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# **Comparative Enterprise Budgets For Public and Private Oyster Relaying**

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# Comparative Enterprise Budgets for Public and Private Oyster Relaying

Oyster landings in many regions are in persistent decline. At the same time, the extent of oyster grounds where harvest is restricted for sanitary reasons is expanding. A joint two-year pilot oyster relaying program was undertaken in Mississippi by oyster fishermen and local, state, and federal governments.

The results of this public relaying program were compared with relaying activities in **hypothetical** private oyster leases. Harvest projections are limited to two years due to the lack of a reliable basis for estimation beyond this period. The presence of juvenile oysters in the public relaying site, however, indicates that more harvests are expected in the future. With good management and suitable environmental factors, the public relaying site could develop into a sustainable oyster fishery.

Average oyster harvests from the public reef were relatively higher than those from the private lease. Oyster fishermen harvest 264 sacks of oysters per acre from the public reef, while only 125 sacks of oysters per acre are sustainable in the private lease. Private relaying is a relatively cheaper method than public relaying.

The estimated average total costs of relaying in a new 14-acre private lease are \$16.76 per sack, or \$2,095 per acre, in Year I and \$4.61 per sack, or \$576 per acre, in Year II. Public relaying in a new 10-acre oyster reef cost \$19.84 per sack, or \$5,244 per acre, in Year I and \$7.38 per sack, or \$1,950 per acre, in Year II. However, the expected average gross receipts are greater in public relaying than in private relaying.

At \$24 per sack, annual gross receipts average \$6,342 per acre in the public enterprise and \$3,000 per acre in the private enterprise. Both public and private relaying could be profitable enterprises. The expected average net returns to capital and management skill in private relaying are \$905 per acre, or \$7.24 per sack, in Year I and \$2,424 per acre, or \$19.39 per sack, in Year II. The estimated average net returns to capital of participating agencies and fishermen's labor and managerial skill in public relaying are \$1,099 per acre, or \$4.16 per sack, in Year I and \$4,393 per acre, or \$16.62 per sack, in Year II. However, the net returns to both enterprises are sensitive to fluctuations in ex-vessel prices and harvests.

## Acknowledgment

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# Introduction

## Oyster Industry

Mississippi oyster landings have declined since the latter part of the last decade. Landings in 1990 were 147,517 pounds of meat (Figure 1), which is less than 14 percent of the average over the past decade. The value of the 1990 landings was \$402,976 (Figure 1), representing about 31 percent of the average during the past decade. The average ex-vessel price increased from \$1.06 per pound in 1980 to \$2.73 per pound in 1990 (Figure 2).

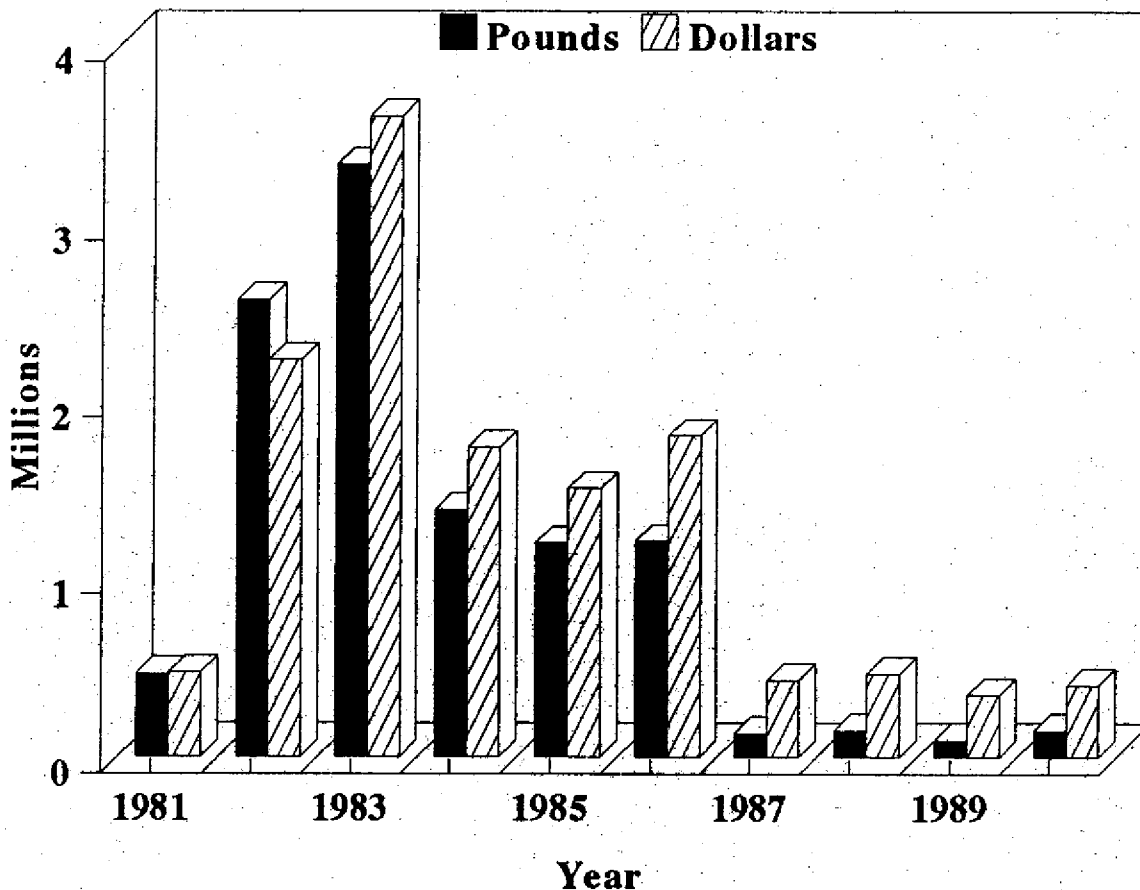
Effort varied widely, reflecting wide fluctuations in oysters available for harvest. An average of 805 fishermen participated in the oyster fishery annually (Figure 3). The reduction in landings adversely affected fishing income of fishermen. The average fisherman landed 1,376 pounds of oyster meat valued at \$1,791 per year (Figure 4).

Loss of habitat was identified as the most serious problem that contributed to the dismal state of the oyster industry

(GSMFC, 1991). Habitat loss may be attributed to the loss of cultch, salinity fluctuations, reef destruction, disease, and pollution. The increase in coastal populations has placed pressure on the estuaries from sewage disposal, industrial activities, increased runoff from urban areas, and agricultural and livestock activities (Broutman and Leonard, 1988). Public health concerns are aggravated because many of the best growing waters are located near discharges of sewage and other wastes (GSMFC, 1991).

For management purposes, the shellfish-growing areas in Mississippi are classified as approved, conditionally approved, restricted, prohibited, and unclassified (MCWFP, 1990). Several sections of the Mississippi oyster-growing areas are classified as restricted waters (MCWFP, 1990) covering about 2,000 and 57,000 acres in 1985 and 1990, respectively (USDC, 1991). Not all water bottoms classified as restricted for water quality reasons are productive oyster reefs, and annual production varies significantly. For example, there is a restricted shoreline safety zone that is essentially devoid of oyster production.

Figure 1



Source: National Marine Fisheries Service, New Orleans, Louisiana.

Figure 1. Mississippi oyster landings and value, 1980-90.

## Goals of Oyster Relaying

Oyster relaying was recognized as one of the measures to increase the use of oyster resources from restricted areas (GSMFC, 1991). Relaying involves removing oysters from restricted waters and transferring the oysters to approved or conditionally approved waters for natural biological cleansing using the ambient environment as a treatment system (USDC and USDHHS, 1985).

The oysters may be spread directly on the new bottom or suspended in various types of containers. When suspended in containers, mature oysters are allowed to cleanse themselves in approximately 15 days (GSMFC, 1991). The materials spread on the new bottom consist of mature and juvenile oysters and empty oyster shells. Mature oysters are harvested later when the oyster season opens. The empty shells may become cultch materials for spat spawned by mature oysters. Juvenile oysters may be harvestable after one or two years from relaying.

Relaying oysters from restricted waters to approved or con-

ditional waters produces more output of harvestable oysters. Additional economic activities, employment, and personal income are generated by public or private relaying enterprise.

## Management Alternatives

### Public Relaying

When relaying is undertaken as a public enterprise, oyster resources are transferred to public water bottoms, and the oyster resources become a common property resource and may be harvested by licensed oyster fishermen during open seasons. The revenues accruing from the harvest and sale of oysters belong to individual oyster fishermen. The state revenues associated with oyster relaying consist of oyster fishing licenses, seafood dealer and processor licenses, and shell retention and sales taxes (GSMFC, 1991). The decision to undertake public relaying enterprises depends on the economic benefits and costs of relaying oysters (Burrage et al., 1991).

Figure 2

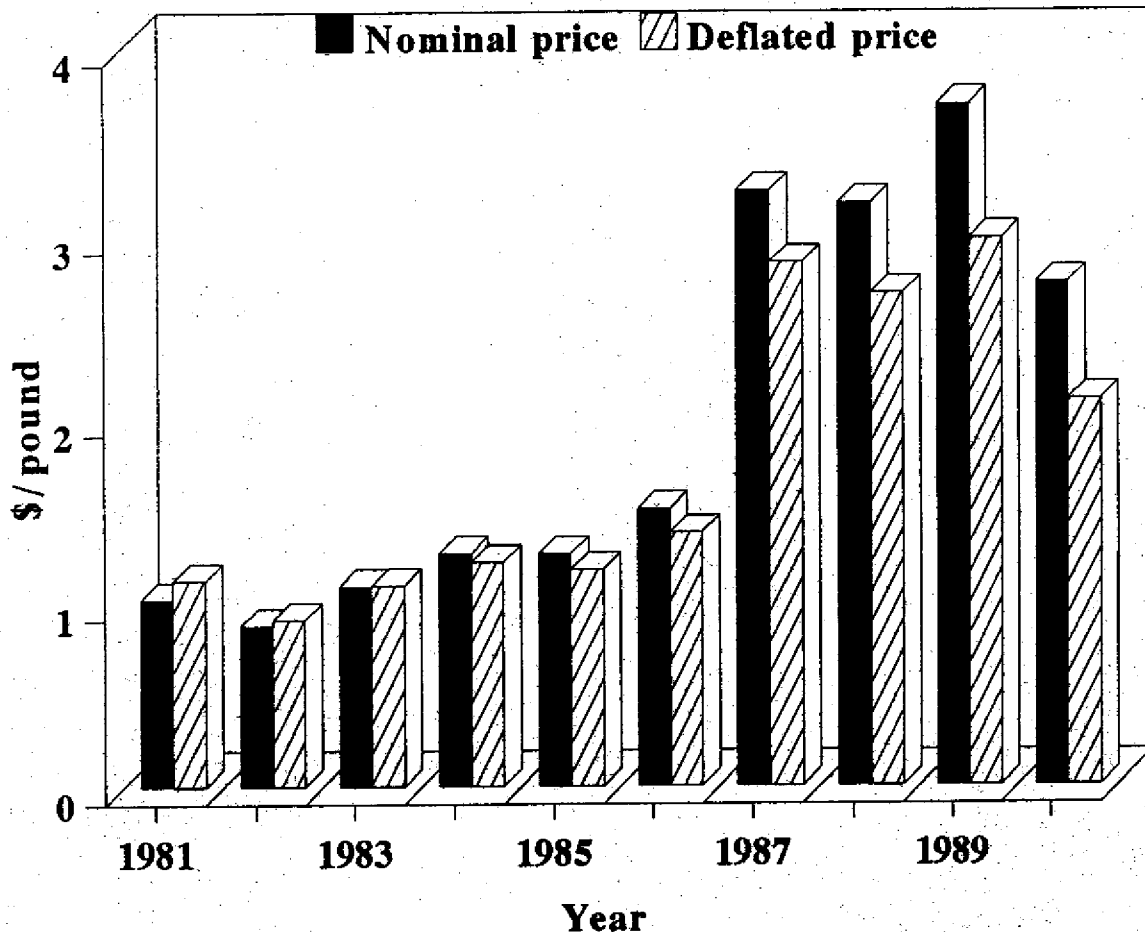


Figure 2. Average ex-vessel price of Mississippi oyster landings, 1980-90.

