A METHOD FOR TAPERING PURSE SEINES

By Jerry E. Jurkovich*

This paper describes how to compute tapers of netting to any predetermined length prior to cutting. Southeastern Alaska salmon purse seines, which are made up of horizontal strips of netting, and a Norwegian tuna seine, of vertical strips, are used as examples. The diagrams show how to cut netting with the least waste.

For the past 10 years, vessel owners in the salmon fishery in Puget Sound and southeastern Alaska have favored using wedged or tapered strips in one or both ends of their seines. The taper is inserted between strips of identical mesh size, and equal twine weight, and as near the corkline as possible. A tapered seine can be fished near shore without having a deep section of web dangling near the bottom. Deep gavels or breast lines have a tendency to foul the purse line, and a tapered strip reduces this tendency to a minimum. Although the need is obvious in seining for salmon, tapering of seines may be advantageous in other fisheries.

Purse seines are made up of either horizontal or vertical strips of webbing. In the United States, most purse seines, other than those used in the menhaden fishery, have horizontal strips of webbing; in northern Europe, purse seines have vertical strips.

Nearly all experienced fishermen can cut tapers or wedges when they are needed, but few can compute a taper to a predetermined length before cutting. Haphazard cutting of netting can be costly if mistakes are made. This report presents an easy method of computing and cutting a taper.

U. S. PURSE SEINE WITH UNIFORM TAPER

For the first example of a taper, I use a salmon purse seine from the Icy Strait district of southeastern Alaska (fig. 1). The bunt end begins with 225 MD (meshes deep) hung $11\frac{1}{2}$ to 12 fathoms in length to 10 fathoms of the corkline, which is the longest side because the leadline is usually 10 percent shorter than the corkline. At the completion of 10 fathoms of bunt, 25 more meshes of corkline selvage webbing are laced in. A taper starts at the junction between bunt and body between two adjacent strips of 4-inch stretch mesh.[1] This taper is to be 20 fathoms (hung measure) long, so allow 16.6 percent additional length for "hanging in" length (24 fathoms of web hung on 20 fathoms of corkline).

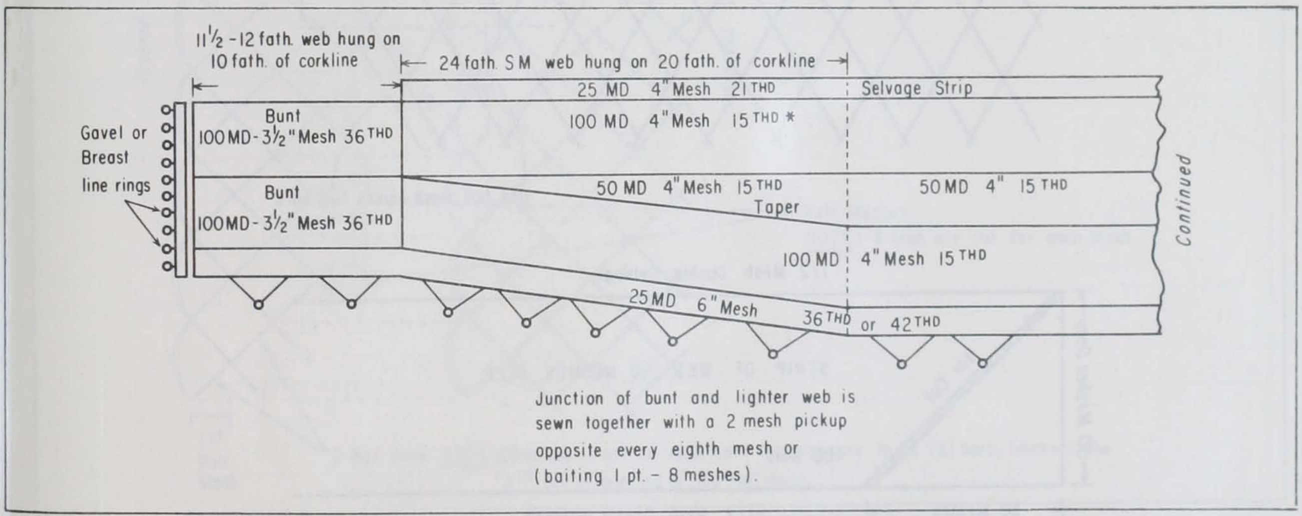

Fig. 1 - Diagram of bunt end of a salmon purse seine that is 300 meshes deep.

