OYSTER CULTIVATION BEST PRACTICE GUIDELINES

Floating Basket Longline Oyster Cultivation

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DPI Fisheries and Aquaculture Management, Management & Administration Unit

Objectives of the Oyster Cultivation Best Practice Guideline Series

The Oyster Cultivation Best Practice Guideline Series has been developed to assist both existing oyster farmers and new entrants into the NSW oyster industry to establish and maintain best practice on commercial oyster lease areas in NSW.

This Guideline Series also provides a valuable source of information for those outside the oyster industry who wish to gain a better understanding of the day-to-day operations of the NSW oyster industry.

Further information regarding the NSW oyster Industry can also be found in the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS). OISAS is available online at:

https://www.dpi.nsw.gov.au/fishing/aquaculture/publications/oysters/industry-strategy

Introduction

Since the 1970's the NSW oyster industry has shown an increasing interest in the development of floating methods of oyster cultivation that could be used in areas of oyster leases that were too deep for the use of traditional intertidal post and rail oyster cultivation. By the late 1980's only timber drum rafts and floating stick cultivation had proven to be viable for commercial oyster production. Oyster farmers then began experimenting with a floating oyster growing system that involved the use of rows of small floating plastic oyster growing baskets attached either side of a central single surface longline. Since that time the development of new innovative technology based around this system (Figures 1 and 2) has revolutionised oyster cultivation methods in NSW.

Floating basket longline systems

Floating basket cultivation technology has evolved quickly and a significantly improved detachable floating basket longline system is being used in NSW estuaries. Interest in this cultivation technique has grown steadily due to the cost savings it offers when compared to the costs associated the establishment and maintenance of traditional intertidal timber post and rail cultivation. Floating basket cultivation is now the dominant cultivation method used by the NSW oyster industry.

All components for the assembly of a floating basket longline system are commercially available from several suppliers. Floating basket longline systems in use today can be divided into two categories; systems with detachable baskets that can be removed and taken back to the oyster farmer's land base for stock management (Figure 1A and 2A); and systems with non-detachable baskets, where the baskets remain permanently attached to the longline and all stock management is done in situ on the lease (Figure 2).

Detachable floating basket longline system

A detachable floating basket longline system involves growing single oysters within mesh baskets (usually around 500mm x 400mm x 150mm) that have been constructed of 10mm black UV stable high-density

polyethylene (HDPE) mesh. The baskets float horizontally on the surface, supported by a pair of rectangular black ethylene vinyl acetate (EVA) plastic closed cell floats (usually around 400mm x 100mm x 50mm), which are attached permanently to the top of each individual basket (Figure 1A). Individual baskets can hold between five and ten dozen mature Sydney Rock Oysters and are attached in pairs, one either side of the central longline. The individual baskets are attached to the central longline either by a pair of commercially available plastic clips, manufactured for this purpose, or by a pair of stainless steel "shark clips", manufactured for use in the offshore longline finfish industry. At either end the individual longlines are secured within the lease area by a substantial timber post driven vertically into the bottom substrate, or by a helical screw anchor, or other mooring device.

Figure 1 (A) detachable floating basket longline system deployed on an oyster aquaculture lease. (B) detachable floating basket longline system with the right-hand baskets in the "drying position" after they have been flipped over the central longline and inverted on top of the adjoining left-hand row of baskets.

Photo: NSW DPI - Aquaculture Management

The key advantage of this system design is that it enables baskets to be regularly flipped manually over the central longline and floated inverted on top of the adjacent baskets (Figure 1B). This allows the previously submerged baskets and the oysters within to be air-dried to control marine biofouling that accumulated whilst the baskets were submerged. Continually submerged baskets and the contained oysters can be quickly colonised by other marine organisms which are collectively referred to as biofouling. Common biofouling organisms may include barnacles, other oysters, mussels, cunjevois, sea-squirts and ascidians. Basket drying time is dependent on the time of year, prevailing weather conditions and the type of biofouling being controlled and can range from between 4 and 14 days. Once the baskets have air dried sufficiently to control any accumulated biofouling the baskets are then manually flipped back into the water and the process repeated for the baskets on the opposite side of the central longline.

Non-detachable floating basket longline system

The development of a patented semi-automated floating basket oyster cultivation system used on deep water leases in New Zealand has been adopted by NSW oyster farmers. In 2020 farmers began to install this floating cultivation infrastructure on their leases. This type of longline floating basket cultivation involves the use of injection moulded HDPE mesh baskets (110mm x 290mm x 330mm) which are attached permanently to a heavy duty longline via a central rotational axle sleeve that is incorporated into the basket design (Figure 2A). The central hollow tube rotation axle is attached to the bottom of the basket perpendicular to the basket's longest axis and allows the basket to rotate freely around the central longline. Individual basket floatation is provided either by a 50mm x 100mm x 330mm black closed cell EVA foam or a hollow HDPE float attached to the top of the basket. This design allows the basket to be placed in either the growing orientation (float up; Figure 2B), or drying orientation (basket up; Figure 3A). The rigid uniformity of the system enables the flipping, restocking and harvesting of the basket to be semi-automated using punt attachments that have been designed and manufactured for each management process (Figures 2B, 2C and 2D). The baskets are stocked or destocked via a snap lock hinged door incorporated into the end of each basket.