## Private Relaying

Oyster relaying might also be undertaken solely by a private business organization: a single proprietorship, a partnership, a corporation, or a cooperative. When oysters are relayed by private enterprises, materials are moved to a privately leased oyster-growing area, and unlike public relaying may not be opened to licensed fishermen for harvest. All the revenues earned from the harvest and sale of oysters belong to the owners of the private relaying enterprises.

Private relaying enterprises are acceptable if the net present value of future income is positive or the internal rate of return is greater than the cost of borrowing.

## Semipublic Relaying

Another management alternative involves the participation of public and private sectors in relaying. An agency of the municipal, city, or county government may undertake an oyster relaying enterprise. When the oysters reach marketable size, fishermen are allowed to harvest them during open seasons after payment of a sack fee equivalent to the cost of relaying the oysters. The decision to undertake relaying under this scheme depends on the expected revenues from sackage fees compared with the cost of relaying.

## Relaying Process

Oysters are dredged and planted during the establishment or Year I (Table 1). The monitoring of oyster resources and

harvesting of mature oysters occur during the establishment (Year I) and production (Year II) years. Harvest projections are limited to 2 years due to the lack of reliable basis for estimation beyond this period.

The presence of juvenile oysters in the public relaying site, however, indicates that more harvests are expected in the future. With good management and suitable environmental factors, the public relaying site could develop into a sustainable oyster fishery.

Table 1. Schedule of activities for public and private relaying.

| Activity                | Year I   |        | Year II  |       |
|-------------------------|----------|--------|----------|-------|
|                         | Start    | End    | Start    | End   |
| <b>Public relaying</b>  |          |        |          |       |
| Dredging                | May      | August | None     | None  |
| Planting                | May      | August | None     | None  |
| Monitoring              | May      | April  | May      | April |
| Harvesting              | December | April  | December | April |
| <b>Private relaying</b> |          |        |          |       |
| Dredging                | March    | April  | None     | None  |
| Planting                | March    | April  | None     | None  |
| Monitoring              | April    | May    | April    | May   |
| Harvesting              | December | April  | December | April |

Figure 3

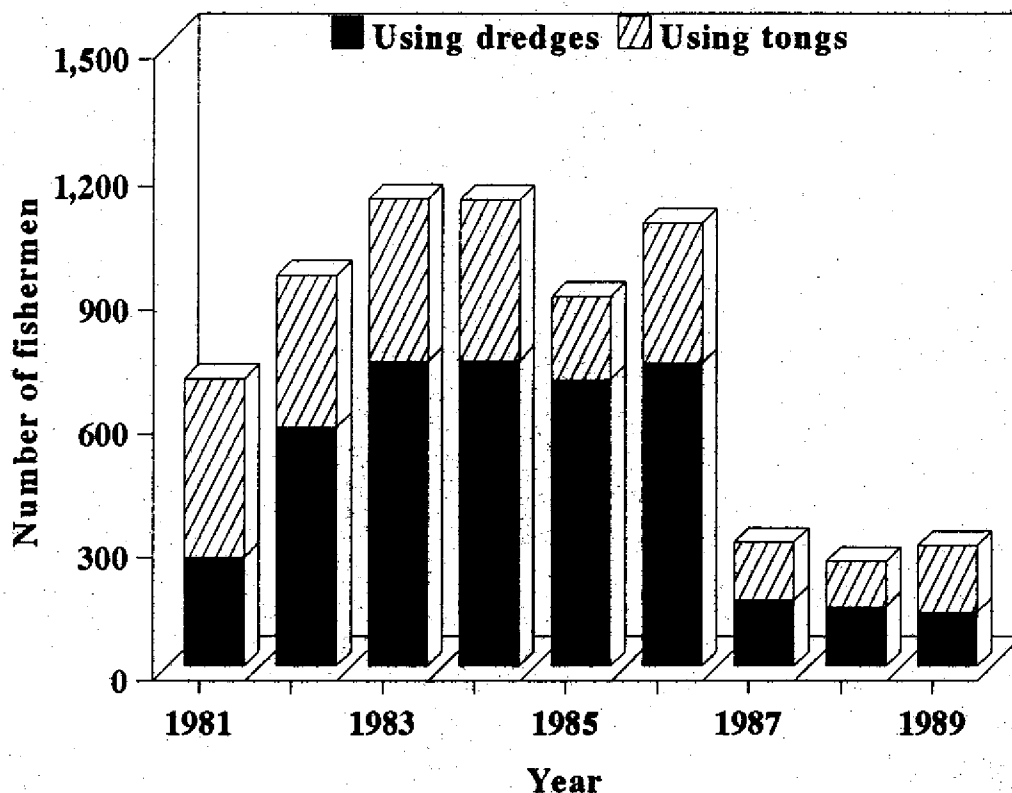


Figure 3. Mississippi oyster fishermen, 1980-88.

## Dredging

A relaying permit issued by the Mississippi Commission on Wildlife, Fisheries and Parks (MCWFP) is required before any person or entity other than the Bureau of Marine Resources (BMR) can relay oysters in the State of Mississippi (MCWFP, 1990). Further, only two dredges (weighing not more than 115 pounds each and not having more than 16 teeth) are allowed on each vessel for dredging oysters. A BMR officer must be present during dredging of oysters in restricted waters until the oysters are transferred to privately leased oyster grounds (MCWFP, 1990).

In public relaying, a 65-foot boat is used in dredging oysters from restricted Mississippi waters (Table 2). Another 14-foot fiberglass support craft with 70-horsepower engine is used to ferry crew members and to survey the oyster grounds. The dredge boat, which can transfer an average of 250 barrels per trip, is manned by four state employees and assisted by four volunteer inmates. In each dredging trip, the dredge boat is operated over 19 hours. An employee guards the boat during evenings when it is loaded with oysters.

In the example of private relaying operations undertaken in Mississippi, a 67-foot vessel is used in dredging and planting oysters. This vessel can move 500 barrels per trip, depending on the availability of materials. The vessel has a crew of three who spend about 18 hours each per dredging trip.

Table 2. Dredging assumptions for public and private oyster relaying.

| Item            | Public relaying       | Private relaying |
|-----------------|-----------------------|------------------|
| Dredging area   | Pascagoula River      | Pascagoula River |
| Dredging period | May-July              | March-April      |
| Dredging output | 250 bbl/trip          | 500 bbl/trip     |
| Dredging vessel | One 65-ft dredge boat | One 67-ft barge  |
| Dredging gear   | 2 dredges             | 2 dredges        |
| Vessel value    | \$100,000             | \$300,000        |
| Regular crew    | 4 persons/trip        | 3 persons/trip   |
| Volunteer crew  | 2-4 persons/trip      | None             |
| Dredging trips  | 20 trips/yr           | 14 trips/yr      |
| Dredging hours  | 19.3 hr/trip          | 17.9 hr/trip     |
| Diesel fuel     | 90.4 gal/trip         | 196.8 gal/trip   |
| Gasoline        | None                  | 35.8 gal/trip    |
| Land travel     | 140 miles/trip        | 15 miles/trip    |
| Guard duty      | 15 hr/trip            | 15 hr/trip       |
| BMR officer     | 16.1 hr/trip          | 17.4 hr/trip     |

## Planting

The planting rate for new oyster reefs is about 500 barrels per acre (Table 3). In existing oyster reefs, planting rate is 250 barrels per acre. The oysters relayed in a public enterprise are shovelled into average 18-foot skiffs powered with

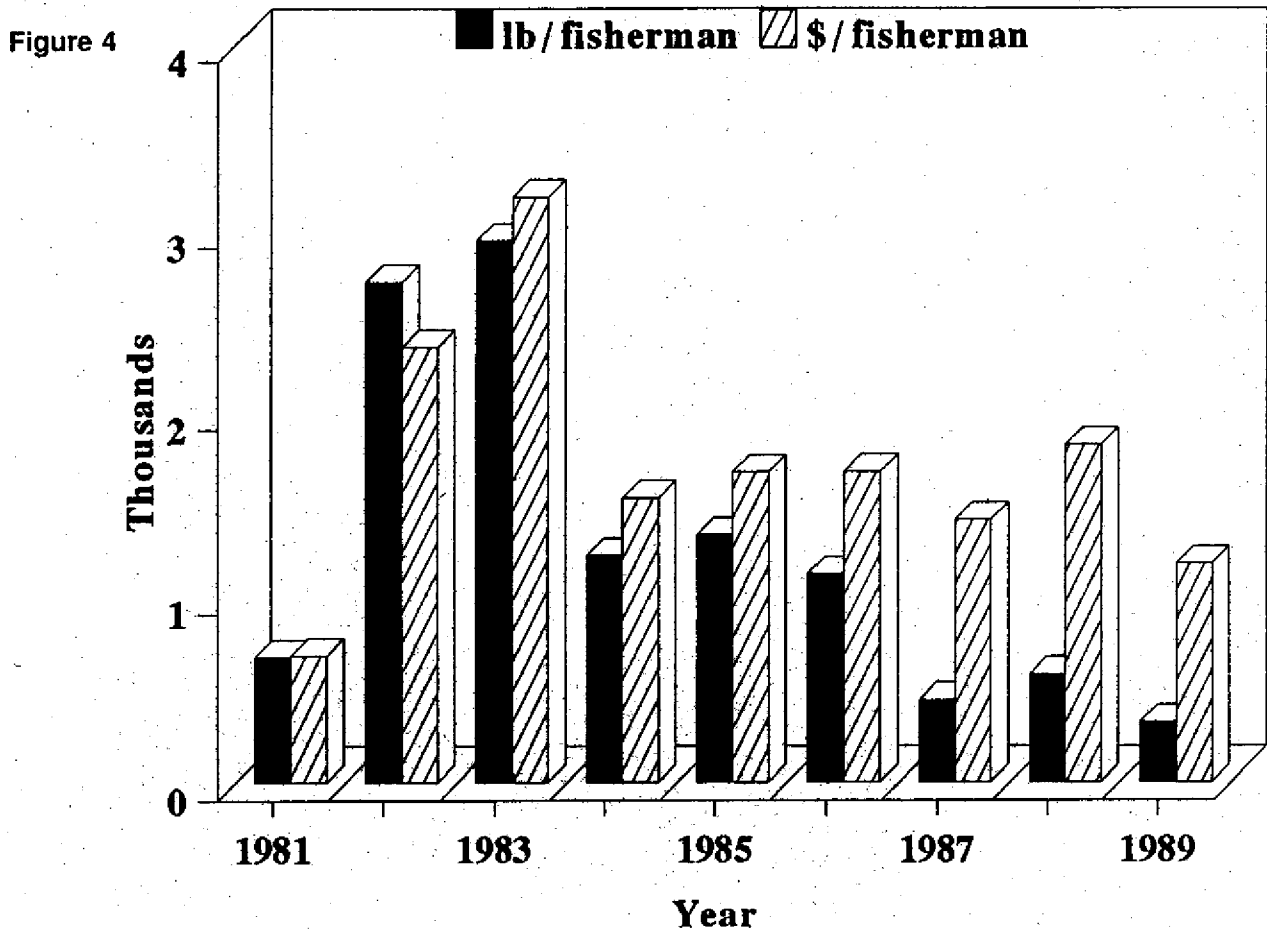


Figure 4. Average Mississippi oyster landings and value per fisherman, 1980-88.



average 30-horsepower engines. Contract oystermen (using six skiffs) plant these materials in over 3 hours at designated areas each planting day. This planting technique is suitable in relaying areas with shallow waters.

