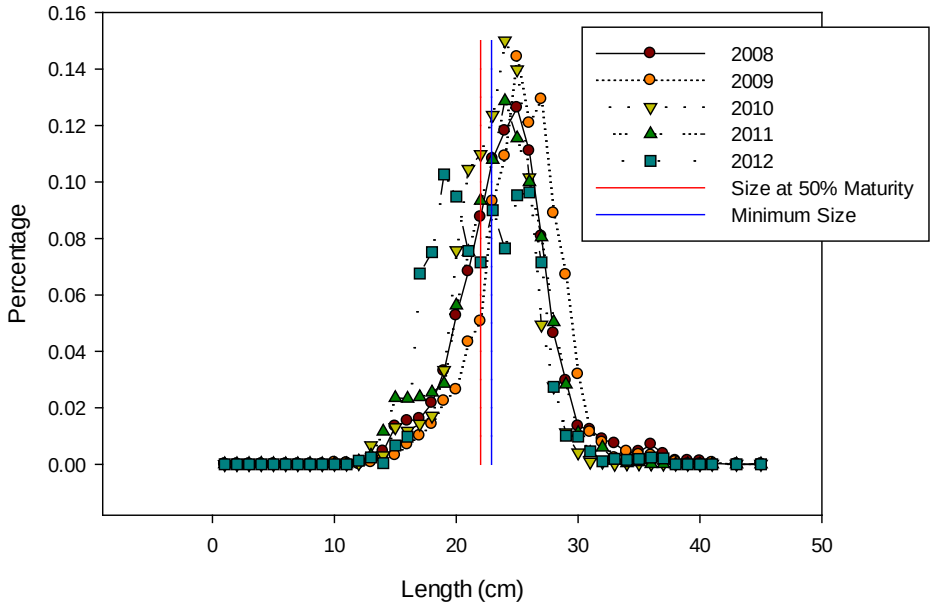

Figure 103: Proportional total discards of redfish from ASM and NEFOP data from 2008 – 2012.

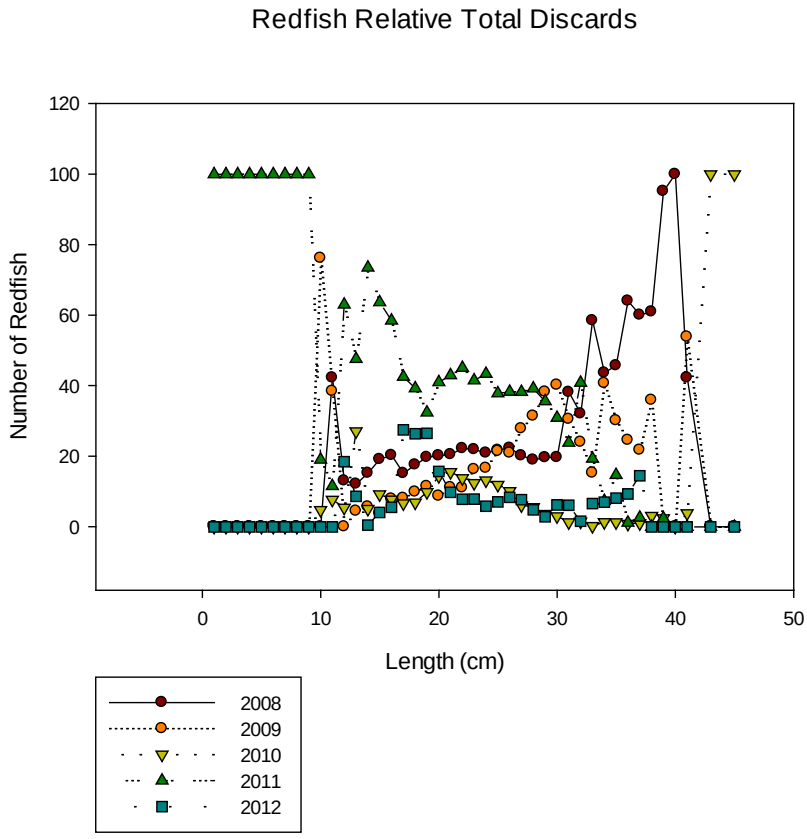

Figure 104: Relative total discards of redfish expressed as a percentage of the total.