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1/All mesh measurements in this paper are stretched mesh inside of one knot over and including opposite measured parallel to the selvage.

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Computing the Taper

First step: Draw a sketch of desired taper (fig. 2).

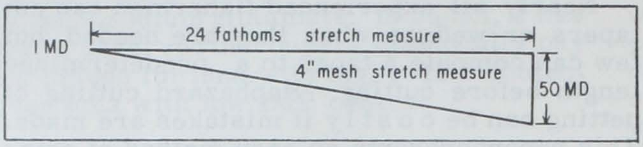

Fig. 2 - Sketch of desired taper.

Second step: Convert 24 fathoms SM (stretch measure) to number of meshes by dividing 1 fathom or 72 inches, by 4-inch mesh, to get 18 meshes per fathom; 24 fathoms x 18 = 432 ML (meshes long). The 432 meshes are rounded to the nearest 50, to get 450 ML.

Check a 1-fathom piece of webbing with a fathom stick, then count the meshes per fathom. This will prevent any mistakes caused by shrinkage or other variations quite often found in machine-made netting.

Third step: Set up a proportion $\frac{MD}{ML}$

$$\frac{MD}{ML} = \frac{50}{450} = \frac{1}{9}$$

The fraction (1/9) indicates a proportion of one mesh in vertical direction opposed to nine meshes in a longitudinal direction. Vertical direction can only be achieved through the use of bar cuts. Because two bars make one mesh, multiply the fraction (1/9) by 2 (see fig. 3).

$$\frac{2}{2} \times \frac{1}{9} = \frac{2}{18}$$

A netting fundamental is that two bars constitute one mesh. Therefore, all tapers must include two or four bars. Use of a two-bar

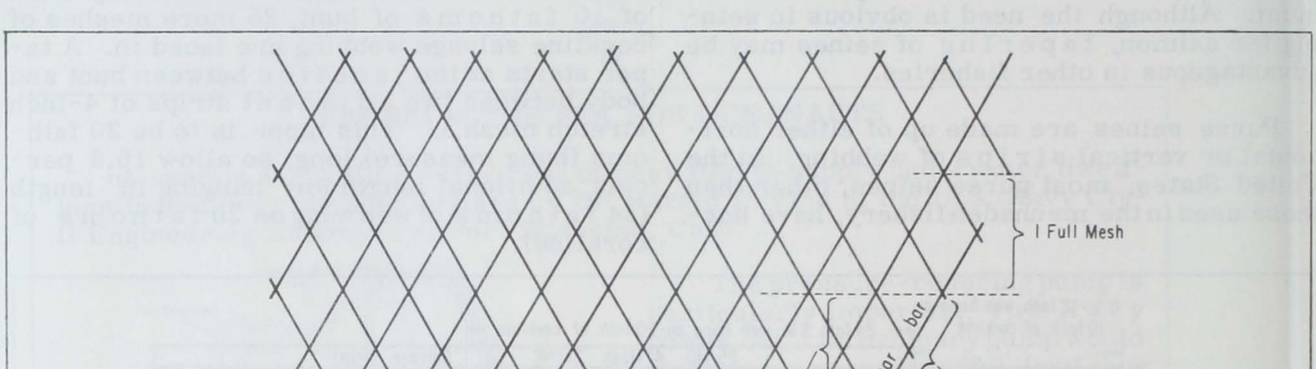

Fig. 3 - Basic netting fundamentals.

formula is preferred for two reasons: (1) two bars reduce the chances of making mistakes; (2) four bars produce larger steps, resulting in a taper that is not quite so smooth. Either a two- or four-bar formula can be used with good results.

