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# Remote Setting Cost Analysis



**“Economy,  
Employment,  
Environment”**

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# REMOTE SETTING COST ANALYSIS

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Being able to accurately determine costs and potential returns in business allows you to plan to maximize potential profit and while defining expenses, cash flow and other important aspects of management. In a business with as many risks as aquaculture this is a wise choice to begin your business. This spreadsheet gives you the opportunity to calculate the cost of producing seed oysters through the process known as “remote setting” to plan that expense in your business. The figures that are already placed in the yellow cells are merely reference points. As you gather more accurate figures from the operation of your business, you will change these and, as you do, it will become a valuable tool to calculate the actual cost of your seed and make better projections for your business. As you start using this spreadsheet you should try to be:



- **Accurate** – gather numbers based on actual costs and production outputs. Search for equipment prices through published or web-based sources, actual vendors or discussions with other growers. The more accurate the information, the better the resulting calculations will be.
- **Conservative** – especially when estimating production and setting efficiencies, until you have experience to justify more aggressive data. Don’t overestimate your production efficiency and spat output until you have numbers that you have determined will be correct.
- **Realistic** – constantly challenge yourself to collect data leading to more precise outcomes. As you gain experience in setting, you will find the accuracy of this tool increases and becomes more valuable in managing your business. It will allow you to evaluate your operations and make decisions to constantly improve production and profitability.

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## What the spreadsheet does

This Excel worksheet is designed to give a general estimate of the costs of constructing and operating a remote setting system for oysters in Maryland. To begin, download the Excel file at:

<https://extension.umd.edu/aquaculture/oysters/remote-setting>

## Using the spreadsheet

Investment, operating costs and production outcomes will normally vary greatly between remote setting sites. Care should be taken to verify information input by the user to the worksheet for your particular location. Be sure to **note the colored tabs at the bottom** of the spreadsheet. These allow you to work through each of the sections that are outlined in the instructions.

**Yellow cells** in the spreadsheet indicate where you should **place information** for your system. **White cells** indicate locations where there are **formulas that calculate values** based on the information you input in the yellow cells. The accuracy of the calculations will be determined by the reliability of the data that you provide to the yellow cells.

**How it works:**  
**Yellow cells = data you input**  
**White cells = calculated values**

In each of the spreadsheet sections, there will be space for you to fill in numbers for your business as you read through the instruction booklet. The information you provide will match the Excel spreadsheet and give you the ability to project the profitability from the business you are developing.



Figure 1 Shell bags being placed in a setting tank

## Assumptions Tab

The first tab is labeled “Assumptions” and you will find a number of boxes. These are divided into logically structured areas for you to begin the process of thinking through the many details that are required for planning a successful setting system for spat on shell seed production. These include production inputs, such as the amount of shell required, setting rate and setting density targets. The size of your operation is calculated based on number of tanks, blowers and pumps while labor, always an important factor in profitable operations, is also included. There are sections for calculating both unskilled and skilled labor requirements.

Input data in the yellow cells based on your system. There are proxy numbers placed in the yellow cells to begin. These can be modified to observe the effect of changing various inputs. As you gain experience with production, you will modify these to more accurately reflect your actual business and the spreadsheet will become more precise.

## Production Inputs

This section will help you determine the number of spat you will produce.

<b>Production Inputs:</b>		
Number of Spat Produced	1.00	million
Cultch Shells	250	shells per bag
Bag Volume	2	bags per bushel
Approximate Shell Bag Length	4	feet
Desired Spat Density	12	spat per shell
Setting Rate	10%	
Sets Requiring Heater	0	

Figure 2 Production Inputs portion of the spreadsheet

*B5 - Number of Spat Produced:* Enter the number of spat you want to produce in your system.

*B6 - Cultch Shells:* Enter the number of shells in a bag. As a guideline, there are normally 250-300 shells per bag. It is suggested that you decide on the size of the bag that you want to use for your operation and count the number of shells in a number of the bags in order to develop an average number. Bag sizes vary according to the needs of the grower but are usually sized so that they can be picked up and carried with arms at the handler's side for ease of transport. This will provide you with a working number to use in this cell. If you decided to change the size of the bags or if the size of the shell changes, you should recount a number of bags to determine an accurate number for your operation.

*B7 - Bag Volume:* Enter the number of bags you plan to use to contain 1 bushel of shell.

*B8 - Shell Bag Length:* Enter the length of the bag material used for each bag. Enter this value in total feet. Round up to the next half foot to make sure you take into account all bagging material to be used. For example, if your bag is 52 inches long, enter 4.5 feet. If your bag is 58 inches long, enter 5.0 feet.

