Oyster AQUACULTURE

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These fact sheets for the off-bottom oyster aquaculture industry in the Gulf of Mexico provide guidelines and suggested safety procedures in preparing for tropical storms and hurricanes:

- **Introductory Planning Guide**
- **Adjustable Long-Line Farms**
- **Floating Bag Farms**
- **Floating Cage Farms**
- **Land-based Operations**
- **Workboats**

To access all of the fact sheets in this series, visit the National Sea Grant Library at *nsgl.gso.uri.edu*. Using the "search the catalog" function, search "Oyster Aquaculture Hurricane Preparedness Series."

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Tropical Storm and Hurricane Preparedness for Off-bottom Oyster Aquaculture in the Gulf of Mexico

Floating Cage Farms Guide

Many oyster growers in the Gulf of Mexico region use the floating cage system, an off-bottom gear. This fact sheet provides guidance related to storm preparation and planning for this gear type. It is part of a series providing an overview of storm preparation and planning for other oyster aquaculture operations, including adjustable long-line farms, floating bag farms, land-based operations, and workboats.

The floating cage system uses a series of cages that hold multiple bags of oysters (typically 6), buoyed by twin floats. The cages are typically attached by lateral lines to a main line that is anchored at either end, but anchoring configuration can vary by site. The floats have removable caps, allowing a farmer to fill the floats and sink the cage to the sea bottom. The cage may be raised later, emptying the floats of water to have them floated again. Cages that are flipped on top of the floats allow for air drying, which controls biofouling.

Photo courtesy of Mark Wallheiser

INSTALLATION

During installation of the floating cage system, there are several important considerations.

- ☐ Assess the site's exposure to storms as a primary factor in site selection.
- ☐ Orient main lines parallel to the prevailing wind and waves.
- ☐ Choose an anchoring system suitable to the bottom type
- ☐ Install substantial, durable anchors (buried to at least 5 feet depth) that will hold in the farm's bottom substrate in the strongest storms (see Figure 1 for options).

FIGURE 1. Two types of anchors used to anchor the floating cage mainlines: helical screw anchors (top) and arrowhead anchors (bottom). Photos courtesy of Auburn University Shellfish Lab

- ☐ Bury anchors (typically helical metal screw anchors) fully in the sediment to reduce projection above the sea floor, corrosion, and tangling hazard.
- ☐ Invest in durable anchor line with some protection from chafing at friction points (e.g., anchor attachment).
- ☐ Allow sufficient spacing between lines to ensure cages do not collide in bad weather.
- ☐ Invest in and practice with a system, such as a mechanical davit or a compressor to fill the floats with air (with a back-up system in place), that allows for safe and efficient sinking and re-floating of cages. (Figure 2)
- ☐ Place identifying tags on each cage or bag.

PRIOR TO HURRICANE SEASON

Prior to the onset of hurricane season, oyster farmers should take these steps to reduce the risk of losses.

- ☐ Maintain appropriate stocking densities so that cages are not crowded and heavy.
- ☐ Air dry cages to control biofouling on a routine basis.
- ☐ Make it a habit to check bridles and lines when flipping to ensure lines do not get tangled.
- ☐ Check all lines for chafing, and repair as needed.
- ☐ Check all door closures to ensure that the attachments are secure and not worn.
- ☐ Have extra caps on hand in workboat.
- ☐ Remove empty cages from the line, as these are prone to come off the line in bad weather.
- ☐ Have crew conduct timed sinking practices (including in less than ideal weather conditions) to gauge time needed per line to correctly sink cages.
- ☐ For shoreside operations, pick up loose pieces of equipment, and secure cages and bags to reduce loss from flooding and wind.

FIGURE 2. A mechanical davit used to raise sunken floating cages from the seafloor after the storm has passed. Photo courtesy of Jason Rider