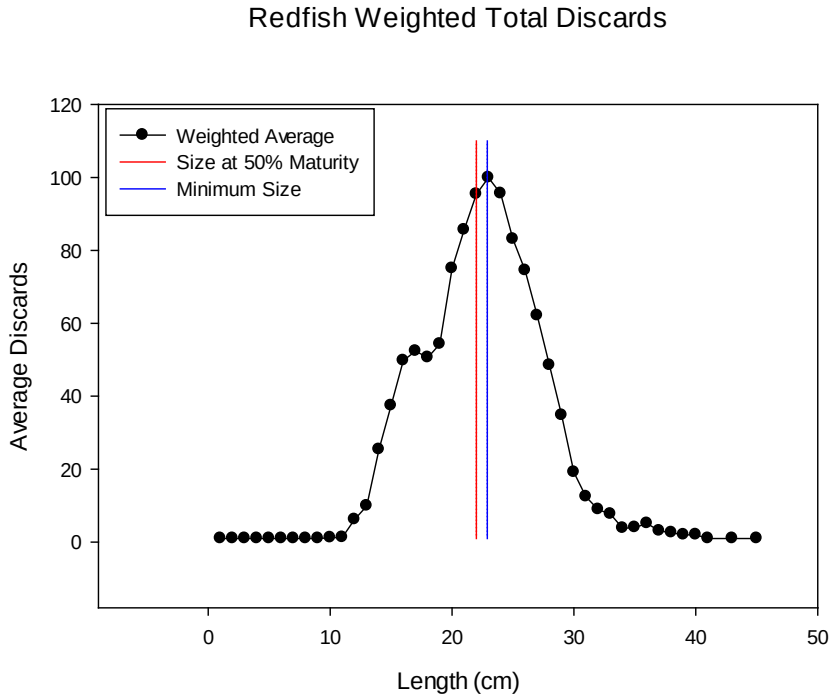

Figure 105: Weighted average total discards of redfish.

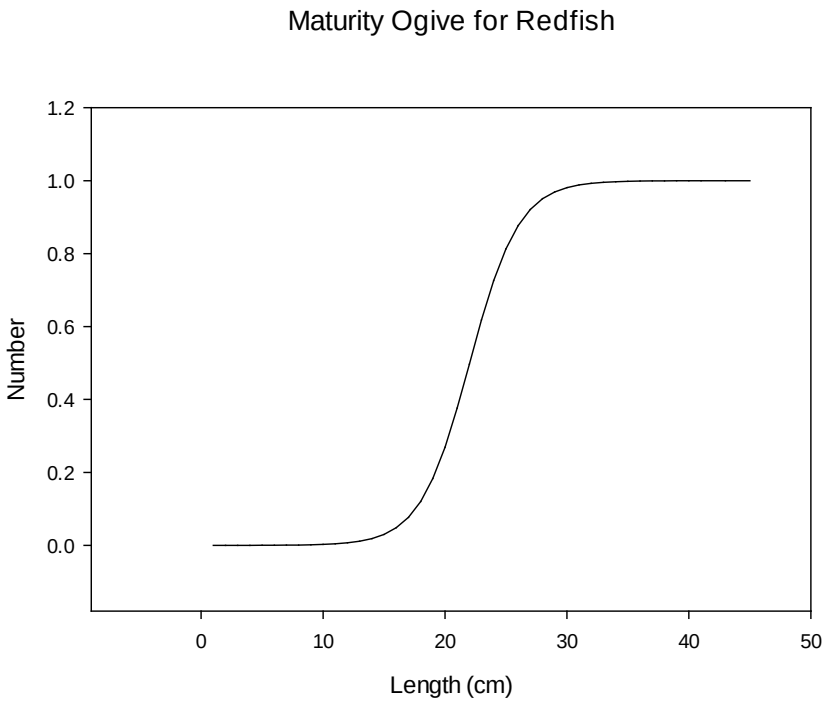

Figure 106: Maturity Ogive for redfish.

