

# **Economics of Remote Setting in Maryland**

## ***A Spreadsheet for Cost Analysis***

***Instruction Booklet***



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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. You can download the Excel file at: [http://www.mdsg.umd.edu/programs/extension/aquaculture/oysters/remote\\_setting/](http://www.mdsg.umd.edu/programs/extension/aquaculture/oysters/remote_setting/)

Investment, operating costs and production outcomes will normally vary greatly between remote setting sites. Care should be taken to verify all information input by the user into the worksheet for your particular location. Please note the colored tabs on the bottom of the spreadsheet. These tabs allow you to work through the sections outlined below.

**Assumptions Tab:** Yellow cells indicate information you should input for your system.

**Production Inputs:** This section will help you determine the number of spat you will produce.

**Number of Spat Produced (B5):** Enter the number of spat your wish to produce in your system.

**Cultch Shells (B6):** Enter the number of shells you have 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 come up with an average. This will provide you with a working number to use in this cell. If you decide 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.

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

**Shell Bag Length (B8):** Enter the length of bagging material you will use 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.

**Desired Spat Density (B9):** 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. Please remember that actual spat set 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.

**Setting Rate (B10):** 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.

**Sets requiring heaters (B11):** Input the number of sets you expect to require heating based on your setting schedule. You should not schedule sets requiring heaters unless absolutely necessary. Heating the 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 determine your production capacity.

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

**Tank Size (B15):** Enter the volume of your tanks in gallons. This should be the volume for one tank, not the entire system.

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

**Blower Specs (B17):** Enter the wattage of the blower you plan to purchase. This will help to determine your electrical costs. This information is available from the manufacturer or supplier.

**Pump Size (B18):** Enter the gallons per minute 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 manufacturer specs, you should remember that the higher you need to lift the water the less the flow will be.

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

**Heater Size (B20):** Enter the wattage of the heater you plan to use if you choose to schedule setting at a time where 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.

**Days Heater Run per Set (B21):** 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 left on until setting has occurred.

**Days Pumps Run per Set (B22):** 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 to flow water through the tank providing food from the local water for the newly set spat.

**Days Blower Run per Set (B23):** 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 occurs and the spat are removed from the tank.

**Cost Inputs:** This section will help determine your cost of production.

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

**Skilled Labor Rate (E6):** 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.

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

**Setting Shell Cost (E8):** 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.

**Shell Transportation and Handling Cost (E9):** 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.

**Shell Bag (E10):** 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.

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

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

**Unskilled Labor:** This section will determine your additional labor costs. These figures will likely be estimates as you begin your operation but, over time, you will be able to obtain more accurate figures as you gain experience in setting. At that point you will also begin to determine ways to more efficiently use your labor in order to increase output and decrease costs.

**Shell cleaning and bagging (E15):** Enter the number of man hours it will take to clean and bag 1 bushel of shell.

**Shell loading (E16):** Enter the number of man hours it will take to load 1 bushel of shell into the setting tanks.

**Shell Unloading (E17):** 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.

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

**Total Setting Shell Needed (E21:E22):** 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.

**Capacity per set (E23):** 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.

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

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

**Equipment List Tab:** This tab will help you determine the total cost for your remote setting system equipment. It will also help you determine the yearly depreciation of your system. It should be noted the number of tanks, blowers and heaters required will be calculated based on the information you entered on the Assumptions page. Additionally the number of pumps will be calculated. It is recommended you have at least 2 pumps; therefore the default value for this item is 2. Yellow cells indicate information you should input for your system. Additional rows are provided for other equipment which may be specific to your operation.

**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 your equipment will be used in your remote 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 bob cat 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 depreciation per year.

**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 will show your remote setting operational costs on an annual and a per set basis. Additional information is shown on the cost to produce spat annually on a per million spat basis. It also shows you the percentage of total annual cost for each input. Additional rows have been provided for you to input costs that may be specific to your operation and have not already been included in the spreadsheet. Annual depreciation is not used in the cost analysis since it is a non-cash expense, however it is noted below the annual cost sheet for your information.

The cost per set section will tell you the cost per set with and without heat. This should be used to help determine your setting schedule and help you decide on the costs versus benefits of heating water in your system.

This tab will also help you in determining a price for spat on shell oysters that you may decide to sell to other growers. It is important to have knowledge of your costs to determine a proper sales 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.

**Other References on Oyster Production Costs:**

Congrove, M.S. 2009. A Bio-Economic Feasibility Model for Remote Setting: Potential for Oyster Aquaculture in Virginia. Masters Thesis. Virginia Institute of Marine Science.

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Luckenbach, M., D. Lipton, D. Webster, S. Abel, T. Zinn, T. Leggett, E. Rhodes, and K.G. Sellner. 2008. A Framework for Native Oyster Aquaculture Development in Maryland. CRC Publ. No. 08-166, Edgewater, MD. 38 pp.

Wieland, R. 2008. Costs and Returns to Oyster Aquaculture in the Chesapeake Bay. A report for the NOAA Chesapeake Bay Office.