Lagoon Benthic Surveys,

Lough Atalia & Renmore Lough, Galway

Updated Report

Produced by: AQUAFACT – APEM Group

On behalf of Galway Harbour Company

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1 Introduction

AQUAFACT – APEM Group was commissioned by Galway Harbour Company to carry out a benthic lagoon survey and ecological assessment of Lough Atalia and Renmore Lough to update existing ecological data submitted as part of the planning process for the Galway Harbour Extension project. The project proposes to expand the port of Galway to allow 24hr use of the harbour as it is currently restricted to operating only at high water. The expansion will require infilling an area of both intertidal and subtidal habitats of the Galway Bay Complex SAC.

Lough Atalia and its small off-shoot, Renmore Lough comprise an area of *ca.* 40 ha of Inner Galway Bay. Given the presence of at least 3 lagoonal specialists in the Lough Atalia/Renmore Lough water body, the wide variability in salinities and the fact that it only partially empties, this habitat falls within the definition of a lagoon. Lagoons are listed in Annex I of the Habitats Directive as a priority habitat, 'Coastal Lagoons'. A full list of site-specific conservation objectives are included in 'Galway Bay Complex SAC (site code 268) Conservation objectives supporting document- Lagoons' published in 2013 by NPWS.

A review of species and where they occur in Lough Atalia in the original EIS in 2014 showed that the bed of the Lough is very species poor with six of the ten sites surveyed returning no fauna and two of the remaining four only returning 1 species each. The station nearest the open sea (St 1) returned 7 species. The more biologically diverse area is the intertidal zone. However, as noted in Oliver (2007), Lough Atalia is of no conservation value.

Figure 1-1: Locations of previous benthic grabs (2013) and DDV surveys (2024).

2 Materials & Methods

2.1 Lough Atalia

The drop-down video (DDV) survey took place on the 12th of July 2024 on board the *Aquafact-2*. The weather on the day was clear with a Force 3 northwesterly wind and swell of <0.5m. In order to access Lough Atalia through the access channel from the open sea, the survey took place at high water which was at 10.20am and a tidal height of 4.24m.

A GoPro Hero8 was used for this survey. Its specifications include a 12-megapixel camera with CMOS sensor, HyperSmooth 2.0 image stabilization and built-in GPS. Attached to the camera was a Subgear Prolight SP30 torch with a high-quality CREE XM-L LED diode which provided a light source of 500 lumens.

The camera was lowered to the seafloor and a recording made of the bottom type and flora and fauna encountered. Once the camera was recording, the boat was allowed to drift with the current during filming (for approximately two minutes) to get representative footage along each camera deployment.

All captured video footage was reviewed, and substrate type and characterising species were noted and used to assess any changes in the environment.

The survey sites were located in the infralittoral zone, in areas of low to medium energy, exposed to tidal action. A total of ten stations were surveyed by DDV. Stations covered the entire expanse of Lough Atalia and depths ranged from 1 m to 3 m.

An EXO2 Multiparameter Water Quality Sonde was deployed from the RIB beneath the surface of the water at each of the 10 transect stations to record near bottom to assess environmental conditions including temperature, salinity, dissolved oxygen, pH, chlorophyll, turbidity, and conductivity.

2.2 Renmore Lough

The sweep net and probe survey took place on the 16th of August on the shore at 2 locations at Renmore Lough (**Figure 2-1**). The weather on the day was overcast. These methods were carried out from the shore as it was deemed unsafe on the day to carry out a drop-down video analysis due to the shallow depth, deep mud and access issues.

Figure 2-1: Renmore Lough sampling stations.

3 Results

3.1 Water Chemistry Results

3.1.1 Lough Atalia

Several readings were taken by a probe at each station in **Figure 1-1**, these included temperature, salinity, dissolved oxygen, pH, chlorophyll, turbidity, and specific conductivity were recorded.

Table 3-1 below shows the maximum, minimum and mean value of all readings taken from the probe.

Mean readings taken at stations 3, 8, 9 and one reading at station 5 show a chlorophyll level above the 5µg/ml target set out in the conservation objectives for lagoons (NPWS, 2013).

3.1.2 Renmore Lough

Several readings were taken by a probe at 2 stations in **Figure 2-1**, these included temperature, salinity, dissolved oxygen, pH, chlorophyll, turbidity, and specific conductivity were recorded.

Table 3-2 below shows the average of the readings taken at both stations from the probe.

Both readings taken at stations 1 and 2 show a chlorophyll level above the 5µg/ml target set out in the conservation objectives for lagoons (NPWS, 2013).

Table 3-1: Water chemistry readings Lough Atalia.

Station		Depth (m)	Temp (°C)	Salinity	DO(%Sat)	pH	CHL (µg/l)	Turbidity (NTU)	SPC(mS/cm)
LT_1	Mean	0.834	15.858	25.218	105.675	8.233	1.028	0.178	39.479
	Max	1.348	15.87	25.33	105.8	8.24	1.18	0.32	39.64
	Min	0.257	15.847	25.07	105.6	8.23	0.91	0.07	39.275
LT_2	Mean	0.61	15.898	23.857	104.4	8.33	1.208	0.132	37.543
	Max	1.551	16.005	25.39	104.9	8.36	1.38	0.2	39.73
	Min	0.2	15.8	22.26	104	8.3	1.08	0.1	35.256
LT_3	Mean	0.791	15.984	24.814	91.12	8.002	6.646	18.948	38.903
	Max	1.254	16.127	25.31	105.7	8.32	18.02	78.33	39.608
	Min	0.277	15.919	23.14	62.8	7.48	1.35	0.17	36.517
LT_4	Mean	0.574	16.012	24.938	105.333	8.342	2.098	0.845	39.082
	Max	0.819	16.028	25.44	107	8.35	2.5	3.82	39.787
	Min	0.364	15.993	24.77	104.3	8.33	1.84	0.23	38.847
LT_5	Mean	0.534	16.172	25.505	104.133	8.37	4.68	1.882	39.879
	Max	0.807	16.366	26.05	104.7	8.37	12.33	5.2	40.648
	Min	0.266	16.081	25.2	103.8	8.37	1.96	0.47	39.446
LT_6	Mean	0.479	16.095	23.405	102.813	8.368	1.308	1.066	36.897
	Max	0.673	16.127	23.72	103.1	8.38	3.37	6.9	37.351
	Min	0.238	16.074	23.02	102.6	8.35	0.94	0.2	36.342

Station		Depth (m)	Temp (°C)	Salinity	DO(%Sat)	pH	CHL (µg/l)	Turbidity (NTU)	SPC(mS/cm)
LT_7	Mean	0.431	16.299	25.183	105.175	8.405	2.693	0.563	39.425
	Max	0.568	16.331	25.22	105.4	8.41	3.16	0.59	39.477
	Min	0.287	16.268	25.12	105	8.4	2.25	0.53	39.343
LT_8	Mean	0.407	16.561	25.883	112.375	8.428	6.418	1.028	40.411
	Max	0.473	16.593	25.89	112.7	8.45	6.81	1	40.424
	Min	0.352	16.529	25.88	112.2	8.41	5.97	1.05	40.403
LT_9	Mean	0.344	16.701	26.073	115.625	8.44	7.425	1.508	40.678
	Max	0.349	16.681	26.08	116.1	8.44	7.63	2.72	40.694
	Min	0.341	16.71	26.06	115.3	8.44	7.22	1.08	40.655
LT_10	Mean	0.269	16.196	23.428	103.775	8.403	2.695	0.365	36.926
	Max	0.256	16.202	23.41	103.8	8.41	2.81	0.38	36.962
	Min	0.277	16.187	23.45	103.7	8.4	2.6	0.36	36.898

Table 3-2: Water chemistry readings Renmore Lough.

Station	Depth (m)	Temp (°C)	Salinity	DO(%Sat)	pH	CHL (µg/l)	Turbidity (NTU)	SPC(mS/cm)
Site 1	<0.5	14.687	5.88	82.2	7.47	6.85	2.76	10.356
Site 2	<0.5	15.62	14.6	97.7	8.67	86.75	5.48	23.990

3.2 Drop Down Video Results

Images of the lagoon floor were captured from the videos recorded at each of the stations that drop-down video was deployed. Below is an analysis of each station based on review of the footage along with representative still images of the epibiotic communities. Full video footage from each of the recordings is available through request from AQUAFACT if required.

3.2.1 Station 1

The transect video at station 1 was approximately 2 minutes long. The depth at this station is recorded as approximately 3m below chart datum. The substrate consisted of coarse sand with mussel shell fragments observed throughout. Some boulders were present with fucoids, *Chondrus cripsus/Mastocarpus stellatus,* and filamentous algae (possibly *Cladophora* spp. or *Vaucheria*) attached. The sediment surface at this station appeared more oxygenated than the other stations examined in the survey; this is due to the input of seawater flowing into the Lough at a fast rate from Galway Bay. This strong current also influences the substrate with most of the fine mud and silt swept away. As expected, this station had the highest number of faunal taxa recorded, and this mirrors the results of the previous 2013 survey. The species that were observed were a shore crab (*Carcinus maenus*), a velvet crab (*Necora puber*), lug worms casts (*Arenicola marina*), common goby (*Pomatoschistus microps*), a mysid and the tube worm *Spirobranchus spp.* Some drift and decaying algae were observed including *Enteromorpha/Ulva* spp. and *Chaetomorpha linum*.

