LIVE CARS FOR USE IN CATFISH INDUSTRY

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Live cars--mesh "fish-holding bags"--have a variety of applications in the production of pond-raised channel catfish (Ictalurus punctatus). When used in harvesting and holding catfish, the fish can be moved easily to loading sites or shifted to safe areas for holding. When used along with a haul seine, pulling techniques are modified so the seine forms a "chute" during the final stages of seining. This is necessary to encourage fish to move into the live car.

Information on holding capacities and a method to accurately meter fish into live cars are needed by fish farmers to better utilize these units. As more data are developed on live car holding capacities, and new applications found, live cars will be accepted as useful tools in catfish farming.

Live cars are finding acceptance as useful harvesting and management tools by fish farmers producing pond-raised channel catfish (Ictalurus punctatus). Farmers are discovering that these mesh "fish-holding bags" described by Boussu (1967) are very helpful in harvesting, handling, and loading channel catfish; these bags are useful too in working with fish in other phases of their farming operations. Research has continued on the live car's development at the Kelso Station, Arkansas. More information is available on its application, construction, and operation.

APPLICATION

There are many ways catfish producers can use live cars. They can be coupled with a seine and used as collection bags for the catch. Full live cars can be moved around a pond to a point suitable for loading. They can be shifted to deep water, or set adjacent to a well head for holding fish. Haul trucks can be scheduled more accurately because fish in properly staked live cars do not escape and can be harvested before truck arrives. Exact quantities of fish can be placed in live cars and held for future loading; the unneeded fish can be returned to the pond. Loading is simplified because fish can't escape by swimming under the seine; boom-mounted brailers can be lowered into the live car and filled by crowding fish into them, thus eliminating time-consuming dip-netting. Workers can stand outside the live car to load fish and are much less likely to get "finned". Live cars can be used to hold small quantities of fish for processing--or be used during sorting as repositories for selected fish. We expect many more uses will be discovered as the live car becomes a working tool in fish farming.

LIVE CAR USE

The live car, coupled with a haul seine, makes a very effective unit for harvesting catfish from well-constructed commercial farm ponds (Figure 1). We have used this arrangement in ponds ranging from 3 to 40 acres and have captured up to 78,000 pounds of channel catfish in one seine haul by using several live cars in sequence. Harvesting efficiencies in well-constructed ponds using live cars and haul seine have been as high as 90%.

In our studies, we used the mechanized haul seine and equipment described by Coon, Larsen, and Ellis (1968). Here the live car was attached by a coupling ring to a specialized

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"funnel" section positioned somewhere near the middle of the haul seine (Figure 2). The specialized section forms a transition between seine and live cars. It has a 10-foot-square opening at the seine and necks down to a 2-foot-high by 4-foot-wide port at the back end. All the transition takes place on the sides and the top so the bottom can remain flat on the pond bottom when being fished. The basic design of this "funnel" section takes advantage of the bottom-seeking behavior catfish demonstrate in their escape attempts during seining.

Several sizes and shaped for the opening between the funnel section and live car were tried. We found a 2-foot-diameter round opening unsatisfactory because most of the open area is off the bottom--and thus contrary to fish behavior. Also, the 2-foot-diameter hole is not large enough to give a satisfactory flow of fish. This is also true with a 2-foot-square opening. In large ponds, with the seine moving at 25 to 30 feet per minute, the orifice size must be large enough to allow fish to pass into the live car as the seine is being beached or the fish will be beached. A 4-foot-wide opening is about the minimum width desirable. The height of the opening is dependent upon water depth. For example, if the pond is three feet deep where the live car is used, a 3-foot-high opening would be fine. However, if the pond is 2 feet deep, a 2-foot-deep opening is adequate. A 2-foot-high by 4-foot-wide coupling ring was used in most of our tests. Draw strings in both the funnel section of the seine and in the live car are tied tightly around this coupling ring to fasten the two units together.

In most instances, we wait until about $\frac{2}{3}$ to $\frac{3}{4}$ of the pond is pulled before tying on the live car. This eliminates the possibility of tearing the unit on obstacles, such as roots or snags. Also, if the pond has a soft, muddy bottom, the seine is a little easier to pull without the drag of a large live car. The coupling ring is tied in the live car on shore and, at the appropriate time, carried out and tied to the funnel section of the seine. This can be done on foot or by boat. We use a short piece of twine to tie off the end of the funnel until the live car is attached. The funnel draw string could be used but is hard to untie when it is wet; it is easier to just cut the twine tie.

A different pattern of beaching the seine is used when a live car is attached. As soon as possible, usually when both ends of the seine are about ready to be beached, we start setting up a "chute". Figure 3 illustrates this maneuver. The narrower the "chute", the easier it is to get fish to enter the live car. There is much less space for them to mill in and a more directional impetus for them to move into the live car. With large quantities of fish, it will be necessary to stop pulling the seine occasionally and let fish pass into the live cars. In most cases where the "chute" is established in time, it will be necessary to roll only a few hundred pounds out of the seine into the live car as it is beached. Without setting up a "chute", however, there may be many thousands of pounds of fish remaining in the seine as it is beached; it is just about impossible then to move these fish into the live car.

