

**NWIFCA Technical, Science and Byelaw  
Sub-Committee**

**6<sup>th</sup> November 2015: 10:00 a.m.**

**AGENDA  
ITEM NO.  
6**

**SCIENCE REPORT**  
**25<sup>TH</sup> JULY – 24<sup>TH</sup> OCTOBER 2015**

**Staffing and Recruitment**

The Science Team has been strengthened by the recruitment of two new officers in the last quarter. Firstly Jonathan Haines has been appointed as our full time permanent Conservation and Environment Advisor. We first met Jonathan back in 2011 when he was one of the first cohort of Wildlife Trust Marine Graduates and produced the Heysham Flat *Sabellaria alveolata* condition report. Since then he has worked as a benthic taxonomist for Thomson Unicomarine Consultancy, and he had an 18 month position with North Eastern IFCA as an Assistant Scientific and Conservation Officer. He is a welcome addition to the team.

Secondly Abi Carroll (new Abi) who has been employed on a 12 month contract using Defra funding to assist with the EMS work. Abi completed her Masters in Marine Environmental Protection with a Distinction at Bangor School of Ocean Sciences in 2014, with a thesis entitled 'Population Dynamics of European Seabass in Welsh Waters'.

All the interviews were conducted using Skype which turned out to be very successful. Abi was invited up to the office before being offered a firm position. As we already knew Jon, and had had recent contact with him during EMS Review training and IFCA TAG conferences, this was not felt to be necessary for him.

Ms Knott and Ms Temple have been busy carrying out a period of induction and organising training courses and equipment acquisition for them both. Once fully trained we are confident the team will be capable of introducing new elements to our workstream.

**Cockle and Mussel Fisheries in the NWIFCA District**

Ms Knott and Ms Temple have been busy with cockle and mussel surveys during the summer months, with details below or in other tabled reports. Daylight hours and spring tides are now becoming problematic as they always do in our District at this time of year.

Generally recruitment appears to have occurred late compared to most years, which could be attributed to the weather. This appears also to be a year of quite dramatic change on some of the mussel beds in particular, with shifting sands and new areas being settled on, while others have been smothered.

Some of the District's cockle beds have received a substantial settlement since the last report, in particular Morecambe beds and Leasowe. The multi-sector Shellfish Liaison Group has been notified, and all IFCOs and Science Officers will prioritise full surveys across the District as soon as the tides allow in the spring to assess whether a potential commercial stock has persisted through the winter, and report back to the Authority at the earliest opportunity.

## **SURVEY AND FISHERIES WORK**

### **Mussel Beds**

#### **Wirral**

##### **West Kirby Mussels**

There are no stocks of mussel at West Kirby, with the bed made up largely of dead shell. Members may recall that this area lies within the NRW Dee Estuary Cockle Order area, and became taken over by mussels when there was a large cockle die off and mussel spat settled on to the remaining cockle shell. It is being monitored to see whether or not it returns to cockle ground.

##### **New Brighton Mussels**

Industry reported a new area of seed mussel on the beach at New Brighton, which was scouring heavily and being ravaged by starfish. Officers brought it to the BMWG, and consulted with stakeholders in the area and there were no major objections. A notice was posted on the website and two authorisations were issued to dredge a limited area (Fig. 1) following HRA in September. One attempt was made to fish it but found very little mussel with many starfish, and the fishery was not prosecuted further. An inspection of the area by Officers on 30<sup>th</sup> September found large quantities of starfish present (Fig. 2), with dead mussel shell and gulls feeding.

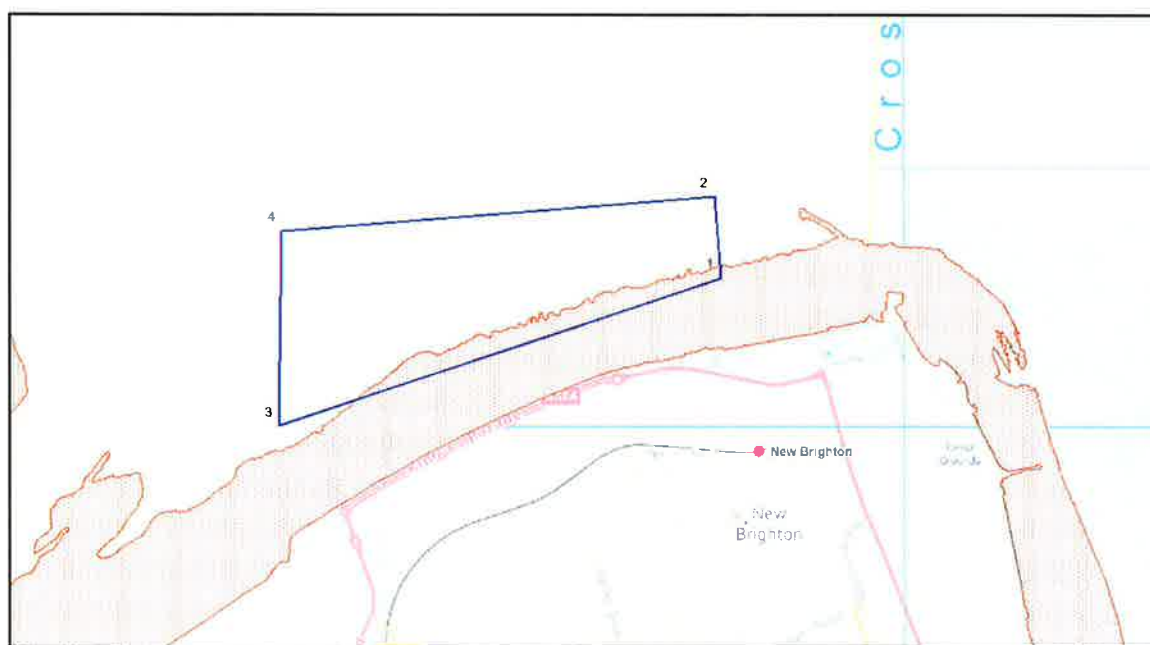


Fig. 1. Illustrative map of New Brighton authorised area for seed mussel, September 2015