Epibiotic community: Figures 3.1 – 3.8.

Figure 3-1: Lough Atalia Station 1.1 Coarse substrate, mussel shell debris. Boulders with epifloral.

Figure 3-2: Lough Atalia Station 1.2 Coarse substrate, mussel shell debris. Boulders with epiflora including filamentous green algae.

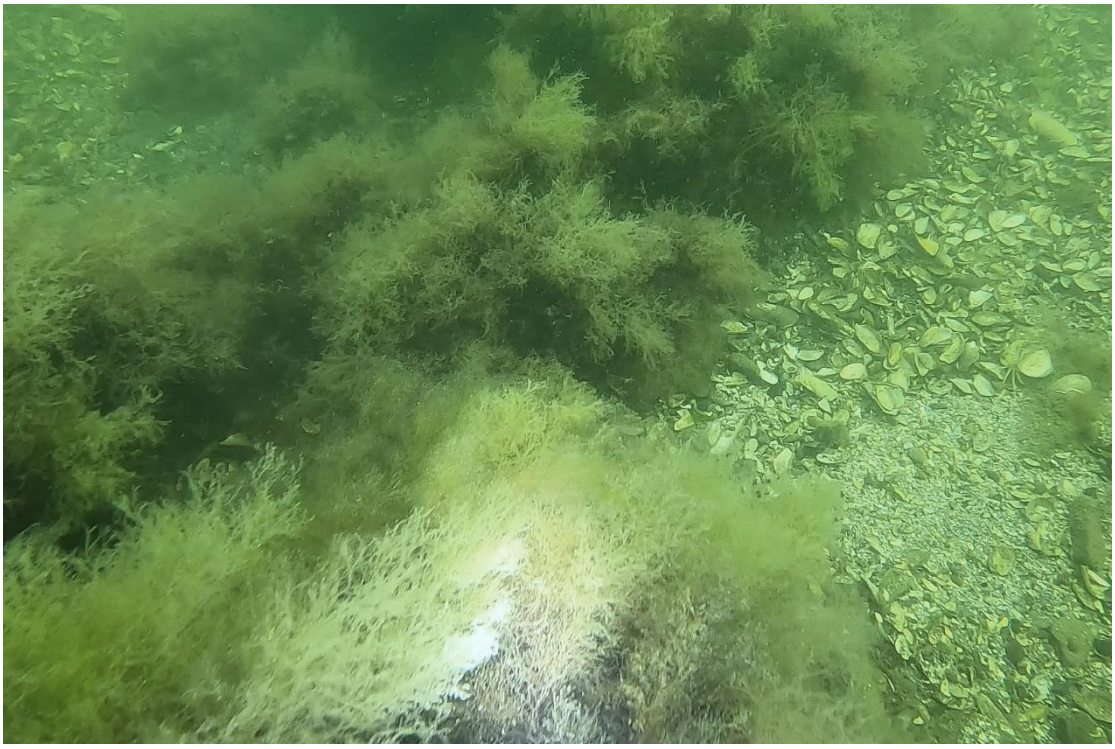

Figure 3-3: Lough Atalia Station 1.3 Coarse substrate, shell debris, epiflora.

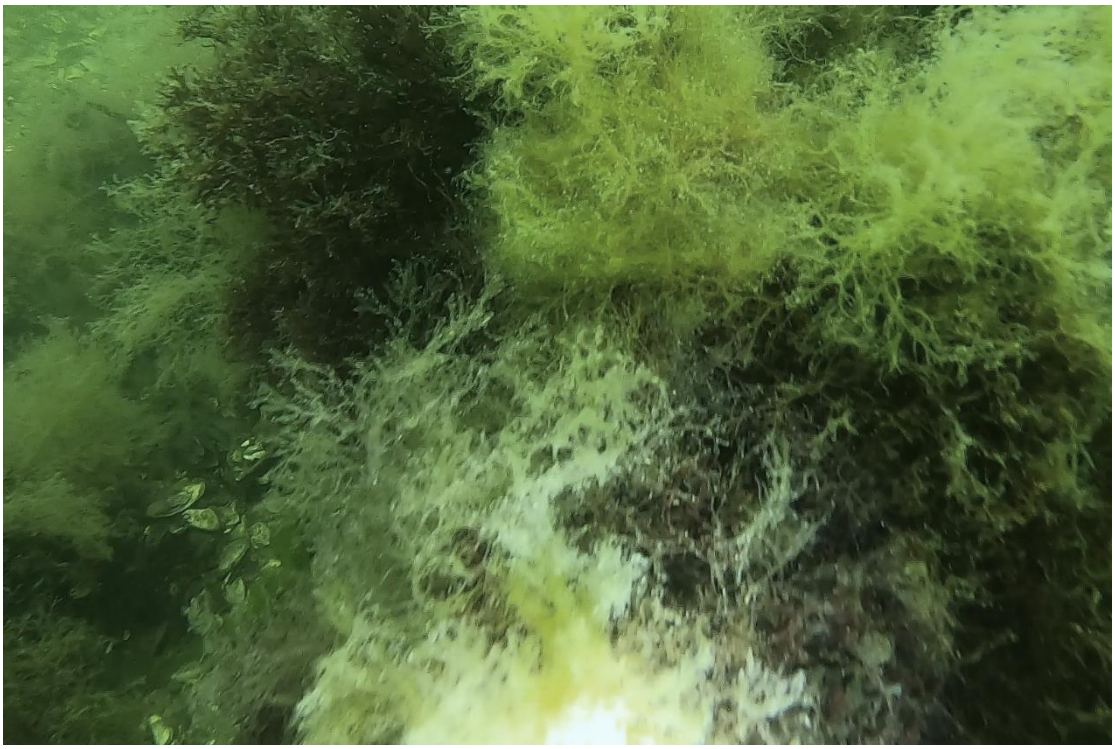

Figure 3-4: Lough Atalia Station 1.4 Boulders with epifloral including *Chondrus crispus/Mastocarpus.*

Figure 3-5: Lough Atalia Station 1.5 Extensive mussel shell debris on sea bed.

Figure 3-6: Lough Atalia Station 1.6 Coarse sediment, mussel shell debris, *Arenicola marina* casts and epiflora on boulders.

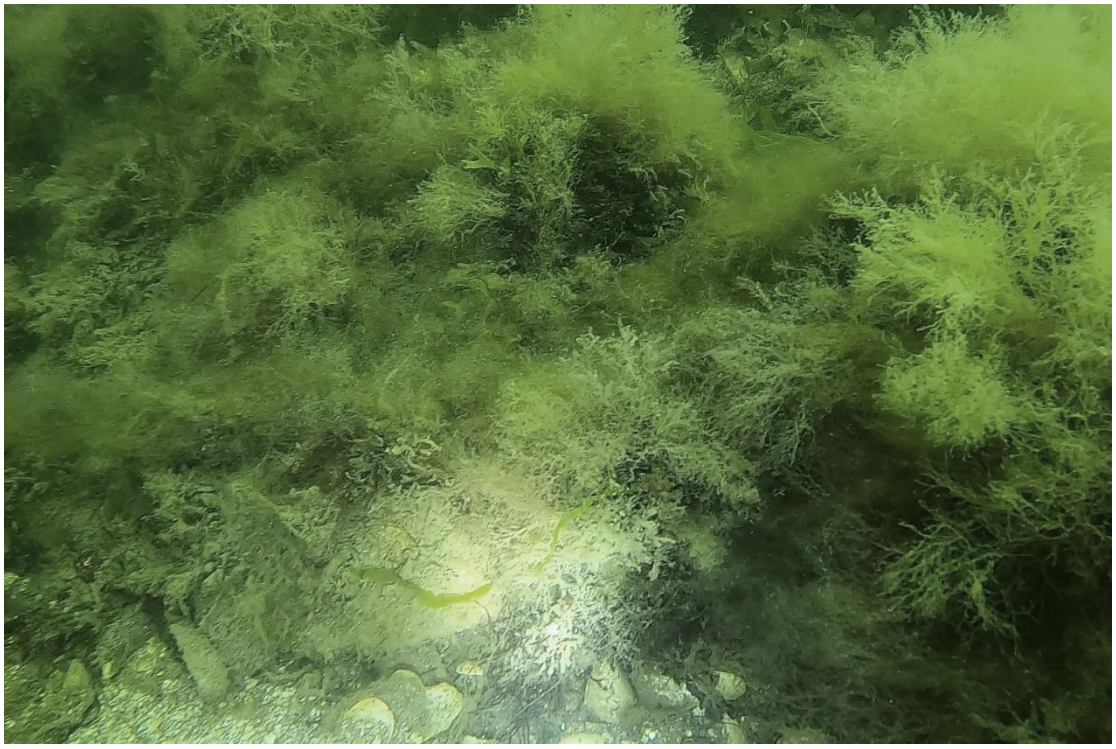

Figure 3-7: Lough Atalia. Station 1.7 Coarse sediment, mussel shell debris, and epiflora on boulders.