Capturing large quantities of fish in live cars can be handled in different ways. Several small live cars can be used; as each is filled, it is removed and an empty one attached. In a test on a 40-acre pond, we made eight live car changes. We have attached two live cars in tandem (Figure 4), allowed fish to pass through the first into the second, and removed the second one when full.

Once filled, live cars should be staked as soon as possible (Figure 5) to prevent fish from escaping. The stakes should be set so there is about one foot of freeboard on the live car. To do this requires a stake every eight feet or so. Proper staking will prevent fish from escaping over the cork line if it is submerged by turtles, or by the weight of the catch.

If the live cars are to be positioned near a pump discharge, place them so the eddy caused by the discharge creates circulation through the mesh sides of the live car. Don't put them directly under or in front of the discharge. Over a period of time, strong currents can cause stress and result in fish mortality.

If the live car appears to be very heavily loaded, the population pressure can be relieved by attaching a second live car to the first; over several hours, the population will equalize.

CONSTRUCTION

In general, the live cars and specialized seine sections can be made of any material suitable for seines. We used live cars made of one inch bar measure, number 18 nylon

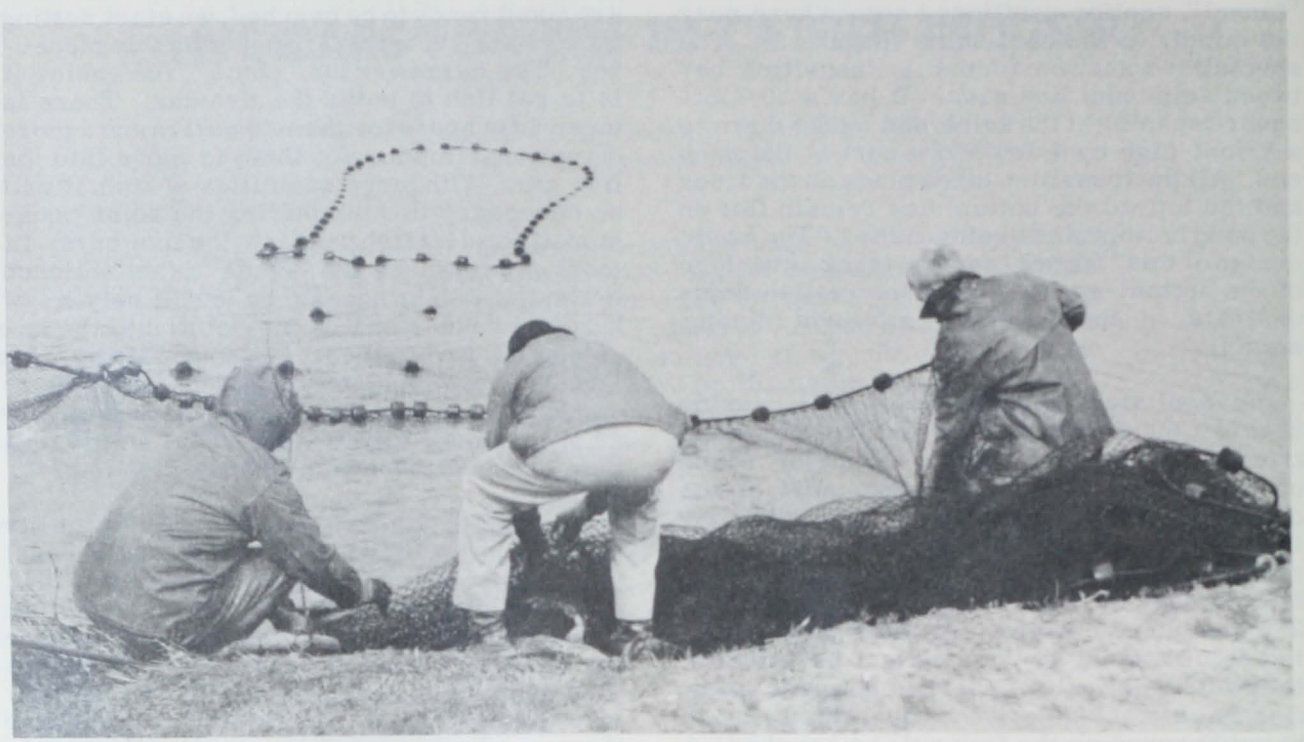

Fig. 1 - Harvesting channel catfish from a 20-acre pond using a haul seine and live car.

