FNE01-399 Field Testing of Modified New Zealand Oyster Cylinders
SARE Final Report, December 2001.
Great Island Oyster Co., Ltd, Yarmouth, MA

Great Island Oyster Company has been growing oysters since 1980, gradually developing improved methods by a very slow internal R&D process. Oyster seed is obtained from a hatchery, and grown for 2-3 years in polyethylene mesh bags designed for oyster culture. Modified New Zealand Oyster Cylinders (herafter referred to as "drums" as opposed to "bags") were tested during the 2001 growing season.

Goals/objectives: The goals of the project were to evaluate the effect of the drums on oyster growth, specifically on shell shape and shell density. The traditional bag method places hundreds of seed oysters in mesh bags which are attached to racks which keep the bags about 12" off the bottom. Fouling is controlled by air drying, but crowding in the bags often causes irregular growth rates, as well as shapes. A fast growing, but long and thin oyster, has no real market value.

The modified NZ drum system uses a plastic or wire mesh cylinder to hold the oyster crop. The drums are 12" in diameter, 36" long, and have a long 36" float attached to the outside. Individual drums are suspended from a metal pipe held between two posts. At low tide the drum hangs from the pipe or rests on the bottom. At high tide, the drum is totally submerged, and the float is now on the top. Each tide serves to gently roll and tumble the oysters inside the drum. This prevents any one oyster from being permanently stuck in a corner, and also erodes the shell edges slightly, preventing the long thin fragile shell growth common in bag culture. This improves shell weight, shell shape, and subsequent quality. Although the legal size for oysters is 3" (75 mm), a thin, flimsy specimen at this size is not salable. When growing these out for another year, a 100-120 mm oyster is often produced, which are not necessarily "selects", even though meat quality is good. Heavier, rounder oysters in less time are the objectives.

The farm has not changed in terms of size or crop, other than the total annual target production has increased by the addition of the drum culture method. The farm is not limited by space or available seed, but by labor. Management methods that reduce fouling, thinning, and repacking save the most labor. The drum concept is really quite a breakthrough, since seed can be packed at suitable densities, and will grow without further labor input until the drums are harvested. Product quality in the drums is slightly more consistent than in bags, with oysters being closer to the same size, shape, and quality.

Methods: Drums were considered several years ago when we learned about this method in New Zealand. Prototypes were used in 1999 and 2000, but these were individually hand made, and not enough of them were available to get good growth data. Note that the growth variability in oysters is considerable, even under good conditions.

Wire mesh drums were ordered from a commercial gear manufacturer (using ½ inch mesh, plastic coated wire, 12" diameter, 36" long, side door) and packed with various groups of 2000 year class seed. Due to the huge natural variation in oyster growth, various bags of 2000 seed were split into equal densities, with half going into a drum, and the other half remaining in the original bag. Both the bag and drum were then put onto the same rack, and grown in the same location for the duration of the season. In some cases, bags were thinned into thirds ( each bag providing seed for two drums, as well as the repacked original bag). This approach kept the drums together with their original bagged cohorts, which otherwise can easily get confused during normal maintenance and thinning operations.

Needless to say, we were interested in trying out various methods, so several experiments were conducted, including the use of drums for first year seed (2001 crop), the placement of drums directly on the intertidal without the flotation, the use of drums both intertidal and subtidal, the comparison of drums with different groups of bagged seed, and the evaluation of various densities in the drums. All of these are important, but for different reasons as explained in the results section.

Results/findings: The results were impressive. The drums actually and consistently produce a rounder, fatter, deeper oyster, with a heavier shell. Economics will be discussed separately, but in terms of growth there were slight, but obvious and significant improvements from using the drums. For example, one year old seed is usually not salable on our site, although there are always a few faster growers. Drums provided more than double the number of market oysters in 15 months, although this number was still small, and not the primary benefit from the system. When looking at, measuring, weighing, and sorting oysters grown using the two methods, drum culture produced a shorter, rounder oyster, with a deeper cup. This subsequently translates into a smaller but meatier little oyster in less time, or in other words, a salable oyster instead of one that needs another year of growth.

There were also a number of additional findings. Drums can be readily set out in the intertidal by lining them up in rows of 10 or more, and threading one cable through the entire row, anchoring each end of the cable. Drums can also be attached to the side of a rack, allowing for the rise and fall tumble on each tide, or simply set on the top of a rack for temporary storage. Oysters can be grown resting on the top of a rack for the entire season, but do not benefit from the rise and fall tumbling action. Even without the floatation and subsequent tumbling, however, there are significant differences in shell shape. The drum shape alone produces a slight improvement in shell cupping.
The drums to not perform well if simply set out on the bottom unless the oysters are already large. The mesh catches sand and silt, and water circulation through the bottom of the drum is prevented. Growth was mediocre, although not terrible. The drums were also tried as a growing method for first year seed, since they are very easy to load, set out, empty, and repack. This approach, however, was not as effective as bag culture for first year seed. Mortality was high, and growth was actually slower. The seed culture test was not a strictly controlled experiment, but we would not try it again either.

