Economic and Business Considerations for Small-Scale Soft Crab Production

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ECONOMIC AND BUSINESS CONSIDERATIONS FOR SMALL-SCALE SOFT CRAB PRODUCTION

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It's getting very hard to find a waterman that just
does one thing anymore. People who make a living
from the water have had to change—or get left ashore.
So it is no news flash that many watermen have had to
diversify and do a little of several things rather than a
lot of just one. Many watermen pot crabs, then chase
finfish with gill nets when they are plentiful, or they
may hard clam when crabs and fish are slow. A little
here...a little there...and maybe you can still make
a living from the water. This advisory suggests another
way you might be able to make a little more from doing
something else—soft crabs.

Soft crabs have been produced in Virginia for years.
The technology required to hold a peeler crab until it
sheds is well understood. The market for soft crabs is
established and consistently strong. And the initial
investment required to build a small-scale system is
relatively small. Relative, that is, to a shedding facility
able of producing many hundreds of dozens of soft
crabs a week. Yet even with such large shedding
operations in existence, the market for a high quality,
soft crab is still strong. Seafood wholesalers, special­
ized soft crab buyers, local restaurants and retail
seafood establishments offer excellent market opportu­
nities for even the small-scale producer.

However, there are many questions that need to be
answered before jumping into soft crab production.
What size shedding system are we talking about?
What does it cost to build it? How much money in
soft crab sales (revenue) can be expected? How
long will it take to recover the money to get
started in the business? And how sensitive are
net returns to changes in the market, peeler
availability, rate of production, etc.? Although
everyone's situation is different, this advisory will try to
answer these questions and help you determine if small­
scale soft crab production makes sense as another
source of supplemental income for your business.

Table 1 lists the expenses required to build a 3-tank
crab shedding system. The three most expensive
components include the wood and materials for the
tanks themselves, the pumps, and an in-ground biofilter.
These three items account for two-thirds of the total
expense. When everything is added up, the total initial
outlay amounts to about $2,700. Keep in mind that this
is for a recirculating water system (i.e., the water is
sent through the filter system and pumped back into the
tanks to be used again). The initial outlay may be less
for a flow-through system where the water is continu­
ally pumped through the tanks from an outside source.
You may already have some of the necessary items. If
so, great! That will reduce your initial investment even
more.

A basic soft crab production “unit” is a 4' X 8' X 1'
tank hooked up to a water circulation system. Blue
crabs that are about to shed (peelers) are placed in a
tank and watched. When they shed, you place them in
a box in the refrigerator until you have enough to take to
a buyer. Some of the larger crab shedding facilities
have dozens, or more, of these tanks, with the pumping
systems required to move the necessary water through
them. For our example, however, we're talking small­
scale—3 tanks. The entire system will consist of three
tanks and stands, a pump (and one backup), a filter
system (for a recirculating water system), plumbing, a
refrigerator, some wiring and a few lights, and various
assorted supplies. You will also need a covered area to
place the tanks and the necessary sewer, water, and
electrical hookups. That's about it!
Table 1. The Initial Investment Required for a 3-Tank Soft Crab Shedding System.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost Per Each</th>
<th>Number Required</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank and Stand (plywood, lumber, seal, hardware)</td>
<td>$175</td>
<td>3</td>
<td>$525</td>
</tr>
<tr>
<td>Bio-filter (500 gal. septic tank)</td>
<td>$550</td>
<td>1</td>
<td>$550</td>
</tr>
<tr>
<td>Mechanical filter and cover for filters</td>
<td>$65</td>
<td>1</td>
<td>$65</td>
</tr>
<tr>
<td>PVC plumbing for tank and filter</td>
<td>$60</td>
<td></td>
<td>$60</td>
</tr>
<tr>
<td>Primary Pump (1 hp plastic electric)</td>
<td>$300</td>
<td>1</td>
<td>$300</td>
</tr>
<tr>
<td>Backup Pump (1 hp gasoline powered)</td>
<td>$250</td>
<td>1</td>
<td>$250</td>
</tr>
<tr>
<td>Water Quality Kit</td>
<td>$125</td>
<td>1</td>
<td>$125</td>
</tr>
<tr>
<td>Cooler for transporting crabs to buyer</td>
<td>$100</td>
<td>1</td>
<td>$100</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>$200</td>
<td></td>
<td>$200</td>
</tr>
<tr>
<td>Electrical hookups and water/sewer service</td>
<td>$200</td>
<td>--</td>
<td>$200</td>
</tr>
<tr>
<td>Cover for tank system (PVC poles and tarp)</td>
<td>$200</td>
<td>1</td>
<td>$200</td>
</tr>
<tr>
<td>Various supplies (gloves, dip nets, etc)</td>
<td>$100</td>
<td>--</td>
<td>$100</td>
</tr>
<tr>
<td><strong>Total Initial Investment</strong></td>
<td></td>
<td></td>
<td><strong>$2,700</strong></td>
</tr>
</tbody>
</table>