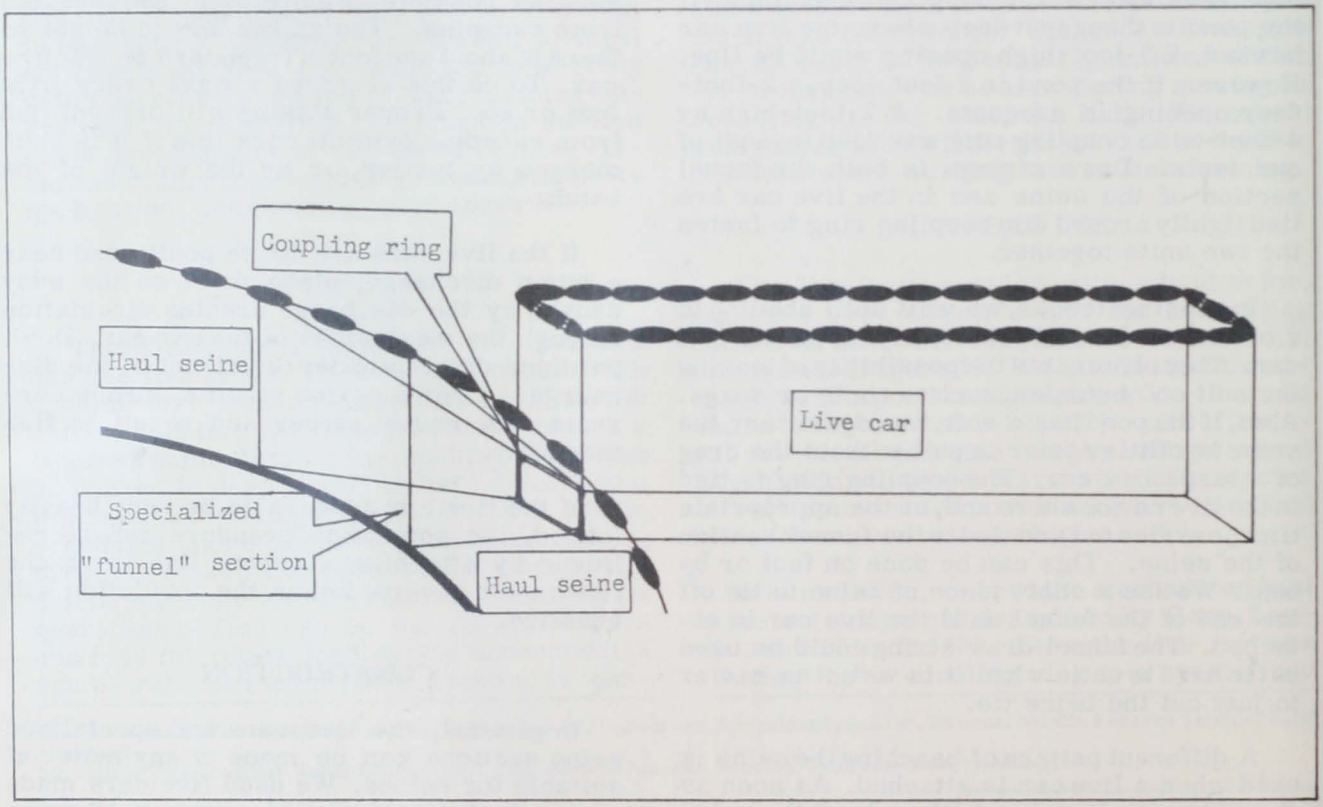

Fig. 2 - Diagrammatic sketch of specialized "funnel" section and live car rigged into a haul seine.