Site conditions: Site conditions did not seem to affect the outcome, since bags and drums were used in close proximity. Other growers report similar findings using a similar approach, and new products are now available for oyster culture using this concept. We have personally seen oysters grown in other locations that actually were even rounder and fatter, using a cylinder growing method. The features of our site that favor this approach are a very sheltered environment, with minimal wave exposure (daily severe wave action would seem to be excessive). Negative features are a very high fouling rate in the subtidal (requiring intertidal use to minimize fouling).

Economics: This is an important section, as there are a number of factors which influence economics, only one of which is growth. Economics are affected by survival, growth rate, product quality, labor costs, and gear costs, all of which are interrelated. For example, if survival is good, but growth is slow, income is limited, but labor and gear requirements increase. Profit decreases until this group gets to market size. However, as time goes on, mortality increases with age. The best equation is fast growth to market, minimizing mortalities, labor costs, and gear use. This is easy to write down, but the grower has little control over growth rates and disease losses from year to year.

The advantages of the drums are improved oyster shape, ease of handling, reduced labor, and reduced fouling. If first year seed is screened by size, separating out the 50 mm and larger stock from the remainder, we have demonstrated that about 20% are marketable by the end of the season. Due to the tremendous variability in oyster growth, this is not always the case, but occasionally results are even better. Compared to the bags, the drums provide more marketable product, which becomes significant even at low percentages (for example, the breakeven point on economics would be 5-10% increased productivity). Even more importantly, they produce a more consistent product since no oysters are trapped in corners or crowded into a bad section for the entire season. This is not measurable immediately, since high quality consistently shaped seed oysters at 70-80 mm are still not marketable, but it is encouraging. They also save labor time, since bags are clipped to their racks with four small stainless steel clips, which are difficult to undo with gloves, and dangerous to undo without gloves because of cuts, and in either case are time consuming to attach and remove. Drums can also hold more product, but we have not yet tested the drums for total volume capacity, since crowding may cause slower growth. Two accidentally overcrowded drums, however, provided over 90 markets in addition to over 100 high quality seed, in each.
The average return for bags is usually 50 markets + or -. This will be looked at in more detail next season.

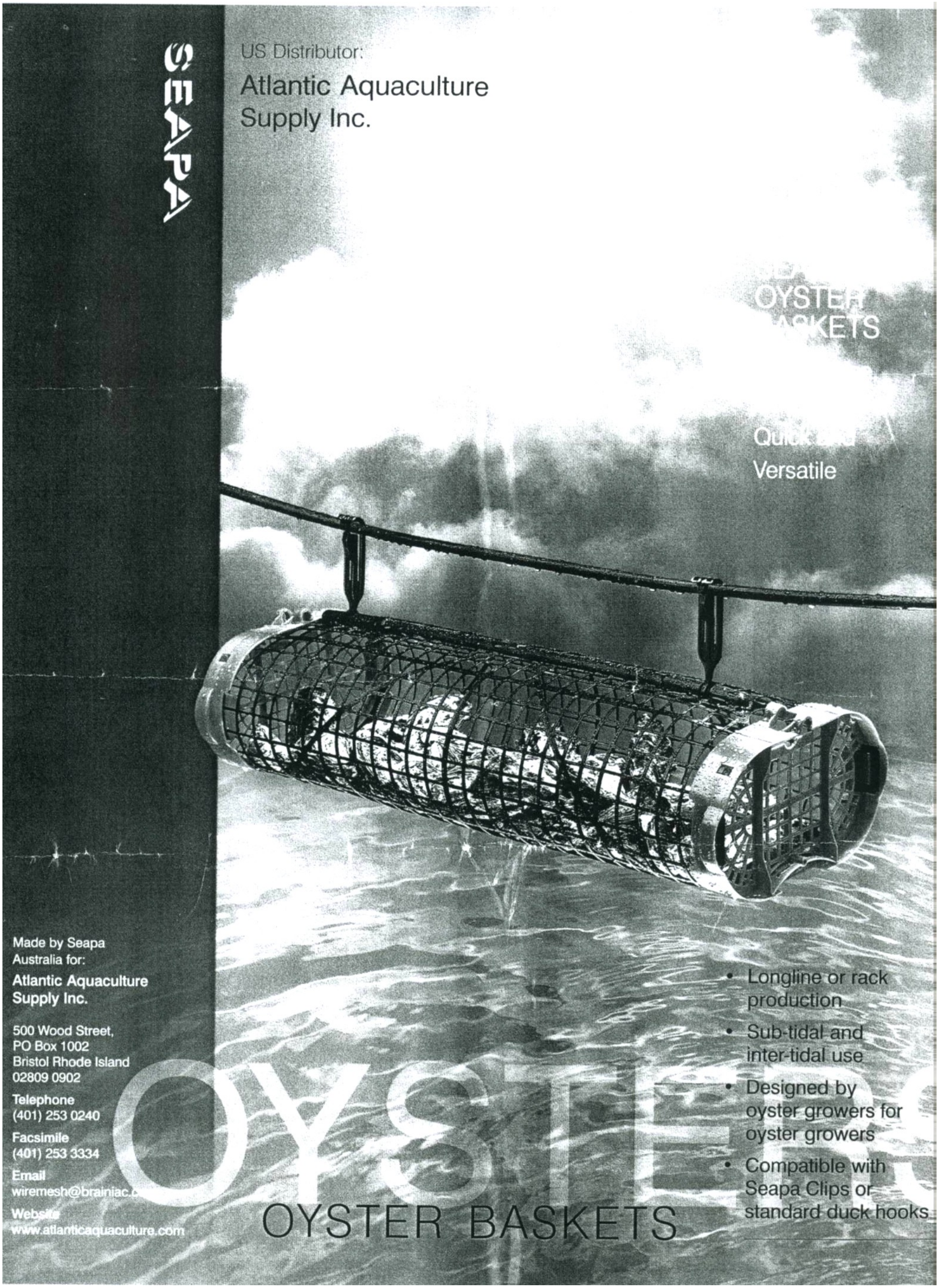
Our analysis shows that the direct break-even point for drum use is 5% improved marketability during one growing cycle (i.e. before the gear has to be handled again for thinning or cleaning), and this is the low end of documented actual performance. Indirect gains also exist, but could not be quantified in the first year. One way to visualize this is to compare the culture of 1000 oysters at 2" (bags vs. drums).