The use of these semi-automated, vessel based, handling processes provides significant labour cost savings when managing the stock; and as the growing infrastructure remains permanently on the lease

area it enables more oysters to be transported in bulk to and from the lease, significantly reducing the number of oyster punt movements and associated transport costs.

Figure 2 A floating non-detachable basket longline system. (A) baskets in the drying position showing detail of the rotational axle tube attached to the bottom of the basket. (B) baskets being flipped into the drying position using an outboard motor driven punt with modular flipping attachment. (C) bulk oysters being loaded three baskets at a time with the aid of a low voltage DC electric lazy-line hauler and a detachable floating aluminium loading shuttle. (D) oysters being harvested in bulk with the aid of a detachable floating aluminium harvest shuttle with a low voltage DC delivery bulk bin conveyor delivery system.

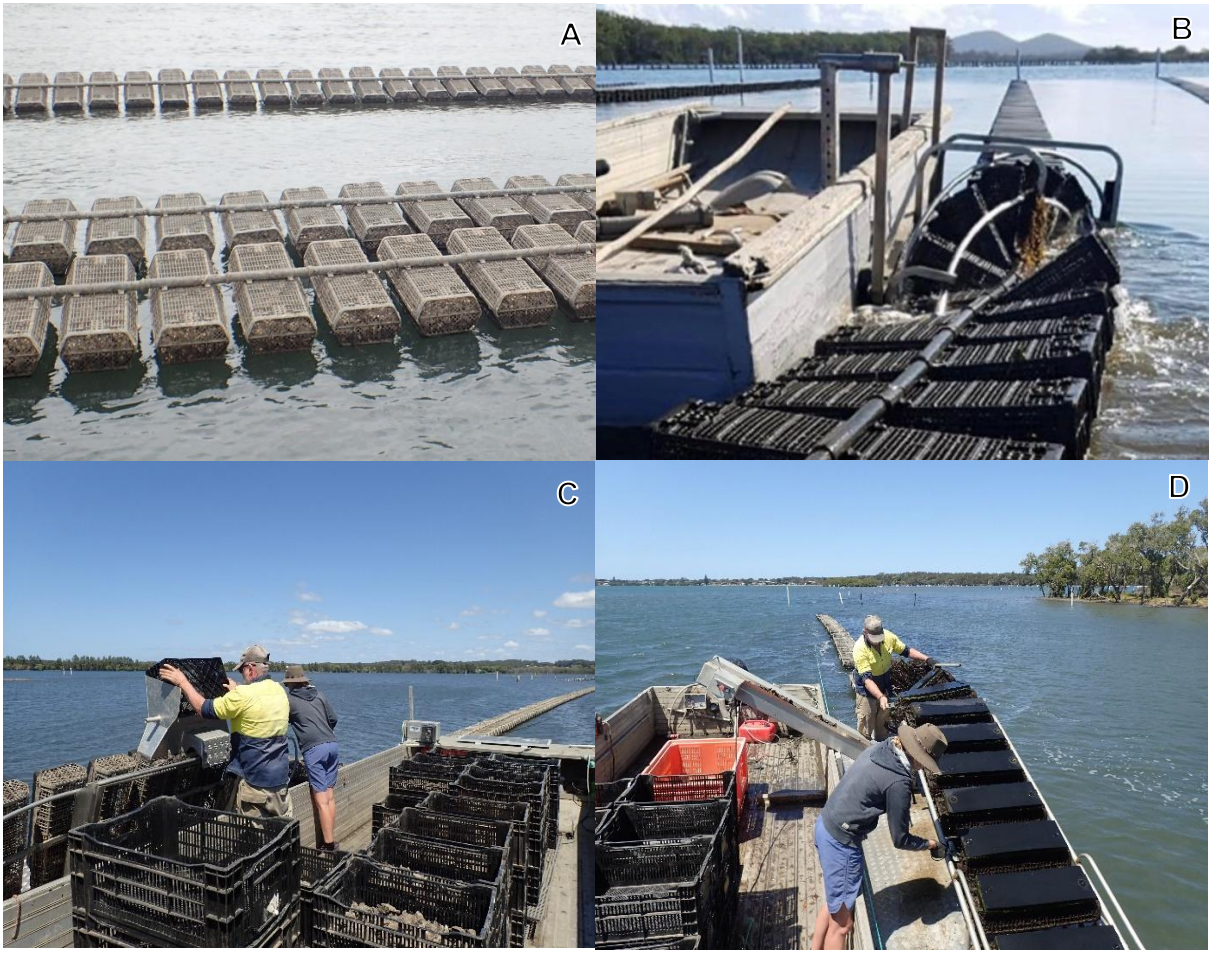

Photo: NSW DPI - Aquaculture Management

Advantages of the floating basket longline cultivation system

Floating basket longline cultivation systems have several advantages over traditional intertidal post and rail cultivation systems. These advantages are summarised below:

- allows for oyster crops to be worked irrespective of the stage of the tide
- enables the submerged oyster crop to feed on demand, resulting in faster growth when compared to traditional inter-tidal post and rail rack cultivation techniques, where oysters are only submerged on average for 12 hours per day
- the cultivation system is suitable for use in most traditional inter-tidal post and rail rack cultivation areas and enables the utilisation of lease areas that are too deep or too shallow for traditional inter-tidal post and rail oyster farming techniques
- the cultivation system simplifies and reduces lease infrastructure construction and maintenance costs
- the cultivation system reduces the need for heavy lifting gear
- the cultivation system increases farm infrastructure mobility

- the cultivation system is compatible with an established environmentally sustainable recycling pathway
- the cultivation system significantly reduces labour, infrastructure and transport cost component of production, when compared to traditional intertidal post and rail and post supported longline systems
- the cultivation system significantly reduces the impact of oyster cultivation on estuarine seagrass communities.

Issues associated with floating basket longline cultivation systems

While the advantages of floating basket longline systems are obvious, there are also several issues that need to be managed to ensure the commercial viability of a floating basket longline cultivation system. These issues include:

- where oysters grown using floating systems are submerged for long periods of time, they may become colonised by a wide range of marine biofouling organisms. Unless removed regularly these organisms may:
  - compete with the oysters for available planktonic food, resulting in reduced growth rate
  - colonise basket infrastructure and impede water circulation and exchange within the individual baskets resulting poor growth due to a reduction in available planktonic food
  - significantly increase the weight suspended within the basket resulting in basket deformation
  - significantly increase the labour costs associated with the removal of advanced biofouling later in the production cycle.
- prolonged periods of submergence may also increase the oyster crop's susceptibility to mudworm infestation due to:
  - the accumulation of silt
  - increased exposure to environmental conditions that are favourable for the settlement, survival and growth of mudworm larvae that may be present in the plankton.
- increase the vulnerability of the oyster crop to freshwater mortality due to:
  - growing oysters being confined to the top 250mm of the water column, where prolonged periods of low surface salinities may occur as a result of salinity stratification following freshwater events.

Managing issues associated with floating basket longline cultivation systems

Marine biofouling

Traditional intertidal post and rail oyster cultivation systems were designed to take advantage of the oyster's ability to survive prolonged periods of intertidal exposure sufficient to kill or inhibit the majority of competing marine biofouling organisms that settle on the oyster crops when tidally submerged.

A key design component of the floating basket longline system is the ability to flip and invert a basket enabling the flipped basket to be air-dried to control marine biofouling both on the basket and the enclosed oysters (Figure 1B and 2A). The drying time required to kill susceptible marine biofouling organisms varies according to the type and size of the biofouling present and the prevailing weather conditions. Usually most soft or delicate biofouling such as algae, cunjevois and bryozoans can be killed within a few days. Hard biofouling such as barnacles, mussels and juvenile oysters may take considerably longer. During summer careful consideration must be given to the prevailing and projected weather conditions. During hot weather, prolonged drying times may result in significant oyster crop mortality. This is particularly the case where a lease is in an area sheltered from cooling winds where air drying oysters can quickly reach lethal temperatures on hot days. The effectiveness of air-drying may also be reduced by rain or regular splashing caused by wind generated waves or boating activities. Please note that drying measures to control biofouling that are used on non-healthy oysters, or oysters in very fat reproductive condition, may also result in increased mortalities.

Important note: It is advised that where farmers have concerns regarding the heat susceptibility of their oysters that they conduct small scale exposure trials before embarking on large-scale crop drying activities

Mudworm

Mudworm is a general term given to a group of marine polychaete worm species that can during their planktonic stage settle on the oyster's shell or by be drawn into the oyster during its feeding process. Once within the oyster the mudworm and its muddy feeding deposits irritate the oyster's soft tissue and in response the oyster attempts to cover the worm and its feeding deposits with a thin layer of secreted shell, commonly known a mud blister. Mud blisters are easily ruptured when opening the oyster using an oyster knife, rendering the oyster unpalatable and often result in significantly affected oyster shipments being rejected in the marketplace. Mudworm can also cause oyster mortality, particularly when affected oysters are exposed to other environmental stressors, such as heat, freshwater inundation and prolonged time out of the water. In some cases, a heavy mudworm infestation alone may also be enough to cause significant crop losses.

There are several planktonically dispersed mudworm species present in NSW estuarine waters that may affect Sydney Rock Oyster, Pacific Oyster and Native Oyster crops. Unfortunately, very little is known about the seasonal reproductive timing and larval settlement of the majority of these mudworm species. The limited literature available and general observations by oyster farmers suggest that, while mudworm settlement can occur throughout the year, there tends to be a higher incidence of infestation during spring and autumn months. Fortunately, there are several methods that can be employed to control mudworm infestations in oysters (Nell, 2003). The most cost effective and commonly used of these is air-drying. Air-drying is most effective during the mudworm's larval settlement and early juvenile stages. However, as a result of the unpredictability of the occurrence of initial mudworm infection, the only cost-effective and reliable option available to oyster farmers to protect against mudworm is the maintenance of a regular and systematic air-drying regime. Postponing air-drying operations due to the visual absence of biofouling can often result in expensive mudworm remediation actions needing to be undertaken further along the crop production cycle and in a worst-case scenario can affect the ongoing commercial viability of the affected crop.