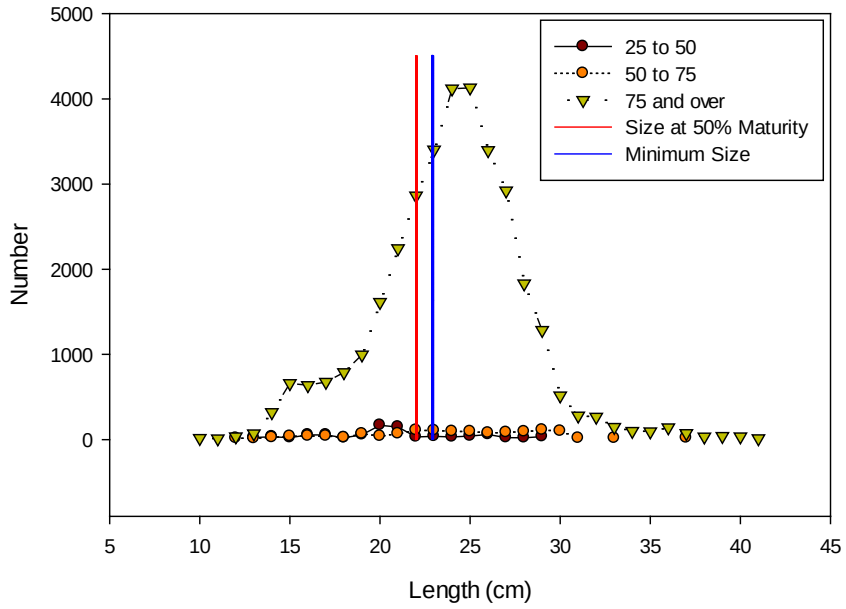

Figure 107: Observed redfish discards by depth.

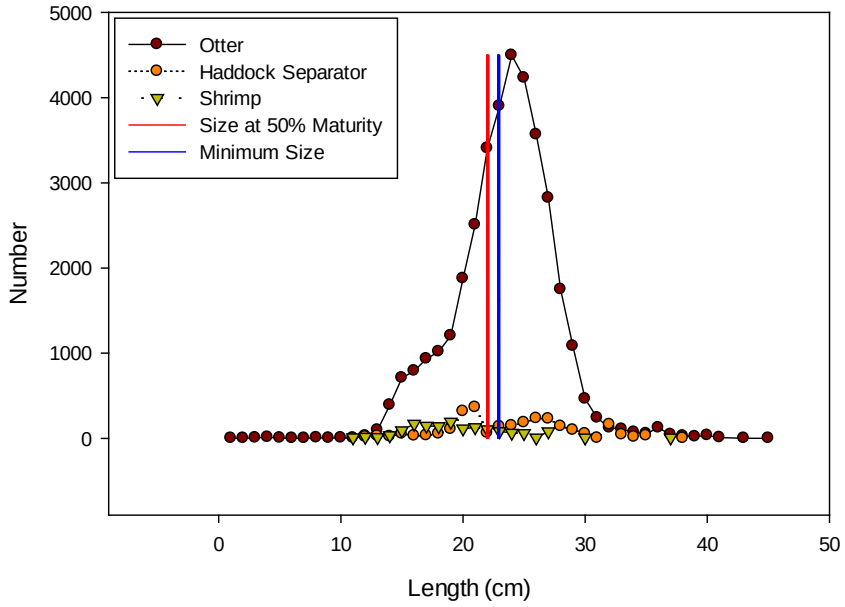

Figure 108: Observed redfish discards by gear type.

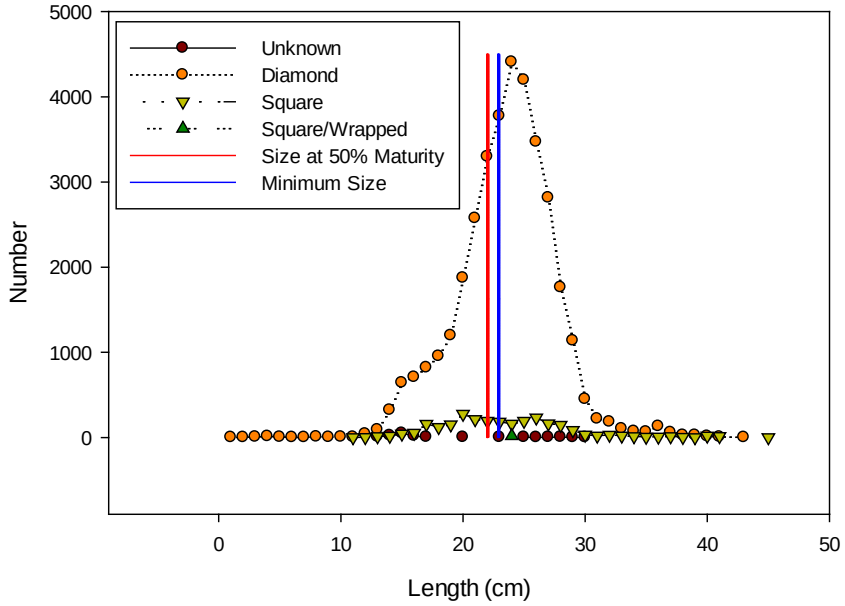

Figure 109: Observed redfish discards by mesh shape.