Fig. 2. Inspection of the area off New Brighton found large quantities of starfish and dead mussel shell on 30<sup>th</sup> September.

### Mersey Sub-tidal Mussels

Officers received a proposal from Peel Ports regarding the capital dredging of a shingle bank in the Mersey Estuary to allow navigation to the Liverpool 2 development. In August NWIFCA received a benthic report carried out by a consultancy for the developers, (survey conducted in June) which showed the presence of quantities of juvenile mussel within the (subtidal) proposed dredge site. NWIFCA has no previous data on mussel beds in the river as the Mersey only came under the Authority's jurisdiction in 2011. This was reported to TSB on 11<sup>th</sup> August following correspondence between Officers and Peel Ports regarding concerns around the loss of the mussel resource present in the proposed capital dredge site and the possibility of mussel dredgers fishing the stock prior to the capital dredging operation. Peel Ports agreed to consider an application from industry to take the juvenile mussels from the area; however the timescale for this was short. TSB resolved to authorise dredging of the mussel (NWIFCA Byelaws 3 and 12) in the area concerned should an application be received. NB. No Habitats Regulations Assessment was necessary to authorise the fishing as one had already been carried out by the developers for the capital dredge.

Investigations were carried out by Officers with FSA, Mersey Port Health Authority and Cefas to ascertain the legality of relaying of this seed mussel given its prohibited status (due to chemical contaminants). Capital dredging was planned to be carried out by the Docks on 24<sup>th</sup> August. NWIFCA issued authorisations to two mussel dredge vessels on 21<sup>st</sup> August - however following initial inspections of the area by the vessels, the juvenile mussel present was not in quantities feasible to dredge.

### **Ribble Estuary**

Seafield Road – Members will recall that following an HRA, a limited seed mussel fishery was authorised on the mudflats around the Seafield Road slipway at Lytham back in May. The general view from historical knowledge was that the mussel that had settled into the mud in this area would

not survive through the summer. In total ten authorisations were issued and five of them worked. Although a 20 tonne TAC (Total Allowable Catch) had been set on this fishery as a precautionary measure, only 3 tonnes were harvested.

The area received multiple settlements and in some areas the mussel has grown on very fast – putting down a layer of thick soft mud which is washing out. Officers were approached by the industry back in August and after an inspection, it was considered that the area should only be fished for size mussel. However areas of mussel on the inner training wall spread out as it grew, with some of it approaching size and some of it on the top of the wall washing away. Following reports of die off and scouring a further inspection was made along with industry and the local authority beach officer in September, and a proposal to open a limited fishery along the low water line (Figs. 3 and 4) to remove the scouring mussel was agreed. An HRA was carried out, a notice placed on the website and Byelaw 3 permit holders invited to apply on an individual basis. The fishery is to only be accessed by boat as running a quad bike over the inner shore will not only run the risk of getting stuck in the mud, but cause damage to the smaller mussel, which officers intend to monitor for its survival and persistence. Therefore permit holders must have the boat endorsement on their permits in order to prosecute this fishery. To date (21<sup>st</sup> October) fifteen authorisations have been issued.

