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CAUSE OF UNOBSERVED PORPOISE MORTALITY**

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U.S. DEPARTMENT OF COMMERCE
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The Mid-Net Zipper Ridge
A Possible Cause of Unobserved Porpoise Mortality

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Each year thousands of oceanic porpoises are killed incidently during purse seining operations for tuna. While the U.S. fleet has greatly reduced its estimated mortality rates during the past several years, further reductions are possible.

It has long been suspected that unobserved porpoise mortality occurs in deep areas of the seine prior to backdown. During the Dedicated Vessel Program¹, NMFS divers observed that the mid-net zipper² held up a wall of webbing 30 feet or more above the floor of the net (Fig. 1 A&B). The wall, or mid-net zipper ridge, formed during the pursing operation and persisted until it was rolled aboard. These observations were further documented by fathometer tracings collected from a small rubber raft crossing the net (Fig. 1,C).

Captured porpoise usually position themselves over the deepest area of the net. When large numbers of porpoise and tuna are captured, or when porpoise must cross over the zipper ridge, the probability of entanglement is greatly increased. NMFS divers have observed porpoise entangled in the overhanging wall of webbing and lesser folds associated with this area. The ridge has also been observed in a number of purse seines during local water hauls and has been noticeably absent in other seines.

The formation of the zipper ridge most commonly results from improper

¹ The U.S. tuna industry and the Federal Government sponsored the tuna seiner M/V Queen Mary during 1978 as a research platform for studies related to the tuna/porpoise problem.

² The mid-net zipper is a line that extends vertically from the corkline to the leadline. It is occasionally pulled to divide the net into equal sections. If pulled when the tuna are crossing the net, the school will be divided into two smaller, more easily handled schools. This is usually only done on extremely large catches to reduce tensions and pressures on the fishing gear.

installation of the "stopper" webbing. The stopper material is made of heavier, stronger twine and used to stop net tears, should they occur, and for attaching the zipper line guide rings. This material is usually 5-inch mesh selvage, 10 meshes wide and made of No.96 or No.120 nylon twine. It is installed vertically from the corkline, through the entire body of the net to the headline. Less common causes for the ridge include a short zipper line and incorrectly installed guide rings.

The zipper ridge occurs when the stopper webbing is prevented from extending as far as the adjacent lighter web in the main body of the purse seine. A close look at zipper installation techniques has shown a definite advantage for those seines in which the stopper was installed with a greater amount of slack. While other factors may contribute to restrict full extension of the stopper, one fairly simple adjustment can eliminate them. This adjustment is most easily made at dockside but can be done at sea.

The five inch mesh stopper must be re-hung to the 4 1/4-inch mesh with enough extra slack to permit full extension of the stopper. There are two accepted methods by which full extension can be achieved.

The first method is the simplest and the only one that should be attempted at sea. Here the existing five inch mesh stopper is cut out of the seine and re-hung, mesh-for-mesh to the 4 1/4-inch mesh. This provides approximately 30% slack in the stopper webbing. An additional one to three meshes of stopper web should be "killed-in"³ to each strip of the 4 1/4-inch mesh. For example, two fathoms of additional slack are provided when only two 5-inch meshes are killed-in for each strip of a 14-strip net. This procedure will ensure a problem free zipper line by providing for differential shrinkage rates between the five inch and 4 1/4-inch mesh, should it occur. Additionally, there is no loss of strength in this area since tensions remain uniform throughout these meshes.

The second method is the technique of stretching the five-inch stopper web evenly with the 4 1/4-inch mesh and tacking them together prior to lacing. This should only be done with pre-shrunk material and only on one side of the stopper at a time. Care must be taken to ensure that both sides are stretched equally tight prior to tacking. An additional three to five meshes of stopper web should be killed-in for each strip of 4 1/4-inch mesh to ensure enough slack in the stopper to prevent formation of the ridge.

Another common cause of the mid-net zipper ridge is a short zipper line which restricts the full extension of the stopper webbing. This case is easily observed at rings up by noting if there is a greater tension on the zipper line than on the chains. Often an indentation of the corkline, at the zipper, protrudes into the net and towards the seiner (Fig. 1,A). This problem is easily corrected by splicing an appropriate length of line into the existing zipper line.

³ Kill-in is a common term used by net builders and net repairmen. It refers to the process of lacing two or more meshes of webbing to only one mesh of adjacent webbing.

Improper installation of the zipper guide rings can effectively reduce the depth of the center section of a 14-strip net by as much as 3/4 of a strip. Guide rings should be lashed to a single knot down the stopper's center knot row. These rings should be evenly spaced, approximately 18-20 meshes apart.