*B9 - Desired Spat Density:* Enter the number of spat you would like to set on each shell. This will help you to determine how much cultch you will need to acquire for a set. Always remember that the actual spat per shell will be highly variable. Some shells will likely have no spat on them while others will far exceed your target number. This is entirely normal and is the result of larval behavior. The number is used to determine system output.

***Spat density and setting rates will vary; this is a normal biological factor***

*B10 - Setting Rate:* Enter the percentage of oyster larvae that you expect will set on the cultch in your system. In Maryland, experience indicates that this usually ranges between 5-30%, and is greatly affected

by the environmental conditions at your setting location. The hatchery you purchase larvae from should be able to give you information on setting rates from their past experiences. It is important to keep good records from your system operation so that you can develop experience in setting ranges at your site. Setting will vary by location and year. As you gain experience, you will be better able to understand how your system works and what you should expect in your business.

*B11 - Sets Requiring Heaters:* Input the number of sets you expect to require heating based on your setting schedule. You should not schedule sets requiring heating unless absolutely necessary for your production

goals, however, the use of heaters can expand the setting season and allow earlier starts in the spring prior to when ambient waters are sufficiently warm to allow for good success. Heating water during remote setting will greatly increase your cost of operation due to the high use of electricity to operate the heating units.

## System Inputs

This section will help you to determine your production capacity.

System Inputs:		
Number of Tanks	2	
Tank Size	3,000	gallons
Blower Size	50	cfm @ 48" water
Blower Specs	900	watts
Pump Size	100	gpm
Pump Specs	2,760	watts
Heater size	15,000	watts
Days Heater Runs per Set	10	
Days Pumps Run per Set	7	
Days Blower Runs per Set	10	

Figure 3 System Inputs portion of the spreadsheet

*B14 - Number of Tanks:* Enter the number of tanks you plan to include in your setting system.

*B15 - Tank Size:* Enter the volume of your tanks in gallons. This should be the volume for a single tank and not for the entire system.



Figure 4 Blowers, pumps, tanks and heaters are important components of setting systems

*B16 - Blower Size:* Enter the volume of air your blower will produce when the air stones or air grid are at a depth of 48 inches. This information is available from the manufacturer or supplier of the equipment.

*B18 - Pump Size:* Enter the gallons per minute that your pump will produce. You should plan on 50-100 gallons per minute per tank. While you can find the GPM for the pump from the manufacturer specifications, you must remember that the higher you need to lift the water, the less flow will be available due to head loss.

*B19 - Pump Specs:* Enter the wattage of the pumps you plan to purchase. This will help determine your electrical costs. The information is available from the manufacturer or supplier of the equipment as well.

*B20 - Heater Size:* Enter the wattage of the heater you plan to use, if you choose to schedule setting at a time when heating the water is necessary. This will help determine your electrical costs. Remember that the heater will be required before the larvae are placed in the tank and it may take a day of operation to bring the temperature up to optimum for setting.

*B21 - Days Heater Run per Set:* Enter the number of days you plan to run the heater for each set, if required. The heater will be turned on prior to the set and after the tank is filled with water and will be left on until after setting has taken place.

*B22 - Days Pump Runs per Set:* Enter the number of days you plan to run your pump for each set. The pump will be used to fill the tank, then turned off until setting has been completed. Afterwards, it will be run again to flow water through the tank to provide food from local water for the newly set spat.

*B23 - Days Blower Runs per Set:* Enter the number of days you plan to run the blower for each set. The blower will be operated after the tank is initially filled and continuously until setting has occurred and the spat are ready to be removed from the tank.

## Cost Inputs

This section will help determine your cost of production.

Cost Inputs		
Unskilled Labor Rate	\$ 8.25	per hour
Skilled Labor Rate	\$ 500.00	per set
Electric Rate	\$ 0.10	kwh
Setting Shell Cost	\$ 1.25	per bushel
Shell Transportation and Handling Cost	\$ 0.25	per bushel
Shell Bag	\$ 0.05	per foot
Facility/Land Rent	\$ 120.00	per month
Larvae Cost	\$ 200	per million

Figure 5 Cost Input section of the spreadsheet

*E5 - Unskilled Labor Rate:* Enter the hourly wage for unskilled labor if you plan on hiring additional help.

*E6 - Skilled Labor Rate:* Enter the wage per set for skilled labor. Skilled labor is paid a higher rate than unskilled labor. Generally this would be work an owner/operator would perform if they were able.

*E7 - Electric Rate:* Enter your electric cost as dollars per kilowatt hour. Your electric utility will be able to provide this information to you.

*E8 - Setting Shell Cost:* Enter the cost of your cultch material as dollar per bushel. Only the cost of the material should be included in this category and it should not include transportation or other costs.

*E9 - Shell Transportation and Handling Cost:* Enter the cost to transport your cultch material to your remote setting site and any handling (storage, cleaning, fuel surcharge, etc.) as dollars per bushel. If you are given a flat rate for transportation, divide the rate by the number of bushels purchased.