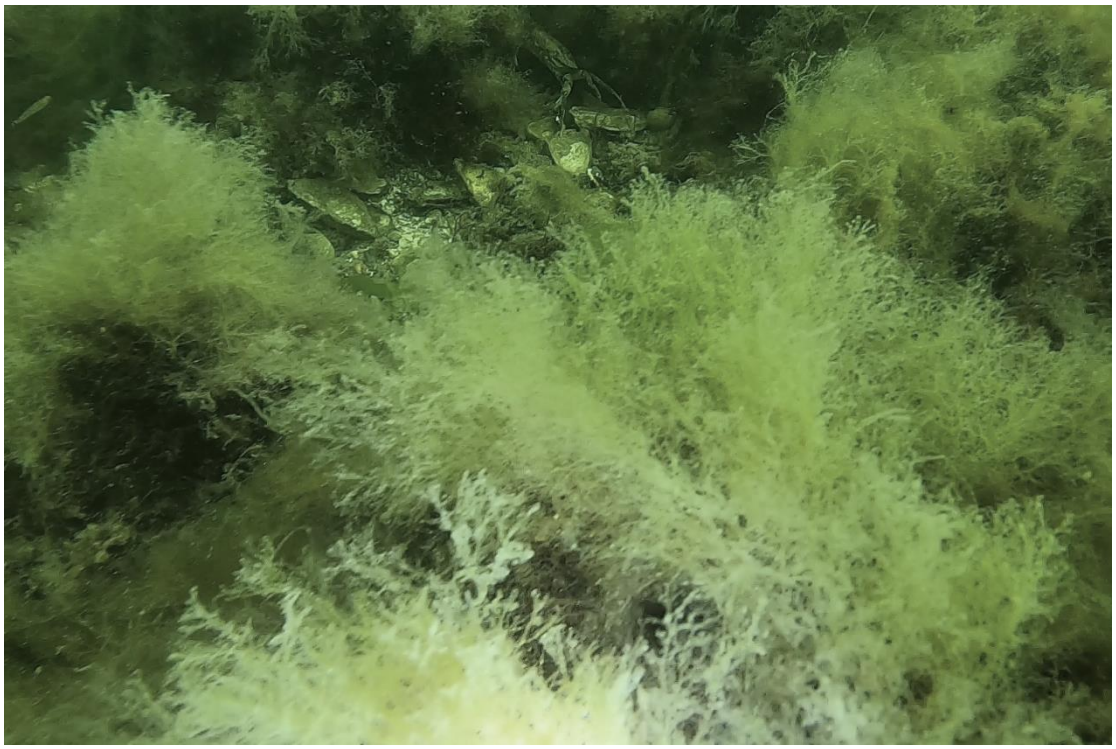

Figure 3-8: Station 1.8 Mussel shell debris with encrusting calcareous polychaetes.

3.2.2 Station 2

The duration of the video transect at station 2 was approximately 2 minutes long. The depth at this station has been recorded at less than 1m below chart datum. The substrate consisted of thick mud with a surface layer of benthic diatoms and scattered shell debris. While the surface for the most part seemed oxygenated, it was apparent wherever the surface was disturbed that anoxic sediment was immediately below. This is as a result of the high organic enrichment throughout Lough Atalia. There were also small patches of *Beggiatoa* bacterial mats – further signs of the anoxic conditions on the seabed. There were few records of fauna present. A couple of shore crabs (*Carcinus maenus*) were recorded and the evidence of their movements in the area can be seen in the numerous tracks across the surface of the mud. Mussel shell fragments were also observed. Some drift and decaying algae were observed including *Enteromorpha/Ulva* spp.

Epibiotic community: Figures 3.9 – 3.15.

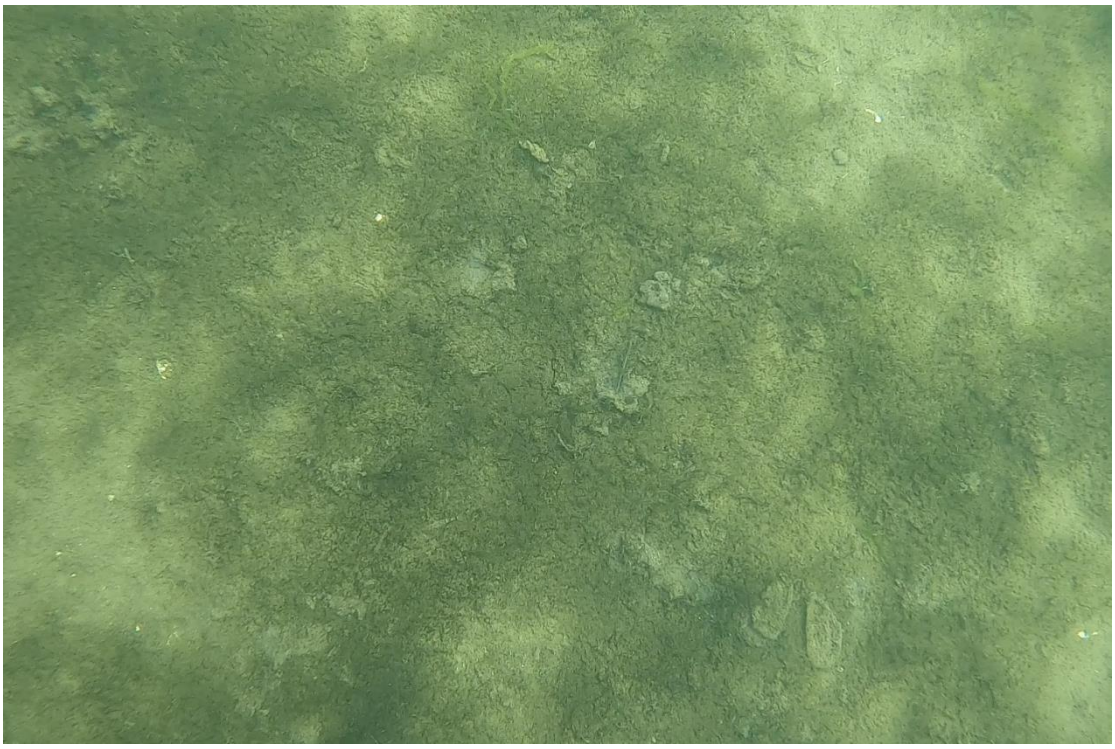

Figure 3-9: Lough Atalia Station 2.1 Soft mud with benthic diatom and shell debris.

Figure 3-10: Lough Atalia Station 2.2 Soft mud, benthic diatoms, *Enteromorpha/Ulva,* and *Carcinus maenus.*

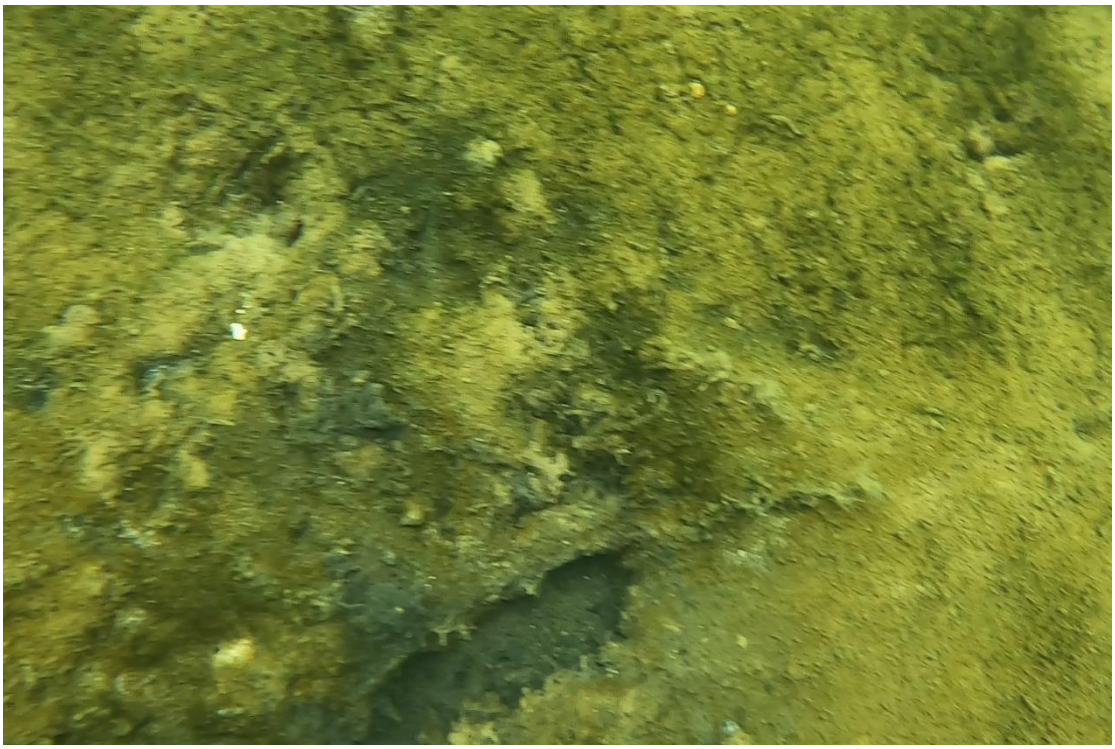

Figure 3-11: Lough Atalia Station 2.3. Soft mud with disturbed sediment exposing anoxic subsurface conditions.

