



Ribble Estuary Cockle Transplant Experiment



**Draft Method Statement
October 2011**

1. Background

- 1.1. In 2007 a proposal was submitted to the North Western & North Wales Sea Fisheries Committee (NWNWSFC) to conduct a cockle transplant experiment on the intertidal beds off Southport, south of the River Ribble. The intention was to investigate the feasibility of seeding “fallow” areas of sand to improve the overall growth and survivability of the area’s cockle stocks.
- 1.2. Originally, it was proposed to use seed cockles from the Thames estuary but this was rejected by the NWNWSFC due to concerns about introducing diseases or pests.
- 1.3. The project was authorised on the understanding that any seed be sourced from disease and pest free areas within the NWNWSFC district. At the time, the most likely candidate for a donor stock was considered to be Morecambe Bay. That has proven not to be the case and the project has been in abeyance since 2009.
- 1.4. In July this year, a routine inspection, carried out by scientific officers of the newly formed North Western Inshore Fisheries and Conservation Authority¹ (NWIFCA), revealed large numbers of 1 year old cockles in very high densities (1,000 – 6,000+m⁻²) on an intertidal bed known as North Run off Lytham St Annes, north of the River Ribble.
- 1.5. A survey was carried out and the results shown in Figure 1. below. From samples taken, it was found that the 2010 cockles displayed three characteristics that might make them suitable for a transplantation experiment. Firstly they are of a very uniform size (shell length 15mm – 19mm) and secondly, they have uniform first year growth marked by an obvious and distinct growth ring. Finally they are present in sufficient numbers to stock for an experiment while leaving enough in situ to act as a control/reference.
- 1.6. Although the experiment was originally proposed for a different area off Southport, the North Run bed has the advantage of having suitable relay areas within its own confines. This greatly reduces any risk of introducing disease or pests to the area and should enable more robust comparability between experimental plots, particularly when considering donor areas against transplant plots.
- 1.7. In addition, by conducting the experiment within what is effectively a single ecological unit, it means there are less issues associated with the area’s conservation designations.

¹ The introduction of the Marine & Coastal Access Act 2009 brought about significant changes in the structure of the inshore fisheries management agencies in England and Wales. As a result, on the 1st April 2010, Welsh Assembly Government assumed control of management within its waters and North Western & North Wales Sea Fisheries Committee became North Western Sea Fisheries Committee (NWSFC). Subsequently, on 1st April 2011 NWSFC merged with Cumbria Sea Fisheries Committee (CSFC) to become the North Western Inshore Fisheries & Conservation Authority (NWIFCA).