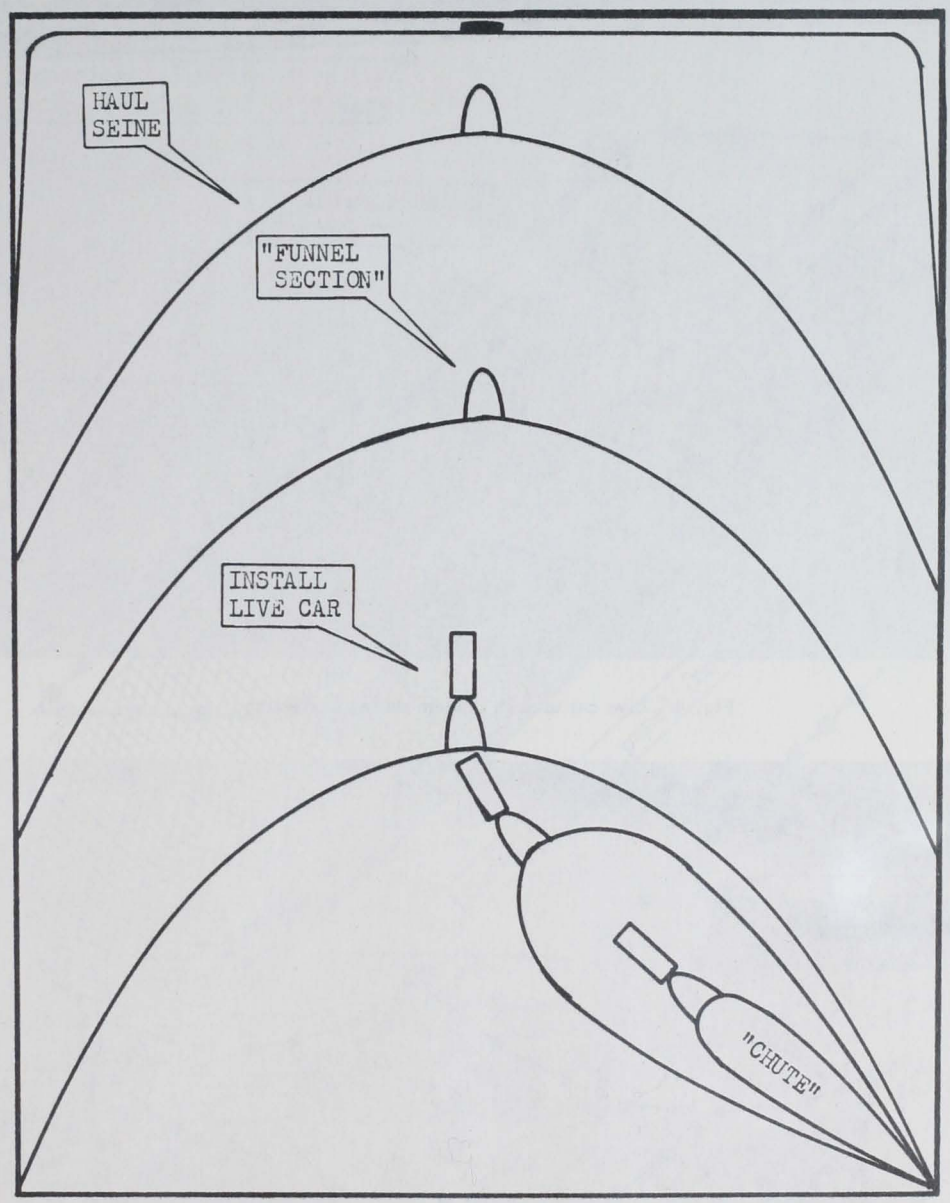

Fig. 3 - Schematic drawing of haul seining procedure used with live car.

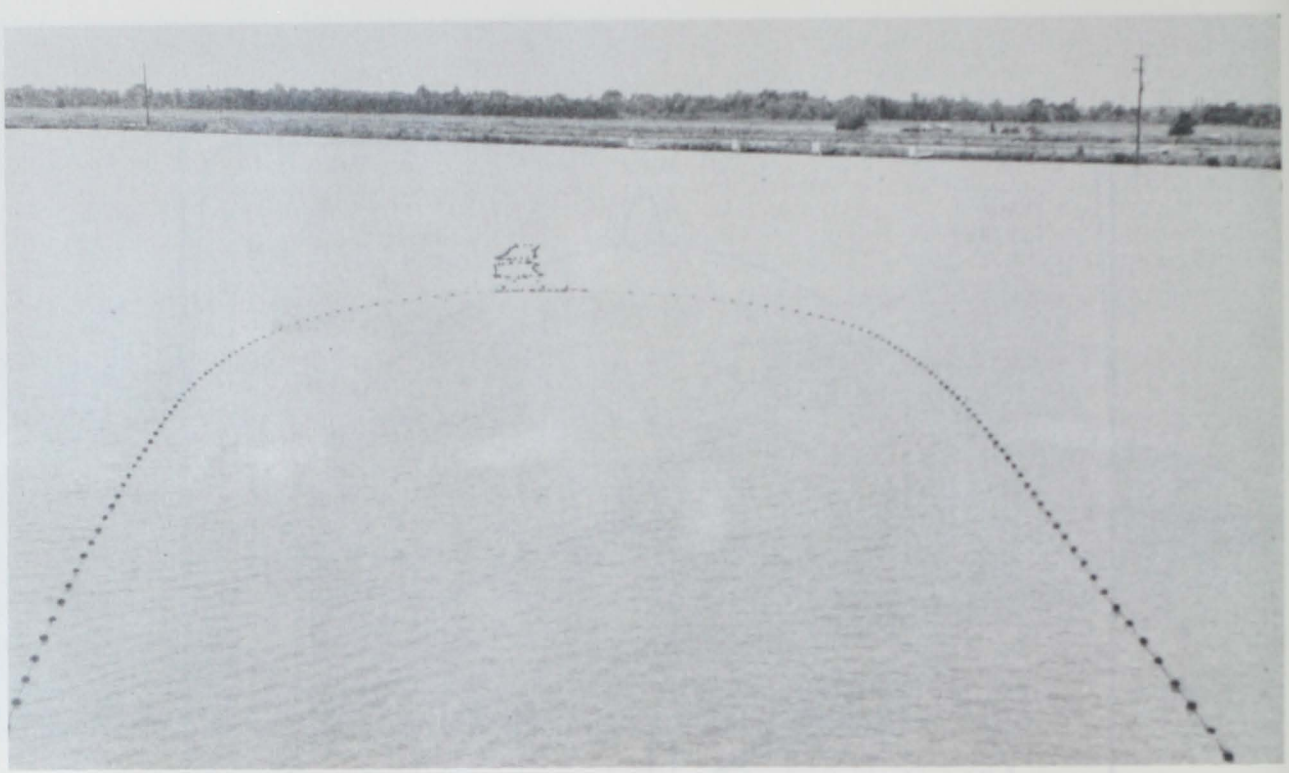

Fig. 4 - Live car used in tandem during harvesting.

