The Wild Oysters Project: Biosecurity Measures Plan

Introduction

Restoration of native oysters (*Ostrea edulis*) is of high priority within the UK and Europe. The 95% loss of native oysters from their historic range has led to a significant increase in efforts to restore this iconic species throughout the North East Atlantic.

The Solent Oyster Restoration Project aims to restore the European native oyster population on a large scale. Between 1972 and 2006, the Solent supported the largest native oyster fishery in Europe. In 1978, 450 vessels, employing over 700 workers, were involved in oyster fishing and 15 million oysters were removed in that year alone. However, since this peak, the oyster population has declined significantly and in 2013 the fishery collapsed.

Working with local stakeholders, the project is using best practice restoration techniques from the UK and abroad to restore this valuable species and the habitat it provides. The Solent Oyster Restoration Project aims to restore native oyster reefs and the associated benefits that they bring through the following methods:

Broodstock nursery cages. To increase the number of breeding oysters within the Solent, oysters are placed at high densities in nursery cages that are hung from existing pontoons, below the surface of the water. Easy access to these oysters allows their physiological and reproductive state to be monitored regularly.

Seabed restoration. To promote natural recruitment and re-establish wild oyster reefs, sanctuary seabed sites will be created on a large scale. Oyster reefs will be placed in areas closed to commercial fishing and allowed to flourish and develop.

The need for a Biosecurity Measures Plan

The Solent Oyster Restoration Project intends to restore oysters in each of the seabed locations through two activities:

1. Translocation of native oysters from farmed and wild sources to create broodstock reserves
2. Targeted introduction of ‘cultch’ (shells and gravels) to promote oyster settlement

Restoration of native oysters through these methods carries inherent risks that must be considered seriously when planning and undertaking activities. The main risks posed by these activities are through the translocation of infectious shellfish diseases and the introduction of Invasive Non-Indigenous Species (INIS). The Solent Oyster Restoration Project recognises these two risks as major threats to biodiversity worldwide as well as locally at restoration sites. However, with appropriate biosecurity measures in place it is possible to restore native oysters safely and effectively.

This Biosecurity Measures Plan (BMP) has been developed in order to ensure all aspects of the project adhere to highest possible biosecurity standards. The BMP will also ensure that all aspects of the project adhere to national international regulation listed here:

Aquatic animal health:

- The Aquatic Animal Health (England and Wales) Regulations 2009 which implement Council Directive 2006/88/EC (as amended) on animal health requirements for Aquatic animals and products thereof and the prevention and control of certain diseases in aquatic animals in Scotland.

Invasive non-native species:

- EU Directive 92/43/EC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive 1992)
- Wildlife and Countryside Act 1981 (England and Wales)
- Natural Environment and Rural Communities Act 2006 (England and Wales)

Guiding principals

The Solent Oyster Restoration Project Biosecurity Measures Plan is underpinned with a number of guiding principles to ensure all risks are minimised.

Health status of Donor sites

The movement of live native oysters poses potential risks, as outlined in the section above. In order to reduce these risks, there are several criteria that the donor site (where oysters are being translocated from) must fulfil and a number of checks that need to be made prior to translocation.

Donor sites:

Donor sites must fulfil the following criteria:

- All donor sites must be of equal or higher health status (with regards to notifiable shellfish diseases) than receiving sites.
- Donor sites must not have high-risk invasive species present that are not present at the receiving site.
- Where possible, donor populations will come from within the Solent, such as the Solent Oyster Restoration Hatchery or wild fisheries in the Solent.
- All donor sites to be agreed with the Fish Health Inspectorate prior to deployment.

The decision tree for deployment of oysters is provided in the annex.

Biosecurity of Cultch

The placement of large amounts of cultch poses significant biosecurity risk, however it is possible for these to be removed through best practice. Cultch will need to be certified as bio-secure prior to deployment.

Marine sources of cultch:

Cultch that has been sourced from the marine environment will need to be weathered to ensure that it is clean from any biological material that may pose a biosecurity risk.