Substitute: $\frac{18 - 2}{2} = 8$ meshes

The taper is two bars and eight meshes. Figure 4 reveals that in a two-bar, eight-mesh, taper the total number of legs cut is

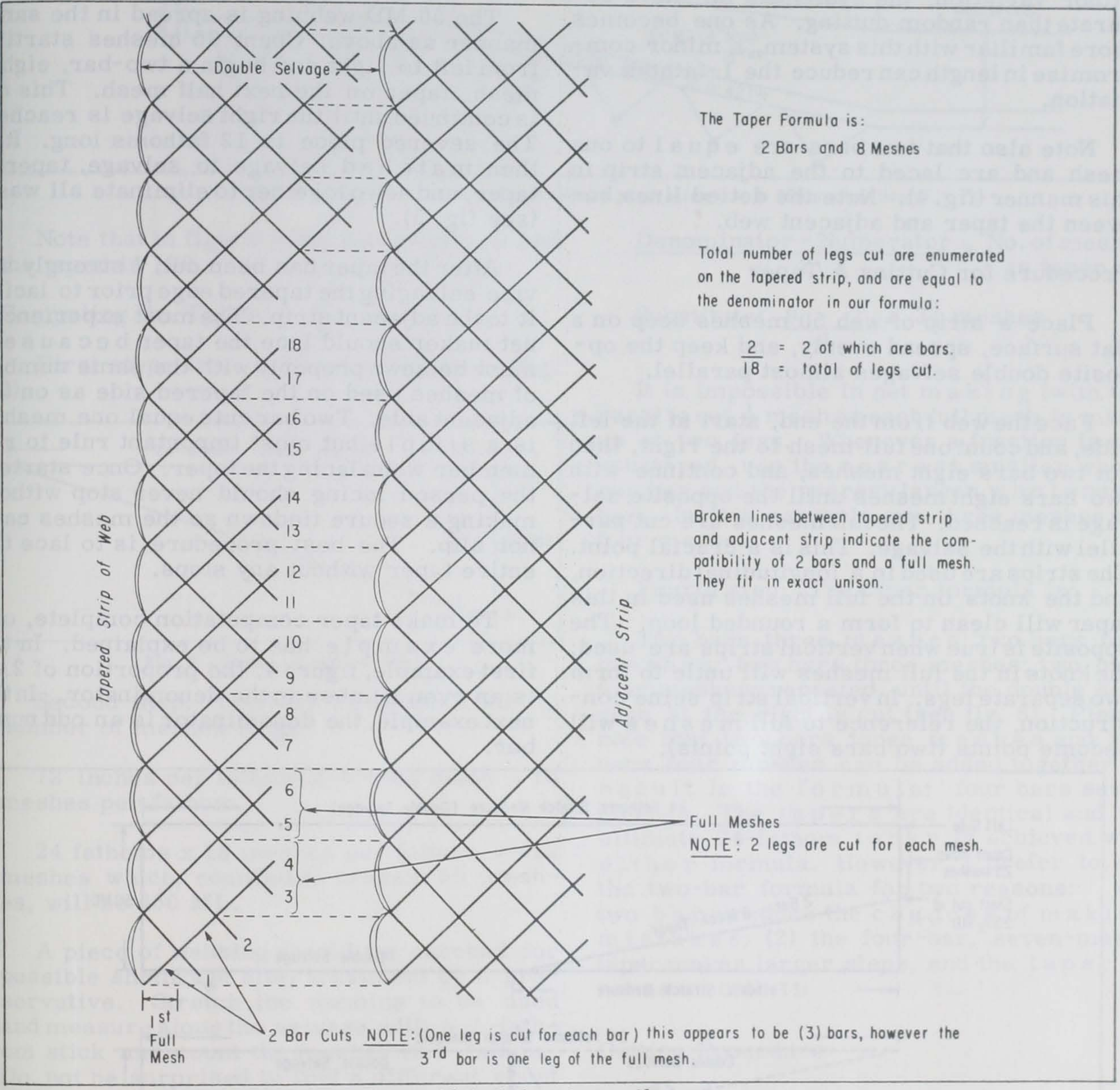

Fig. 4 - Method of cutting a uniform taper.

Result: Fraction 2/18--the numerator (2) indicates a cut of two bars. Next, compute the number of meshes in this taper:

$$\frac{\text{Denominator} - \text{Numerator}}{2} = \text{No. of meshes}$$

18, which is the denominator. The first two legs cut form bars, or numerator of the fraction 2/18. A cut of two bars eight meshes; two bars eight meshes; repeated until the opposite selvage side is reached will result in a taper about 24 fathoms long.

