

Catfish farms now form geometric patterns across the Southern United States.

POND-RAISED CHANNEL CATFISH: The Design of Boom-Mounted Brailers to Move Them

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Boom-mounted fish brailers are commonly used for loading pond-raised channel catfish (*Ictalurus punctatus*) onto haul trucks during harvesting operations. Many different brailer designs are used and the methods of filling them with fish vary. Oftentimes, brailers are suspended in the water next to fish confined in a seine and are filled by a couple of men using dip nets. Some farmers use detachable brailers. Workers carry these units into a batch of seine fish, scoop them up, and then fasten the loaded brailer back onto the lift cable. When fish are harvested in live cars, brailers can be lowered directly into them and the fish can be crowded into the brailers by taking up slack in the live car.

Two brailer designs have gradually developed at the Kelso Station, Arkansas, over the past several years. To develop these, we used data obtained in our harvesting demonstrations, and information given us by farmers actively engaged in producing channel catfish. These two designs, one for working fish in a seine, the other for loading catfish out of live cars, have proved successful in our operations. They could be used in most situations where the fish are close enough to be reached with a boom.

DESIGN CONSIDERATIONS

Harvesting conditions dictate many of the design features required in a brailer. For example, a brailer used for dipping fish out of a live car would not be suitable for chasing fish around inside a seine. A brailer used with a live car must fit inside the live car; it must have the ability to collapse into a rather small area because room is limited. The brailer-suspension system must have

enough distance between spreader and brailer so brailer can be tipped sideways for dipping fish. Also, adequate clearance must be allowed so workers can manipulate the brailer in the live car--without the spreader, in-line scales, or boom hook interfering with their activities. Brailers used to chase fish bundled up in a seine need to be light, maneuverable, and so constructed that men in waders can easily handle them. Here the length of the bridle system is not a critical factor in loading. It is necessary, however, that the hardware used for detaching and attaching be operated easily by men wearing cumbersome gloves. Brailers suspended permanently from the lift cable, and filled by dip nets, need a suspension bridle that will allow adequate clearance for the dip nets; the top rim of the brailer must be sturdy enough to take the weight of the dip nets full of fish.

Other Factors Influence Design

Several other factors influence brailer design. For example, the capacity of the boom limits the quantity of fish, and thus the size of the brailer. Also, the size of the fish to be handled would influence the diameter of drain holes or, if webbing is used, the mesh size. Specialized brailers made for skidding along muddy pond bottoms are sometimes used where ponds are harvested by water draw-down methods and the fish are isolated in pools too far from the bank to reach with the boom.

The height and length of the boom used, and the height of the haul-truck compartments, often limit the top-to-bottom dimension of a brailer. If there is only a 3-foot clearance between the maximum boom height and the hatch opening of a haul truck, the brailer must be made to fit into this space.

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Also, if the haul truck hatch is 2-foot-square, then the brailer opening should be somewhat smaller so it can be centered easily over the opening.

DESIGN CRITERIA OF BRAILER USED FOR LOADING FISH OUT OF A SEINE

The brailer shown in Figure 1 is light, maneuverable, and is used for loading fish out of a seine. Workers detach the unit and, using it as a dip net, fill the brailer by scooping up fish concentrated inside the seine. Hooks are located at the terminal end of the

bridle to allow easy removal of the brailer. The wooden spreader keeps the weight of fish from collapsing the top ring when lifting a load--and it keeps the hooks positioned and adds rigidity to the bridle to facilitate hooking and unhooking the brailer. The 5-foot-length of the brailer and the $\frac{3}{4}$ -inch plywood bottom ease the job of moving the unit through the water when pursuing fish. The mesh brailer body puts the bottom of the unit far enough back so fishermen can hold the top ring and work the fish without the bottom bagging around their ankles. When in the water, the wooden bottom offsets some of the weight of the metal frames and the support chains, adding to the brailer's mobility.