Important note: In areas prone to mudworm infestation it is essential that a regular and systematic air-drying regime be maintained throughout the year.

Freshwater stratification

As salinity increases so does the density (relative weight) of the saltwater. Due to a difference in density, lighter freshwater will float on top of heavier saltier water with both salinity and density tending to increase with depth. This effect is known as salinity stratification. In areas subject to freshwater inputs that are not affected by strong tidal and/or wind driven mixing forces, salinity stratification can persist for days and sometimes weeks. As oysters grown using floating basket longline cultivation remain constantly within the top 250mm of the water column they are highly susceptible to freshwater stratification should it occur. Whilst Sydney Rock Oysters and to a lesser extent Pacific Oysters can tolerate immersion in fresh water for extended periods by closing and sealing their shells, prolonged exposure to salinities of less than 10 parts per thousand will eventually kill both species. Reproductively fat oysters of both species, or oysters affected by mudworm or heat stress are at an increased risk of freshwater induced mortality. The Native Oyster has a very low freshwater tolerance and should not be grown in floating basket longline systems in areas subject to freshwater inundation where reduced salinities persist after rainfall events.

Important note: Floating basket longline cultivation is not recommended for areas that are subject to salinity stratification following prolonged periods of freshwater inundation.

Best practice for the construction of floating basket longline systems

The following describes current best practice for the construction of a floating basket longline cultivation systems.

Colour

To create visual harmony and compatibility with the environment, all components of a floating longline basket system must be:

- substantially black, dark grey (Pantone 4128 C or darker) or dark green (Pantone 19 6026 TCX or darker) in colour
- consistent in colour.

Important note: White or light-coloured culture infrastructure is prohibited within the boundaries of an oyster lease in order to reduce visual amenity impacts and to prevent confusion with white lease boundary marker posts during the navigation of oyster lease areas.

Longline materials, construction and mooring systems

During adverse weather conditions, periods of high tidal flow, or during stock management activities, considerable strain can be placed on longlines and their mooring posts or anchoring systems. It is therefore essential to design the longline and mooring system with these conditions in mind.

Longline

While cheap or recycled rope or line is available, these products are not often designed for use under harsh and abrasive marine conditions, nor are they designed for use in conjunction with commercially available clips manufactured specifically to secure baskets to longline systems.

To be suitable for use as longline any rope or line needs to satisfy the following criteria:

- have a breaking strain capable of coping with maximum physical loads that may be exerted on the longline during adverse weather and tidal conditions. This includes tension placed on the line by a laden oyster punt or work boat during rough and windy conditions
- have a high resistance to degradation by UV light
- where used alone without an outer plastic protective sleeve the line needs to be:
    - rated as ‘hard’ to avoid wear by the longline clip, rotational axle, or by basket abrasion
    - be of an appropriate diameter to accommodate the longline clip or rotational axle to be used.

A range of commercially available longline products in common use by the oyster industry adequately satisfy these requirements. Most of these commercially available longline products used in conjunction with clips have a protective outer cover or sheath to protect the longline from abrasion and being cut by the longline basket clips.

Recommended longline lengths

During adverse conditions the use of excessively long longline runs between moorings or post tethering can result in very high loads being placed on the longline and the mooring or longline tethering systems. Excessively long longline systems can also wander on or move outside of the leased area. This can result in operational, visual amenity, navigation and insurance issues. It is therefore recommended that single point-to-point longline runs used in conjunction with both detachable and non-detachable floating baskets systems do not exceed 100 metres in length unless an intermediate mooring device is used.

Important note: Systems used to moor a fully loaded longline system must be capable of securing the entire longline system within the surveyed lease area during adverse weather conditions and all stages of the tide.

Longline mooring and tethering systems

Longline mooring and tethering systems must be carefully designed to ensure that the system can secure the longline system within the surveyed lease area during worst-case adverse weather conditions. Due to the variation in lease shape, size and geographic location a number of issues need to be taken into consideration when deciding on an appropriate tethering or mooring system for a specific lease, these issues include:

- depth of water and bottom substrate
- exposure to prevailing winds and wind driven adverse weather events
- maximum expected tidal and flood driven currents
- shape of the lease area
- the need to incorporate a section of bare longline to allow boat operated mechanical systems to be connected and removed from the longline
- visual amenity.

There are a number of mooring systems suitable for securing longline systems, a general description of these systems is provided below.

Fixed-point post attachment

A fixed-point post attachment system involves securing the longline permanently to a fixed-point on a mooring post at either end of the longline (Figure 3A).

