Eastern IFCA

Inshore Fisheries and Conservation Authority

RESEARCH REPORT
2014

TITCHWELL MARSH
MUSSEL STOCK ASSESSMENT

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CONTENTS

TITCHWELL MARSH MUSSEL BED

Introduction

Titchwell Marsh is a popular nature reserve owned and managed by the Royal Society for the Protection of Birds (RSPB). Located between the villages of Titchwell and Thornham, the reserve has a variety of habitats including reed beds, marshland, fresh and brackish water lagoons and sandy beaches. Together these provide feeding, roosting, breeding, overwintering and staging sites for a number of nationally and internationally important birds. The area plays host to important saltmarsh plant communities and supports important assemblages of several rare moths and beetles. In order to protect these habitats and dependant species, the area is designated as a Special Protected Area (SPA), a Special Area of Conservation (SAC), A Site of Special Scientific Interest (SSSI) and a Ramsar site. It is also a part of the North Norfolk Coast Area of Outstanding Natural Beauty (AONB) and Biosphere Reserve.

Figure 1 Satellite image showing location of Titchwell Marsh nature reserve and mussel bed, Google maps, 2012.

Situated on the beach is a small area of exposed Neolithic peat upon which mussels regularly settle (figure 1). When local fishermen approached Eastern Sea Fisheries Joint Committee (ESFJC) in 2009 requesting permission to fish these mussels it was initially unclear who would be responsible for managing a fishery within a nature reserve maintained by the RSPB. Consultation with the Crown Estate landowners, however,

confirmed that because the Joint Committee would need to relax Byelaw 4, minimum size of mussels, and authorise the fishing activity under Byelaw 2(b), allowing the removal of mussels for the purpose of stocking, the responsibility for the management and enforcement of the fishery was that of the Joint Committee. Since then the Joint Committee (and its successor, Eastern Inshore Fisheries and Conservation Authority (Eastern-IFCA)) have conducted a number of stock assessment surveys on this bed.

In 2009, when the first survey was conducted at this site the total biomass was recorded at 420 tonnes. The exposed location of the bed makes the mussels on it vulnerable to winter storms, however, and subsequent surveys have shown a history of loss and recovery as mussels are lost in winter and new settlements occur in summer. These fluctuation can be severe, with the stocks falling as low as 10 tonnes in March 2010 and 72 tonnes in March 2012, with recoveries back to 146 tonnes in September 2010 and 194 tonnes in October 2012. Irrespective of recoveries, none of the surveys have shown stocks as high as those recorded during the initial survey in 2009.

Method

As part of the on-going survey program the Titchwell mussel bed was surveyed on the 2nd April and the 8th December 2014. The methodology used for these surveys was identical to that used to survey intertidal mussel beds in the Wash (See report, WFO Mussel surveys, 2014).

Results

Titchwell Marsh Mussel Survey - April 2014.

- Area: 2.7 hectares
- Coverage: 28%
- Mean Density: 0.11 kg/0.1m^2
- Total Stock: 30 tonnes
- Stock ≥ 50mm: 0 tonne

At the time of the previous survey in August 2013, mussel was found to occur in seven discrete patches covering an area of 3.5 hectares. When the Authority revisited the bed in April 2014, the extent was found to be fairly similar to that of August the previous year, densities of mussel however where greatly reduced and consequently percentage cover. Figure 2 shows the extent of the mussel beds in April 2014 compared to August 2013. Figure 3 shows the mussels attached to the raised bed of peat.