At this point, it is obvious that tapering is not precise; at best it is a compromise. The aforementioned taper was computed for 432 meshes long, then rounded to 450 meshes in length. The result is a taper that is 18 meshes, or 1 fathom, too long. Regardless of this minor variation, the system is far more accurate than random cutting. As one becomes more familiar with this system, a minor compromise in length can reduce the 1-fathom variation.

Note also that two bars are equal to one mesh and are laced to the adjacent strip in this manner (fig. 4). Note the dotted lines between the taper and adjacent web.

Procedure for Cutting A Taper

Place a strip of web 50 meshes deep on a flat surface, spread evenly, and keep the opposite double selvages almost parallel.

Face the web from the end, start at the left side, and count one full mesh to the right, then cut two bars eight meshes, and continue with two bars eight meshes until the opposite selvage is reached. The full meshes are cut parallel with the selvage. This is a crucial point. The strips are used in a longitudinal direction, and the knots on the full meshes used in this taper will clean to form a rounded loop. The opposite is true when vertical strips are used; the knots in the full meshes will untie to form two separate legs. In vertical strip seine construction, the reference to full meshes will become points (two bars eight points).

When a taper is cut in the aforementioned manner, the remains may be used at the opposite end of the seine.

An alternate method for better utilization of webbing should be used if a taper is needed only at one end of the seine.

The 50 MD webbing is spread in the same manner as above. Count 25 meshes starting from left to right and begin a two-bar, eight-mesh, taper on the next half mesh. This cut is continued until the right selvage is reached. The severed piece is 12 fathoms long. It is then matched selvage to selvage, taper to taper, and sewn together to eliminate all waste (see fig. 5).

After the taper has been cut, I strongly advise selvaging the tapered edge prior to lacing it to the adjacent strip. The most experienced net maker should lace the taper because it must be sewn properly with the same number of meshes used on the tapered side as on the adjacent side. Two bar cuts equal one mesh--is a simple but most important rule to remember when lacing the taper. Once started, the person lacing should never stop without making a secure tiedown so the meshes cannot slip. The best procedure is to lace the entire taper without any stops.

To make taper computation complete, one more example has to be explained. In the first example, figure 4, the proportion of 2/18 is an even number in the denominator. In the next example, the denominator is an odd number.

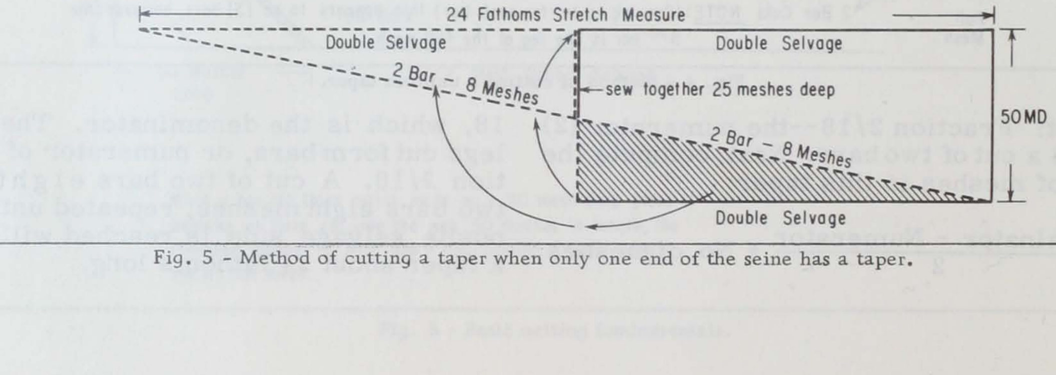

Fig. 5 - Method of cutting a taper when only one end of the seine has a taper.

