

OUTER ARDS SEED MUSSEL STOCK ASSESSMENT:

November 2015

Document version control:

Version	Issue date	Modifier	Note	Issued to and date
1.0	01/12/15	AB	First draft	DARD 01/12/15
Final	09/12/15		Final	DARD 09/12/15

Document title: Outer Ards Seed Mussel Stock Assessment: November 2015

Status: Version: Final

Date: 2015

Reference: Seed/OA/04/15

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Introduction

The November 2015 seed mussel stock assessment survey was undertaken by the Agri-Food and Biosciences Institute on the 3rd and 4th of November 2015 onboard the DARD Fisheries Protection Vessel (FPV) Banrion Uladh. The current seed mussel stock assessment methodology has two stages. The first stage uses dredge tows only. If there are any significant amounts of juvenile *Mytilus edulis* present, a second acoustic and towed camera stage is undertaken to build on the initial ground truthing and provide a total area required for accurate stock assessment calculations. The areas covered within the November 2015 survey are shown in Figure 1, namely Donaghadee Sound, Craigbrain, Skullmartin, Burial Island and the Feathers. The results of the first stage stock assessment surveys are detailed within the paragraphs below.

Care was taken to avoid areas within Craigbrain and Burial Island determined to contain live *Modiolus modiolus* within previous AFBI surveys.

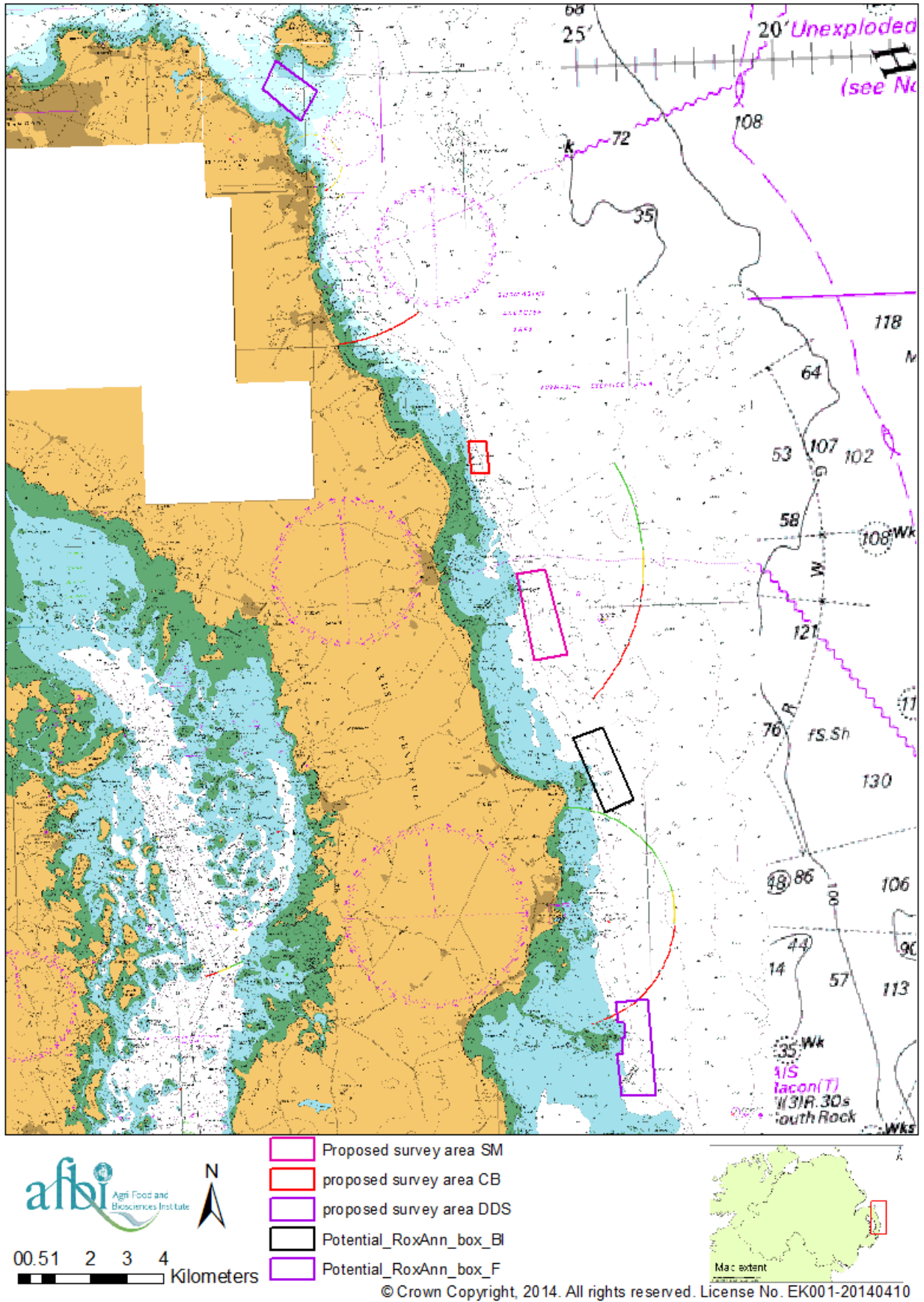


Figure 1: Survey locations for the November 2015 seed mussel stock assessment.

Materials and Methods

- *Survey methods*

All fieldwork was undertaken onboard the DARD FPV Banrion Uladh, with two AFBI staff members onboard collecting samples and directing sampling effort.

Dredging was conducted using a custom oyster dredge measuring 1.5m x 0.5m (Figure 2). Dredge sampling was in accordance with AFBI Standard Operating Procedures (SOP) "Collection and recording of Benthic dredge samples". Samples collected were logged into the AFBI laboratory upon return as per SOP MARISM015 and processed in accordance with SOP MARISM019 and SOP MARISM020.

- *Laboratory Analysis*

Samples collected during the dredge survey were processed as per SOP MARISM019 and MARISM020 the main elements of which are summarised very briefly below:

- 1) Whole sample weighed (sample typically being about 5 kg)
- 2) Mussel removed from the sample and weighed
- 3) Waste calculated from above values
- 4) Mussels in 1 kg were counted
- 5) Sixty mussels selected for length analysis (more if two or more size classes were present)



Figure 2: Photograph showing the mussel dredge used during the November 2015 survey.