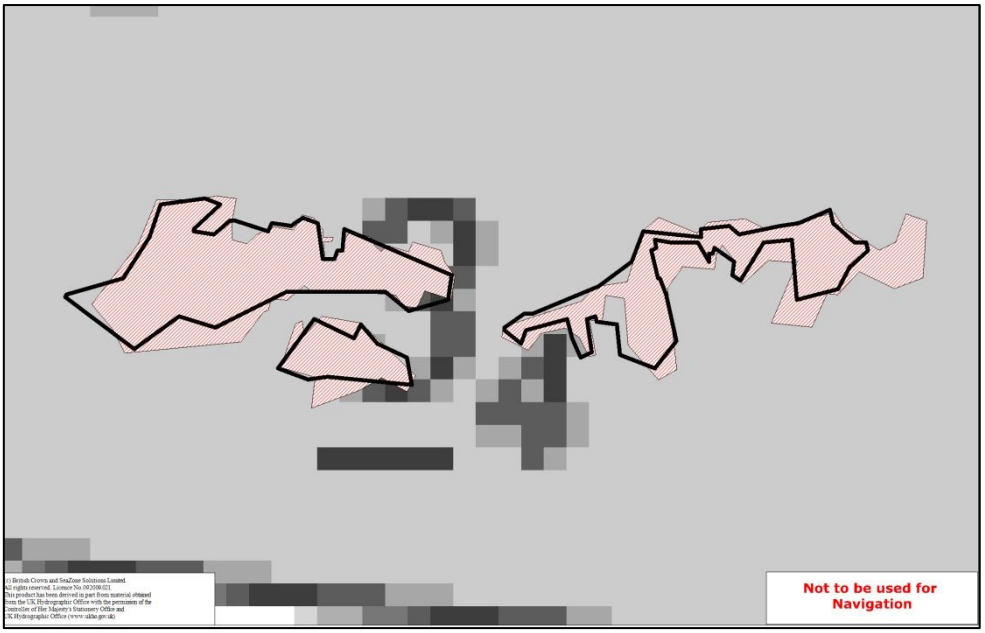

Figure 2 Titchwell Marsh mussel bed in April 2014 (Red hatched) compared to August 2013 (black outline)

Within the bed, samples were collected from every fourth hit, producing 18 samples from 289 "hit/miss" determinations. Taken as a whole, the bed was found to have an average coverage of 28% and a mean density of 0.11 kg/0.1m^2. Both of these figures are lower than those recorded the previous August, when the coverage was 54% and the mean density was 1.10kg/0.1m^2. From these figures the total biomass of mussels on the bed in April 2014 was calculated to be 30 tonnes, none of which had attained the Minimum Landing Size (MLS) of 50mm. This means the biomass of mussels on the bed has declined by 99 tonnes during the winter. While some of this reduction may be attributed to the actual loss of mussels from the bed during winter, much will be due to the decline in meat yields that mussels undergo in winter, when food shortages cause them to metabolise their carbohydrate, protein and lipid reserves. Figure 4 shows the size frequency of the mussels at Titchwell in August 2013 and April 2014. These size frequencies show a marked difference, suggesting that some growth had occurred possibly as a consequence of the mild conditions over the winter period.

Figure 3 – Photograph of the Titchwell mussel bed in February 2013, showing mussels attached to raised bed of peat.