**Table 3. Planting assumptions for public and private oyster relaying.**

| Item            | Public relaying       | Private relaying        |
|-----------------|-----------------------|-------------------------|
| Planting area   | Bangs Lake            | Pass Christian          |
| Planting period | May-July              | March-April             |
| Planting method | Shovelled from skiffs | Sprayed overboard barge |
| Planting boats  | 5.8 skiffs/day        | 1 barge/trip            |
| Planting gear   | 1 shovel/skiff        | 1 fire cannon/boat      |
| Lease size      | 10 acres              | 14 acres                |
| Planting rate   | 500 bbl/acre          | 500 bbl/acre            |
| Planting days   | 20 days/yr            | 14 trips/yr             |
| Planting hours  | 3.1 hr/skiff/day      | 0.5 hr/trip             |
| Regular crew    | 1.7 persons/skiff     | 3 persons/boat          |
| Gasoline        | 4.2 gal/skiff/day     | 1 gal/trip              |
| Land travel     | 10 miles/skiff        | None                    |
| Project manager | 3.2 hr/day            | None                    |
| BMR officer     | 3.2 hr/day            | 0.5 hr/trip             |

In private relaying, oysters are sprayed overboard the dredge boat by a fire cannon directly to designated areas on the relaying site. This planting method takes about 30 minutes to complete and is appropriate in oyster reefs accessible to large dredge boats or barges.

## Monitoring

Monitoring the oysters and growing areas is necessary to assess the biological characteristics of oyster resources to ensure compliance with existing oyster fishing regulations and management practices. Private and public relaying areas are susceptible to poaching, and steps must be taken to deter theft of the relayed materials.

An oyster biologist, a BMR officer, and project manager monitor the oysters in the public relaying area 10-12 times a year (Table 4). A 14-foot fiberglass boat with a 70-horsepower engine is used during sampling. Oyster samples are taken from the relaying area to determine size composition, mortality rates, and other biological indicators.

**Table 4. Monitoring assumptions for public and private oyster relaying.**

| Item              | Public relaying | Private relaying   |
|-------------------|-----------------|--------------------|
| Monitoring period | Monthly         | April-May          |
| Monitoring method | Collect samples | Monitor from beach |
| Monitoring trips  | 1 trip/month    | 60 trips/year      |
| Oyster biologist  | 3 hr/trip       | None               |
| Project manager   | 3 hr/trip       | None               |
| Monitoring crew   | None            | 4 hr/trip          |
| Land travel       | 140 miles/trip  | 10 miles/trip      |
| Monitoring boat   | 1 skiff         | None               |
| Gasoline          | 4 gal/trip      | None               |
| BMR officer       | 3 hr/trip       | None               |

For about 2 months after relaying, an employee of a private relaying enterprise watches the oyster grounds from the beach. When the shrimping season opens, monitoring is stopped since the risk of losses due to poaching is greatly reduced.

## Harvesting

Mature oysters over 3 inches long can be harvested during open season (MCWFP, 1990). An annual oyster fishing license is required when harvesting oysters from the state water bottoms. In addition, oyster fishermen need to register at the designated check-in station before and after harvesting oysters every harvest day. A shell retention tax of \$0.50 is imposed on every sack of oysters landed in Mississippi.

Harvesting of oysters in public relaying sites is undertaken by licensed oyster fishermen using motorized skiffs. Each skiff is equipped with one set of tongs. One fisherman harvests the oysters while the other culls them. Over three sacks of oysters are harvested by each boat daily, which is below the sack limit for commercial fishermen using tongs (Table 5).

The harvest of mature oysters relayed in privately leased grounds requires written permission from the BMR (MCWFP, 1990). Further, harvesting must be done by using the most efficient gear consistent with conservation considerations, including the use of two dredges per boat. The dredge boat has five persons who can harvest 14 sacks of oysters per hour. The actual harvesting rate, however, is generally adjusted to the conditions of the oysters.

**Table 5. Harvesting assumptions for public and private oyster relaying.**

| Item              | Public relaying      | Private relaying  |
|-------------------|----------------------|-------------------|
| Harvesting period | December-April       | December-April    |
| Harvesting days   | 35 days/year         | 35 days/year      |
| Harvesting boats  | 24 skiffs/day        | 1 dredge boat/day |
| Harvesting gear   | 1 set of tongs/skiff | 2 dredges/boat    |
| Harvesting hours  | 2.8 hr/skiff/day     | 3.6 hr/boat/day   |
| Harvesting rate   | 3.2 sacks/skiff/day  | 50 sacks/boat/day |
| Total harvest     | 2,643 sacks/year     | 1,750 sacks/year  |
| Recovery rate     | 17.6%                | 8.3%              |
| Regular crew      | 1.7 persons/skiff    | 5 persons/boat    |
| Diesel fuel       | None                 | 21.4 gal/boat/day |
| Gasoline          | 2.9 gal/skiff/day    | 7.1 gal/boat/day  |
| Land travel       | 20 miles/skiff/day   | 20 miles/boat/day |
| BMR officer       | 2.8 hr/day           | None              |

## Enterprise Budgeting

### Using Enterprise Budgets

Generally, an enterprise budget can be used as a financial planning tool for producers, as policy and program instruments, and for economic analysis of production decisions (Ahearn et al., 1990; Pomeroy et al., 1989). As a financial tool, it is useful in planning relaying enterprises and provides

itemized estimates of income, expenses, and resource requirements of a specific enterprise that investors require in evaluating its profitability. An enterprise budget also stipulates production inputs and management practices needed to successfully operate the enterprise. It shows the data required to prepare an enterprise's projected cash flow, which lenders need in evaluating financial feasibility.

The cost estimates provide the basis in determining the sackage fee to charge fishermen harvesting oysters in relaying enterprises managed by local governments.

## Elements of Enterprise Budgets

Gross receipts are the ex-vessel values of oysters harvested from the relaying area. Ex-vessel prices vary from season to season, possibly due to fluctuations in oyster landings. The value of oysters harvested for home consumption is also included in gross receipts.

Variable costs are those directly related to the quantity of oysters relayed. Estimates of variable costs may vary due to differences in lease sizes, planting rates, recovery rates, dredging output, relaying distance, etc. Total variable costs include labor, fuel/oil, repair/maintenance, food supplies, launching, land transport, and operating capital.

Fixed costs are those incurred as soon as boats, engines, and gear are designated for relaying or related activities. The total cost of fixed inputs remains the same during the entire season and does not change with the quantity of oysters relayed. Total fixed cost covers expenditures on licenses, depreciation, insurance, interest on investment, management, and miscellaneous items, e.g., oyster lease.

Total cost is the sum of variable and fixed costs. When all inputs are valued at their best alternative use, total cost includes opportunity costs.

Net returns are the residual term between gross receipts and total cost. When total cost includes opportunity costs, the residual item is called returns to capital. In public relaying, the residual item is the combined returns to capital of participating institutions and oystermen's labor and managerial skills. In private relaying, it is the returns to owner's capital and managerial skills.

## Explanation of Budget Items

The items included in the enterprise budgets are estimated by using the following computational procedures:

**Oyster harvest**—Public harvest is equal to sacks of oyster materials planted multiplied by the average annual recovery rate. Private harvest consists of average sacks of oysters harvested per day multiplied by harvesting days per year.

**Hired labor**—Dredging labor consists of average dredging and guard man-hours per trip multiplied by dredging trips per year. Planting labor includes average planting hours per day multiplied by planting days per year. Monitoring labor is equal to average monitoring man-hours per trip multiplied by monitoring trips per year. Harvesting labor pertains to average harvesting man-hours per day multiplied by harvesting days per year.

**Volunteer and family labor**—The costs of volunteer labor provided by inmates in dredging and unloading and man-hours employed by owners and crew in harvesting oysters from the public relaying area are not included in estimating labor costs. Volunteer inmates are compensated in the form of sentence reduction per day of work with the relaying project. The compensation of owner and family labor is incorporated in the residual item.

**Fuel and oil**—Fuel consumption is equal to gallons of diesel fuel consumed per trip multiplied by number of trips per year. Oil consumption includes gallons of gasoline burned per trip multiplied by number of trips per year.

**Other variable costs**—Repair and maintenance consists of average repair and maintenance cost per trip multiplied by trips per year. Food supplies pertain to average cost of meals provided to crew per trip multiplied by trips per year. Launching fees include average cost of launching per trip multiplied by trips per year. Land transport is equal to average mileage per trip multiplied by trips per year. Interest on operating capital consists of half the total variable costs multiplied by annual interest rate.

**Fixed costs**—Licenses are equal to average cost of fishing license per day multiplied by fishing trips year. Depreciation is computed by dividing the market value of fishing assets by useful economic life. Insurance and taxes pertain to average investment multiplied by annual rate for insurance and taxes. Management cost is estimated by multiplying management hours per trip by trips per year. Oyster lease is equal to number of acres multiplied by cost per acre. Shell retention tax is equal to sacks harvested multiplied by shell retention tax per sack.

## Comparative Enterprise Budgets

Enterprise budgets for oyster relaying in Mississippi are estimated for the establishment (Year I) and production (Year II) years. Computer simulation models were developed to estimate the enterprise budgets. The biological, technical, and economic aspects of public oyster relaying are based on the results of the Jackson County, Mississippi, oyster relaying program (Burrage et al., 1991). Additional information was collected from a private oysterman (personal communication) who had undertaken private relaying operations in Mississippi to develop enterprise budgets for a private relaying enterprise.

Users of these budgets are cautioned to use them only as guides in preparing financial projections, and estimates must be adjusted to circumstances surrounding individual enterprises. The assumptions used in budgeting are based on actual relaying operations; but differences in the underlying circumstances and management practices of planned enterprises might require adjustments in the planning assumptions. Also, estimates depend on the environmental conditions in the oyster reefs. Fluctuations in environmental factors beyond critical limits may lead to poor harvests.

## Annual Costs and Returns

The two consecutive years of oyster harvests from the Jackson County oyster relaying area (Burrage et al., 1991) provide strong empirical evidence for a successful public relaying enterprise. Oyster fishermen harvest 2,643 sacks of oysters per year from the new 10-acre public oyster reef, or 17.6 percent of oyster materials relayed. The reported sack-oysters harvest of a commercial fishing boat averages 3.2 sacks per day from the public relaying area. With an ex-vessel price of \$24 per sack, the expected gross receipts of public relaying are \$63,423 per year (Table 6). Public relaying of oysters costs \$52,435 in Year I and \$19,496 per year in Year II. The estimated combined net returns to capital of all participating institutions and oystermen's labor and managerial skills are \$10,988 in Year I and \$43,928 in Year II.

However, there are some distributional issues involved in public relaying, since the state/local government provides funds for public relaying enterprises. The state/local government pays for the dredging, planting, and monitoring costs of public relaying. The costs of dredging, planting, and monitoring are \$25,765, \$6,884, and \$1,744, respectively. In return, the state government expects to collect from oyster fishermen fishing licenses and shell retention taxes amounting to \$1,198 and \$1,321 per year, respectively. Additional revenues are anticipated from seafood processor and dealer licenses, sales taxes during the final sale of oyster products, property taxes, and state income taxes.