Cultch will be weathered for a minimum of six months. During this time cultch will be turned to ensure that all cultch is exposed to UV and allow biological material to degrade. Cultch may, if possible, be cleaned to remove epibionts and any remaining flesh.

Before deployment, sub-samples of cultch will be taken and analysed to ensure all cultch is free from live biological material.

Clean and fluvial sources of cultch

Some sources of cultch can be safely used without the need for weathering as they do not pose a biosecurity risk. These include fluvial sources of cultch such as gravels and shells that have previously been treated heat treated, such as cockle shell aggregates.

The decision tree for deployment of cultch is provided in the annex.

Biosecurity risk assessment

Risk assessment

The following table assesses the full risks posed by the project and the proposed mitigation to reduce the risks:

	Identified Risk	Probability (high/med./low)	Impact	Risk Limitation Measure
1	**Infectious agent transferred by movement of live shellfish onto site**	High	High	Before introducing any shellfish discuss the condition and provenance of the stocks with the supplier. If there are any doubts do not introduce the shellfish.
	As above			Review of the disease status and provenance of donor stock to ensure they are free from notifiable disease.
	As above			Visit the site of any proposed source of shellfish where possible to inspect the stock visually for any signs of disease/biosecurity measures carried out on donor site.
	As above			Do not accept batches of shellfish onto the site if they are showing signs of any infection or unaccounted mortality.
	As above			Batches of shellfish from different sites are to be kept separate from each other where possible.
	As above			Examine the stock on a regular basis – minimum monthly. Stock health to be noted and records kept for inspection by relevant FHI. Remove mortalities when they occur and dispose of in a way that does not increase the risk of spread of infection to other stock – disposed of on site where mortalities occur. Mortalities in each batch recorded and records kept.
	As above			Be aware of diseases that have serious implications for the operation and reputation of the business. For listed disease in *O.edulis,* they are susceptible to *Bonamia ostreae* and *Marteilia refringens*.

	As above			Record all shellfish movements to allow proper traceability onto and off site – these will be recorded in the prescribed format in the relevant FHI movement book.
	As above			If suspicion of ill health/disease withhold shellfish from sale/purchase until condition is diagnosed/cured
	Import of shellfish from abroad	High	High	1. Be aware of the provenance of the stock when buying from any supplier. 2. Assess the potential quality of the shellfish by checking the supplier is operating to good biosecurity measures. 3. Do not hesitate to ask for details of fish health surveillance programmes and disease records for the supplying site. 4. All imported stock should be correctly health certified where appropriate. 5. Always contact competent authority at least 5 working days in advance of imports from any new supplier – this enables the relevant Fish Health Inspectorate to help identify any possible problems with the intended shipment.
2	**Invasive Non-Native Species (INNS) transferred onto site by movement of shellfish**	High	High	Be aware of INNS present at source sites for oysters and whether they differ from those present at site of translocation
	As above			Check all oysters for the presence of INNS on surface of shell. Ensure all oysters are cleaned and have all biota removed from the surface at source site.

	As above			Make sure all equipment being used at both sites is cleaned at source site and dried to ensure any INNS are destroyed.
3	**Infectious Agent transferred to or from the site via water or equipment**	Medium	High	Equipment used to transfer shellfish to be specific for each holding unit or be disinfected after use.
	As above			Equipment and containers used to hold or transfer shellfish between sites to be disinfected prior to and after use.
4	**Change in environmental conditions**	High	High	Monitor conditions and do not transfer or grade shellfish at periods likely to be stressful.
	As above			Record details of observations in work diary and use these to inform future decisions.
5	**Awareness of current disease designations**	N/A	N/A	Keep up to date with current disease designations and conditions set out within them.

Monitoring the Plan

Stock health inspection	
Mortality levels in each batch or zone	Mortalities removed and recorded in work diary.
Results of health inspections	Keep all documents from competent authority in region we are working in, private consultants reports etc.
Shellfish movements on and off site	Record in movement books.
Shellfish movements within the site	Record details of grading or where batches are combined.
Disposal of waste	Responsible waste and (where appropriate) effluent water disposal.