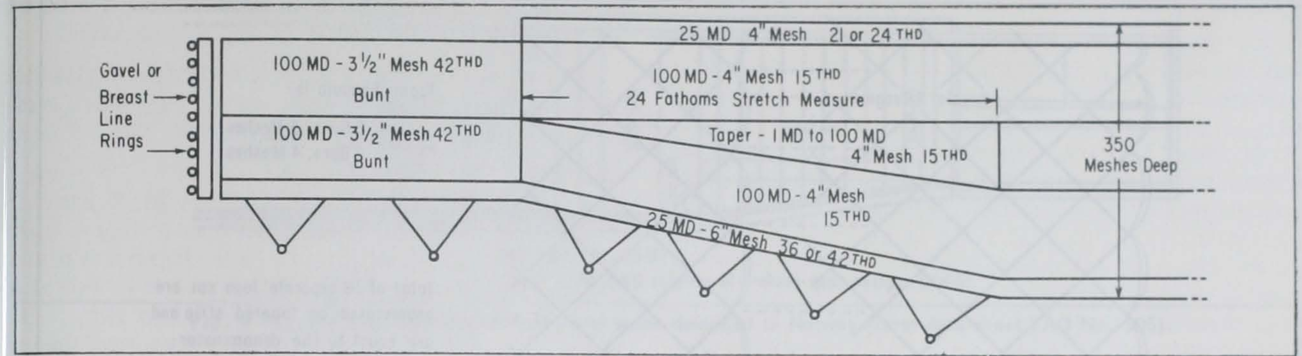

Fig. 6 - Diagram of bunt end of a salmon purse seine that is 350 meshes deep.

Note that in figure 6 the net is 350 MD and the taper is 100.

Computing the Taper

First step: Draw a diagram of taper (fig. 7).

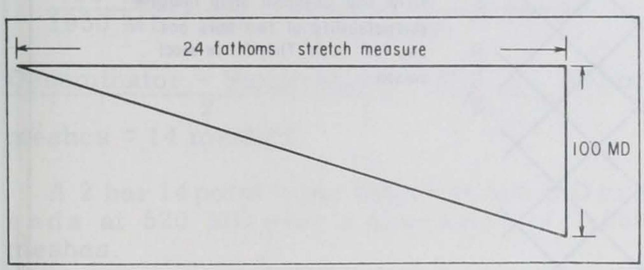

Fig. 7 - Sketch of desired taper.

Second step: Convert 24 fathoms SM to number of meshes long.

72 inches per fathom ÷ 4-inch mesh = 18 meshes per fathom.

24 fathoms x 18 meshes per fathom = 432 meshes which, rounded to nearest 50 meshes, will be 450 ML.

A piece of webbing should be checked for possible shrinkage after treatment by a preservative. Stretch the webbing to be used and measure along the selvage with a 1-fathom stick and count the meshes in 1 fathom. Do not be surprised to find a different count than your computation. Always use the count obtained from the measured length.

Third step: Proportion:

$$\frac{MD}{ML} = \frac{100\ (MD)}{450\ (ML)} = \frac{2}{9}$$

2 in the numerator = 2 bar cuts.

$$\frac{\text{Denominator} - \text{Numerator}}{2} = \text{No. of meshes in taper}$$

Substitute: $\frac{9 - 2}{2} = 3\frac{1}{2}$ meshes

It is impossible in net making (with tapers) to cut ½ mesh as each full mesh is made up of two legs. Whenever a fraction is encountered, use the nearest smaller whole number and the nearest larger whole number. In this example use three meshes and four meshes.

Fourth step: The taper formula is:

Two bars three meshes; two bars four meshes; two bars three meshes; two bars four meshes; repeated, until the double selvage at the right is cut (see fig. 8). Please note that two bars three meshes and two bars four meshes can be added together to result in the formula: four bars seven meshes. The tapers are identical and the ultimate 24-fathom taper is achieved with either formula. However, I prefer to use the two-bar formula for two reasons: (1) two bars reduce the chances of making mistakes; (2) the four-bar, seven-mesh, taper makes larger steps, and the taper is not as smooth.

Cutting Procedure

This taper will be started in the same manner as the first. Spread the 100 MD webbing on a smooth flat surface, spread evenly, and keep opposite double selvages almost parallel. Count one full mesh (see fig. 8), then start two bars three meshes; two bars four meshes; two bars three meshes; two bars four meshes, alternating three and four meshes after each two bars. This will produce a 24-fathom taper from 1 to 100 MD.