Fishermen spend \$18,042 per year to harvest oysters from the public relaying area. In return, fishermen receive \$63,423 per year from the sale of oysters harvested. The net returns to fishermen's labor, capital, and managerial skills are \$45,381 per year. Essentially, the state/local government subsidizes the income of oyster fishermen by paying for the total costs of dredging, planting, and monitoring, which amounted to \$34,393 in Year I and \$1,454 in Year II.

About 1,750 sacks of oysters per year are harvestable from the private lease, representing 8.3 percent of oysters relayed. A harvest rate of 50 sacks per day is sustainable in a new 14-acre private oyster lease. These harvest projections, however, are not adequately substantiated with reliable data from private oyster leases. Substantial variations in the environmental conditions in the private oyster reefs usually lead to poor oyster harvests. The effects of variability in oyster harvest are considered in a later section. Nevertheless, at \$24 per sack, the expected gross receipts of a private relaying enterprise are \$42,000 per year (Table 6). The estimated total costs of relaying oysters in a new 14-acre private oyster lease are \$29,335 in Year I and \$8,062 in Year II. The expected net returns to capital and management in private relaying are \$12,665 in Year I and \$33,938 in Year II.

Table 6. Summary of estimated costs and returns for public and private relaying in a new 10-acre oyster reef. Values and costs are given in dollars.

| Item                  | Public relaying |         | Private relaying |         |
|-----------------------|-----------------|---------|------------------|---------|
|                       | Year I          | Year II | Year I           | Year II |
| Gross receipts        | 63,423          | 63,423  | 42,000           | 42,000  |
| <b>Variable costs</b> |                 |         |                  |         |
| Hired labor           | 17,879          | 409     | 11,900           | 4,532   |
| Fuel/oil              | 5,507           | 3,183   | 4,281            | 1,005   |
| Repair/maintenance    | 3,427           | 2,037   | 1,958            | 76      |
| Food supplies         | 1,865           | 0       | 2,135            | 875     |
| Launching fees        | 988             | 849     | 0                | 0       |
| Land transport        | 4,485           | 3,636   | 372              | 260     |
| Operating interest    | 1,708           | 506     | 841              | 147     |
| Subtotal              | 35,858          | 10,619  | 21,487           | 6,895   |
| Inc. above var. costs | 27,565          | 52,804  | 20,513           | 35,105  |
| <b>Fixed costs</b>    |                 |         |                  |         |
| Licenses              | 1,198           | 1,198   | 200              | 100     |
| Depreciation          | 6,685           | 4,115   | 1,356            | 102     |
| Insurance/taxes       | 815             | 158     | 1,567            | 0       |
| Interest              | 1,542           | 790     | 1,958            | 76      |
| Management            | 5,015           | 1,294   | 1,878            | 0       |
| Miscellaneous         | 1,321           | 1,321   | 889              | 889     |
| Subtotal              | 16,577          | 8,877   | 7,848            | 1,167   |
| <b>Total costs</b>    | 52,435          | 19,496  | 29,335           | 8,062   |
| <b>Net returns</b>    | 10,988          | 43,928  | 12,665           | 33,938  |

## Comparison Between Public and Private Relaying

Oyster harvests from the public relaying enterprise are relatively higher than from private relaying enterprise. Based on actual landings, oyster fishermen harvest 264 sacks of oysters per acre from the public relaying area (Table 7). As suggested by the interviewed oysterman (personal communication), a harvest of 125 sacks of oysters per acre is sustainable in the private relaying area.

The expected average gross receipts are greater in public relaying than in private relaying. At \$24 per sack, annual gross receipts average \$6,342 per acre in public enterprises and \$3,000 per acre in private enterprises due to differences in recovery and harvesting rates.

Private oyster relaying is a relatively cheaper method than public oyster relaying. The estimated average total costs of relaying oysters in a new 14-acre private oyster lease are \$16.76 per sack, or \$2,095 per acre, in Year I and \$4.61 per sack, or \$576 per acre, in Year II. Public relaying of oysters in a new 10-acre oyster reef costs \$19.84 per sack, or \$5,244 per acre, in Year I and \$7.38 per sack, or \$1,950 per acre, in Year II.

**Table 7. Estimated average harvests, costs, and returns for public and private relaying in a new 10-acre oyster reef. Values and costs are in dollars unless otherwise indicated.**

| Item                          | Public relaying |          | Private relaying |          |
|-------------------------------|-----------------|----------|------------------|----------|
|                               | Year I          | Year II  | Year I           | Year II  |
| <b>Average oyster harvest</b> |                 |          |                  |          |
| Per acre planted              | 264.00          | 264.00   | 125.00           | 125.00   |
| <b>Average total costs</b>    |                 |          |                  |          |
| Per sack harvested            | 19.84           | 7.38     | 16.76            | 4.61     |
| Per acre planted              | 5,244.00        | 1,950.00 | 2,095.00         | 576.00   |
| <b>Average gross receipts</b> |                 |          |                  |          |
| Per sack harvested            | 24.00           | 24.00    | 24.00            | 24.00    |
| Per acre planted              | 6,342.00        | 6,342.00 | 3,000.00         | 3,000.00 |
| <b>Average net returns</b>    |                 |          |                  |          |
| Per sack harvested            | 4.16            | 16.62    | 7.24             | 19.39    |
| Per acre planted              | 1,099.00        | 4,393.00 | 905.00           | 2,424.00 |

Private relaying generates higher average net returns per sack of oysters harvested due to lower average relaying costs. However, public relaying produces higher average net returns per acre planted because of higher average oyster harvest. The expected average net returns to capital and management skills for private relaying are \$905 per acre, or \$7.24 per sack, in Year I and \$2,424 per acre, or \$19.39 per sack, in Year II. The estimated average net returns to capital of all participating institutions and oystermen's labor and managerial skills in public relaying are \$1,099 per acre, or \$4.16 per sack, in Year I and \$4,393 per acre, or \$16.62 per sack, in Year II.

## Sensitivity Analysis

The precarious nature of the oyster industry requires an evaluation of the possible effects of fluctuations in critical factors affecting the economic viability of oyster relaying, e.g., recovery rates and ex-vessel price. Annual harvests are determined by the availability of mature oysters in the relaying area. The survival of oysters depends on several biological and environmental factors (e.g., spawning, salinity, predation, and pollution).

The wide fluctuations in environmental conditions in traditional oyster-growing areas make relaying a high risk enterprise. To evaluate the sensitivity of both oyster relaying enterprises to ex-vessel price and harvest fluctuations, three output levels and three ex-vessel prices are assumed, namely: oyster harvest—1,000, 2,000, and 3,000 sacks per year; ex-vessel price—\$10, \$15, and \$20 per sack.

The combined returns to capital of participating agencies and labor and management of oyster fishermen are sensitive to fluctuations in ex-vessel prices and oyster harvests (Table 8). In a new 10-acre oyster reef, with an above-average oyster harvest of 3,000 sacks per year and a low ex-vessel price of \$10 per sack, net returns will be \$-24,773 in Year I and \$8,167 in Year II. An average annual harvest of 2,000 sacks of oysters and average ex-vessel price of \$15 per sack will

generate net returns of \$-28,220 in Year I and \$4,720 in Year II. If oyster harvest averages 1,000 sacks per year and average ex-vessel price is \$20 per sack, net returns will be \$-31,666 in Year I and \$1,273 in Year II.

**Table 8. Estimated combined net returns from public relaying in a new 10-acre reef at different ex-vessel prices and oyster harvests, Years I and II. Values are given in dollars.**

| Ex-vessel price | Oyster harvest |             |             |
|-----------------|----------------|-------------|-------------|
|                 | 1,000 sacks    | 2,000 sacks | 3,000 sacks |
|                 | Year I         |             |             |
| \$10/sack       | -31,666        | -28,220     | -24,773     |
| \$15/sack       | -26,668        | -18,223     | -9,778      |
| \$20/sack       | -21,668        | -8,223      | 5,222       |
| Year II         |                |             |             |
| \$10/sack       | 1,273          | 4,720       | 8,167       |
| \$15/sack       | 6,271          | 14,714      | 23,162      |
| \$20/sack       | 11,271         | 24,714      | 38,162      |

The returns to capital and managerial skill of the owners of a private lease are sensitive to fluctuations in ex-vessel prices and oyster harvests (Table 9). In a new 14-acre oyster lease, an above average oyster harvest of 3,000 sacks per year and a low ex-vessel price of \$10 per sack will produce net returns of \$-2,464 in Year I and \$18,810 in Year II. When annual harvest averages 2,000 sacks and ex-vessel price averages \$15 per sack, net returns will be \$-9,959 in Year I and \$11,315 in Year II. If oyster harvest is less than average at 1,000 sacks per year and average ex-vessel price is \$20 per sack, net returns will be \$-17,463 in Year I and \$3,810 in Year II.

**Table 9. Estimated net returns from private relaying in a new 14-acre oyster reef at different ex-vessel prices and oyster harvests, Years I and II. Values are given in dollars.**

| Ex-vessel price | Oyster harvest |             |             |
|-----------------|----------------|-------------|-------------|
|                 | 1,000 sacks    | 2,000 sacks | 3,000 sacks |
|                 | Year I         |             |             |
| \$10/sack       | -17,463        | -9,959      | -2,464      |
| \$15/sack       | -11,877        | -152        | 11,574      |
| \$20/sack       | -6,876         | 9,850       | 26,576      |
| Year II         |                |             |             |
| \$10/sack       | 3,810          | 11,315      | 18,810      |
| \$15/sack       | 9,371          | 21,131      | 32,891      |
| \$20/sack       | 14,371         | 31,132      | 47,893      |

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Appendix Table 1. Estimated costs and returns of public relaying in a new 10-acre oyster reef, Year I. Values and costs are given in dollars, except where noted.

