SINTEF

A26515- Unrestricted

Report

Quantifying Size Selection of Cod (Gadus morhua) in Square Mesh Codends for Demersal Seining: a Simulation-based Approach

Author(s)
Bent Herrmann
Roger B. Larsen (University of Tromsø, Uit)
Manu Sistiaga
Nina A.H. Madsen
Karl G. Aarsæther
Eduardo Grimaldo
Olafur A. Ingolfsson (Institute of Marine Research, IMR)

SINTEF Fisheries and Aquaculture
SINTEF Fisheries and Aquaculture
2014-11-26

SINTEF Fiskeri og havbruk AS
SINTEF Fisheries and Aquaculture
Address:
Postboks 4762 Sluppen
NO-
NORWAY
Telephone:+47 40005350
Telefax:+47
fish@sintef.no
www.sintef.no/fisk
Enterprise /VAT No:
NO 980 478 270 MVA

KEYWORDS:
Demersal Seining
Square meshes
Codend size selection
Cod (Gadus morhua)
Simulation
FISHSELECT.

Report

Quantifying Size Selection of Cod (Gadus morhua) in Square Mesh Codends for Demersal Seining: a Simulation-based Approach

VERSION
1.0

DATE
2014-11-26

AUTHOR(S)
Bent Herrmann
Roger B. Larsen (University of Tromsø, Uit)
Manu Sistiaga
Nina A.H. Madsen
Karl G. Aarsæther
Eduardo Grimaldo
Olafur A. Ingolfsson (Institute of Marine Research, IMR)

CLIENT(S)
The Norwegian Seafood Research Fund - FHF
The research Council of Norway

CLIENT'S REF.
900861
225193

PROJECT NO.
225193 (MAROFF-2) / 900861 (FHF) / 6020699 (SFH)

NUMBER OF PAGES/APPENDICES:
30 + Appendices

ABSTRACT
Demersal seining is an important fishing method to harvest cod (Gadus morhua) in Norwegian fisheries. Knowledge about size selectivity of cod in this type of fishing gear is therefore of importance for managing the exploitation of cod resources. However, limited data exist on the size selection of cod in the square mesh codends mostly applied in this fishery. The purpose of the project "Danish Seine: Computer based Development and Operation" (MAROFF-2 project no. 225193 / FHF 900861), funded by Research Council of Norway (RCN) and Norwegian Seafood Research Fund (FHF), is to develop and apply software tools to investigate Demersal Seine fishing. One important aspect of this is related to simulate the size selectivity inside the Seine codend. By using knowledge of fish morphology and the computer-based simulation method FISHSELECT, we investigated the potential for size selection of cod in square mesh codends for demersal seining. We were able to explain and understand existing experimental selectivity results and predict the effect of design changes in the codend. The results showed that the currently applied codend designs are adequate to ensure low catches of cod below the minimum size for this fishery, but they also indicated that a considerable part of the size selection may occur through slack meshes. Thus, it is likely that part of the codend mesh selection may occur when the gear is at the surface. This report provides a set of guidelines on what size selectivity that can be expected for cod in square mesh codends with various mesh sizes, mesh openness's and mesh states. These design guides are intended to support fishermen, authorities and fishing gear technologists regarding choice of codend design for demersal seining targeting cod in different situations.

SINTEF Fiskeri og havbruk AS
SINTEF Fisheries and Aquaculture

Address:
Postboks 4762 Sluppen
NO-
NORWAY

Telephone:+47 40005350
Telefax:+47

fish@sintef.no
www.sintef.no/fisk
Enterprise /VAT No:
NO 980 478 270 MVA

PREPARED BY
Bent Herrmann

SIGNATURE

CHECKED BY
Nina Madsen

SIGNATURE

APPROVED BY
Marit Aursand

SIGNATURE

REPORT NO.	ISBN	CLASSIFICATION	CLASSIFICATION THIS PAGE
A26515	978-82-14-05774-4	Unrestricted	Unrestricted

Document history

VERSION	DATE	VERSION DESCRIPTION
1.0	2014-11-26	

SINTEF

Table of contents

1 Introduction

Cod (*Gadus morhua*) is the most important species in the Norwegian white fish fishery when measured in both tonnes landed and in value (www.råfisklaget.no). About 20% of the Norwegian cod quota is caught by demersal seining, i.e. the Norwegian style fly dragging of a seine net. Most of the Norwegian demersal seine fishing targeting cod is conducted north of 64ºN. This fishing method has been increasingly favoured over the last decades at the expense of e.g. gillnetting and longlining. Many of the seine vessels operate in coastal areas, including fjords, while larger vessels also target fish in deeper waters. Especially within the last 15-20 years, vessel size, main engine power and gear size has increased (Digre et al. 2010). Studies on bottom trawls (Engås and Godø 1989, Ingolfsson and Jørgensen 2006) showed that a relatively large fraction of small and undersized cod, haddock (*Melanogrammus aeglefinus*) and saithe (*Pollachius virens*) escape below the fishing line. Modern demersal seines towed by larger vessels are in the northern fisheries usually equipped with a weighted netting skirt to prevent escapement below the ordinary fishing line. Therefore, these seine nets are likely to experience entry of more small fish than before, making the size selection in the codend increasingly important.

Demersal seining in Norwegian fishery targeting cod and other demersal fish is practiced by deploying two long seine ropes connected to the wing tips of the seine net in one end and the winches of the vessel on the other end. The length of the seine ropes is restricted to 2000 m each, when fishing inside the four nautical mile limit. The seine net has a typical headline and fishing line length of 123 m and a maximum circumference of 156 m stretched in the mouth when used inside the four nautical mile limit. The seine ropes, made of up to Ø60 mm combination rope (polyethylene with a steel core) weighting more than 2 kg/m, are placed on the seabed in a quadrilateral pattern in order to encircle the targeted fish (Sainsbury 1996). Once the ropes and the net have reached the seabed the vessel starts moving forward at a speed of 1-1.5 knots. As a result of the vessel movement the seine ropes are moving towards each other and herd the fish into the centre of the encircled area; the collecting phase. At some instance the net will start moving along the seabed when pulled by the seine ropes. When the distance between the ropes has decreased to a certain level the rope drums are activated in order to close the wings fast and to force the last fraction of collected fish into the codend; the closing phase. This fly dragging principle of demersal seining is shown in Fig. 1.

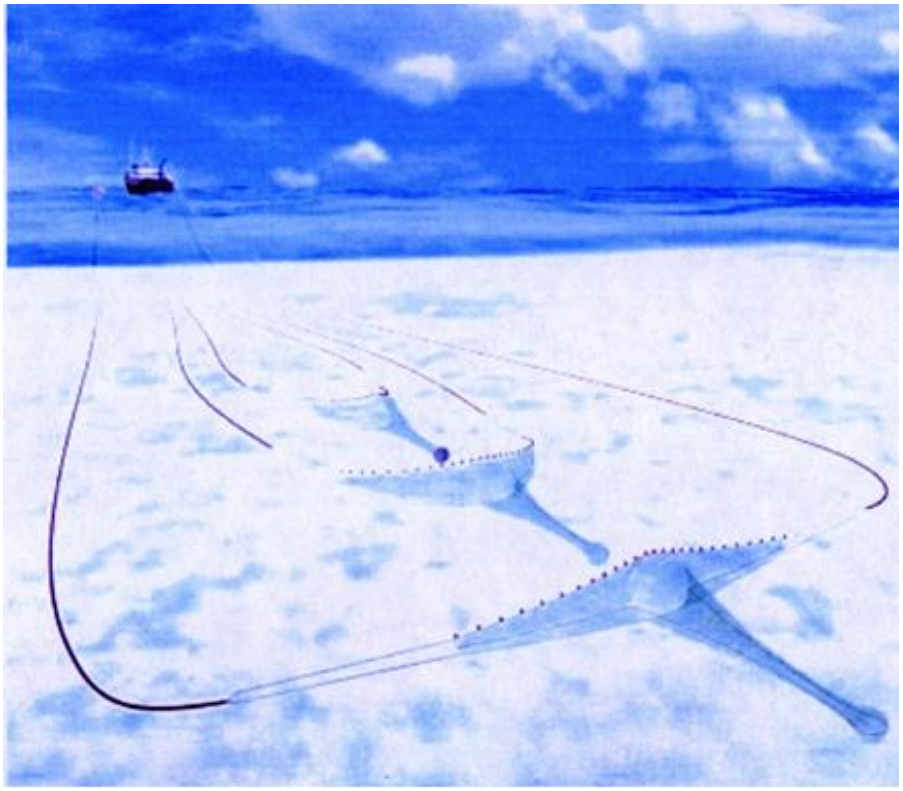

Fig. 1: Principles of a demersal seine in a fly dragging operation (not scaled), showing the collecting and closing phases. (The full process in the Norwegian operation is: Drop a drift buoy attached to the start of first (port) rope, deployment of port rope, deployment of the seine net (and stretch out wing ends), deployment of the starboard rope, returning to drift buoy (start point), pick up buoy and first rope, adjust rope lengths and start the fishing operation). © Crown copyright 2004.

Recent underwater observations (conducted by the sixth author) has confirmed that fish starts entering the funnel of the net as soon as the seine net is sat in motion during the collecting phase, but the majority of those fish herded by the ropes enters the belly and codend sections in the latter stage of the closing phase. The actual fishing time, i.e. the collecting and closing phase, may be as short as 15 minutes. The good initial physical condition of seine net caught fish is often explained by the relatively low towing speed and short fishing time. For this reason, the demersal seine is the commonly used gear to catch live cod for capture based aquaculture (Dreyer at al. 2008).

The size of seine net, total lengths and dimensions of the seine ropes vary depending on the size of the vessel. Mandatory codends used in fishing areas north of 64^{o}N must have a minimum mesh size of 130 mm or 125 mm depending on whether they are constructed in diamond meshes or square meshes. The regulations require that only the 125 mm square mesh codend should be used in specific areas to protect the undersized haddock along the coast (Norwegian Fisheries Directorate, 2010). Most of the demersal seine fishery north of 64°N is in fact carried out using this type of codend. The reason for demanding the use of a square mesh codend for this fishery is that this type of codend increases the potential escaping area for the fish compared to an ordinary diamond mesh codend. Due to the longitudinal tensions, the meshes in a diamond mesh codend have small openness except for the area just in front of the catch bulk. Whereas, in a square mesh codend the tension while fishing is distributed along the mesh bars enabling these meshes to keep open and stable along the whole codend (Robertson and Stewart, 1988; Krag et al., 2011;

Herrmann et al., 2007a). Since the fish spends little time in the back part of the codend while the gear is at the seabed it is considered of particular importance for demersal seining that undersized fish have a fair chance to escape along the entire codend. For the final phase of the fishing operation the codend is brought next to the vessel and the catch is then either pumped or lifted on board in batches of approximately 500-800 kg in a procedure known as "sacking". When "sacking", an adequate portion of fish is released from the aft of the square mesh codend into an attached short diamond mesh section, termed the fish-lift. The entrance to the fish-lift is by regulation closed during fishing and only opens during the sacking operations. The fish-lift may contribute to the size selection during the last stage of the fishing operation (Fig. 2). On vessels using a pump to bring the catch on board, a hose is connected to the aft end of the codend. For practical reasons only portions up to 1000-1500 kg are pumped into the sorting and processing area at a time. Therefore, independent on whether the catch is pumped or sacked on board the remaining catch will spend substantial time at the surface surrounded by tensionless meshes.

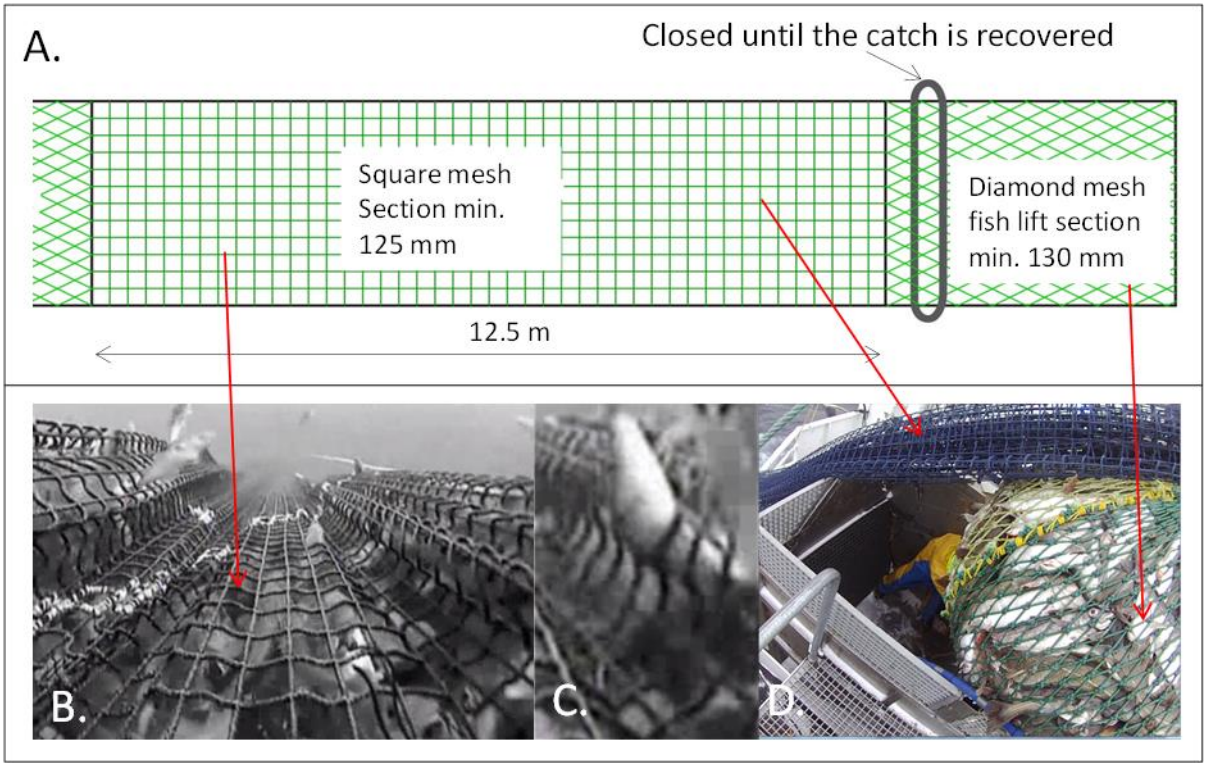

Fig. 2: Square mesh codend used in commercial demersal seine fishing to target cod. A: outline of the codend design with a main section of 125 mm (minimum mesh size) and a diamond mesh section of 130 mm (minimum mesh size) that is used as fish-lift. A binding strap ensures that fish cannot enter the fish-lift section before the process of lifting the fish on board has begun. B: Snapshot from an underwater recording showing both fully open and partly open square meshes occurring during this part of the fishing process. C: Snapshot from an underwater recording showing a fish escaping through a codend square mesh while it bends outwards the tensionless circumferential mesh bars. D: Fish-lift and aft end of the square mesh section of the codend during the "sacking" operation.

Depending on the catch volume, the number of sacks necessary to take the catch onboard can be high, especially when catches reach 20 tonnes or more. During the sacking operations the part of the square mesh codend holding the rest of the catch bulk remains at the surface with slack square meshes. The fish in a demersal seine codend does not normally

experience fatigue because they are not forced to swim for a long period in their attempt to escape the gear, as compared to e.g. the fish captured by a trawl. Therefore, it is likely that the fish in general has the sufficient energy to attempt escaping at the surface (Fig. 3).

Fig. 3: Collage of photos taken during the "sacking" operation. The photos show how the fish-lift is operated by releasing part of the catch into it while the remaining part of the catch is kept in the square mesh section of the codend at the surface. Several of the photos show that the catch remaining in the square mesh section is surrounded by tensionless square meshes. Further, there is evidence that escapement at the surface does occur.

The minimum target size for cod in Norway north of 64ºN is currently 44 cm. Thus the gear used to harvest cod in these waters should ensure low risk to retain cod below the minimum size, especially if small cod would be highly represented on the fishing grounds. Therefore it is important to have quantitative information on the size selectivity of cod in the square mesh codends commonly applied in the Norwegian demersal seine fishery. It is relevant to know to what extent the design or the operational conditions of the gear may affect the size selectivity of cod in these codends. It is unclear to which extent surface selection of cod may contribute to the overall size selection in the codend. In particular, it has not been investigated to which extent the slack meshes at the surface represent an escape possibility for

bigger cod that did not have a chance to escape at depth or during haul back, when the codend meshes hold some tension due to hydrodynamic forces. However, limited published information exists regarding size selection of cod in square mesh codends of relevance to the Norwegian demersal seine fishery. In fact, we only found one study on the size selection of cod in a square mesh codend with a mesh size of 120 mm (Isaksen and Larsen, 1988).

Because of the knowledge gaps identified above, the present study investigates which codend mesh states of the currently compulsory 125 mm square mesh would ensure the release of undersized cod.

Size selectivity studies for active fishing gears in Norwegian waters have to a great extent been conducted at sea as a direct co-operation with the industry following a trial and error procedure and solely based on experimental fishing (Kvamme and Isaksen, 2004; Jørgensen et al., 2006). Apart from being costly, time consuming and experimentally complicated for demersal seining, sea trials are limited with regard to the amount of different gear designs that can be tested. Considering these challenges we applied the FISHSELECT methodology (Herrmann et al., 2009) to investigate and predict the size selective properties of different square mesh codends relevant to the Norwegian demersal seine fishery targeting cod. Further, we try to explain and understand the limited experimental size selectivity results available from this fishery.

2 Materials and Methods

2.1 The FISHSELECT Methodology and Basic Cod Data

FISHSELECT is a framework of methods, tools, and software developed to determine if a fish is able to penetrate a certain mesh in an active fishing gear. Through computer simulation, FISHSELECT enables the estimation of the size selectivity for a certain species by comparing the morphological characteristics of the fish to the shape and size of the mesh. The methodology is thoroughly described in Herrmann et al. (2009) for a case study on trawl selectivity of cod. It has since been applied to investigate size selectivity of haddock in the North Sea (Krag et al. 2011), nephrops (*Nephrops norvegicus*) (Frandsen et al. 2010) and krill (*Euphausia superba*) (Krag et al., 2014). The FISHSELECT methodology has also been applied to study and predict the size selectivity of different species in Norwegian bottom trawl fishery north of 64º: cod and haddock (Sistiaga et al., 2011); redfish (*Sebastes spp.*) (Herrmann et al, 2012; Herrmann et al, 2013d); greenland halibut (*Reinhardtius hippoglossoides*) (Herrmann et al., 2013b). The morphological data and basic FISHSELECT models necessary to study cod size selectivity in the Norwegian demersal seine square mesh codends was already available through the bottom trawl study by Sistiaga et al. (2011), and was adapted to this study.

2.2 Mesh Penetration Modelling

Since square meshes are especially relevant for demersal seine codends (Fig. 2), it is particularly important to find an accurate way of modelling the size selectivity of cod through this type of codend netting. The model needs to consider both the shape and the potential distortion of the mesh as well as the compression of the fish when it tries to escape. In this study, we used the cross section compression model determined by Sistiaga et al. (2011) for the North-east Arctic

cod. A cross section compression model defines how and to what extent the cross section of a fish of a certain length can be compressed when the fish attempts to escape through a mesh. Regarding the shape and physical behaviour of the codend meshes we need to consider two different situations: i) during the fishing process the codend is towed and therefore only tensionless circumferential mesh bars can potentially be distorted by a cod trying to escape through it; ii) during the sacking operations the codend meshes hold no tension and a cod trying to escape through a mesh can fully distort the mesh shape. To model the meshes in situation i) Krag et al. (2011) developed a model for round fish species which was based on approximating the shape of the distorted mesh by a hexagonal shape. This model assumes that if the square mesh codend is not fully circumferentially opened, meaning that the distance between the longitudinal mesh bars is shorter than the length of the mesh bars, a round fish attempting to escape can distort the mesh into a hexagonal-like shape. The meshes in this state are defined to be in a semi-soft state (Fig. 4B). In situation ii), the slack mesh scenario, it is assumed that a cod trying to escape can fully distort the shape of the mesh in the escape attempt. This state is referred to as the soft mesh state (Fig 4C). Further, we also considered the possibility of fish not being able to distort the mesh bars at all, not even tensionless bars. In this situation the partly open square meshes can, in regard to size selection, be modelled as rectangular meshes. This mesh scenario is referred to as the stiff mesh state (Fig. 4A). Figure 4 illustrates the three mesh states which are considered for the square meshes in the FISHSELECT simulations of the size selectivity through the demersal seine codends.

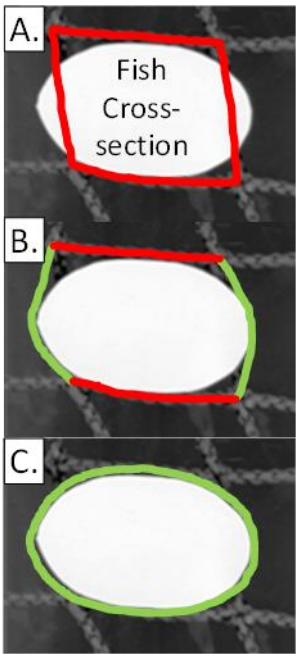

Fig. 4: The three different mesh state scenarios considered to simulate size selectivity in the square meshes of demersal seine codends. A: "stiff mesh state" where we assume that cod cannot deform the mesh in any way. B: "semi-soft mesh state" where we assume that cod can deform tensionless mesh bars outwards in a way that they become hexagonal like meshes. C: "soft mesh state" where we assume that cod can deform the mesh shape fully to take shape after its own cross section.

For the diamond meshes in the fish-lift (Fig. 2A) we considered the scenario of cod being able to distort the meshes fully (the soft mesh state) and the scenario of cod not being able to distort the meshes at all (the stiff mesh state).

For the square meshes we defined mesh openness as the circumferential distance between mesh bars to the mesh bar length. Thus, a fully open square mesh where the bars would be fully stretched would have an openness of 100%. While a square mesh where the circumferential distance between the two mesh bars was 0.7 of the length of the mesh bars would have an openness of 70%. For the diamond meshes, the openness was defined as the ratio between the circumferential distance between the knots and the axial distance between the other two knots in the mesh. Thus, a diamond having an opening angle of 90 degrees would have an openness of 100%. While a similar mesh with an opening angle of 53 degrees would have an openness of 50%.

In this study we considered the semi-soft and the stiff mesh state models for simulating the size selection of cod through square meshes with tension in the mesh bars along the codend. Thus, it is necessary to investigate if these partly opened square meshes are present in the codend during parts of the fishing process where fish actually attempts to escape. In particular it is important to assess how closed the meshes might be since this sets limits for the hexagonal-like and rectangular-like shapes to be considered while a cod attempts to escape. Underwater recordings (Fig. 2B) showed not only that partially open meshes are present in the codend but also that there are meshes with openness down to ≈ 50%. Thus, in the simulations carried out we considered mesh openness between 50% and 100%.

The slack mesh selectivity (soft mesh state) can potentially occur during any of the phases of the fishing process, especially during the sacking operation (Fig. 3). It can be simulated using the soft mesh penetration model implemented in the FISHSELECT software (Fig. 4; Herrmann et al., 2009 for further details).

2.3 Simulating the Selective Potential of the Square Mesh Codend

To examine the size selective potential in the currently legislated square mesh codend (Fig. 2) we simulated the size selection of cod through the codend meshes with openness from 50% to 100% using FISHSELECT and the cod morphology data from Sistiaga et al. (2011). For the 125 mm square meshes we considered the three different mesh state scenarios: soft, semi-soft and stiff. For the 130 mm diamond meshes in the fish-lift we considered both the soft and the stiff mesh states. The simulations were conducted following the standard FISHSELECT procedure (see Herrmann et al. (2009) for details). First, based on the morphology data reported in Sistiaga et al. (2011) we generated a virtual population of 5000 cod with lengths uniformly distributed between 20 and 100 cm. Then, we defined different hexagonal shaped meshes to represent 125 mm square meshes in a semi-soft state with openness between 50 and 100%. Similarly, we defined different rectangular meshes representing partly open square meshes in the stiff mesh state. For the soft mesh state only one 125 mm mesh was generated since the fish for this scenario is assumed to be able to distort the mesh shape fully. In addition to the square meshes, different diamond meshes of 130 mm with different openness (50% to 100) were generated to enable simulating the stiff mesh state in the fish-lift. Finally, a single 130 mm mesh was generated to represent the soft mesh state scenario for the fish-lift.

In the next step of the FISHSELECT procedure we simulated whether or not each of the 5000 virtually generated cod could pass through the defined meshes using the cod compression model from Sistiaga et al. (2011). This procedure led to a set of simulated "covered codend retention data" (Wileman et al., 1996) for each of the meshes defined. Each of these simulated retention data sets was then analysed as covered codend data assuming a standard logit selection curve (Wileman et al., 1996). This analysis was conducted using the software tool SELNET (Herrmann et al., 2012). Each of

the retention curves was represented by L05, L25, L50, L75 and L95, which is the size of a cod having respectively 5%, 25%, 50%, 75% and 95% probability of being retained by the mesh given that the fish attempted to escape through it. By plotting L05, L50 and L95 for the range of mesh openness considered likely to occur during fishing for both the square and the diamond meshes, we obtained a global picture of the selective potential of the currently legislated square mesh codend. These estimations was applied to judge the risk of catching cod below the minimum size and to assess the risk of losing cod of target size.

2.4 Understanding the Size Selection Process in a Historically Tested Square Mesh Codend

Isaksen and Larsen (1988) collected size selectivity data for a demersal seine square mesh codend using the trouser trawl sampling method (paired gear data) (Wileman et al., 1996; Herrmann et al., 2007b). The codend they applied had a mesh size of 120.1 mm and was made of 3 mm single twine nylon. Even though thicker and stiffer polyethylene twine materials are in use today, we still expect the results obtained with this old codend could help us gain some insight on the size selection processes that occur in the square mesh codends used today. We were interested in whether the experimental results obtained with this historical codend could be understood based on FISHSELECT simulations. Specifically, we needed information on the extent of escapement through slack meshes (soft mesh state), through distortion of partly opened meshes (semi-soft mesh state) and through non-distorted meshes (stiff mesh state). Accordingly, we explored if the experimental size selection curve based on the data collected by Isaksen and Larsen (1988) could be replicated by simulation scenarios with mesh states: stiff, semi-soft, soft or combinations of them. Since the fish-lift mesh size (110.1 mm) was smaller than that of the square mesh main section in the codend, it is not necessary to consider the fish-lift in the FISHSELECT simulations. We considered the following scenarios: i) stiff square meshes with varying openness between 50% and 100%; ii) semi-soft square meshes with varying openness between 50% and 100%; iii) soft square meshes; iv) a combination of a soft square mesh and semi-soft square meshes with varying mesh openness between 50% and 100%. For each of the scenarios we obtained the combination of varying openness that best was able to reproduce the experimental size selection curve of the historical codend.