Results

Donaghadee Sound

Six dredge tows were undertaken within the area of Donaghadee Sound known to have previously yielded seed mussel (Figure 3). Only one of these tows contained mussels (Figures 3, 4 and 5 and Tables 1, 2 and 3).

- *Shellfish Processing*

The summary results from the mussel sample processing for this dredge tow are shown in Tables 1 and 2 and the size class distributions of mussels are shown within Figure 5. As can be seen from Figure 5 the majority of the mussels found were greater than 60.1 mm in length. As can be seen from Figure 4 and Table 1 the percentage waste contained within this sample was greater than 50%.

Table 1: Mussel sample processing summary data, Donaghadee Sound 03/11/15.

Total sample weight (kg)	1.765
Shellfish weight (kg)	0.850
% Waste	51.841
Pieces per kilo	45

Table 2: Mussel length measurement summary data, Donaghadee Sound 03/11/15.

Mussel length measurements (mm)				
Mean	Median	SD	min	max
63.25	65.91	14.37	11.03	77.63

SD= Standard Deviation from the mean

Table 3: Dredge information from 3rd and 4th of November 2015 Outer Ards dredge survey. Only the dredge Tows whose contents were composed of greater than 10% mussels are shown as red lines on the corresponding maps (Figure 3: Donaghadee sound, Figure 6: Craigbrian, Figure 7: Skullmartin, Figure 10: Burial Island and Figure 13: The Feathers).

Date	Location	Tow No	Depth Start	Depth End	Percent fill	Mussels present	% Mussel	Photo no.	Notes
03/11/2015	Donaghadee Sound	T1	10.1	7.7	33.33	N	NA	3332-3344	Stones with Kelp and starfish, no mussels
03/11/2015	Donaghadee Sound	T2	10	10.2	20	Y	30-40	3345-3357	Stones with Kelp and starfish, no seed mussels
03/11/2015	Donaghadee Sound	T3	9.5	6.3	33.33	N	NA	3358-3372	stones/pebbles with kelp
03/11/2015	Donaghadee Sound	T4	7.2	8	10	N	NA	3373-3381	Stones with Kelp
03/11/2015	Donaghadee Sound	T5	12.2	11.2	15-20	N	NA	3382-3391	Stones/cobbles with Kelp
03/11/2015	Donaghadee Sound	T6	9.5	9.4	NA	NA	NA	NA	Dredge door open. Void tow
03/11/2015	Donaghadee Sound	T7	10.6	10.9	25	N	NA	3392-3405	Stones/cobbles with Kelp
03/11/2015	Craigbrian	T8	22.6	23.9	50	N	NA	3406-3417	Stones/cobbles and Flustra
03/11/2015	Craigbrian	T9	23.1	24	40-50	N	NA	3418-3428	Whole shell and shell gravel with Flustra
03/11/2015	Craigbrian	T10	25.5	24.9	80	N	NA	3429-3442	Whole shell (old Modiolus shell) and shell gravel with Flustra
03/11/2015	Craigbrian	T11	19.2	22.3	50	N	NA	3443-3451	Stones/cobbles and shell gravel
03/11/2015	Craigbrian	T12	24.2	20.1	40	N	NA	3452-3465	Whole shell (old Modiolus shell) and shell gravel with Flustra
03/11/2015	Skullmartin	T13	14.4	19.8	5-10	Y	80	3466-3477	Mussels and Kelp
03/11/2015	Skullmartin	T14	24.8	25.1	33.33	Y	5	3478-3492	Whole shell (old Modiolus shell) and shell gravel with Flustra and seed mussels
03/11/2015	Skullmartin	T15	22.3	22.8	60	Y	<1	3493-3509	Whole shell and shell gravel
03/11/2015	Skullmartin	T16	17.8	17.1	15	N	NA	3510-3521	very fine shell gravel/sand
03/11/2015	Skullmartin	T17	17.4	19.7	60	N	NA	3522-3534	Whole shell and shell gravel with small pebbles
03/11/2015	Skullmartin	T18	24.9	25.3	40	N	NA	3535-3549	Stones/cobbles with dead shell and Flustra
04/11/2015	Skullmartin	T19	22.9	24	25	N	NA	3550-3559	Rocks, smaller stones
04/11/2015	Skullmartin	T20	16.6	18.3	20	N	NA	3560-3568	Shingle, dead shell, pebbles, lots of starfish
04/11/2015	Burial Island	T21	17.2	19.9	5-10	Y	5	3569-3578	Dead shell, small stones
04/11/2015	Burial Island	T22	22	21.7	65	N	NA	3579-3589	Modiolus and brittle stars, dead shell
04/11/2015	Burial Island	T23	27.1	22.4	80	N	NA	3590-3599	Shingle, dead shell

Date	Location	Tow No	Depth Start	Depth End	Percent fill	Mussels present	% Mussel	Photo no.	Notes
04/11/2015	Burial Island	T24	21.7	24.2	60	N	NA	3600-3614	Brittle stars, Modiolus, dead shells
04/11/2015	Burial Island	T25	22	22.5	60	Y	90	3615-3624	Mussel, some stone
04/11/2015	Burial Island	T26	17.6	15.3	45	Y	95	3625-3634	Mussel, some stone
04/11/2015	Burial Island	T27	17.4	18.2	0	N	NA		Empty, problem with dredge
04/11/2015	Burial Island	T28	23.7	24.1	60	N	NA	3635-3642	Brittle stars, dead Modiolus, dead shells
04/11/2015	Feathers	T29	24.3	24.5	10	N	NA	3643-3650	Dead shell, kelp, Flustra, cobbles
04/11/2015	Feathers	T30	24.7	23.7	15	N	NA	3651-3659	cobbles, dead shell, algae
04/11/2015	Feathers	T31	21.8	30	50	N	NA	3660-3668	cobbles, dead shell, algae
04/11/2015	Feathers	T32	18.8	17.5	5	N	NA	3669-3675	Cobbles, Flustra, shell
04/11/2015	Feathers	T33	18	20.4	15	Y		3676-3683	Cobbles, urchins, shell
04/11/2015	Feathers	T34	14.7	14.6	1	Y	5	3684-3691	Nearly empty, rock and algae
04/11/2015	Feathers	T35	19.9	22	3	N	NA	3692-3700	Cobbles and shell
04/11/2015	Feathers	T36	20.7	19.5	75	Y		3701-3713	Mussel, cobbles, algae
04/11/2015	Feathers	T37	17.6	15.5	75	Y		3714-3726	Shingle, seed mussel, algae, shell

Craigbrain

Five dredge tows were undertaken within the area of Craigbrain known to have previously yielded seed mussel (Figure 6). No seed mussel was found within any of these tows (Table 3).