Figure 3-12: Lough Atalia Station 2.4. Soft mud, mussel shell debris, and *Enteromorpha/Ulva.*

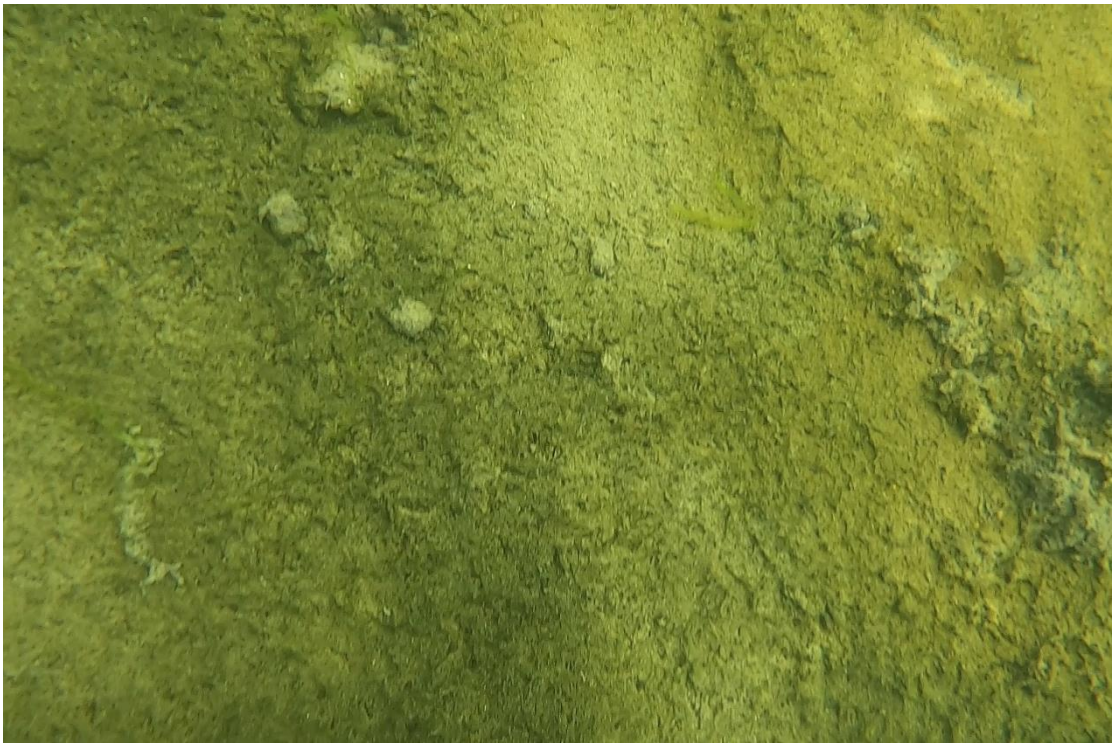

Figure 3-13: Lough Atalia Station 2.5 Soft mud with benthic diatoms.

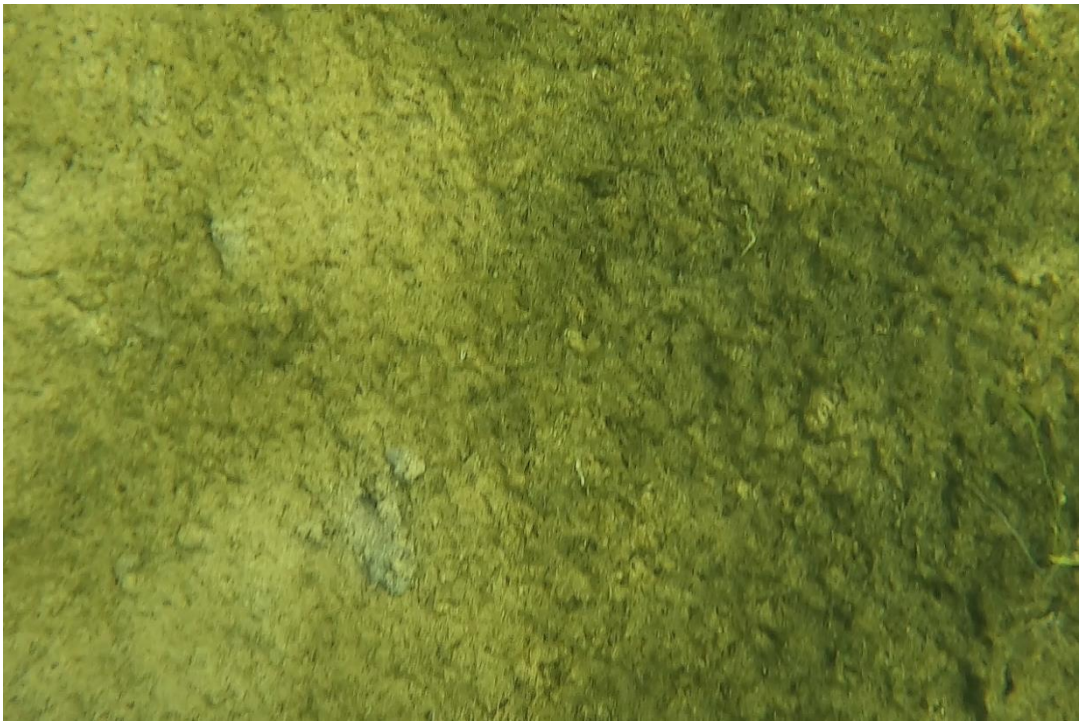

Figure 3-14: Lough Atalia Station 2.6 Soft mud with benthic diatoms

Figure 3-15: Lough Atalia Station 2.7 Soft mud with benthic diatoms and *Carcinus maenus*.

3.2.3 Station 3

The duration of the video transect at station 3 was approximately 2 minutes long. The depth at this station was recorded at less than 1m below chart datum. The substrate consisted of thick mud with a surface layer of benthic diatoms. While the surface for the most part seemed oxygenated, it was apparent wherever the surface was disturbed that anoxic sediment was immediately below. This is as a result of the high organic enrichment throughout Lough Atalia. As recorded in Station 2 there were also more extensive patches of *Beggiatoa* bacterial mats – further signs of the anoxic conditions on the seabed. There were few records of fauna present. No fauna was recorded but evidence of the movements of crabs in areas can be seen in the numerous tracks across the surface of the mud. Some drift and decaying algae were observed including *Enteromorpha/Ulva* spp and *Chaetomorpha linum*.

Epibiotic community: Figures 3.16 – 3.20.

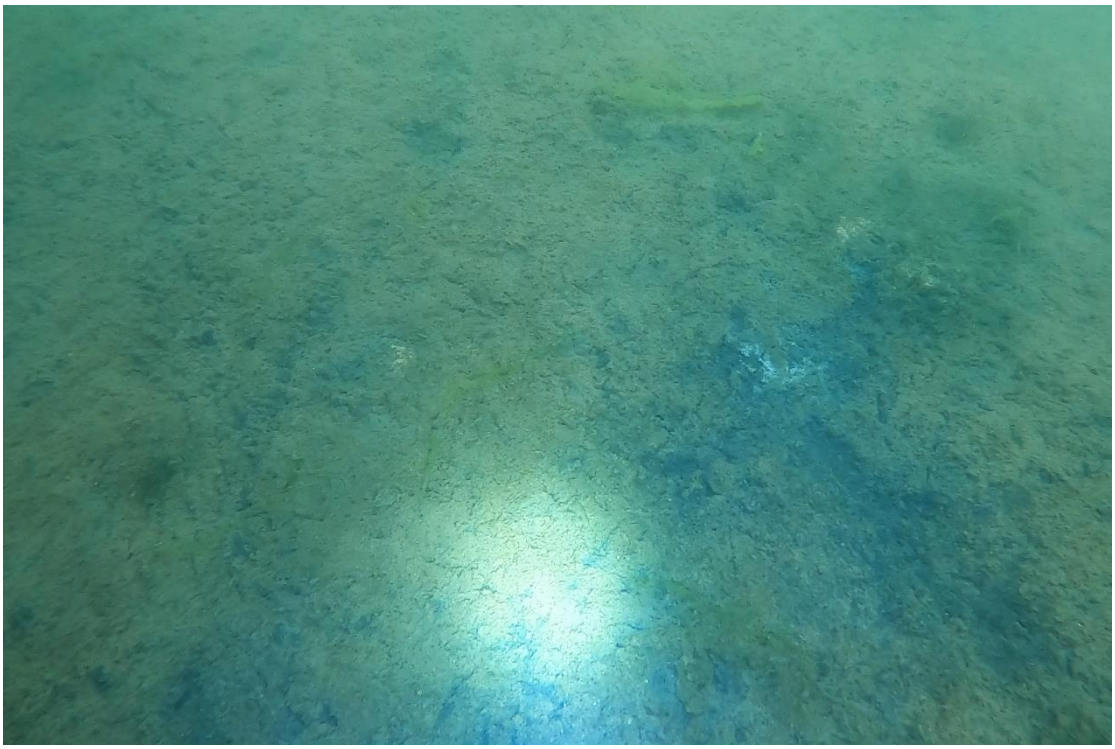

Figure 3-16: Lough Atalia Station 3.1. Soft mud with anoxic sediment and *Beggiatoa* visible.