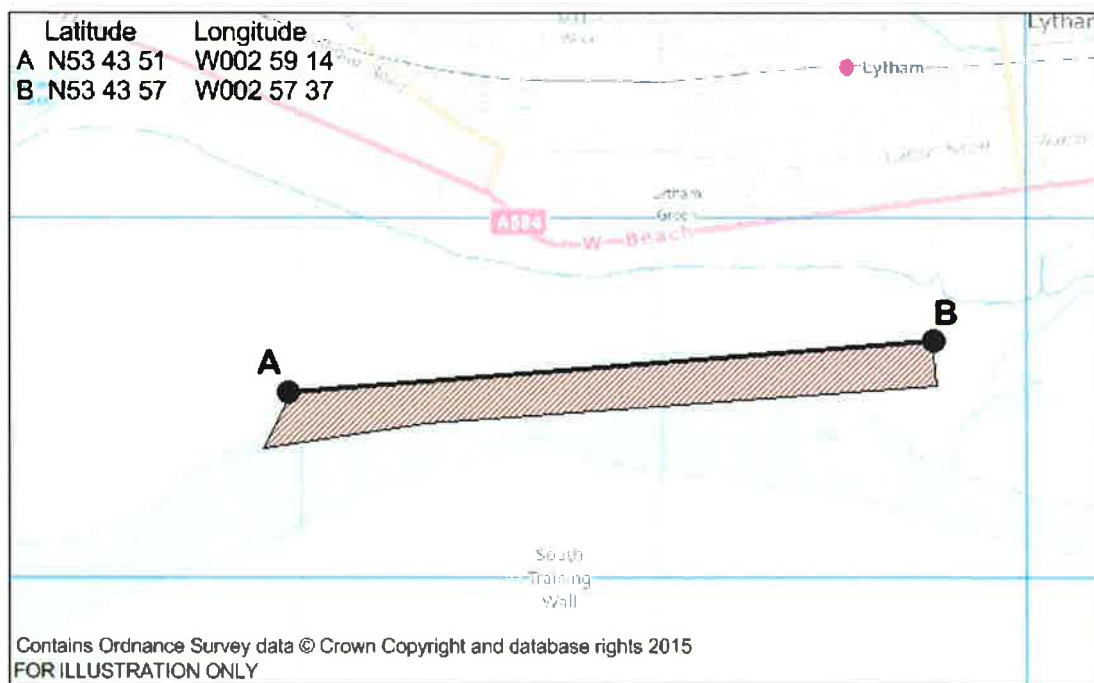


Fig. 3. Seafeld Road, Lytham. Black demarcation line shown - fishing for undersize mussel is authorised in the area south of this line. Red filled area shows rough area of mussel in the authorised area.



Fig. 4. Google Earth image of Seafield Road, Lytham. Demarcation line is a clear line of sight from where the training wall meets the beach (on the western end) to the end of the sailing club jetty. Fishing is authorised in the area south of this line.

Outer training wall – a low level of fishing for size mussel continues on the outer walls of the Ribble Estuary. This fishery has been on-going for a number of years and is prosecuted by around six Byelaw 3 permit holders.

### **Fleetwood**

Inspections were made of the five skears off the coast at Fleetwood (Fig. 5) on 4th August and 29th September. Members will recall that the Authority authorised the dredging for seed mussel of the Perch Scar area last year following a request from industry and lack of interest from hand-gatherers.

All five skears had received some mussel settlement, with varying densities and stability, and it had been thought from the August inspection that there might be a fishable resource developing on Perch scar then. However, the September inspection showed that much of this mussel had either washed out, been predated on, not put on much growth or had gone hard-in. Officers intend to return on the next set of spring tides at the end of October to confirm whether or not this situation has improved.

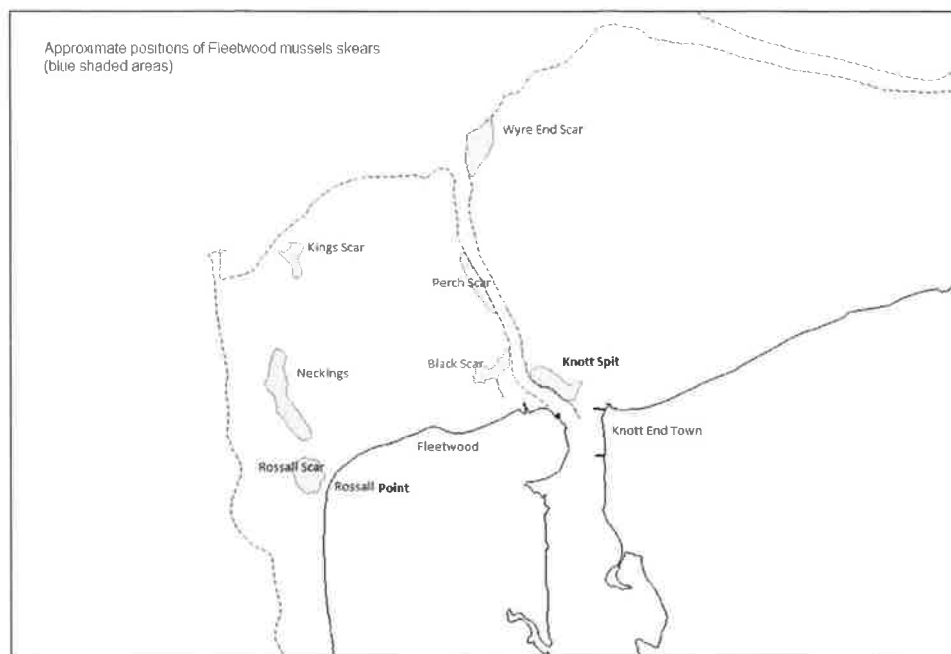


Fig. 5. Approximate locations of mussel skears at Fleetwood and Knott End

The mussel on the other four scars, Black Scar, Kings Scar, Neckings and Rossall Scar had persisted to varying degrees but was not considered to be commercial in its extent. However it should be noted that it had attracted a number of birds, namely gulls, as would be expected.

### Knott End

Wyre End Scar– was inspected on 1<sup>st</sup> August and found to only hold an amount of 2014 mussel around the periphery of the bed, with a number of birds feeding on it. Much of this was gnarled and barnacled. The raised centre of the bed, covered in green filamentous algae, was barren of mussel.

Heysham Flat – please see separate report tabled.

### South America and Falklands

Following a request to authorise a limited seed mussel dredge fishery from an area of the Falklands bed in north Morecambe Bay, an inspection was carried out by science officers and IFCOs on 1<sup>st</sup> September, on a 0.3m ebb, by drying out a RIB on the bed. Industry representative and Authority Member Trevor Jones accessed the area by hovercraft and joined officers on the bed.

The area had a covering of dense bootlace weed – *Corda filum*. Attached to some strands was sparse pinhead mussel showing the bed had been subject to recruitment (Fig. 6). However there was no spat evident on the ground, which was dominated by size mussel from 2014 year class (Fig. 7 and 8). This was mainly 'hard-in' in sandy sediment, with areas of cobble substrate between with associated macro-fauna and flora (anemones, red algae, kelps).