Skullmartin

Eight dredge tows were undertaken within the area of Skullmartin known to have previously yielded seed mussel (Figure 7). Mussels were found within one of these tows (Figures 8 and 9, Tables 3, 4 and 5).

- *Shellfish Processing*

The summary results from the mussel sample processing for the dredge tow that yielded mussels are shown in Tables 4 and 5 and the size class distributions of mussels are shown within Figure 9. As can be seen from Figure 9 the majority of the mussels found were greater than 40.1 mm in length. As can be seen from Figure 8 and Table 4 the percentage waste contained within this sample was greater than 35%.

Table 4: Seed mussel sample processing summary data: Skullmartin 03/11/15

Total sample weight (kg)	1.683
Shellfish weight (kg)	1.067
% Waste	36.601
Pieces per kilo	151

Table 5: Seed mussel length measurement summary data: Skullmartin 03/11/15.

Mussel length measurements (mm)				
Mean	Median	SD	min	max
43.91	44.20	4.11	26.32	50.47

SD= Standard Deviation from the mean

Burial Island

Eight dredge tows were undertaken within the area of Burial Island known to have previously yielded seed mussel (Figure 10). Mussels were found within two of these tows (Figures 11 and 12, Tables 3, 6 and 7).

- *Shellfish Processing*

The summary results from the mussel sample processing for the dredge tows undertaken within the area of Burial Island are shown in Tables 6 and 7 and the size class distributions for mussels within each of the dredges are shown within Figure 12. As can be seen from Figure 12 the majority of the mussels found were within the 35.1-40.0 mm and 40.1-45.0 mm size classes. As can be seen from Figure 11 and Table 6 the percentage waste contained within these samples was less than 27%.

Table 6: Seed mussel sample processing summary data: Burial Island 04/11/15

Tow No.	Total sample weight (kg)	Shellfish weight (kg)	% Waste	Pieces per kilo
25	2.618	2.002	23.529	177
26	2.342	1.722	26.473	172

Table 7: Seed mussel length measurement summary data: Burial Island 04/11/15

Tow No.	Mussel length measurements (mm)				
	Mean	Median	SD	min	max
25	41.39	41.67	4.32	30.47	51.35
26	40.44	40.54	3.99	31.17	49.10

SD= Standard Deviation from the mean

The Feathers

Nine dredge tows were undertaken within the area of the Feathers known to have previously yielded seed mussel (Figure 13). Mussels were found within two of these tows (Figures 14 and 15, Tables 3, 8 and 9).

- *Shellfish Processing*

The summary results from the mussel sample processing for the dredge tows undertaken within the area of The Feathers are shown in Tables 8 and 9 and the size class distributions for seed mussels within each of the dredges are shown within Figure 15. As can be seen from Figure 15 the majority of the mussels found within Tow thirty six were within the 35.1-40.0 mm size class whilst two size classes (15.1-20.0 mm and 40.1-45.0 mm) predominated within the mussels analysed from Tow thirty seven. As can be seen from Figure 14 and Table 8 the percentage waste contained within the sample retained from Tow thirty six was greater than 45% whilst the percentage waste within the sample retained from Tow thirty seven was greater than 80%.

Table 8: Mussel sample processing summary data: The Feathers 04/11/15.

Tow No.	Total sample weight (kg)	Shellfish weight (kg)	% Waste	Pieces per kilo
36	13.955	7.630	45.324	207
37	24.36	4.365	82.081	178

Table 9: Mussel length measurement summary data: The Feathers 04/11/15.

Tow No.	Mussel length measurements (mm)				
	Mean	Median	SD	min	max
36	39.38	39.47	3.66	29.75	47.08
37	35.63	39.66	11.73	10.81	50.46