| Item                          | Unit  | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|-------------------------------|-------|---------------------|----------|----------------------|----------------------------|----------------------------|
| <b>Gross receipts</b>         |       |                     |          |                      |                            |                            |
| Oyster harvest                | sacks | 24.00               | 2,643    | 3,423                | 24.00                      | 6,342                      |
| <b>Variable costs</b>         |       |                     |          |                      |                            |                            |
| <b>Labor services</b>         |       |                     |          |                      |                            |                            |
| Dredging                      |       |                     |          |                      |                            |                            |
| Regular                       | hr    | 7.44                | 1,843    | 13,703               | 5.19                       | 1,370                      |
| Volunteers                    | hr    | .00                 | 1,543    | 0                    | .00                        | 0                          |
| Planting                      | hr    | 10.00               | 369      | 3,685                | 1.39                       | 369                        |
| Monitoring                    |       |                     |          |                      |                            |                            |
| Guards                        | hr    | 4.30                | 0        | 0                    | .00                        | 0                          |
| Biologists                    | hr    | 13.65               | 36       | 491                  | .19                        | 49                         |
| Harvesting                    | hr    | .00                 | 4,108    | 0                    | .00                        | 0                          |
| Subtotal                      |       |                     |          | 17,879               | 6.77                       | 1,788                      |
| <b>Fuel and oil</b>           |       |                     |          |                      |                            |                            |
| Dredging                      |       |                     |          |                      |                            |                            |
| Diesel                        | gal   | .80                 | 1,807    | 1,452                | .55                        | 145                        |
| Gasoline                      | gal   | 1.10                | 0        | 0                    | .00                        | 0                          |
| Hydraulic fluid               | gal   | 4.16                | 58       | 243                  | .09                        | 24                         |
| Engine oil                    | gal   | 5.27                | 0        | 0                    | .00                        | 0                          |
| Planting                      |       |                     |          |                      |                            |                            |
| Gasoline                      | gal   | 1.10                | 485      | 534                  | .20                        | 53                         |
| Engine oil                    | gal   | 8.80                | 10       | 85                   | .03                        | 9                          |
| Monitoring                    |       |                     |          |                      |                            |                            |
| Gasoline                      | gal   | 1.10                | 47       | 52                   | .02                        | 5                          |
| Engine oil                    | gal   | 8.80                | 1        | 8                    | .00                        | 1                          |
| Harvesting                    |       |                     |          |                      |                            |                            |
| Gasoline                      | gal   | 1.10                | 2,455    | 2,701                | 1.02                       | 270                        |
| Engine oil                    | gal   | 8.80                | 49       | 432                  | .16                        | 43                         |
| Subtotal                      |       |                     |          | 5,507                | 2.08                       | 551                        |
| <b>Repair and maintenance</b> |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 57.10               | 20       | 1,142                | .43                        | 114                        |
| Planting                      | trips | 2.09                | 117      | 244                  | .09                        | 24                         |
| Monitoring                    | trips | 2.09                | 12       | 25                   | .01                        | 3                          |
| Harvesting                    | trips | 2.40                | 839      | 2,016                | .76                        | 202                        |
| Subtotal                      |       |                     |          | 3,427                | 1.30                       | 343                        |
| <b>Food supplies</b>          |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 93.26               | 20       | 1,865                | .71                        | 187                        |
| Planting                      | trips | .00                 | 117      | 0                    | .00                        | 0                          |
| Monitoring                    | trips | .00                 | 12       | 0                    | .00                        | 0                          |
| Harvesting                    | trips | .00                 | 839      | 0                    | .00                        | 0                          |
| Subtotal                      |       |                     |          | 1,865                | .71                        | 187                        |
| <b>Launching fees</b>         |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 1.00                | 20       | 20                   | .01                        | 2                          |
| Planting                      | trips | 1.00                | 117      | 117                  | .04                        | 12                         |
| Monitoring                    | trips | 1.00                | 12       | 12                   | .00                        | 1                          |
| Harvesting                    | trips | 1.00                | 839      | 839                  | .32                        | 84                         |
| Subtotal                      |       |                     |          | 988                  | .37                        | 99                         |
| <b>Land transport</b>         |       |                     |          |                      |                            |                            |
| Dredging                      | miles | .20                 | 2,800    | 560                  | .21                        | 56                         |
| Planting                      | miles | .20                 | 1,167    | 233                  | .09                        | 23                         |
| Monitoring                    | miles | .20                 | 1,680    | 336                  | .13                        | 34                         |
| Harvesting                    | miles | .20                 | 16,779   | 3,356                | 1.27                       | 336                        |
| Subtotal                      |       |                     |          | 4,485                | 1.70                       | 449                        |

(continued)

Appendix Table 1 (continued)

| Item                               | Unit    | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|------------------------------------|---------|---------------------|----------|----------------------|----------------------------|----------------------------|
| Interest on operating capital      |         |                     |          |                      |                            |                            |
| Dredging                           | percent | 10.00               | 9,492    | 949                  | .36                        | 95                         |
| Planting                           | percent | 10.00               | 2,449    | 245                  | .09                        | 24                         |
| Monitoring                         | percent | 10.00               | 462      | 46                   | .02                        | 5                          |
| Harvesting                         | percent | 10.00               | 4,671    | 467                  | .18                        | 47                         |
| Subtotal                           |         |                     |          | 1,708                | .65                        | 171                        |
| <b>Total variable costs</b>        |         |                     |          | <b>35,858</b>        | <b>13.57</b>               | <b>3,586</b>               |
| <b>Income above variable costs</b> |         |                     |          | <b>27,565</b>        | <b>10.43</b>               | <b>2,757</b>               |
| <b>Fixed costs</b>                 |         |                     |          |                      |                            |                            |
| Licenses                           |         |                     |          |                      |                            |                            |
| Dredging                           | trips   | .00                 | 20       | 0                    | .00                        | 0                          |
| Planting                           | trips   | .00                 | 117      | 0                    | .00                        | 0                          |
| Monitoring                         | trips   | .00                 | 12       | 0                    | .00                        | 0                          |
| Harvesting                         | trips   | 1.43                | 839      | 1,198                | .45                        | 120                        |
| Subtotal                           |         |                     |          | 1,198                | .45                        | 120                        |
| Depreciation                       |         |                     |          |                      |                            |                            |
| Dredging                           | trips   | 106.52              | 20       | 2,130                | .81                        | 213                        |
| Planting                           | trips   | 3.67                | 117      | 428                  | .16                        | 43                         |
| Monitoring                         | trips   | 5.42                | 12       | 65                   | .02                        | 7                          |
| Harvesting                         | trips   | 4.84                | 839      | 4,061                | 1.54                       | 406                        |
| Subtotal                           |         |                     |          | 6,685                | 2.53                       | 668                        |
| Insurance and taxes                |         |                     |          |                      |                            |                            |
| Dredging                           | trips   | 31.96               | 20       | 639                  | .24                        | 64                         |
| Planting                           | trips   | .15                 | 117      | 17                   | .01                        | 2                          |
| Monitoring                         | trips   | .27                 | 12       | 3                    | .00                        | 0                          |
| Harvesting                         | trips   | .19                 | 839      | 155                  | .06                        | 16                         |
| Subtotal                           |         |                     |          | 815                  | .31                        | 82                         |
| Interest on investment             |         |                     |          |                      |                            |                            |
| Dredging                           | trips   | 33.14               | 20       | 663                  | .25                        | 66                         |
| Planting                           | trips   | .75                 | 117      | 87                   | .03                        | 9                          |
| Monitoring                         | trips   | 1.36                | 12       | 16                   | .01                        | 2                          |
| Harvesting                         | trips   | .93                 | 839      | 776                  | .29                        | 78                         |
| Subtotal                           |         |                     |          | 1,542                | .58                        | 154                        |
| Management                         |         |                     |          |                      |                            |                            |
| Project manager                    |         |                     |          |                      |                            |                            |
| Dredging                           | hr      | 11.70               | 0        | 0                    | .00                        | 0                          |
| Planting                           | hr      | 11.70               | 63       | 739                  | .28                        | 74                         |
| Monitoring                         | hr      | 11.70               | 36       | 421                  | .16                        | 42                         |
| Harvesting                         | hr      | 11.70               | 0        | 0                    | .00                        | 0                          |
| Subtotal                           |         |                     |          | 1,160                | .44                        | 116                        |
| BMR officer                        |         |                     |          |                      |                            |                            |
| Dredging                           | hr      | 7.44                | 323      | 2,398                | .91                        | 240                        |
| Planting                           | hr      | 7.44                | 63       | 470                  | .18                        | 47                         |
| Monitoring                         | hr      | 7.44                | 36       | 268                  | .10                        | 27                         |
| Harvesting                         | hr      | 7.44                | 97       | 720                  | .27                        | 72                         |
| Subtotal                           |         |                     |          | 3,856                | 1.46                       | 386                        |
| Subtotal                           |         |                     |          | 5,015                | 1.90                       | 502                        |
| Miscellaneous                      |         |                     |          |                      |                            |                            |
| Oyster lease                       | acres   | .00                 | 10       | 0                    | .00                        | 0                          |
| Dredging                           | trips   | .00                 | 20       | 0                    | .00                        | 0                          |
| Planting                           | trips   | .00                 | 117      | 0                    | .00                        | 0                          |
| Monitoring                         | trips   | .00                 | 12       | 0                    | .00                        | 0                          |
| Harvesting                         | sacks   | .50                 | 2,643    | 1,321                | .50                        | 132                        |
| Subtotal                           |         |                     |          | 1,321                | .50                        | 132                        |
| <b>Total fixed costs</b>           |         |                     |          | <b>16,577</b>        | <b>6.27</b>                | <b>1,658</b>               |
| <b>Total costs</b>                 |         |                     |          | <b>52,435</b>        | <b>19.84</b>               | <b>5,244</b>               |
| <b>Net returns</b>                 |         |                     |          | <b>10,988</b>        | <b>4.16</b>                | <b>1,099</b>               |

Appendix Table 2. Estimated costs and returns of public relaying in a new 10-acre oyster reef, Year II. Values and costs are given in dollars, except where noted.

| Item                                 | Unit    | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|--------------------------------------|---------|---------------------|----------|----------------------|----------------------------|----------------------------|
| <b>Gross receipts</b>                |         |                     |          |                      |                            |                            |
| Oyster harvest                       | sacks   | 24.00               | 2,643    | 63,423               | 24.00                      | 6,342                      |
| <b>Variable costs</b>                |         |                     |          |                      |                            |                            |
| <b>Labor services</b>                |         |                     |          |                      |                            |                            |
| Dredging                             |         |                     |          |                      |                            |                            |
| Regular                              | hr      | 7.44                | 0        | 0                    | .00                        | 0                          |
| Volunteers                           | hr      | .00                 | 0        | 0                    | .00                        | 0                          |
| Planting                             | hr      | 10.00               | 0        | 0                    | .00                        | 0                          |
| Monitoring                           |         | .00                 |          |                      |                            |                            |
| Guards                               | hr      | 4.30                | 0        | 0                    | .00                        | 0                          |
| Biologists                           | hr      | 13.65               | 30       | 409                  | .15                        | 41                         |
| Harvesting                           | hr      | .00                 | 4,108    | 0                    | .00                        | 0                          |
| Subtotal                             |         |                     |          | 409                  | .15                        | 41                         |
| <b>Fuel and oil</b>                  |         |                     |          |                      |                            |                            |
| Dredging                             |         |                     |          |                      |                            |                            |
| Diesel                               | gal     | .80                 | 0        | 0                    | .00                        | 0                          |
| Gasoline                             | gal     | 1.10                | 0        | 0                    | .00                        | 0                          |
| Hydraulic fluid                      | gal     | 4.16                | 0        | 0                    | .00                        | 0                          |
| Engine oil                           | gal     | 5.27                | 0        | 0                    | .00                        | 0                          |
| Planting                             |         |                     |          |                      |                            |                            |
| Gasoline                             | gal     | 1.10                | 0        | 0                    | .00                        | 0                          |
| Engine oil                           | gal     | 8.80                | 0        | 0                    | .00                        | 0                          |
| Monitoring                           |         |                     |          |                      |                            |                            |
| Gasoline                             | gal     | 1.10                | 39       | 43                   | .02                        | 4                          |
| Engine oil                           | gal     | 8.80                | 1        | 7                    | .00                        | 1                          |
| Harvesting                           |         |                     |          |                      |                            |                            |
| Gasoline                             | gal     | 1.10                | 2,455    | 2,701                | 1.02                       | 270                        |
| Engine oil                           | gal     | 8.80                | 49       | 432                  | .16                        | 43                         |
| Subtotal                             |         |                     |          | 3,183                | 1.20                       | 318                        |
| <b>Repair and maintenance</b>        |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | 57.10               | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | 2.09                | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | 2.09                | 10       | 21                   | .01                        | 2                          |
| Harvesting                           | trips   | 2.40                | 839      | 2,016                | .76                        | 202                        |
| Subtotal                             |         |                     |          | 2,037                | .77                        | 204                        |
| <b>Food supplies</b>                 |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | 93.26               | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | .00                 | 10       | 0                    | .00                        | 0                          |
| Harvesting                           | trips   | .00                 | 839      | 0                    | .00                        | 0                          |
| Subtotal                             |         |                     |          | 0                    | .00                        | 0                          |
| <b>Launching fees</b>                |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | 1.00                | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | 1.00                | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | 1.00                | 10       | 10                   | .00                        | 1                          |
| Harvesting                           | trips   | 1.00                | 839      | 839                  | .32                        | 84                         |
| Subtotal                             |         |                     |          | 849                  | .32                        | 85                         |
| <b>Land transport</b>                |         |                     |          |                      |                            |                            |
| Dredging                             | miles   | .20                 | 0        | 0                    | .00                        | 0                          |
| Planting                             | miles   | .20                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | miles   | .20                 | 1,400    | 280                  | .11                        | 28                         |
| Harvesting                           | miles   | .20                 | 16,779   | 3,356                | 1.27                       | 336                        |
| Subtotal                             |         |                     |          | 3,636                | 1.38                       | 364                        |
| <b>Interest on operating capital</b> |         |                     |          |                      |                            |                            |
| Dredging                             | percent | 10.00               | 0        | 0                    | .00                        | 0                          |
| Planting                             | percent | 10.00               | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | percent | 10.00               | 385      | 39                   | .01                        | 4                          |
| Harvesting                           | percent | 10.00               | 4,671    | 467                  | .18                        | 47                         |
| Subtotal                             |         |                     |          | 506                  | .19                        | 51                         |
| <b>Total variable costs</b>          |         |                     |          | 10,619               | 4.02                       | 1,062                      |