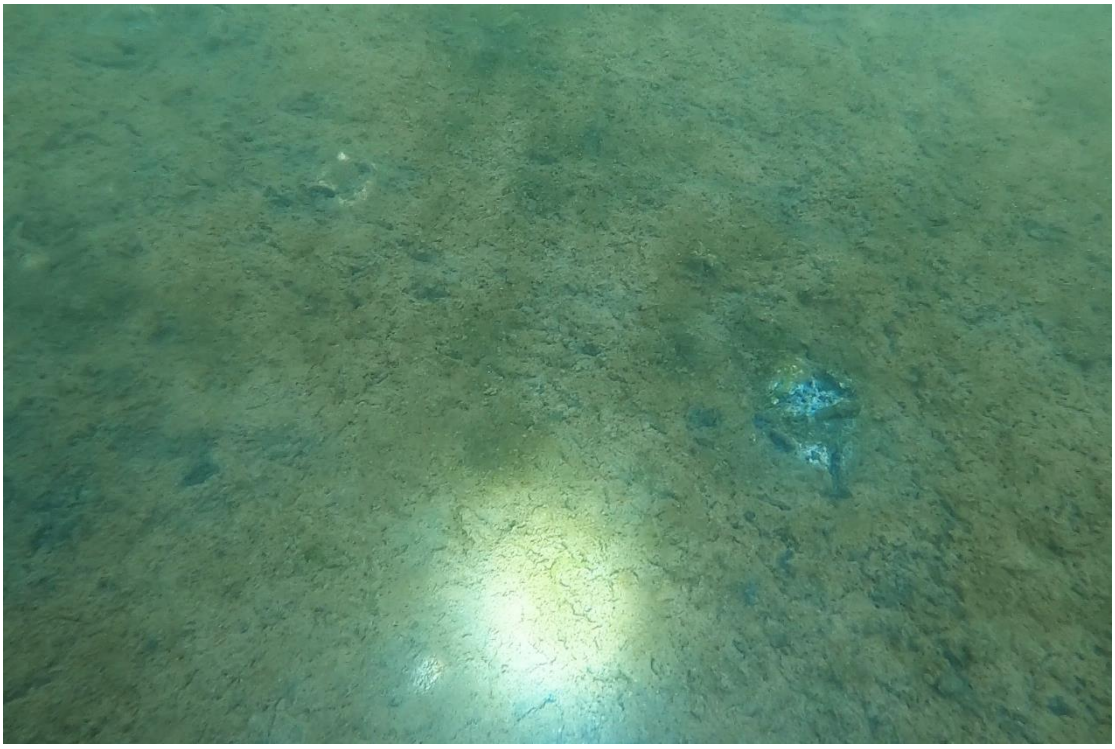

Figure 3-17: Lough Atalia Station 3.2 Soft mud with benthic diatoms, *Beggiatoa* and anoxic sediment.

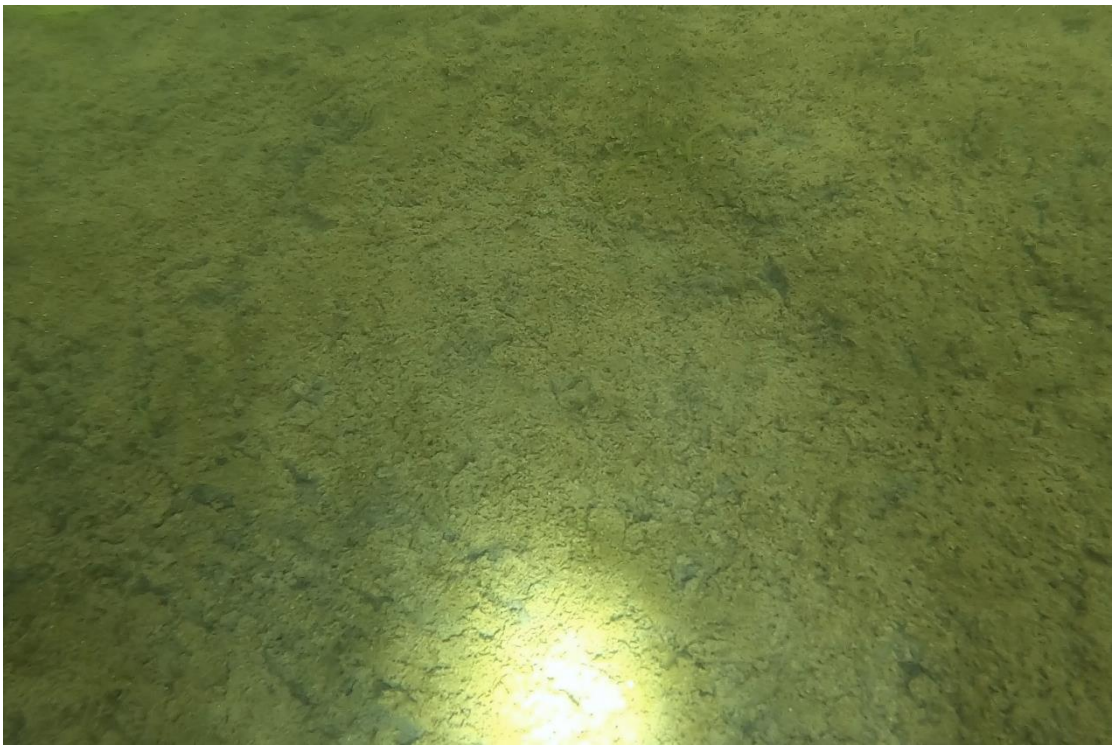

Figure 3-18: Lough Atalia Station 3.3. 2 Soft mud with benthic diatoms. Tracks of mobile surface fauna visible.

Figure 3-19: Lough Atalia Station 3.4. Soft mud with benthic diatoms, *Beggiatoa, Enteromorpha/Ulva* and anoxic sediment.

Figure 3-20: Lough Atalia Station 3.5. Soft mud with decaying green algae, *Beggiatoa,* and benthic diatoms.

3.2.4 Station 4

The duration of video transect at station 4 was approximately 2 minutes long. The depth at this station has been recorded at less than 1m below chart datum. The substrate consisted of thick mud with a surface layer of benthic diatoms. While the surface again appears oxygenated, as in the majority of the other stations it was apparent wherever the surface was disturbed that anoxic sediment was immediately below. Small patches of *Beggiatoa* bacterial mats were again recorded as were patches of drift and decaying algae, primarily *Entromorpha/Ulva.* There were few records of fauna present. A couple of shore crabs (*Carcinus maenus*) were recorded and the evidence of their movements in the areas can be seen in the numerous tracks across the surface of the mud.

Epibiotic community: Figures 3-21 - 3-24.-

Figure 3-21: Lough Atalia Station 4.1 Soft mud with benthic diatoms, anoxic sediment and *Enteromorpha/Ulva.* Tracks of mobile surface fauna also visible.

Figure 3-22: Lough Atalia Station 4.2. *Enteromorpha/Ulva* and patchy *Beggiatoa* on muddy substrate.

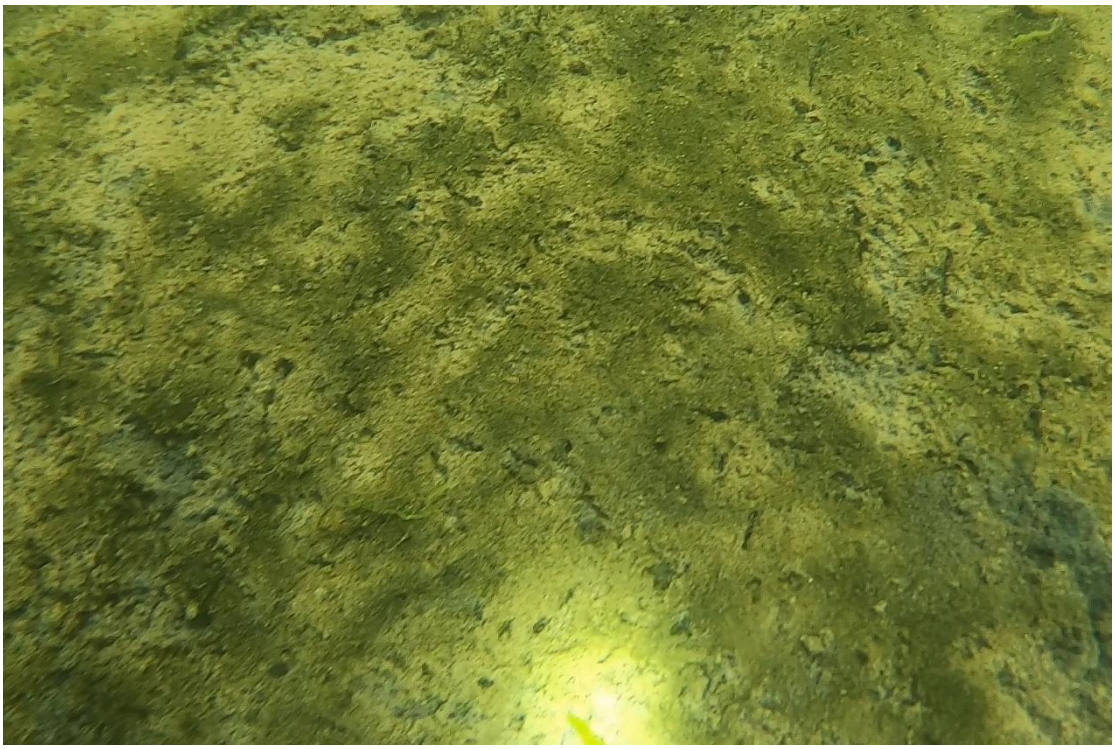

Figure 3-23: Lough Atalia Station 4.3. Tracks of mobile surface fauna visible on the muddy surface. Tracks of mobile fauna visible.

Figure 3-24: Lough Atalia Station 4.4. Shore crab *Carcinus maenus* on a muddy substrate with surface benthic diatoms.