SD= Standard Deviation from the mean

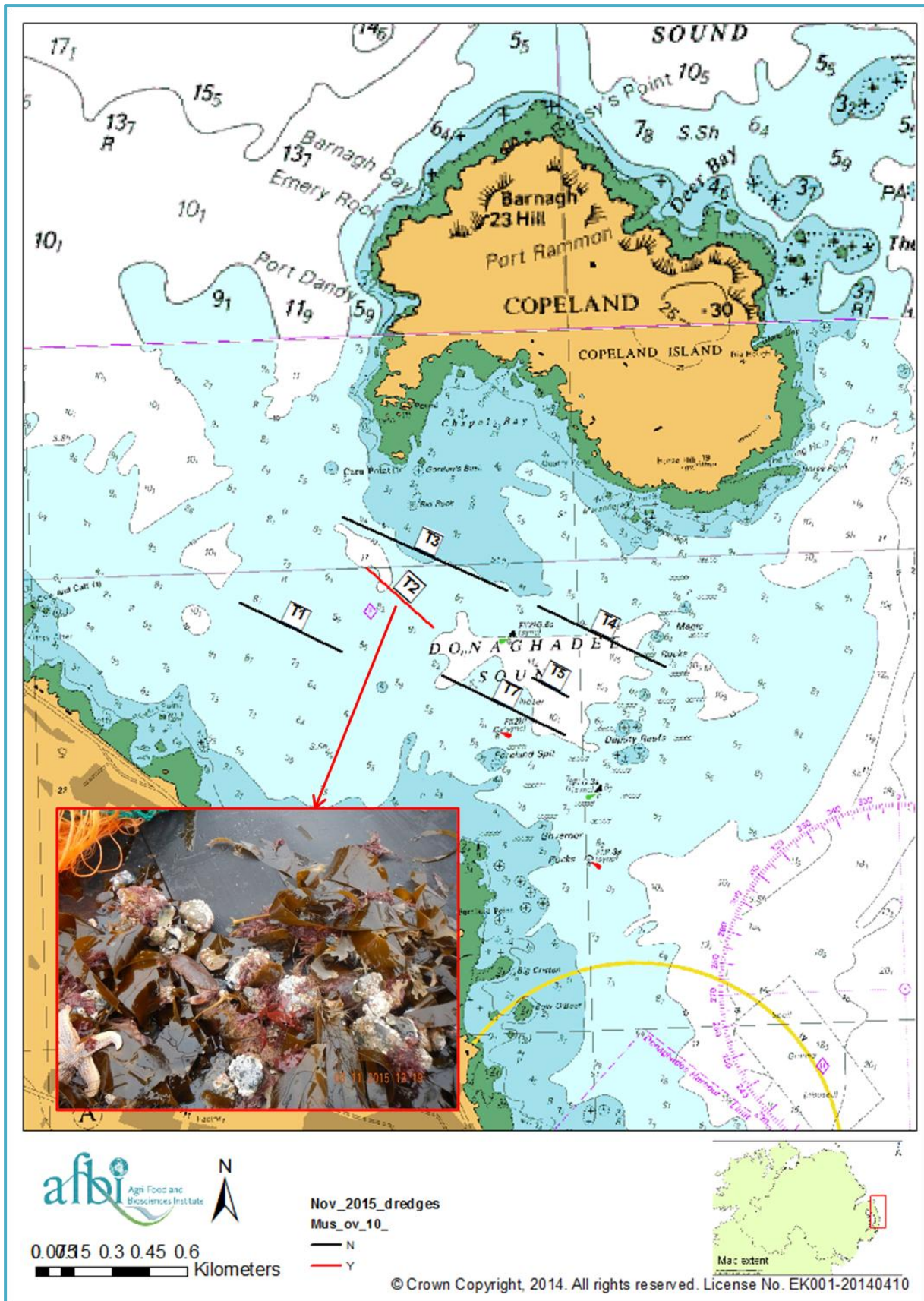


Figure 3: Location of dredge tows undertaken within the Donaghadee sound area during the November 2015 seed mussel survey.



Figure 4: Photographs showing the contents of the dredge tow undertaken within the area of Donaghadee Sound, during the November 2015 seed mussel survey, which yielded mussels.

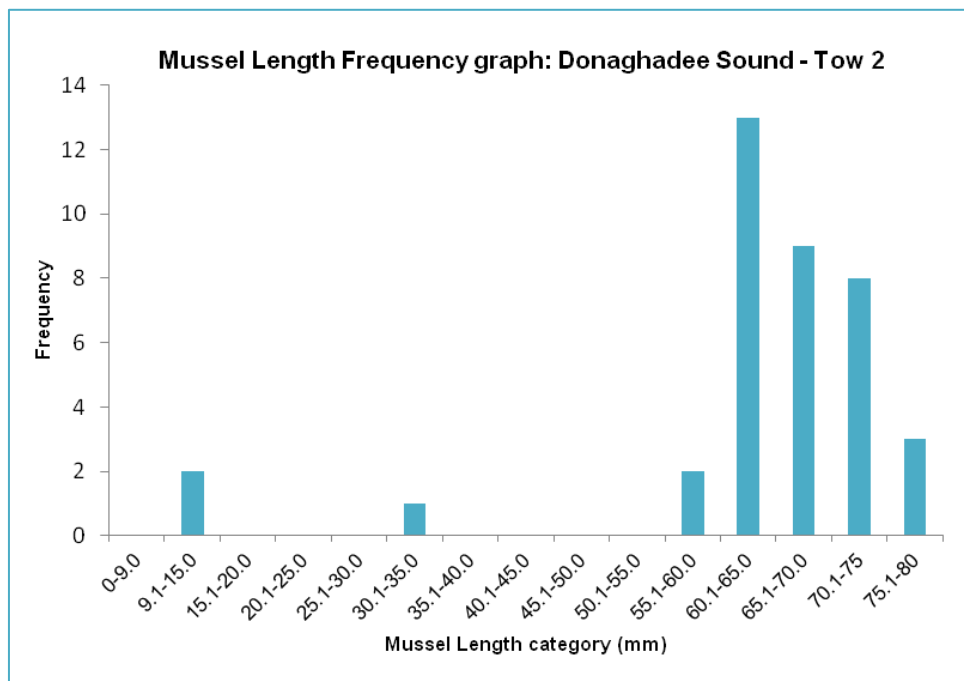


Figure 5: Length class distribution histogram for mussels found within dredge Tow 2 undertaken within the area of Donaghadee Sound, during the November 2015 seed mussel survey.