(continued)



Appendix Table 2 (continued)

| Item                               | Unit  | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|------------------------------------|-------|---------------------|----------|----------------------|----------------------------|----------------------------|
| <b>Income above variable costs</b> |       |                     |          | 52,804               | 19.98                      | 5,280                      |
| <b>Fixed costs</b>                 |       |                     |          |                      |                            |                            |
| <b>Licenses</b>                    |       |                     |          |                      |                            |                            |
| Dredging                           | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Planting                           | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | trips | .00                 | 10       | 0                    | .00                        | 0                          |
| Harvesting                         | trips | 1.43                | 839      | 1,198                | .45                        | 120                        |
| Subtotal                           |       |                     |          | 1,198                | .45                        | 120                        |
| <b>Depreciation</b>                |       |                     |          |                      |                            |                            |
| Dredging                           | trips | 106.52              | 0        | 0                    | .00                        | 0                          |
| Planting                           | trips | 3.67                | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | trips | 5.42                | 10       | 54                   | .02                        | 5                          |
| Harvesting                         | trips | 4.84                | 839      | 4,061                | 1.54                       | 406                        |
| Subtotal                           |       |                     |          | 4,115                | 1.56                       | 411                        |
| <b>Insurance and taxes</b>         |       |                     |          |                      |                            |                            |
| Dredging                           | trips | 31.96               | 0        | 0                    | .00                        | 0                          |
| Planting                           | trips | .15                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | trips | .27                 | 10       | 3                    | .00                        | 0                          |
| Harvesting                         | trips | .19                 | 839      | 155                  | .06                        | 16                         |
| Subtotal                           |       |                     |          | 158                  | .06                        | 16                         |
| <b>Interest on investment</b>      |       |                     |          |                      |                            |                            |
| Dredging                           | trips | 33.14               | 0        | 0                    | .00                        | 0                          |
| Planting                           | trips | .75                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | trips | 1.36                | 10       | 14                   | .01                        | 1                          |
| Harvesting                         | trips | .93                 | 839      | 776                  | .29                        | 78                         |
| Subtotal                           |       |                     |          | 790                  | .30                        | 79                         |
| <b>Management</b>                  |       |                     |          |                      |                            |                            |
| <b>Project manager</b>             |       |                     |          |                      |                            |                            |
| Dredging                           | hr    | 11.70               | 0        | 0                    | .00                        | 0                          |
| Planting                           | hr    | 11.70               | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | hr    | 11.70               | 30       | 351                  | .13                        | 35                         |
| Harvesting                         | hr    | 11.70               | 0        | 0                    | .00                        | 0                          |
| Subtotal                           |       |                     |          | 351                  | .13                        | 35                         |
| <b>BMR officer</b>                 |       |                     |          |                      |                            |                            |
| Dredging                           | hr    | 7.44                | 0        | 0                    | .00                        | 0                          |
| Planting                           | hr    | 7.44                | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | hr    | 7.44                | 30       | 223                  | .08                        | 22                         |
| Harvesting                         | hr    | 7.44                | 97       | 720                  | .27                        | 72                         |
| Subtotal                           |       |                     |          | 943                  | .36                        | 94                         |
| Subtotal                           |       |                     |          | 1,294                | .49                        | 129                        |
| <b>Miscellaneous</b>               |       |                     |          |                      |                            |                            |
| Oyster lease                       | acres | .00                 | 10       | 0                    | .00                        | 0                          |
| Dredging                           | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Planting                           | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                         | trips | .00                 | 10       | 0                    | .00                        | 0                          |
| Harvesting                         | sacks | .50                 | 2,643    | 1,321                | .50                        | 132                        |
| Subtotal                           |       |                     |          | 1,321                | .50                        | 132                        |
| <b>Total fixed costs</b>           |       |                     |          | 8,877                | 3.36                       | 888                        |
| <b>Total costs</b>                 |       |                     |          | 19,496               | 7.38                       | 1,950                      |
| <b>Net returns</b>                 |       |                     |          | 43,928               | 16.62                      | 4,393                      |

**Appendix Table 3. Summary of estimated costs and returns of public relaying in a new 10-acre oyster reef, Year I. Values and costs are given in dollars.**

| Item                                    | Dredging        | Planting       | Monitoring     | Harvesting    | Total         |
|---|-----------------|----------------|----------------|---------------|---------------|
| <b>Gross receipts</b>                   |                 |                |                |               |               |
| Oyster harvest                          | 0               | 0              | 0              | 63,423        | 63,423        |
| <b>Variable costs</b>                   |                 |                |                |               |               |
| Labor services                          | 13,703          | 3,685          | 491            | 0             | 17,879        |
| Fuel and oil                            | 1,695           | 619            | 60             | 3,133         | 5,507         |
| Repair and maintenance                  | 1,142           | 244            | 25             | 2,016         | 3,427         |
| Food supplies                           | 1,865           | 0              | 0              | 0             | 1,865         |
| Launching fees                          | 20              | 117            | 12             | 839           | 988           |
| Land transport                          | 560             | 233            | 336            | 3,356         | 4,485         |
| Interest on operating capital           | 949             | 245            | 46             | 467           | 1,708         |
| <b>Total variable costs</b>             | <b>19,934</b>   | <b>5,143</b>   | <b>971</b>     | <b>9,810</b>  | <b>35,858</b> |
| <b>Income above variable costs</b>      | <b>(19,924)</b> | <b>(5,143)</b> | <b>(971)</b>   | <b>53,613</b> | <b>27,565</b> |
| <b>Fixed costs</b>                      |                 |                |                |               |               |
| Licenses                                | 0               | 0              | 0              | 1,198         | 1,198         |
| Depreciation                            | 2,130           | 428            | 65             | 4,061         | 6,685         |
| Insurance and taxes                     | 639             | 17             | 3              | 155           | 815           |
| Interest on investment                  | 663             | 87             | 16             | 776           | 1,542         |
| Management                              | 2,398           | 1,208          | 689            | 720           | 5,015         |
| Miscellaneous                           | 0               | 0              | 0              | 0             | 1,321         |
| <b>Total fixed costs</b>                | <b>5,831</b>    | <b>1,741</b>   | <b>773</b>     | <b>8,232</b>  | <b>16,577</b> |
| <b>Total costs</b>                      | <b>25,765</b>   | <b>6,884</b>   | <b>1,744</b>   | <b>18,042</b> | <b>52,435</b> |
| <b>Net returns</b>                      | <b>(25,765)</b> | <b>(6,884)</b> | <b>(1,744)</b> | <b>45,381</b> | <b>10,988</b> |
| <b>Average costs per sack harvested</b> | <b>9.75</b>     | <b>2.61</b>    | <b>.66</b>     | <b>6.83</b>   | <b>19.84</b>  |
| <b>Average costs per acre planted</b>   | <b>2,576</b>    | <b>688</b>     | <b>174</b>     | <b>1,804</b>  | <b>5,244</b>  |

**Appendix Table 4. Summary of estimated costs and returns of public relaying in a new 10-acre oyster reef, Year II. Values and costs are given in dollars.**

| Item                                    | Dredging | Planting | Monitoring     | Harvesting    | Total         |
|---|----------|----------|----------------|---------------|---------------|
| <b>Gross receipts</b>                   |          |          |                |               |               |
| Oyster harvest                          | 0        | 0        | 0              | 63,423        | 63,423        |
| <b>Variable costs</b>                   |          |          |                |               |               |
| Labor services                          | 0        | 0        | 409            | 0             | 409           |
| Fuel and oil                            | 0        | 0        | 50             | 3,133         | 3,183         |
| Repair and maintenance                  | 0        | 0        | 21             | 2,016         | 2,037         |
| Food supplies                           | 0        | 0        | 0              | 0             | 0             |
| Launching fees                          | 0        | 0        | 10             | 839           | 849           |
| Land transport                          | 0        | 0        | 280            | 3,356         | 3,636         |
| Interest on operating capital           | 0        | 0        | 39             | 467           | 506           |
| <b>Total variable costs</b>             | <b>0</b> | <b>0</b> | <b>809</b>     | <b>9,810</b>  | <b>10,619</b> |
| <b>Income above variable costs</b>      | <b>0</b> | <b>0</b> | <b>(809)</b>   | <b>53,613</b> | <b>52,804</b> |
| <b>Fixed costs</b>                      |          |          |                |               |               |
| Licenses                                | 0        | 0        | 0              | 1,198         | 1,198         |
| Depreciation                            | 0        | 0        | 54             | 4,061         | 4,115         |
| Insurance and taxes                     | 0        | 0        | 3              | 155           | 158           |
| Interest on investment                  | 0        | 0        | 14             | 776           | 790           |
| Management                              | 0        | 0        | 574            | 720           | 1,294         |
| Miscellaneous                           | 0        | 0        | 0              | 1,321         | 1,321         |
| <b>Total fixed costs</b>                | <b>0</b> | <b>0</b> | <b>644</b>     | <b>8,232</b>  | <b>8,877</b>  |
| <b>Total costs</b>                      | <b>0</b> | <b>0</b> | <b>1,454</b>   | <b>18,042</b> | <b>19,496</b> |
| <b>Net returns</b>                      | <b>0</b> | <b>0</b> | <b>(1,454)</b> | <b>45,381</b> | <b>43,928</b> |
| <b>Average costs per sack harvested</b> | <b>0</b> | <b>0</b> | <b>.55</b>     | <b>6.83</b>   | <b>7.38</b>   |
| <b>Average costs per acre planted</b>   | <b>0</b> | <b>0</b> | <b>145</b>     | <b>1,804</b>  | <b>1,950</b>  |

Appendix Table 5. Estimated costs and returns of private relaying in a new 14-acre oyster reef, Year I. Values and costs are given in dollars.