*E10 - Shell Bag:* Enter the cost per foot of bagging material to be used. Be sure to account for the cost of hog rings or other closures for the bags.



Figure 6 Oyster larvae will be placed in the setting tank during metamorphosis

*E11 - Facility/Land Rent:* If you are required to pay rent for the location your setting system is located at, enter it here in dollars per month.

*E12 - Larvae Cost:* Enter the cost of hatchery larvae in dollars per million larvae.

### Unskilled Labor

This section determines additional labor costs. The figures will likely be estimates as you begin but, over time, you will obtain more accurate figures as you gain experience in setting. You will then begin to determine ways to more efficiently use labor to increase output and decrease cost.

<b>Unskilled Labor:</b>		
Shell Cleaning and Bagging	0.32	man hour per bushel
Shell Loading	0.03	man hour per bushel
Shell Unloading	0.04	man hour per bushel

Figure 7 Unskilled labor portion of the spreadsheet

*E15 - Shell cleaning and bagging:* Enter the number of man hours that you estimate it will take to clean and bag 1 bushel of shell.

*E16 - Shell loading:* Enter the number of man hours that you estimate it will take to load 1 bushel of shell into the setting tanks.

*E17 - Shell Unloading:* Enter the number of man hours it will take to unload 1 bushel of shell from the setting tanks.

### Calculated Values

These values will be calculated by the spreadsheet based on the information you have provided.

<b>Calculated Values</b>		
Total Larvae Needed	10	million
Total Setting Shell needed	333	bags
	667	bushels
Capacity per Set	600	bags
Sets This Season	1.00	
Larvae per Set	10,000,000	

Figure 8 The Unskilled Labor portion asks for input data and then calculates system requirements

*E20 - Total Larvae Needed:* This is the total number of larvae you will need to purchase to achieve your desired production.

*E21:E22 - Total Setting Shell Needed:* This is the total number of bags you will need to produce and the total number of bushels of cultch material you will need to purchase to achieve your desired production.

*E23 - Capacity per set:* This is the total number of bags you will be able to place in your system at any given time. It is assumed 1 bushel of shell will require 20 gallons of space.

*E24 - Sets this season:* Based on your desired production and tank capacity, this is the total number of sets you will need to schedule.

*E25 - Larvae per set:* This is the number of larvae you will need to purchase for each set this season.

## Equipment List Tab

This tab will help determine the total cost for your remote setting system equipment. It will also help determine annual depreciation of your system and its associated equipment. It should be noted that the number of tanks, blowers and heaters required are calculated based on the information you entered on the Assumptions page. Additionally, the number of pumps will be calculated. It is recommended that you have at least 2 pumps; therefore the default value for this is item is 2.

***Calculating depreciation of equipment for tax purposes is an important business item***

Yellow cells indicate information you should input for your system. Additional rows are provided for you to input other equipment which may be specific to your operation. The Years of Useful Life column relates to the length of time that equipment may be depreciated for tax purposes. The actual useful life of many of these items will be considerably longer with items like blowers lasting for decades with minimal maintenance required.

System Equipment and Materials						
Item	Quantity	Cost per Unit	Total Cost	Years of Useful Life	Percentage of Equipment Time Devoted to Aquaculture	Depreciation per Year
Tanks Desired	2	\$ 1,500.00	\$ 3,000.00	10	100%	\$ 300.00
Blowers Required	1	\$ 625.00	\$ 625.00	5	100%	\$ 125.00
Pumps Required	2	\$ 575.00	\$ 1,150.00	5	100%	\$ 230.00
Heaters Required	2	\$ 600.00	\$ 1,200.00	10	100%	\$ 120.00
Plumbing		\$ 400.00	\$ 400.00	3	100%	\$ 133.33
Shellwasher		\$ 2,050.00	\$ 2,050.00	10	100%	\$ 205.00
			\$ -	1		\$ -
			\$ -	1		\$ -
			\$ -	1		\$ -
			\$ -	1		\$ -
			\$ -	1		\$ -
			\$ -	1		\$ -
			\$ -	1		\$ -
<b>Total</b>			<b>\$ 8,425.00</b>			<b>\$ 1,113.33</b>

Figure 9 The Equipment List Tab provides annual depreciation calculations



*Item Column:* Enter any additional items you may need that are not currently listed.

*Quantify Column:* Enter the number of those items needed.

*Cost per unit Column:* Enter the cost for each item you will need.

*Total Cost Column:* This column is calculated based on the cost and number of items you entered.

*Years of Useful Life Column:* Enter the length of time each item is considered useful before it should be replaced. This will determine your yearly depreciation of that item.