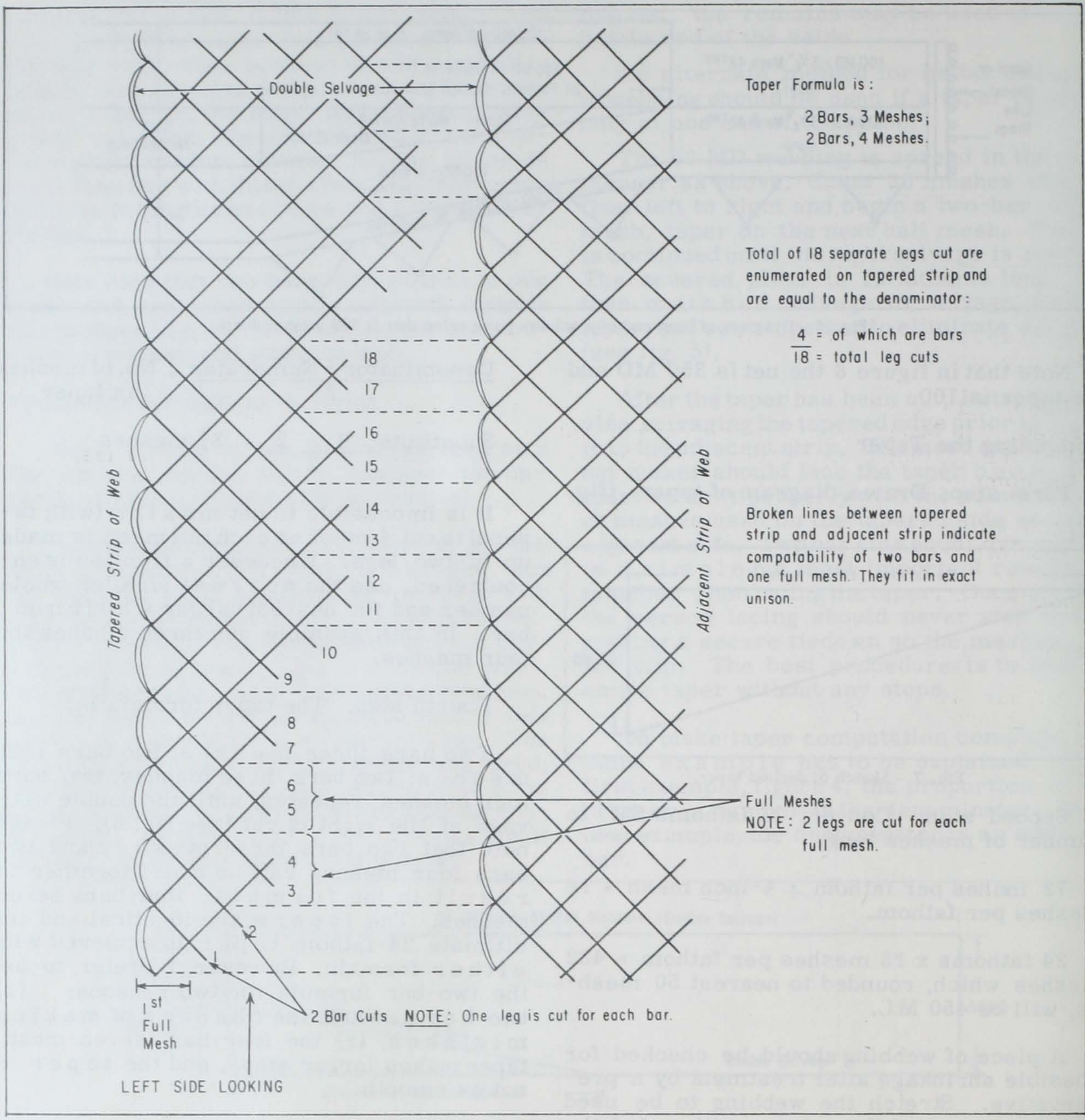

Fig. 8 - Method of cutting a nonuniform taper.

NORWEGIAN TUNA PURSE SEINE

The purse seine on data sheet FAO No. 305 (Food and Agriculture Organization, Catalogue of Fishing Gear Design, 1965) was selected for the example of a purse seine made up of vertical strips of webbing (fig. 9). The seams of vertical strips are laced together to make the selvages line up perfectly. This task is accomplished by using a baiting rate of 1 point 15 meshes to lace the long selvage to the short selvage so that they are the same length on the bottom edge. This baiting rate causes a bagging effect that is considered a good feature in purse seine configuration.