If the stocking rate is 200 per bag and 200 per drum, this requires 5 bags at $6.00, and 5 drums at $20.00 each. However, the bags are attached to racks, which cost $40, but hold five bags. The bags also use clips (4/bag at $0.25, or $1/bag). Thus, one rack, with five bags, and clips, and labor costs about $85 to set out (holding 1000). Five drums cost $120 to set out, since there are no bags or clips. The additional cost on the drums is $1.50 per drum flotation. The drums are threaded onto a rope held between two anchor blocks.

The difference in cost here/1000 is $35 (about 50 oysters, about 5%, or, an average of 10 per drum). Or, about 50 oysters, regardless of the stocking density, regardless of percentages, and regardless of other statistics. No further labor or costs are entailed until the product is harvested. At harvest time, there is a slight additional savings, since the drums are easier and faster to empty and handle. In terms of salability of 18 month old stock, our data show that the drums perform about 8% better in this size class of seed, using stocking densities of 200. In the best case scenarios, over 20%. It should be noted that different batches of oysters have tremendous variability in growth and survival, even oysters grown at the same densities on the same rack. Out of five bags from the same rack, usually there is one bad one, three average, and one that is exceptional. It is easy to focus on the exceptional productivity in the high quality bag, but its value is almost always reduced by the number of dead shells found in the others. We still have no idea what causes this, but it is the norm rather than the exception.

There are also three additional benefits: improved seed quality for the following year (a higher proportion of high quality, almost marketable seed, opposed to various sized mixed seed), which has a very high potential value, but no actual value until the product is sold. Secondly, those oysters that are sold earlier do not have to be grown on further, eliminating not only labor costs, but potential mortality losses. Third, the potential for greater stocking volume. The stocking volume alone could also make up the additional 5%, but we did not test the limits of stocking densities. The maximum capacity of a drum is one question we would like to look at next year.

Again, a small increase of only 5-10% is valuable. In fact, one of the economic factors in the oyster culture industry is that the entire business is affected by small but expensive problems that routinely cause a 5-10% reduction in productivity. This "background loss" factor, when applied to 5-10% of 500,000 adds up. A grower continually wrestles with a combination of multiple "background loss" factors (including but not limited to disease, crowding, stunting, shape, slow growth, algal fouling, predation, poaching, winterkill, DFNR (dead for no reason), shipping costs, bad publicity about oysters in some bayou in Louisiana, market demand, and even terrorist attacks). A 5-10% improvement on any front is worth investigating. In most cases, different growing methods have their own pros and cons, and although they may be different, when you add it all up, they may not actually be better (i.e. both may work, but neither justifies the cost of switchover to the other). In this case, the drums show definite consistent advantages which we feel are worth the investment.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OYSTERS
OYSTER BASKETS
• Longline or rack production
• Sub-tidal and inter-tidal use
• Designed by oyster growers for oyster growers
• Compatible with Seapa Clips or standard duck hooks