There were one or two starfish on the bed, and some crabs (shore crab, decorator crab and edible crab). It was possible to walk to the northern edge of the bed, cross a very narrow and shallow channel and continue on to the next sandbank. During previous fly-overs and hovercraft surveys this would not have been possible, again showing that the area is generally sanding in and over.

There was no mussel mud evident. Officers concurred with Mr Jones that the bed was not suitable for dredging this year. Ideally it should be monitored when tides allow to assess whether this single year



class of mussels persists over winter, or if not whether it scours or is predated on by starfish and crabs. It is also surmised that this relatively large bed (Fig. 9) may become inundated with sand in line with the more northern beds of the South America area.

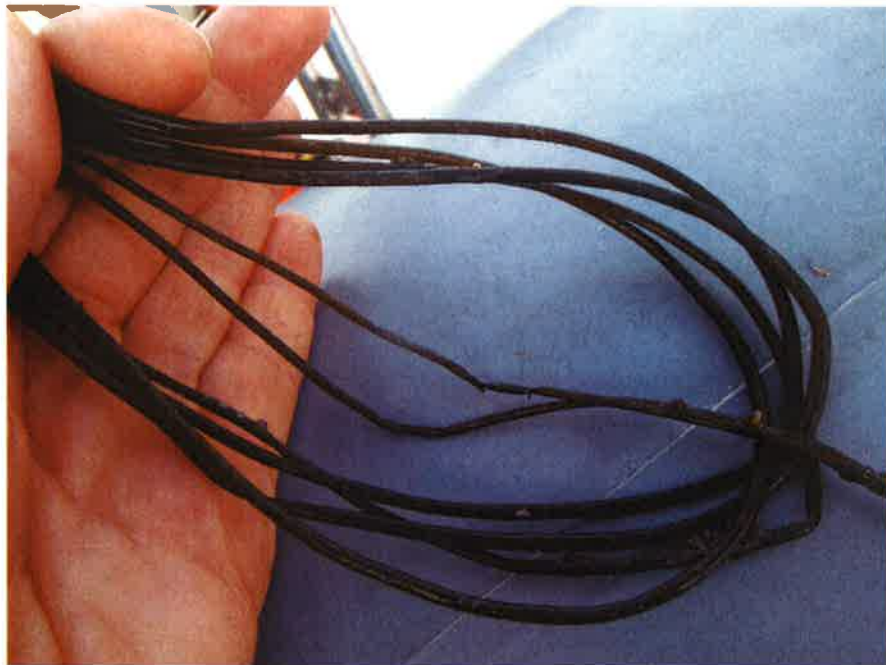


Fig. 6. *Corda filum* on Falklands skear with sparse tiny mussel spat. 01-09-15



Fig. 7. Remaining 2014 mussel on Falklands skear. 01-09-15



Fig. 8. Remaining 2014 mussel on Falklands skear. 01-09-15



Fig.9. The extent of the Falklands skear. 01-09-15

### **Low Bottom**

Officers will provide a verbal report on the state of mussel stock following an inspection on 27<sup>th</sup> October.

### **Foulney**

The mussel bed at Foulney was surveyed using the Dutch Wand methodology to assess biomass on 3<sup>rd</sup> August (0.5m tide). The mapping below (Fig. 10) shows transects that were walked. (Note the



base map used in MapInfo does not reflect the true low water marks now found on this skear). There was a problem with the GPS so some of the transects were conducted by eye to cover a zig zag pattern across the bed. Samples using a corer were taken every 25 hits. The total bed size was estimated at around 40.8 ha with 77% coverage giving an estimated 5253 tonnes of mussel biomass.