3.2.5 Station 5

The duration of the video transect at station 5 was approximately 2.5 minutes long. The depth recorded at this station was less than 0.5m below chart datum. The substrate again consisted of thick soft mud. The large patches of benthic diatoms recorded at other stations was not observed along this transect. However, the visibility was poor due to the shallow depth at this station resulting in slight disturbance of the surface silt as the boat transited. Again, while the surface seemed oxygenated, subsurface anoxic sediment was visible immediately below. A shore crab (*Carcinus maenus*) was recorded but little evidence of other fauna was observed. Some drift and decaying algae were observed which was possibly *Enteromorpha/Ulva* spp. but was difficult to discern due to the poor visibility.

Epibiotic community: Figures 3-25 – 3-28.

Figure 3-25: Lough Atalia Station 5.1. Soft mud with an oxygenated appearance

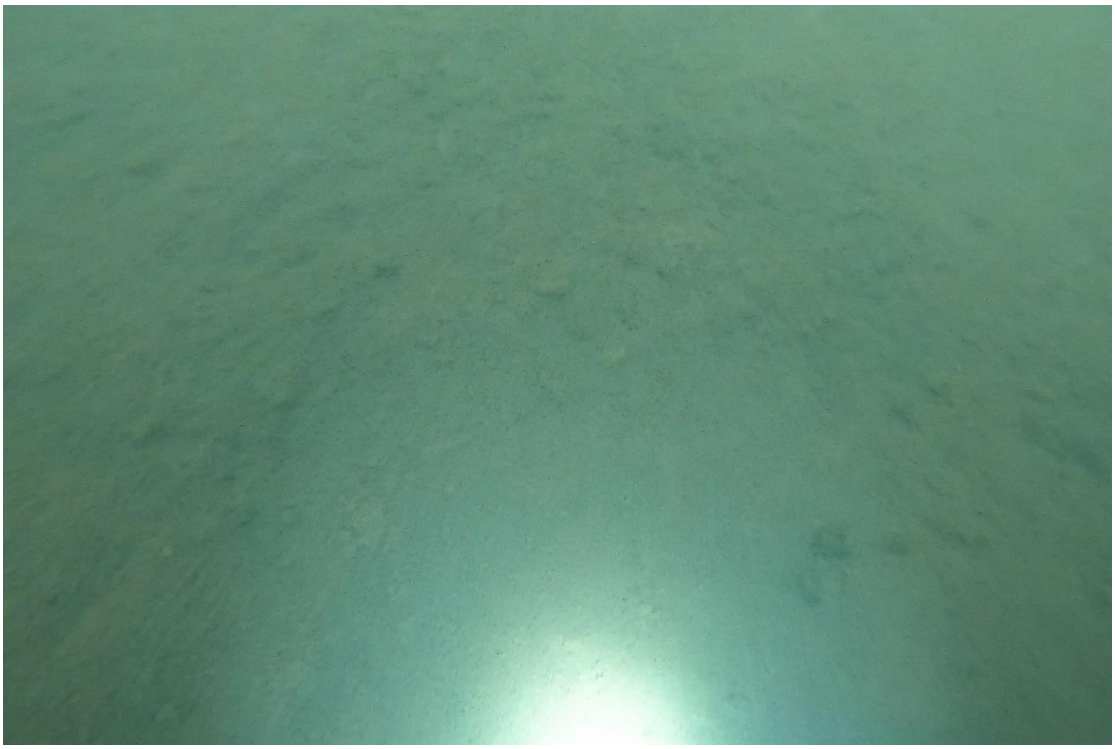

Figure 3-26: Lough Atalia Station 5.2. Soft mud with an oxygenated appearance.

Figure 3-27: Lough Atalia Station 5.3 Shore crab *Carcinus maenus.*

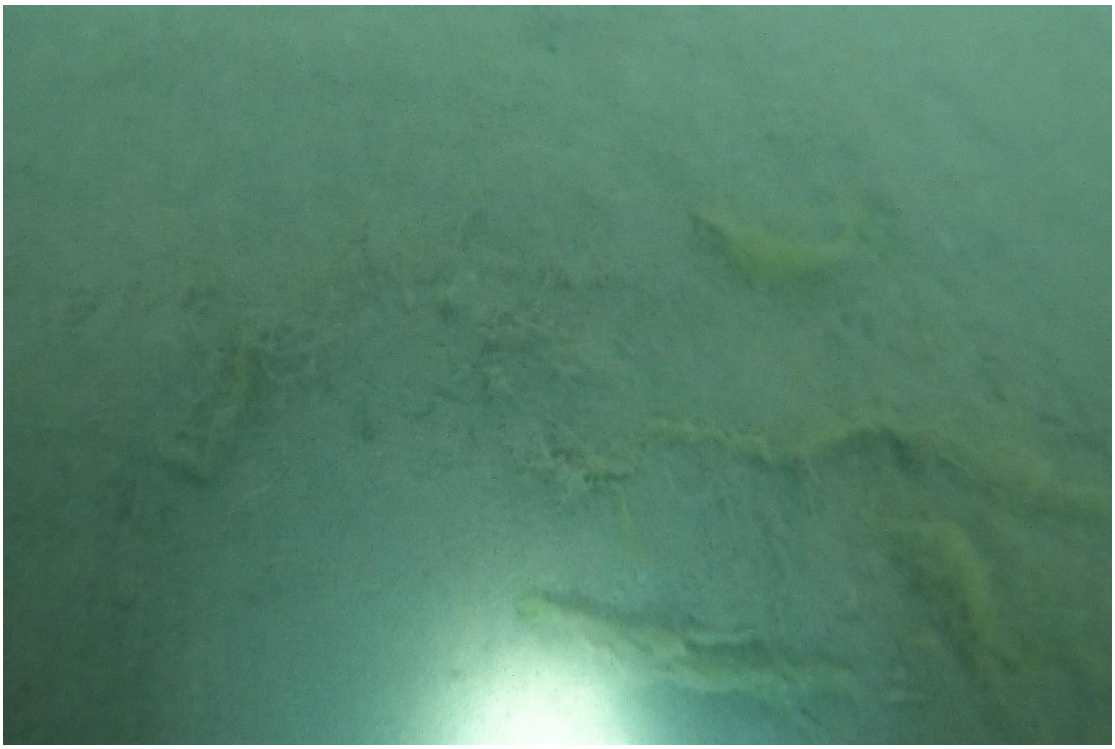

Figure 3-28: Lough Atalia Station 5.3. Drift and decaying algae, possibly *Enteromorpha/Ulva.*

3.2.6 Station 6

The duration of the video transect at station 6 was approximately 2 minutes long. The depth recorded at this station was less than 0.5m below chart datum. The substrate consisted of thick mud with a patches of benthic diatoms on the surface. The sediment surface along this transect appeared less oxygenated than at previous stations with larger areas of surface anoxic sediment. *Beggiatoa* mats were also observed. The only fauna recorded at this station were a shore crab and a goby. Tracks of both these taxa can be seen across the surface of the mud can been seen along the transect, with the smaller disturbance from crab movement and larger areas disturbed by the fish. Some drift and decaying algae were observed including *Enteromorpha/Ulva* spp and *Chaetomorpha linum*.

Epibiotic community: Figures 3-29 – 3-32.

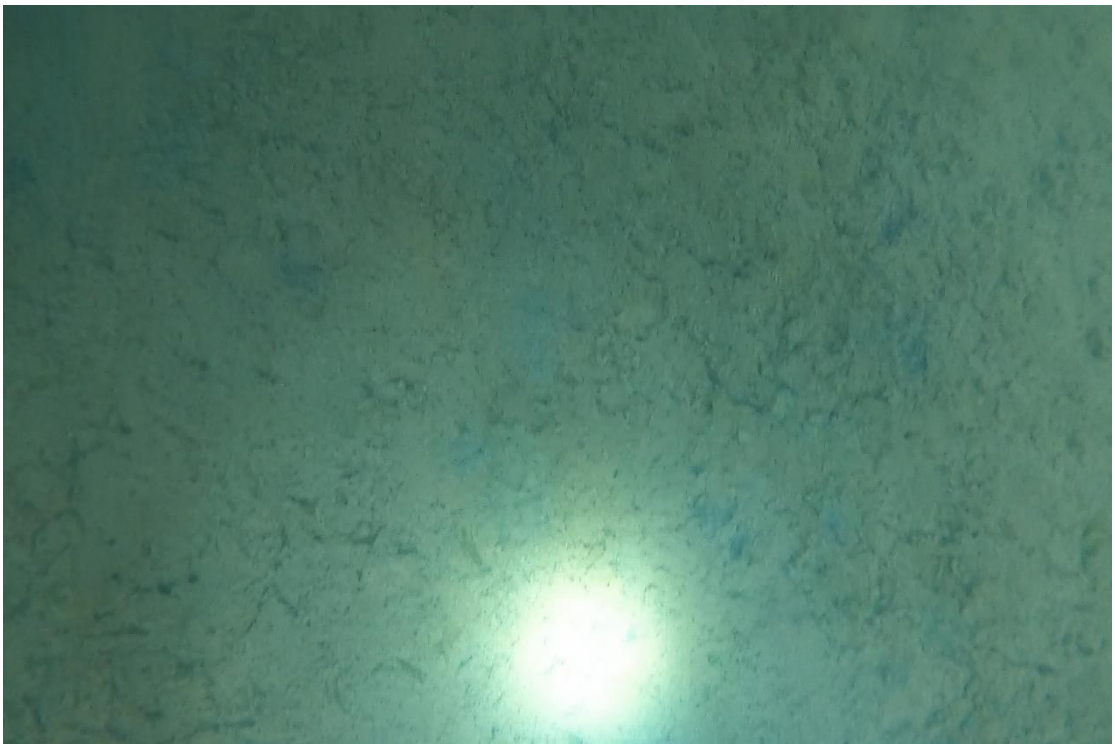

Figure 3-29: Lough Atalia Station 6.1.Soft mud with tracks of mobile surface fauna.