| Item                          | Unit  | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|-------------------------------|-------|---------------------|----------|----------------------|----------------------------|----------------------------|
| <b>Gross receipts</b>         |       |                     |          |                      |                            |                            |
| Oyster harvest                | sacks | 24.00               | 1,750    | 42,000               | 24.00                      | 3,000                      |
| <b>Variable costs</b>         |       |                     |          |                      |                            |                            |
| <b>Labor services</b>         |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Regular                       | hr    | 7.50                | 961      | 7,210                | 4.12                       | 515                        |
| Volunteers                    | hr    | .00                 | 0        | 0                    | .00                        | 0                          |
| Planting                      | hr    | 7.50                | 21       | 158                  | .09                        | 11                         |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Guards                        | hr    | 4.30                | 240      | 1,032                | .59                        | 74                         |
| Biologists                    | hr    | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                    | hr    | 5.60                | 625      | 3,500                | 2.00                       | 250                        |
| Subtotal                      |       |                     |          | 11,900               | 6.80                       | 850                        |
| <b>Fuel and oil</b>           |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Diesef                        | gal   | .80                 | 2,755    | 2,213                | 1.26                       | 158                        |
| Gasoline                      | gal   | 1.10                | 501      | 551                  | .31                        | 39                         |
| Hydraulic fluid               | gal   | 4.16                | 89       | 370                  | .21                        | 2                          |
| Engine oil                    | gal   | 5.27                | 10       | 53                   | .03                        | 4                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Diesel                        | gal   | .80                 | 77       | 62                   | .04                        | 4                          |
| Hydraulic fluid               | gal   | 4.16                | 2        | 10                   | .01                        | 1                          |
| Gasoline                      | gal   | 1.10                | 14       | 15                   | .01                        | 1                          |
| Engine Oil                    | gal   | 5.27                | 0        | 1                    | .00                        | 0                          |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Gasoline                      | gal   | 1.10                | 0        | 0                    | .00                        | 0                          |
| Engine Oil                    | gal   | 5.27                | 0        | 0                    | .00                        | 0                          |
| <b>Harvesting</b>             |       |                     |          |                      |                            |                            |
| Diesel                        | gal   | .80                 | 750      | 602                  | .34                        | 43                         |
| Hydraulic fluid               | gal   | 4.16                | 24       | 101                  | .06                        | 7                          |
| Gasoline                      | gal   | 1.10                | 250      | 275                  | .16                        | 20                         |
| Engine Oil                    | gal   | 5.27                | 5        | 26                   | .02                        | 2                          |
| Subtotal                      |       |                     |          | 4,281                | 2.45                       | 306                        |
| <b>Repair and maintenance</b> |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 130.77              | 14       | 1,831                | 1.05                       | 131                        |
| Planting                      | trips | 3.65                | 14       | 51                   | .03                        | 4                          |
| Monitoring                    | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                    | trips | 2.18                | 35       | 76                   | .04                        | 5                          |
| Subtotal                      |       |                     |          | 1,958                | 1.12                       | 140                        |
| <b>Food supplies</b>          |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 90.00               | 14       | 1,260                | .72                        | 90                         |
| Planting                      | trips | .00                 | 14       | 0                    | .00                        | 0                          |
| Monitoring                    | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                    | trips | 25.00               | 35       | 875                  | .50                        | 63                         |
| Subtotal                      |       |                     |          | 2,135                | 1.22                       | 153                        |
| <b>Launching fees</b>         |       |                     |          |                      |                            |                            |
| Dredging                      | trips | .00                 | 14       | 0                    | .00                        | 0                          |
| Planting                      | trips | .00                 | 14       | 0                    | .00                        | 0                          |
| Monitoring                    | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                    | trips | .00                 | 35       | 0                    | .00                        | 0                          |
| Subtotal                      |       |                     |          | 0                    | .00                        | 0                          |
| <b>Land transport</b>         |       |                     |          |                      |                            |                            |
| Dredging                      | miles | .20                 | 560      | 112                  | .06                        | 8                          |
| Planting                      | miles | .20                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                    | miles | .20                 | 600      | 120                  | .07                        | 9                          |
| Harvesting                    | miles | .20                 | 700      | 140                  | .08                        | 10                         |
| Subtotal                      |       |                     |          | 372                  | .21                        | 27                         |

(continued)

Appendix Table 5 (continued)

| Item                               | Unit    | Unit<br>cost/<br>value | Quantity | Total<br>cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|------------------------------------|---------|------------------------|----------|-------------------------|----------------------------|----------------------------|
| Interest on operating capital      |         |                        |          |                         |                            |                            |
| Dredging                           | precent | 10.00                  | 6,800    | 680                     | .39                        | 49                         |
| Planting                           | precent | 10.00                  | 140      | 14                      | .01                        | 1                          |
| Monitoring                         | precent | 10.00                  | 576      | 58                      | .03                        | 4                          |
| Harvesting                         | precent | 10.00                  | 897      | 90                      | .05                        | 6                          |
| Subtotal                           |         |                        |          | 841                     | .48                        | 60                         |
| <b>Total variable costs</b>        |         |                        |          | <b>21,487</b>           | <b>12.28</b>               | <b>1,535</b>               |
| <b>Income above variable costs</b> |         |                        |          | <b>20,513</b>           | <b>11.72</b>               | <b>1,465</b>               |
| <b>Fixed costs</b>                 |         |                        |          |                         |                            |                            |
| Licenses                           |         |                        |          |                         |                            |                            |
| Dredging                           | trips   | 7.14                   | 14       | 100                     | .06                        | 7                          |
| Planting                           | trips   | .00                    | 14       | 0                       | .00                        | 0                          |
| Monitoring                         | trips   | .00                    | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | trips   | 2.86                   | 35       | 100                     | .06                        | 7                          |
| Subtotal                           |         |                        |          | 200                     | .11                        | 14                         |
| Depreciation                       |         |                        |          |                         |                            |                            |
| Dredging                           | trips   | 87.18                  | 14       | 1,221                   | .70                        | 87                         |
| Planting                           | trips   | 2.44                   | 14       | 34                      | .02                        | 2                          |
| Monitoring                         | trips   | .00                    | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | trips   | 2.90                   | 35       | 102                     | .06                        | 7                          |
| Subtotal                           |         |                        |          | 1,356                   | .77                        | 97                         |
| Insurance and taxes                |         |                        |          |                         |                            |                            |
| Dredging                           | trips   | 104.62                 | 14       | 1,465                   | .84                        | 105                        |
| Planting                           | trips   | 2.92                   | 14       | 41                      | .02                        | 3                          |
| Monitoring                         | trips   | .00                    | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | trips   | 1.74                   | 35       | 61                      | .03                        | 4                          |
| Subtotal                           |         |                        |          | 1,567                   | .90                        | 112                        |
| Interest on investment             |         |                        |          |                         |                            |                            |
| Dredging                           | trips   | 130.77                 | 14       | 1,831                   | 1.05                       | 131                        |
| Planting                           | trips   | 3.65                   | 14       | 51                      | .03                        | 4                          |
| Monitoring                         | trips   | .00                    | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | trips   | 2.18                   | 35       | 76                      | .04                        | 5                          |
| Subtotal                           |         |                        |          | 1,958                   | 1.12                       | 140                        |
| Management                         |         |                        |          |                         |                            |                            |
| Project manager                    |         |                        |          |                         |                            |                            |
| Dredging                           | hr      | 11.70                  | 0        | 0                       | .00                        | 0                          |
| Planting                           | hr      | 11.70                  | 0        | 0                       | .00                        | 0                          |
| Monitoring                         | hr      | 11.70                  | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | hr      | 11.70                  | 0        | 0                       | .00                        | 0                          |
| Subtotal                           |         |                        |          | 0                       | .00                        | 0                          |
| BMR officer                        |         |                        |          |                         |                            |                            |
| Dredging                           | hr      | 7.50                   | 243      | 1,826                   | 1.04                       | 130                        |
| Planting                           | hr      | 7.50                   | 7        | 53                      | .03                        | 4                          |
| Monitoring                         | hr      | 7.50                   | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | hr      | 7.50                   | 0        | 0                       | .00                        | 0                          |
| Subtotal                           |         |                        |          | 1,878                   | 1.07                       | 134                        |
| Subtotal                           |         |                        |          | 1,878                   | 1.07                       | 134                        |
| Miscellaneous                      |         |                        |          |                         |                            |                            |
| Oyster lease                       | acres   | 1.00                   | 14       | 14                      | .01                        | 1                          |
| Dredging                           | trips   | .00                    | 14       | 0                       | .00                        | 0                          |
| Planting                           | trips   | .00                    | 14       | 0                       | .00                        | 0                          |
| Monitoring                         | trips   | .00                    | 0        | 0                       | .00                        | 0                          |
| Harvesting                         | sacks   | .50                    | 1,750    | 875                     | .50                        | 63                         |
| Subtotal                           |         |                        |          | 889                     | .51                        | 64                         |
| <b>Total fixed costs</b>           |         |                        |          | <b>7,848</b>            | <b>4.48</b>                | <b>561</b>                 |
| <b>Total costs</b>                 |         |                        |          | <b>29,335</b>           | <b>16.76</b>               | <b>2,095</b>               |
| <b>Net returns</b>                 |         |                        |          | <b>12,665</b>           | <b>7.24</b>                | <b>905</b>                 |

Appendix Table 6. Estimated costs and returns of private relaying in a new 14-acre oyster reef, Year II. Values and costs are given in dollars.

| Item                          | Unit  | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|-------------------------------|-------|---------------------|----------|----------------------|----------------------------|----------------------------|
| <b>Gross receipts</b>         |       |                     |          |                      |                            |                            |
| Oyster harvest                | sacks | 24.00               | 1,750    | 42,000               | 24.00                      | 3,000                      |
| <b>Variable costs</b>         |       |                     |          |                      |                            |                            |
| <b>Labor services</b>         |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Regular                       | hr    | 7.50                | 0        | 0                    | .00                        | 0                          |
| Volunteers                    | hr    | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Monitoring                    | hr    | 7.50                | 0        | 0                    | .00                        | 0                          |
| <b>Guards</b>                 |       |                     |          |                      |                            |                            |
| Biologists                    | hr    | 4.30                | 240      | 1,032                | .59                        | 74                         |
| Harvesting                    | hr    | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                    | hr    | 5.60                | 625      | 3,500                | 2.00                       | 250                        |
| Subtotal                      |       |                     |          | 4,532                | 2.59                       | 324                        |
| <b>Fuel and oil</b>           |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Diesel                        | gal   | .80                 | 0        | 0                    | .00                        | 0                          |
| Gasoline                      | gal   | 1.10                | 0        | 0                    | .00                        | 0                          |
| Hydraulic fluid               | gal   | 4.16                | 0        | 0                    | .00                        | 0                          |
| Engine oil                    | gal   | 5.27                | 0        | 0                    | .00                        | 0                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Diesel                        | gal   | .80                 | 0        | 0                    | .00                        | 0                          |
| Hydraulic fluid               | gal   | 4.16                | 0        | 0                    | .00                        | 0                          |
| Gasoline                      | gal   | 1.10                | 0        | 0                    | .00                        | 0                          |
| Engine oil                    | gal   | 5.27                | 0        | 0                    | .00                        | 0                          |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Gasoline                      | gal   | 1.10                | 0        | 0                    | .00                        | 0                          |
| Engine oil                    | gal   | 5.27                | 0        | 0                    | .00                        | 0                          |
| <b>Harvesting</b>             |       |                     |          |                      |                            |                            |
| Diesel                        | gal   | .80                 | 750      | 602                  | .34                        | 43                         |
| Hydraulic fluid               | gal   | 4.16                | 24       | 101                  | .06                        | 7                          |
| Gasoline                      | gal   | 1.10                | 250      | 275                  | .16                        | 20                         |
| Engine oil                    | gal   | 5.27                | 5        | 26                   | .02                        | 2                          |
| Subtotal                      |       |                     |          | 1,005                | .57                        | 72                         |
| <b>Repair and maintenance</b> |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 130.77              | 0        | 0                    | .00                        | 0                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Planting                      | trips | 3.65                | 0        | 0                    | .00                        | 0                          |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Monitoring                    | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Harvesting</b>             |       |                     |          |                      |                            |                            |
| Harvesting                    | trips | 2.18                | 35       | 76                   | .04                        | 5                          |
| Subtotal                      |       |                     |          | 76                   | .04                        | 5                          |
| <b>Food supplies</b>          |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Dredging                      | trips | 90.00               | 0        | 0                    | .00                        | 0                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Planting                      | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Monitoring                    | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Harvesting</b>             |       |                     |          |                      |                            |                            |
| Harvesting                    | trips | 25.00               | 35       | 875                  | .50                        | 63                         |
| Subtotal                      |       |                     |          | 875                  | .50                        | 63                         |
| <b>Launching fees</b>         |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Dredging                      | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Planting                      | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Monitoring                    | trips | .00                 | 0        | 0                    | .00                        | 0                          |
| <b>Harvesting</b>             |       |                     |          |                      |                            |                            |
| Harvesting                    | trips | .00                 | 35       | 0                    | .00                        | 0                          |
| Subtotal                      |       |                     |          | 0                    | .00                        | 0                          |
| <b>Land transport</b>         |       |                     |          |                      |                            |                            |
| <b>Dredging</b>               |       |                     |          |                      |                            |                            |
| Dredging                      | miles | .20                 | 0        | 0                    | .00                        | 0                          |
| <b>Planting</b>               |       |                     |          |                      |                            |                            |
| Planting                      | miles | .20                 | 0        | 0                    | .00                        | 0                          |
| <b>Monitoring</b>             |       |                     |          |                      |                            |                            |
| Monitoring                    | miles | .20                 | 600      | 120                  | .07                        | 9                          |
| <b>Harvesting</b>             |       |                     |          |                      |                            |                            |
| Harvesting                    | miles | .20                 | 700      | 140                  | .08                        | 10                         |
| Subtotal                      |       |                     |          | 260                  | .15                        | 19                         |