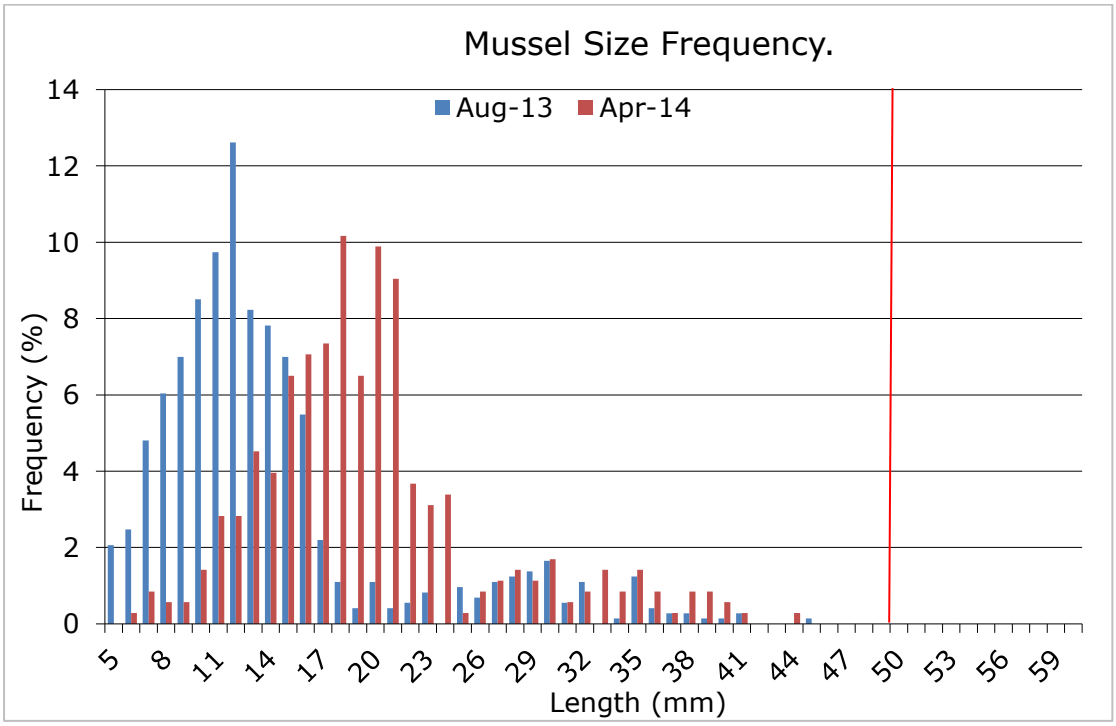

Figure 4 - Population size frequency of mussels found at Titchwell in August 2012 and April 2013.

Titchwell Marsh Mussel Survey – December 2014

- Area: 2.6 hectares
- Coverage: 38%
- Mean Density: 0.25 kg/0.1m^2
- Total Stock: 66 tonnes
- Stock ≥ 45mm: 0 tonnes

The bed was visited again in December 2014, during which samples were collected from every fifth hit, producing 14 samples from 183 "hit/miss" determinations. This survey found that some of the mussels that had been present when surveyed in February had shifted. This had resulted in the area of the bed declining slightly from 2.7 hectares to 2.6 hectares (see figure 5).

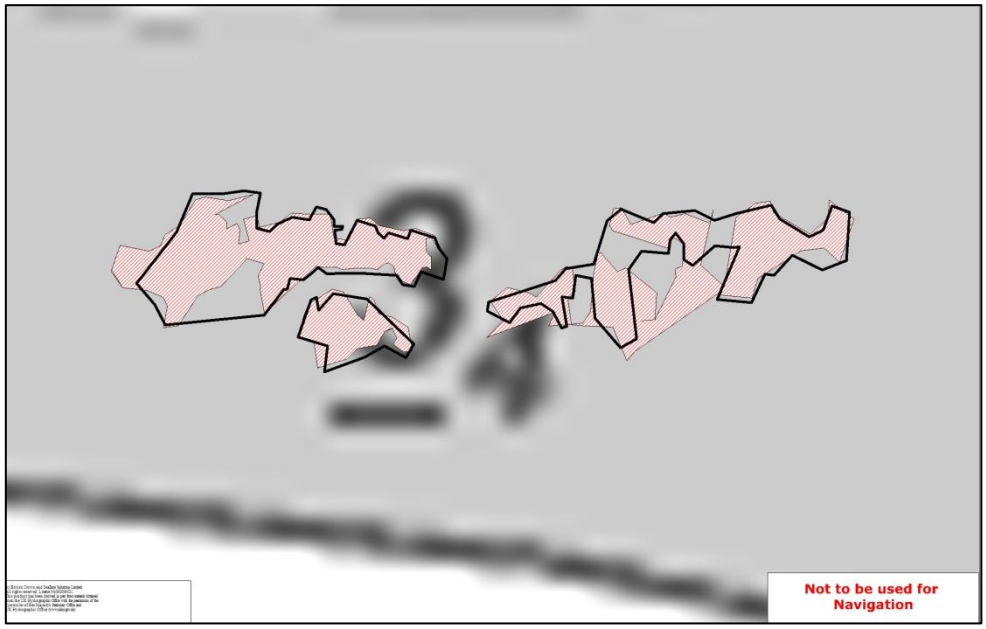

Figure 2 Titchwell Marsh mussel bed in December 2014 (Red hatched) compared to April 2014 (black outline)

While the area of the bed has shown minor decline the coverage of mussels within the bed has seen a 10% increase over the summer months with a resulting increase in mean density of 0.14kg/0.1m^2. The increase in stock biomass and mussel density is described by figure 6, which shows the changes to size frequencies that have occurred since the spring survey.