To estimate the revenue, operating costs, and net returns associated with operating a 3-tank shedding system, we made the following basic assumptions about how the system would operate. If you plan to operate your system differently, you can adjust this example to get a reasonably accurate look at your revenue, operating costs and net returns.

**Assumptions on How the System is Operated and How Revenue and Costs are Estimated**

**Production**
- The tanks are each stocked with 200 peeler crabs.
- Two out of every ten peelers will die before shedding.
- All peelers that survive will shed within 5 days... or each tank will "turn" about 1.5 times per week.
- Production is consistent every week... or about 20 dozen per tank per week.
- All harvested soft crabs are the same size and of equal marketable quality.
- Each production season lasts 8 weeks.

**Prices and Operating Costs**
- Peelers are purchased for 40 cents each.
- Soft crabs are sold live for $18 per dozen.
- Shipping costs are 50 cents a dozen for boxes, packing materials, etc., plus $20/week for gasoline for delivery.
- Utilities are 58 cents/day electrical, plus water/sewer... or approximately $12/week total for the entire system.
- Repair/maintenance is about $20/week for the system.
- Labor (not charged, family labor used).
The major costs associated with operating a shedding system include utilities, shipping, repair maintenance/supplies, and...the peelers. Given the previous assumptions, the weekly production, operating costs, and revenue are calculated as shown below:

**Production**—200 peelers per tank X .80 survival = 160 crabs X 1.5 turns/week = 240 crabs/12 = 20 dozen crabs X 3 tanks = 60 dozen soft crabs per week.

**Peelers**—200 peelers per tank X $0.40 each = $80 X 1.5 turns/week = $120 X 3 tanks = $360 per week.

**Utilities**—$12 per week for the entire 3-tank system.

**Repair/Maint.**—$20 per week for the entire 3-tank system (extremely variable, mostly incurred during the off-season).

**Shipping**—$0.50 per dozen soft crabs X 60 dozen = $30/week + $20 gasoline = $50/week for entire system.

**Revenue**—20 dozen soft crabs per tank X 3 tanks = 60 dozen soft crabs X $18 per dozen = $1,080/week.

Therefore, for an 8-week season, the 3-tank system can generate $8,640 in total revenue. After operating costs of $3,540 are incurred, that leaves a seasonal net return of $5,100. Note that this does not take into consideration your cost of labor or what you could have earned with your capital and labor in your next best alternative. What you could have earned elsewhere is your opportunity cost. As long as that value does not exceed $5,100, then your time and money spent producing soft crabs is probably worthwhile. Also, it is assumed you will pay the initial investment out-of-pocket. A loan would require interest and principal payments, which are not included in this case. Given that the initial investment totaled $2,700, the 3-tank system pays this back within the first 8-week season. Other costs not included are the necessary annual licenses and permits, as well as the cost of acquiring enough high quality water to initially fill and maintain the 3-tank system. Also, the utility costs associated with biofilter conditioning are not included.