I believe that vertical strips laced mesh on mesh and a taper cut would work even more effectively because this seine has a 40 percent "hang in" initially, which gives plenty of bagging. Any additional bagging achieved by baiting is superfluous and will be a detriment, in-

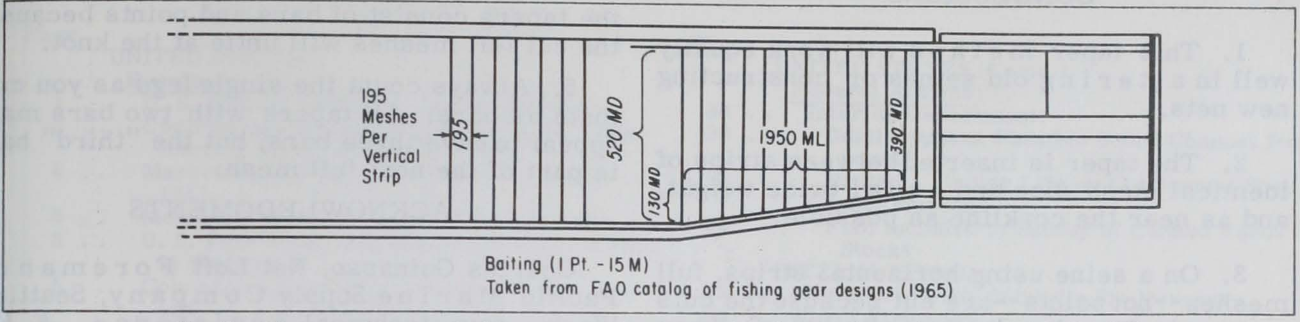

Fig. 9 - Diagram of bunt end of tuna purse seine designed in Norway (from data sheet FAO No. 305).

stead of an asset, when the seine is used where tides are strong.

From data sheet No. 305, the following is derived: 130 MD is the difference between 390 MD at the beginning of the taper and 520 MD at the completion of the taper.

$$\frac{130\ \text{MD}}{1950\ \text{ML}} = \frac{13}{195} = \frac{1 \times 2}{15 \times 2} = \frac{2}{30} = 2\ \text{bars}$$

$$\frac{\text{Denominator - Numerator}}{2} \qquad \frac{30 - 2}{2} = \text{No. of}$$

meshes = 14 meshes.

A 2 bar 14 point taper starts at 390 MD and ends at 520 MD over a distance of 1,950 meshes.

Panel I. Count down 403 meshes. At the next ½ mesh, start cutting a 2-bar, 14-point, taper. Then match bottom and top on 403-mesh sides and lace together.

Panel II. Count down 429 meshes. At the next ½ mesh, start cutting a 2-bar, 14-point taper and lace 429-mesh sides together. Then match 416-mesh sides from Panel I and II and lace together.

Panels III, IV, V--Repeat as in Panel I and II.

The result is a piece of netting with 390 MD gradually increasing to 520 MD over a span of 1,950 ML. The bottom edge is a con-