(continued)

Appendix Table 6 (continued)

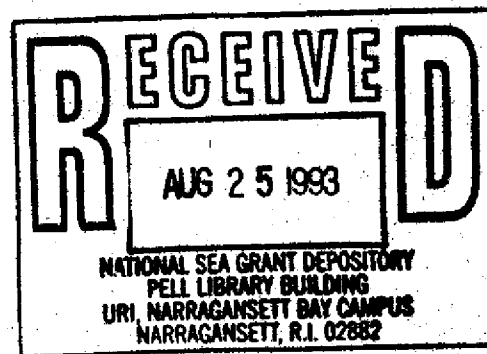
| Item                                 | Unit    | Unit cost/<br>value | Quantity | Total cost/<br>value | Cost/<br>value<br>per sack | Cost/<br>value<br>per acre |
|--------------------------------------|---------|---------------------|----------|----------------------|----------------------------|----------------------------|
| <b>Interest on operating capital</b> |         |                     |          |                      |                            |                            |
| Dredging                             | precent | 10.00               | 0        | 0                    | .00                        | 0                          |
| Planting                             | precent | 10.00               | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | precent | 10.00               | 576      | 58                   | .03                        | 4                          |
| Harvesting                           | precent | 10.00               | 897      | 90                   | .05                        | 6                          |
| Subtotal                             |         |                     |          | 147                  | .08                        | 11                         |
| <b>Total variable costs</b>          |         |                     |          | <b>6,895</b>         | <b>3.94</b>                | <b>493</b>                 |
| <b>Income above variable costs</b>   |         |                     |          | <b>35,105</b>        | <b>20.06</b>               | <b>2,507</b>               |
| <b>Fixed costs</b>                   |         |                     |          |                      |                            |                            |
| <b>Licenses</b>                      |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | 7.14                | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | trips   | 2.86                | 35       | 100                  | .06                        | 7                          |
| Subtotal                             |         |                     |          | 100                  | .06                        | 7                          |
| <b>Depreciation</b>                  |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | 87.18               | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | 2.44                | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | trips   | 2.90                | 35       | 102                  | .06                        | 7                          |
| Subtotal                             |         |                     |          | 102                  | .06                        | 7                          |
| <b>Insurance and taxes</b>           |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | trips   | .00                 | 35       | 0                    | .00                        | 0                          |
| Subtotal                             |         |                     |          | 0                    | .00                        | 0                          |
| <b>Interest on investment</b>        |         |                     |          |                      |                            |                            |
| Dredging                             | trips   | 130.77              | 0        | 0                    | .00                        | 0                          |
| Planting                             | trips   | 3.65                | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | trips   | 2.18                | 35       | 76                   | .04                        | 5                          |
| Subtotal                             |         |                     |          | 76                   | .04                        | 5                          |
| <b>Management</b>                    |         |                     |          |                      |                            |                            |
| <b>Project manager</b>               |         |                     |          |                      |                            |                            |
| Dredging                             | hr      | 11.70               | 0        | 0                    | .00                        | 0                          |
| Planting                             | hr      | 11.70               | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | hr      | 11.70               | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | hr      | 11.70               | 0        | 0                    | .00                        | 0                          |
| Subtotal                             |         |                     |          | 0                    | .00                        | 0                          |
| <b>BMR officer</b>                   |         |                     |          |                      |                            |                            |
| Dredging                             | hr      | 7.50                | 0        | 0                    | .00                        | 0                          |
| Planting                             | hr      | 7.50                | 0        | 0                    | .00                        | 0                          |
| Monitoring                           | hr      | 7.50                | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | hr      | 7.50                | 0        | 0                    | .00                        | 0                          |
| Subtotal                             |         |                     |          | 0                    | .00                        | 0                          |
| Subtotal                             |         |                     |          | 0                    | .00                        | 0                          |
| <b>Miscellaneous</b>                 |         |                     |          |                      |                            |                            |
| Oyster lease                         | acres   | 1.00                | 14       | 14                   | .01                        | 1                          |
| Dredging                             | trips   | .00                 | 14       | 0                    | .00                        | 0                          |
| Planting                             | trips   | .00                 | 14       | 0                    | .00                        | 0                          |
| Monitoring                           | trips   | .00                 | 0        | 0                    | .00                        | 0                          |
| Harvesting                           | sacks   | .50                 | 1,750    | 875                  | .50                        | 63                         |
| Subtotal                             |         |                     |          | 889                  | .51                        | 64                         |
| <b>Total fixed costs</b>             |         |                     |          | <b>1,167</b>         | <b>.67</b>                 | <b>83</b>                  |
| <b>Total costs</b>                   |         |                     |          | <b>8,062</b>         | <b>4.61</b>                | <b>576</b>                 |
| <b>Net returns</b>                   |         |                     |          | <b>33,938</b>        | <b>19.39</b>               | <b>2,424</b>               |

Appendix Table 7. Summary of estimated costs and returns of private relaying in a new 14-acre oyster reef, Year I. Values and costs are given in dollars.

| Item                                    | Dredging        | Planting     | Monitoring     | Harvesting      | Total         |
|---|-----------------|--------------|----------------|-----------------|---------------|
| <b>Gross receipts</b>                   |                 |              |                |                 |               |
| Oyster harvest                          | 0               | 0            | 0              | 42,000          | 42,000        |
| <b>Variable costs</b>                   |                 |              |                |                 |               |
| Labor services                          | 7,210           | 158          | 1,032          | 3,500           | 11,900        |
| Fuel and oil                            | 3,187           | 89           | 0              | 1,005           | 4,281         |
| Repair and maintenance                  | 1,831           | 51           | 0              | 76              | 1,958         |
| Food supplies                           | 1,260           | 0            | 0              | 875             | 2,135         |
| Launching fees                          | 0               | 0            | 0              | 0               | 0             |
| Land transport                          | 112             | 0            | 120            | 140             | 372           |
| Interest on operating capital           | 680             | 14           | 58             | 90              | 841           |
| <b>Total variable costs</b>             | <b>14,280</b>   | <b>312</b>   | <b>1,210</b>   | <b>5,685</b>    | <b>21,487</b> |
| <b>Income above variable costs</b>      | <b>(14,280)</b> | <b>(312)</b> | <b>(1,210)</b> | <b>(36,315)</b> | <b>20,513</b> |
| <b>Fixed costs</b>                      |                 |              |                |                 |               |
| Licenses                                | 100             | 0            | 0              | 100             | 200           |
| Depreciation                            | 1,221           | 34           | 0              | 102             | 1,356         |
| Insurance and taxes                     | 1,465           | 41           | 0              | 61              | 1,567         |
| Interest on investment                  | 1,831           | 51           | 0              | 76              | 1,958         |
| Management                              | 1,826           | 53           | 0              | 0               | 1,878         |
| Miscellaneous                           | 0               | 14           | 0              | 875             | 889           |
| <b>Total fixed costs</b>                | <b>6,442</b>    | <b>193</b>   | <b>0</b>       | <b>1,214</b>    | <b>7,848</b>  |
| <b>Total costs</b>                      | <b>20,722</b>   | <b>505</b>   | <b>1,210</b>   | <b>6,899</b>    | <b>29,335</b> |
| <b>Net returns</b>                      | <b>(20,722)</b> | <b>(505)</b> | <b>(1,210)</b> | <b>35,101</b>   | <b>12,665</b> |
| <b>Average costs per sack harvested</b> | <b>11.84</b>    | <b>.29</b>   | <b>.69</b>     | <b>3.94</b>     | <b>16.76</b>  |
| <b>Average costs per acre planted</b>   | <b>1,480</b>    | <b>36</b>    | <b>86</b>      | <b>493</b>      | <b>2,095</b>  |

Appendix Table 8. Summary of estimated costs and returns of private relaying in a new 14-acre oyster reef, Year II. Values and costs are given in dollars.

| Item                                    | Dredging   | Planting    | Monitoring     | Harvesting    | Total         |
|---|------------|-------------|----------------|---------------|---------------|
| <b>Gross receipts</b>                   |            |             |                |               |               |
| Oyster harvest                          | 0          | 0           | 0              | 42,000        | 42,000        |
| <b>Variable costs</b>                   |            |             |                |               |               |
| Labor services                          | 0          | 0           | 1,032          | 3,500         | 4,532         |
| Fuel and oil                            | 0          | 0           | 0              | 1,005         | 1,005         |
| Repair and maintenance                  | 0          | 0           | 0              | 76            | 76            |
| Food supplies                           | 0          | 0           | 0              | 875           | 875           |
| Launching fees                          | 0          | 0           | 0              | 0             | 0             |
| Land transport                          | 0          | 0           | 120            | 140           | 260           |
| Interest on operating capital           | 0          | 0           | 58             | 90            | 147           |
| <b>Total variable costs</b>             | <b>0</b>   | <b>0</b>    | <b>1,210</b>   | <b>5,685</b>  | <b>6,895</b>  |
| <b>Income above variable costs</b>      | <b>0</b>   | <b>0</b>    | <b>(1,210)</b> | <b>36,315</b> | <b>35,105</b> |
| <b>Fixed costs</b>                      |            |             |                |               |               |
| Licenses                                | 0          | 0           | 0              | 100           | 100           |
| Depreciation                            | 0          | 0           | 0              | 102           | 102           |
| Insurance and taxes                     | 0          | 0           | 0              | 0             | 0             |
| Interest on investment                  | 0          | 0           | 0              | 76            | 76            |
| Management                              | 0          | 0           | 0              | 0             | 0             |
| Miscellaneous                           | 0          | 14          | 0              | 875           | 889           |
| <b>Total fixed costs</b>                | <b>0</b>   | <b>14</b>   | <b>0</b>       | <b>1,153</b>  | <b>1,167</b>  |
| <b>Total costs</b>                      | <b>0</b>   | <b>14</b>   | <b>1,210</b>   | <b>6,838</b>  | <b>8,062</b>  |
| <b>Net returns</b>                      | <b>0</b>   | <b>(14)</b> | <b>(1,210)</b> | <b>35,162</b> | <b>33,938</b> |
| <b>Average costs per sack harvested</b> | <b>.00</b> | <b>.01</b>  | <b>.69</b>     | <b>3.91</b>   | <b>4.61</b>   |
| <b>Average costs per acre planted</b>   | <b>0</b>   | <b>1</b>    | <b>86</b>      | <b>488</b>    | <b>576</b>    |



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