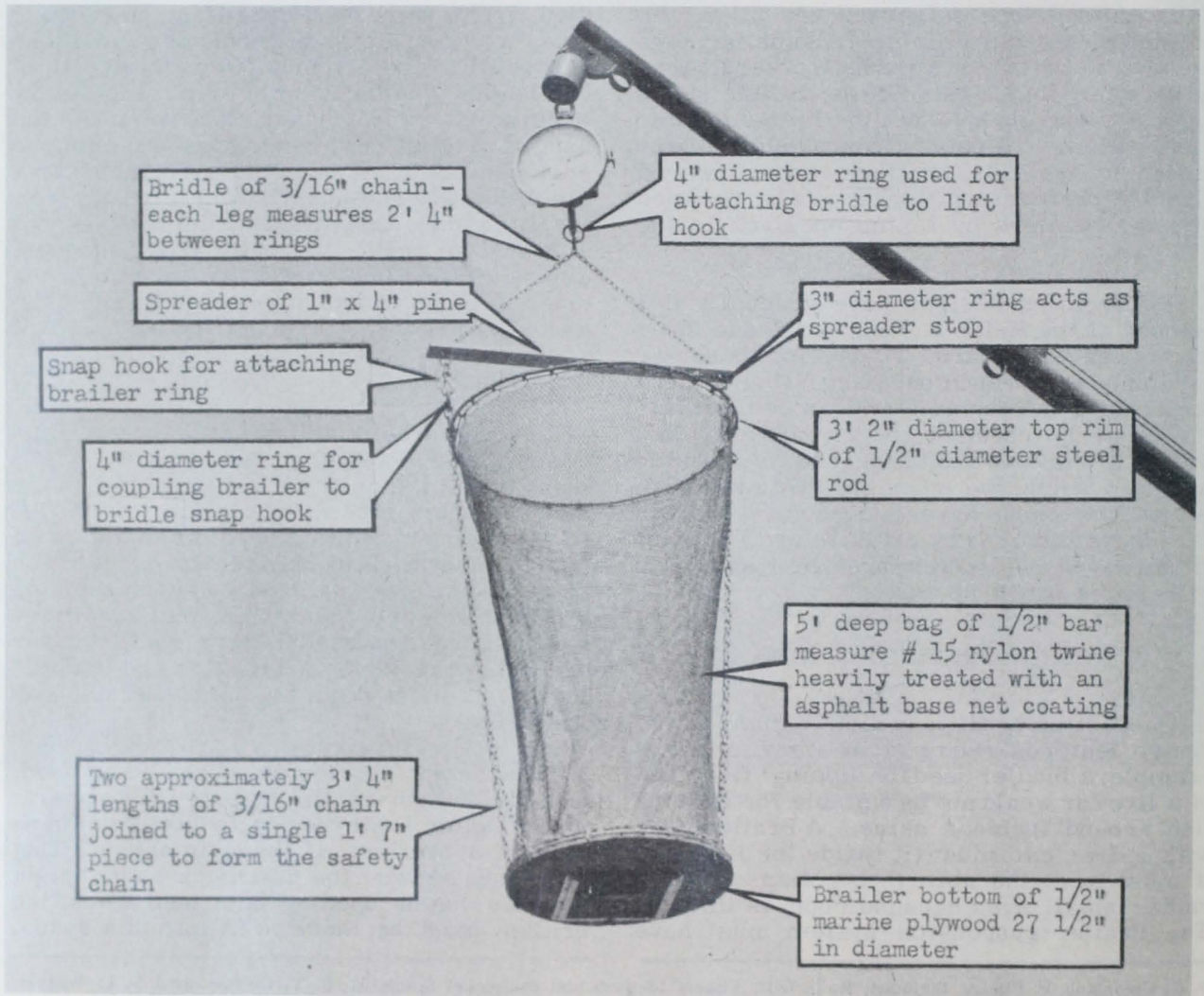


Fig. 1 - Brailer designed for removing channel catfish held in a seine net.

Construction Details

Construction details of this brailer are shown in Figure 2. Note that safety chains are included to protect the mesh from too-much stress caused by a heavy fish load. When attaching these chains, a slight amount of slack should be left in them so, when fish are put into the brailer, the mesh sides can stretch. The resulting tension eliminates much of the bagging around the brailer bottom caused by the weight of the fish on the mesh sides; it becomes easier to empty fish out of the brailer.

The brailer shown in Figures 1 and 2 is fitted with a slide door for emptying fish. A brailer with such a large capacity makes it almost necessary to have a door that can be used to throttle the flow of fish. The quantity of fish that can be loaded into the brailer will often exceed the capacity of haul-truck compartments. For example, we have loaded over 500 pounds of fish in this brailer and

hoisted them up to haul trucks having 200-pound-capacity compartments. By being able to control the flow of fish from the brailer, the fish were put in three different compartments. With a quick-release gate, all fish would have gone into one compartment, and we would have had to distribute them into the other compartments with a dip net.