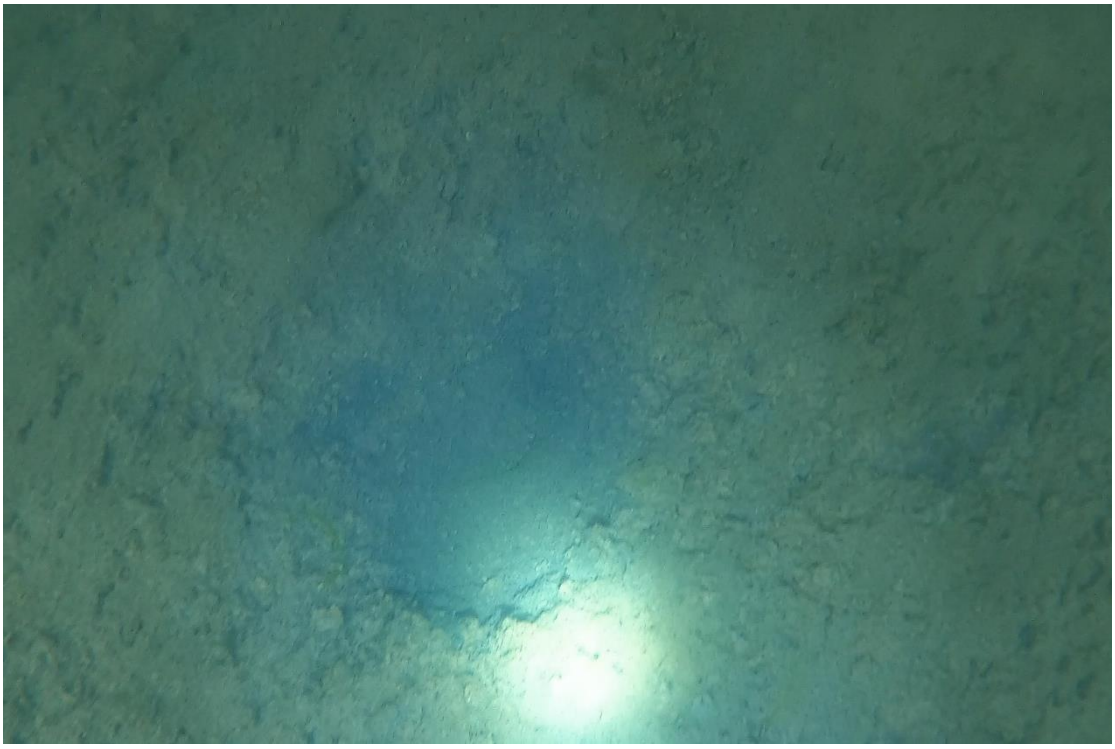

Figure 3-30: Lough Atalia Station 6.2. Soft mud with a large patch of anoxic surface sediment.

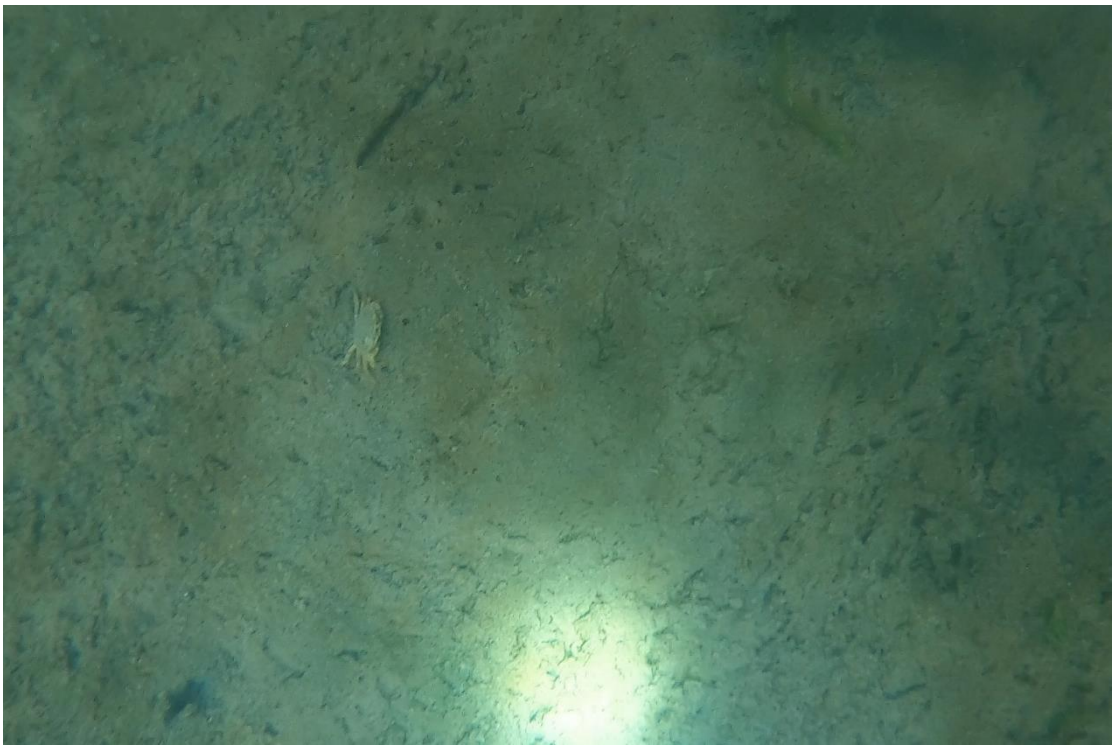

Figure 3-31: Lough Atalia Station 6.3 Soft mud with benthic diatoms, *Carcinus maenus,* and tracks of mobile surface fauna.

Figure 3-32: Lough Atalia Station 6.4 Patch of drift and decaying algae including *Enteromorpha/Ulva.*

3.2.7 Station 7

The duration of the video transect at station 7 was approximately 2 minutes long. The depth recorded at this station was less than 0.5m below chart datum. The substrate consisted of thick soft mud. The sediment surface appeared more oxygenated than at any other stations. There were small patches of anoxic sediment where disturbed, however. The only visible fauna along the transect were two gobies. There was also evidence of the movements of mobile surface fauna in the area can be seen in tracks across the surface of the mud. Some drift and decaying algae were observed.

Epibiotic community: Figures 3-33 – 3-36.-

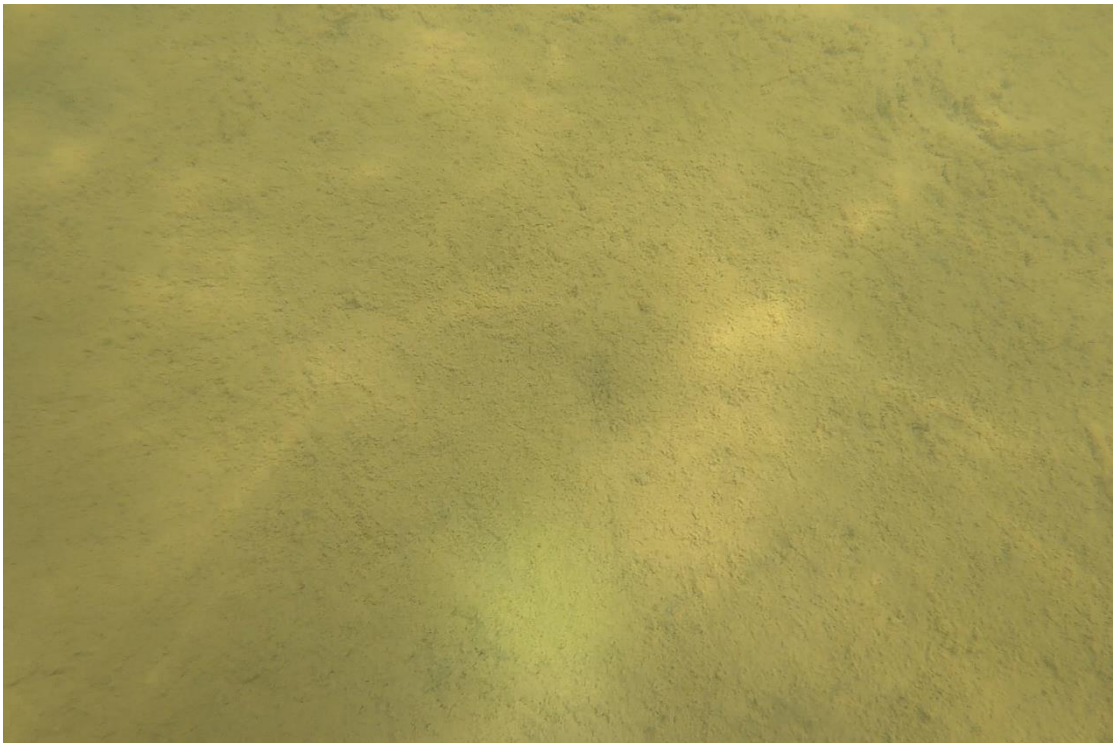

Figure 3-33: Lough Station 7.1. Surface of the soft mud substrate with an oxygenated appearance.