It is apparent that the stock surveyed in April has grown on and remained largely in-situ, additionally the recruitment of new seed had helped the coverage of mussels to increase from 28% in April to 38% in December, and the mean density to increase from 0.11 kg/0.1m^2 to 0.25 kg/0.1m^2. The growth and retention of mussel surveyed in the spring, combined with recruitment of fresh seed has resulted in the total stock biomass to more

than double from 30 tonnes to 66 tonnes however; None of these stocks were found to have attained the Minimum Landing Size of 50mm. While this increase in stock biomass is encouraging figure 2.5.7 shows that the recovery is far from remarkable. This bed is known to be extremely ephemeral in nature and while the current trend seems to be of recovery experience from previous surveys show that a sudden decline is equally possible.

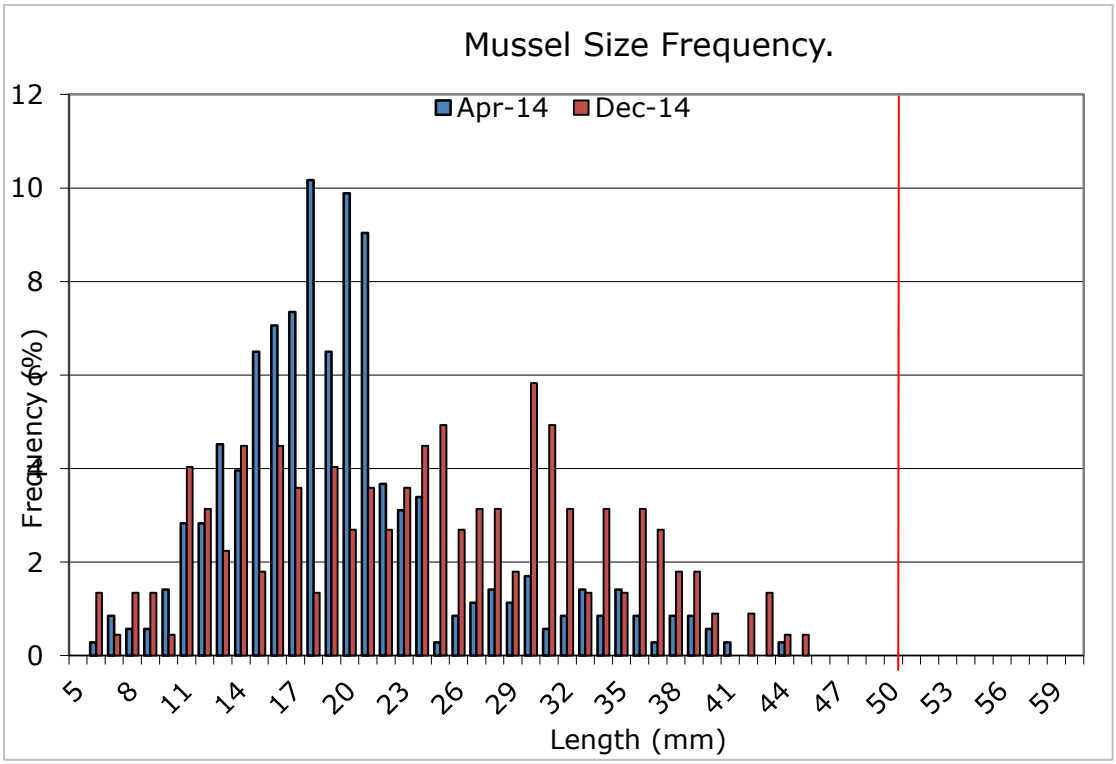

Figure 6 – Comparison between the population size frequencies of mussels found at Titchwell in April 2014 and December 2014.

2.5.4 Discussion

An outcropping of exposed Neolithic peat on the lower shoreline of Titchwell Marsh provides a suitable habitat for the settlement of mussel seed. Anecdotal evidence from fishermen suggests that this bed is ephemeral in nature, regularly attracting good settlements of seed that are subsequently washed away. Figure 7 shows the biomass of mussels estimated to be present on this bed during the ten surveys the Authority has conducted there since September 2009. While demonstrating mussels can survive over winter on this bed, it does show clear reductions between the stocks surveyed during the September 2009, September 2010 and October 2010 surveys and the stocks present during their following spring surveys. From this chart it can be seen that the greatest loss occurred following a period when the mussels were at their highest biomass, when they declined from 420 tonnes to just 10 tonnes. The site is particularly exposed, and while the peat provides a firm substrate for mussels to attach to, the accretion of soft, unstable 'mussel mud' beneath the mussels renders the bed vulnerable to wave and

storm action. Accretion is greatest when the stocks are high, and during the summer months when the mussels are most active, so it is of no surprise that the greatest losses have occurred when the stocks have been at their peak.