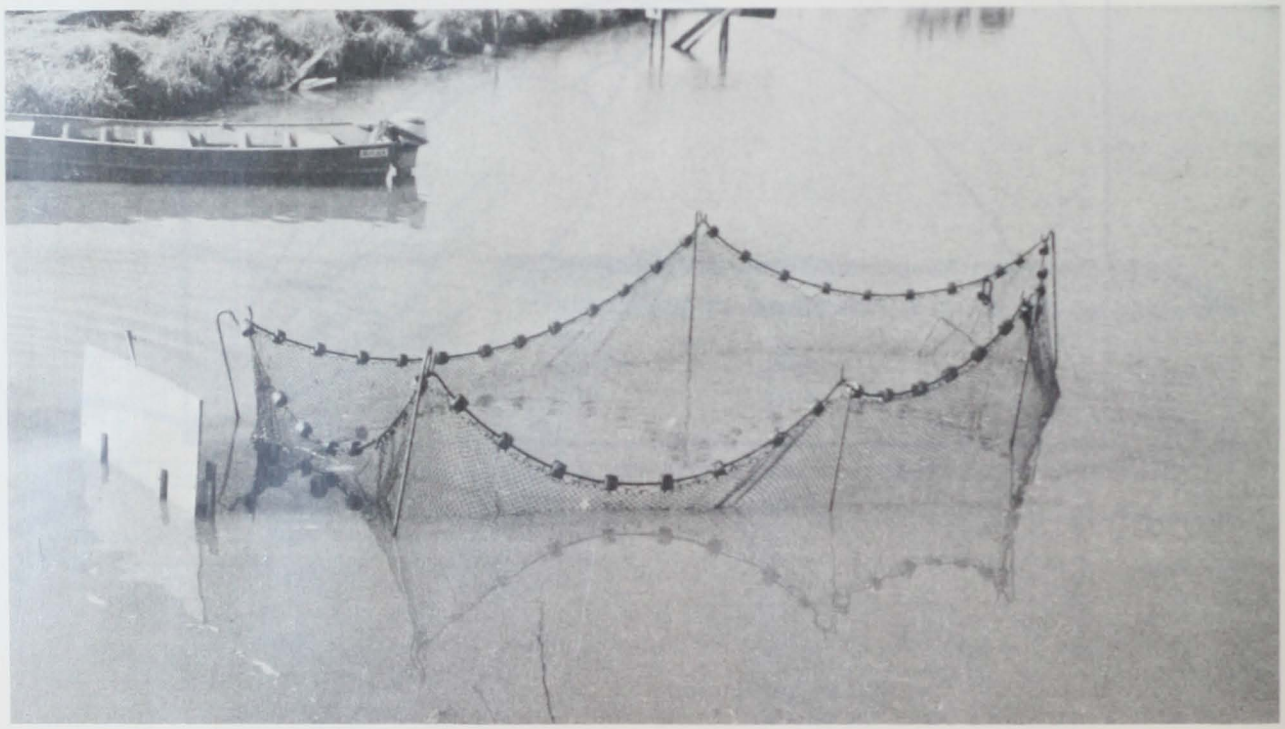

Fig. 5 - Test live car staked for holding fish.