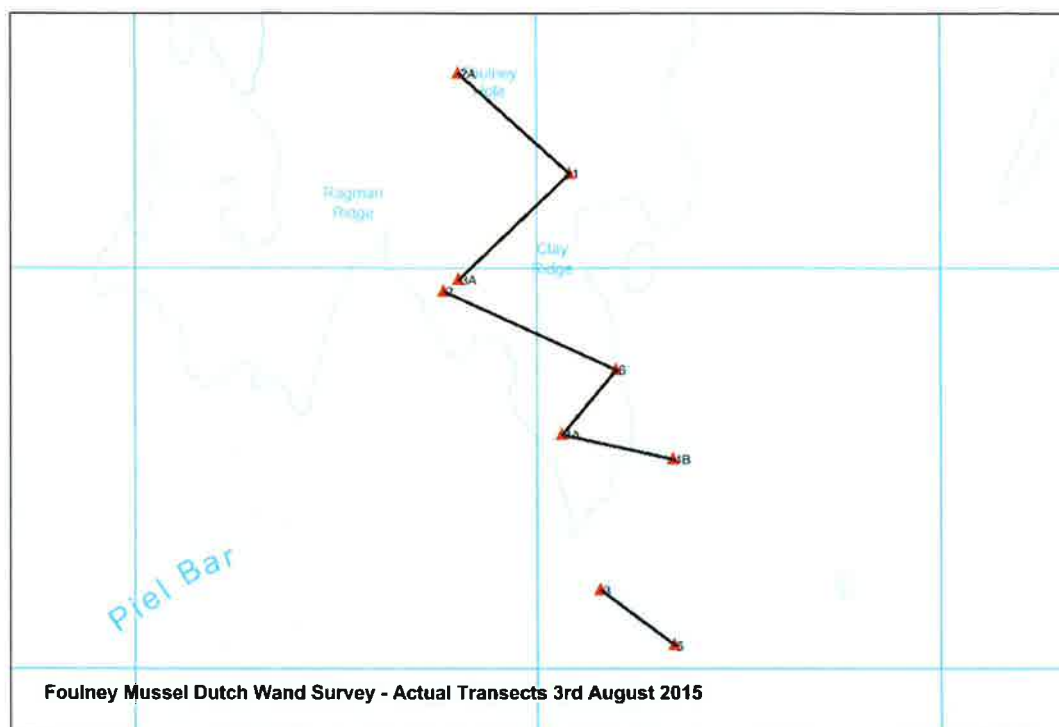


Fig. 10. Dutch Wand Survey to assess mussel biomass on Foulney. 3<sup>rd</sup> August 2015.

Sample 5A to 5B contained the largest mussels (2014 remaining). It appears off the skear but is actually on an 'island' off the bottom of the skear that can only be reached on the biggest tides due to a channel running between it and the main skear. There were some starfish still littering the north eastern part of this bed which had previously been observed swarming over western edge. This island had around 99% mussel coverage, and was an area that had been hand-gathered in 2014.

The rest of the skear held a mix of sizes with a great deal of broken shell. Much of the lower skear was covered in a dense mat of green algae, covering the mussel underneath. This is a common occurrence on this skear and in some years appears to protect the mussel from being washed out in scouring.

A further inspection is due to take place on 27<sup>th</sup> October and officers will provide a verbal update to members.

### Duddon Estuary

The mussel skear in the channel at Hardacre, Duddon Estuary was subject to a late but dense settlement. All hand-gathering has ceased there for the time being. Officers will provide a verbal update following a further inspection on 27<sup>th</sup> October.

## Solway

### Ellisons Scar

An inspection of Ellisons Scar mussel bed (in the Solway) was carried out on 1<sup>st</sup> October. The inner bed had very little mussel, which was patchy, old and barnacled, with mounds of *Sabellaria alveolata* present. The middle bed held a denser, cleaner mix of sizes of mussel and gulls were seen feeding. A Dutch wand survey was carried out on a portion of this bed - due to its size not all of the area could be covered on this tide and a triangular shaped track was walked by eye and sampled every 25 hits with a corer (Fig. 11). It was estimated from the results that this half of the bed (around 9.4 hectares) contained roughly 1300 tonnes of mussel. However as the Dutch wand survey was not carried out in full and only in a limited area in a triangular shape this is very much an estimate. It was estimated that the total area of mussel bed covered 20 hectares. The outer bed uncovered but due to time limitations, the size of the whole area and the channel between the beds, it was not inspected.