Where the maximum tidal range is approximately 2 metres, the length of longline necessary for a fixed post point tethering system can be roughly calculated by adding an additional 2 metres (length of securing knot configurations not included) to the direct distance between the individual tether posts.

The static point of longline attachment to the post should be located at the approximate mid-tide level on the post (Figure 3A). Permanently attaching the line at this height will allow for enough slack in the line to compensate for tidal rise and fall while minimising the amount of bow or wander in the longline during cross winds or cross tidal flows.

Figure 3 (A) a general layout diagram describing the components of a fixed-point post floating longline mooring system. (B) a mid-tide fixed-point floating basket longline system deployed on an oyster lease (photo taken during lower half of the tidal cycle).

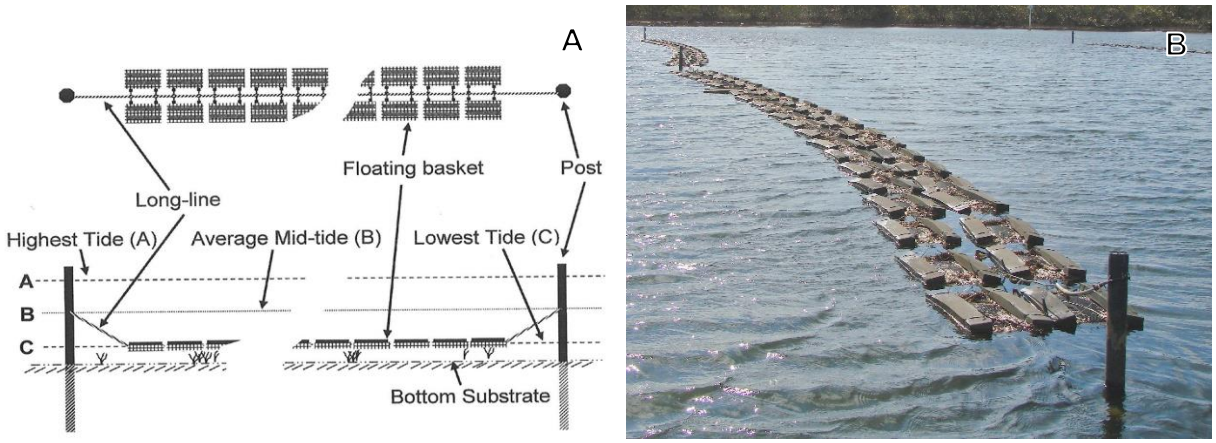

Diagram and photo: NSW DPI - Aquaculture Management

Sliding collar post attachment

A sliding collar post attachment involves attaching either end of the longline to a sliding post collar which is free to move up and down the mooring post during the tidal cycle (Figure 4). The use of a sliding post collar enables a reduction in the length of longline necessary between the posts compared to a fixed point longline (Figure 3) and reduces the amount of longline bow during cross winds or cross currents. Sliding collars can be divided into two main types, floating collars and non-floating collars. Floating collars (Figure 4A) have inbuilt floatation and maintain the long line on or close to the surface when the line is not stocked with floating baskets. Non-floating collars (Figure 4B) rely on the floatation built into the baskets to operate and depending on the type of longline material used may sink when the line is not stocked with baskets.

Figure 4 Examples of two types of sliding post attachment collars currently in use in NSW; floating A and non-floating B.

Photo: NSW DPI - Aquaculture Management

Posts used in conjunction with sliding post collars should have a hard HDPE plastic sleeve to enable the collar to slide freely up and down the post during the tidal cycle.

In areas where flood heights have been recorded that exceed the post heights used with sliding collar a sliding collar retainer such as a small timber block or cross-piece (Figure 5B) needs to be attached near the top of the post to stop the collar floating free of the post during a flood.

Important note: To minimise visual impact and reduce the risk of navigation confusion, all intermediate longline tether posts used within the lease area must not be white in colour.

Moored float-and-anchor point of attachment

In areas where the depth of water, bottom substrate or strong tidal current flows prohibit the use of a longline tether post, a float-and-anchor mooring system (Figure 5) may be used to secure the floating basket longline system securely within the lease area.

Where a float-and-anchor mooring system is used the following minimum requirements apply:

- mooring location floats are to have a minimum diameter of 200 millimetres
- the mooring system securing the float needs to be enough to hold the longline system in place during adverse conditions
- the length of the float to anchor mooring rope should not exceed the maximum depth of water at highest high tide (spring tide)
- the rope connecting the mooring device to the mooring location float should be of a diameter (breaking strain) sufficient to enable the mooring block or anchoring device to be lifted and removed from the bottom substrate.

Figure 5 (A) An example of a design for a float mooring system suitable for uses with a clip-on floating basket longline system. (B) An example of a design for a mooring system suitable for uses with a non-detachable floating basket longline system.