DESIGN CRITERIA OF BRAILER FOR USE WITH LIVE CARS

When harvesting fish using live cars, brailers can be lowered right into the live cars and be loaded with fish. A brailer used for this purpose is shown in Figure 3. A wooden spreader is used to keep the weight of the load from crushing the top ring when the brailer is full of fish. Note the spreader is raised high above the brailer to keep it out of the way of the loading activity when the brailer is submerged in the live car.

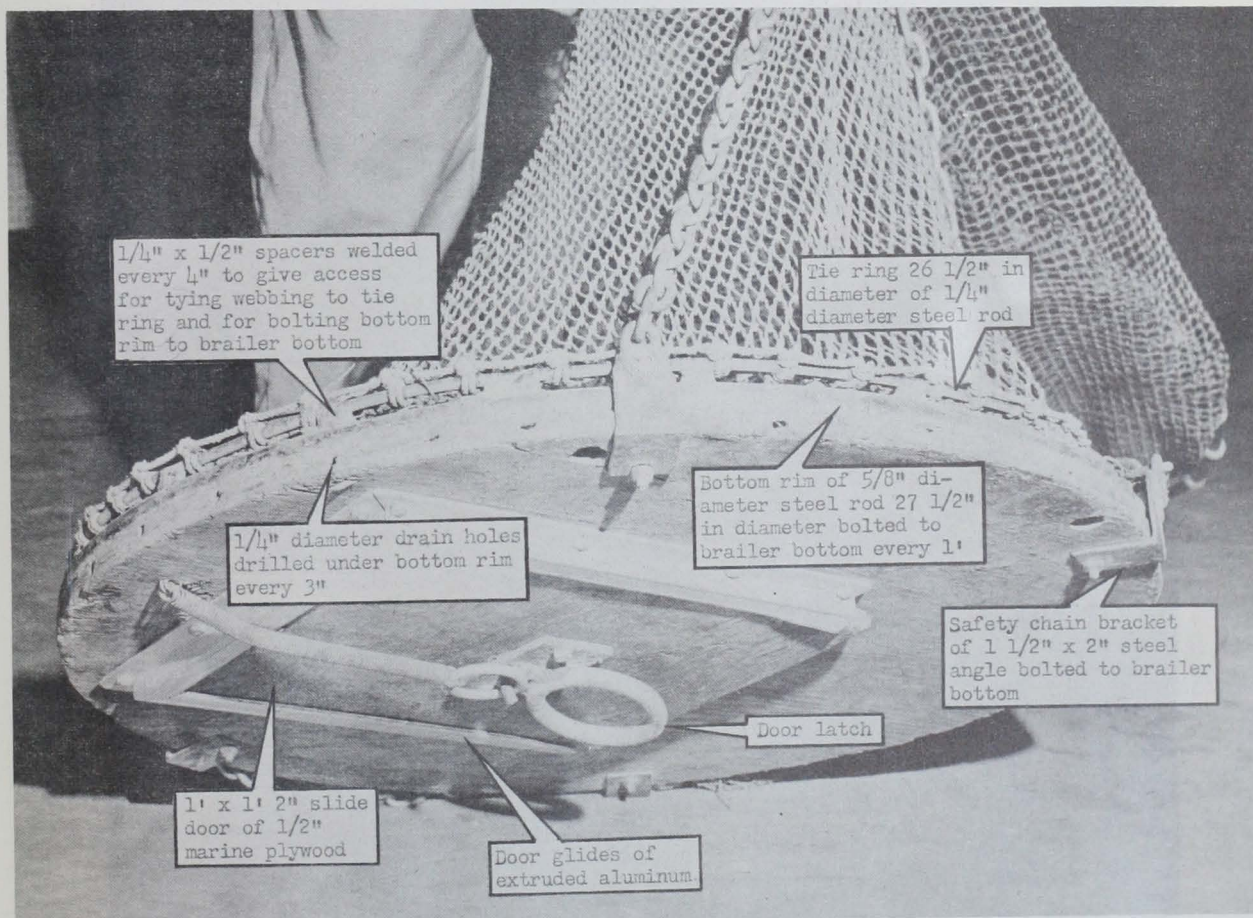


Fig. 2 - Details of brailer designed for removing channel catfish from a seine.