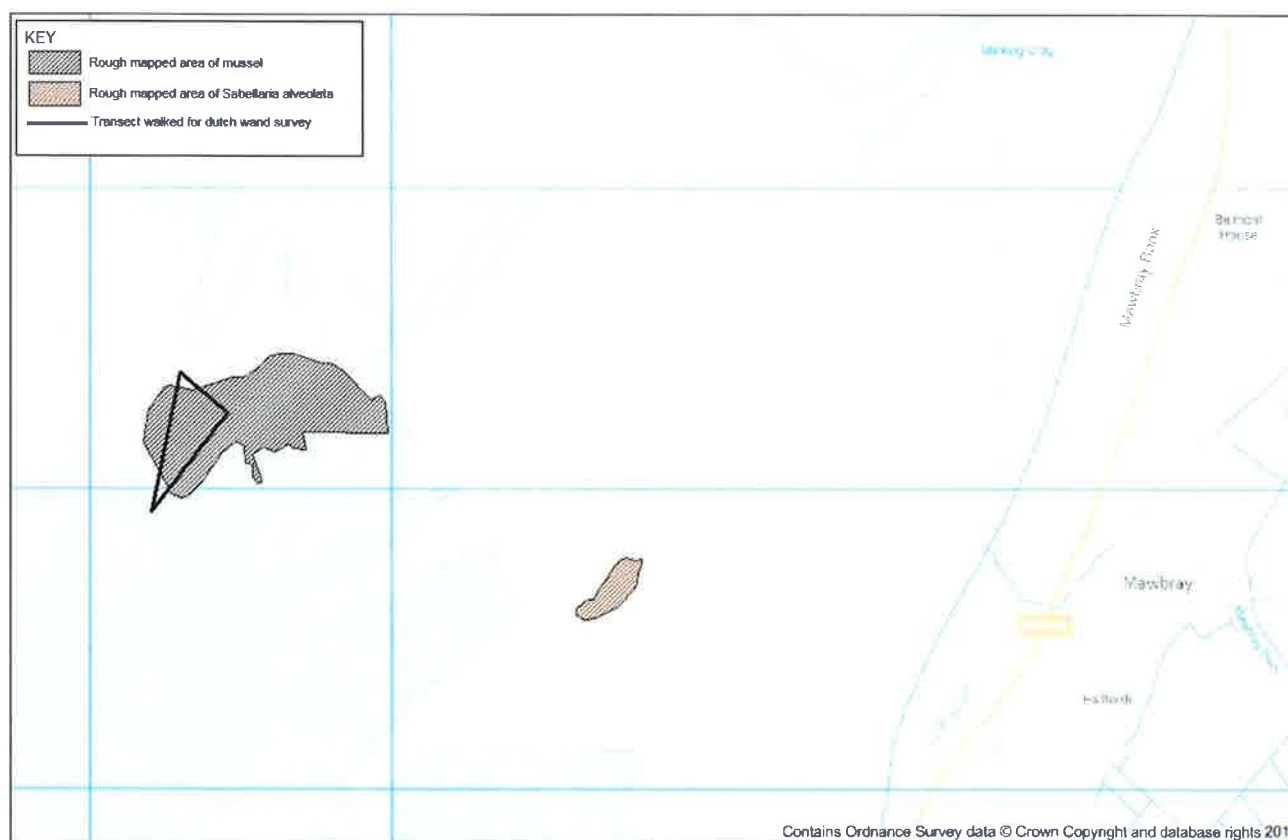


Fig. 11. Mapping from the Ellisons Scar inspection on 01-10-15

## Cockle Beds

### Wirral

During an inspection on 30<sup>th</sup> September on the North Wirral foreshore, Officers saw oystercatchers and knot feeding in a dense area of mud. Closer inspection found large quantities of fingernail size cockle present. This will be closely monitored and a full survey carried out in the spring.

### Ribble

IFCOs regularly inspect the sands on the Southport beds – Penfold Channel and South Gut, plus Foulnaze if it can be accessed on quad bikes, and the Lytham and St Annes beds – Grannys Bay,

North Run and Mousehole. There does not appear to be any evidence of much settlement of cockles. This situation will be monitored and action taken to fully survey the beds should it change over the winter.

### **Morecambe Bay**

As previously reported three surveys were carried out on the Leven Sands cockle bed following indications that a large cockle stock existed there earlier in the year. However all three surveys gave results indicating low stock levels.

There is now evidence of a late but significant cockle spatfall across parts of the Bay. It is possible many of them will not survive the winter, through natural die-off and predation. Much of it will depend on the weather and the amount of rainfall. However, cockles are able to move around and predicting survival rates is not possible. A full and detailed survey will be planned for the spring to assess the stocks at the earliest opportunity.

### **Solway**

There has been no change from the previous reports and no indication of any settlement.

### **Other Fisheries**

In September Officers received a letter from the Dee Estuary Conservation Group requesting information on the regulation of fisheries in the Dee Estuary and reporting concerns around trawling activity for flounder there. Discussions with local fishery officers showed that this activity takes place mainly or entirely on the Welsh side of the estuary with little change over the years. Officers responded to DECG to this effect, along with an explanation of the regulations in place and stating that Officers will record more detail of this activity on the English side of the Dee in future so that the scale of the fishery can be monitored.

### **Inspection on 'Bay Protector'**

On 14<sup>th</sup> and 15<sup>th</sup> October Science Officers Sarah Temple and Jon Haines assisted with a patrol on 'Bay Protector', covering the Mersey to Fleetwood on the first day, and the Mersey and Dee on the second day. A huge number of birds including common scoter, cormorant, guillemot, razorbill and gannet were seen in Liverpool Bay. Bird sightings and fishing activities were noted and will help with upcoming EMS assessments. The patrols also provided Jon with a good overview of the southern part of the District, the fishing occurring there and allowed him to meet other officers.

### **Crab Tiling and Mussel Beds**

At the NWIFCA meeting in June Mr Rob Benson raised concerns that crab tiling in the Barrow area was interfering with mussel beds, and possibly in breach of NWSFC Byelaw 12, para. 3, whereby it is an offence to dig in any mussel bed without written authority. Officers are not aware of any crab tiling in the commercial mussel beds in the Barrow / Walney Channel area. Crab tiling does occur in the channel on the mudflats. Mr Benson may have been referring to an area north of Jubilee Bridge in the channel outside of Kingfisher's depot which was the area authorised for a mussel relaying trial back in 2012. However this trial was not progressed further and no mussel is fished commercially there. IFCO Dixon will inspect the area and report back on his findings.

### **Cardunock Mussel Poles**

Recent correspondence with RSPB and Natural England colleagues reported on a development in the Solway Estuary at Campfield / Cardunock Marsh whereby a number of wooden poles had been placed for aquaculture by one individual on Lonsdale Settled Estate land. IFCO Thinessen went to

investigate and found around 160 posts in total, 8-10 ft tall made of solid Iroco 6x6, set out in a T formation, located about 1.2 miles from the shore (Figs. 12 and 13). It is not considered that they are interfering with any public fishing activity, however concerns were raised about them being a potential navigational hazard. This point was raised with Mr John Turner for the Estate who confirmed that they had been buoyed and that action would be taken to ensure if the buoys had gone they would be replaced. Natural England have been involved from the conservation aspect of the Solway designated European Site and SSSI.