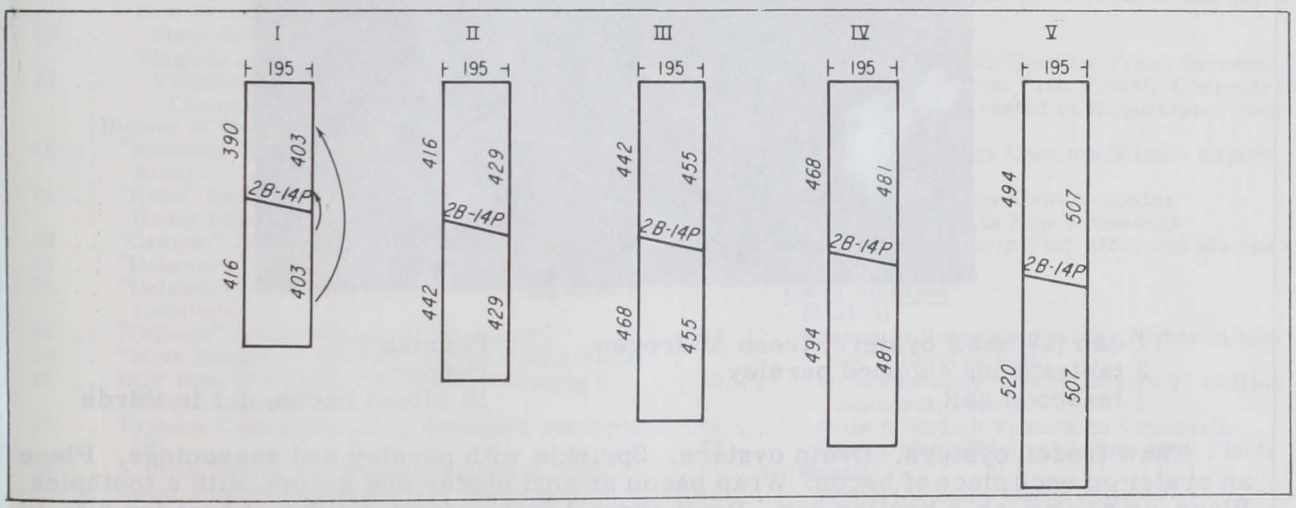

Fig. 10 - Method of cutting the webbing for FAO No. 305 with no waste.

Panel I - 195 ML x 806½ meshes deep
Panel II - 195 ML x 858½ " "
Panel III - 195 ML x 910½ " "
Panel IV - 195 ML x 962½ " "
Panel V - 195 ML x 1014½ " "

The half mesh is important because it is lost when the taper is cut.

tinuous 2-bar, 14-point, taper and the top seam has straight meshes.

The tapered edge at the bottom will lace mesh upon mesh to the selvage. When two bars are reached, they are treated exactly the same as one mesh. This will not be difficult.

CONCLUSIONS

1. This taper method will work equally well in altering old seines or constructing new nets.

2. The taper is inserted between strips of identical mesh size and equal twine weight, and as near the corkline as possible.

3. On a seine using horizontal strips, full meshes--not points--are cut because the cuts are made in a longitudinal direction. When the knots are cleaned, complete loops are formed.

4. On European nets using vertical strips, the tapers consist of bars and points because the cut full meshes will untie at the knot.

5. Always count the single legs as you cut them as bars. All tapers with two bars may appear to have three bars, but the "third" bar is part of the next full mesh.

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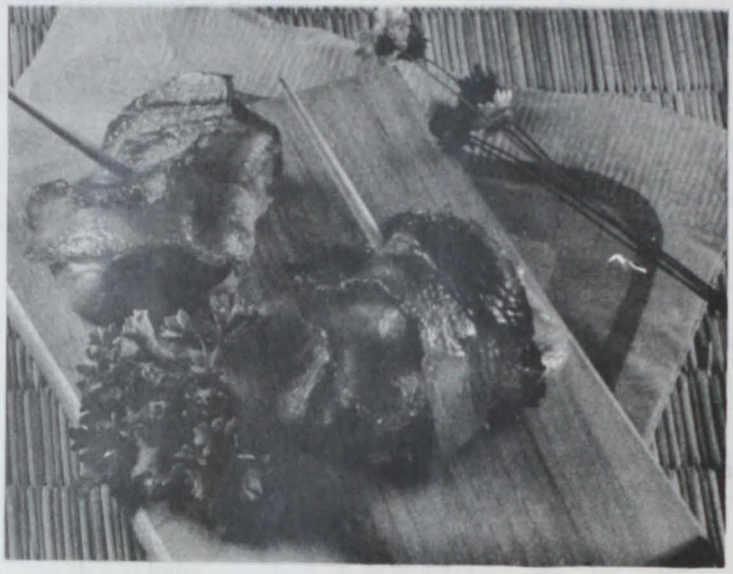
ANGELS ON HORSEBACK



1 can (12 ozs.) oysters, fresh or frozen
2 tablespoons chopped parsley
$\frac{1}{2}$ teaspoon salt
Paprika
Pepper
10 slices bacon, cut in thirds

Thaw frozen oysters. Drain oysters. Sprinkle with parsley and seasonings. Place an oyster on each piece of bacon. Wrap bacon around oyster and secure with a toothpick. Place oysters on a broiler pan. Broil about 4 inches from source of heat for 8 to 10 minutes or until bacon is crisp. Turn carefully. Broil 4 to 5 minutes longer or until bacon is crisp. Makes approximately 30 hors d'oeuvres.

This idea for entertaining is from a new, 22-page, full-color booklet, "Nautical Notions for Nibbling, released by the United States Department of the Interior's BCF. It is available for 45¢ from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10, (catalog no. I-49.49/2:10).