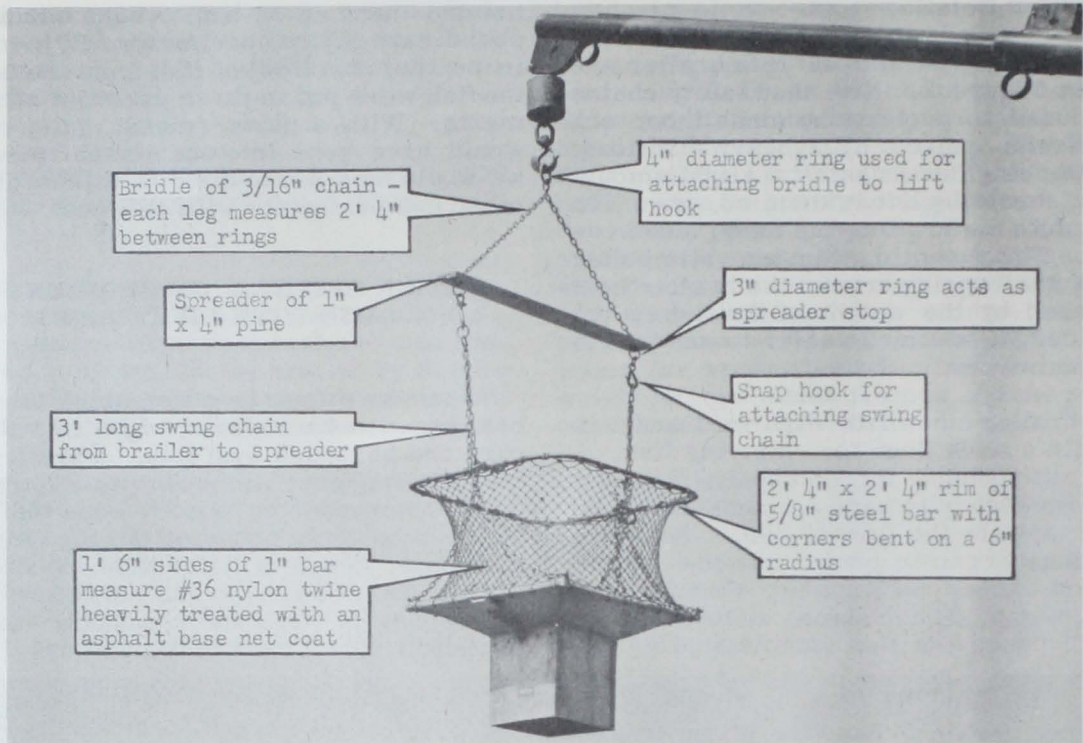


Fig. 3 - Brailer designed for removing channel catfish from live cars.