To carry out the above outlined procedure we first re-analysed the historical size selection data from Isaksen and Larsen (1988) using the selectivity analysis tool SELNET (Herrmann et al., 2012). From the re-analysis we obtained the selection curve with confidence intervals and the retention lengths L05 to L95 in steps of 5, which quantify the length of a cod with respectively 5% to 95% probability of being retained in the codend. For the 120.1 mm square mesh we simulated retention curves for different mesh openness's and the different mesh states using FISHSELECT following the approach described in section 2.3. For each of the scenarios i)-iv) we estimated the contributions needed from the different retention curves to obtain combined selection curves that fitted the experimentally obtained values L05… L95. This procedure is identical to the one applied in Herrmann et al. (2013b) which contains detailed information on the technical aspects of the method.

2.5 Design Guides for Predicting Size Selectivity in Different Square Mesh Codends

To explore the potential consequences of making design changes to the currently legislated codend, we simulated the size selection for a number of other mesh sizes using FISHSELECT following the procedure described in section 2.3. We were interested in the size selection in the square mesh section and in the diamond mesh fish-lift. We considered the mesh state scenarios: soft, semi-soft and stiff to obtain a global overview of potential consequences of design changes on size selection of cod. Based on the results obtained we produced a number of design guides consisting of iso-curves for L05, L25, L50, L75 or L95 that quantify the sizes of cod which has a specific probability of being retained by a mesh depending on the mesh size and openness (consult Herrmann et al., 2009 for more information on design guides). Each design guide covers mesh sizes in the range 100 to 200 mm.

3 Results

3.1 Size Selective Potential of the Mandatory Square Mesh Codend

The size selective potential (Fig. 5) of the mandatory square mesh codend is quantified, based on the procedure described in section 2.3. The size selective potential of the three mesh state scenarios are quantified for the square mesh (125 mm) main section. The figure also quantifies the selective potential of the fish-lift (130 mm diamond meshes) considering both the soft and stiff mesh scenarios. Each of the vertical bars in the figure shows the selective range from 5% to 95% retention probability with the middle cross bar representing the 50% retention probability. The y-axis in the figure shows the corresponding cod length. The dashed horizontal line represents the minimum legal catch size for cod (44 cm).

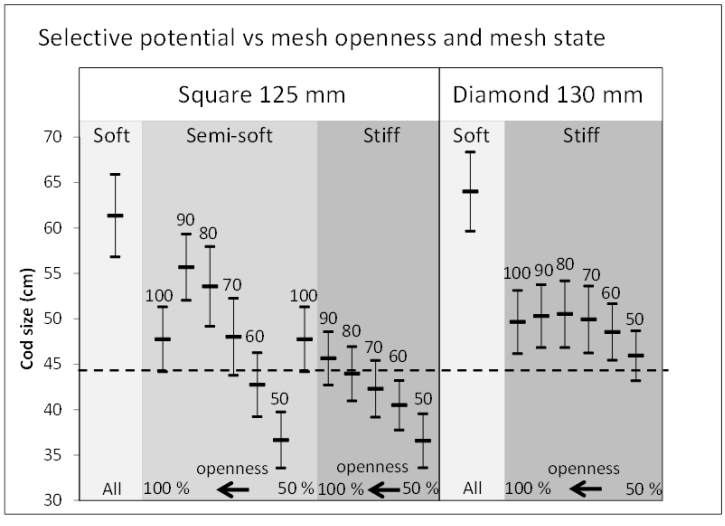

Fig. 5: Selective potential for both the 125 mm square mesh section and the 130 mm diamond mesh fish-lift section in the legislated demersal seine codend (Fig. 2). The vertical bars represent the selective range for each situation. The lower cross bar represents the 5% retention probability (L05), the middle cross bar the 50% retention probability (L50) and the top cross bar the 95% retention probability (L95). The label above each vertical bar shows the mesh openness, which is also represented on the x-axis of the plot.

The y-axis represents the length of the fish and the horizontal stippled line illustrates the minimum target size for cod (44 cm). For the square mesh section all three mesh states are considered; soft, semi-soft and stiff states. For the fish-lift we considered both the soft and stiff mesh state scenarios.

If slack mesh selectivity occurs (soft mesh state), then this could potentially result in release of cod far above the minimum size as this mesh state is predicted not to retain cod below 57 cm (Fig. 5). In addition, if semi-soft mesh selectivity with mesh openness of 80-90% occurs, cod well above 44 cm could be released. However, the meshes also need to have an openness of at least 70% to avoid retaining some undersized cod. Moreover, if cod would not be able distort even tensionless mesh bars (stiff mesh state), the square meshes would need to be fully open to avoid the risk of retaining undersized cod. If the diamond meshes were slack/soft or well open in the fish-lift, it could lead to after-selection at the surface where the entrance to the fish-lift is open.

From the above observations it is evident that the selective potential of the codend is highly dependent on the contribution of the different mesh states during the fishing process.

3.2 Understanding the Size Selection Process in the Historical Square Mesh Codend

Following the procedure described in section 2.4 we re-analysed the paired-gear selection data collected by Isaksen and Larsen (1988). The analysis revealed that the data could be described sufficiently well by a Richard curve (Wileman et al., 1996; Wienbeck et al., 2014). Fig. 6 plots the fit of the Richard curve versus the experimental data and the selection curve. Table 1 summarises the results of the analysis.

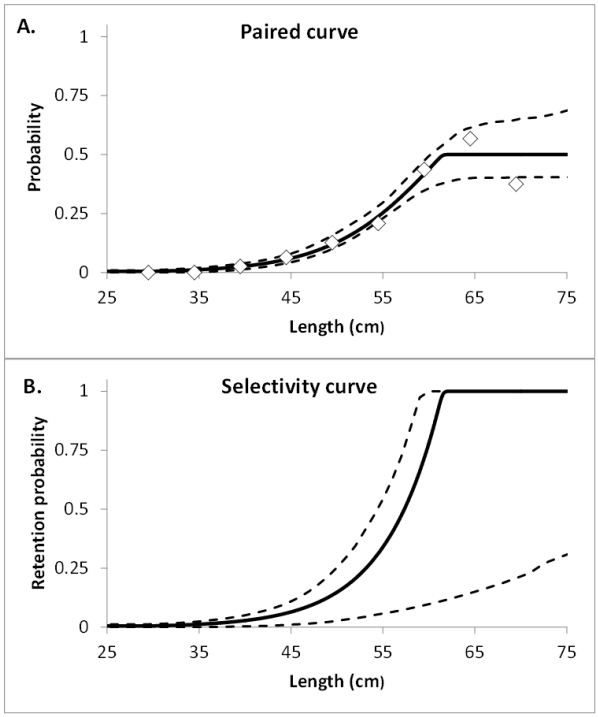

Fig. 6: Experimental size selection curves (Richard curves) obtained from re-analysing the demersal seine data collected by Isaksen and Larsen (1988). A: Experimental retention rates (diamond marks) and the estimated paired curve. B: The selectivity curve estimated. The stippled curves represent the 95% confidence bands for the estimated curves (full curves).

Table 1: Results from fitting a Richard selection curve to the selection data collected by Isaksen and Larsen (1988) for cod. The values in brackets show the 95% confidence limits. L50, SR and δ are the selection parameters for the Richard curve (see Wileman et al., 1996 or Wienbeck et al., 2014 for details). SP is the split parameter for the entry sharing of fish between the two legs of the trouser gear (see Herrmann et. al, 2007b for details). DOF are the degree of freedom. L05… L95 denote the length of cod having 5%… 95% of probability of being retained.

L50 (cm)	57.33 (54.52 - 85.65)
SR (cm)	6.61 (5.37 - 32.43)
1/δ	0.0231 (0.0193 – 100)
SP	0.500 (0.4044 - 0.8603)
P-Value	0.5889
Deviance	3.73
DOF	5
L05 (cm)	43.48 (39.44 - 53.66)
L10 (cm)	47.65 (44.14 - 59.44)
L15 (cm)	50.09 (46.88 - 63.69)
L20 (cm)	51.82 (48.69 - 66.80)
L25 (cm)	53.16 (50.09 - 70.31)
L30 (cm)	54.26 (51.30 - 73.61)
L35 (cm)	55.18 (52.34 - 76.61)
L40 (cm)	55.99 (53.18 - 79.57)
L45 (cm)	56.70 (53.85 - 82.57)
L55 (cm)	57.90 (55.08 - 88.87)
L60 (cm)	58.43 (55.61 - 92.29)
L65 (cm)	58.91 (56.11 - 96.15)
L70 (cm)	59.35 (56.58 - 100.56)
L75 (cm)	59.77 (57.10 - 105.58)
L80 (cm)	60.16 (57.49 - 110.38)
L85 (cm)	60.52 (57.83 - 116.91)
L90 (cm)	60.87 (58.36 - 123.78)
L95 (cm)	61.21 (58.71 - 137.68)

The experimental data can be described by the Richard curve since the p-value is above 0.05 (Table 1). The choice of the model is further supported by the deviance being similar to the degrees of freedom. Consult Wileman et al. (1996) or Herrmann et al. (2013c) for further details on how to interpret these fit statistics. The selection parameters for the Richard curve, L50 and SR (= L75 - L25), were estimated to be 57.3 cm and 6.6 cm respectively. The L50 is significantly and far above the 44 cm minimum legal size for cod with the lower confidence limit at 54.5 cm (Table 1). The size of a cod with 10% retention probability (L10) is estimated to be 47.7 cm with a lower confidence limit at 44.1 cm matching the minimum size. Hence a mesh size of 120 mm should ensure low catching probability for undersized cod at least for the material type applied in the historical codend.

We investigated to what extent it is possible to reproduce the size selection curve from the historical codend based on FISHSELECT simulations while assuming different mesh state scenarios (Fig. 7).

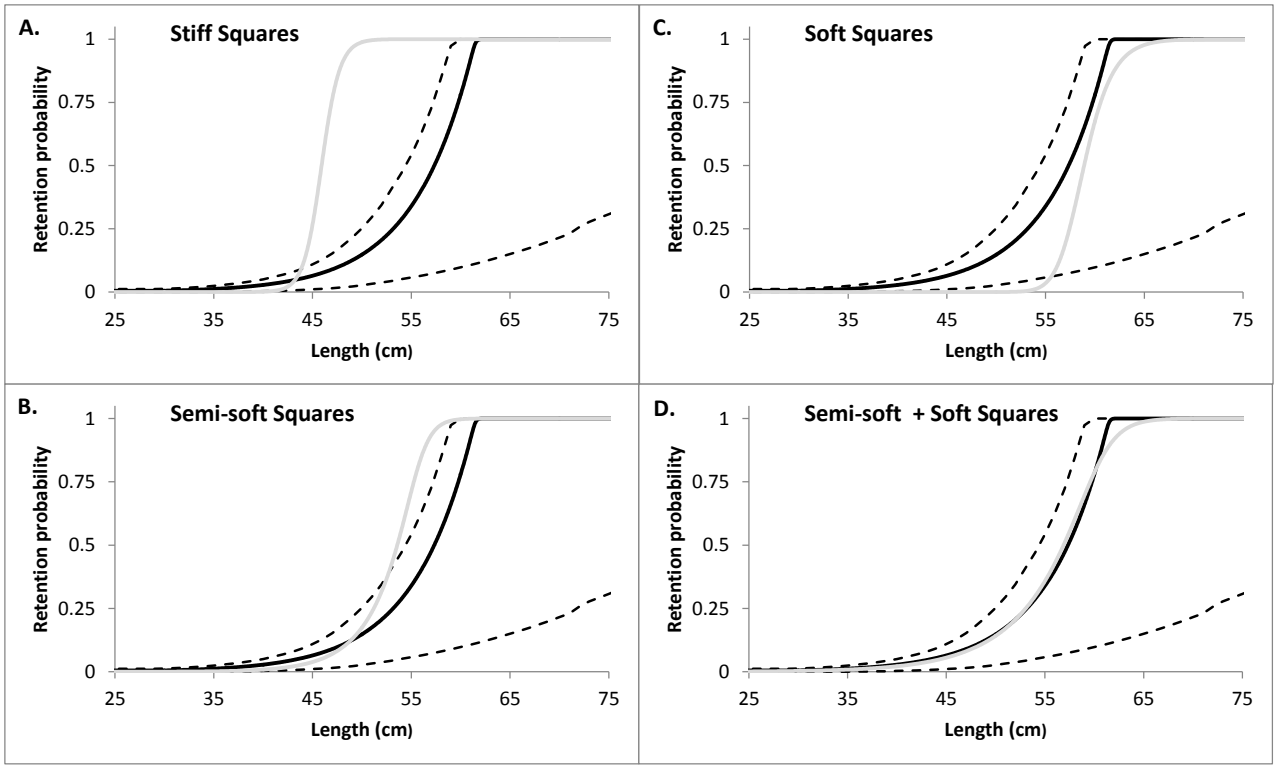

Fig. 7: Best possible fits of simulated size selectivity curves (grey curves) to experimental size selection curve (black curve) based on Isaksen and Larsen (1988). Each simulated curve assumes a different mesh state scenario. A: 100% stiff mesh state. B: Semi-soft mesh state. C: Soft mesh state. D: A combination of semi-soft and soft meshes. The stippled curves in each plot represent the 95% confidence limits for the experimental size selection curve.

In the first scenario we assumed that the fish was not able to distort the meshes during the escape attempt (stiff mesh state). Fig. 7A shows the best fit (grey curve) to the experimental curve (black curve). It is clear from the plot that a pure stiff mesh scenario can by no means explain the historical results since the best fitted curve is left compared to the confidence interval of the experimental curve. For the next scenario we assumed that the cod could distort the circumferential mesh bars (semi-soft mesh state). Fig. 7B shows that this scenario is a better fit to the experimental curve than the stiff mesh scenario. However, the semi-soft mesh scenario is not able to fully explain the upper part of the experimental selection curve since it has a significantly higher retention probability for cod sizes between 53 and 58 cm (Fig. 7B). Thus, this scenario cannot fully explain the experimentally obtained results. The third scenario considered assumed that all the cod could fully distort the meshes when trying to escape through (soft mesh state). It is clear that this scenario matches the upper part of the experimental selection curve but that it leads to a selection curve that has a retention probability significantly lower for cod below 56 cm compared to the experimental curve (Fig. 7C). Based on the results presented in Fig. 7A-C it seems likely that a combination of semi-soft and soft meshes could potentially explain the historical experimental size selection. Fig. 7D shows that this is actually case. Hence a combination of semi-soft mesh and soft mesh penetration is a possible explanation for size selection of cod in the square mesh demersal seine

codend, at least for the design used by Isaksen and Larsen (1988). The contributions of respectively soft mesh selectivity and semi-soft mesh states for the simulated curve are shown in Fig. 8.

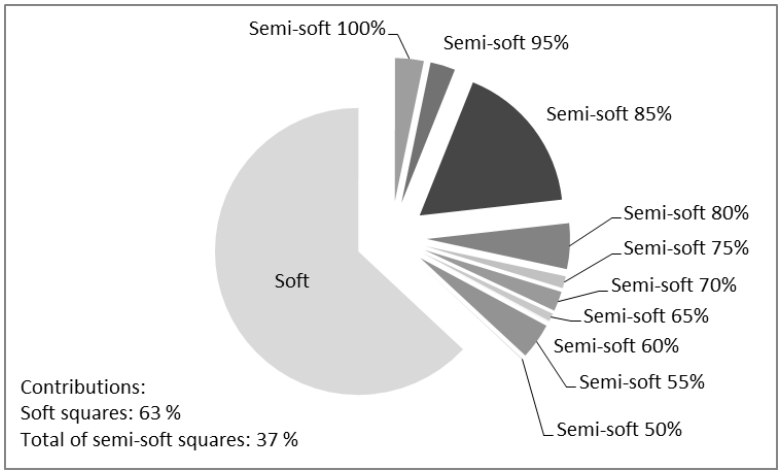

Fig. 8: Contribution of respectively the semi-soft mesh state with different mesh openness and the soft mesh state to best simulate the experimental size selection curve (data from Isaksen and Larsen (1988)). The contributions shown for the simulation are based on a combination of meshes in the semi-soft and soft state (Fig. 7D). The plot shows that more than 60% of the meshes are in the soft state while the remaining are in the semi-soft state with openness varying between 50% and 100%.

According to our predictions, a large proportion of the size selection in this type of codends occurs through slack meshes (more than 60% according to Fig. 8). The remaining 37% is caused by semi-soft meshes with openness between 50% and 100% and with the contribution of meshes with openness ≤ 70% predicted to be less than 10%. So at least for the historical square mesh codend it seems that size selectivity occurs mainly through slack meshes and a lower proportion through semi-soft meshes. For the currently applied codend materials, which are often stiffer and with thicker twine diameter (up to 7 mm), the situation might be slightly displaced towards meshes with less distortion.

3.3 Design Guides for Predicting Size Selectivity in Different Square Mesh Codends

In this section we explored the potential consequences of making design changes to the square mesh codend used in the Norwegian demersal seine fishery (Fig. 2). Using the simulation tools in FISHSELECT and following the procedure described in section 2.5, we predicted changes to size selectivity by varying mesh size. In addition to changes in the mesh size of the main square mesh part of the codend, we also considered mesh size changes in the fish-lift. The predictions included soft/slack mesh penetration and semi-soft mesh penetration since these were found to be important for the size selection in the historical codend. However, since the codend materials used today are often stiffer, and because we wanted to assess a theoretical lower limit for the size selection, we also covered the case of stiff mesh penetration in this section.

Fig. 9 plots a design guide for the soft/slack mesh scenario for codend mesh sizes between 100 and 200 mm. Since the initial mesh shape does not affect the predictions in the case of soft mesh penetration, these results are valid both for the square mesh part of the codend and the diamond fish-lift.

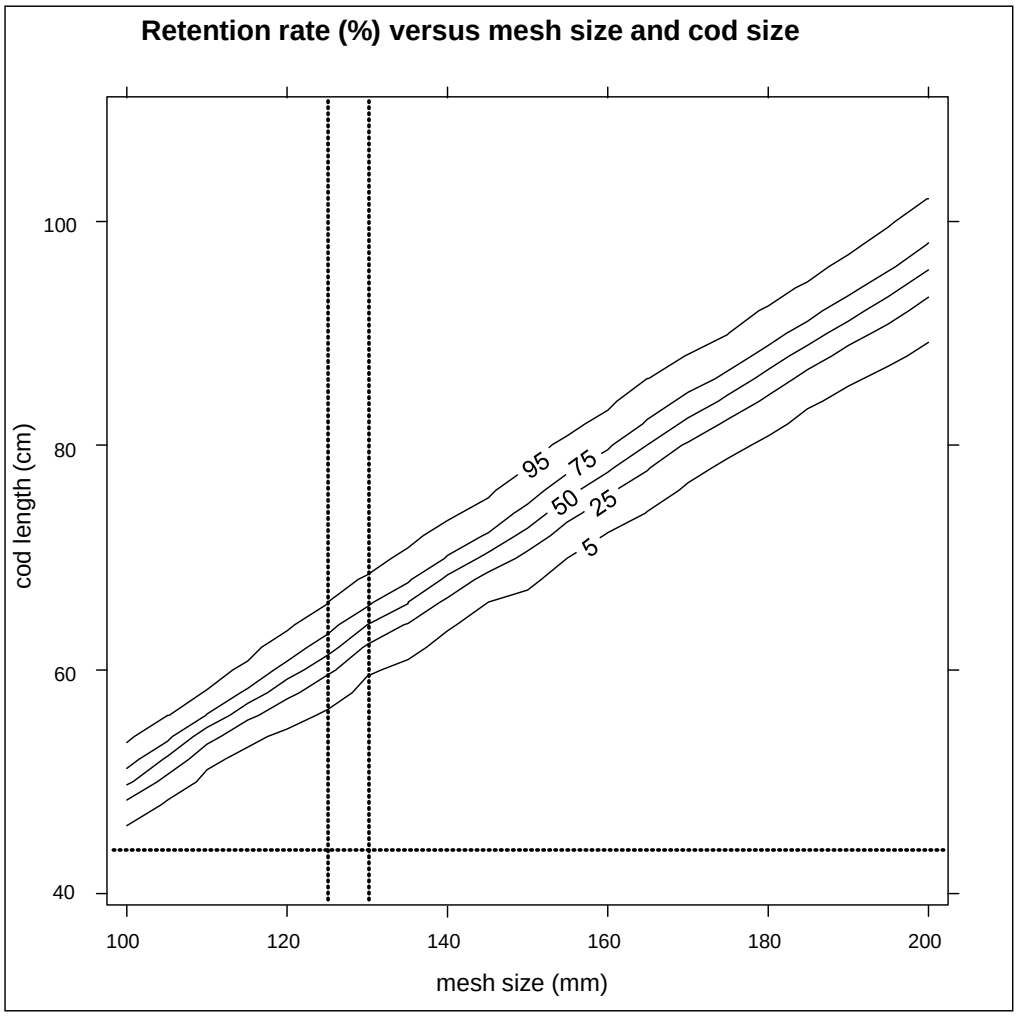

Fig. 9: Design guide for the soft mesh state. It quantifies the retention probability for different mesh sizes (x-axis) and different lengths of cod (y-axis). The iso-curves represent different levels of retention probability respectively at 5, 25, 50, 75 and 95%. The vertical lines in the plot represent the minimum mesh sizes at 125 mm and 130 mm for respectively the square mesh section and for the fish-lift. The soft mesh state design guide is applicable for both square and diamond meshes since the initial mesh shape has no effect on the retention probability for this mesh state scenario.

The first vertical line in Fig. 9 marks the current minimum mesh size for the square mesh part of the codend and the second for the fish-lift. The horizontal line marks the minimum target size for cod. Fig. 9 shows that the current mesh size in its slack form ensures negligible retention levels for cod below the minimum size. This discovery is in line with the result from Fig. 5. However, cod considerably above the minimum size would also be able to escape. Further, the larger mesh size required for the fish-lift enables escapement of even bigger cod. Hence cod that are still active when released into the fish-lift (with slack mesh state) may contribute to additional surface escapement because of the larger mesh size (Fig. 3).

Fig. 10 quantifies the predicted size selection for square meshes in semi-soft state.

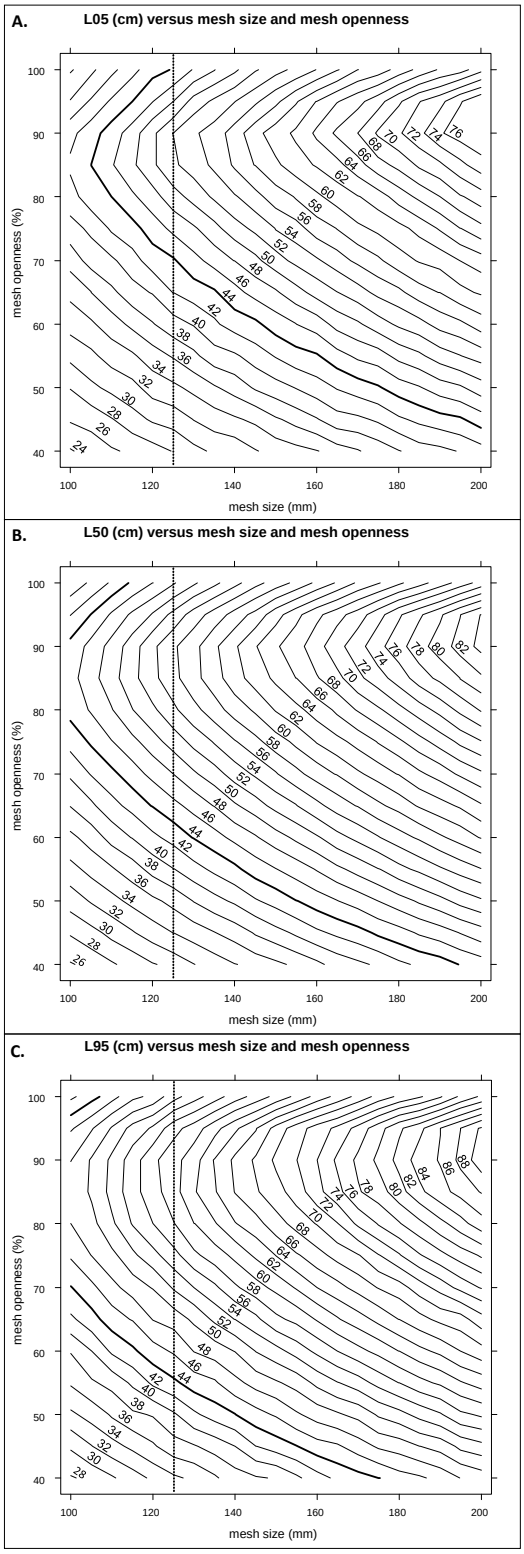

Fig. 10: Design guides for the semi-soft square mesh scenario (Fig. 4B). They quantify the size selective potential for square meshes of different size (x-axis) and mesh openness (y-axis) assuming a semi-soft mesh state. The vertical line in the plot represents the minimum mesh size at 125 mm. The thick curve in the plots represents the minimum target size for cod in the fishery. A: Iso-curves for L05 (length of cod having 5% probability of being retained given that it attempts to escape through the mesh). B: Iso-curves for

L50 (length of cod having 50% probability of being retained given that it attempts to escape through the mesh). C: iso-curves for L95 (length of cod having 95% probability of being retained given that it attempts to escape through the mesh).

Fig. 10A-C quantifies the dependency of respectively L05, L50 and L95 on mesh size and openness. The iso-curve in bold represents the minimum legal size of cod for the fishery (44 cm). The vertical lines represent the current minimum mesh size. For instance to match L05 (5% retention probability) with the minimum target size requires an openness above 72% for a mesh size of 125 mm, whereas for a mesh size of 140 mm the openness required would be above 62% (Fig. 10A). Fig 10B-C provides similar information for L50 and L95.