The immediate fleet-wide effect in reducing porpoise mortality cannot be determined at this time. Individual vessels plagued by zipper problems, however, do stand a good chance of achieving lower mortality rates by correctly modifying the mid-net zipper and/or stopper web.

A major trend in recent years has been toward deeper and faster sinking nets. These have proven more efficient in capturing traveling schools of tuna than the shorter 10-12-strip nets. Heavily weighted, 14-strip nets are now common throughout the U.S. fleet and a few vessels are equipped with nets 18-20 strips in depth. The overall efficiency of those purse seines with zipper problems may be improved by allowing the mid-section to sink faster and deeper, thus preventing potential loss of fish under this area.

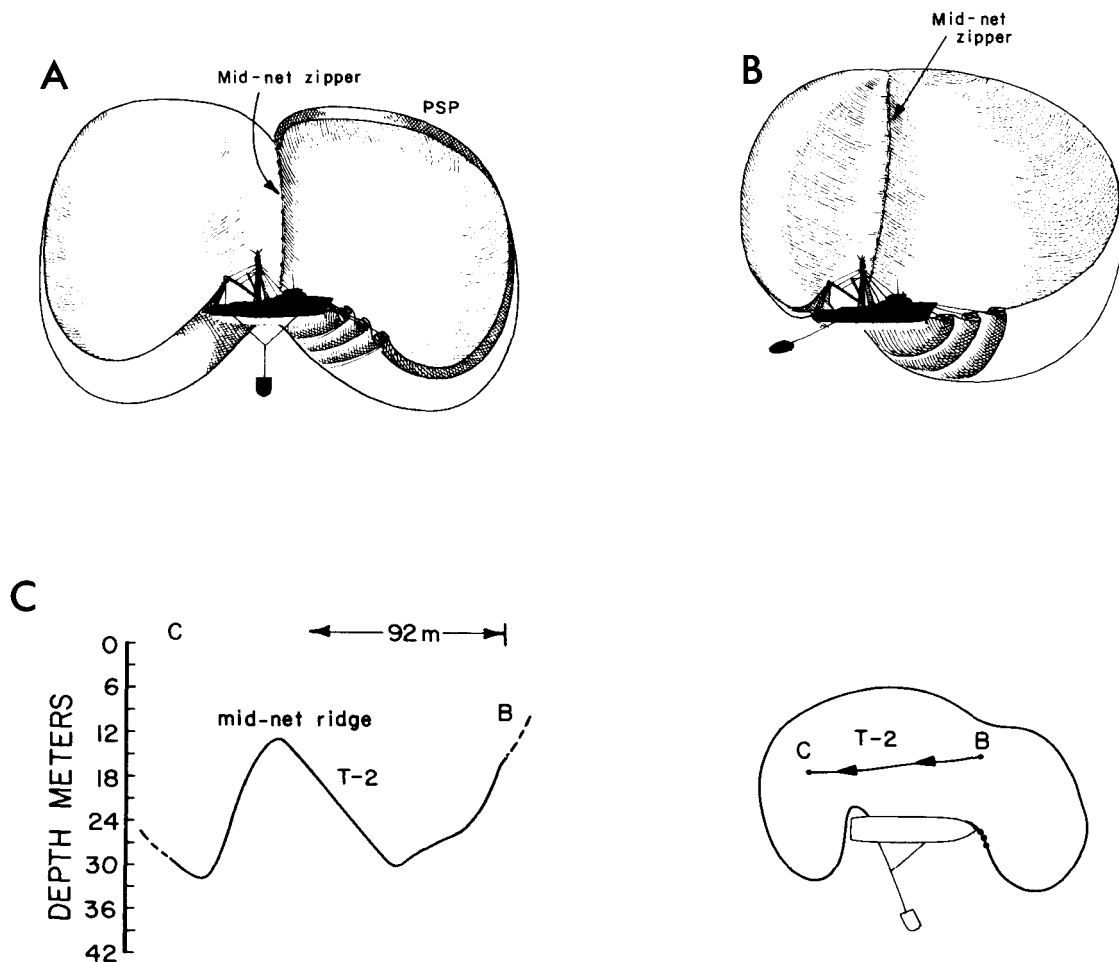


Figure 1. (A) Mid-net zipper ridge when fully pursed. Note indentation of corkline opposite vessel. (B) Zipper ridge with one-fourth net retrieved aboard vessel. (C) Fathometer trace when fully pursed.