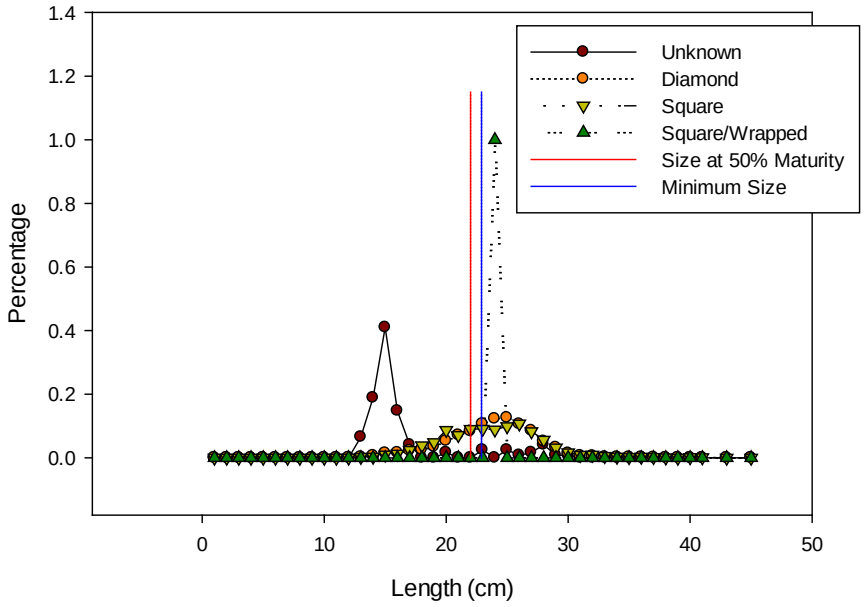

Figure 110: Proportional observed redfish discards by mesh shape.

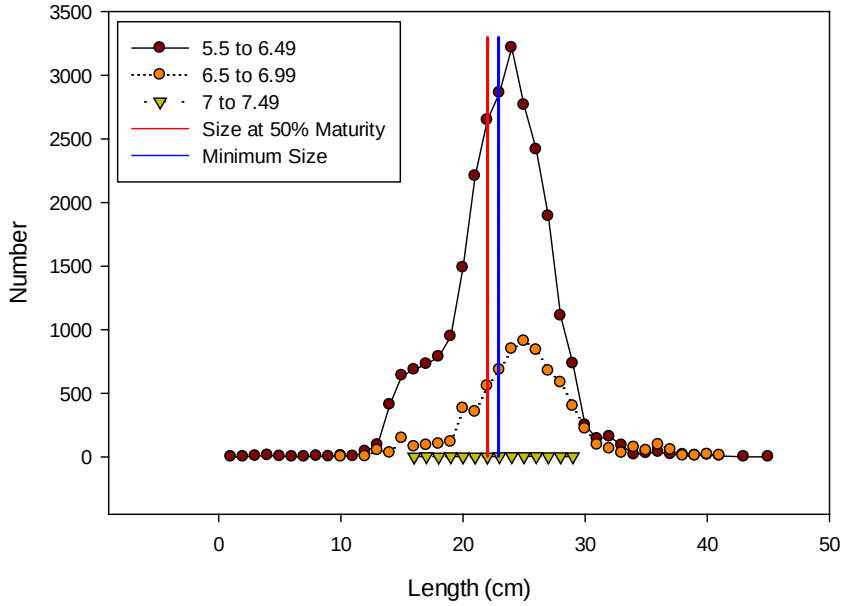

Figure 111: Observed redfish discards by mesh size.

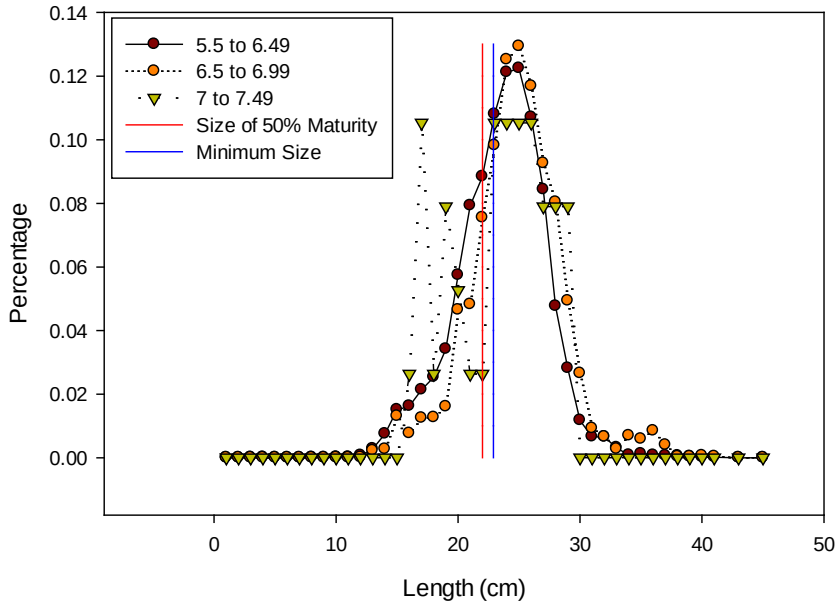

Figure 112: Proportional observed redfish discards by mesh size.