Based on Fig. 10 it is possible to predict the consequences of changing mesh size in a situation where cod can distort the tensionless circumferential meshes in the square mesh codend (semi-soft state). Based on the results obtained for the historical square mesh codend, this type of mesh state is likely to play a role also for the codends applied in the fishery today. However, today's use of stiffer materials makes it relevant with similar predictions for the stiff mesh state (Fig. 11).

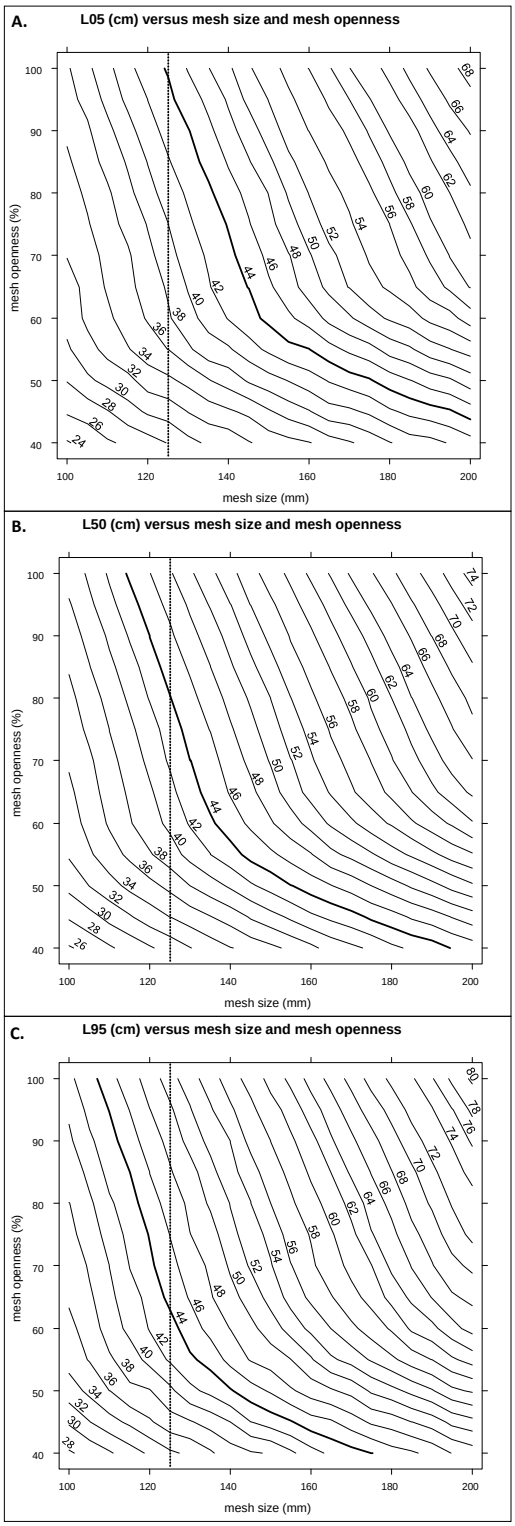

Fig. 11: Design guides for the stiff square mesh scenario (Fig. 4A). They quantify the size selective potential for square meshes of different size (x-axis) and mesh openness (y-axis) assuming a stiff mesh state. The vertical line in the plot represents the minimum mesh size at 125 mm. The thick curve in the plots represents the minimum target size of cod for the fishery. A: Iso-curves for L05 (length of cod having 5% probability of being retained given that it attempts to escape through the mesh). B: Iso-curves for L50

(length of cod having 50% probability of being retained given that it attempts to escape through the mesh). C: Iso-curves for L95 (length of cod having 95% probability of being retained given that it attempts to escape through the mesh).

A comparison of the plots in Fig. 11 with its homologous plots in Fig. 10 reveals that the retention probabilities are in general higher for the stiff meshes, except when the meshes are fully open. Fig. 11A illustrates the importance of keeping the meshes fully open when the fish is not able to distort the codend mesh bars. The L05 value for fully open meshes (100%) matches the minimum legal sized cod at 44 cm for the current legal mesh size. However, for a mesh size of 125 mm L05 decreases considerably with decreasing openness. For example, L05 is only about 39 cm if the openness is 70% and only 33 cm for an openness of 50%. A similar tendency is found for respectively L50 (Fig. 11B) and L95 (Fig. 11C).

When the diamond meshes in the fish-lift are under tension, they act like stiff diamond meshes for cod trying to escape. Fig. 12 shows predictions for stiff diamond meshes similar to those shown in Fig. 10 and 11 for the square meshes in the main part of the codend. A stiff 125 mm diamond mesh with openness above 53% for example, would enable the escape of nearly all undersized cod.

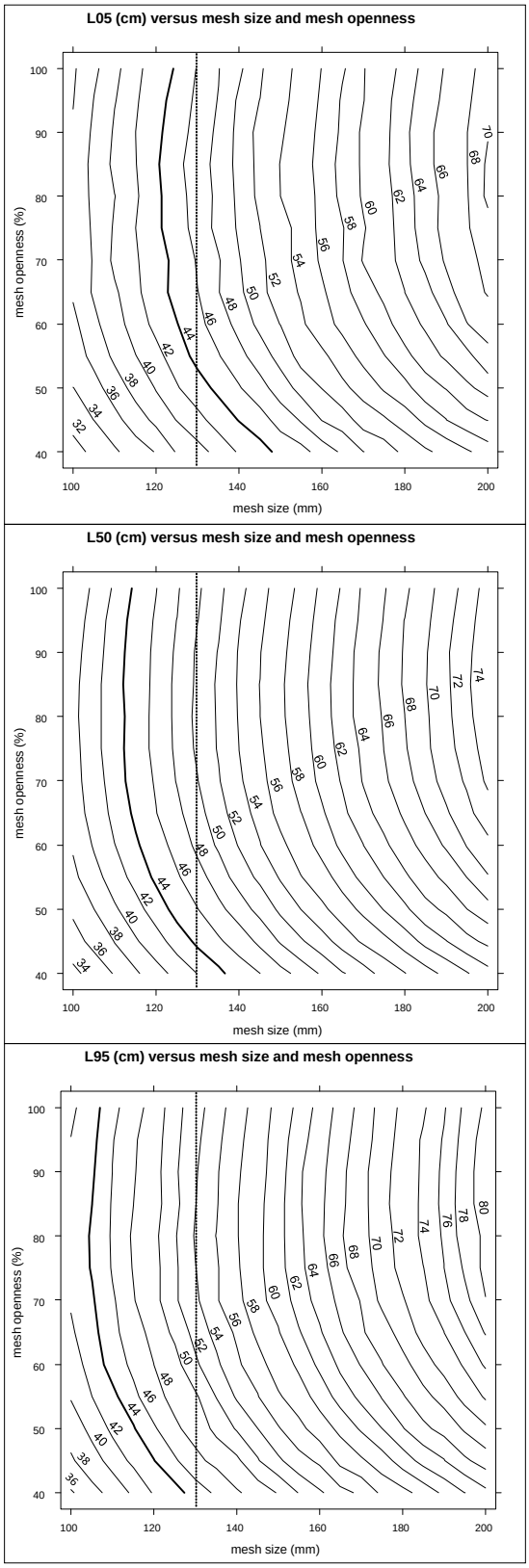

Fig. 12: Design guides for the stiff diamond mesh scenario. They quantify the size selective potential for diamond meshes of different size (x-axis) and mesh openness (y-axis) assuming a stiff mesh state. The vertical line in the plot represents the minimum mesh size

for the fish-lift at 130 mm. The thick curve in the plots represents the minimum target size of cod for the fishery. A: Iso-curves for L05 (length of cod having 5% probability of being retained given that it attempts to escape through the mesh). B: Iso-curves for L50 (length of cod having 50% probability of being retained given that it attempts to escape through the mesh). C: Iso-curves for L95 (length of cod having 95% probability of being retained given that it attempts to escape through the mesh).

3.4 Design Guides for Predicting Size Selectivity for specific sizes of cod in Different Square Mesh Codends

In this section we present a set of design guides that quantify the retention probabilities for cod at specific sizes in different meshes for different square mesh codends. These design guides are produced based on the same simulations as used for the design guides in section 3.3 and the design guides in this section are intended to supplement those shown in section 3.3.

Fig. 13 quantifies the predicted retention probability for a respectively 44 cm, 50 cm and 60 cm cod for square meshes in semi-soft state.

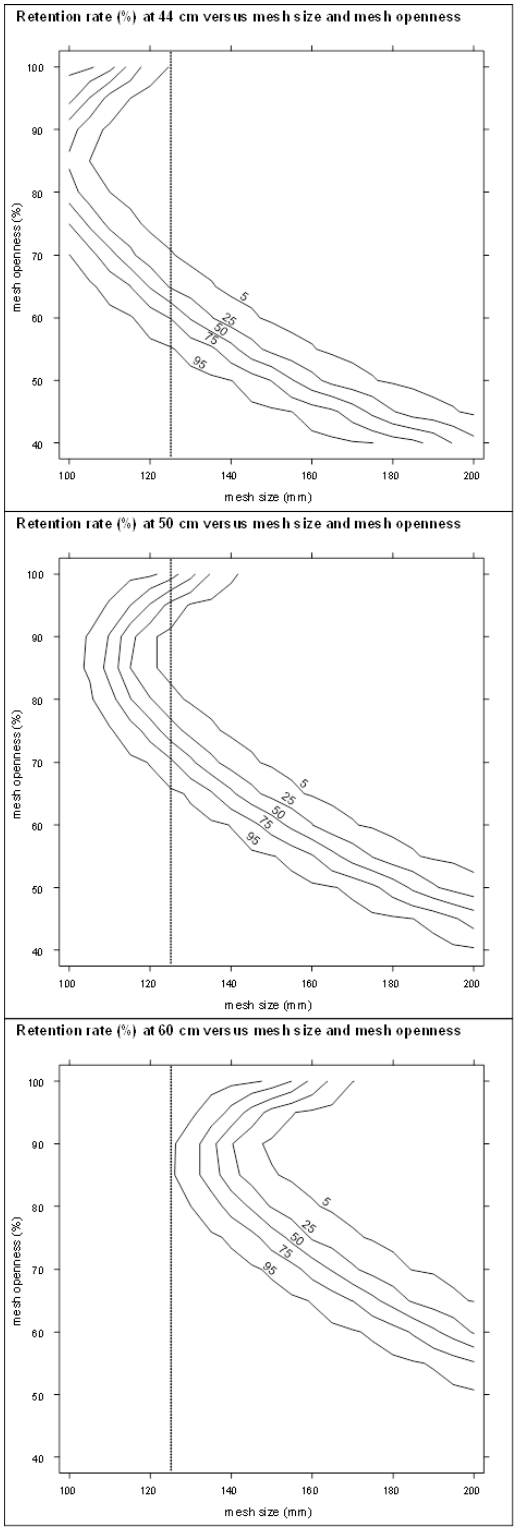

Fig. 13: Design guides for the semi-soft square mesh scenario (Fig. 4B). They quantify the retention probabilities for cod at respectively 44 cm (top), 50 cm (middle) and 60 cm (bottom) for square meshes of different size (x-axis) and mesh openness (y-axis) assuming a semi-soft mesh state. The vertical line in the plot represents the minimum mesh size at 125 mm.

Fig. 14 quantifies the predicted retention probability for a respectively 44 cm, 50 cm and 60 cm cod for square meshes in the stiff mesh state.

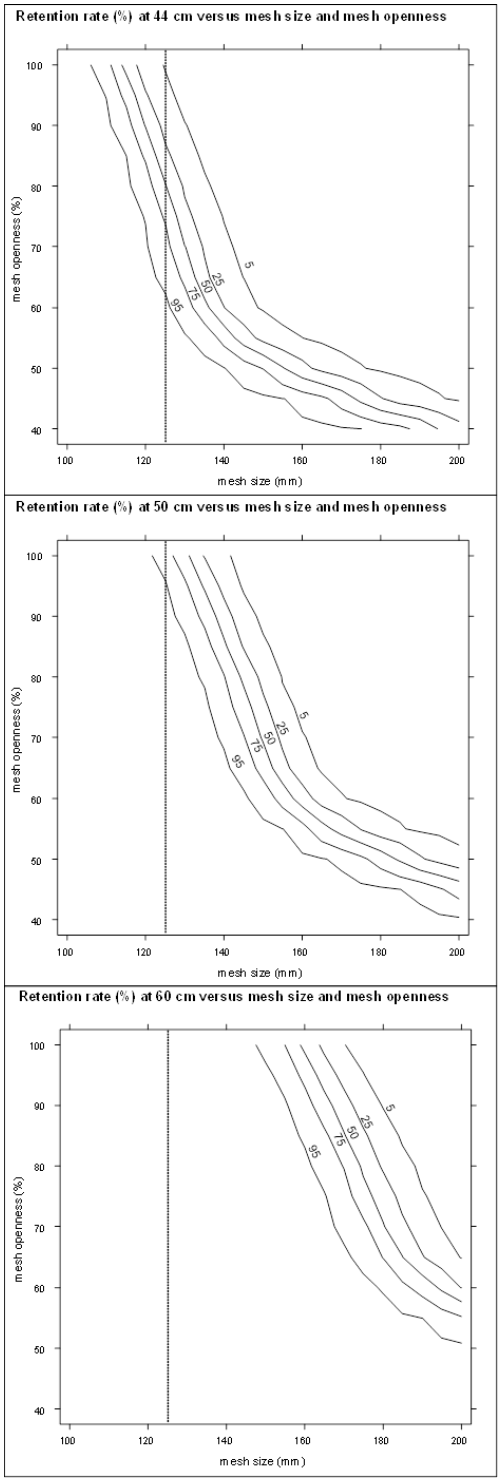

Fig. 14: Design guides for the stiff square mesh scenario (Fig. 4A). They quantify the retention probabilities for cod at respectively 44 cm (top), 50 cm (middle) and 60 cm (bottom) for square meshes of different size (x-axis) and mesh openness (y-axis) assuming a stiff mesh state. The vertical line in the plot represents the minimum mesh size at 125 mm.

Fig. 15 quantifies the predicted retention probability for a respectively 44 cm, 50 cm and 60 cm cod for diamond meshes in the stiff mesh state.

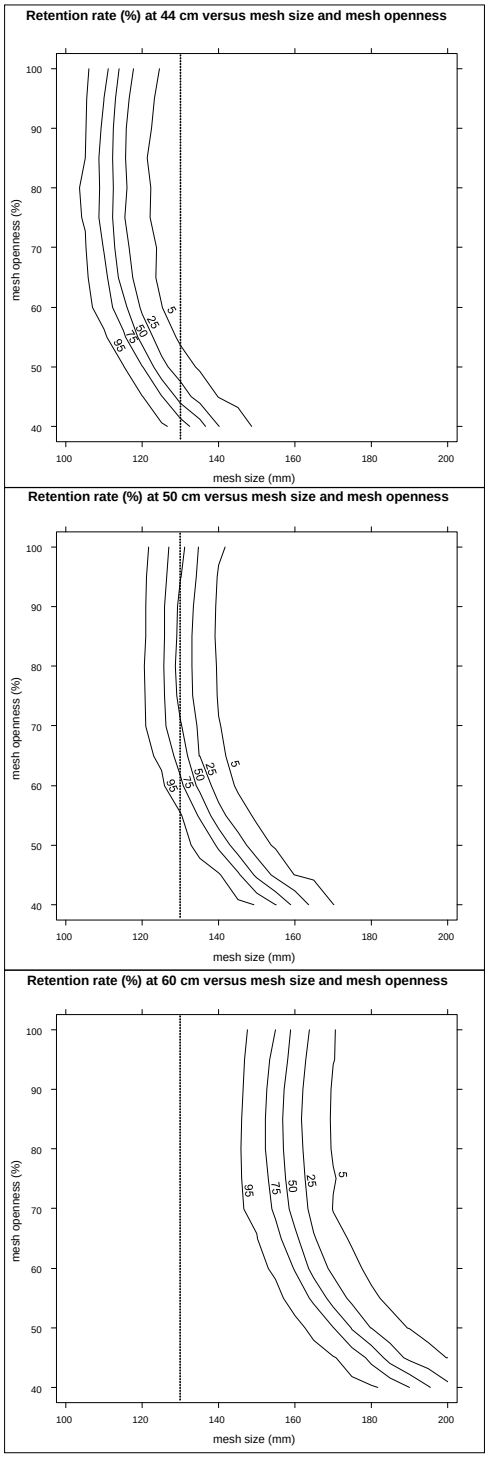

Fig. 15: Design guides for the stiff diamond mesh scenario. They quantify the retention probabilities for cod at respectively 44 cm (top), 50 cm (middle) and 60 cm (bottom) for diamond meshes of different size (x-axis) and mesh openness (y-axis) assuming a stiff mesh state. The vertical line in the plot represents the minimum mesh size for the fish-lift at 130 mm.

4 Discussion

We investigated the size selection of cod in square mesh codends with relevance for Norwegian demersal seine fishing. Limited scientific work is published on this gear in general and in particular on its selectivity. We applied for the first time the fish morphology and simulation-based method FISHSELECT to investigate size selection in demersal seines. We investigated the size selectivity in the mandatory codend for this fishery (Fig. 2) to conclude that the 125 mm square meshes ensure low retention probability of undersized cod as long as they are fully open or the cod attempting to escape are able to distort the tensionless mesh bars in the partially opened meshes. We also studied the selective properties of the 130 mm diamond mesh fish-lift, which the cod is released into during the process of taking the catch onboard, to learn that it can potentially lead to an after-selection process at the surface for some sizes of the cod if the meshes are sufficiently open or slack.

Based on FISHSELECT simulations we were able to explain the size selection curve for the only published study on square mesh codends for the Norwegian demersal seine fishery (Isaksen and Larsen, 1988). Soft/slack mesh escapement seemed to play an important role for the selection process in the codend. Consequently, one could speculate at which stage of the fishing process the selection may occur and what would be the survival rate of those escaping fish. The codends used in the fishery today are made of stiffer and thicker twine and it can therefore be questioned if soft/slack mesh escapement plays as big a role today as it did 25 years ago. Therefore, it would be beneficial to carry out selectivity experiments with the types of codends used in the fishery today (e.g. square mesh codends).

If cod as indicated from underwater recordings (Fig. 2) can distort tensionless square meshes (semi-soft state), then the design used today would enable the escapement of all cod below the target size (44 cm) as long as the mesh openness is at least 70%. However, this mesh configuration can also lead to considerable escapement of cod far above the minimum size if the meshes in the codend become slack as they might do during the sacking operation (Fig. 3). In towed fishing gears, late escapement through codend meshes is a known phenomenon as various demersal trawl selectivity studies have reported it in the past (Grimaldo et al., 2009; Herrmann et al., 2013a). In particular, Herrmann et al. (2013a) reported that about 30% of the cod entering the codend during the fishing process made their first escape attempt after the haul back operation had begun. Because the fish in a demersal seine is expected to have spent less time in contact with the gear than in a demersal trawl, both fishermen and scientists claim that when taken onboard the fish harvested with demersal seines is less exhausted (see for instance Dreyer et al. 2008). Since seine caught fish hold a good physiological state as they reach the surface, late escapement might be even more prominent for demersal seines than it is for demersal trawls. The design guides (Fig. 9-12) produced in the current study enable the exploration of the consequences of making design changes to the codends used in the demersal seine fishery. These design guides are tools that facilitate a quick first judgement that could aid on decision making for both fisheries managers and fishermen. We believe this approach could also be relevant and be applied to seine fisheries other than the Norwegian cod demersal seine fisheries.

Keeping in mind the evident technological improvements and capacities on vessels and gears since the Isaksen and Larsen (1988) data were collected, it is important to encourage the industry and the science community to update data on the selection characteristics of modern demersal seines. The Norwegian demersal seine fleet today consists of more

than 300 vessels in a size range of 15-40 m, and the variations of dimensions on gear (seine ropes and net), hauling operations and catch handling varies accordingly. The fishing method has over the last 5 decades changed from a historical typical gear for the catch of plaice (*Pleuronectas platessa*) on smooth sandy grounds (i.e. using the original Danish seine principle) to become very efficient for species like cod, haddock, saithe and the deep water species greenland halibut. Due to structural changes inside the Norwegian fisheries it is expected that larger proportions of the national quotas for the most important commercial species of bottom fish will be caught by demersal seines in the future. Especially the use of heavy ropes (up to 2.2 kg/m) and modern types of groundgears (i.e. a flexible netting panel weighted with chains and combination wire) to avoid fish escapement below the fishing line, may lead to the entry of more small fish given they are present in the population making codend size selection increasingly important.

5 Acknowledgements

The investigations included in this study were funded by the Research Council of Norway (project no. 225193 (MAROFF-2)) and the Norwegian Seafood Research Fund (project no. 900861 (FHF)). We are grateful for their financial support.

6 References

Digre, H., Aursand, I.G., Aasjord, H.L., Geving, I.H., 2010. Fangstbehandling i snurrevadflåten. Sintef report no SFH80 A105002 (in Norwegian). ISBN 978-82-14-049329-5.

Dreyer, B.M., Nøstvold, B.H., Midling, K.Ø., Hermansen, Ø., 2008. Capture-based aquaculture of cod. In A. Lovatelli and P.F. Holthus (eds). Capture-based aquaculture. Global overview. FAO Fisheries Technical Paper. No. 508. Rome, FAO. pp. 183–198.

Engås, A., Godø, O.R., 1989. Escape of fish under the Norwegian sampling trawl and its influence on survey results. ICES J. Mar. Sci. 45, 269-276.

Frandsen, R., Herrmann, B., Madsen, N., 2010. A simulation-based attempt to quantify the morphological component of size selectivity of *Nephrops norvegicus* in trawl codends. Fish. Res. 101, 156-167.

Grimaldo, E., Larsen, R. B., Sistiaga, M., Madsen, N., Breen, M., 2009. Selectivity and escape percentages during three phases of the towing process for codends fitted with different selection systems. Fish. Res. 95, 198–205.

Herrmann, B., Priour, D., Krag, L.A., 2007a. Simulation-based study of the combined effect on cod-end size selection of turning meshes by 90 degrees and reducing the number of meshes in the circumference for round fish. Fish. Res. 84, 222–232.

Herrmann, B., Frandsen, R., Holst, R., O'Neill, F.G., 2007b. Simulation-based investigation of the paired-gear method in cod-end selectivity studies. Fish. Res. 83, 175–184.

Herrmann, B., Krag, L.A., Frandsen, R.P., Madsen, N., Lundgren, B., Stæhr, K.J., 2009. Prediction of selectivity from morphological conditions: methodology and a case study on cod (*Gadus morhua*). Fish. Res. 97, 59–71.

Herrmann, B., Sistiaga, M., Nielsen, K.N., Larsen, R.B., 2012. Understanding the size selectivity of redfish (Sebastes spp.) in North Atlantic trawl codends. J.Northw. Atl. Fish. Sci., 44, 1–13.

Herrmann, B., Mieske, B., Stepputtis, D., Krag, L., Madsen, N., Noack, T., 2013a. Modelling towing and haul-back escape patterns during the fishing process: a case study for cod, plaice, and flounder in the demersal Baltic Sea cod fishery. ICES J. Mar. Sci. 70, 850–863.

Herrmann, B., Sistiaga, M., Larsen, R.B., Nielsen, K.N., Grimaldo, E., 2013b. Understanding sorting grid and codend size selectivity of Greenland halibut (*Reinhardtius hippoglossoides*). Fish. Res. 146, 59–73.

Herrmann, B., Wienbeck, H., Moderhak, W., Stepputtis, D., Krag, L., 2013c. The influence of twine thickness, twine number and netting orientation on codend selectivity. Fish. Res. 145, 22–36.

Herrmann, B., Sistiaga, M., Larsen, R. B., Nielsen, K. N., 2013d. Size selectivity of redfish (*Sebastes spp*.) in the Northeast Atlantic using grid-based selection systems for trawls. Aqua. Liv. Res. 26, 109–120.

Isaksen, B., Larsen, R.B., 1988. Codend selectivity of the Danish Seine investigated by the trouser trawl method. ICES CM 1988/B:28.

Robertson, J.H.B., Stewart, P.A.M., 1988. A comparison of size selection of haddock and whiting by square and diamond mesh codends. ICES J. Mar. Sci. 44, 148–161.

Jørgensen, T., Ingolfsson, O.A., Graham, N., Isaksen, B., 2006. Size selection of cod by rigid grids—is anything gained compared to diamond mesh codends only? Fish. Res. 79, 337–348.

Ingolfsson, O.A., Jørgensen, T., 2006. Escapement of gadoid fish beneath a commercial bottom trawl: Relevance to the overall trawl selectivity. Fish. Res. 79, 303–312.

Krag, L.A., Herrmann, B., Madsen, N., Frandsen, R.P., 2011. Size selection of haddock (*Melanogrammus aeglefinus*) in square mesh codends: A study based on assessment of decisive morphology for mesh penetration. Fish. Res. 110, 225–235.

Krag, L.A., Herrmann, B., Iversen, S., Engås, A., Nordrum, S., Krafft, B.A., 2014. Size selection of Antarctic krill (*Euphausia superba*) in trawls. PloS ONE 9(8): e102168. doi:10.1371/journal.pone.0102168.

Kvamme, C., Isaksen, B., 2004. Total selectivity of a commercial cod trawl with and without a grid mounted: grid and codend selectivity of north-east Arctic cod. Fish. Res. 68, 305–318.

Sainsbury, J.C., 1996. Commercial fishing methods. An introduction to vessels and gears 3rd ed. Fishing News Books ISBN 10: 0-85238-217-0. 359 pp.

Sistiaga, M., Herrmann, B., Nielsen, K. N., Larsen, R.B., 2011. Understanding limits to cod and haddock separation using size selectivity in a multispecies trawl fishery: an application of FISHSELECT. Can. J. Fish. Aquat. Sci. 68, 927–940.

Wienbeck, H., Herrmann, B., Feekings, J. P., Stepputtis, D., Moderhak, W., 2014. Comparative analysis of legislated and modified Baltic Sea trawl codends for simultaneously improving the size selection of cod (*Gadus morhua*) and plaice (*Pleuronectes platessa*). Fish. Res. 150, 28–37.