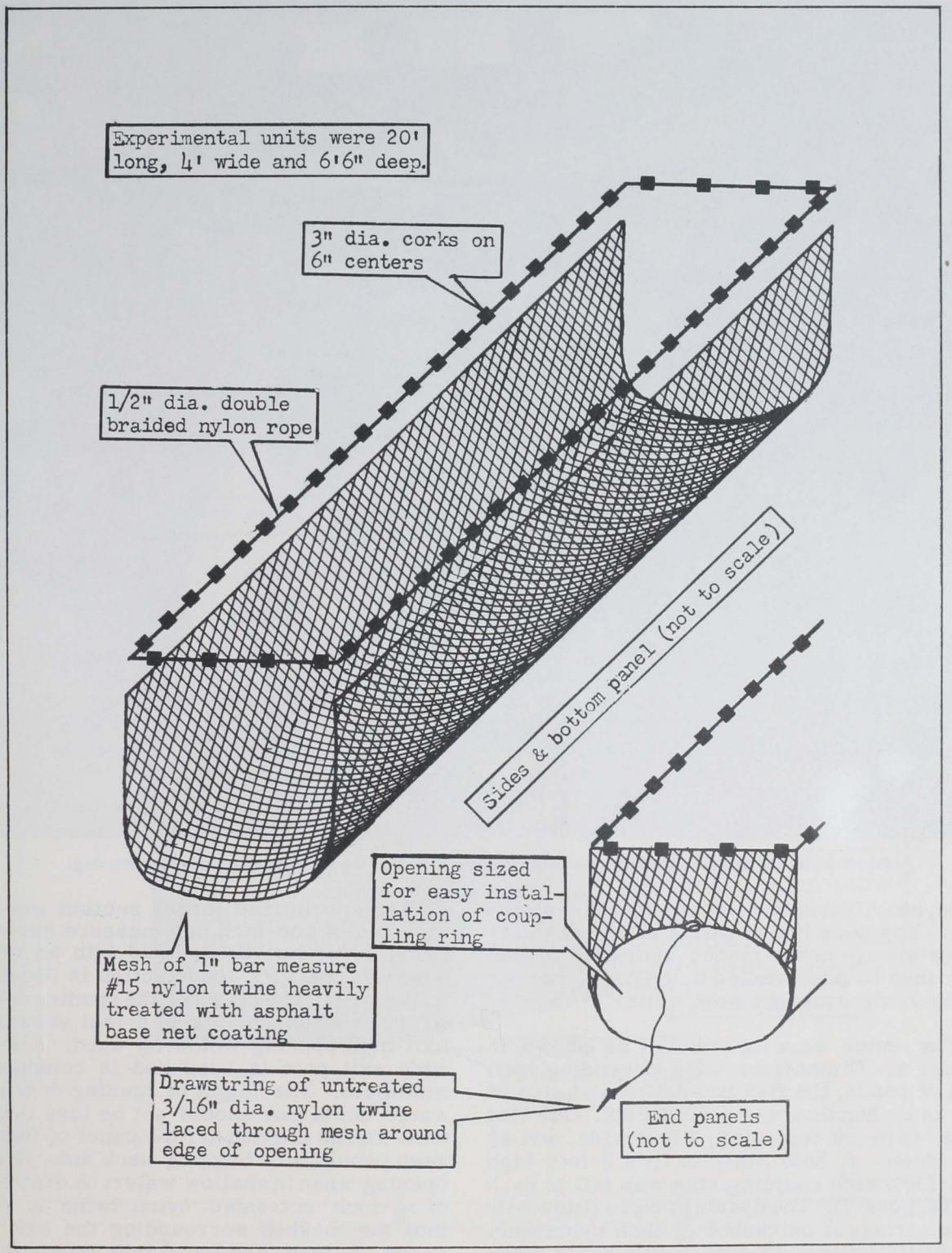

Fig. 6 - Construction details of experimental live car.

Fig. 7 - Live car in final stages of construction showing 2 by 4-foot-wide opening left for coupling ring.

twine, heavily treated with an asphalt base net coat. The cork line consists of $3\frac{1}{2}$-inch diameter sponge corks placed every six inches on $\frac{1}{2}$-inch double braided nylon rope. Larger corks would probably work better.

The units were assembled as shown in Figure 6. Dimensions vary depending upon size of ponds, the fish population and size of fish to be handled, and pond depths. Our test units were 20 feet long, 4 feet wide, and $6\frac{1}{2}$ feet deep. A hole sized to fit a 2-foot-high by 4-foot-wide coupling ring was left in each end (Figure 7). The openings were fitted with draw strings of untreated $\frac{3}{16}$-inch nylon line. Our initial units had 2-foot-long tunnels leading from the coupling ring to the live car. We found the tunnel unnecessary; in fact, it seemed detrimental to fish passage.

The specialized funnel section was constructed of one-inch bar measure number 18 nylon twine heavily treated with an asphalt base net coat. Its construction is illustrated in Figure 8. The height of the opening depends on the seine depth--for an 8-foot seine, an 8-foot-high opening would be used. A 4-foot-wide exit port is used and is considered a minimum. The height of opening depends on water depth but should not be less than two feet. Corks are tied to rope panel of funnel to keep panel from bagging back into live car opening when in shallow water. A draw string of $\frac{3}{16}$-inch untreated nylon twine is woven into the meshes surrounding the exit port. Lines, $\frac{3}{16}$ inch, are laced into net seams and around entrance opening to add strength to this unit. This is done because it is often necessary to lift and roll several hundred