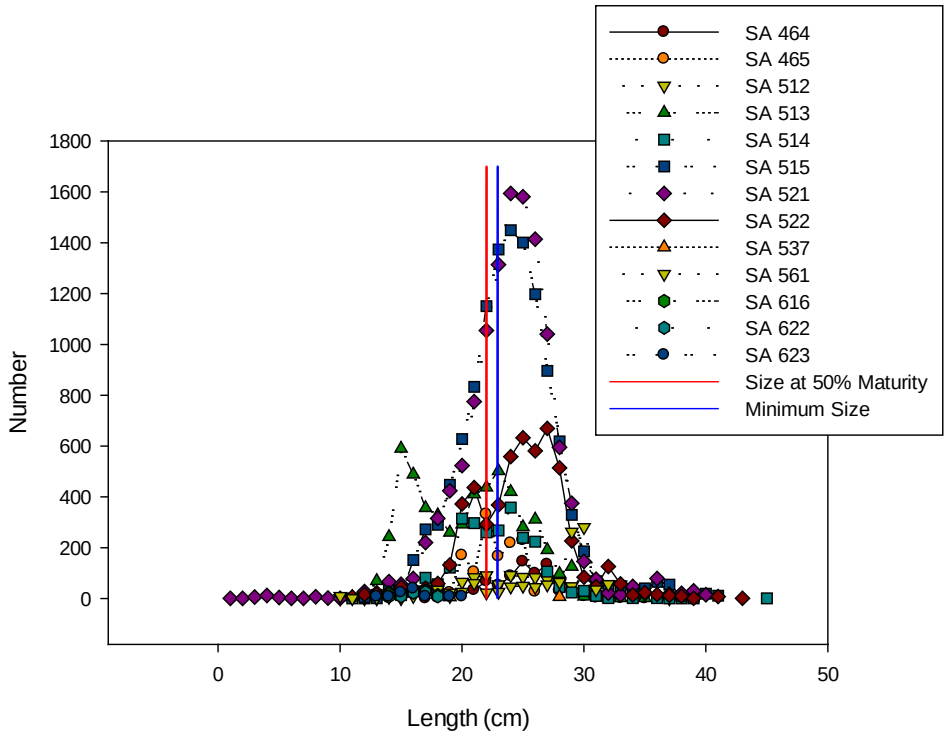

Figure 113: Observed redfish discards by statistical area.

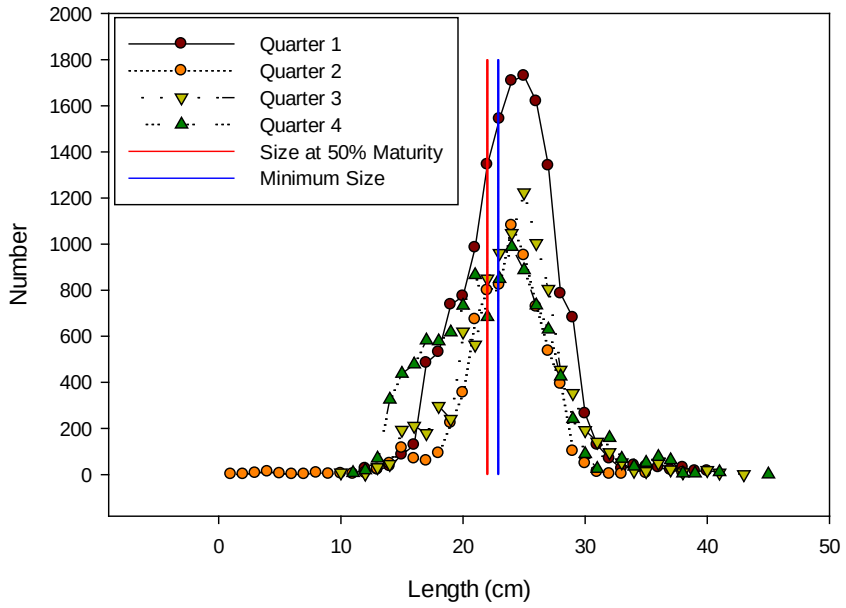

Figure 114: Observed redfish discards by quarter.