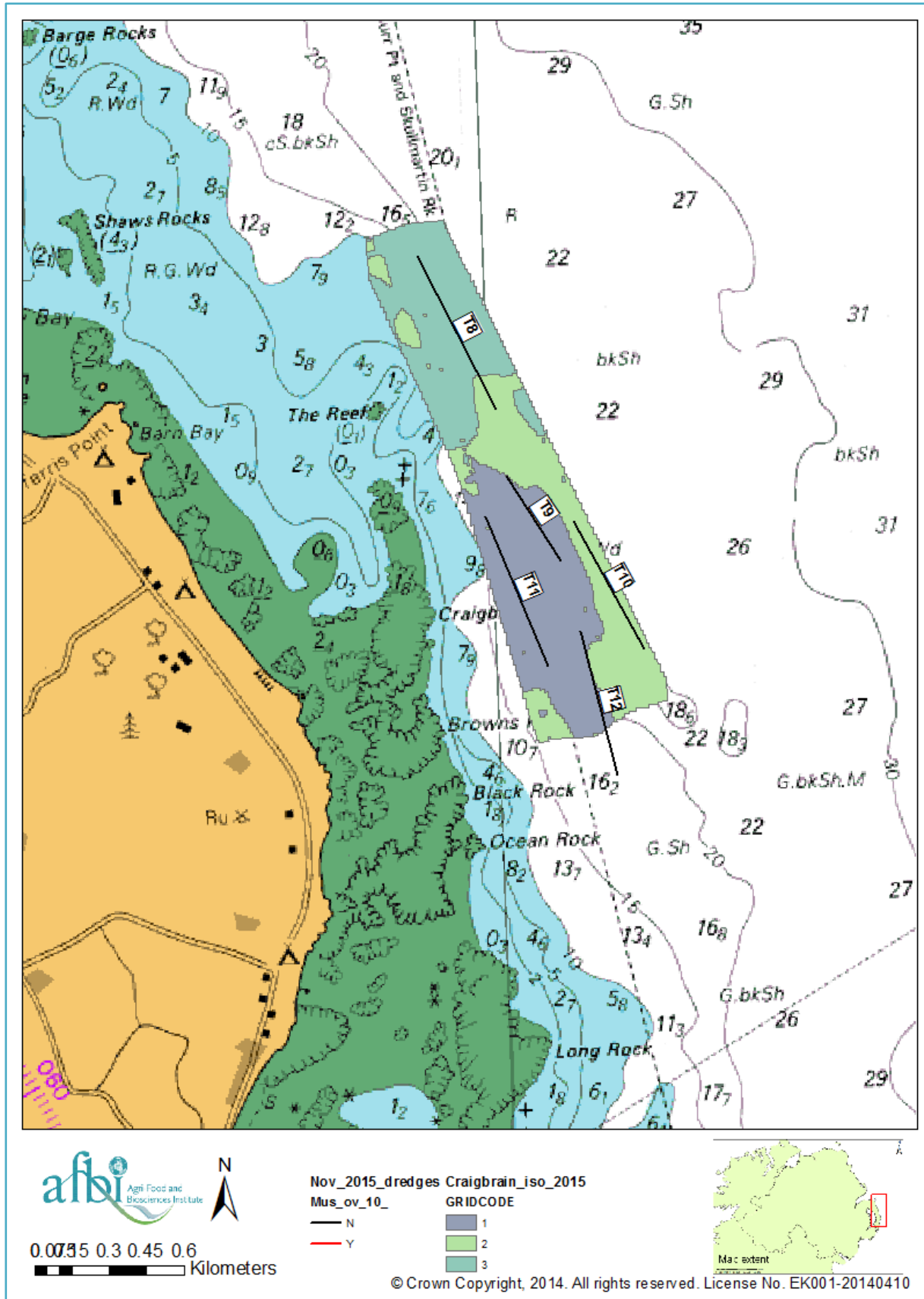


Figure 6: Location of dredge tows undertaken within the area of Craigbrain, during the November 2015 seed mussel survey.

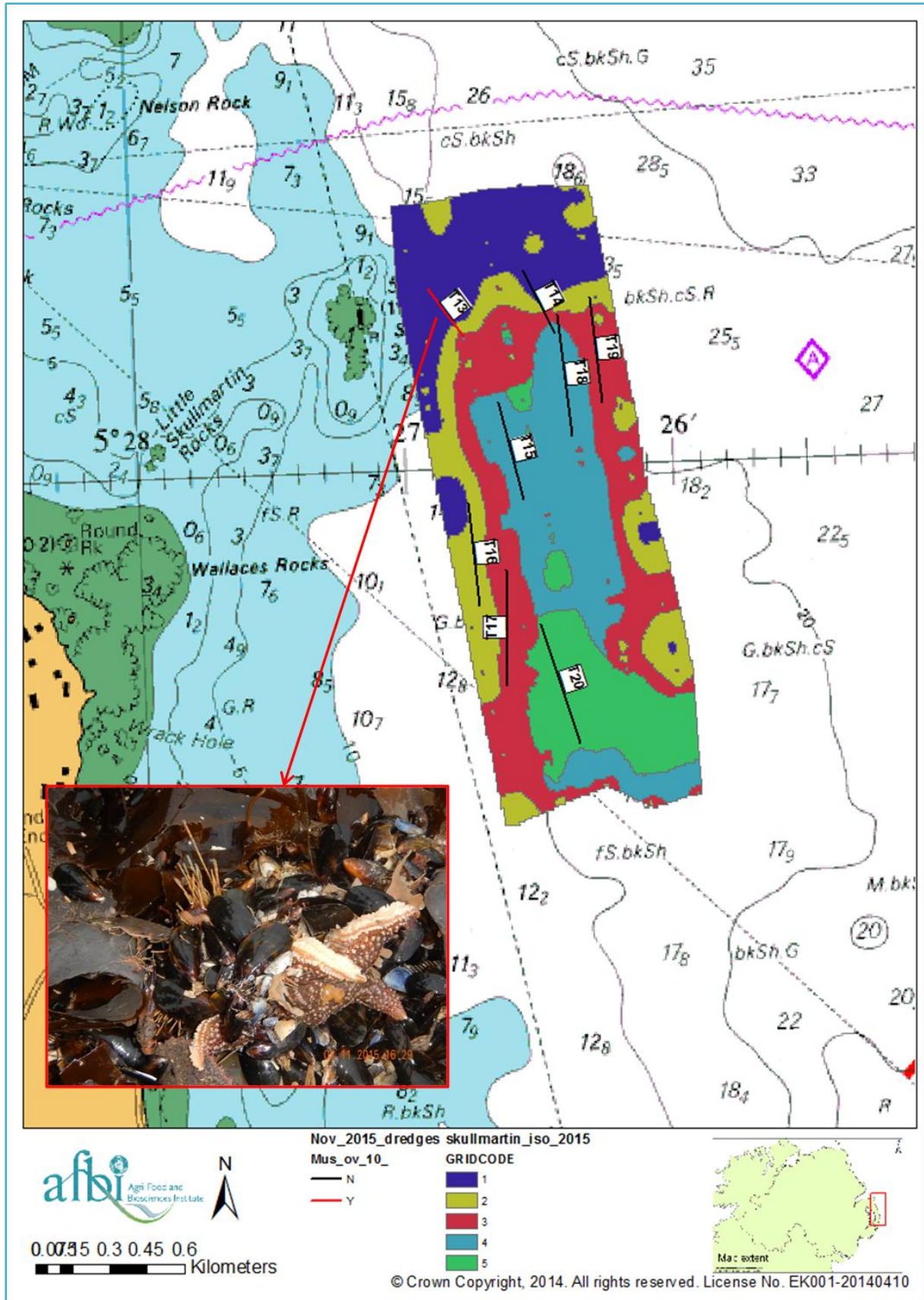


Figure 7: Location of dredge tows undertaken within the area of Skullmartin Rock, during the November 2015 seed mussel survey.



Figure 8: Photographs showing the contents of the dredge tow which yielded mussels undertaken within the area of Skullmartin during the November 2015 seed mussel survey.