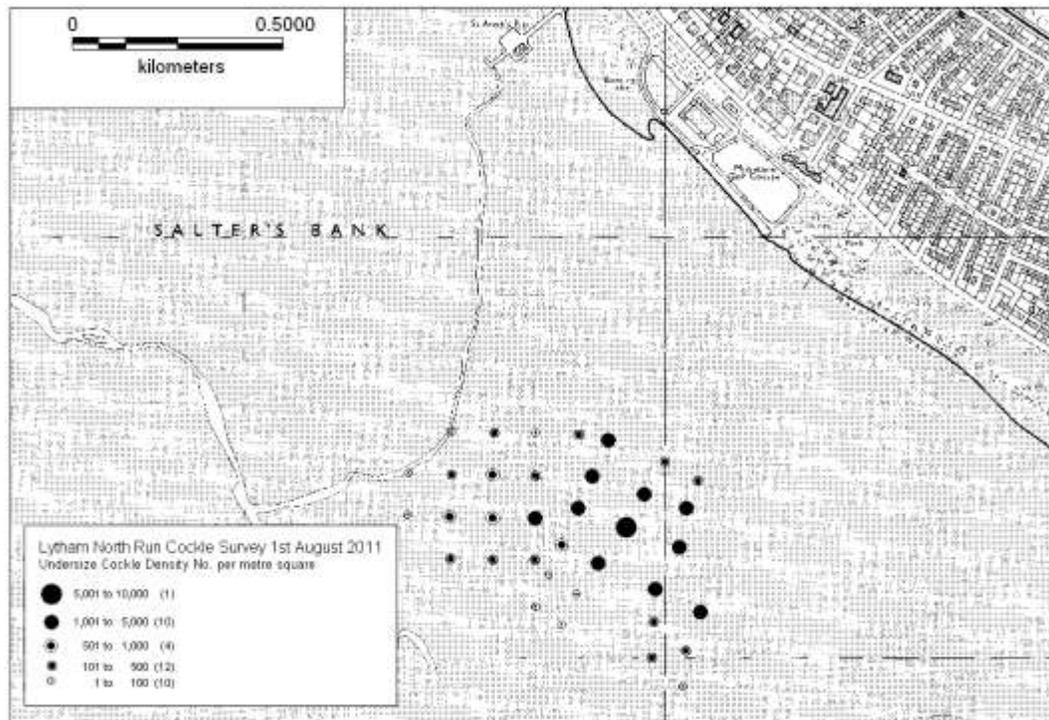


Figure 1.

Relative densities of undersize cockles on the North Run bed, Lytham St Annes, August 2011.

- 1.8. Discussions were reopened with the operator and further joint and independent inspections of the area conducted. Beach profiling work was undertaken by the operator, the results of which are available on request.
- 1.9. At a meeting on the 30th September 2011, the Authority endorsed the actions and work of officers so far and agreed that the project should go ahead under the direction and supervision of the NWIFCA Technical, Science and Byelaw Sub-Committee. This report forms the first stage in the transition from planning to implementation.

2. Rationale

- 2.1. The Common Cockle (*Cerastoderma edule*) supports a valuable and characteristic fishery of the NWIFCA district. However, whilst much is known about molluscan bivalve species in general and specifically in great detail for some individual species, little quantitative scientific work has been completed on the cockle populations of North West England (Pers Comms: Cook).
- 2.2. The intention is to use the proposal to transplant cockles within the area known as North Run off Lytham (see Figure 2.) as an experiment to investigate three things:
 - the survival rates of transplanted cockles compared to natural areas
 - the effects on growth of artificially reducing and increasing stock densities of cockles
 - how the presence or absence of cockles affects settlement within a bed.
- 2.3. In addition, the extension of sampling and recording of environmental data across reference sites within the bed will provide the basis for the establishment of baselines for local parameters such as growth and mortality.