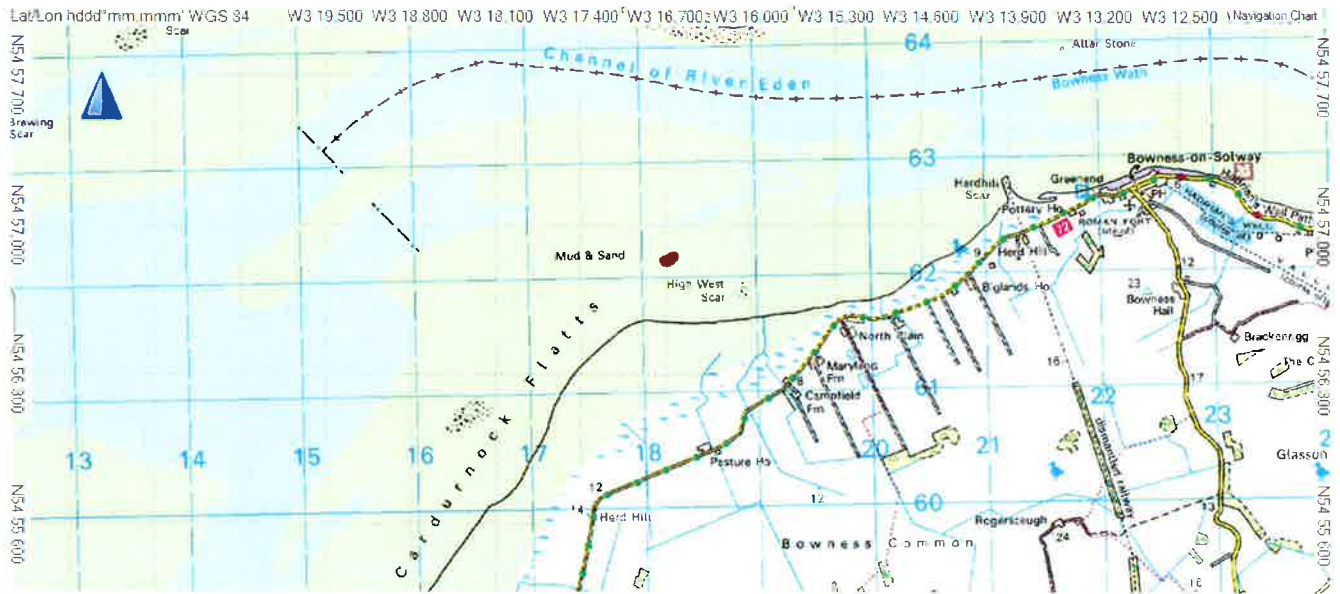


Fig. 12. Location of the poles on Cardunock Marsh indicated by the red polygon.



Fig. 13. Wooden poles at Cardunock Marsh – September 2015.



## **Assessment of Fishing Activities in European Marine Sites**

Work continues with carrying out the HRAs for all fishing activity against all conservation features under the DEFRA revised approach to fisheries management in EMS. HRAs are carried out for all active fisheries such as the seed mussel fisheries, and will be carried out for all size mussel fisheries in future. It is anticipated that the appointment of the two new officers will assist the science team to reach the 2016 deadline for management to be in place, as it is not expected that there should be any new management measures required in the District. However this will only be fully determined by completing the HRAs.

Officers continue to attend national meetings and teleconferences with Natural England, MMO and Defra. A recent telecon concerned the cross-boundary assessment and management of the Liverpool Bay SPA with MMO, Natural England, Natural Resources Wales and Welsh Government.

Ms Temple and Knott attended a one day training course with Natural England on the new Conservation Advice packages on 12<sup>th</sup> August, and look forward to the introduction of a new web portal to assist in finding and interpreting the advice.

### **NORTH WEST COAST CONNECTIONS - NATIONAL GRID work on routing options for 400KV cables from Moorside nuclear power station**

Members may recall that the Senior Scientist was previously instrumental in facilitating dialogue between fishermen in Morecambe Bay and National Grid over their positioning of the ventilation / escape shaft for the proposed tunnel under the Bay to carry the high voltage electricity cable from Moorside nuclear power station (new build) into the grid. The survey work, including deploying survey vessels, metocean buoys and a jack-up barge for seismic surveys and boreholes, was delayed during the summer and was carried out at the one crucial time when the bass had started running and fishing activity was due to increase. The positioning of the buoys in the channels in particular blocked access to the fisheries and was a great cause of consternation to the fishermen. The Chair of the TSB was contacted as the Senior Scientist was on leave and he relayed these concerns to her on her return. She contacted National Grid directly to express real frustration that the very issues that the fishermen had raised as the most important had not been addressed. The survey work has now been completed for this year. However, there are further concerns that at some point there may be a need for Grid to carry out surveys over Heysham Flat – disturbing / causing damage to not only the mussel bed but the honeycomb worm reef for which Byelaw 6 has prohibited bottom towed fishing gear – and over the cockle beds in the north and west of the Bay.

Once again it shows the need for Officers to remain vigilant on all the developments proposed for the coastal reaches of our District and to act to ensure fisheries interest are represented and not lost.

### **Moorside Power Station**

Science Officers are attending the Moorside Power Station quarterly EIA Technical meetings relating to marine environment and fisheries. A specific meeting with fishing industry is planned for 2<sup>nd</sup> November which the Senior Scientist will attend.

### **Cumbria Wildlife Trust Marine Trainees Partnership**

The Partnership project continues in its fourth year with the Marine Trainees assisting with the mussel survey work at Heysham Flat, surveying the honeycomb worm reef at Heysham Survey and writing the report on its Condition and Distribution, and a new project looking at Bird Disturbance from hand gathered fishing at Heysham planned with RSPB input.

## **TAG**

The Senior Scientist attended the IFCA Technical Advisory group meeting in London on 28<sup>th</sup> July and can provide information on this meeting on request.