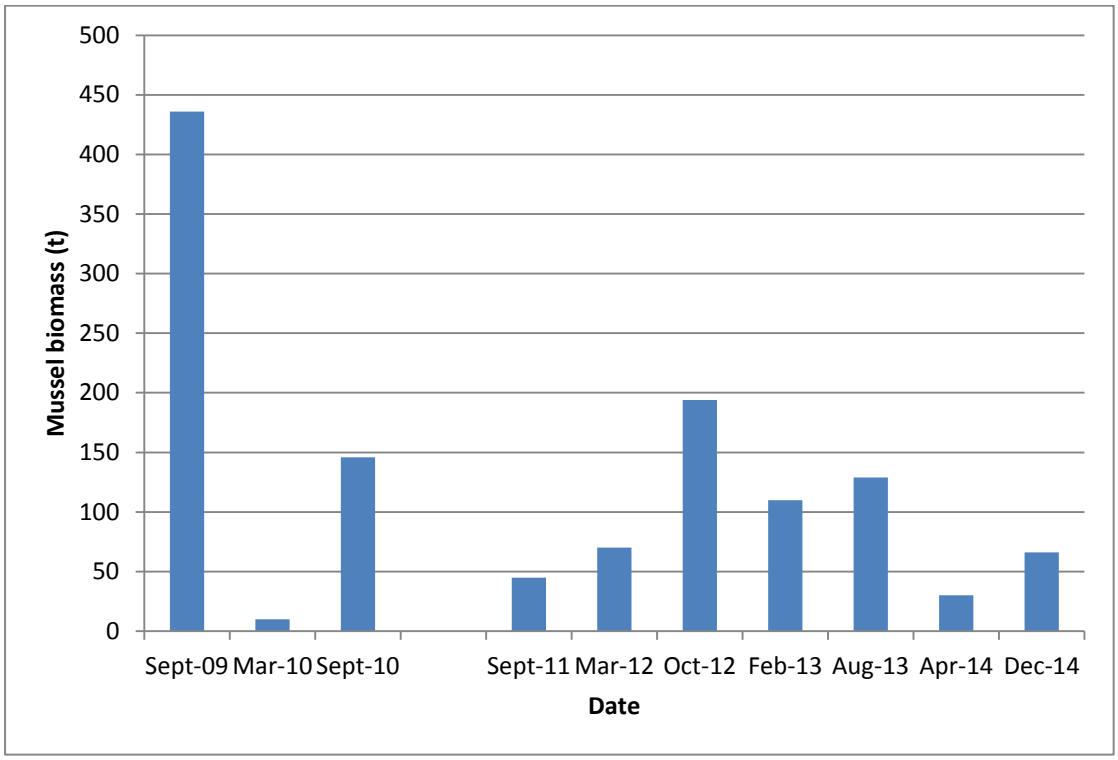

Figure 7 – Chart showing the total mussel biomass estimated to be present on the Titchwell mussel bed between September 2009 and December 2014

Data from the previous surveys indicate few mussels from this bed attain the Minimum Landing Size of 50mm. This is likely due to the ephemeral nature of the bed causing the majority of the population to be washed away before they reach this size. From a fisheries perspective, this makes the Titchwell bed more valuable to the fishing industry as a seed resource than a source of marketable mussels. Although it is usually the Authority's policy to open ephemeral beds to exploitation once they have been identified, the location of the Titchwell bed is sensitive. The bed is situated within a RSPB maintained nature reserve, so there are concerns regarding the disturbance and competition that a commercial fishery could cause to the birds. Further, fishing activities could also cause irreversible damage to the relatively soft and fragile exposed Neolithic peat that the mussels are attached to. Unless the peat is protected by a layer of pseudo-faeces beneath the mussels, even a hand worked fishery could cause irreparable damage to this feature. Timing a fishery to coincide with when such a protective layer is present, but before the mussels are washed away, is difficult, however, and would require more frequent monitoring than is currently conducted. This would be best achieved by conducting targeted surveys following alerts from fishermen that the beds are in a condition suitable to be fished.