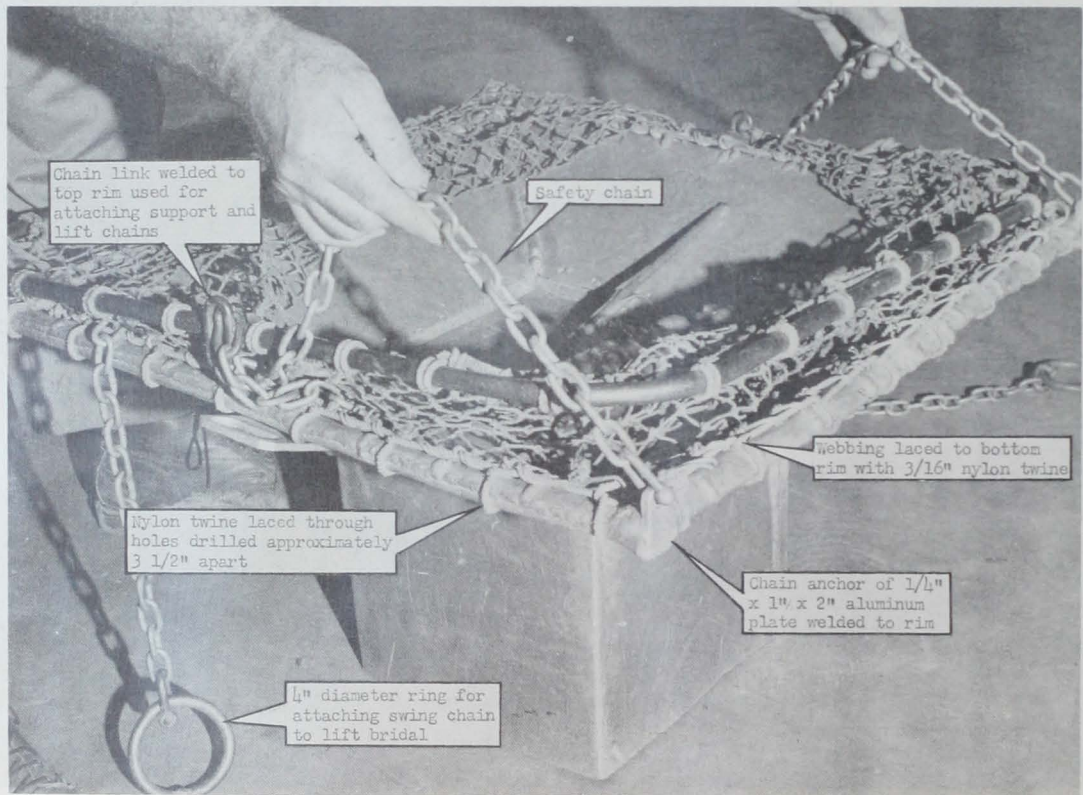


Fig. 4 - Details of brailer designed for removing channel catfish from live cars.

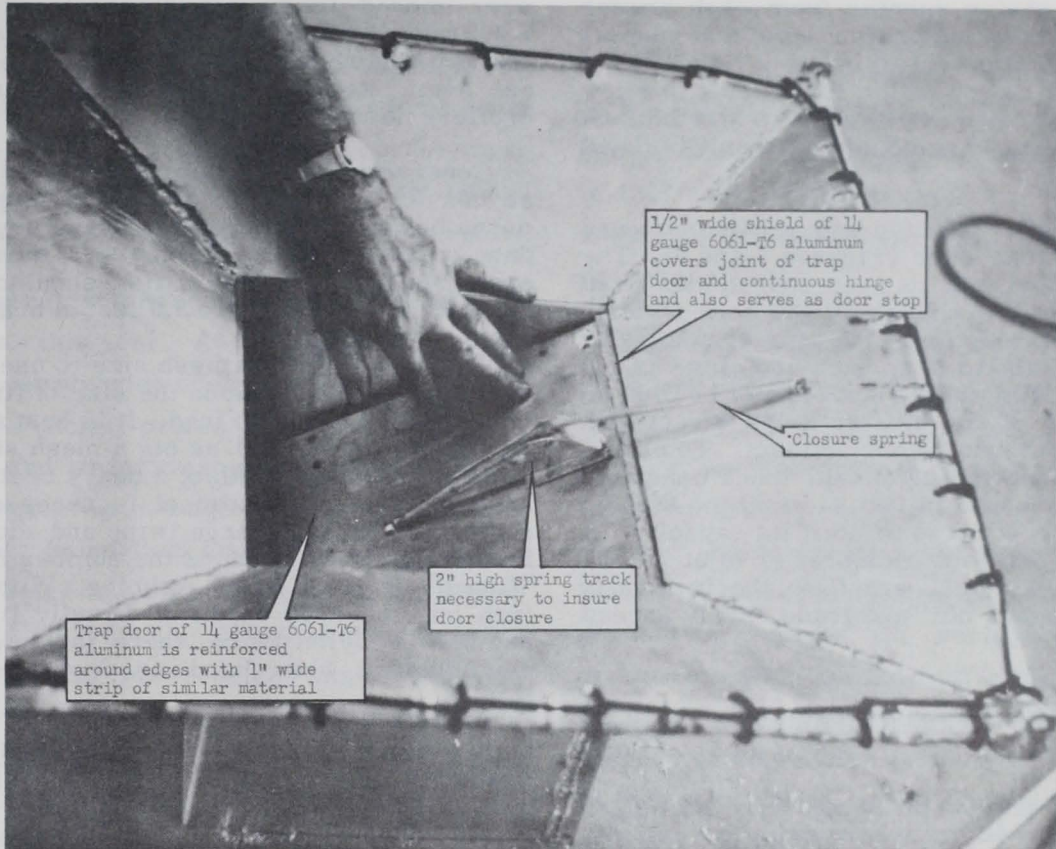


Fig. 5 - Details of brailer designed for removing channel catfish from live cars.