Wileman, D., Ferro, R.S.T., Fonteyne, R., Millar, R.B. (Eds.), 1996. Manual of Methods of Measuring the Selectivity of Towed Fishing Gears. , ICES Coop. Res. Rep., No. 215, 126 pp.

Appendices

Appendix A1: Guideline table for the soft mesh state. It quantifies the retention probabilities in percentage for fish between 30 and 80 cm for different mesh sizes between 100 and 200 mm.

Mesh size (mm)	Retention probability (%) at fish length (cm)										
	30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
100	0	0	0	1	56	99	100	100	100	100	100
105	0	0	0	0	13	91	100	100	100	100	100
110	0	0	0	0	1	54	99	100	100	100	100
115	0	0	0	0	0	16	93	100	100	100	100
120	0	0	0	0	0	5	65	98	100	100	100
125	0	0	0	0	0	2	30	91	100	100	100
130	0	0	0	0	0	0	6	66	98	100	100
135	0	0	0	0	0	0	2	36	93	100	100
140	0	0	0	0	0	0	1	11	73	98	100
145	0	0	0	0	0	0	0	3	42	95	100
150	0	0	0	0	0	0	0	1	18	78	98
155	0	0	0	0	0	0	0	0	5	45	93
160	0	0	0	0	0	0	0	0	1	18	79
165	0	0	0	0	0	0	0	0	1	7	49
170	0	0	0	0	0	0	0	0	0	2	21
175	0	0	0	0	0	0	0	0	0	1	8
180	0	0	0	0	0	0	0	0	0	0	3
185	0	0	0	0	0	0	0	0	0	0	1
190	0	0	0	0	0	0	0	0	0	0	0
195	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0

Appendix A2: Guideline table for the soft mesh state. It quantifies the length of fish in cm with different retention probabilities 5 to 95 % for different mesh sizes between 100 and 200 mm.

Mesh size (mm)	Length of fish (cm) with specific retention probability																		
	5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
100	46	47	48	48	48	49	49	49	50	50	50	50	50	51	51	51	52	52	53
105	49	50	50	51	51	51	51	52	52	52	52	53	53	53	54	54	54	55	56
110	51	52	53	53	54	54	54	54	55	55	55	55	56	56	56	56	57	57	58
115	53	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	60	60
120	55	56	57	57	58	58	58	59	59	59	59	60	60	60	61	61	62	62	63
125	57	58	59	59	60	60	60	61	61	61	62	62	62	63	63	63	64	65	66
130	60	61	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	68
135	61	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	69	71
140	64	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	71	72	73
145	66	67	68	68	69	69	70	70	70	71	71	71	71	72	72	73	73	74	75
150	67	69	70	70	71	71	72	72	72	73	73	73	74	74	75	75	76	77	78
155	70	71	72	73	73	74	74	75	75	75	76	76	76	77	77	78	78	79	81
160	72	74	75	75	76	76	77	77	77	78	78	78	79	79	80	80	81	82	83
165	74	76	77	77	78	78	79	79	80	80	80	81	81	82	82	83	83	84	86
170	77	78	79	80	80	81	81	82	82	83	83	83	84	84	85	85	86	87	88
175	79	80	81	82	82	83	83	84	84	84	85	85	86	86	86	87	88	89	90
180	81	83	83	84	85	85	86	86	86	87	87	88	88	88	89	89	90	91	92
185	83	85	86	86	87	87	88	88	89	89	89	90	90	91	91	92	92	93	94
190	85	87	88	88	89	90	90	90	91	91	92	92	92	93	93	94	94	95	97
195	87	89	90	90	91	92	92	92	93	93	94	94	94	95	95	96	97	98	99
200	89	91	92	93	93	94	94	95	95	96	96	97	97	98	98	99	99	100	102

Appendix A3: Guideline table for the square meshes in semi-soft mesh state. It quantifies the retention probabilities in percentage for fish between 30 and 80 cm for different mesh sizes between 100 and 200 mm.

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
100	100	0	2	80	100	100	100	100	100	100	100	100
100	95	0	0	18	83	100	100	100	100	100	100	100
100	90	0	0	1	35	99	100	100	100	100	100	100
100	85	0	0	1	21	99	100	100	100	100	100	100
100	80	0	0	2	36	99	100	100	100	100	100	100
100	75	0	0	9	74	100	100	100	100	100	100	100
100	70	0	1	43	95	100	100	100	100	100	100	100
100	65	0	7	83	99	100	100	100	100	100	100	100
100	60	0	37	99	100	100	100	100	100	100	100	100
100	55	3	84	100	100	100	100	100	100	100	100	100
100	50	29	99	100	100	100	100	100	100	100	100	100
100	45	93	100	100	100	100	100	100	100	100	100	100
100	40	100	100	100	100	100	100	100	100	100	100	100
105	100	0	0	40	98	100	100	100	100	100	100	100
105	95	0	0	4	49	99	100	100	100	100	100	100
105	90	0	0	0	10	94	100	100	100	100	100	100
105	85	0	0	0	5	93	100	100	100	100	100	100
105	80	0	0	0	11	97	100	100	100	100	100	100
105	75	0	0	3	45	99	100	100	100	100	100	100
105	70	0	0	13	84	100	100	100	100	100	100	100
105	65	0	2	58	97	100	100	100	100	100	100	100
105	60	0	15	95	100	100	100	100	100	100	100	100
105	55	1	59	99	100	100	100	100	100	100	100	100
105	50	8	96	100	100	100	100	100	100	100	100	100
105	45	68	100	100	100	100	100	100	100	100	100	100
105	40	99	100	100	100	100	100	100	100	100	100	100
110	100	0	0	9	84	100	100	100	100	100	100	100
110	95	0	0	1	16	94	100	100	100	100	100	100
110	90	0	0	0	2	73	99	100	100	100	100	100
110	85	0	0	0	1	66	99	100	100	100	100	100
110	80	0	0	0	5	84	100	100	100	100	100	100
110	75	0	0	1	18	97	100	100	100	100	100	100
110	70	0	0	7	59	99	100	100	100	100	100	100
110	65	0	1	27	90	100	100	100	100	100	100	100
110	60	0	5	74	99	100	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
110	55	0	32	99	100	100	100	100	100	100	100	100
110	50	3	84	100	100	100	100	100	100	100	100	100
110	45	35	99	100	100	100	100	100	100	100	100	100
110	40	96	100	100	100	100	100	100	100	100	100	100
115	100	0	0	1	41	100	100	100	100	100	100	100
115	95	0	0	0	5	75	99	100	100	100	100	100
115	90	0	0	0	1	32	95	100	100	100	100	100
115	85	0	0	0	0	25	94	100	100	100	100	100
115	80	0	0	0	2	51	97	100	100	100	100	100
115	75	0	0	0	8	86	100	100	100	100	100	100
115	70	0	0	2	31	98	100	100	100	100	100	100
115	65	0	0	10	75	100	100	100	100	100	100	100
115	60	0	1	48	96	100	100	100	100	100	100	100
115	55	0	14	93	100	100	100	100	100	100	100	100
115	50	1	61	99	100	100	100	100	100	100	100	100
115	45	12	97	100	100	100	100	100	100	100	100	100
115	40	83	100	100	100	100	100	100	100	100	100	100
120	100	0	0	0	11	99	100	100	100	100	100	100
120	95	0	0	0	1	47	97	100	100	100	100	100
120	90	0	0	0	0	7	75	99	100	100	100	100
120	85	0	0	0	0	7	78	99	100	100	100	100
120	80	0	0	0	1	26	91	100	100	100	100	100
120	75	0	0	0	3	65	98	100	100	100	100	100
120	70	0	0	0	11	94	100	100	100	100	100	100
120	65	0	0	4	48	99	100	100	100	100	100	100
120	60	0	1	23	88	100	100	100	100	100	100	100
120	55	0	5	74	99	100	100	100	100	100	100	100
120	50	0	37	99	100	100	100	100	100	100	100	100
120	45	4	90	100	100	100	100	100	100	100	100	100
120	40	56	100	100	100	100	100	100	100	100	100	100
125	100	0	0	0	4	87	100	100	100	100	100	100
125	95	0	0	0	0	16	82	99	100	100	100	100
125	90	0	0	0	0	1	37	97	100	100	100	100
125	85	0	0	0	0	1	42	97	100	100	100	100
125	80	0	0	0	0	8	73	99	100	100	100	100
125	75	0	0	0	1	35	94	100	100	100	100	100
125	70	0	0	0	6	80	99	100	100	100	100	100
125	65	0	0	1	23	98	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
125	60	0	0	9	74	100	100	100	100	100	100	100
125	55	0	2	52	96	100	100	100	100	100	100	100
125	50	0	17	96	100	100	100	100	100	100	100	100
125	45	2	72	100	100	100	100	100	100	100	100	100
125	40	29	99	100	100	100	100	100	100	100	100	100
130	100	0	0	0	1	58	99	100	100	100	100	100
130	95	0	0	0	0	3	52	97	100	100	100	100
130	90	0	0	0	0	0	13	89	100	100	100	100
130	85	0	0	0	0	1	18	85	99	100	100	100
130	80	0	0	0	0	3	44	95	100	100	100	100
130	75	0	0	0	1	17	81	99	100	100	100	100
130	70	0	0	0	2	56	97	100	100	100	100	100
130	65	0	0	0	11	93	100	100	100	100	100	100
130	60	0	0	4	48	99	100	100	100	100	100	100
130	55	0	1	27	90	100	100	100	100	100	100	100
130	50	0	7	83	99	100	100	100	100	100	100	100
130	45	1	51	99	100	100	100	100	100	100	100	100
130	40	9	97	100	100	100	100	100	100	100	100	100
135	100	0	0	0	0	23	95	100	100	100	100	100
135	95	0	0	0	0	1	23	89	100	100	100	100
135	90	0	0	0	0	0	5	57	97	100	100	100
135	85	0	0	0	0	0	7	63	98	100	100	100
135	80	0	0	0	0	1	22	86	99	100	100	100
135	75	0	0	0	0	7	62	97	100	100	100	100
135	70	0	0	0	1	31	93	100	100	100	100	100
135	65	0	0	0	6	78	99	100	100	100	100	100
135	60	0	0	1	26	98	100	100	100	100	100	100
135	55	0	0	10	80	100	100	100	100	100	100	100
135	50	0	3	63	98	100	100	100	100	100	100	100
135	45	0	28	99	100	100	100	100	100	100	100	100
135	40	4	90	100	100	100	100	100	100	100	100	100
140	100	0	0	0	0	7	79	99	100	100	100	100
140	95	0	0	0	0	0	9	68	98	100	100	100
140	90	0	0	0	0	0	2	26	89	99	100	100
140	85	0	0	0	0	0	2	33	91	100	100	100
140	80	0	0	0	0	1	10	66	97	100	100	100
140	75	0	0	0	0	3	37	93	100	100	100	100
140	70	0	0	0	0	15	79	99	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
140	65	0	0	0	2	55	97	100	100	100	100	100
140	60	0	0	0	11	95	100	100	100	100	100	100
140	55	0	0	6	59	99	100	100	100	100	100	100
140	50	0	1	43	95	100	100	100	100	100	100	100
140	45	0	15	95	100	100	100	100	100	100	100	100
140	40	3	74	100	100	100	100	100	100	100	100	100
145	100	0	0	0	0	1	45	98	100	100	100	100
145	95	0	0	0	0	0	4	40	92	100	100	100
145	90	0	0	0	0	0	0	8	68	98	100	100
145	85	0	0	0	0	0	1	15	78	99	100	100
145	80	0	0	0	0	0	4	45	94	100	100	100
145	75	0	0	0	0	1	19	82	99	100	100	100
145	70	0	0	0	0	7	60	97	100	100	100	100
145	65	0	0	0	1	32	93	100	100	100	100	100
145	60	0	0	0	7	82	99	100	100	100	100	100
145	55	0	0	2	34	98	100	100	100	100	100	100
145	50	0	0	19	87	100	100	100	100	100	100	100
145	45	0	8	80	99	100	100	100	100	100	100	100
145	40	1	55	99	100	100	100	100	100	100	100	100
150	100	0	0	0	0	0	17	92	100	100	100	100
150	95	0	0	0	0	0	1	16	72	97	100	100
150	90	0	0	0	0	0	0	3	39	94	100	100
150	85	0	0	0	0	0	0	6	59	97	100	100
150	80	0	0	0	0	0	2	23	84	99	100	100
150	75	0	0	0	0	0	8	63	97	100	100	100
150	70	0	0	0	0	3	37	93	100	100	100	100
150	65	0	0	0	1	17	81	99	100	100	100	100
150	60	0	0	0	3	65	98	100	100	100	100	100
150	55	0	0	1	18	96	100	100	100	100	100	100
150	50	0	0	9	74	100	100	100	100	100	100	100
150	45	0	3	64	98	100	100	100	100	100	100	100
150	40	0	37	99	100	100	100	100	100	100	100	100
155	100	0	0	0	0	0	7	75	99	100	100	100
155	95	0	0	0	0	0	0	6	45	92	99	100
155	90	0	0	0	0	0	0	1	21	85	99	100
155	85	0	0	0	0	0	0	3	36	92	100	100
155	80	0	0	0	0	0	1	13	70	97	100	100
155	75	0	0	0	0	0	5	44	93	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
155	70	0	0	0	0	1	19	83	99	100	100	100
155	65	0	0	0	0	8	67	98	100	100	100	100
155	60	0	0	0	1	43	95	100	100	100	100	100
155	55	0	0	0	9	91	100	100	100	100	100	100
155	50	0	0	5	52	99	100	100	100	100	100	100
155	45	0	1	43	95	100	100	100	100	100	100	100
155	40	0	20	97	100	100	100	100	100	100	100	100
160	100	0	0	0	0	0	3	43	96	100	100	100
160	95	0	0	0	0	0	0	2	21	80	98	100
160	90	0	0	0	0	0	0	0	7	62	97	100
160	85	0	0	0	0	0	0	2	19	76	98	100
160	80	0	0	0	0	0	0	6	52	95	100	100
160	75	0	0	0	0	0	2	23	84	99	100	100
160	70	0	0	0	0	1	10	66	97	100	100	100
160	65	0	0	0	0	3	43	94	100	100	100	100
160	60	0	0	0	1	26	88	99	100	100	100	100
160	55	0	0	0	6	78	99	100	100	100	100	100
160	50	0	0	2	32	98	100	100	100	100	100	100
160	45	0	1	23	88	100	100	100	100	100	100	100
160	40	0	12	88	99	100	100	100	100	100	100	100
165	100	0	0	0	0	0	1	19	86	99	100	100
165	95	0	0	0	0	0	0	1	9	61	96	100
165	90	0	0	0	0	0	0	0	2	31	90	99
165	85	0	0	0	0	0	0	1	11	58	94	99
165	80	0	0	0	0	0	0	3	32	87	99	100
165	75	0	0	0	0	0	1	13	71	97	100	100
165	70	0	0	0	0	0	5	48	94	100	100	100
165	65	0	0	0	0	2	25	87	99	100	100	100
165	60	0	0	0	0	11	74	99	100	100	100	100
165	55	0	0	0	2	58	98	100	100	100	100	100
165	50	0	0	1	18	96	100	100	100	100	100	100
165	45	0	0	10	80	100	100	100	100	100	100	100
165	40	0	5	74	99	100	100	100	100	100	100	100
170	100	0	0	0	0	0	0	5	62	98	100	100
170	95	0	0	0	0	0	0	0	4	37	89	99
170	90	0	0	0	0	0	0	0	1	14	73	98
170	85	0	0	0	0	0	0	0	4	33	84	98
170	80	0	0	0	0	0	0	2	19	70	96	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
170	75	0	0	0	0	0	0	6	54	95	100	100
170	70	0	0	0	0	0	2	28	87	99	100	100
170	65	0	0	0	0	1	14	75	98	100	100	100
170	60	0	0	0	0	6	57	96	100	100	100	100
170	55	0	0	0	1	38	95	100	100	100	100	100
170	50	0	0	0	10	92	100	100	100	100	100	100
170	45	0	0	7	64	99	100	100	100	100	100	100
170	40	0	3	59	97	100	100	100	100	100	100	100
175	100	0	0	0	0	0	0	3	38	93	100	100
175	95	0	0	0	0	0	0	0	2	17	71	97
175	90	0	0	0	0	0	0	0	0	4	45	94
175	85	0	0	0	0	0	0	0	2	17	72	97
175	80	0	0	0	0	0	0	1	11	54	92	99
175	75	0	0	0	0	0	0	4	36	88	99	100
175	70	0	0	0	0	0	1	17	77	98	100	100
175	65	0	0	0	0	0	6	57	96	100	100	100
175	60	0	0	0	0	3	37	93	100	100	100	100
175	55	0	0	0	1	24	87	99	100	100	100	100
175	50	0	0	0	6	80	99	100	100	100	100	100
175	45	0	0	4	44	98	100	100	100	100	100	100
175	40	0	1	43	95	100	100	100	100	100	100	100
180	100	0	0	0	0	0	0	1	17	81	99	100
180	95	0	0	0	0	0	0	0	1	6	42	89
180	90	0	0	0	0	0	0	0	0	2	23	82
180	85	0	0	0	0	0	0	0	1	9	51	92
180	80	0	0	0	0	0	0	1	5	35	84	98
180	75	0	0	0	0	0	0	3	22	76	97	100
180	70	0	0	0	0	0	0	8	62	97	100	100
180	65	0	0	0	0	0	4	39	91	99	100	100
180	60	0	0	0	0	1	21	85	99	100	100	100
180	55	0	0	0	0	11	74	99	100	100	100	100
180	50	0	0	0	3	65	98	100	100	100	100	100
180	45	0	0	1	26	98	100	100	100	100	100	100
180	40	0	1	23	88	100	100	100	100	100	100	100
185	100	0	0	0	0	0	0	0	6	64	98	100
185	95	0	0	0	0	0	0	0	0	2	20	77
185	90	0	0	0	0	0	0	0	0	1	11	60
185	85	0	0	0	0	0	0	0	0	4	30	80

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
185	80	0	0	0	0	0	0	0	3	21	71	96
185	75	0	0	0	0	0	0	2	13	59	93	99
185	70	0	0	0	0	0	0	5	42	92	99	100
185	65	0	0	0	0	0	2	22	83	99	100	100
185	60	0	0	0	0	1	13	72	98	100	100	100
185	55	0	0	0	0	6	58	97	100	100	100	100
185	50	0	0	0	2	46	96	100	100	100	100	100
185	45	0	0	1	15	95	100	100	100	100	100	100
185	40	0	0	11	81	100	100	100	100	100	100	100
190	100	0	0	0	0	0	0	0	2	35	92	100
190	95	0	0	0	0	0	0	0	0	1	10	54
190	90	0	0	0	0	0	0	0	0	0	3	37
190	85	0	0	0	0	0	0	0	0	3	18	66
190	80	0	0	0	0	0	0	0	1	11	54	91
190	75	0	0	0	0	0	0	1	7	41	87	98
190	70	0	0	0	0	0	0	4	30	83	98	100
190	65	0	0	0	0	0	1	14	72	98	100	100
190	60	0	0	0	0	0	6	55	96	100	100	100
190	55	0	0	0	0	3	40	94	100	100	100	100
190	50	0	0	0	1	28	92	100	100	100	100	100
190	45	0	0	0	9	91	100	100	100	100	100	100
190	40	0	0	8	69	100	100	100	100	100	100	100
195	100	0	0	0	0	0	0	0	2	19	76	98
195	95	0	0	0	0	0	0	0	0	0	3	29
195	90	0	0	0	0	0	0	0	0	0	2	20
195	85	0	0	0	0	0	0	0	0	1	10	50
195	80	0	0	0	0	0	0	0	1	6	34	82
195	75	0	0	0	0	0	0	0	3	25	76	97
195	70	0	0	0	0	0	0	2	17	68	96	100
195	65	0	0	0	0	0	0	7	61	97	100	100
195	60	0	0	0	0	0	4	39	91	99	100	100
195	55	0	0	0	0	2	25	87	99	100	100	100
195	50	0	0	0	1	17	81	99	100	100	100	100
195	45	0	0	0	6	78	99	100	100	100	100	100
195	40	0	0	4	48	99	100	100	100	100	100	100
200	100	0	0	0	0	0	0	0	1	7	53	94
200	95	0	0	0	0	0	0	0	0	0	1	13
200	90	0	0	0	0	0	0	0	0	0	1	12

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
200	85	0	0	0	0	0	0	0	0	1	5	33
200	80	0	0	0	0	0	0	0	0	3	21	68
200	75	0	0	0	0	0	0	0	2	14	63	95
200	70	0	0	0	0	0	0	1	11	54	92	99
200	65	0	0	0	0	0	0	4	40	91	99	100
200	60	0	0	0	0	0	2	23	84	99	100	100
200	55	0	0	0	0	1	15	78	99	100	100	100
200	50	0	0	0	0	9	70	98	100	100	100	100
200	45	0	0	0	3	65	98	100	100	100	100	100
200	40	0	0	2	32	98	100	100	100	100	100	100

Appendix A4: Guideline table for the square meshes in semi-soft mesh state. It quantifies the length of fish in cm with different retention probabilities 5 to 95 % for different mesh sizes between 100 and 200 mm.

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
100	100	36	36	37	37	38	38	38	38	38	39	39	39	39	39	40	40	40	41	42
100	95	38	39	40	40	41	41	41	41	42	42	42	42	43	43	43	44	44	45	46
100	90	41	42	43	43	43	44	44	44	44	45	45	45	45	46	46	46	47	47	48
100	85	42	43	44	44	44	45	45	45	45	45	46	46	46	46	47	47	47	48	48
100	80	41	42	43	43	43	44	44	44	44	45	45	45	45	46	46	46	47	47	48
100	75	39	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	45	46
100	70	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
100	65	35	35	36	36	37	37	37	38	38	38	38	39	39	39	39	40	40	41	42
100	60	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	37	38
100	55	31	31	32	32	32	33	33	33	33	33	34	34	34	34	34	35	35	36	36
100	50	28	29	29	30	30	30	30	30	31	31	31	31	31	32	32	32	32	33	34
100	45	26	27	27	27	27	28	28	28	28	28	28	29	29	29	29	29	29	30	30
100	40	24	24	25	25	25	25	25	26	26	26	26	26	26	26	27	27	27	27	28
105	100	38	38	39	39	39	40	40	40	40	40	41	41	41	41	41	42	42	43	43
105	95	40	41	42	42	43	43	43	44	44	44	44	45	45	45	45	46	46	47	48
105	90	43	44	45	45	45	46	46	46	46	47	47	47	47	48	48	48	49	49	50
105	85	44	45	45	46	46	46	47	47	47	47	47	48	48	48	48	49	49	50	50
105	80	43	44	44	45	45	45	46	46	46	46	46	47	47	47	47	48	48	49	49
105	75	41	41	42	42	43	43	43	44	44	44	45	45	45	45	46	46	46	47	48
105	70	39	40	40	41	41	41	41	42	42	42	42	43	43	43	43	44	44	45	46
105	65	36	37	37	38	38	39	39	39	39	40	40	40	40	41	41	41	42	42	43
105	60	34	35	35	35	36	36	36	36	37	37	37	37	38	38	38	38	39	39	40
105	55	32	32	33	33	33	34	34	34	34	35	35	35	35	36	36	36	36	37	38
105	50	30	30	31	31	31	31	32	32	32	32	32	33	33	33	33	33	34	34	35
105	45	27	27	28	28	28	29	29	29	29	29	30	30	30	30	30	31	31	31	32
105	40	25	25	26	26	26	26	26	26	27	27	27	27	27	27	27	28	28	28	29
110	100	39	40	41	41	41	42	42	42	42	42	43	43	43	43	43	44	44	45	45
110	95	42	43	44	44	45	45	45	46	46	46	47	47	47	47	48	48	49	49	50
110	90	45	46	47	47	47	48	48	48	48	49	49	49	50	50	50	51	51	52	52
110	85	46	47	47	48	48	48	49	49	49	49	49	50	50	50	51	51	51	52	53
110	80	44	45	46	46	46	47	47	47	48	48	48	48	49	49	49	50	50	51	52
110	75	42	43	44	44	45	45	45	45	46	46	46	46	47	47	47	48	48	49	50
110	70	40	41	41	42	42	42	43	43	43	44	44	44	44	45	45	45	46	46	47
110	65	38	38	39	40	40	40	40	41	41	41	42	42	42	42	43	43	43	44	45
110	60	35	36	37	37	37	38	38	38	38	39	39	39	39	40	40	40	41	41	42

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
110	55	33	34	34	34	35	35	35	35	36	36	36	36	36	37	37	37	37	38	39
110	50	31	31	32	32	32	33	33	33	33	33	34	34	34	34	34	35	35	36	36
110	45	28	29	29	29	30	30	30	30	30	31	31	31	31	31	32	32	32	33	33
110	40	26	26	27	27	27	27	27	27	28	28	28	28	28	28	28	29	29	29	30
115	100	41	42	43	43	43	44	44	44	44	44	45	45	45	45	46	46	46	47	47
115	95	44	45	46	46	47	47	47	48	48	48	49	49	49	50	50	50	51	52	53
115	90	47	48	49	49	50	50	50	50	51	51	51	52	52	52	53	53	53	54	55
115	85	48	49	49	50	50	50	51	51	51	51	52	52	52	53	53	53	54	54	55
115	80	46	47	47	48	48	49	49	49	50	50	50	51	51	51	52	52	52	53	54
115	75	43	44	45	45	46	46	47	47	47	47	48	48	48	49	49	49	50	51	52
115	70	41	42	43	43	44	44	44	45	45	45	45	46	46	46	47	47	47	48	49
115	65	39	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	45	46
115	60	37	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	43	44
115	55	34	35	35	35	36	36	36	37	37	37	37	38	38	38	38	39	39	40	40
115	50	31	32	33	33	33	34	34	34	34	35	35	35	35	35	36	36	36	37	38
115	45	29	30	30	31	31	31	31	31	32	32	32	32	32	33	33	33	33	34	34
115	40	26	27	27	28	28	28	28	28	29	29	29	29	29	29	30	30	30	30	31
120	100	43	44	44	45	45	45	45	46	46	46	46	46	46	47	47	47	48	48	49
120	95	46	47	48	48	49	49	49	50	50	50	50	51	51	51	52	52	53	53	54
120	90	50	51	51	52	52	52	53	53	53	54	54	54	54	55	55	55	56	57	58
120	85	50	51	51	52	52	52	53	53	53	53	54	54	54	54	55	55	56	56	57
120	80	47	48	49	49	50	50	51	51	51	52	52	52	53	53	53	54	54	55	56
120	75	45	46	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52	52	53
120	70	43	44	44	45	45	46	46	46	46	47	47	47	47	48	48	48	49	49	50
120	65	40	41	42	42	43	43	43	44	44	44	44	45	45	45	46	46	46	47	48
120	60	38	39	39	40	40	40	41	41	41	42	42	42	42	43	43	43	44	44	45
120	55	35	36	37	37	37	38	38	38	38	39	39	39	39	40	40	40	41	41	42
120	50	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	37	38
120	45	30	31	31	32	32	32	32	33	33	33	33	33	34	34	34	34	35	35	36
120	40	27	28	28	29	29	29	29	29	30	30	30	30	30	31	31	31	31	32	32
125	100	44	45	46	46	46	47	47	47	47	48	48	48	48	49	49	49	50	50	51
125	95	48	49	50	50	51	51	52	52	52	53	53	53	54	54	54	55	55	56	57
125	90	52	53	54	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59
125	85	52	53	53	54	54	54	55	55	55	55	56	56	56	56	57	57	58	58	59
125	80	49	50	51	51	52	52	53	53	53	54	54	54	54	55	55	56	56	57	58
125	75	46	48	48	49	49	50	50	50	51	51	51	52	52	52	53	53	54	54	55
125	70	44	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	52
125	65	42	43	43	44	44	44	45	45	45	45	46	46	46	46	47	47	47	48	49