Table 2 summarizes the projected revenue, operating costs, and net returns that would be expected for an 8-week season, given the assumptions previously described. Your season may be longer or shorter.

<table>
<thead>
<tr>
<th>Category</th>
<th>Per Week</th>
<th>Total for 8-Week Season</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue from Sales</strong></td>
<td>$1,080</td>
<td>$8,640</td>
</tr>
<tr>
<td><strong>Operating Costs</strong>:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peelers</td>
<td>$360</td>
<td>$2,880</td>
</tr>
<tr>
<td>Utilities</td>
<td>$12</td>
<td>$100</td>
</tr>
<tr>
<td>Shipping</td>
<td>$50</td>
<td>$400</td>
</tr>
<tr>
<td>Repair/Maint./Supplies</td>
<td>$20</td>
<td>$160</td>
</tr>
<tr>
<td><strong>Total Operating Costs</strong></td>
<td>$442</td>
<td>$3,540</td>
</tr>
<tr>
<td><strong>Net Returns for Season</strong></td>
<td></td>
<td>$5,100</td>
</tr>
</tbody>
</table>
Thus, it appears that a small-scale soft crab shedding system may be profitable, and an attractive source of supplemental income. But remember, that is only the case if our initial set of assumptions holds. What if some of them don’t?

The previous example assumes a lot of things. For example, we have assumed that market prices, survival levels, peeler availability, and the size of harvested crabs remain the same. What if they don’t? In addition, what if the crabs shed slower or faster? What happens to net returns when you double the number of tanks? What happens to costs if you have a flow-through instead of a recirculating system? Table 3 provides some indication of how net returns change as some of these assumptions change. In reality, several of these key factors may be changing at the same time. But to keep it simple and to see how important each one is, we will look at how operating costs and net returns change when we change them one at a time.

The situation changes a bit if you are already a commercial crabber and can provide your own peelers when needed. In that case, you will be able to avoid the single largest operational expense... peelers. Of course, those peelers do not come free. Though you will likely already own a boat and motor, the fuel and maintenance required will be added expenses. Also, the peelers have an opportunity cost as well. They could be sold into the live or picking house market. Given the current market prices, however, each peeler directed into the shedding tanks will earn about $1 more than if sold as a hard crab. And that is even taking into account all shedding costs per crab and the fact that some peelers will die in the shedding tanks. It doesn’t take many peelers to pay for your gas. You may also find that if you produce your own peelers, the losses to mortality may be lower, since you will be handling the peelers less and likely treating them with more care... like eggs. But, the most troublesome barrier to being successful as a soft crab producer will be finding an adequate supply of peeler crabs. As a commercial crabber, you may have an advantage.

Few things are certain. But if the basic assumptions discussed above hold, small-scale soft crab shedding appears to be a potential source of supplemental income. Do your homework before you invest. Determine how your situation differs from the example given in this advisory. Only after fully understanding the factors that might affect production in your area, particularly the availability of peeler crabs, will you minimize the likelihood of failure.

There are sources for assistance in constructing and operating your soft crab production system. Every coastal state in the U.S. has a Sea Grant Program that can either directly provide information on soft crab production, or can put you in touch with the right person to answer your questions. To identify the appropriate individual in your area for assistance—in Virginia, contact Mike Oesterling at 804-684-7165; in Florida, contact the Florida Sea Grant Program at 352-392-1837.
Table 3. How Operating Costs and Net Returns Change When The Assumptions Change¹