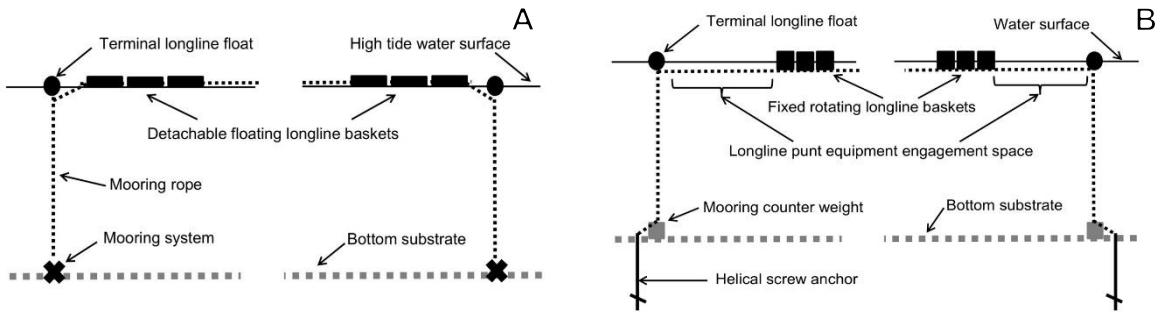

Photo: NSW DPI - Aquaculture Management

Important note: Floating basket longlines must not be attached to lease corner or intermediate boundary marks.

Helical screw anchor systems

The use of galvanised helical screw anchors (Figure 6A) is another method for mooring floating longline basket cultivation systems. Helical screw anchors are suitable for use in soft sediments such as mud and sand and have been used in the mussel longline industry and boat mooring industry for many years. Helical screw anchors are screwed into the bottom sediment either manually using a metal bar inserted through the anchor eye (Figure 6C), or by a hydraulically operated auger attachment fitted to a ridged "Hiab type" punt crane (Figure 6B).

Figure 6 (A) An example of a standard helical screw anchor used to moor longline floating basket systems. (B) A hydraulically operated auger attachment fitted to a rigid "Hiab type" punt crane. (C) A manually operated t-brace system used to install helical screw anchors.

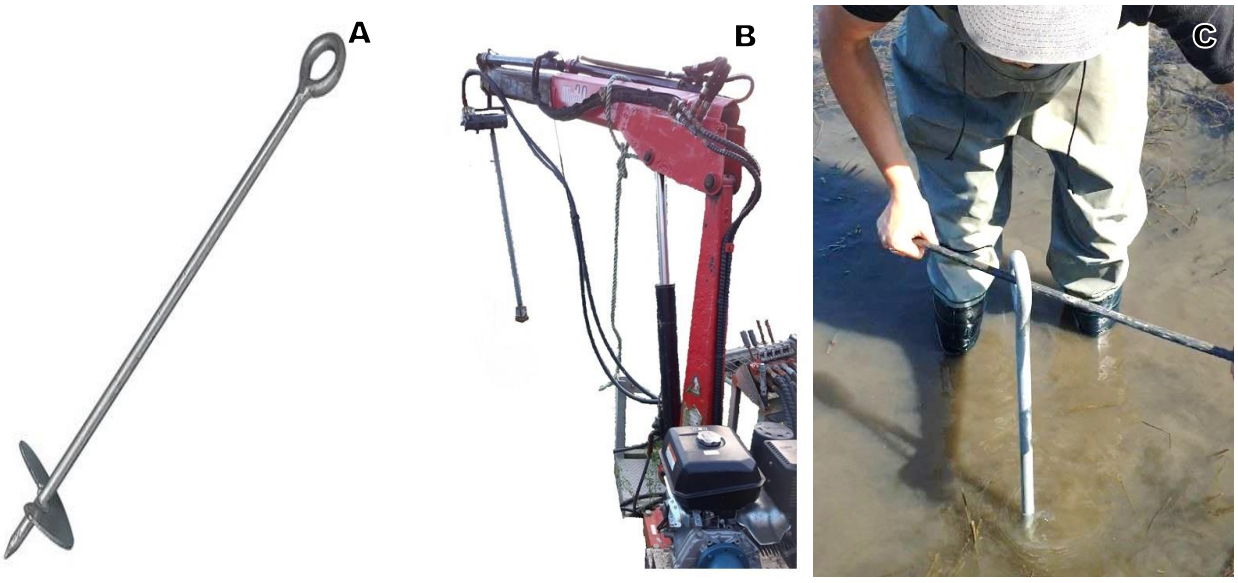

Photo: NSW DPI - Aquaculture Management

In deeper water helical screw anchors can be installed from a punt using a galvanised pipe extension (various lengths) with a heavy plate metal oblong box fitting welded to the end of the pipe to engage the anchor eye. Voids can be constructed in the box structure to allow a mooring line to be pre-attached to the helical screw anchor and threaded through the metal pipe installing extension. Properly installed helical screw anchors are usually driven into the sediment to the depth of the mooring line point of attachment and are capable of securing extremely high loads. Galvanised helical screw anchors come in a variety of lengths and screw plate diameters and the manufactures directions regarding loads and installation should be followed.

Floating basket design and construction

Careful attention needs to be given to the materials used in the construction of floating baskets as any component failure, malfunction or deterioration will usually tend to affect a large number of baskets simultaneously. Component failure is also most likely to occur during adverse environmental conditions when access to the lease is either difficult or impossible.