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
125	60	39	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	45	46
125	55	36	37	38	38	39	39	39	39	40	40	40	40	41	41	41	42	42	43	44
125	50	34	34	35	35	35	36	36	36	36	37	37	37	37	38	38	38	38	39	40
125	45	31	32	32	33	33	33	33	34	34	34	34	34	35	35	35	35	36	36	37
125	40	28	29	29	30	30	30	30	30	31	31	31	31	31	32	32	32	32	33	34
130	100	46	47	48	48	48	49	49	49	49	50	50	50	50	51	51	51	52	52	53
130	95	51	52	52	53	53	54	54	54	55	55	55	55	56	56	56	57	57	58	59
130	90	54	55	55	56	56	56	57	57	57	57	58	58	58	58	59	59	60	60	61
130	85	53	54	55	55	56	56	56	57	57	57	58	58	58	59	59	59	60	61	62
130	80	51	52	53	53	54	54	54	55	55	55	56	56	56	57	57	58	58	59	60
130	75	48	49	50	50	51	51	52	52	52	53	53	53	54	54	54	55	56	56	58
130	70	45	46	47	48	48	48	49	49	49	50	50	50	51	51	51	52	52	53	54
130	65	43	44	45	45	45	46	46	46	46	47	47	47	47	48	48	48	49	49	50
130	60	40	41	42	42	43	43	43	44	44	44	44	45	45	45	46	46	46	47	48
130	55	38	38	39	39	40	40	40	41	41	41	41	42	42	42	43	43	43	44	45
130	50	35	35	36	36	37	37	37	38	38	38	38	39	39	39	39	40	40	41	42
130	45	32	33	33	34	34	34	34	35	35	35	35	35	36	36	36	36	37	37	38
130	40	29	30	30	31	31	31	31	32	32	32	32	32	32	33	33	33	33	34	34
135	100	48	49	49	50	50	50	51	51	51	51	52	52	52	52	53	53	54	54	55
135	95	52	54	54	55	55	56	56	56	57	57	57	57	58	58	59	59	59	60	61
135	90	55	56	57	57	58	58	59	59	59	60	60	60	61	61	61	62	62	63	64
135	85	54	56	56	57	57	58	58	59	59	59	59	60	60	60	61	61	62	63	64
135	80	52	54	54	55	55	56	56	56	57	57	57	58	58	58	59	59	60	61	62
135	75	49	51	51	52	52	53	53	54	54	54	55	55	55	56	56	56	57	58	59
135	70	47	48	49	49	50	50	50	51	51	51	51	52	52	52	53	53	54	54	56
135	65	44	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	52
135	60	42	43	43	44	44	44	45	45	45	45	46	46	46	46	47	47	47	48	49
135	55	39	40	41	41	41	42	42	42	42	42	43	43	43	43	44	44	44	45	46
135	50	36	37	37	38	38	38	39	39	39	39	40	40	40	40	41	41	41	42	43
135	45	33	34	34	35	35	35	35	36	36	36	36	36	37	37	37	37	38	38	39
135	40	30	31	31	32	32	32	32	33	33	33	33	33	34	34	34	34	35	35	36
140	100	50	51	51	52	52	52	53	53	53	53	54	54	54	54	55	55	56	56	57
140	95	54	55	56	56	57	57	58	58	58	59	59	59	60	60	61	61	62	62	64
140	90	57	58	59	59	60	60	61	61	61	62	62	62	63	63	63	64	64	65	66
140	85	56	58	58	59	59	60	60	61	61	61	62	62	62	63	63	63	64	65	66
140	80	54	55	56	56	57	57	58	58	58	59	59	60	60	60	61	61	62	63	64
140	75	51	52	53	54	54	54	55	55	56	56	56	56	57	57	58	58	59	59	61
140	70	48	49	50	51	51	51	52	52	53	53	53	54	54	54	55	55	56	56	58

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
140	65	45	46	47	48	48	48	49	49	49	50	50	50	51	51	51	52	52	53	54
140	60	43	44	44	45	45	45	46	46	46	47	47	47	47	48	48	48	49	49	50
140	55	40	41	41	42	42	42	43	43	43	44	44	44	44	45	45	45	46	46	47
140	50	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
140	45	34	35	35	35	36	36	36	36	37	37	37	37	38	38	38	38	39	39	40
140	40	31	31	32	32	33	33	33	33	34	34	34	34	35	35	35	35	36	36	37
145	100	52	53	53	54	54	54	55	55	55	55	55	56	56	56	57	57	57	58	59
145	95	56	57	58	58	59	59	60	60	60	61	61	61	62	62	63	63	64	65	66
145	90	59	60	61	62	62	63	63	63	64	64	64	64	65	65	66	66	66	67	68
145	85	58	59	60	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67	68
145	80	55	57	57	58	58	59	59	60	60	60	61	61	61	62	62	63	63	64	65
145	75	53	54	55	55	56	56	56	57	57	57	58	58	58	59	59	60	60	61	62
145	70	49	51	51	52	53	53	53	54	54	54	55	55	55	56	56	57	57	58	59
145	65	47	48	49	49	49	50	50	51	51	51	51	52	52	52	53	53	54	54	56
145	60	44	45	45	46	46	47	47	47	48	48	48	48	49	49	49	50	50	51	52
145	55	41	42	43	43	43	44	44	44	45	45	45	45	46	46	46	47	47	48	49
145	50	38	39	40	40	40	41	41	41	42	42	42	42	42	43	43	43	44	44	45
145	45	34	35	36	36	37	37	37	38	38	38	38	39	39	39	40	40	40	41	42
145	40	32	33	33	33	34	34	34	34	35	35	35	35	35	36	36	36	37	37	38
150	100	53	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	60	61
150	95	57	59	60	60	61	62	62	62	63	63	64	64	64	65	65	66	66	67	69
150	90	61	62	63	64	64	64	65	65	65	66	66	66	67	67	67	68	68	69	70
150	85	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	68	69
150	80	57	58	59	60	60	61	61	61	62	62	62	63	63	64	64	65	65	66	67
150	75	54	55	56	57	57	58	58	58	59	59	59	60	60	61	61	61	62	63	64
150	70	51	52	53	54	54	54	55	55	56	56	56	56	57	57	58	58	59	59	61
150	65	48	49	50	50	51	51	52	52	52	53	53	53	54	54	54	55	56	56	58
150	60	45	46	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52	52	53
150	55	42	43	44	44	45	45	45	45	46	46	46	46	47	47	47	48	48	49	50
150	50	39	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	45	46
150	45	36	37	37	38	38	38	39	39	39	39	40	40	40	40	41	41	41	42	43
150	40	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	37	38
155	100	54	56	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	62	63
155	95	60	61	62	63	63	64	64	65	65	65	66	66	67	67	67	68	69	70	71
155	90	62	64	64	65	65	66	66	66	67	67	67	68	68	69	69	69	70	71	72
155	85	61	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	70	71
155	80	58	60	60	61	61	62	62	63	63	63	64	64	65	65	65	66	67	67	69
155	75	55	57	57	58	58	59	59	60	60	60	61	61	62	62	62	63	64	64	66

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
155	70	53	54	55	55	56	56	56	57	57	57	58	58	58	59	59	60	60	61	62
155	65	49	50	51	52	52	53	53	53	54	54	54	55	55	55	56	56	57	57	59
155	60	46	47	48	48	49	49	49	50	50	50	51	51	51	52	52	52	53	54	55
155	55	43	44	45	45	46	46	46	46	47	47	47	47	48	48	48	49	49	50	51
155	50	40	41	42	42	42	43	43	43	44	44	44	44	45	45	45	46	46	47	48
155	45	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
155	40	33	34	35	35	35	36	36	36	36	36	37	37	37	37	38	38	38	39	40
160	100	56	57	58	58	59	59	59	60	60	60	61	61	61	62	62	62	63	64	65
160	95	62	63	64	65	65	66	66	67	67	67	68	68	69	69	70	70	71	72	73
160	90	64	66	66	67	67	68	68	69	69	69	70	70	70	71	71	71	72	73	74
160	85	62	64	65	65	66	66	67	67	67	68	68	69	69	69	70	70	71	72	73
160	80	60	61	62	62	63	63	64	64	65	65	65	66	66	66	67	67	68	69	70
160	75	57	58	59	60	60	61	61	61	62	62	63	63	63	64	64	65	65	66	67
160	70	54	55	56	56	57	57	58	58	59	59	59	60	60	60	61	61	62	63	64
160	65	51	52	53	53	54	54	54	55	55	55	56	56	56	57	57	58	58	59	60
160	60	47	48	49	49	50	50	51	51	51	52	52	52	53	53	54	54	55	55	57
160	55	44	45	46	46	47	47	47	48	48	48	48	49	49	49	50	50	51	51	53
160	50	41	42	43	43	44	44	44	44	45	45	45	46	46	46	46	47	47	48	49
160	45	38	39	39	40	40	40	41	41	41	42	42	42	42	43	43	43	44	44	45
160	40	34	35	35	36	36	36	37	37	37	38	38	38	38	39	39	39	40	40	41
165	100	58	59	60	60	61	61	61	62	62	62	63	63	63	63	64	64	65	66	67
165	95	64	65	66	67	67	68	68	68	69	69	70	70	70	71	71	72	72	73	75
165	90	66	68	68	69	69	70	70	71	71	71	72	72	72	73	73	74	74	75	76
165	85	63	65	66	67	67	68	68	69	69	69	70	70	71	71	72	72	73	74	75
165	80	61	62	63	64	64	65	65	66	66	66	67	67	68	68	68	69	70	71	72
165	75	58	59	60	61	61	62	62	63	63	63	64	64	65	65	65	66	67	67	69
165	70	55	56	57	58	58	59	59	59	60	60	60	61	61	62	62	63	63	64	65
165	65	52	53	54	55	55	55	56	56	57	57	57	58	58	58	59	59	60	61	62
165	60	49	50	51	51	52	52	52	53	53	53	54	54	54	55	55	56	56	57	58
165	55	45	46	47	48	48	48	49	49	49	50	50	50	50	51	51	52	52	53	54
165	50	42	43	44	44	45	45	45	45	46	46	46	46	47	47	47	48	48	49	50
165	45	39	40	41	41	41	42	42	42	42	42	43	43	43	43	44	44	44	45	46
165	40	35	36	37	37	37	38	38	38	38	39	39	39	39	40	40	40	41	41	42
170	100	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	66	67	68	69
170	95	65	67	68	68	69	69	70	70	71	71	71	72	72	73	73	74	74	75	77
170	90	68	69	70	71	71	72	72	72	73	73	74	74	74	75	75	76	76	77	78
170	85	65	67	68	69	69	70	70	71	71	72	72	72	73	73	74	74	75	76	78
170	80	62	63	64	65	66	66	67	67	68	68	69	69	69	70	70	71	72	73	74

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
170	75	60	61	62	62	63	63	64	64	64	65	65	65	66	66	67	67	68	69	70
170	70	56	58	59	59	60	60	61	61	61	62	62	62	63	63	64	64	65	65	67
170	65	53	54	55	56	56	57	57	57	58	58	58	59	59	60	60	61	61	62	63
170	60	50	51	52	52	53	53	54	54	54	55	55	55	56	56	56	57	57	58	59
170	55	46	47	48	49	49	49	50	50	50	51	51	51	52	52	52	53	53	54	55
170	50	43	44	45	45	45	46	46	46	47	47	47	47	48	48	48	49	49	50	51
170	45	40	40	41	42	42	42	42	43	43	43	44	44	44	44	45	45	45	46	47
170	40	36	37	37	38	38	38	39	39	39	40	40	40	40	41	41	41	42	42	43
175	100	61	62	63	64	64	64	65	65	65	66	66	66	67	67	68	68	69	69	71
175	95	67	69	70	70	71	71	72	72	73	73	74	74	74	75	75	76	77	78	79
175	90	70	72	72	73	73	74	74	75	75	75	76	76	76	77	77	78	78	79	80
175	85	67	69	70	70	71	71	72	72	73	73	74	74	74	75	75	76	77	78	79
175	80	63	65	66	67	67	68	68	69	69	70	70	71	71	71	72	73	73	74	76
175	75	60	62	63	63	64	64	65	65	66	66	67	67	67	68	68	69	69	70	72
175	70	58	59	60	60	61	61	62	62	62	63	63	64	64	64	65	65	66	67	68
175	65	55	56	57	57	58	58	58	59	59	60	60	60	61	61	61	62	63	63	65
175	60	51	52	53	54	54	54	55	55	56	56	56	56	57	57	58	58	59	59	61
175	55	47	48	49	50	50	50	51	51	52	52	52	53	53	53	54	54	55	55	57
175	50	44	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	52
175	45	40	41	42	42	43	43	44	44	44	44	45	45	45	45	46	46	47	47	48
175	40	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
180	100	63	64	65	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	72
180	95	70	71	72	73	73	74	74	75	75	76	76	77	77	77	78	79	79	80	82
180	90	72	73	74	75	75	76	76	76	77	77	78	78	78	79	79	80	80	81	83
180	85	69	70	71	72	73	73	74	74	74	75	75	76	76	77	77	78	79	80	81
180	80	65	67	68	68	69	70	70	70	71	71	72	72	73	73	74	74	75	76	78
180	75	61	63	64	65	65	66	66	67	67	68	68	68	69	69	70	71	71	72	74
180	70	59	60	61	62	62	63	63	63	64	64	64	65	65	66	66	66	67	68	69
180	65	55	57	58	58	59	59	60	60	60	61	61	61	62	62	63	63	64	65	66
180	60	52	54	54	55	55	56	56	57	57	57	58	58	58	59	59	59	60	61	62
180	55	49	50	51	51	52	52	52	53	53	53	54	54	54	55	55	56	56	57	58
180	50	45	46	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52	52	53
180	45	42	43	43	44	44	44	45	45	45	45	46	46	46	46	47	47	47	48	49
180	40	38	39	39	40	40	40	41	41	41	42	42	42	42	43	43	43	44	44	45
185	100	65	66	66	67	67	68	68	69	69	69	69	70	70	70	71	71	72	73	74
185	95	72	73	74	75	76	76	76	77	77	78	78	78	79	79	80	80	81	82	83
185	90	73	75	76	76	77	78	78	78	79	79	80	80	80	81	81	82	83	83	85
185	85	70	72	73	74	74	75	76	76	76	77	77	78	78	79	79	80	81	82	83

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
185	80	66	68	69	70	71	71	72	72	73	73	73	74	74	75	75	76	77	78	79
185	75	63	64	65	66	67	67	68	68	69	69	70	70	71	71	72	72	73	74	76
185	70	60	62	62	63	64	64	64	65	65	66	66	66	67	67	68	68	69	70	71
185	65	57	58	59	60	60	61	61	62	62	62	63	63	63	64	64	65	65	66	67
185	60	53	55	55	56	56	57	57	58	58	58	59	59	59	60	60	61	61	62	63
185	55	50	51	52	52	53	53	53	54	54	54	55	55	55	56	56	57	57	58	59
185	50	46	47	48	48	49	49	49	50	50	50	51	51	51	52	52	52	53	54	55
185	45	43	43	44	44	45	45	45	46	46	46	47	47	47	47	48	48	48	49	50
185	40	39	40	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	46
190	100	66	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	75	76
190	95	73	75	76	77	77	78	78	79	79	80	80	81	81	81	82	83	83	84	86
190	90	76	77	78	79	79	79	80	80	81	81	81	82	82	82	83	83	84	85	86
190	85	72	73	74	75	76	77	77	78	78	78	79	79	80	80	81	82	83	84	85
190	80	68	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78	79	80	81
190	75	64	66	67	68	68	69	69	70	70	71	71	72	72	73	73	74	75	76	77
190	70	61	62	63	64	65	65	66	66	66	67	67	68	68	69	69	70	70	71	73
190	65	58	59	60	61	61	62	62	63	63	63	64	64	64	65	65	66	66	67	69
190	60	55	56	57	57	58	58	59	59	59	60	60	60	61	61	61	62	63	63	65
190	55	51	52	53	53	54	54	55	55	55	56	56	56	57	57	57	58	58	59	60
190	50	47	48	49	49	50	50	50	51	51	51	52	52	52	53	53	53	54	55	56
190	45	43	44	45	45	46	46	46	46	47	47	47	48	48	48	48	49	49	50	51
190	40	39	40	41	41	42	42	42	43	43	43	43	44	44	44	44	45	45	46	47
195	100	67	69	69	70	71	71	72	72	72	73	73	74	74	74	75	75	76	77	78
195	95	76	77	78	79	80	80	81	81	81	82	82	83	83	84	84	85	85	86	88
195	90	77	78	79	80	81	81	82	82	82	83	83	84	84	84	85	86	86	87	89
195	85	73	75	76	77	78	78	79	79	80	80	80	81	81	82	82	83	84	85	87
195	80	70	71	73	73	74	75	75	76	76	77	77	77	78	78	79	80	80	82	83
195	75	66	68	69	69	70	71	71	72	72	72	73	73	74	74	75	76	76	77	79
195	70	62	64	65	65	66	67	67	67	68	68	69	69	70	70	71	71	72	73	75
195	65	59	61	61	62	62	63	63	64	64	64	65	65	65	66	66	67	67	68	69
195	60	55	57	58	58	59	59	60	60	60	61	61	61	62	62	63	63	64	65	66
195	55	52	53	54	55	55	55	56	56	57	57	57	58	58	58	59	59	60	61	62
195	50	48	49	50	50	51	51	52	52	52	53	53	53	54	54	54	55	56	56	58
195	45	44	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	52
195	40	40	41	42	42	43	43	43	44	44	44	44	45	45	45	46	46	46	47	48
200	100	69	71	72	72	73	73	74	74	74	75	75	76	76	76	77	77	78	79	80
200	95	78	79	80	81	82	82	83	83	84	84	84	85	85	86	86	87	88	89	90
200	90	78	80	81	81	82	83	83	84	84	85	85	85	86	86	87	88	88	90	91

Mesh size (mm)	Open-ness (%)	Fish length (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
200	85	75	77	78	79	79	80	80	81	81	82	82	82	83	83	84	85	85	86	88
200	80	71	73	74	75	76	76	77	77	78	78	79	79	80	80	81	82	82	83	85
200	75	67	69	70	71	71	72	73	73	73	74	74	75	75	76	76	77	78	79	80
200	70	63	65	66	67	67	68	68	69	69	70	70	71	71	71	72	73	73	74	76
200	65	60	62	63	63	64	64	65	65	65	66	66	66	67	67	68	68	69	70	71
200	60	57	58	59	60	60	61	61	61	62	62	63	63	63	64	64	65	65	66	67
200	55	53	54	55	56	56	56	57	57	58	58	58	59	59	59	60	60	61	62	63
200	50	49	50	51	52	52	52	53	53	53	54	54	54	55	55	55	56	56	57	58
200	45	45	46	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52	52	53
200	40	41	42	43	43	44	44	44	44	45	45	45	46	46	46	46	47	47	48	49

Appendix A5: Guideline table for the square meshes in the stiff mesh state. It quantifies the retention probabilities in percentage for fish between 30 and 80 cm for different mesh sizes between 100 and 200 mm at various mesh openness's.