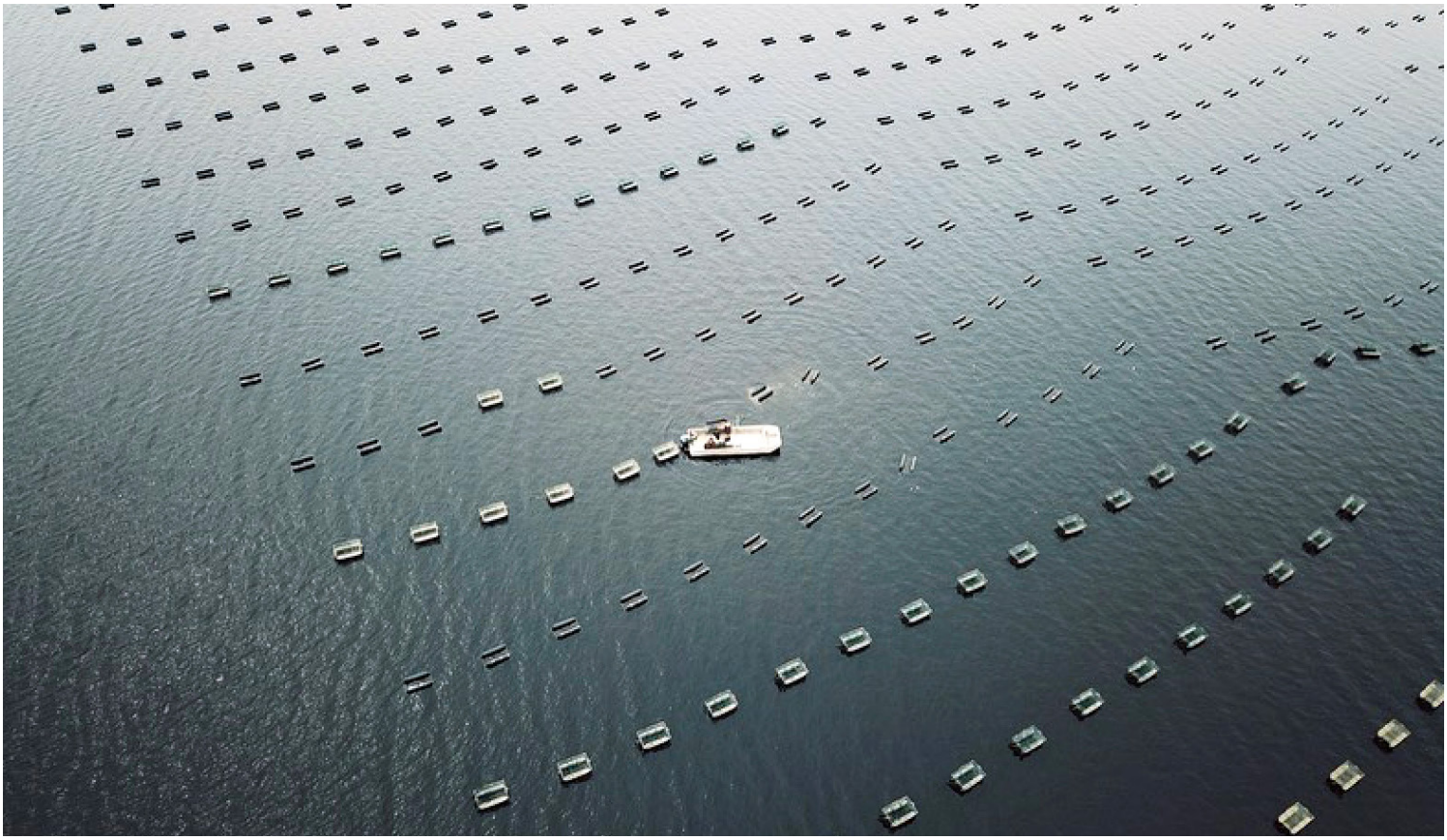

Photo courtesy of Grand Isle Sea Farms

- ☐ Review storm plan with crew and family so they can account for personal preparations alongside farm preparations.

DURING HURRICANE SEASON

A tiered approach to preparation, which has been adopted in each fact sheet, allows growers to stage tasks based on the storm or hurricane's track forecast. The authors developed the following color codes to address increasing levels of concern and actions.

CODE YELLOW

Once a hurricane or tropical storm has formed in the Gulf of Mexico or has a chance of entering the Gulf, it is time to begin preparations according to the farm's plan. Note that the timeline is fluid and will depend on the storm's speed and track.

- ☐ Re-check stocking densities and reduce as necessary, taking special care with any bags of seed as the smaller mesh can produce more water resistance.
- ☐ Re-check all lines for chafing and repair as needed.
- ☐ Re-check that all bridles and pucks are in good condition.
- ☐ Re-check that all bag and cage closures are in good condition.
- ☐ Consider consolidating all small seed (e.g., seed held in 2 mm bags) to one section of cages so that you can re-float those cages first once the threat has passed.
- ☐ Secure any empty bags and cages on shore or on lines.
- ☐ Document the condition of the farm with dated photographs and notes.
- ☐ Document the numbers of various sizes of oysters.
- ☐ Review workboat(s) plan.

CODE ORANGE

Once a hurricane or tropical storm watch has been issued, final preparations should begin. In the case of a fast-moving storm, proceed with tasks associated with final stages of preparation.