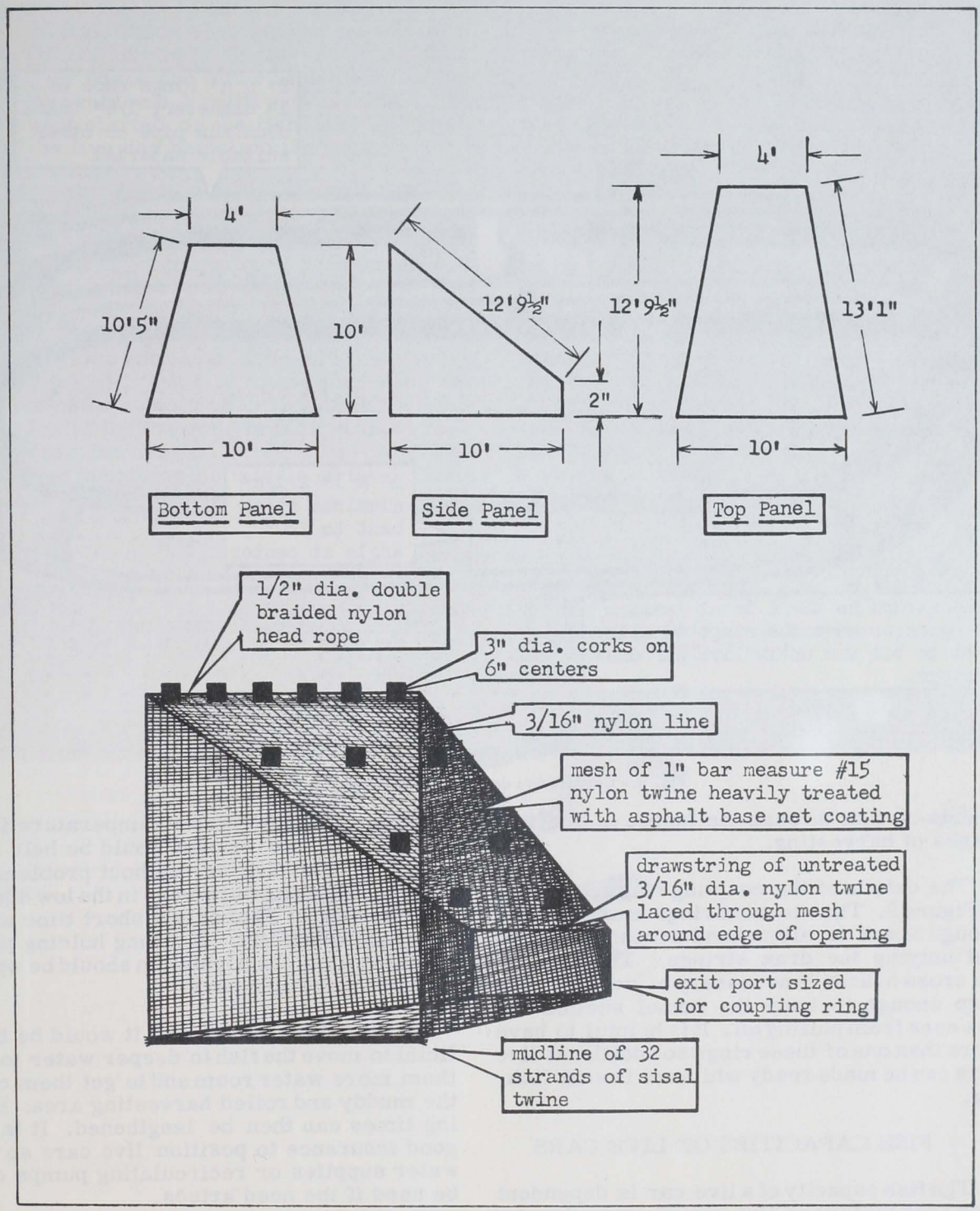

Fig. 8 - Construction details of specialized "funnel" section.