The following section describes the components used in the construction of a typical robust floating basket and basket securing systems in common use by the NSW oyster industry (Figure 7A and 7B).

Figure 7 Typical detachable floating basket design (A), and a non-detachable floating basket design (B).

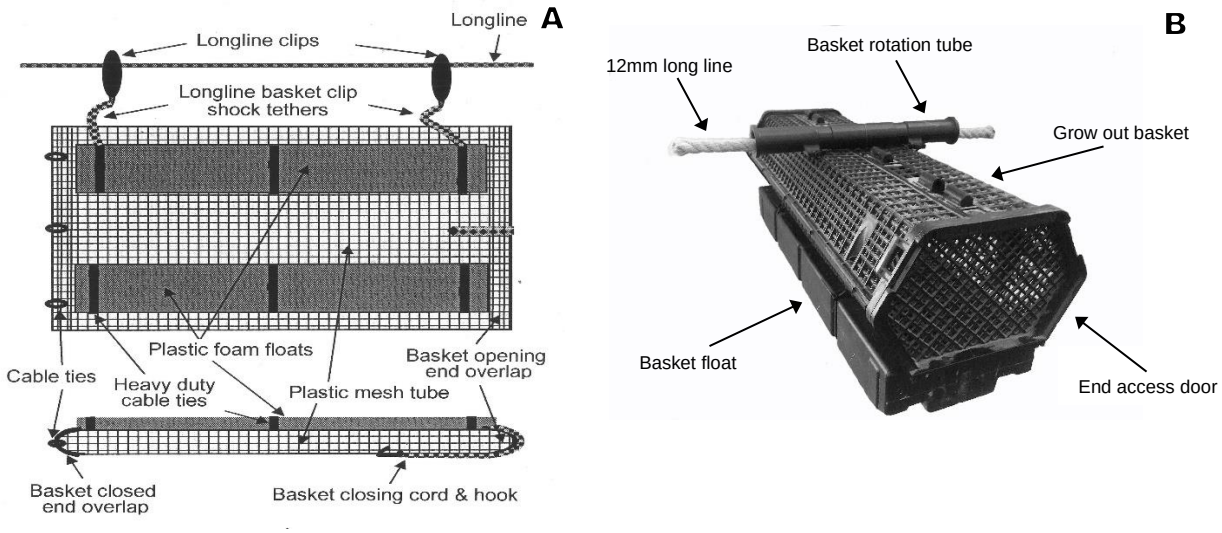

Photo: NSW DPI - Aquaculture Management

Detachable and non-detachable floating basket construction

When constructing detachable floating baskets (Figure 7A) on farm the following recommendations need to be considered:

- baskets should be constructed of high-quality rigid HDPE plastic mesh. Baskets constructed of a soft or flexible mesh will often suffer basket deformation under the weight of the oysters and basket deformation or sagging will result in oysters 'piling up' which can lead to significant variation in oyster growth and increased oyster mortality
- where baskets are constructed from HPDE mesh tube the basket closing hooks and lanyards need to be UV and corrosion resistant and designed to secure basket closure during adverse load conditions e.g. when the basket is lifted and handled from the opposite non-opening end
- basket design should ensure that the basket is free of protrusions that will cause snagging
- baskets need to be of a size that is easily manipulated on the lease area and stacked by hand; a basket size of approximately 750mm x 500mm x 100mm is recommended.

Commercially available non-detachable floating basket systems (Figure 7B) have been designed and field tested to ensure they meet the rigors of adverse marine conditions. It is recommended that when installing a non-detachable longline system on an oyster lease that the installation advice provided by the manufacturer is followed.

Basket floatation

Basket floatation systems typically involve the use of a single or twin float attached to the top of the basket. In the case of detachable floating baskets twin floats are aligned parallel to the longline backbone (Figure 7A). In the case of non-detachable floating baskets, a larger single float is attached at right angles to the centrally located longline backbone. The size (volume) of floats used in both detachable and non-detachable must provide enough floatation to keep the flipped drying oyster basket above the splash zone.

The following minimum requirements apply to floating basket floatation systems:

- to minimise visual impact, floats must be uniform in shape and be constructed of a UV stable material
- the basket needs to have sufficient floatation to support the flipped drying oyster basket and the enclosed oysters above the splash zone during a drying regime
- floats must be secured to the baskets using a UV stable fixing system. Poor quality or non-UV resistant fixing devices will quickly fail with constant exposure to direct sunlight.

While the above issues are usually addressed appropriately in the design of commercially available longline floating baskets that are available from reputable suppliers, some cheaper copies available on-line may not address these issues adequately.

Longline basket attachment systems

Detachable floating basket clip systems

When selecting a commercially available longline clip (Figure 7A) it is essential that the clip is matched to the diameter of the backbone line. Mismatched clips will often result in rapid clip wear and may result in damage to backbone line leading to line failure and loss of baskets. Mismatched clips may also result in the baskets sliding along the longline during adverse conditions which will make flipping the baskets for drying difficult, if not impossible.