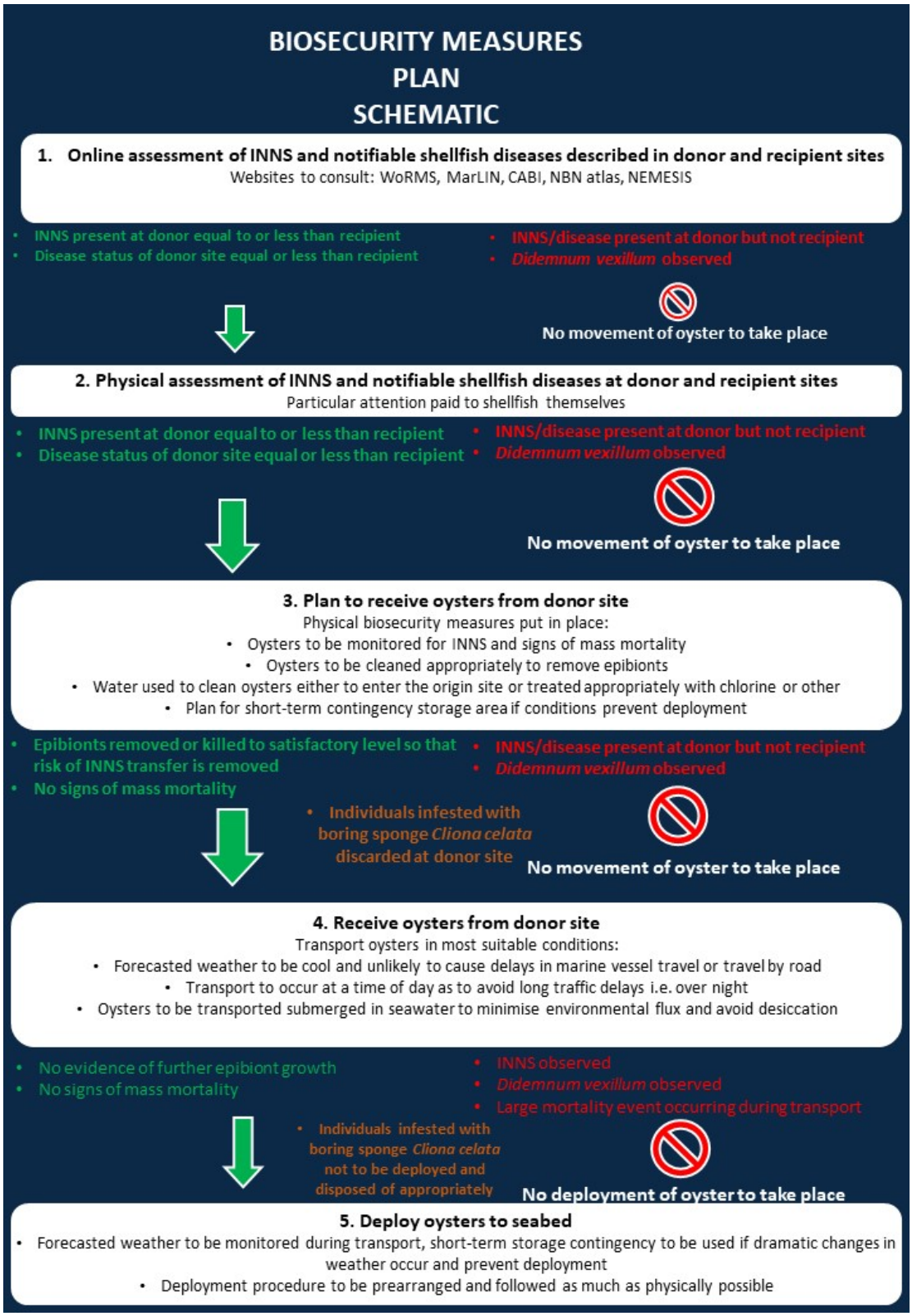
Actions to Take in the Event of Clinical Disease

Record	**Action to Take**
Inform Cefas	Inform competent authority in region you are working in.
Continuing unexplained mortality	Inform competent authority in region you are working in to arrange for disease screening.
Need to dispose of dead shellfish	Identify a suitable and legal way to dispose of waste from the site, try to avoid long-term storage of this material.