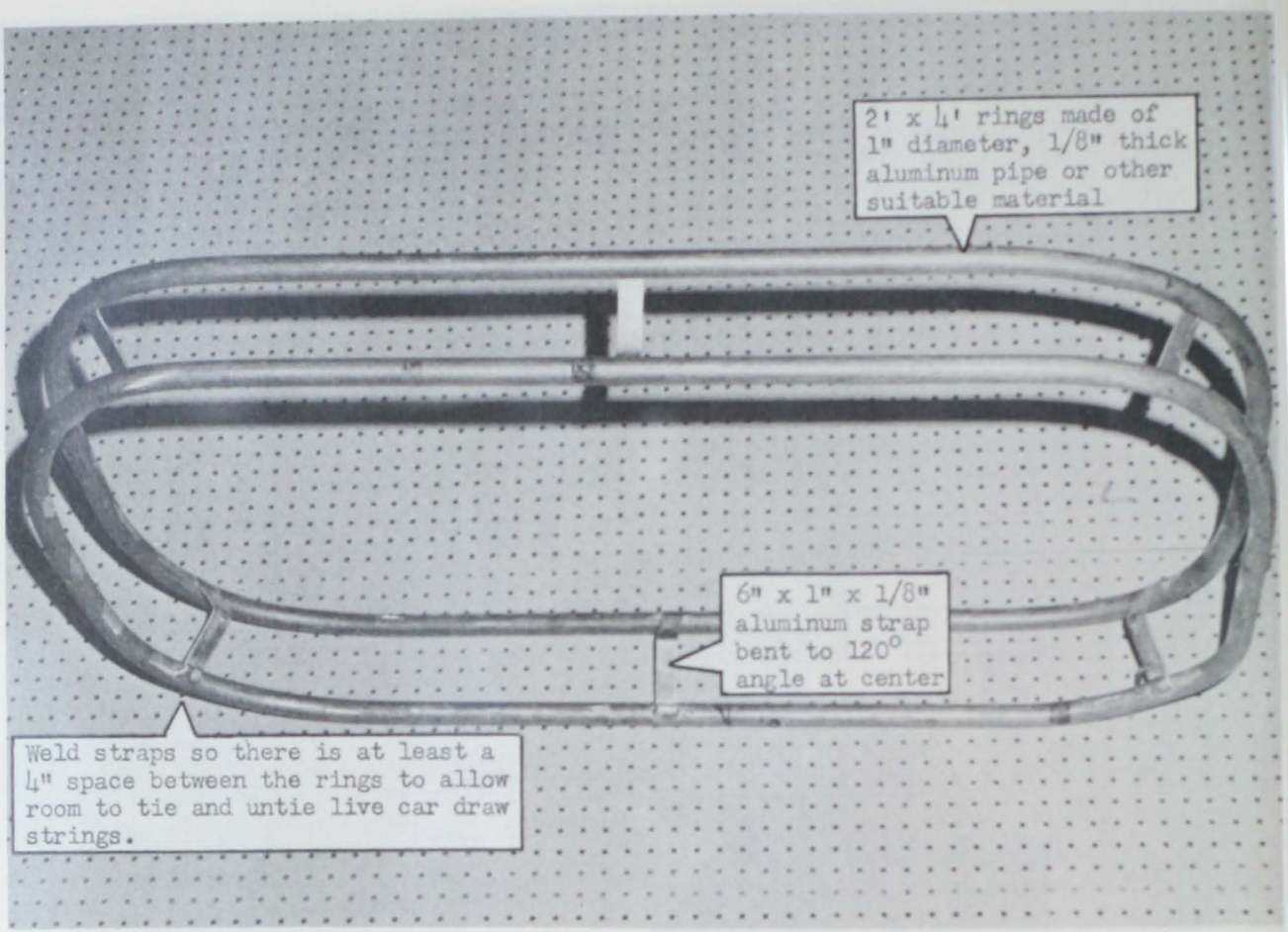

Fig. 9 - Construction details of live car coupling ring.

pounds of fish through the funnel in the final stages of harvesting.

The details of the coupling ring are shown in Figure 9. The two main rings must be wide enough apart to allow hand access for tying and untying the draw strings. The angle of the cross braces is necessary to give a trough deep enough to keep the funnel section and live cars from pulling off. It is helpful to have more than one of these rings so additional live cars can be made ready while one is still fishing.

FISH CAPACITIES OF LIVE CARS

The fish capacity of a live car is dependent upon such factors as live car size, pond water depth and temperatures, length of time fish are to be held, and whether a well discharge or a circulating pump is available. When harvesting using a live car 20 feet long by 4 feet wide by 6.5 feet deep, between 8,000 and 12,000 pounds of channel catfish can be crowded into the live car. If the water temperature is below 60° F., this amount could be held many hours in this live car without problems. If the water temperature were in the low 80s° F., they should be held only a short time and be watched constantly. If a long holding period is anticipated, the population should be spread out into more live cars.

In all holding situations, it would be beneficial to move the fish to deeper water to give them more water room and to get them out of the muddy and roiled harvesting area. Holding times can then be lengthened. It is also good insurance to position live cars so pond water supplies or recirculating pumps could be used if the need arises.

FISH FARMERS' CONCERNS

Almost all the fish farmers we talked to about using live cars have expressed concern about the lack of hard facts on holding capacities. Until information on holding

accumulates, we advise that if any concern arises that the live car is too heavily loaded for pond conditions, a man should be stationed to watch the live car. If fish start piping or rolling, or there are other indications of developing problems, a relift pump can be turned on, a well started, or the fish can be dumped from the live car back into the pond.

Some farmers have experienced difficulty in using live cars in ponds with soft, muddy bottoms. If live cars are allowed to sit in one place too long, or units are put into pond with seine the day before harvesting, they can "mud in"--the mesh on bottom will sink gradually into the mud. In ponds with muddy bottoms, live cars also can cause drag and make seine harder to pull. Usually, these problems can be eliminated by waiting until near end of seine set to instal thelive car. In fact, at this stage of seining, the drag of a live car is helpful as an anchor in holding the middle of the seine as "chute" is set.

Channel catfish are very adept at escaping from confined situations. Many fish farmers have had the experience of bunching up several thousand pounds of catfish in a seine one day--and coming back the next day to find them gone. Live cars are much more secure for holding fish than seines but, if there are any holes or if the cork line is not properly staked, fish will escape. The live car should be examined for holes every time it is used, and all holes should be patched. Extra minutes spent checking the live car and staking it properly may save reseining a pond.

A means of estimating how many fish or pounds of fish are present in a live car is needed. Some device or method that could measure the flow of fish into the live car and give fish quantities at any time would be useful. At present, a visual estimate is used; our experience shows the amount can be off as much as 100%.

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