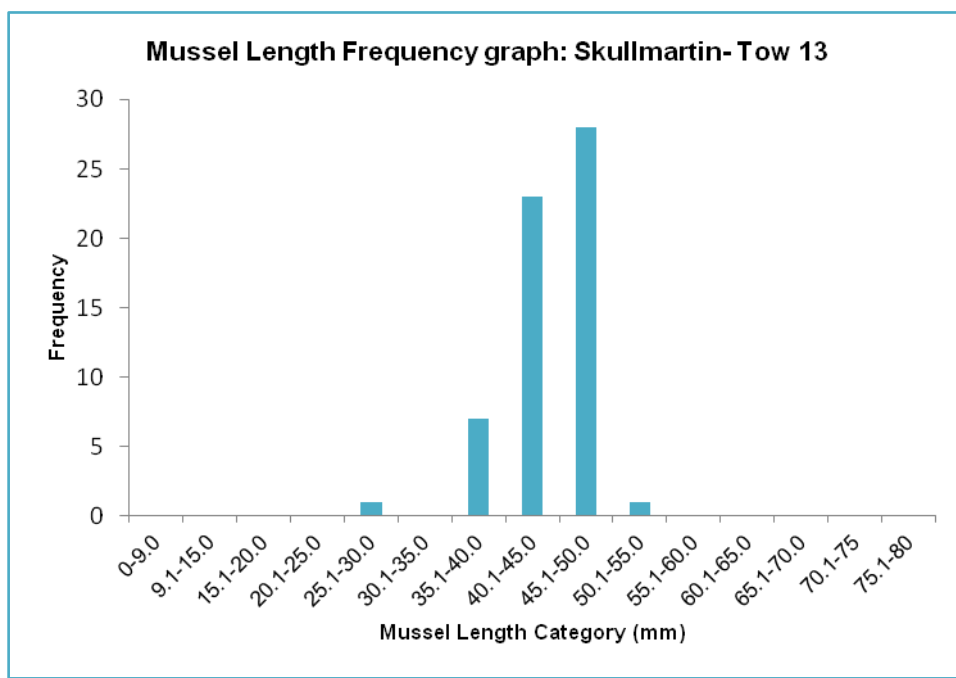


Figure 9: Length class distribution histogram for mussels found within dredge Tow 13 undertaken within the area of Skullmartin, during the November 2015 seed mussel survey.

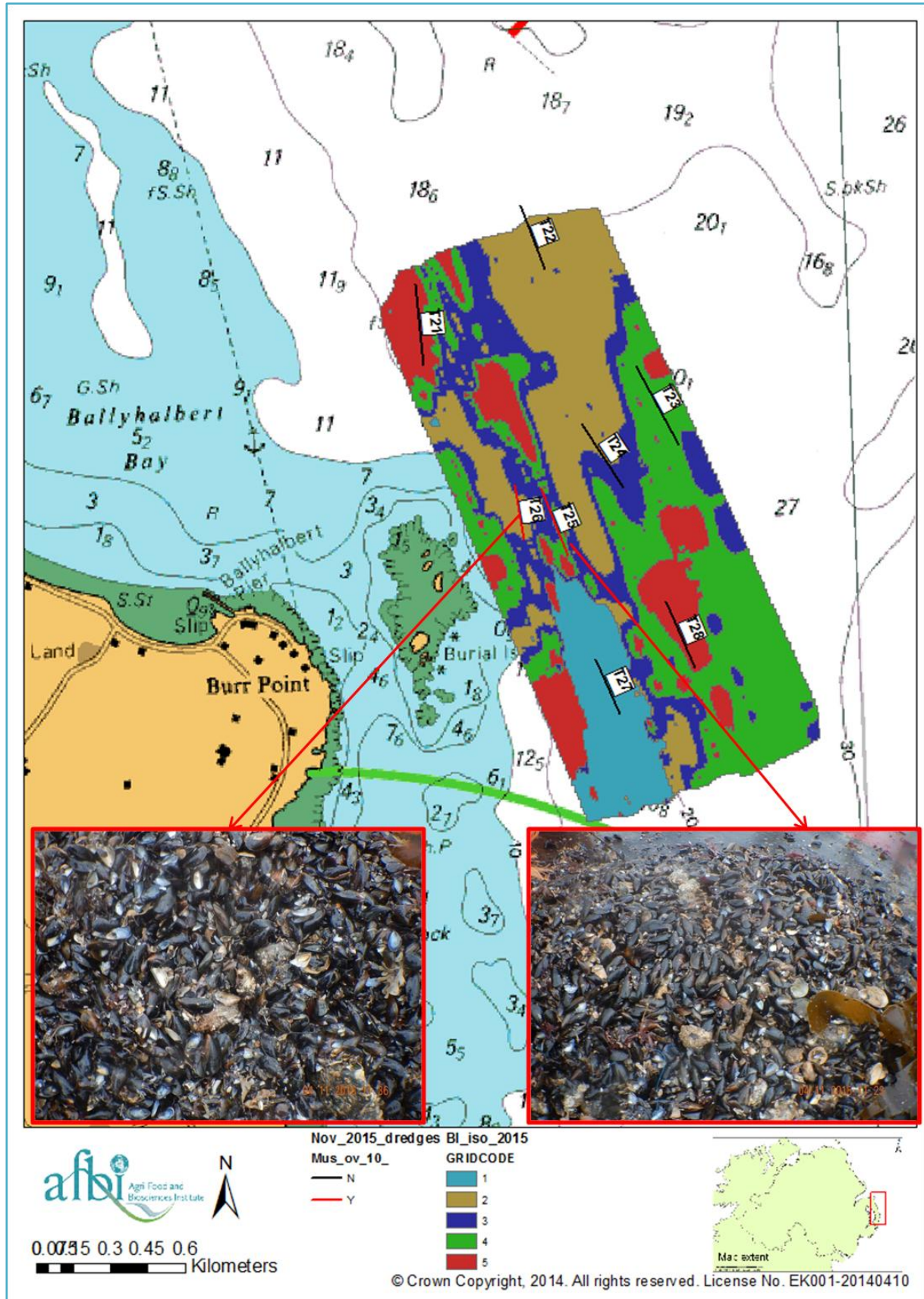


Figure 10: Location of dredge tows undertaken within the area of Burial Island, during the November 2015 seed mussel survey.



Figure 11: Photographs showing the contents of the dredge tows which yielded mussels undertaken within the area of Burial Island during the November 2015 seed mussel survey.