Annex

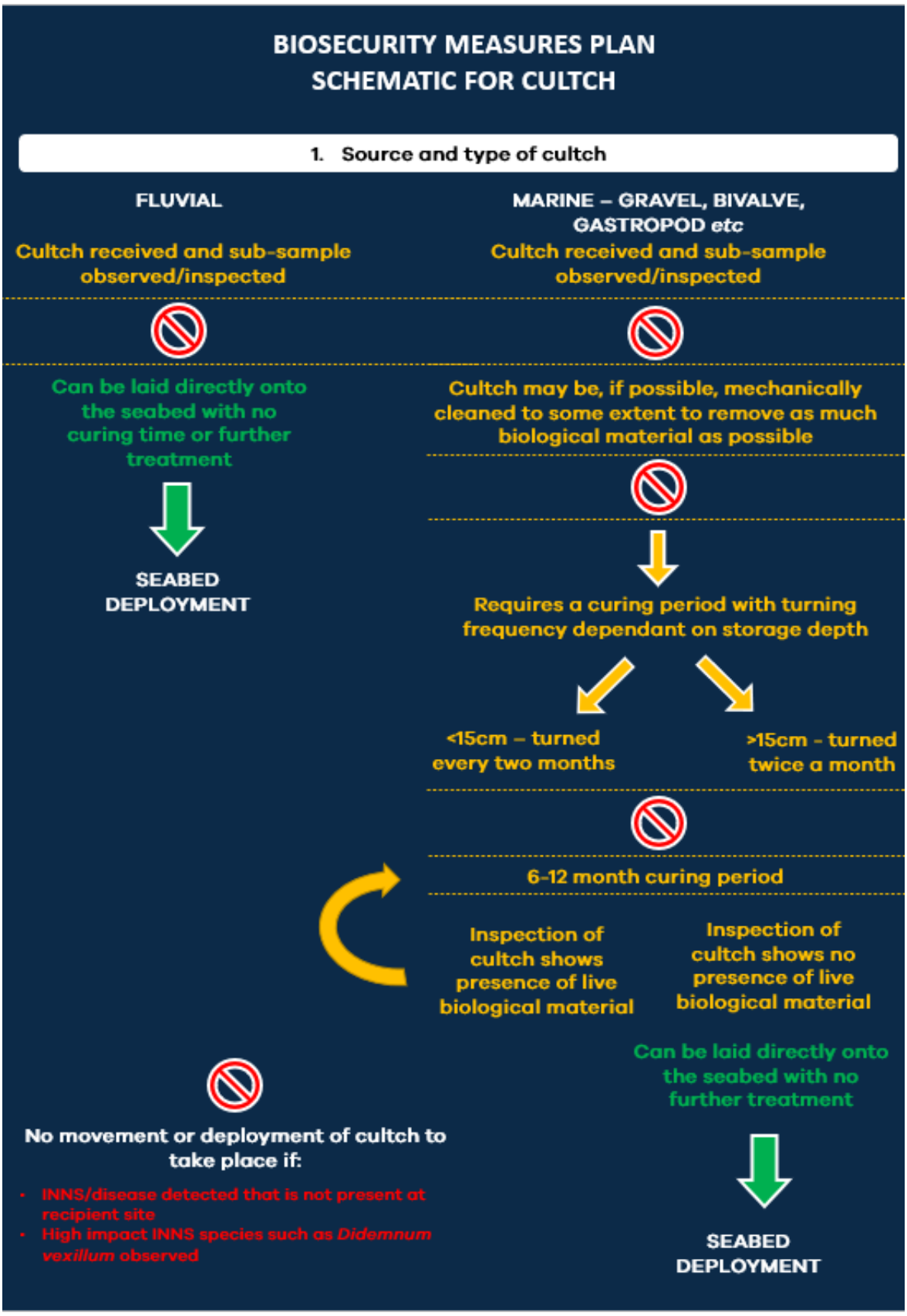
Annex 1.

Decision Trees for movement of oysters



Annex 2.