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
100	100	0	2	80	100	100	100	100	100	100	100	100
100	95	0	3	93	100	100	100	100	100	100	100	100
100	90	0	10	97	100	100	100	100	100	100	100	100
100	85	0	21	99	100	100	100	100	100	100	100	100
100	80	0	36	100	100	100	100	100	100	100	100	100
100	75	0	52	100	100	100	100	100	100	100	100	100
100	70	0	74	100	100	100	100	100	100	100	100	100
100	65	2	82	100	100	100	100	100	100	100	100	100
100	60	3	91	100	100	100	100	100	100	100	100	100
100	55	7	96	100	100	100	100	100	100	100	100	100
100	50	34	99	100	100	100	100	100	100	100	100	100
100	45	93	100	100	100	100	100	100	100	100	100	100
100	40	100	100	100	100	100	100	100	100	100	100	100
110	100	0	0	9	84	100	100	100	100	100	100	100
110	95	0	0	19	95	100	100	100	100	100	100	100
110	90	0	0	42	98	100	100	100	100	100	100	100
110	85	0	1	60	99	100	100	100	100	100	100	100
110	80	0	3	78	99	100	100	100	100	100	100	100
110	75	0	3	90	100	100	100	100	100	100	100	100
110	70	0	7	95	100	100	100	100	100	100	100	100
110	65	0	11	97	100	100	100	100	100	100	100	100
110	60	0	21	98	100	100	100	100	100	100	100	100
110	55	0	45	100	100	100	100	100	100	100	100	100
110	50	3	87	100	100	100	100	100	100	100	100	100
110	45	35	99	100	100	100	100	100	100	100	100	100
110	40	96	100	100	100	100	100	100	100	100	100	100
105	100	0	0	40	98	100	100	100	100	100	100	100
105	95	0	1	60	99	100	100	100	100	100	100	100
105	90	0	3	79	100	100	100	100	100	100	100	100
105	85	0	4	91	100	100	100	100	100	100	100	100
105	80	0	10	97	100	100	100	100	100	100	100	100
105	75	0	17	98	100	100	100	100	100	100	100	100
105	70	0	32	99	100	100	100	100	100	100	100	100
105	65	0	45	100	100	100	100	100	100	100	100	100
105	60	0	60	100	100	100	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
105	55	1	83	100	100	100	100	100	100	100	100	100
105	50	8	97	100	100	100	100	100	100	100	100	100
105	45	68	100	100	100	100	100	100	100	100	100	100
105	40	99	100	100	100	100	100	100	100	100	100	100
115	100	0	0	1	41	100	100	100	100	100	100	100
115	95	0	0	3	68	100	100	100	100	100	100	100
115	90	0	0	10	85	100	100	100	100	100	100	100
115	85	0	0	24	95	100	100	100	100	100	100	100
115	80	0	0	41	98	100	100	100	100	100	100	100
115	75	0	1	59	99	100	100	100	100	100	100	100
115	70	0	3	73	99	100	100	100	100	100	100	100
115	65	0	3	85	100	100	100	100	100	100	100	100
115	60	0	4	91	100	100	100	100	100	100	100	100
115	55	0	16	98	100	100	100	100	100	100	100	100
115	50	1	62	99	100	100	100	100	100	100	100	100
115	45	12	97	100	100	100	100	100	100	100	100	100
115	40	83	100	100	100	100	100	100	100	100	100	100
120	100	0	0	0	11	99	100	100	100	100	100	100
120	95	0	0	1	27	99	100	100	100	100	100	100
120	90	0	0	2	49	100	100	100	100	100	100	100
120	85	0	0	5	72	100	100	100	100	100	100	100
120	80	0	0	10	87	100	100	100	100	100	100	100
120	75	0	0	25	94	100	100	100	100	100	100	100
120	70	0	1	38	96	100	100	100	100	100	100	100
120	65	0	1	58	99	100	100	100	100	100	100	100
120	60	0	2	69	99	100	100	100	100	100	100	100
120	55	0	5	91	100	100	100	100	100	100	100	100
120	50	0	37	100	100	100	100	100	100	100	100	100
120	45	4	90	100	100	100	100	100	100	100	100	100
120	40	57	100	100	100	100	100	100	100	100	100	100
125	100	0	0	0	4	87	100	100	100	100	100	100
125	95	0	0	0	7	97	100	100	100	100	100	100
125	90	0	0	0	16	99	100	100	100	100	100	100
125	85	0	0	1	31	99	100	100	100	100	100	100
125	80	0	0	2	52	100	100	100	100	100	100	100
125	75	0	0	5	72	100	100	100	100	100	100	100
125	70	0	0	10	83	100	100	100	100	100	100	100
125	65	0	0	21	92	100	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
125	60	0	0	37	98	100	100	100	100	100	100	100
125	55	0	2	69	99	100	100	100	100	100	100	100
125	50	0	18	97	100	100	100	100	100	100	100	100
125	45	2	72	100	100	100	100	100	100	100	100	100
125	40	29	99	100	100	100	100	100	100	100	100	100
130	100	0	0	0	1	58	99	100	100	100	100	100
130	95	0	0	0	2	80	100	100	100	100	100	100
130	90	0	0	0	5	91	100	100	100	100	100	100
130	85	0	0	0	9	98	100	100	100	100	100	100
130	80	0	0	1	21	99	100	100	100	100	100	100
130	75	0	0	1	33	99	100	100	100	100	100	100
130	70	0	0	2	50	100	100	100	100	100	100	100
130	65	0	0	4	70	100	100	100	100	100	100	100
130	60	0	0	10	86	100	100	100	100	100	100	100
130	55	0	0	35	96	100	100	100	100	100	100	100
130	50	0	7	85	99	100	100	100	100	100	100	100
130	45	1	51	99	100	100	100	100	100	100	100	100
130	40	9	97	100	100	100	100	100	100	100	100	100
135	100	0	0	0	0	23	95	100	100	100	100	100
135	95	0	0	0	1	47	98	100	100	100	100	100
135	90	0	0	0	1	69	99	100	100	100	100	100
135	85	0	0	0	3	85	100	100	100	100	100	100
135	80	0	0	0	6	93	100	100	100	100	100	100
135	75	0	0	0	11	98	100	100	100	100	100	100
135	70	0	0	1	22	99	100	100	100	100	100	100
135	65	0	0	1	31	99	100	100	100	100	100	100
135	60	0	0	3	58	100	100	100	100	100	100	100
135	55	0	0	11	90	100	100	100	100	100	100	100
135	50	0	2	67	99	100	100	100	100	100	100	100
135	45	0	28	99	100	100	100	100	100	100	100	100
135	40	4	90	100	100	100	100	100	100	100	100	100
140	100	0	0	0	0	7	78	99	100	100	100	100
140	95	0	0	0	0	17	92	100	100	100	100	100
140	90	0	0	0	0	36	98	100	100	100	100	100
140	85	0	0	0	1	55	99	100	100	100	100	100
140	80	0	0	0	2	77	100	100	100	100	100	100
140	75	0	0	0	5	86	100	100	100	100	100	100
140	70	0	0	0	7	93	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
140	65	0	0	0	11	98	100	100	100	100	100	100
140	60	0	0	1	26	99	100	100	100	100	100	100
140	55	0	0	6	67	100	100	100	100	100	100	100
140	50	0	1	43	96	100	100	100	100	100	100	100
140	45	0	15	95	100	100	100	100	100	100	100	100
140	40	3	74	100	100	100	100	100	100	100	100	100
145	100	0	0	0	0	1	45	98	100	100	100	100
145	95	0	0	0	0	3	70	99	100	100	100	100
145	90	0	0	0	0	10	85	100	100	100	100	100
145	85	0	0	0	0	23	94	100	100	100	100	100
145	80	0	0	0	1	44	98	100	100	100	100	100
145	75	0	0	0	1	62	99	100	100	100	100	100
145	70	0	0	0	3	76	99	100	100	100	100	100
145	65	0	0	0	5	89	100	100	100	100	100	100
145	60	0	0	0	9	97	100	100	100	100	100	100
145	55	0	0	2	37	99	100	100	100	100	100	100
145	50	0	0	19	87	100	100	100	100	100	100	100
145	45	0	8	80	99	100	100	100	100	100	100	100
145	40	1	55	99	100	100	100	100	100	100	100	100
150	100	0	0	0	0	0	17	92	100	100	100	100
150	95	0	0	0	0	1	37	97	100	100	100	100
150	90	0	0	0	0	2	60	99	100	100	100	100
150	85	0	0	0	0	7	79	99	100	100	100	100
150	80	0	0	0	0	18	90	100	100	100	100	100
150	75	0	0	0	0	31	96	100	100	100	100	100
150	70	0	0	0	1	47	98	100	100	100	100	100
150	65	0	0	0	1	67	99	100	100	100	100	100
150	60	0	0	0	3	88	100	100	100	100	100	100
150	55	0	0	1	18	98	100	100	100	100	100	100
150	50	0	0	9	74	100	100	100	100	100	100	100
150	45	0	3	63	98	100	100	100	100	100	100	100
150	40	0	37	99	100	100	100	100	100	100	100	100
155	100	0	0	0	0	0	7	75	99	100	100	100
155	95	0	0	0	0	0	14	91	100	100	100	100
155	90	0	0	0	0	1	27	96	100	100	100	100
155	85	0	0	0	0	1	48	99	100	100	100	100
155	80	0	0	0	0	4	70	99	100	100	100	100
155	75	0	0	0	0	9	82	99	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
155	70	0	0	0	0	20	91	100	100	100	100	100
155	65	0	0	0	1	33	96	100	100	100	100	100
155	60	0	0	0	1	66	99	100	100	100	100	100
155	55	0	0	0	8	95	100	100	100	100	100	100
155	50	0	0	5	52	99	100	100	100	100	100	100
155	45	0	1	43	96	100	100	100	100	100	100	100
155	40	0	20	97	100	100	100	100	100	100	100	100
160	100	0	0	0	0	0	3	43	96	100	100	100
160	95	0	0	0	0	0	6	68	99	100	100	100
160	90	0	0	0	0	0	10	87	100	100	100	100
160	85	0	0	0	0	1	22	94	100	100	100	100
160	80	0	0	0	0	1	37	97	100	100	100	100
160	75	0	0	0	0	2	58	99	100	100	100	100
160	70	0	0	0	0	6	72	99	100	100	100	100
160	65	0	0	0	0	10	86	100	100	100	100	100
160	60	0	0	0	1	38	97	100	100	100	100	100
160	55	0	0	0	5	83	100	100	100	100	100	100
160	50	0	0	2	32	98	100	100	100	100	100	100
160	45	0	1	23	88	100	100	100	100	100	100	100
160	40	0	12	88	99	100	100	100	100	100	100	100
165	100	0	0	0	0	0	1	19	86	99	100	100
165	95	0	0	0	0	0	2	39	95	100	100	100
165	90	0	0	0	0	0	5	60	98	100	100	100
165	85	0	0	0	0	0	8	81	99	100	100	100
165	80	0	0	0	0	0	16	91	100	100	100	100
165	75	0	0	0	0	1	27	96	100	100	100	100
165	70	0	0	0	0	2	45	98	100	100	100	100
165	65	0	0	0	0	3	66	99	100	100	100	100
165	60	0	0	0	0	14	89	100	100	100	100	100
165	55	0	0	0	2	59	98	100	100	100	100	100
165	50	0	0	1	18	96	100	100	100	100	100	100
165	45	0	0	10	80	100	100	100	100	100	100	100
165	40	0	5	74	99	100	100	100	100	100	100	100
170	100	0	0	0	0	0	0	5	62	98	100	100
170	95	0	0	0	0	0	1	16	83	99	100	100
170	90	0	0	0	0	0	2	35	93	100	100	100
170	85	0	0	0	0	0	4	52	97	100	100	100
170	80	0	0	0	0	0	7	74	99	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
170	75	0	0	0	0	0	12	86	100	100	100	100
170	70	0	0	0	0	1	22	92	100	100	100	100
170	65	0	0	0	0	1	35	97	100	100	100	100
170	60	0	0	0	0	6	73	99	100	100	100	100
170	55	0	0	0	1	39	96	100	100	100	100	100
170	50	0	0	0	10	92	100	100	100	100	100	100
170	45	0	0	7	64	100	100	100	100	100	100	100
170	40	0	3	59	97	100	100	100	100	100	100	100
175	100	0	0	0	0	0	0	3	38	93	100	100
175	95	0	0	0	0	0	0	5	59	98	100	100
175	90	0	0	0	0	0	1	14	81	99	100	100
175	85	0	0	0	0	0	2	29	91	100	100	100
175	80	0	0	0	0	0	3	46	95	100	100	100
175	75	0	0	0	0	0	5	59	98	100	100	100
175	70	0	0	0	0	0	9	82	100	100	100	100
175	65	0	0	0	0	0	16	92	100	100	100	100
175	60	0	0	0	0	2	49	98	100	100	100	100
175	55	0	0	0	1	24	89	100	100	100	100	100
175	50	0	0	0	6	80	99	100	100	100	100	100
175	45	0	0	4	44	98	100	100	100	100	100	100
175	40	0	1	43	95	100	100	100	100	100	100	100
180	100	0	0	0	0	0	0	1	17	81	99	100
180	95	0	0	0	0	0	0	2	36	93	100	100
180	90	0	0	0	0	0	0	4	55	97	100	100
180	85	0	0	0	0	0	0	11	74	99	100	100
180	80	0	0	0	0	0	1	22	87	99	100	100
180	75	0	0	0	0	0	3	39	93	100	100	100
180	70	0	0	0	0	0	4	52	96	100	100	100
180	65	0	0	0	0	0	8	74	99	100	100	100
180	60	0	0	0	0	1	28	94	100	100	100	100
180	55	0	0	0	0	10	77	99	100	100	100	100
180	50	0	0	0	3	65	98	100	100	100	100	100
180	45	0	0	1	26	98	100	100	100	100	100	100
180	40	0	1	23	88	100	100	100	100	100	100	100
185	100	0	0	0	0	0	0	0	6	64	98	100
185	95	0	0	0	0	0	0	1	15	79	99	100
185	90	0	0	0	0	0	0	3	34	91	99	100
185	85	0	0	0	0	0	0	4	50	96	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
185	80	0	0	0	0	0	0	8	66	98	100	100
185	75	0	0	0	0	0	1	17	81	99	100	100
185	70	0	0	0	0	0	2	30	91	100	100	100
185	65	0	0	0	0	0	4	51	97	100	100	100
185	60	0	0	0	0	1	15	81	99	100	100	100
185	55	0	0	0	0	6	61	97	100	100	100	100
185	50	0	0	0	1	46	96	100	100	100	100	100
185	45	0	0	1	15	95	100	100	100	100	100	100
185	40	0	0	11	81	100	100	100	100	100	100	100
190	100	0	0	0	0	0	0	0	2	35	92	100
190	95	0	0	0	0	0	0	0	6	61	98	100
190	90	0	0	0	0	0	0	1	13	77	99	100
190	85	0	0	0	0	0	0	2	27	88	99	100
190	80	0	0	0	0	0	0	3	43	94	100	100
190	75	0	0	0	0	0	0	6	59	97	100	100
190	70	0	0	0	0	0	1	13	77	99	100	100
190	65	0	0	0	0	0	1	27	90	100	100	100
190	60	0	0	0	0	0	7	66	98	100	100	100
190	55	0	0	0	0	2	41	95	100	100	100	100
190	50	0	0	0	1	28	92	100	100	100	100	100
190	45	0	0	1	9	90	100	100	100	100	100	100
190	40	0	0	8	69	100	100	100	100	100	100	100
195	100	0	0	0	0	0	0	0	2	19	76	98
195	95	0	0	0	0	0	0	0	2	34	92	100
195	90	0	0	0	0	0	0	0	5	57	97	100
195	85	0	0	0	0	0	0	1	12	74	98	100
195	80	0	0	0	0	0	0	2	23	85	99	100
195	75	0	0	0	0	0	0	3	38	92	100	100
195	70	0	0	0	0	0	0	5	54	97	100	100
195	65	0	0	0	0	0	1	13	77	99	100	100
195	60	0	0	0	0	0	4	46	94	100	100	100
195	55	0	0	0	0	2	25	88	99	100	100	100
195	50	0	0	0	1	17	81	99	100	100	100	100
195	45	0	0	0	6	78	99	100	100	100	100	100
195	40	0	0	4	48	99	100	100	100	100	100	100
200	100	0	0	0	0	0	0	0	1	7	53	94
200	95	0	0	0	0	0	0	0	2	19	76	98
200	90	0	0	0	0	0	0	0	3	33	90	99

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
200	85	0	0	0	0	0	0	0	5	53	96	100
200	80	0	0	0	0	0	0	1	11	72	98	100
200	75	0	0	0	0	0	0	1	19	81	99	100
200	70	0	0	0	0	0	0	2	36	93	100	100
200	65	0	0	0	0	0	0	5	62	98	100	100
200	60	0	0	0	0	0	2	24	87	99	100	100
200	55	0	0	0	0	1	16	78	99	100	100	100
200	50	0	0	0	0	9	70	98	100	100	100	100
200	45	0	0	0	3	65	98	100	100	100	100	100
200	40	0	0	2	32	98	100	100	100	100	100	100

Appendix A6: Guideline table for the square meshes in the stiff mesh state. It quantifies the length of fish in cm with different retention probabilities 5 to 95 % for different mesh sizes between 100 and 200 mm.

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
100	100	36	36	37	37	38	38	38	38	38	39	39	39	39	39	40	40	40	41	42
100	95	35	36	36	37	37	37	37	38	38	38	38	38	38	39	39	39	39	40	40
100	90	34	35	35	36	36	36	36	37	37	37	37	37	38	38	38	38	39	39	40
100	85	34	34	35	35	35	35	36	36	36	36	36	37	37	37	37	37	38	38	39
100	80	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	37	38
100	75	32	33	33	34	34	34	34	35	35	35	35	35	35	36	36	36	36	37	37
100	70	32	33	33	33	33	34	34	34	34	34	34	35	35	35	35	35	35	36	36
100	65	31	32	32	32	33	33	33	33	33	34	34	34	34	34	35	35	35	36	36
100	60	31	31	32	32	32	32	32	33	33	33	33	33	34	34	34	34	34	35	36
100	55	30	30	31	31	31	32	32	32	32	32	32	33	33	33	33	33	34	34	35
100	50	28	29	29	29	30	30	30	30	30	31	31	31	31	31	32	32	32	32	33
100	45	26	27	27	27	27	28	28	28	28	28	28	29	29	29	29	29	29	30	30
100	40	24	24	25	25	25	25	25	26	26	26	26	26	26	26	27	27	27	27	28
110	100	39	40	41	41	41	42	42	42	42	42	43	43	43	43	43	44	44	45	45
110	95	39	39	40	40	40	41	41	41	41	41	42	42	42	42	42	43	43	43	44
110	90	37	38	39	39	39	39	40	40	40	40	41	41	41	41	41	42	42	42	43
110	85	37	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	41	42	43
110	80	36	36	37	37	38	38	38	38	39	39	39	39	39	40	40	40	40	41	42
110	75	35	36	36	37	37	37	37	38	38	38	38	38	39	39	39	39	40	40	41
110	70	35	35	36	36	36	37	37	37	37	37	38	38	38	38	38	39	39	39	40
110	65	34	35	35	36	36	36	36	37	37	37	37	37	37	38	38	38	38	39	39
110	60	34	34	35	35	35	35	36	36	36	36	36	37	37	37	37	38	38	38	39
110	55	33	33	34	34	34	34	35	35	35	35	35	36	36	36	36	36	37	37	38
110	50	31	31	32	32	32	33	33	33	33	33	33	34	34	34	34	35	35	35	36
110	45	28	29	29	29	30	30	30	30	30	31	31	31	31	31	32	32	32	33	33
110	40	26	26	27	27	27	27	27	27	28	28	28	28	28	28	28	29	29	29	30
105	100	38	38	39	39	39	40	40	40	40	40	41	41	41	41	41	42	42	43	43
105	95	37	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	41	42	43
105	90	36	36	37	37	38	38	38	38	38	39	39	39	39	40	40	40	40	41	42
105	85	35	36	36	37	37	37	37	38	38	38	38	38	38	39	39	39	40	40	41
105	80	34	35	35	36	36	36	36	37	37	37	37	37	38	38	38	38	39	39	40
105	75	34	34	35	35	35	36	36	36	36	36	37	37	37	37	37	38	38	38	39
105	70	33	34	34	34	35	35	35	35	36	36	36	36	36	36	37	37	37	38	38
105	65	33	33	34	34	34	34	35	35	35	35	35	36	36	36	36	36	37	37	38
105	60	32	33	33	34	34	34	34	34	35	35	35	35	35	35	36	36	36	36	37

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
105	55	31	32	32	33	33	33	33	33	34	34	34	34	34	34	35	35	35	36	36
105	50	30	30	31	31	31	31	32	32	32	32	32	32	33	33	33	33	33	34	34
105	45	27	27	28	28	28	29	29	29	29	29	30	30	30	30	30	31	31	31	32
105	40	25	25	26	26	26	26	26	26	27	27	27	27	27	27	27	28	28	28	29
115	100	41	42	43	43	43	44	44	44	44	44	45	45	45	45	45	46	46	47	47
115	95	40	41	42	42	42	42	43	43	43	43	43	44	44	44	44	45	45	45	46
115	90	39	40	40	41	41	41	42	42	42	42	42	43	43	43	43	44	44	44	45
115	85	38	39	39	40	40	40	41	41	41	41	41	42	42	42	42	42	43	43	44
115	80	37	38	39	39	39	40	40	40	40	40	41	41	41	41	41	42	42	42	43
115	75	37	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	41	42	43
115	70	36	37	37	37	38	38	38	38	39	39	39	39	40	40	40	40	41	41	42
115	65	36	36	37	37	37	38	38	38	38	38	39	39	39	39	39	40	40	40	41
115	60	35	36	36	37	37	37	37	37	38	38	38	38	38	39	39	39	39	40	41
115	55	34	35	35	35	35	36	36	36	36	36	37	37	37	37	37	38	38	38	39
115	50	31	32	33	33	33	34	34	34	34	35	35	35	35	35	36	36	36	37	38
115	45	29	30	30	31	31	31	31	31	32	32	32	32	32	33	33	33	33	34	34
115	40	26	27	27	28	28	28	28	28	29	29	29	29	29	29	30	30	30	30	31
120	100	43	44	44	45	45	45	45	46	46	46	46	46	46	47	47	47	48	48	49
120	95	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	47	48
120	90	41	42	42	43	43	43	43	44	44	44	44	44	45	45	45	45	46	46	47
120	85	40	41	41	42	42	42	42	43	43	43	43	43	44	44	44	44	45	45	46
120	80	39	40	40	41	41	41	42	42	42	42	42	43	43	43	43	43	44	44	45
120	75	38	39	39	40	40	40	40	41	41	41	41	42	42	42	42	43	43	43	44
120	70	37	38	39	39	39	40	40	40	40	41	41	41	41	41	42	42	42	43	44
120	65	37	38	38	38	39	39	39	39	39	40	40	40	40	41	41	41	41	42	43
120	60	36	37	37	38	38	38	39	39	39	39	39	40	40	40	40	41	41	41	42
120	55	35	36	36	36	37	37	37	37	38	38	38	38	38	39	39	39	39	40	41
120	50	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	37	38
120	45	30	31	31	32	32	32	32	33	33	33	33	33	34	34	34	34	35	35	36
120	40	27	28	28	29	29	29	29	29	30	30	30	30	30	31	31	31	31	32	32
125	100	44	45	46	46	46	47	47	47	47	48	48	48	48	49	49	49	50	50	51
125	95	44	44	45	45	45	46	46	46	46	47	47	47	47	47	48	48	48	49	50
125	90	43	43	44	44	45	45	45	45	45	46	46	46	46	46	47	47	47	48	49
125	85	42	43	43	43	44	44	44	44	45	45	45	45	45	46	46	46	47	47	48
125	80	41	42	42	43	43	43	43	44	44	44	44	44	45	45	45	45	46	46	47
125	75	40	41	41	42	42	42	42	43	43	43	43	43	44	44	44	44	45	45	46
125	70	39	40	40	41	41	41	42	42	42	42	42	43	43	43	43	44	44	45	45

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
125	65	38	39	40	40	40	41	41	41	41	41	42	42	42	42	43	43	43	44	45
125	60	38	38	39	39	39	40	40	40	40	40	41	41	41	41	41	42	42	43	43
125	55	36	37	37	38	38	38	38	39	39	39	39	40	40	40	40	41	41	41	42
125	50	34	34	35	35	35	36	36	36	36	37	37	37	37	37	38	38	38	39	40
125	45	31	32	32	33	33	33	33	34	34	34	34	34	35	35	35	35	36	36	37
125	40	28	29	29	30	30	30	30	30	31	31	31	31	31	32	32	32	32	33	34
130	100	46	47	48	48	48	49	49	49	49	50	50	50	50	51	51	51	52	52	53
130	95	45	46	46	47	47	47	48	48	48	48	49	49	49	49	50	50	50	51	52
130	90	44	45	45	46	46	46	47	47	47	47	48	48	48	48	49	49	49	50	51
130	85	43	44	45	45	45	45	46	46	46	46	46	47	47	47	47	48	48	48	49
130	80	42	43	44	44	44	45	45	45	45	45	46	46	46	46	47	47	47	48	48
130	75	42	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	47	47	48
130	70	41	42	42	43	43	43	43	44	44	44	44	44	45	45	45	45	46	46	47
130	65	40	41	41	42	42	42	43	43	43	43	43	44	44	44	44	45	45	45	46
130	60	39	40	40	41	41	41	42	42	42	42	42	43	43	43	43	44	44	44	45
130	55	38	38	39	39	40	40	40	40	40	41	41	41	41	42	42	42	42	43	44
130	50	35	35	36	36	37	37	37	38	38	38	38	38	39	39	39	40	40	41	41
130	45	32	33	33	34	34	34	34	35	35	35	35	35	36	36	36	36	37	37	38
130	40	29	30	30	31	31	31	31	32	32	32	32	32	32	33	33	33	33	34	34
135	100	48	49	49	50	50	50	51	51	51	51	52	52	52	52	53	53	54	54	55
135	95	47	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	53	54
135	90	46	46	47	47	48	48	48	49	49	49	49	50	50	50	50	51	51	52	53
135	85	45	45	46	46	47	47	47	47	48	48	48	48	49	49	49	50	50	51	51
135	80	44	45	45	45	46	46	46	47	47	47	47	47	48	48	48	49	49	49	50
135	75	43	44	44	45	45	45	45	46	46	46	46	46	47	47	47	47	48	48	49
135	70	42	43	44	44	44	44	45	45	45	45	46	46	46	46	46	47	47	48	48
135	65	42	43	43	43	44	44	44	44	45	45	45	45	45	46	46	46	47	47	48
135	60	41	41	42	42	43	43	43	43	43	44	44	44	44	45	45	45	45	46	47
135	55	39	40	40	41	41	41	41	42	42	42	42	42	43	43	43	43	44	44	45
135	50	36	37	37	38	38	38	38	39	39	39	39	40	40	40	40	41	41	42	43
135	45	33	34	34	35	35	35	35	36	36	36	36	36	37	37	37	37	38	38	39
135	40	30	31	31	32	32	32	32	33	33	33	33	33	34	34	34	34	35	35	36
140	100	50	51	51	52	52	52	53	53	53	53	54	54	54	54	55	55	56	56	57
140	95	48	49	50	50	51	51	51	51	52	52	52	52	53	53	53	54	54	55	56
140	90	47	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	53	54
140	85	46	47	48	48	48	49	49	49	50	50	50	50	50	51	51	51	52	52	53
140	80	45	46	46	47	47	48	48	48	48	49	49	49	49	50	50	50	51	51	52

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
140	75	44	45	46	46	46	47	47	47	48	48	48	48	49	49	49	49	50	51	51
140	70	44	44	45	45	46	46	46	46	47	47	47	47	48	48	48	49	49	49	50
140	65	43	44	44	45	45	45	46	46	46	46	46	47	47	47	47	48	48	48	49
140	60	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	47	48
140	55	40	41	41	42	42	42	42	43	43	43	43	44	44	44	44	45	45	46	47
140	50	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
140	45	34	35	35	35	36	36	36	36	37	37	37	37	38	38	38	38	39	39	40
140	40	31	31	32	32	33	33	33	33	34	34	34	34	35	35	35	35	36	36	37
145	100	52	53	53	54	54	54	55	55	55	55	55	56	56	56	57	57	57	58	59
145	95	51	51	52	52	53	53	53	54	54	54	54	55	55	55	55	56	56	57	58
145	90	49	50	51	51	51	52	52	52	53	53	53	53	54	54	54	55	55	56	57
145	85	48	49	49	50	50	50	51	51	51	51	52	52	52	53	53	53	54	54	55
145	80	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54
145	75	46	47	47	48	48	48	49	49	49	49	50	50	50	50	51	51	52	52	53
145	70	45	46	46	47	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52
145	65	44	45	45	46	46	47	47	47	47	48	48	48	48	49	49	49	50	50	51
145	60	43	44	45	45	45	46	46	46	46	46	47	47	47	47	48	48	48	49	49
145	55	41	42	43	43	43	44	44	44	44	45	45	45	45	46	46	46	47	47	48
145	50	38	39	40	40	40	41	41	41	41	42	42	42	42	43	43	43	44	44	45
145	45	34	35	36	36	37	37	37	38	38	38	38	39	39	39	40	40	40	41	42
145	40	32	33	33	33	34	34	34	34	35	35	35	35	35	36	36	36	37	37	38
150	100	53	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	60	61
150	95	52	53	54	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59
150	90	51	52	52	53	53	54	54	54	54	55	55	55	55	56	56	56	57	57	58
150	85	50	50	51	52	52	52	53	53	53	53	54	54	54	54	55	55	56	56	57
150	80	48	49	50	50	51	51	51	51	52	52	52	53	53	53	54	54	54	55	56
150	75	47	48	49	49	50	50	50	51	51	51	51	52	52	52	52	53	53	54	55
150	70	47	47	48	48	49	49	49	50	50	50	50	51	51	51	52	52	52	53	54
150	65	46	47	47	48	48	48	48	49	49	49	49	50	50	50	50	51	51	52	53
150	60	44	45	46	46	47	47	47	47	48	48	48	48	48	49	49	49	50	50	51
150	55	42	43	44	44	44	45	45	45	45	46	46	46	46	47	47	47	48	48	49
150	50	39	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	45	46
150	45	36	37	37	38	38	38	39	39	39	39	40	40	40	40	41	41	41	42	43
150	40	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	37	38
155	100	54	56	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	62	63
155	95	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	59	60	61
155	90	53	54	54	55	55	55	55	56	56	56	56	57	57	57	57	58	58	59	60