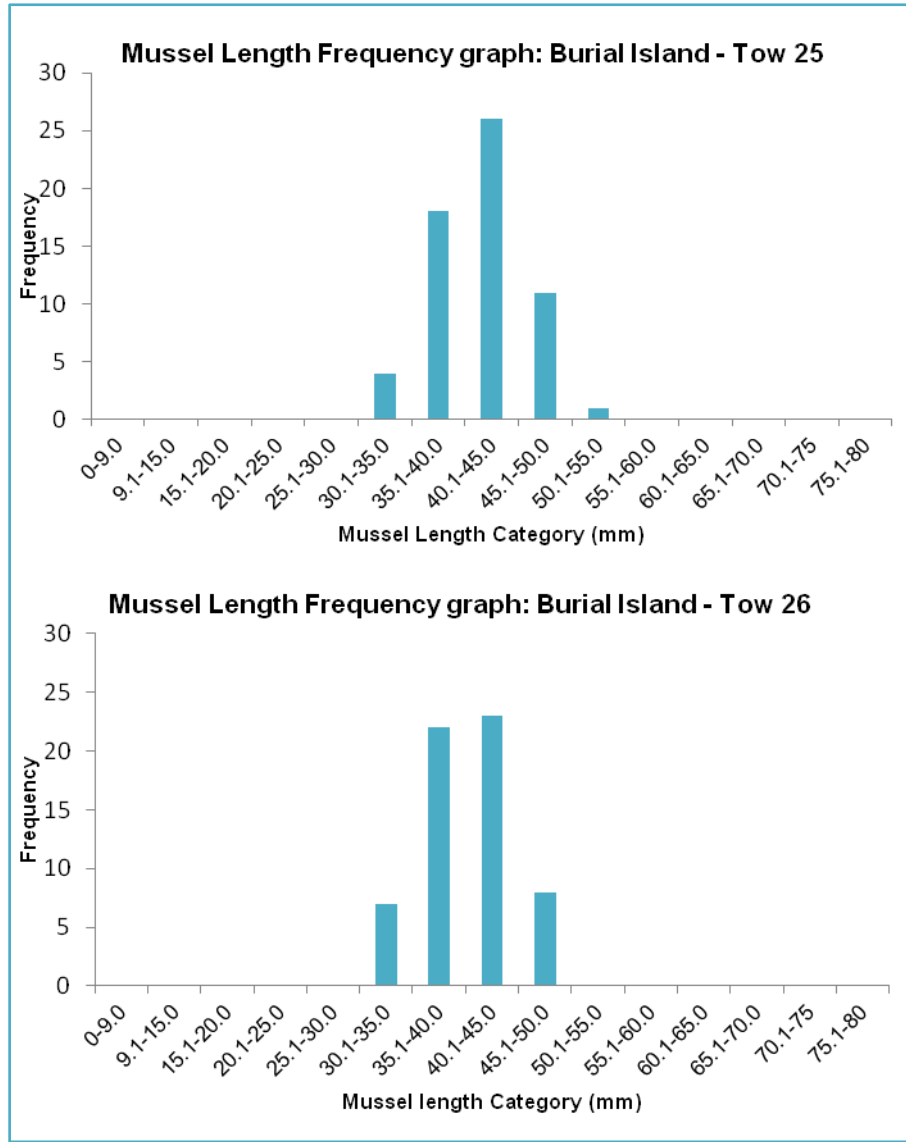


Figure 12: Length class distribution histograms for mussels found within dredge Tows 25 and 26 undertaken within the area of Burial Island, during the November 2015 seed mussel survey.

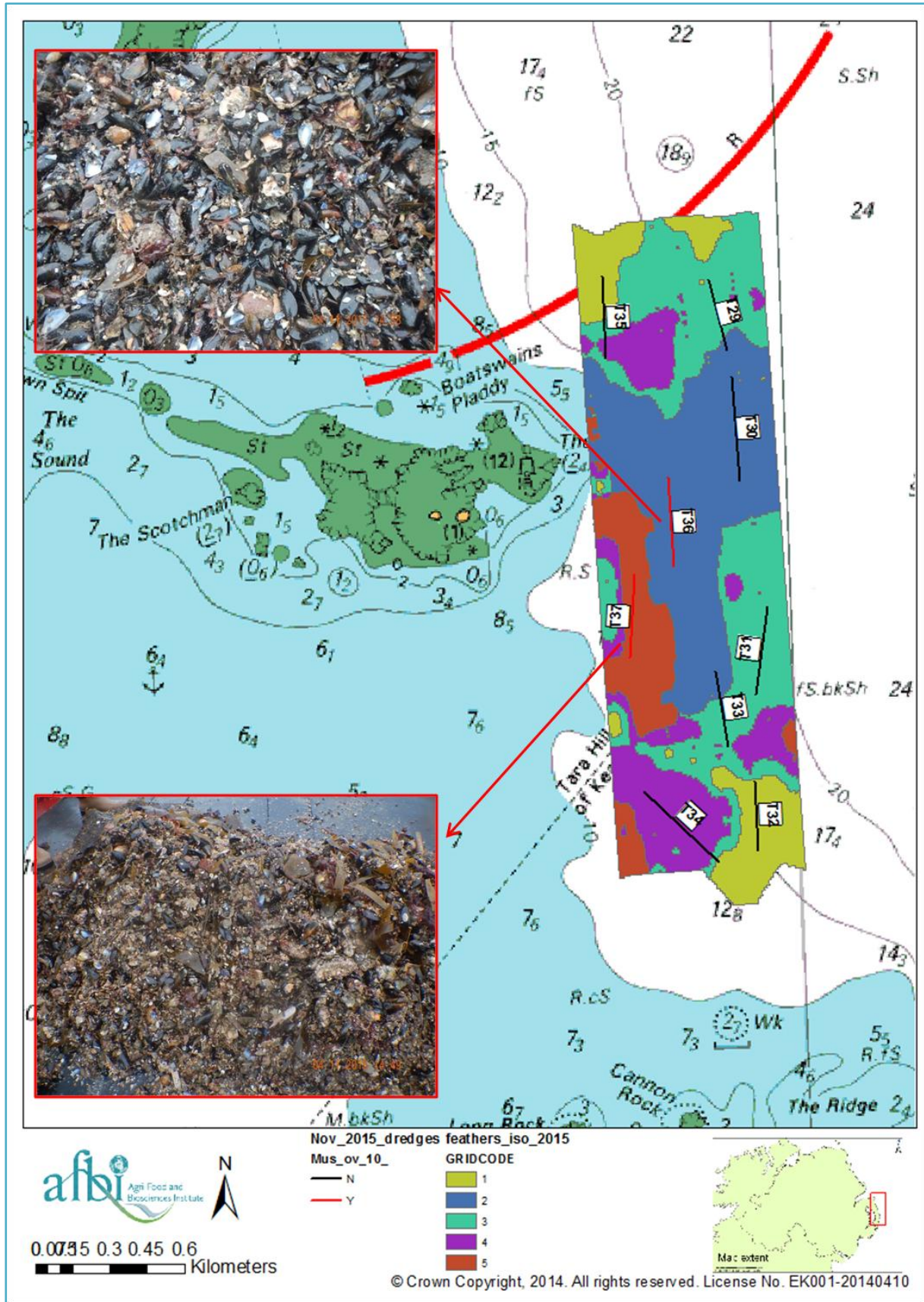


Figure 13: Location of dredge tows undertaken within the area of The Feathers, during the November 2015 seed mussel survey.