# OYSTER BASKETS

## Seapa Oyster Baskets

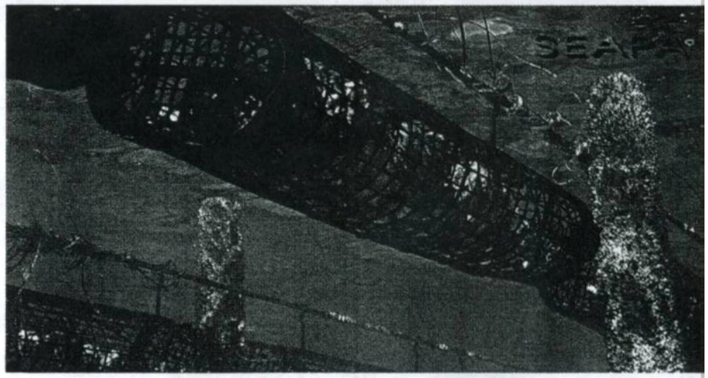
Seapa oyster baskets are purpose designed to simplify sub-tidal and inter-tidal oyster production using longline or rack production.

Developed in association with oyster growers the Seapa 12mm and 20mm mesh baskets provide a simple to use, versatile, secure growing environment.

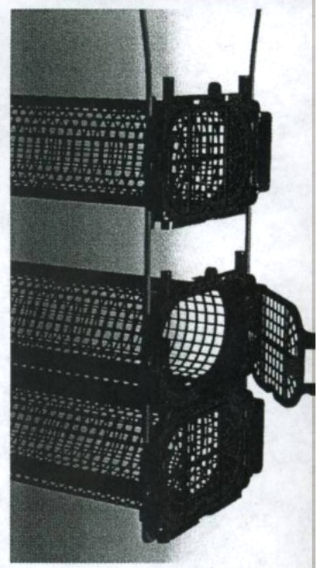
The baskets are fully compatible with the longline system and have attachment points for Seapa Clips. They can be configured for sub-tidal and inter-tidal use.

### Seapa oyster baskets are:

- Cost effective
- Easy to assemble, pack flat
- Easy access to oysters at either end
- Securely hold oysters when closed
- Suit both sub-tidal and inter-tidal use
- For use in longline and racked applications
- Designed by oyster growers for oyster growers
- Compatible with Seapa Clips or standard duck hooks



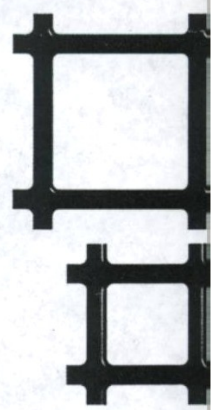

Components are simply snapped together to make a secure strong basket. An assembly jig is available.



Seapa oyster basket standard caps can be obtained in a variety of optional colours for stock coding.

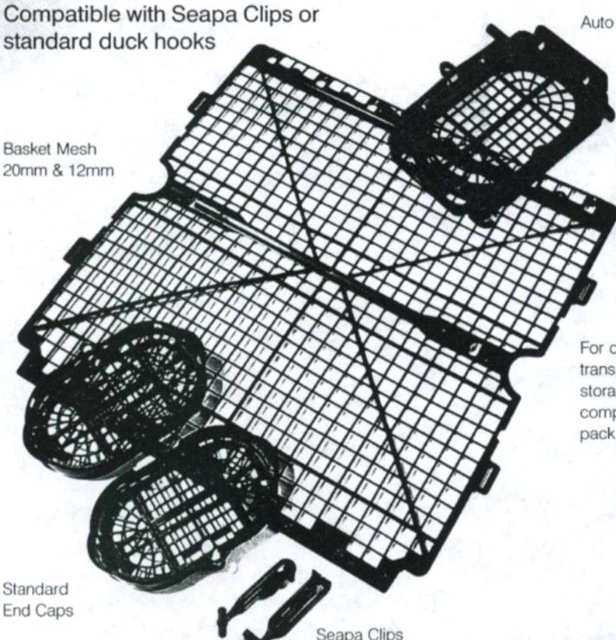
Auto Cap equipped baskets can be used separately or laddered.

Auto Cap



20mm & 12mm meshes available.

Seapa Auto Caps provide hinged door access and are designed to suit conveyor automation.



Basket Mesh 20mm & 12mm

For convenient transport and storage Seapa components pack flat.

Standard End Caps

Seapa Clips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