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
155	85	52	53	53	53	54	54	54	55	55	55	55	56	56	56	56	57	57	58	58
155	80	50	51	52	52	53	53	53	53	54	54	54	54	55	55	55	56	56	57	58
155	75	49	50	51	51	52	52	52	53	53	53	53	54	54	54	54	55	55	56	57
155	70	48	49	50	50	50	51	51	51	52	52	52	52	53	53	53	54	54	55	56
155	65	47	48	49	49	49	50	50	50	51	51	51	51	52	52	52	53	53	54	55
155	60	46	47	47	48	48	48	48	49	49	49	49	50	50	50	51	51	51	52	53
155	55	43	44	45	45	46	46	46	46	47	47	47	47	47	48	48	48	49	49	50
155	50	40	41	42	42	42	43	43	43	44	44	44	44	45	45	45	46	46	47	48
155	45	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
155	40	33	34	35	35	35	36	36	36	36	36	37	37	37	37	38	38	38	39	40
160	100	56	57	58	58	59	59	59	60	60	60	61	61	61	62	62	62	63	64	65
160	95	55	56	57	57	57	58	58	58	59	59	59	60	60	60	61	61	61	62	63
160	90	54	55	56	56	56	57	57	57	57	58	58	58	58	59	59	59	60	60	61
160	85	53	54	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	60
160	80	52	53	54	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59
160	75	51	52	53	53	53	54	54	54	54	55	55	55	55	56	56	56	57	57	58
160	70	50	51	51	52	52	53	53	53	53	54	54	54	55	55	55	56	56	57	58
160	65	49	50	51	51	51	52	52	52	52	53	53	53	54	54	54	54	55	56	56
160	60	47	48	48	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54	55
160	55	44	45	46	46	46	47	47	47	48	48	48	48	49	49	49	50	50	51	52
160	50	41	42	43	43	44	44	44	44	45	45	45	46	46	46	46	47	47	48	49
160	45	38	39	39	40	40	40	41	41	41	42	42	42	42	43	43	43	44	44	45
160	40	34	35	35	36	36	36	37	37	37	38	38	38	38	39	39	39	40	40	41
165	100	58	59	60	60	61	61	61	62	62	62	63	63	63	63	64	64	65	66	67
165	95	56	57	58	59	59	59	60	60	60	61	61	61	62	62	62	63	63	64	65
165	90	55	56	57	57	58	58	59	59	59	59	60	60	60	61	61	61	62	63	64
165	85	54	55	56	56	57	57	57	58	58	58	58	59	59	59	60	60	60	61	62
165	80	53	54	55	55	56	56	56	57	57	57	57	58	58	58	58	59	59	60	61
165	75	53	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	58	59	60
165	70	52	52	53	54	54	54	54	55	55	55	56	56	56	56	57	57	57	58	59
165	65	50	51	52	52	53	53	53	54	54	54	54	55	55	55	56	56	56	57	58
165	60	49	50	50	51	51	51	52	52	52	52	53	53	53	53	54	54	54	55	56
165	55	45	46	47	47	48	48	49	49	49	49	50	50	50	51	51	51	52	53	54
165	50	42	43	44	44	45	45	45	45	46	46	46	46	47	47	47	48	48	49	50
165	45	39	40	41	41	41	42	42	42	42	42	43	43	43	43	44	44	44	45	46
165	40	35	36	37	37	37	38	38	38	38	39	39	39	39	40	40	40	41	41	42
170	100	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	66	67	68	69

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
170	95	58	59	60	60	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67
170	90	56	58	58	59	59	60	60	60	61	61	61	62	62	62	63	63	64	64	66
170	85	55	57	57	58	58	59	59	59	60	60	60	60	61	61	62	62	63	63	64
170	80	54	55	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	62	63
170	75	54	55	55	56	56	56	57	57	57	58	58	58	58	59	59	59	60	60	61
170	70	53	54	54	55	55	56	56	56	56	57	57	57	58	58	58	59	59	60	61
170	65	52	53	54	54	54	55	55	55	55	56	56	56	57	57	57	57	58	58	59
170	60	50	51	51	52	52	53	53	53	53	54	54	54	54	55	55	55	56	57	58
170	55	46	48	48	49	49	49	50	50	50	51	51	51	51	52	52	53	53	54	55
170	50	43	44	45	45	45	46	46	46	47	47	47	47	48	48	48	49	49	50	51
170	45	40	40	41	42	42	42	42	43	43	43	44	44	44	44	45	45	45	46	47
170	40	36	37	37	38	38	38	39	39	39	40	40	40	40	41	41	41	42	42	43
175	100	61	62	63	64	64	64	65	65	65	66	66	66	67	67	68	68	69	69	71
175	95	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	68	69
175	90	58	59	60	61	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67
175	85	57	58	59	59	60	60	60	61	61	61	62	62	62	63	63	64	64	65	66
175	80	56	57	58	58	59	59	59	60	60	60	61	61	61	62	62	62	63	64	65
175	75	55	56	57	57	58	58	59	59	59	59	60	60	60	61	61	62	62	63	64
175	70	54	55	56	56	57	57	57	58	58	58	58	59	59	59	59	60	60	61	62
175	65	53	54	55	55	56	56	56	57	57	57	57	58	58	58	58	59	59	60	61
175	60	51	52	53	53	54	54	54	54	55	55	55	56	56	56	56	57	57	58	59
175	55	47	48	49	50	50	50	51	51	51	52	52	52	53	53	53	54	54	55	56
175	50	44	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	52
175	45	40	41	42	42	43	43	44	44	44	44	45	45	45	45	46	46	47	47	48
175	40	37	38	38	39	39	39	40	40	40	40	41	41	41	41	42	42	42	43	44
180	100	63	64	65	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	72
180	95	61	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	69	71
180	90	60	61	62	63	63	63	64	64	64	65	65	65	66	66	66	67	67	68	69
180	85	59	60	61	61	62	62	62	63	63	63	64	64	64	65	65	65	66	67	68
180	80	57	59	59	60	60	61	61	61	62	62	62	63	63	63	64	64	65	65	67
180	75	56	57	58	59	59	59	60	60	60	61	61	61	62	62	62	63	64	64	65
180	70	55	56	57	58	58	59	59	59	60	60	60	61	61	61	62	62	63	63	64
180	65	54	55	56	57	57	57	58	58	58	58	59	59	59	60	60	60	61	62	63
180	60	52	53	54	54	55	55	55	56	56	56	57	57	57	57	58	58	59	59	60
180	55	49	50	51	51	52	52	52	53	53	53	54	54	54	54	55	55	56	56	58
180	50	45	46	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52	52	53
180	45	42	43	43	44	44	44	45	45	45	45	46	46	46	46	47	47	47	48	49

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
180	40	38	39	39	40	40	40	41	41	41	42	42	42	42	43	43	43	44	44	45
185	100	65	66	66	67	67	68	68	69	69	69	69	70	70	70	71	71	72	73	74
185	95	63	64	65	66	66	66	67	67	67	68	68	68	69	69	70	70	71	71	73
185	90	61	62	63	64	64	65	65	65	66	66	66	67	67	68	68	68	69	70	71
185	85	60	62	62	63	63	64	64	64	65	65	65	66	66	66	67	67	68	68	70
185	80	59	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	69
185	75	58	59	60	60	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67
185	70	57	58	59	59	60	60	60	61	61	61	62	62	62	63	63	64	64	65	66
185	65	55	57	57	58	58	59	59	59	60	60	60	61	61	61	62	62	63	63	64
185	60	53	54	55	56	56	56	57	57	57	58	58	58	59	59	59	60	60	61	62
185	55	50	51	52	52	53	53	53	54	54	54	55	55	55	56	56	56	57	58	59
185	50	46	47	48	48	49	49	49	50	50	50	51	51	51	51	52	52	53	53	55
185	45	43	43	44	44	45	45	45	46	46	46	47	47	47	47	48	48	48	49	50
185	40	39	40	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	45	46
190	100	66	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	75	76
190	95	65	66	67	67	68	68	68	69	69	69	70	70	70	71	71	71	72	73	74
190	90	63	64	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	72	73
190	85	62	63	64	64	65	65	66	66	66	67	67	67	68	68	69	69	70	70	72
190	80	61	62	63	63	64	64	64	65	65	65	66	66	66	67	67	68	68	69	70
190	75	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	68	69
190	70	58	60	60	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67	68
190	65	57	58	59	59	60	60	61	61	61	62	62	62	63	63	63	64	64	65	66
190	60	55	56	56	57	57	58	58	58	59	59	59	60	60	60	61	61	62	62	63
190	55	51	52	53	53	54	54	55	55	55	56	56	56	56	57	57	58	58	59	60
190	50	47	48	49	49	50	50	50	51	51	51	52	52	52	53	53	53	54	55	56
190	45	43	44	45	45	46	46	46	46	47	47	47	48	48	48	48	49	49	50	51
190	40	39	40	41	41	42	42	42	43	43	43	43	44	44	44	44	45	45	46	47
195	100	67	69	69	70	71	71	72	72	72	73	73	74	74	74	75	75	76	77	78
195	95	66	68	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	75	76
195	90	65	66	67	67	68	68	69	69	69	70	70	70	71	71	71	72	72	73	74
195	85	63	65	65	66	66	67	67	68	68	68	69	69	69	70	70	71	71	72	73
195	80	62	63	64	65	65	66	66	66	67	67	67	68	68	69	69	69	70	71	72
195	75	61	62	63	63	64	64	65	65	66	66	66	67	67	67	68	68	69	70	71
195	70	60	61	62	63	63	63	64	64	64	65	65	65	66	66	66	67	67	68	69
195	65	58	60	60	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67	68
195	60	55	57	57	58	58	59	59	60	60	60	61	61	61	62	62	63	63	64	65
195	55	52	53	54	55	55	55	56	56	56	57	57	57	58	58	59	59	60	60	62

Mesh size (mm)	Open-ness (%)	Length for fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
195	50	48	49	50	50	51	51	52	52	52	53	53	53	54	54	54	55	56	56	58
195	45	44	45	46	46	46	47	47	47	48	48	48	49	49	49	50	50	51	51	52
195	40	40	41	42	42	43	43	43	44	44	44	44	45	45	45	46	46	46	47	48
200	100	69	71	72	72	73	73	74	74	74	75	75	76	76	76	77	77	78	79	80
200	95	67	69	69	70	71	71	72	72	72	73	73	74	74	74	75	75	76	77	78
200	90	66	67	68	69	69	70	70	71	71	71	72	72	72	73	73	74	74	75	76
200	85	65	66	67	68	68	68	69	69	69	70	70	70	71	71	72	72	73	73	75
200	80	64	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	71	72	73
200	75	63	64	65	65	66	66	66	67	67	68	68	68	69	69	69	70	70	71	73
200	70	61	63	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	69	70
200	65	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	66	67	67	68
200	60	57	58	59	60	60	60	61	61	62	62	62	63	63	63	64	64	65	65	67
200	55	53	54	55	56	56	56	57	57	58	58	58	59	59	59	60	60	61	62	63
200	50	49	50	51	52	52	52	53	53	53	54	54	54	55	55	55	56	56	57	58
200	45	45	46	47	47	48	48	48	49	49	49	49	50	50	50	51	51	52	52	53
200	40	41	42	43	43	44	44	44	44	45	45	45	46	46	46	46	47	47	48	49

Appendix A7: Guideline table for diamond meshes in the stiff mesh state. It quantifies the retention probabilities in percentage for fish between 30 and 80 cm for different mesh sizes between 100 and 200 mm at various mesh openness's.

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
100	100	0	2	80	100	100	100	100	100	100	100	100
100	95	0	2	73	99	100	100	100	100	100	100	100
100	90	0	2	66	99	100	100	100	100	100	100	100
100	85	0	1	63	99	100	100	100	100	100	100	100
100	80	0	1	61	99	100	100	100	100	100	100	100
100	75	0	2	65	99	100	100	100	100	100	100	100
100	70	0	1	66	99	100	100	100	100	100	100	100
100	65	0	1	75	100	100	100	100	100	100	100	100
100	60	0	3	87	100	100	100	100	100	100	100	100
100	55	0	5	94	100	100	100	100	100	100	100	100
100	50	0	16	99	100	100	100	100	100	100	100	100
100	45	0	41	100	100	100	100	100	100	100	100	100
100	40	1	87	100	100	100	100	100	100	100	100	100
105	100	0	0	40	98	100	100	100	100	100	100	100
105	95	0	0	29	97	100	100	100	100	100	100	100
105	90	0	0	24	96	100	100	100	100	100	100	100
105	85	0	0	19	95	100	100	100	100	100	100	100
105	80	0	0	19	93	100	100	100	100	100	100	100
105	75	0	0	21	94	100	100	100	100	100	100	100
105	70	0	0	26	96	100	100	100	100	100	100	100
105	65	0	0	28	97	100	100	100	100	100	100	100
105	60	0	0	44	99	100	100	100	100	100	100	100
105	55	0	1	68	99	100	100	100	100	100	100	100
105	50	0	4	90	100	100	100	100	100	100	100	100
105	45	0	14	98	100	100	100	100	100	100	100	100
105	40	0	49	100	100	100	100	100	100	100	100	100
110	100	0	0	9	84	100	100	100	100	100	100	100
110	95	0	0	5	75	100	100	100	100	100	100	100
110	90	0	0	4	71	100	100	100	100	100	100	100
110	85	0	0	3	67	100	100	100	100	100	100	100
110	80	0	0	5	70	100	100	100	100	100	100	100
110	75	0	0	4	68	100	100	100	100	100	100	100
110	70	0	0	3	74	100	100	100	100	100	100	100
110	65	0	0	7	82	100	100	100	100	100	100	100
110	60	0	0	12	89	100	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
110	55	0	0	25	97	100	100	100	100	100	100	100
110	50	0	1	58	99	100	100	100	100	100	100	100
110	45	0	3	89	100	100	100	100	100	100	100	100
110	40	0	20	99	100	100	100	100	100	100	100	100
115	100	0	0	1	41	100	100	100	100	100	100	100
115	95	0	0	1	32	99	100	100	100	100	100	100
115	90	0	0	1	28	99	100	100	100	100	100	100
115	85	0	0	1	28	99	100	100	100	100	100	100
115	80	0	0	1	29	99	100	100	100	100	100	100
115	75	0	0	1	27	99	100	100	100	100	100	100
115	70	0	0	1	31	99	100	100	100	100	100	100
115	65	0	0	1	39	100	100	100	100	100	100	100
115	60	0	0	2	58	100	100	100	100	100	100	100
115	55	0	0	5	80	100	100	100	100	100	100	100
115	50	0	0	19	96	100	100	100	100	100	100	100
115	45	0	1	56	99	100	100	100	100	100	100	100
115	40	0	5	92	100	100	100	100	100	100	100	100
120	100	0	0	0	11	99	100	100	100	100	100	100
120	95	0	0	0	9	98	100	100	100	100	100	100
120	90	0	0	0	8	98	100	100	100	100	100	100
120	85	0	0	0	6	98	100	100	100	100	100	100
120	80	0	0	0	8	97	100	100	100	100	100	100
120	75	0	0	0	7	97	100	100	100	100	100	100
120	70	0	0	0	10	97	100	100	100	100	100	100
120	65	0	0	0	10	99	100	100	100	100	100	100
120	60	0	0	0	20	99	100	100	100	100	100	100
120	55	0	0	1	40	100	100	100	100	100	100	100
120	50	0	0	4	76	100	100	100	100	100	100	100
120	45	0	0	21	95	100	100	100	100	100	100	100
120	40	0	2	69	99	100	100	100	100	100	100	100
125	100	0	0	0	4	87	100	100	100	100	100	100
125	95	0	0	0	3	85	100	100	100	100	100	100
125	90	0	0	0	2	81	100	100	100	100	100	100
125	85	0	0	0	1	82	100	100	100	100	100	100
125	80	0	0	0	2	79	100	100	100	100	100	100
125	75	0	0	0	2	81	100	100	100	100	100	100
125	70	0	0	0	3	82	100	100	100	100	100	100
125	65	0	0	0	3	92	100	100	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
125	60	0	0	0	5	98	100	100	100	100	100	100
125	55	0	0	0	13	99	100	100	100	100	100	100
125	50	0	0	1	32	99	100	100	100	100	100	100
125	45	0	0	5	76	100	100	100	100	100	100	100
125	40	0	0	30	98	100	100	100	100	100	100	100
130	100	0	0	0	1	58	99	100	100	100	100	100
130	95	0	0	0	1	51	99	100	100	100	100	100
130	90	0	0	0	0	44	98	100	100	100	100	100
130	85	0	0	0	0	42	98	100	100	100	100	100
130	80	0	0	0	1	40	97	100	100	100	100	100
130	75	0	0	0	1	43	98	100	100	100	100	100
130	70	0	0	0	1	52	98	100	100	100	100	100
130	65	0	0	0	1	65	99	100	100	100	100	100
130	60	0	0	0	1	80	100	100	100	100	100	100
130	55	0	0	0	3	96	100	100	100	100	100	100
130	50	0	0	0	11	99	100	100	100	100	100	100
130	45	0	0	1	39	100	100	100	100	100	100	100
130	40	0	0	10	88	100	100	100	100	100	100	100
135	100	0	0	0	0	23	95	100	100	100	100	100
135	95	0	0	0	0	20	93	100	100	100	100	100
135	90	0	0	0	0	16	91	100	100	100	100	100
135	85	0	0	0	0	13	90	100	100	100	100	100
135	80	0	0	0	0	15	89	100	100	100	100	100
135	75	0	0	0	0	14	91	100	100	100	100	100
135	70	0	0	0	0	21	91	100	100	100	100	100
135	65	0	0	0	0	25	96	100	100	100	100	100
135	60	0	0	0	0	44	99	100	100	100	100	100
135	55	0	0	0	1	72	100	100	100	100	100	100
135	50	0	0	0	3	92	100	100	100	100	100	100
135	45	0	0	0	14	99	100	100	100	100	100	100
135	40	0	0	2	62	100	100	100	100	100	100	100
140	100	0	0	0	0	7	78	99	100	100	100	100
140	95	0	0	0	0	4	72	99	100	100	100	100
140	90	0	0	0	0	3	67	99	100	100	100	100
140	85	0	0	0	0	3	65	99	100	100	100	100
140	80	0	0	0	0	4	66	99	100	100	100	100
140	75	0	0	0	0	4	68	99	100	100	100	100
140	70	0	0	0	0	5	75	99	100	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
140	65	0	0	0	0	7	86	100	100	100	100	100
140	60	0	0	0	0	14	92	100	100	100	100	100
140	55	0	0	0	0	33	97	100	100	100	100	100
140	50	0	0	0	1	72	100	100	100	100	100	100
140	45	0	0	0	5	97	100	100	100	100	100	100
140	40	0	0	1	26	99	100	100	100	100	100	100
145	100	0	0	0	0	1	45	98	100	100	100	100
145	95	0	0	0	0	1	38	97	100	100	100	100
145	90	0	0	0	0	1	31	97	100	100	100	100
145	85	0	0	0	0	1	29	97	100	100	100	100
145	80	0	0	0	0	1	30	97	100	100	100	100
145	75	0	0	0	0	1	36	97	100	100	100	100
145	70	0	0	0	0	2	42	97	100	100	100	100
145	65	0	0	0	0	2	54	98	100	100	100	100
145	60	0	0	0	0	3	73	100	100	100	100	100
145	55	0	0	0	0	11	90	100	100	100	100	100
145	50	0	0	0	0	37	98	100	100	100	100	100
145	45	0	0	0	2	79	100	100	100	100	100	100
145	40	0	0	0	11	99	100	100	100	100	100	100
150	100	0	0	0	0	0	17	92	100	100	100	100
150	95	0	0	0	0	0	15	91	100	100	100	100
150	90	0	0	0	0	0	12	89	100	100	100	100
150	85	0	0	0	0	0	10	87	100	100	100	100
150	80	0	0	0	0	0	11	87	100	100	100	100
150	75	0	0	0	0	0	14	88	100	100	100	100
150	70	0	0	0	0	0	17	91	100	100	100	100
150	65	0	0	0	0	0	19	96	100	100	100	100
150	60	0	0	0	0	1	39	98	100	100	100	100
150	55	0	0	0	0	3	66	99	100	100	100	100
150	50	0	0	0	0	11	90	100	100	100	100	100
150	45	0	0	0	0	45	98	100	100	100	100	100
150	40	0	0	0	3	94	100	100	100	100	100	100
155	100	0	0	0	0	0	7	75	99	100	100	100
155	95	0	0	0	0	0	6	67	99	100	100	100
155	90	0	0	0	0	0	5	62	98	100	100	100
155	85	0	0	0	0	0	5	60	98	100	100	100
155	80	0	0	0	0	0	5	61	98	100	100	100
155	75	0	0	0	0	0	7	66	98	100	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
155	70	0	0	0	0	0	6	71	99	100	100	100
155	65	0	0	0	0	0	9	83	100	100	100	100
155	60	0	0	0	0	0	14	93	100	100	100	100
155	55	0	0	0	0	0	30	98	100	100	100	100
155	50	0	0	0	0	3	71	99	100	100	100	100
155	45	0	0	0	0	19	94	100	100	100	100	100
155	40	0	0	0	2	75	100	100	100	100	100	100
160	100	0	0	0	0	0	3	43	96	100	100	100
160	95	0	0	0	0	0	2	39	95	100	100	100
160	90	0	0	0	0	0	2	34	94	100	100	100
160	85	0	0	0	0	0	2	32	93	100	100	100
160	80	0	0	0	0	0	2	34	93	100	100	100
160	75	0	0	0	0	0	2	35	95	100	100	100
160	70	0	0	0	0	0	2	41	96	100	100	100
160	65	0	0	0	0	0	3	55	98	100	100	100
160	60	0	0	0	0	0	5	73	99	100	100	100
160	55	0	0	0	0	0	14	91	100	100	100	100
160	50	0	0	0	0	1	39	98	100	100	100	100
160	45	0	0	0	0	5	84	100	100	100	100	100
160	40	0	0	0	0	43	98	100	100	100	100	100
165	100	0	0	0	0	0	1	19	86	99	100	100
165	95	0	0	0	0	0	1	14	82	99	100	100
165	90	0	0	0	0	0	1	13	79	99	100	100
165	85	0	0	0	0	0	0	11	77	99	100	100
165	80	0	0	0	0	0	1	12	76	99	100	100
165	75	0	0	0	0	0	1	16	81	99	100	100
165	70	0	0	0	0	0	1	18	87	100	100	100
165	65	0	0	0	0	0	1	27	92	100	100	100
165	60	0	0	0	0	0	2	40	97	100	100	100
165	55	0	0	0	0	0	5	70	99	100	100	100
165	50	0	0	0	0	0	15	93	100	100	100	100
165	45	0	0	0	0	2	55	98	100	100	100	100
165	40	0	0	0	0	18	93	100	100	100	100	100
170	100	0	0	0	0	0	0	5	61	98	100	100
170	95	0	0	0	0	0	0	5	59	97	100	100
170	90	0	0	0	0	0	0	4	53	97	100	100
170	85	0	0	0	0	0	0	4	53	97	100	100
170	80	0	0	0	0	0	0	4	54	97	100	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
170	75	0	0	0	0	0	0	6	60	97	100	100
170	70	0	0	0	0	0	0	5	66	99	100	100
170	65	0	0	0	0	0	0	9	74	99	100	100
170	60	0	0	0	0	0	1	20	89	100	100	100
170	55	0	0	0	0	0	2	39	96	100	100	100
170	50	0	0	0	0	0	6	76	99	100	100	100
170	45	0	0	0	0	0	24	96	100	100	100	100
170	40	0	0	0	0	5	84	100	100	100	100	100
175	100	0	0	0	0	0	0	3	38	93	100	100
175	95	0	0	0	0	0	0	2	34	92	100	100
175	90	0	0	0	0	0	0	2	31	89	99	100
175	85	0	0	0	0	0	0	2	30	89	99	100
175	80	0	0	0	0	0	0	3	33	90	99	100
175	75	0	0	0	0	0	0	2	35	92	100	100
175	70	0	0	0	0	0	0	3	40	94	100	100
175	65	0	0	0	0	0	0	4	56	98	100	100
175	60	0	0	0	0	0	0	8	72	99	100	100
175	55	0	0	0	0	0	1	19	90	100	100	100
175	50	0	0	0	0	0	2	48	98	100	100	100
175	45	0	0	0	0	0	13	89	100	100	100	100
175	40	0	0	0	0	2	56	98	100	100	100	100
180	100	0	0	0	0	0	0	1	17	81	99	100
180	95	0	0	0	0	0	0	1	13	77	99	100
180	90	0	0	0	0	0	0	1	12	76	99	100
180	85	0	0	0	0	0	0	1	12	74	98	100
180	80	0	0	0	0	0	0	1	14	78	99	100
180	75	0	0	0	0	0	0	1	16	79	99	100
180	70	0	0	0	0	0	0	1	18	85	99	100
180	65	0	0	0	0	0	0	1	28	92	100	100
180	60	0	0	0	0	0	0	3	47	97	100	100
180	55	0	0	0	0	0	0	7	72	99	100	100
180	50	0	0	0	0	0	1	25	91	100	100	100
180	45	0	0	0	0	0	5	69	99	100	100	100
180	40	0	0	0	0	1	31	97	100	100	100	100
185	100	0	0	0	0	0	0	0	6	63	98	100
185	95	0	0	0	0	0	0	0	5	57	97	100
185	90	0	0	0	0	0	0	0	4	53	97	100
185	85	0	0	0	0	0	0	0	4	52	97	100

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
185	80	0	0	0	0	0	0	0	5	55	97	100
185	75	0	0	0	0	0	0	0	4	57	97	100
185	70	0	0	0	0	0	0	0	7	66	98	100
185	65	0	0	0	0	0	0	1	13	78	99	100
185	60	0	0	0	0	0	0	1	24	90	100	100
185	55	0	0	0	0	0	0	3	48	97	100	100
185	50	0	0	0	0	0	0	9	77	99	100	100
185	45	0	0	0	0	0	2	40	96	100	100	100
185	40	0	0	0	0	0	14	91	100	100	100	100
190	100	0	0	0	0	0	0	0	2	35	92	100
190	95	0	0	0	0	0	0	0	2	30	90	99
190	90	0	0	0	0	0	0	0	2	26	89	99
190	85	0	0	0	0	0	0	0	2	27	88	99
190	80	0	0	0	0	0	0	0	2	30	90	99
190	75	0	0	0	0	0	0	0	2	31	91	100
190	70	0	0	0	0	0	0	0	2	38	94	100
190	65	0	0	0	0	0	0	0	4	55	97	100
190	60	0	0	0	0	0	0	0	10	76	99	100
190	55	0	0	0	0	0	0	1	25	92	100	100
190	50	0	0	0	0	0	0	5	60	98	100	100
190	45	0	0	0	0	0	1	19	91	100	100	100
190	40	0	0	0	0	0	6	75	99	100	100	100
195	100	0	0	0	0	0	0	0	2	19	76	98
195	95	0	0	0	0	0	0	0	1	16	72	97
195	90	0	0	0	0	0	0	0	1	14	68	97
195	85	0	0	0	0	0	0	0	1	13	67	97
195	80	0	0	0	0	0	0	0	1	14	70	97
195	75	0	0	0	0	0	0	0	1	15	75	98
195	70	0	0	0	0	0	0	0	1	21	83	99
195	65	0	0	0	0	0	0	0	2	29	91	100
195	60	0	0	0	0	0	0	0	3	48	97	100
195	55	0	0	0	0	0	0	1	13	78	99	100
195	50	0	0	0	0	0	0	2	35	94	100	100
195	45	0	0	0	0	0	0	9	76	99	100	100
195	40	0	0	0	0	0	3	53	98	100	100	100
200	100	0	0	0	0	0	0	0	1	7	53	94
200	95	0	0	0	0	0	0	0	0	6	47	92
200	90	0	0	0	0	0	0	0	0	5	45	92

Mesh size (mm)	Open-ness (%)	Retention probability (%) at fish length (cm)										
		30 cm	35 cm	40 cm	44 cm	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm
200	85	0	0	0	0	0	0	0	0	4	41	92
200	80	0	0	0	0	0	0	0	0	4	44	94
200	75	0	0	0	0	0	0	0	1	7	51	93
200	70	0	0	0	0	0	0	0	1	9	59	95
200	65	0	0	0	0	0	0	0	1	13	74	98
200	60	0	0	0	0	0	0	0	2	29	90	99
200	55	0	0	0	0	0	0	0	4	52	97	100
200	50	0	0	0	0	0	0	1	19	86	99	100
200	45	0	0	0	0	0	0	5	58	98	100	100
200	40	0	0	0	0	0	1	30	93	100	100	100

Appendix A8: Guideline table for diamond meshes in the stiff mesh state. It quantifies the length of fish in cm with different retention probabilities 5 to 95 % for different mesh sizes between 100 and 200 mm.