Figure 14: Photographs showing the contents of the dredge tows undertaken within the area of The Feathers that contained mussel, during the November 2015 seed mussel survey.

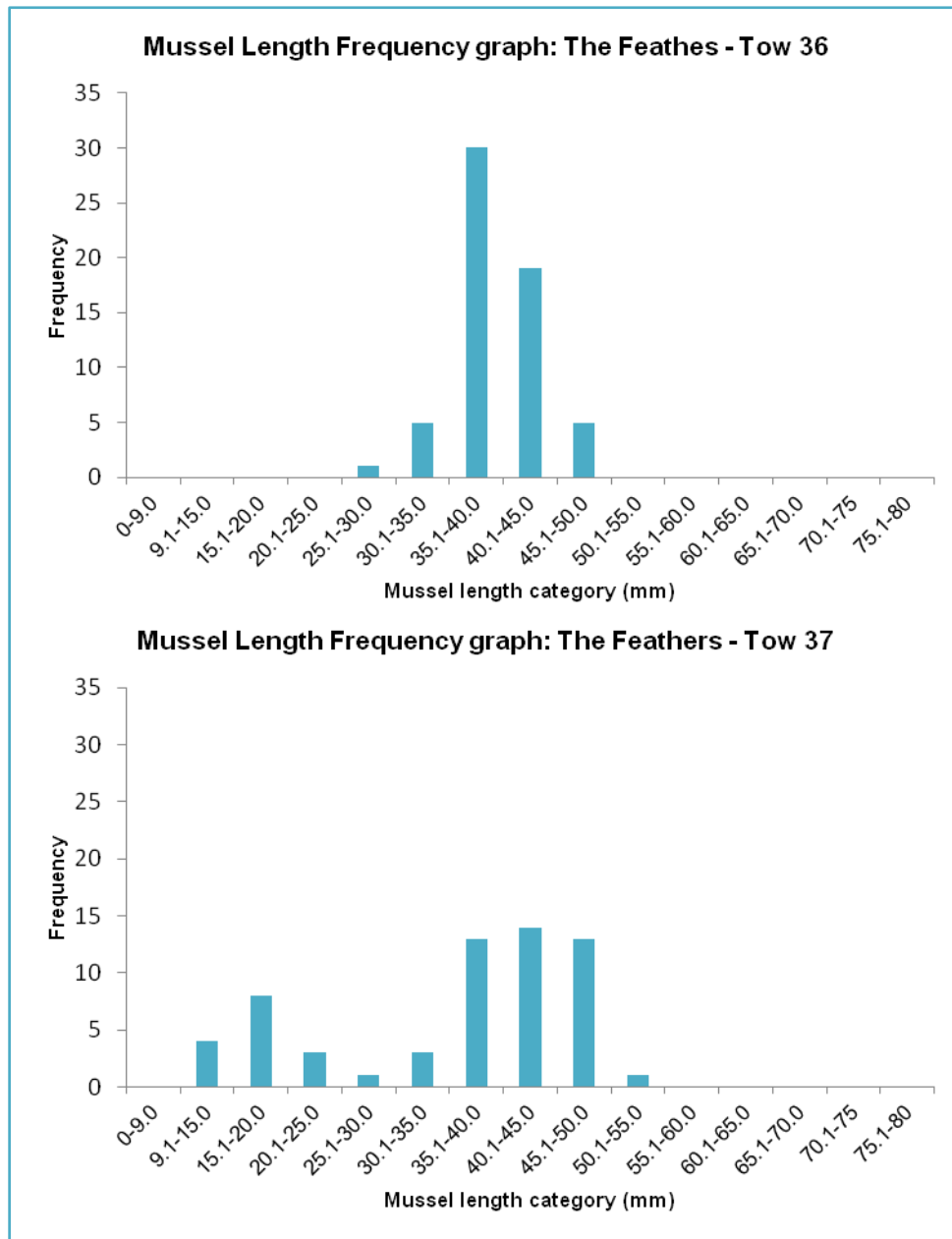


Figure 15: Length class distribution histograms for mussels found within dredge Tows 36 and 37 undertaken within the area of The Feathes, during the November 2015 seed mussel survey.

Discussion

Donaghadee Sound

The mussels found within Tow 2 were large, old mussels that were heavily encrusted with barnacles. As can be seen from Figure 4 and Table 1 mussels constituted less than 50% of the dredge contents and were confined to a small area (Figure 3). **AFBI would therefore not recommend opening this area to mussel fishing at the present time.**

Skullmartin

The majority of the mussels found within Tow 13 were >40.1 mm, and therefore not recently settled seed. These mussels occupied a small area close to Skullmartin rock (Figure 7). **AFBI would therefore not recommend opening this area to mussel fishing at the present time.**

Burial Island

The November 2015 surveys outlined above indicated some small pockets of mussel remaining within the Burial Island mussel bed (Figure 10). This confirms the findings of the previous AFBI surveys within this area (AFBI 2015) which concluded that the mussel in this area was sparse and confined to small patchy clumps, typical of a previously fished area. **AFBI would therefore not recommend opening this area to mussel fishing at the present time.**

The Feathers

The November 2015 surveys outlined above indicate some small pockets of mussel remaining within the Feathers mussel bed (Figure 13). As can be seen within Table 8 the percentage waste was high within both dredges that yielded mussels (45% within Tow thirty six and 82% within Tow thirty seven). This is typical of a previously fished area where only small patchy clumps of mussels remain. Some evidence of sparse recently settled seed mussel was found (Figures 14 and 15) within dredge Tow thirty seven.

As no dense newly settled seed mussel beds were discovered during the course of the November 2015 Outer Ards seed mussel survey stage two surveys (acoustic and video) were not undertaken. The November surveys have however shown that there has been some recent settlement of seed mussel within the area of the Feathers. AFBI would recommend further surveys to be undertaken in early 2016 to determine if this

seed has survived over the winter period to form dense seed beds and if so to determine the extent of these beds.

References

AFBI, 2015. Burial Island Post Fishery Assessment and Outer Ards Seed Mussel Stock Assessment: February 2015. Report to the Department of Agriculture and Rural Development. 40pp