## **Irish Sea Maritime Forum / Celtic Seas Partnership Marine Strategy Framework Directive Workshop**

Science Officer Sarah Temple attended the Irish Sea Maritime Forum / Celtic Seas Partnership Marine Strategy Framework Directive Workshop in Belfast in September. The workshop explored how the Irish Sea community can support the delivery of MSFD, a rapid ecosystem services approach, guidelines for terrestrial planning and recommendations on trans-boundary governance of the Celtic Seas.

## **Halite – Gas Storage in Salt Caverns at Preesall near Fleetwood**

Officers are remaining vigilant as to how this issue progresses. The Senior Scientist was alerted to a sentence within the document produced to attract Chinese investment in the region entitled 'Northern Powerhouse Investment Pitchbook' which contains a foreword from the Chancellor George Osborn. The sentence states 'A high proportion of the subsurface and engineering work for the project has already been completed'.

A letter sent to the Chancellor from the Protect Wyre Group Chair Ian Mulroy addresses this and several other issues within the document thus:

"If you or your advisors were to visit the site you would see that Halite has hardly put a spade in the ground. They are relying on old borehole data and upon being able to develop a shallow area of virgin layered salt which has been subjected to a limited seismic survey. There are no pipe tracks, excavations, buildings or anything else one might connect with a development of this magnitude and be considered as engineering work. There is no mention of the 'soon to be contested' Compulsory Purchase Orders which could blight the scheme for years to come.

It's a green field agricultural site littered with old brine wells from a previous ICI development".

## **Seal Deterrents in the Ribble Estuary**

Fishermen in the Ribble have asked the Science Team for advice on a problem they have with seals ruining their catch. It appears that one or two individual seals have learned to follow the boats out, and as soon as any fish, particularly bass, are caught they eat what they can get at. When a catch may comprise of nine fish and four or five of them are damaged in this way, it is obvious that the fisher's income is sorely affected. The fisher who reported this stated he did not wish to harm the seal and knew they needed to fish too, but was there anything that could be done to deter them.

Officers investigated and this report briefly summarises technical and practical measures that could potentially reduce the amount of seal depredation.

Seal depredation is the removal of or damage to fish from fishing gear by seals, compromising the catch and potentially a fisher's livelihood.

Grey seals (*Halichoerus grypus*) and harbour (*Phoca vitulina*) (also known as common) seals are listed under Annex II of the Habitats Directive. This means that exploitation of the seal species is only allowed under strict conditions (licences, granted by Natural England), provided that the conservation status is monitored to ensure that they are maintained at a favourable conservation status. The seals present in the Ribble Estuary are most likely grey seals, as these are the most common in the area.

In a study by Coram et al 2014 into the effects of seal depredation on Irish set net fisheries, it was noted that various factors affect the magnitude of seal depredation. These factors include proximity to haul outs or colonies, vessel characteristics (e.g. engine noise), and soak time. Seal depredation was estimated to increase by approximately 5% per hour of soak time. The breeding season for the grey seal in the UK is autumn (Durham University 2015). Seals will likely feed more in the run up to breeding at this time of year, and therefore depredation may be more prevalent.

### Smart Fishing/ Soak Time

Removing fish from the nets shortly after they are caught, reduces the chance of seals noticing and therefore taking or biting the catch. However, this would involve fishermen staying with their nets throughout the entire fishing time. Soak time is something that can be controlled by fishermen and has been reported to be an effective mitigation measure (Coram et al. 2014). Reducing the soak time (time nets are in the water) of nets reduces the chance of seal depredation simply by giving the seals less time to take the fish.

### Net Type

Use of stronger netting materials could prevent seals from taking fish from nets. Using trap nets instead of gill or trammel nets could also improve catch retention and quality. Varjopuro & Salmi (2006) tested net strength of trap nets and developed a 'seal-proof' net. This trap net was made of strong material that is not easy to bite through. The fish are, to an extent 'safe' from depredation by seals due to the fact they are enclosed within the trap net. Figure 1 shows a trap or pontoon net that could reduce the risk of seal depredation. In Sammanfattning's literature review however, there were reports of seals damaging fish within these type of net.

### Acoustic Deterrent Devices (ADD)

There is a large amount of research on ADD's, mostly focused on fish farms (Coram et al 2014) for the protection of caged salmon. Reports of effectiveness are variable; there is evidence that the devices are successful, although seals have been observed to become accustomed to the noise emitted from the device. Much of the current technology is designed for large fixed nets or a caged aquaculture facility, and needs a fixed power supply (Wilson, undated). Small scale netting could make use of a battery operated system, however these are expensive and with particular reference to the Ribble netting, this may prove inaccessible due to the costs involved.

### Culling

Control of seal populations by culling is a very controversial subject. Allowing the killing of seals near to their gear by fishermen may make them feel better in the short term but in reality it would take a large scale cull of the population to have any effect on depredation. In some rare cases, it is a rogue individual that is causing the problem - if this were the case then killing an individual may be a solution (Harwood 1987).

### Conclusions:

There do not appear to be any straightforward answers to this issue. The following appear to be the only current measures that could be considered:

- Remaining in the boat and servicing the nets throughout the time they are in use is possibly the most effective solution to seal depredation, partly through physical human presence being a deterrent and by never giving the seals a chance to take the fish. However this is already carried out in the fishery in question;

- Obtaining a licence to shoot a small number of rogue individuals may be a short term solution until others learn where to find the netted fish;
- Large scale culling of seals - a controversial topic and unlikely in the near future.

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**Science Officers**  
**24<sup>th</sup> October 2015**