Decision tree for deployment of cultch



Biosecurity Plan Annex
Proposed native oyster sourcing and cleaning protocol:

1. Oysters roughly cleaned and sorted at donor site by supplier
2. Oysters delivered to the Institute of Marine Sciences (IMS), University of Portsmouth PO4 9LY
3. Oysters visually assessed on IMS forecourt by BLUE, UoP and UoS staff for any obvious signs of INNS (especially *D. vex*)
    a. If particularly heavy fouling is observed a pressure washer will be used at this point, ensuring that any material goes into general waste.
4. Oysters placed into one 5000L holding tank set up as static system with no initial discharge (Tank 1)
5. Oysters taken into the laboratory at IMS in batches.
6. Any material that is not oyster or attached to oyster is removed from process line and disposed of in general waste to be sent to landfill.
    a. Oysters visually assessed for INNS and signs of mass mortality. Those that are present in the Solent (*Crassostrea gigas, Crepidula fornicata, Corella eumyota, Diadumene lineata, Caprella mutica, Styela clava, Sargassum muticum* etc) that can be easily removed will be disposed of in general waste to be sent to landfill. Oysters physically cleaned with brushes and paper towel if required to remove remaining organisms
    b. Oysters counted and sorted into baskets/bushels by hand (visually checked to confirm all oysters are *Ostrea edulis;* no pacific oyster *C. gigas* or other INNS present)
7. Oysters placed into a second 5000L holding tank set up as a static system (Tank 2)

If all oysters fit into one 5000L tank:

8. Once Tank 1 is emptied of oysters, the sea water within it will be chlorinated and then neutralised before being discharged. Tank 1 will then be refilled with fresh sea water
9. Oysters will the be stored in seawater tank (Tank 2) for a minimum of 24 hours prior to step 10; this is to allow discharge of any larval/micro-INNS from within the oysters gut or shell water
10. Tank 2 will then be chlorinated to destroy any remaining INNS with the oyster in place, after a suitable period of time (likely to be 30 mins to 1hr) the oysters will be removed and the tank neutralised before discharge.
11. Oysters will be rinsed with/in fresh water before being transferred back into Tank 1 ready for deployment (might be that we use the big blue round tanks for this. Tank 2 will be refilled with fresh water to enable the oysters to be distributed for longer storage, reducing the density and likelihood of disease outbreaks.

If not all oysters fit into one 5000L tank

8. Once Tank 1 is emptied of oysters, the sea water within it will be chlorinated and then neutralised before being discharged. Tank 1 will then be refilled with fresh sea water
9. Tank 2 will be filled as much as possible with additional water storage containers filled with fresh seawater that has been chlorinated for several bushels of oysters to be dunked at any one time
10. Oysters will be rinsed with/in fresh water before being transferred back into Tank 1 ready for deployment. Tank 2 will be refilled with fresh water to enable the oysters to be distributed for longer storage, reducing the density and likelihood of disease outbreaks.

11. Oysters will the be stored in seawater tanks for a minimum of 24 hours prior to laying; this is to allow discharge of any larval/micro-INNS from within the oysters gut or shell water
12. Remaining seawater in these tanks will be chlorinated and subsequently neutralised prior to being discharged.

If INNS found at any stage

1. Any INNS species that are already present within the body of water (Solent) (that is/are not considered high-impact) found on the shells/samples will be removed from the oyster during the cleaning process and disposed of in general waste facilities that are disposed of in landfill to minimise introduction of species already present and reduce genetic diversity
2. If any high-impact INNS, or one that is not currently present in the body of water (Solent) is detected or suspected, further detailed identification will take place and no deployment will take place until this is confirmed (these species are listed below). In the case that there is a positive identification of a high-impact or absent INNS, no deployment of oysters from that shipment or location will take place in line with the biosecurity protocol. High-Impact INNS considered as follows:

High Impact INNS:

i. Warty comb jelly/Sea walnut *Mnemiopsis leidyi*
ii. Carpet sea squirt (*Didemnum vexillum*)
iii. Acorn barnacle (*Hesperibalanus fallax*)
iv. Brush-clawed/Asian shore crab (*Hemigrapsus penicillatus*)