- ☐ Sell product as market allows.
- ☐ Track the storm's progress frequently and carefully. When assessing whether to sink cages, keep in mind the amount of time necessary to carry out the sinking operation.
- ☐ Remember that the day before the storm is to make landfall, farmers should not plan to be on the water. They will need that day for other preparations, and the weather will likely not allow it.
- ☐ If weather conditions do not warrant sinking cages based on personal judgment, consider adding slack to anchor lines to allow for storm surge.
- ☐ If weather conditions warrant sinking cages, ensure that cages sit "float down" on the bottom, with the wire mesh off the bottom (though this may depend on sediment type).

- ☐ Ensure all air from floats is removed when sinking, and walk or dive over the cages to be sure the pontoons are down, with adjustments made as needed.
- ☐ Some growers suggest replacing caps on floats (once all air is removed) to prevent sediment from filling the floats (though this may depend on sediment type). This adds time to preparations.
- ☐ Prepare to implement workboat(s) plan.

CODE RED

When a hurricane or tropical storm warning has been issued and there is a high probability of being in the path of the storm, farmers must conclude final preparations if and only if they can be accomplished safely. Farmers will make a series of personal risk assessments.

- ☐ Conduct last check of farm.
- ☐ Implement workboat(s) plan.
- ☐ Get to safety.

POST-STORM RECOVERY

Oyster growers and their employees must be ready to take care of the needs of the farm as soon as it is safe and reasonable to do so. After a storm has passed, the following tasks should be considered.

- ☐ Assess risk of returning to farm and proceed only when safe.
- ☐ Patrol the area upstream and downstream of the farm for significant debris that could entangle or dislodge gear once it is refloated, and remove or secure debris.
- ☐ Document the condition of the farm with dated photographs and notes.
- ☐ Refloat cages as soon as practically possible, using the systems designed for this task, with cages lifted from reinforced points, allowing the water to drain out the end caps and being careful to work any cages out of the sea floor if necessary.
- ☐ If necessary, use an on-board washdown hose to rinse sediment out of floats, and recap once washed down.
- ☐ Assess and document oyster survival, gear condition, and losses.
- ☐ Once mortality risk has passed, resume normal biofouling regimen.
- ☐ Communicate with public agencies about closures and effects of the storm.
- ☐ Communicate with buyers and suppliers to provide situation and outlook reports.

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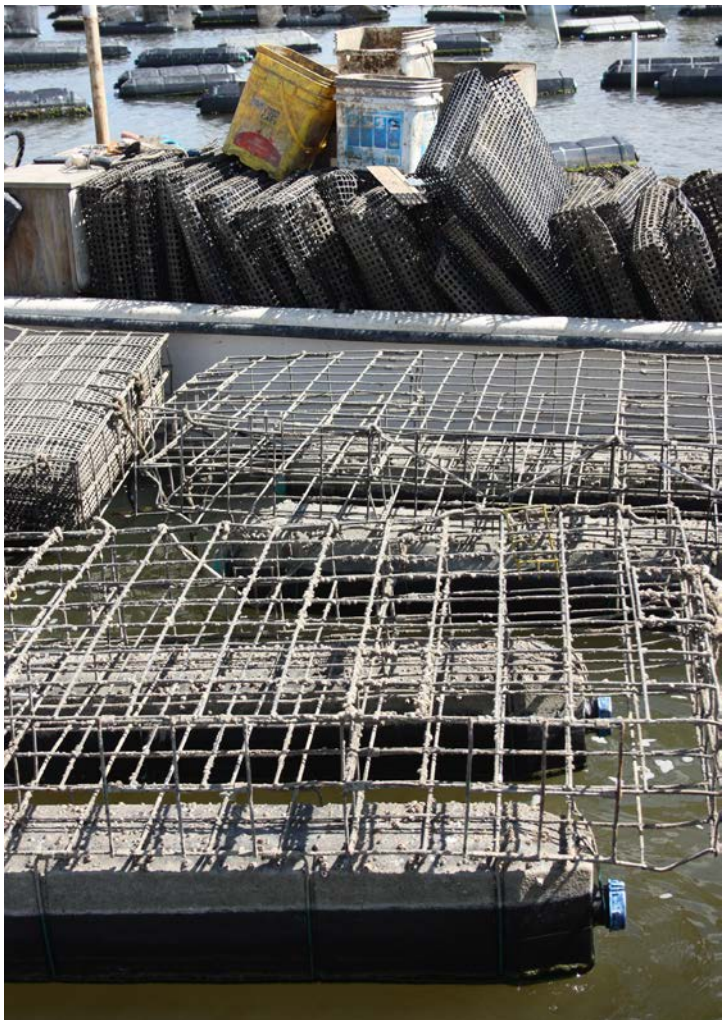
We are grateful for discussions and input from several commercial growers using floating bags that greatly improved this fact sheet.



This fact sheet is the result of a collaborative effort among shellfish aquaculture extension specialists in the Sea Grant programs of Florida, Mississippi-Alabama, and Louisiana. For further information, contact:

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