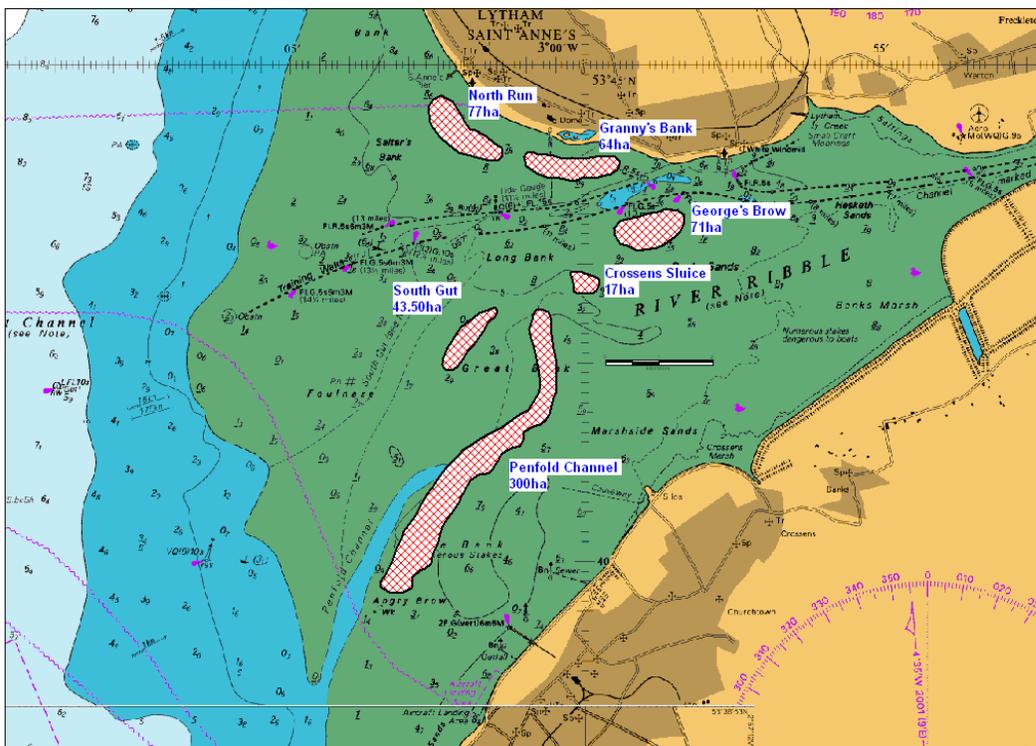


Figure 2. Overview of the cockle beds of the Ribble Estuary, August 2011.

3. Methodology

- 3.1. A study area that encompasses the donor and potential relay areas measuring approximately 3.4km by 1.5km has been agreed with the operator.
- 3.2. Two preliminary surveys will be undertaken, one to refine the position and extent of the donor area and the biomass of cockles available within it – this will inform the relay densities – and another to provide detailed baseline data on the composition of the existing natural stock across the whole study area.
- 3.3. These surveys and subsequent monitoring work will be carried out using appropriate subsets from a survey grid of sample stations at 100m intervals across the study area.
- 3.4. It is proposed that cockles will be taken from a donor area of 50% of the mostly densely ($> 1,000$ individuals per m^2) region (see Fig. 1). Using the results of the survey undertaken in August 2011 this would make an estimated 17.5m individual cockles available for transplant.
- 3.5. Cockles for transplantation will be lifted using a tractor hauled “dry” dredge (see Fig. 3). This type of harvester uses an angled blade to scoop the top layer of sediment onto an angled conveyor that feeds the sediments into a rotating drum (see Fig. 4). The drum is strung circumferentially with piano wire that acts as riddle, retaining cockles above a certain size dependant on the lateral spacing of the wire strings. Smaller cockles and sediment drop through the mesh and back onto the bed.
- 3.6. The operators have considerable experience in the use of this type of dredge having been part of the experimental fisheries in the NWNWSFC district of the late 1980s and early 2000s. Appropriate blade depth settings, tow speeds and drum wire spacing will be determined prior to “harvesting” and checked with NWIFCA officers.
- 3.7. Harvested cockles will be further sorted to ensure that the size range is kept as close as possible to 15mm-19mm shell length. This process is likely to be carried out by hand to avoid any further, possibly critical, stress to the cockles through additional mechanical processing.
- 3.8. Once sorted, the catch will be transferred to a seeding machine for relaying in predetermined areas elsewhere within the bed. This machine is an adaptation of a terrestrial seed drill and will also be tractor towed.
- 3.9. Up to four areas for transplantation will be identified within the study using the findings from the preliminary surveys. Their size will be dependant upon the biomass of seed cockles that is available but will be checked to ensure they are of sufficient scale to enable reliable statistical analysis.



Figure 3. Towed “dry” cockle dredge showing wire drum riddle.

- 3.10. Within each of these areas, the cockles will be relaid at a range of densities to allow comparative analysis between and within them and also against other “reference” areas.
- 3.11. Following relaying a monthly monitoring programme of harvested, transplanted and reference areas will be undertaken. This will entail taking samples of cockles within appropriate regions areas of the study area using a 0.1m² quadrat and washing through a 2mm square mesh.
- 3.12. Counts of cockles of all year classes will be recorded.
- 3.13. Per metre square densities of 2010 year class cockles will be calculated from the samples obtained and the size range obtained recorded from randomly selected, appropriately large sub samples.



Figure 4. *Dredge blade and conveyor arrangement.*

- 3.14. Counts of other bivalve species will also be recorded.
- 3.15. Water salinity and surface temperature readings will be recorded for each area sampled.
- 3.16. The data obtained will be analysed to determine any significant differences in growth and mortality within and between areas and to assess any the effect of varying environmental parameters using appropriate statistical methods.
- 3.17. Separate analysis of 2012 year class cockles will be made should they appear in the samples. The aim of this is to consider the factors that might influence settlement rates and patterns locally. A methodology for this aspect of the work will be drawn up in due course.

4. Appendices