<table>
<thead>
<tr>
<th>Market Price (per doz.)</th>
<th>$16</th>
<th>$18</th>
<th>$20</th>
<th>$22</th>
<th>$24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Costs</td>
<td>$3,540</td>
<td>$3,540</td>
<td>$3,540</td>
<td>$3,540</td>
<td>$3,540</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$4,140</td>
<td>$5,100</td>
<td>$6,060</td>
<td>$7,020</td>
<td>$7,980</td>
</tr>
<tr>
<td>Price of Peellers</td>
<td>$0.30</td>
<td>$0.40</td>
<td>$0.50</td>
<td>$0.50</td>
<td>$0.50</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$2,820</td>
<td>$3,540</td>
<td>$4,340</td>
<td>$4,380</td>
<td>$4,380</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$5,200</td>
<td>$6,700</td>
<td>$7,600</td>
<td>$8,700</td>
<td>$8,700</td>
</tr>
<tr>
<td>Stocking Densities</td>
<td>100 per tank</td>
<td>150 per tank</td>
<td>200 per tank</td>
<td>250 per tank</td>
<td>300 per tank</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$1,980</td>
<td>$2,760</td>
<td>$3,540</td>
<td>$4,320</td>
<td>$4,510</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$2,340</td>
<td>$3,720</td>
<td>$5,100</td>
<td>$6,480</td>
<td>$7,860</td>
</tr>
<tr>
<td>Survival Rates</td>
<td>60%</td>
<td>70%</td>
<td>80%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$3,480</td>
<td>$3,510</td>
<td>$3,540</td>
<td>$3,570</td>
<td>$3,570</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$3,100</td>
<td>$4,050</td>
<td>$5,100</td>
<td>$6,150</td>
<td>$6,150</td>
</tr>
<tr>
<td>Size Distribution of</td>
<td>All M</td>
<td>½ M &amp; ½ L</td>
<td>3S, 3M, 3L</td>
<td>3S, 3M, 3L</td>
<td>3S, 3M, 3L</td>
</tr>
<tr>
<td>Harvested Soft Crabs</td>
<td></td>
<td></td>
<td>Different size peelers will produce different size soft crabs. The peelers prices change, as do the market prices for soft crabs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$3,540</td>
<td>$4,260</td>
<td>$3,320</td>
<td>$3,320</td>
<td>$3,320</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$5,100</td>
<td>$5,340</td>
<td>$5,640</td>
<td>$5,640</td>
<td>$5,640</td>
</tr>
<tr>
<td>Tank Turns per Week</td>
<td>1.0 Turns</td>
<td>1.5 Turns</td>
<td>2.0 Turns</td>
<td>2.5 Turns</td>
<td>3.0 Turns</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$2,500</td>
<td>$3,540</td>
<td>$4,580</td>
<td>$5,320</td>
<td>$6,940</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$3,260</td>
<td>$5,100</td>
<td>$6,940</td>
<td>$8,280</td>
<td>$10,000</td>
</tr>
<tr>
<td>Flow-Through vs.</td>
<td>Recirculating</td>
<td>Flow-Through</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recirculating System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Investment</td>
<td>$2,700</td>
<td>$1,640</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$3,540</td>
<td>$3,540</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Returns</td>
<td>$5,100</td>
<td>$5,100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Tanks</td>
<td>3 Tanks</td>
<td>6 Tanks</td>
<td>10 Tanks</td>
<td>15 Tanks</td>
<td>20 Tanks</td>
</tr>
<tr>
<td>Initial Investment</td>
<td>$2,700</td>
<td>$3,040</td>
<td>$4,290</td>
<td>$5,430</td>
<td>$6,570</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$3,540</td>
<td>$6,780</td>
<td>$10,980</td>
<td>$15,210</td>
<td>$19,440</td>
</tr>
<tr>
<td>Net Returns</td>
<td>$5,100</td>
<td>$10,500</td>
<td>$17,820</td>
<td>$25,620</td>
<td>$33,420</td>
</tr>
</tbody>
</table>

¹Bold cells indicate the basic assumptions.

²S-primes, M-jumbos, L-whales. The prices associated with different size peeler crabs are as follows: S-$0.35, M-$0.40, L-$0.50. Market prices (per dozen) for the different size soft crabs are as follows: S-$16, M-$18, L-$22.