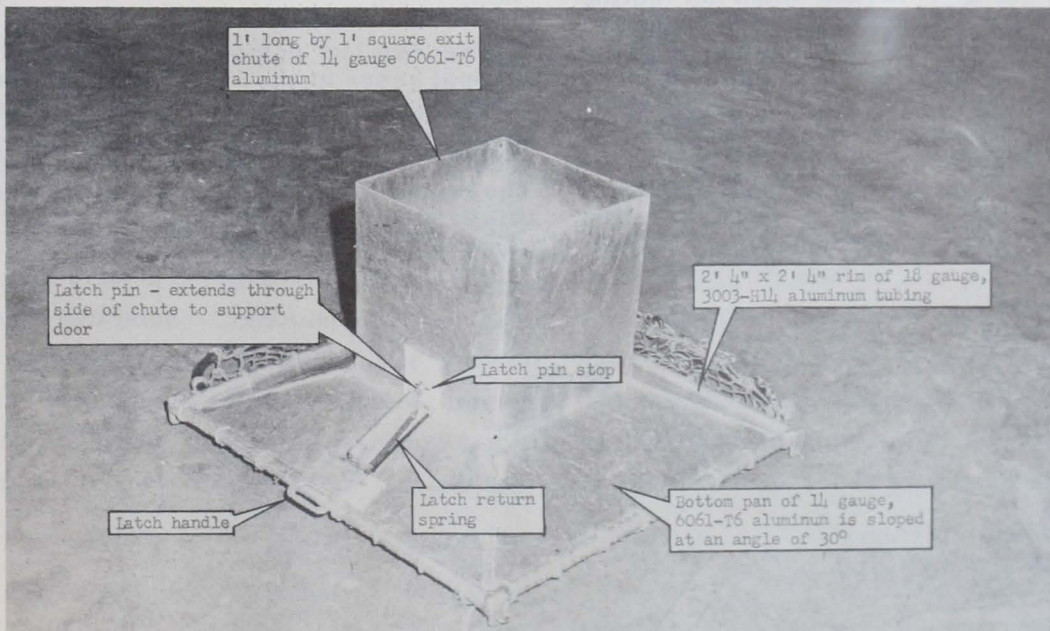


Fig. 6 - Details of brailer designed for removing channel catfish from live cars.

Safety chains running from each corner (Figure 4) keep the brailer level and support the load when the brailer is full of fish. These chains are rigged with a little slack to allow the mesh body of the brailer to stretch, and thus eliminate bagging, when the unit is filled with fish.

This brailer is fitted with a quick-release latch and trap door (Figures 5 and 6). The hinge is designed to keep fish spines from catching in the slot where the door joins as the brailer empties. The spring design allows the gate to snap back and close as the last fish falls through. A funnel section on the bottom of the brailer helps direct fish into the haul-truck compartment. To eliminate the over-filling of haul-truck compartments (discussed in last section) the brailer height is restricted to limit its capacity. A maximum load for this brailer is about 350 pounds. In actual practice, the brailer is seldom "topped off," and loads rarely exceed 250 pounds.

SUMMARY

The two designs presented here have been used in many different harvesting operations. With innovations and modifications, they should work in almost any harvesting situation. They have the capacity for moving fish safely and quickly. In fact, when harvesting large quantities, fish usually can be loaded out with boom-mounted brailers much faster than haul trucks can be supplied to carry them. In one of our harvesting demonstrations, channel catfish were shifted from live cars across the levee into an adjacent pond; a live-car-type brailer was used similar to the one described in this paper. In this instance, 40,000 pounds of channel catfish

were moved in $5\frac{1}{2}$ hours--a rate of about 7,300 pounds per hour. In several harvesting operations, we have loaded out 5,000 pounds per hour into waiting haul trucks, using the brailers described here.

Generally, large brailers can be loaded so heavily that it is possible to damage fish on the bottom layer. We don't have any firm data on this problem. However, from our experience, it appears fish shouldn't be stacked higher than 2.5 to 3.0 feet in brailers.

The choice of what mesh size to use for a brailer bag depends upon the size of fish the brailer will be used to load. It is best to use as large a twine and as big a mesh size as fish size will allow. Also, a heavy coat of an asphalt-base net treatment is necessary to seal the webbing. Large twine and adequate net treatment will reduce the number of fish "finned" or gilled in the webbing. With one-inch bar measure mesh of heavily treated number 36 nylon twine, there is almost no entanglement when handling process-sized fish.

We have never had the mesh body of a brailer split open when loaded. But this is a possibility if the mesh is not checked properly for holes and abrasion. We have had fish hang on outside and fall off as the brailer was lifted. Do not swing over working personnel. Men in the pond should keep an eye out for "hung" fish.

The brailer designs have evolved over several years at the Kelso Station. We have incorporated the ideas of many fish farmers in these units. Their suggestions have aided greatly in the development of these brailers. The brailers have been field tested with many thousands of pounds of channel catfish; their basic designs have proved sound.