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
100	100	36	36	37	37	38	38	38	38	38	39	39	39	39	39	40	40	40	41	42
100	95	36	37	37	38	38	38	38	39	39	39	39	39	40	40	40	40	41	41	42
100	90	36	37	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	42	42
100	85	37	37	38	38	38	39	39	39	39	39	40	40	40	40	41	41	41	42	42
100	80	37	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	41	42	43
100	75	36	37	38	38	38	38	39	39	39	39	40	40	40	40	40	41	41	42	42
100	70	36	37	38	38	38	39	39	39	39	39	40	40	40	40	40	41	41	41	42
100	65	36	37	37	38	38	38	38	39	39	39	39	39	40	40	40	40	41	41	42
100	60	35	36	37	37	37	37	38	38	38	38	38	39	39	39	39	40	40	40	41
100	55	35	36	36	36	37	37	37	37	37	38	38	38	38	38	39	39	39	40	40
100	50	34	35	35	35	35	36	36	36	36	36	36	37	37	37	37	37	38	38	39
100	45	33	33	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37	38
100	40	31	32	32	32	33	33	33	33	33	33	34	34	34	34	34	35	35	35	36
105	100	38	38	39	39	39	40	40	40	40	40	41	41	41	41	41	42	42	43	43
105	95	38	39	39	40	40	40	40	40	41	41	41	41	41	42	42	42	42	43	43
105	90	38	39	39	40	40	40	40	41	41	41	41	41	42	42	42	42	43	43	44
105	85	39	39	40	40	40	41	41	41	41	41	42	42	42	42	42	43	43	43	44
105	80	39	39	40	40	40	41	41	41	41	41	42	42	42	42	42	43	43	44	44
105	75	38	39	40	40	40	40	41	41	41	41	41	42	42	42	42	43	43	43	44
105	70	38	39	39	40	40	40	40	41	41	41	41	41	42	42	42	42	43	43	44
105	65	38	39	39	40	40	40	40	40	41	41	41	41	41	42	42	42	42	43	43
105	60	38	38	39	39	39	39	40	40	40	40	40	41	41	41	41	41	42	42	43
105	55	37	37	38	38	38	39	39	39	39	39	40	40	40	40	40	41	41	41	42
105	50	35	36	36	37	37	37	37	38	38	38	38	38	39	39	39	39	40	40	41
105	45	34	35	35	35	36	36	36	36	36	37	37	37	37	37	37	38	38	38	39
105	40	33	33	34	34	34	34	35	35	35	35	35	35	36	36	36	36	36	37	37
110	100	39	40	41	41	41	42	42	42	42	42	43	43	43	43	43	44	44	45	45
110	95	40	41	41	41	42	42	42	42	43	43	43	43	44	44	44	44	45	45	46
110	90	40	41	41	42	42	42	43	43	43	43	43	44	44	44	44	45	45	45	46
110	85	40	41	42	42	42	42	43	43	43	43	43	44	44	44	44	45	45	45	46
110	80	40	41	41	42	42	42	42	43	43	43	43	44	44	44	44	45	45	45	46
110	75	40	41	41	42	42	42	43	43	43	43	43	44	44	44	44	45	45	45	46
110	70	40	41	42	42	42	42	43	43	43	43	43	43	44	44	44	44	45	45	46
110	65	40	40	41	41	41	42	42	42	42	43	43	43	43	43	44	44	44	45	45
110	60	39	40	40	41	41	41	41	42	42	42	42	42	43	43	43	43	44	44	45

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
110	55	38	39	39	40	40	40	40	41	41	41	41	41	41	42	42	42	42	43	43
110	50	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	41	41	42	42
110	45	35	36	36	37	37	37	38	38	38	38	38	38	39	39	39	39	40	40	41
110	40	34	34	35	35	35	35	36	36	36	36	36	36	37	37	37	37	38	38	39
115	100	41	42	43	43	43	44	44	44	44	44	45	45	45	45	46	46	46	47	47
115	95	42	43	43	43	44	44	44	44	45	45	45	45	45	46	46	46	47	47	48
115	90	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	47	48
115	85	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	47	48
115	80	42	43	43	43	44	44	44	45	45	45	45	45	46	46	46	47	47	47	48
115	75	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	47	47	47	48
115	70	42	43	43	43	44	44	44	44	45	45	45	45	45	46	46	46	47	47	48
115	65	42	42	43	43	43	44	44	44	44	44	45	45	45	45	46	46	46	47	47
115	60	41	42	42	42	43	43	43	43	44	44	44	44	44	45	45	45	45	46	46
115	55	40	41	41	41	42	42	42	42	43	43	43	43	43	44	44	44	44	45	45
115	50	39	39	40	40	40	41	41	41	41	41	41	42	42	42	42	42	43	43	44
115	45	37	38	38	38	39	39	39	39	40	40	40	40	40	41	41	41	41	42	42
115	40	35	36	36	36	37	37	37	37	38	38	38	38	38	38	39	39	39	40	40
120	100	43	44	44	45	45	45	45	46	46	46	46	46	46	47	47	47	48	48	49
120	95	43	44	45	45	45	45	46	46	46	46	46	47	47	47	47	48	48	48	49
120	90	44	44	45	45	45	46	46	46	46	46	47	47	47	47	47	48	48	48	49
120	85	44	44	45	45	45	46	46	46	46	46	47	47	47	47	47	48	48	49	49
120	80	44	44	45	45	45	46	46	46	46	47	47	47	47	47	48	48	48	49	50
120	75	44	44	45	45	45	46	46	46	46	47	47	47	47	47	48	48	48	49	49
120	70	43	44	44	45	45	45	46	46	46	46	46	47	47	47	47	48	48	49	49
120	65	43	44	44	45	45	45	45	46	46	46	46	46	46	47	47	47	47	48	49
120	60	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	47	47	48
120	55	41	42	43	43	43	44	44	44	44	44	45	45	45	45	46	46	46	47	47
120	50	40	41	41	42	42	42	42	43	43	43	43	43	44	44	44	44	45	45	46
120	45	39	39	40	40	40	40	41	41	41	41	41	42	42	42	42	42	43	43	44
120	40	36	37	37	38	38	38	39	39	39	39	39	40	40	40	40	41	41	41	42
125	100	44	45	46	46	46	47	47	47	47	48	48	48	48	49	49	49	50	50	51
125	95	45	46	46	46	47	47	47	48	48	48	48	48	49	49	49	50	50	51	51
125	90	45	46	46	47	47	47	48	48	48	48	49	49	49	49	50	50	50	51	52
125	85	46	46	47	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	51
125	80	45	46	47	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	52
125	75	45	46	46	47	47	47	48	48	48	48	49	49	49	49	50	50	50	51	52
125	70	45	45	46	46	47	47	47	48	48	48	48	49	49	49	49	50	50	51	52
125	65	45	45	46	46	46	47	47	47	47	48	48	48	48	48	49	49	49	50	50

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
125	60	44	45	45	45	46	46	46	46	46	47	47	47	47	47	48	48	48	49	49
125	55	43	44	44	45	45	45	45	45	46	46	46	46	46	47	47	47	47	48	49
125	50	42	43	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	48
125	45	40	41	41	42	42	42	42	42	43	43	43	43	43	44	44	44	45	45	46
125	40	38	39	39	40	40	40	40	40	41	41	41	41	41	41	42	42	42	43	43
130	100	46	47	48	48	48	49	49	49	49	50	50	50	50	51	51	51	52	52	53
130	95	46	47	48	48	49	49	49	49	50	50	50	50	51	51	51	52	52	53	53
130	90	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54
130	85	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54
130	80	47	48	48	49	49	49	50	50	50	50	51	51	51	52	52	52	53	53	54
130	75	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54
130	70	46	47	48	48	49	49	49	49	50	50	50	50	51	51	51	52	52	53	54
130	65	46	47	47	48	48	48	49	49	49	49	50	50	50	50	51	51	51	52	53
130	60	45	46	47	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	52
130	55	45	45	46	46	46	46	47	47	47	47	47	48	48	48	48	48	49	49	50
130	50	43	44	44	45	45	45	45	46	46	46	46	46	47	47	47	47	48	48	49
130	45	41	42	43	43	43	44	44	44	44	44	45	45	45	45	46	46	46	47	48
130	40	39	40	40	41	41	41	41	42	42	42	42	42	43	43	43	43	44	44	45
135	100	48	49	49	50	50	50	51	51	51	51	52	52	52	52	53	53	54	54	55
135	95	48	49	50	50	50	51	51	51	52	52	52	52	53	53	53	54	54	55	55
135	90	48	49	50	50	51	51	51	52	52	52	52	53	53	53	53	54	54	55	56
135	85	49	50	50	51	51	51	52	52	52	52	53	53	53	53	54	54	54	55	56
135	80	48	49	50	50	51	51	51	52	52	52	52	53	53	53	54	54	54	55	56
135	75	49	50	50	51	51	51	51	52	52	52	52	53	53	53	53	54	54	55	56
135	70	48	49	49	50	50	51	51	51	52	52	52	52	53	53	53	54	54	55	56
135	65	48	49	49	50	50	50	51	51	51	51	52	52	52	52	53	53	53	54	55
135	60	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54
135	55	46	47	47	48	48	48	48	49	49	49	49	49	50	50	50	50	51	51	52
135	50	44	45	46	46	46	47	47	47	47	47	48	48	48	48	49	49	49	50	51
135	45	43	44	44	44	45	45	45	45	46	46	46	46	46	47	47	47	47	48	49
135	40	41	41	42	42	42	43	43	43	43	44	44	44	44	44	45	45	45	46	46
140	100	50	51	51	52	52	52	53	53	53	53	54	54	54	54	55	55	56	56	57
140	95	50	51	52	52	53	53	53	53	54	54	54	54	55	55	55	56	56	56	57
140	90	51	52	52	52	53	53	53	54	54	54	54	55	55	55	55	56	56	57	58
140	85	51	51	52	52	53	53	53	54	54	54	54	55	55	55	56	56	56	57	58
140	80	50	51	52	52	53	53	53	54	54	54	54	55	55	55	56	56	56	57	58
140	75	50	51	52	52	53	53	53	54	54	54	54	55	55	55	55	56	56	57	58
140	70	50	51	51	52	52	53	53	53	53	54	54	54	54	55	55	55	56	56	57

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
140	65	50	51	51	51	52	52	52	53	53	53	53	53	54	54	54	55	55	55	56
140	60	49	50	50	50	51	51	51	52	52	52	52	53	53	53	53	54	54	55	56
140	55	47	48	49	49	50	50	50	50	51	51	51	51	52	52	52	52	53	53	54
140	50	46	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	51	51	52
140	45	44	45	45	46	46	46	46	46	47	47	47	47	47	48	48	48	48	49	50
140	40	42	43	43	44	44	44	44	45	45	45	45	45	46	46	46	46	47	47	48
145	100	52	53	53	54	54	54	55	55	55	55	55	56	56	56	57	57	57	58	59
145	95	52	53	53	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59
145	90	53	53	54	54	55	55	55	55	56	56	56	56	57	57	57	57	58	58	59
145	85	53	53	54	54	55	55	55	56	56	56	56	56	57	57	57	58	58	59	59
145	80	53	53	54	54	55	55	55	56	56	56	56	56	57	57	57	58	58	59	59
145	75	52	53	54	54	54	55	55	55	55	56	56	56	57	57	57	57	58	59	59
145	70	52	53	53	54	54	54	55	55	55	55	56	56	56	57	57	57	58	58	59
145	65	51	52	53	53	53	54	54	54	55	55	55	55	56	56	56	57	57	58	58
145	60	51	51	52	52	53	53	53	53	54	54	54	54	55	55	55	55	56	56	57
145	55	49	50	50	51	51	51	52	52	52	52	53	53	53	53	54	54	54	55	56
145	50	47	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	53	54
145	45	45	46	47	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	52
145	40	43	44	44	45	45	45	45	46	46	46	46	46	47	47	47	47	48	48	49
150	100	53	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	60	61
150	95	53	54	55	55	56	56	56	57	57	57	57	58	58	58	59	59	59	60	61
150	90	54	55	55	56	56	56	57	57	57	57	58	58	58	58	59	59	60	60	61
150	85	54	55	56	56	56	57	57	57	57	58	58	58	58	59	59	59	60	60	61
150	80	54	55	55	56	56	57	57	57	57	58	58	58	58	59	59	59	60	60	61
150	75	54	55	55	56	56	56	57	57	57	57	58	58	58	59	59	59	60	60	61
150	70	53	54	55	55	56	56	56	56	57	57	57	58	58	58	58	59	59	60	61
150	65	53	54	55	55	55	56	56	56	56	57	57	57	57	58	58	58	58	59	60
150	60	52	53	53	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59
150	55	51	52	52	53	53	53	53	54	54	54	54	55	55	55	56	56	56	57	58
150	50	49	50	50	51	51	51	52	52	52	52	53	53	53	53	54	54	54	55	56
150	45	47	48	48	49	49	49	50	50	50	50	50	51	51	51	51	52	52	53	54
150	40	45	45	46	46	46	47	47	47	47	47	48	48	48	48	48	49	49	49	50
155	100	54	56	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	62	63
155	95	55	56	56	57	57	58	58	58	59	59	59	60	60	60	61	61	61	62	63
155	90	55	56	57	57	58	58	58	59	59	59	60	60	60	61	61	61	62	63	64
155	85	55	56	57	57	58	58	59	59	59	59	60	60	60	61	61	61	62	63	64
155	80	55	56	57	57	58	58	58	59	59	59	60	60	60	61	61	61	62	63	64
155	75	54	56	56	57	57	58	58	58	59	59	59	60	60	60	61	61	62	62	64

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
155	70	55	56	56	57	57	58	58	58	58	59	59	59	60	60	60	61	61	62	63
155	65	54	55	56	56	57	57	57	57	58	58	58	58	59	59	59	60	60	61	62
155	60	54	55	55	55	56	56	56	57	57	57	57	57	58	58	58	59	59	60	60
155	55	53	54	54	54	55	55	55	55	56	56	56	56	57	57	57	57	58	58	59
155	50	51	51	52	52	53	53	53	54	54	54	54	54	55	55	55	56	56	57	57
155	45	48	49	50	50	50	51	51	51	52	52	52	52	52	53	53	53	54	54	55
155	40	45	46	47	47	47	48	48	48	48	49	49	49	49	50	50	50	51	51	52
160	100	56	57	58	58	59	59	59	60	60	60	61	61	61	62	62	62	63	64	65
160	95	56	57	58	59	59	59	60	60	60	61	61	61	62	62	62	63	63	64	65
160	90	57	58	58	59	59	60	60	60	61	61	61	62	62	62	63	63	64	64	65
160	85	57	58	59	59	59	60	60	61	61	61	61	62	62	62	63	63	64	64	66
160	80	56	58	58	59	59	60	60	60	61	61	61	62	62	62	63	63	64	64	66
160	75	57	58	58	59	59	60	60	60	61	61	61	61	62	62	62	63	63	64	65
160	70	56	57	58	59	59	59	60	60	60	61	61	61	61	62	62	63	63	64	65
160	65	56	57	57	58	58	59	59	59	59	60	60	60	61	61	61	62	62	63	64
160	60	55	56	57	57	57	58	58	58	58	59	59	59	60	60	60	60	61	62	62
160	55	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	59	60	61
160	50	52	53	53	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59
160	45	50	51	51	52	52	52	53	53	53	53	53	54	54	54	54	55	55	56	56
160	40	47	48	48	49	49	49	50	50	50	50	51	51	51	51	52	52	52	53	54
165	100	58	59	60	60	61	61	61	62	62	62	63	63	63	63	64	64	65	66	67
165	95	58	59	60	61	61	61	62	62	62	63	63	63	64	64	64	65	65	66	67
165	90	58	59	60	61	61	62	62	62	63	63	63	64	64	64	65	65	66	66	67
165	85	59	60	61	61	61	62	62	63	63	63	63	64	64	64	65	65	66	66	68
165	80	59	60	60	61	61	62	62	63	63	63	63	64	64	65	65	65	66	67	68
165	75	58	59	60	60	61	61	62	62	62	63	63	63	64	64	64	65	66	66	67
165	70	58	59	60	60	61	61	61	62	62	62	63	63	63	63	64	64	65	65	66
165	65	57	58	59	59	60	60	61	61	61	61	62	62	62	63	63	63	64	65	66
165	60	57	58	58	59	59	59	60	60	60	61	61	61	61	62	62	62	63	63	64
165	55	55	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	61	62	63
165	50	54	54	55	55	56	56	56	57	57	57	57	58	58	58	58	59	59	60	60
165	45	51	52	53	53	53	54	54	54	54	55	55	55	56	56	56	57	57	58	59
165	40	48	49	50	50	51	51	51	51	52	52	52	52	53	53	53	54	54	54	55
170	100	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	66	67	68	69
170	95	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	68	69
170	90	60	62	62	63	63	64	64	64	65	65	65	65	66	66	66	67	67	68	69
170	85	60	61	62	63	63	64	64	64	64	65	65	65	66	66	66	67	67	68	69
170	80	60	61	62	63	63	63	64	64	64	65	65	65	66	66	66	67	67	68	69

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
170	75	60	61	62	62	63	63	63	64	64	64	65	65	65	66	66	67	67	68	69
170	70	60	61	62	62	63	63	63	64	64	64	64	65	65	65	66	66	66	67	68
170	65	59	60	61	61	62	62	63	63	63	63	64	64	64	65	65	65	66	67	68
170	60	58	59	60	60	60	61	61	61	62	62	62	63	63	63	64	64	64	65	66
170	55	57	58	58	59	59	59	60	60	60	61	61	61	61	62	62	62	63	64	65
170	50	55	56	56	57	57	57	58	58	58	58	59	59	59	60	60	60	61	61	62
170	45	53	54	54	55	55	55	56	56	56	56	57	57	57	57	58	58	58	59	60
170	40	50	51	51	52	52	52	53	53	53	53	53	54	54	54	54	55	55	56	56
175	100	61	62	63	64	64	64	65	65	65	66	66	66	67	67	68	68	69	69	71
175	95	61	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	70	71
175	90	61	63	63	64	65	65	65	66	66	66	67	67	67	68	68	69	69	70	71
175	85	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	69	70	71
175	80	61	62	63	64	64	65	65	65	66	66	67	67	67	68	68	69	69	70	71
175	75	61	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	70	71
175	70	61	62	63	63	64	64	65	65	65	66	66	66	67	67	67	68	68	69	70
175	65	60	61	62	63	63	63	64	64	64	65	65	65	66	66	66	67	67	68	69
175	60	59	60	61	62	62	62	63	63	63	64	64	64	65	65	65	66	66	67	68
175	55	58	59	60	60	60	61	61	61	62	62	62	63	63	63	64	64	64	65	66
175	50	56	57	58	58	59	59	59	60	60	60	60	61	61	61	62	62	62	63	64
175	45	54	55	55	56	56	56	57	57	57	57	58	58	58	58	59	59	60	60	61
175	40	51	52	52	53	53	54	54	54	54	55	55	55	55	56	56	56	57	57	58
180	100	63	64	65	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	72
180	95	63	65	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	72	73
180	90	64	65	65	66	66	67	67	68	68	68	69	69	69	70	70	70	71	72	73
180	85	63	65	65	66	66	67	67	68	68	68	69	69	69	70	70	71	71	72	73
180	80	63	64	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	72	73
180	75	63	64	65	65	66	66	67	67	67	68	68	68	69	69	70	70	71	71	73
180	70	63	64	65	65	66	66	66	67	67	67	68	68	68	69	69	69	70	71	72
180	65	62	63	64	64	65	65	65	66	66	66	67	67	67	68	68	68	69	70	71
180	60	61	62	63	63	64	64	64	65	65	65	65	66	66	66	67	67	68	68	69
180	55	60	61	61	62	62	62	63	63	63	64	64	64	65	65	65	66	66	67	68
180	50	57	58	59	60	60	60	61	61	61	62	62	62	62	63	63	64	64	65	66
180	45	55	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	61	62	63
180	40	52	53	54	54	55	55	55	55	56	56	56	56	57	57	57	58	58	59	59
185	100	65	66	67	67	67	68	68	69	69	69	69	70	70	70	71	71	72	73	74
185	95	65	66	67	67	68	68	69	69	69	70	70	70	71	71	71	72	72	73	74
185	90	65	66	67	68	68	69	69	69	70	70	70	70	71	71	71	72	72	73	74
185	85	66	67	67	68	68	69	69	69	70	70	70	70	71	71	72	72	72	73	74

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
185	80	65	66	67	67	68	68	69	69	69	70	70	70	71	71	71	72	72	73	74
185	75	65	66	67	67	68	68	69	69	69	70	70	70	70	71	71	72	72	73	74
185	70	64	66	66	67	67	68	68	68	69	69	69	70	70	70	71	71	72	72	73
185	65	63	65	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	71	73
185	60	62	63	64	65	65	65	66	66	66	67	67	67	68	68	68	69	69	70	71
185	55	61	62	63	63	64	64	64	65	65	65	65	66	66	66	67	67	68	68	69
185	50	59	60	61	61	62	62	62	63	63	63	64	64	64	65	65	65	66	66	67
185	45	56	58	58	59	59	59	60	60	60	61	61	61	61	62	62	62	63	64	65
185	40	54	55	55	56	56	56	56	57	57	57	57	58	58	58	59	59	59	60	61
190	100	66	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	75	76
190	95	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	74	75	76
190	90	67	68	69	69	70	70	71	71	71	72	72	72	73	73	73	74	74	75	76
190	85	67	68	69	69	70	70	71	71	71	72	72	72	73	73	73	74	75	75	77
190	80	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	74	75	76
190	75	67	68	68	69	69	70	70	71	71	71	72	72	72	73	73	73	74	75	76
190	70	66	67	68	69	69	69	70	70	70	71	71	71	72	72	72	73	73	74	75
190	65	65	67	67	68	68	68	69	69	69	70	70	70	71	71	71	72	72	73	74
190	60	64	65	66	66	67	67	67	68	68	68	69	69	69	70	70	70	71	72	73
190	55	62	63	64	65	65	65	66	66	66	67	67	67	67	68	68	68	69	70	71
190	50	60	61	62	62	63	63	64	64	64	64	65	65	65	66	66	66	67	68	69
190	45	58	59	60	60	60	61	61	61	62	62	62	62	63	63	63	64	64	65	66
190	40	55	56	56	57	57	57	58	58	58	59	59	59	59	60	60	60	61	61	62
195	100	67	69	69	70	71	71	72	72	72	73	73	74	74	74	75	75	76	77	78
195	95	68	69	70	71	71	72	72	72	73	73	74	74	74	75	75	76	76	77	79
195	90	68	69	70	71	71	72	72	73	73	74	74	74	75	75	76	76	77	78	79
195	85	68	69	70	71	72	72	72	73	73	74	74	74	75	75	76	76	77	78	79
195	80	68	69	70	71	71	72	72	73	73	73	74	74	75	75	75	76	77	78	79
195	75	68	69	70	71	71	72	72	72	73	73	73	74	74	75	75	76	76	77	78
195	70	67	68	69	70	70	71	71	72	72	72	73	73	73	74	74	75	75	76	77
195	65	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	74	75	76
195	60	66	67	68	68	69	69	69	70	70	70	70	71	71	71	72	72	73	73	74
195	55	63	65	65	66	66	67	67	67	68	68	68	69	69	69	70	70	71	71	73
195	50	62	63	63	64	64	65	65	65	66	66	66	67	67	67	68	68	68	69	70
195	45	59	60	61	61	62	62	63	63	63	63	64	64	64	65	65	65	66	67	68
195	40	56	57	57	58	58	59	59	59	60	60	60	60	61	61	61	62	62	63	64
200	100	69	71	72	72	73	73	74	74	74	75	75	76	76	76	77	77	78	79	80
200	95	70	71	72	73	73	74	74	74	75	75	76	76	76	77	77	78	79	79	81
200	90	70	71	72	73	73	74	74	75	75	75	76	76	77	77	77	78	79	80	81

Mesh size (mm)	Open-ness (%)	Length of fish (cm) with different retention probabilities																		
		5 %	10 %	15 %	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
200	85	70	72	73	73	74	74	75	75	75	76	76	76	77	77	78	78	79	80	81
200	80	70	72	72	73	74	74	74	75	75	75	76	76	76	77	77	78	78	79	80
200	75	69	71	72	72	73	73	74	74	75	75	75	76	76	77	77	78	78	79	81
200	70	69	70	71	72	72	73	73	74	74	74	75	75	75	76	76	77	78	78	80
200	65	68	69	70	71	71	72	72	73	73	73	74	74	74	75	75	76	76	77	78
200	60	67	68	69	69	70	70	70	71	71	71	72	72	72	73	73	74	74	75	76
200	55	65	67	67	68	68	69	69	69	70	70	70	70	71	71	71	72	72	73	74
200	50	63	64	65	65	66	66	66	67	67	67	68	68	68	68	69	69	70	71	72
200	45	60	61	62	62	63	63	64	64	64	64	65	65	65	66	66	67	67	68	69
200	40	57	58	59	59	60	60	60	61	61	61	62	62	62	62	63	63	64	64	65

Technology for a better society

www.sintef.no