*Percentage of Equipment Time Devoted to Aquaculture Column:* Enter the estimated time the equipment will be used in your setting operation. For example, if you purchase tanks and only use them for remote setting, the associated cell should be 100%. Conversely if you own a skid loader and use it equally between your aquaculture operation and your commercial fishing business, the percentage of time devoted to aquaculture would be 50%. This is used to determine the correct annual depreciation.

*Depreciation per year Column:* This column is calculated based on the total cost of the items and their useful life. Depreciation is the “non cash” expense of operating your system and is an important consideration in managing your business.

## Cost Analysis Tab

This tab shows your remote setting operating costs on both an annual and a per-set basis. Additional information is shown for the cost to produce spat annually on a per-million basis. It shows the percentage of total annual cost for each input. Additional rows have been provided for you to input costs specific to your operation and which are not already included. Annual depreciation is not used in cost analysis since it is a non-cash expense; however, it is noted below the annual cost sheet for your information.

Cost per set calculations are provided for those carried out with and without heat. This should be used to determine your schedule and help you make decisions based on cost versus the benefits of heating water in your system. You should also consider aspects including the benefits of getting seed produced earlier in the year. This allows you to extend you production season and may aid in increasing your overall output as well as gaining additional growth time.



**Figure 10** Loading tank with labor and machinery for increased efficiency in the remote setting operation

The tab also helps in determining a price for spat on shell oysters that you might sell to other growers. It is important know your costs to determine a profitable selling price.



## Sensitivity Analysis Tab

A sensitivity analysis provides an easy way for you to view the effects of changes to your system without having to change the worksheet. In this case, setting shell cost and setting rate of oyster larvae are represented. As you can see, as the shell cost and setting rate change, so does your cost of production. The production costs based on your inputs are located in the green cell in the center of the table.

Sensitivity Analysis: Effects on Total Cost of Production												
		Setting Rate										
		0.0%	2.0%	4.0%	6.0%	8.0%	10%	12.00%	14.00%	16.00%	18.00%	20.00%
Setting Shell Cost	\$ (1.00)	\$ -	\$ 13,850	\$ 8,812	\$ 7,138	\$ 6,302	\$ 5,799	\$ 5,466	\$ 5,228	\$ 5,049	\$ 4,910	\$ 4,799
	\$ (0.50)	\$ -	\$ 14,183	\$ 9,145	\$ 7,472	\$ 6,636	\$ 6,133	\$ 5,799	\$ 5,561	\$ 5,383	\$ 5,244	\$ 5,133
	\$ -	\$ -	\$ 14,516	\$ 9,479	\$ 7,805	\$ 6,969	\$ 6,466	\$ 6,133	\$ 5,895	\$ 5,716	\$ 5,577	\$ 5,466
	\$ 0.50	\$ -	\$ 14,850	\$ 9,812	\$ 8,138	\$ 7,302	\$ 6,799	\$ 6,466	\$ 6,228	\$ 6,049	\$ 5,910	\$ 5,799
	\$ 1.00	\$ -	\$ 15,183	\$ 10,145	\$ 8,472	\$ 7,636	\$ 7,133	\$ 6,799	\$ 6,561	\$ 6,383	\$ 6,244	\$ 6,133
	\$ 1.50	\$ -	\$ 15,516	\$ 10,479	\$ 8,805	\$ 7,969	\$ 7,466	\$ 7,133	\$ 6,895	\$ 6,716	\$ 6,577	\$ 6,466
	\$ 2.00	\$ -	\$ 15,850	\$ 10,812	\$ 9,138	\$ 8,302	\$ 7,799	\$ 7,466	\$ 7,228	\$ 7,049	\$ 6,910	\$ 6,799
	\$ 2.50	\$ -	\$ 16,183	\$ 11,145	\$ 9,472	\$ 8,636	\$ 8,133	\$ 7,799	\$ 7,561	\$ 7,383	\$ 7,244	\$ 7,133
	\$ 3.00	\$ -	\$ 16,516	\$ 11,479	\$ 9,805	\$ 8,969	\$ 8,466	\$ 8,133	\$ 7,895	\$ 7,716	\$ 7,577	\$ 7,466
	\$ 3.50	\$ -	\$ 16,850	\$ 11,812	\$ 10,138	\$ 9,302	\$ 8,799	\$ 8,466	\$ 8,228	\$ 8,049	\$ 7,910	\$ 7,799
	\$ 4.00	\$ -	\$ 17,183	\$ 12,145	\$ 10,472	\$ 9,636	\$ 9,133	\$ 8,799	\$ 8,561	\$ 8,383	\$ 8,244	\$ 8,133

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## Notes

## Notes

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*Cover: shell bags for a production run being loaded into a tank through the Remote Setting Training (RST) program at the UM Horn Point Lab*

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## ***“Building Our Industry Together”***