The use of stainless steel “shark clips” particularly swivelled “shark clips” are not recommended for use with longline floating basket systems due to their abrasive cutting behaviour on the line and the high likelihood of swivel wear and failure due to constant wave action.

To minimise the risk of abrasion between longline clips and the longline it is recommended that a short flexible tether is installed between the basket and the clip. The instillation of a flexible tether will significantly reduce the amount of wave action being transferred from the basket to the clip and greatly reduce wear on both the longline clip and the longline.

In areas where strong current flows run parallel to the longline system, a stopper system may need to be incorporated into the design to stop baskets sliding along the longline. While there are a number of commercially available clip systems which, when matched correctly to the longline, resist basket slide along the longline, in some instances a backup anti-slide system may be necessary. A simple anti-slide system can be to retrofit a robust cable tie tightly at intervals along the longline. This will only allow the basket clip to slide as far as the cable tie and will keep the baskets evenly spaced on the longline during adverse conditions.

Non-detachable floating basket fixed rotational tube

Non-detachable floating basket systems are attached to the longline via central rotational tube incorporated into each basket (Figure 7B). The central hollow tube rotation tube which is attached to the bottom of the basket at a right angle to the baskets longest axis allows the basket to rotate freely around the central longline. It is essential that the manufacturer’s directions are followed when using this system. The use of cheap inferior or small diameter longline may lead to system failure and spill floating baskets into the estuarine environment.

Basket stocking rates

It is important that floating baskets are not initially overstocked or allowed to become overstocked as overstocking may result in:

- poor biofouling control
- basket deformation
- irregular growth and shell deformities
- increased oyster stress and susceptibility to disease and stress related mortality (e.g. heat while drying or freshwater inundation).

As a general rule of thumb baskets should be initially stocked by volume at approximately 20% of the basket volume. For a standard floating basket (750mm x 500mm x 100mm) this equates to approximately 2 to 3 litres of stock per basket.

Good neighbour policy

Important note: If a floating basket is stood vertically on its end and it is more than half full it is overstocked.

The NSW oyster industry is an integral part of many NSW coastal communities. Oyster farming businesses not only generate economic benefits, but also make a positive and constructive contribution to the social fabric of these communities.

Oyster farmers appreciate the wider social responsibilities of their businesses and aim to be recognised in their communities as good corporate citizens and environmentally responsible, professional primary producers. Safeguarding water quality is a primary driver for oyster farmers.

Oyster farmers recognise that the land adjacent to leased areas is either community owned public land or private land. In either case, this land is treated with respect and oyster farming activities are conducted to minimise any existing and potential impact on this land.

Responsible NSW oyster farmers:

- do not abandon infrastructure and equipment as it can cause a hazard to watercraft, land vehicles and the environment
- ascertain ownership of adjacent lands and liaise with 'neighbours'
- recognise that Crown Land or National Park is land owned and managed for the public good, and is not vacant land
- acknowledge the responsibility that goes with the right of access to public waterways and infrastructure
- operate so as not to interfere with the reasonable peace, comfort or privacy of other estuarine and foreshore neighbours
- minimise noise, especially in the vicinity of residences and during the quiet times of the day or night
- treat neighbours and the community cordially and with respect
- actively participate in community forums
- give preference to purchasing local products and employing local people
- develop and maintain good relationships with their communities, building mutual trust and respect
- acknowledge community concerns and co-operate with neighbours to resolve them.

Visual impact and prohibited materials

The general neat and tidy provisions that apply to all aquaculture leases in NSW are specified in the NSW Oyster Industry Sustainable Aquaculture Strategy (OISAS) which can be found at: www.dpi.nsw.gov.au/fisheries/aquaculture

Routine maintenance

A poorly maintained floating basket longline cultivation system can:

- result in a significant loss of stock
- break free and scatter cultivation materials among sensitive environmental habitats
- reflect poorly on the environmental credentials of the NSW oyster industry
- pose a threat to safe navigation
- attract NSW DPI compliance action.

It is therefore important that regular maintenance of floating basket longline cultivation systems be undertaken.

Regular check list

The following visual checks should be carried out whenever a floating basket longline system is attended or at a minimum of at least every three months:

- ❑ Check that the system remains wholly within the surveyed boundaries of the lease at all times
- ❑ Check for missing, broken or malfunctioning basket components as this may indicate a problem that needs to be rectified to avoid multiple component failure in the future
- ❑ Check the backbone line for signs of wear at the point of clip attachment
- ❑ Check the point of attachment of the longline at the tether post for signs of wear

- ❑ Check for basket deformation (sagging) which may indicate overstocking or poor quality basket mesh
- ❑ Check for weak points in mesh due to abrasion by oysters
- ❑ Check for signs of recent marine biofouling that may need to be scheduled for air drying.

Annual check list

The following checks should be carried out at least annually:

- ❑ Check tether post alignment and condition
- ❑ Check the point of attachment of mooring float lines to the mooring device and attachment to longline for wear and replace or repair where necessary
- ❑ Remove excessive marine biofouling from mooring float lines.

References and further reading

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More information

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