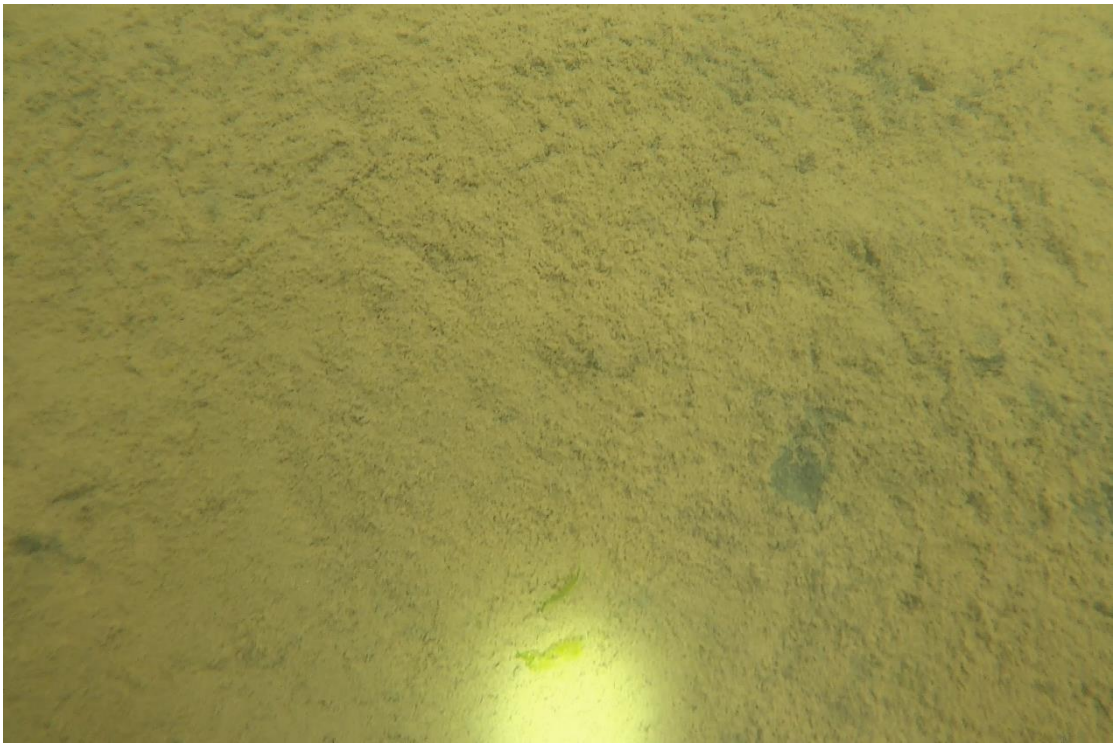

Figure 3-34: Lough Atalia. Station 7.2. Tracks of mobile surface fauna and anoxic sediment

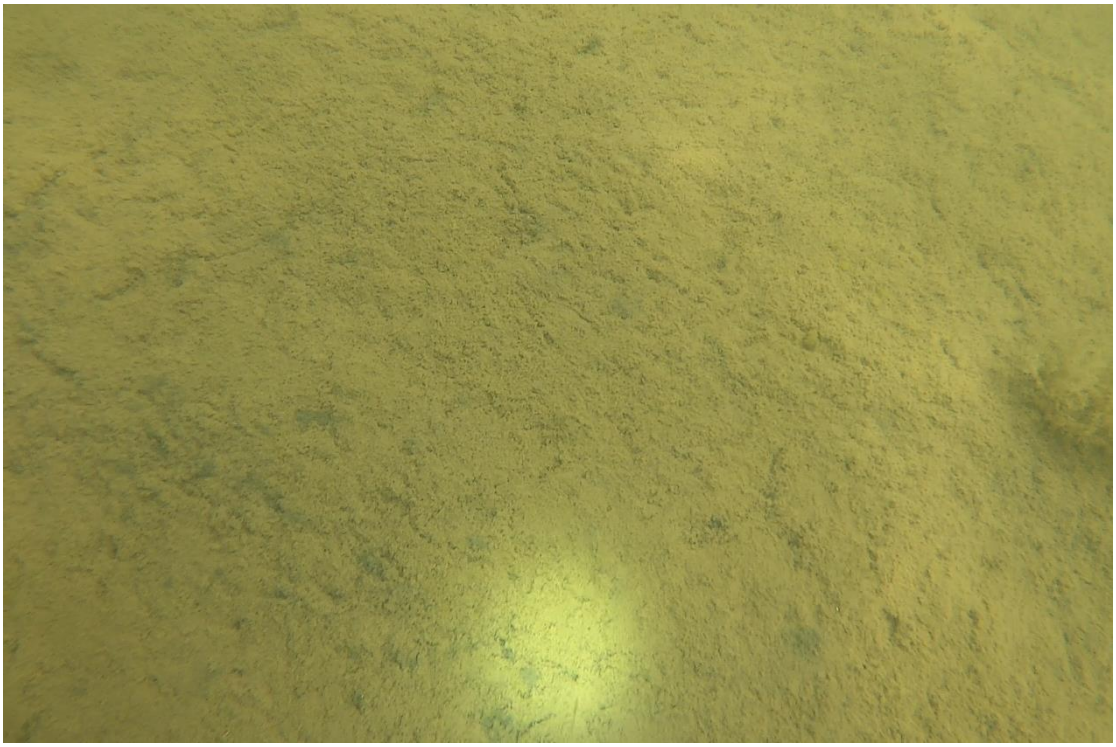

Figure 3-35: Lough Atalia Station 7.3. Surface of the soft mud substrate with an oxygenated appearance and surface tracks.

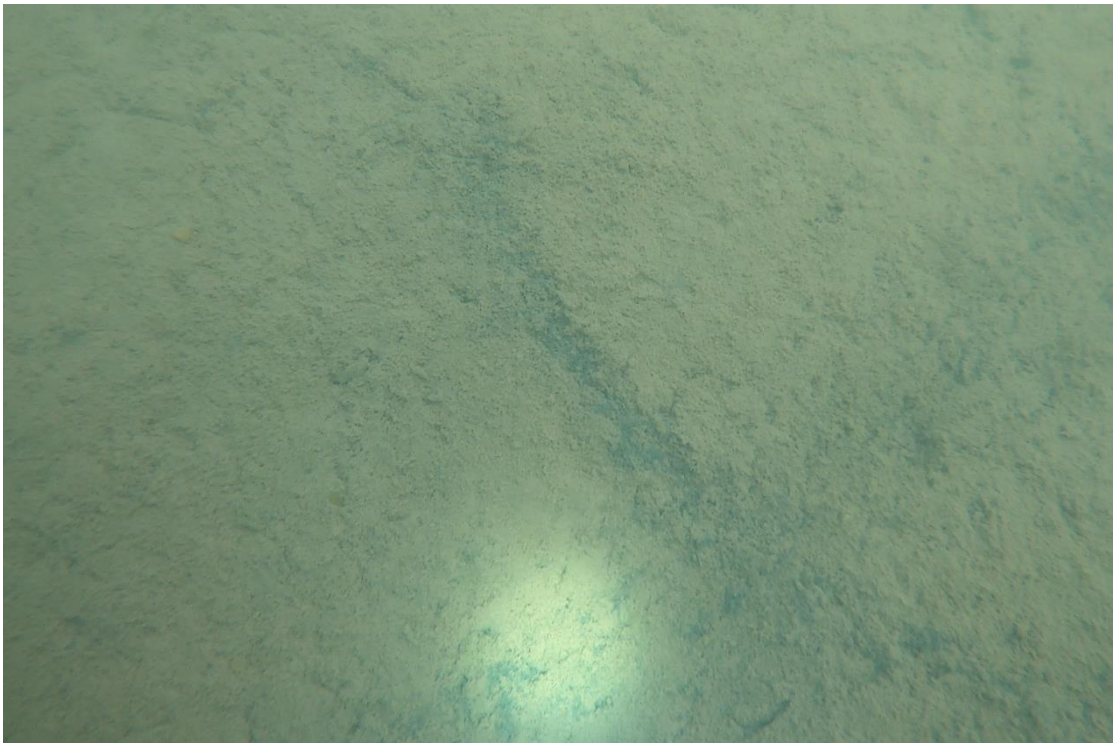

Figure 3-36: Lough Atalia Station 7.4. Surface disturbed revealing anoxic sediment beneath.

3.2.8 Station 8

The duration of the video transect at station 8 was approximately 2 minutes long. The depth recorded at this station was less than 0.5m below chart datum. The substrate as in the majority of the stations consisted of thick mud. While the surface for the most part seemed oxygenated, it was apparent wherever the surface was disturbed that anoxic sediment was immediately below. The surface along the transect had several large patches of drift and decaying algae including *Entreomorpha/Ulva* and possibly *Chaetomorpha linum* and *Cladophora* spp. Tracks of mobile surface fauna are visible as well as a shore crab and two gobies.

Epibiotic community: Figures 3-37 – 3-40.

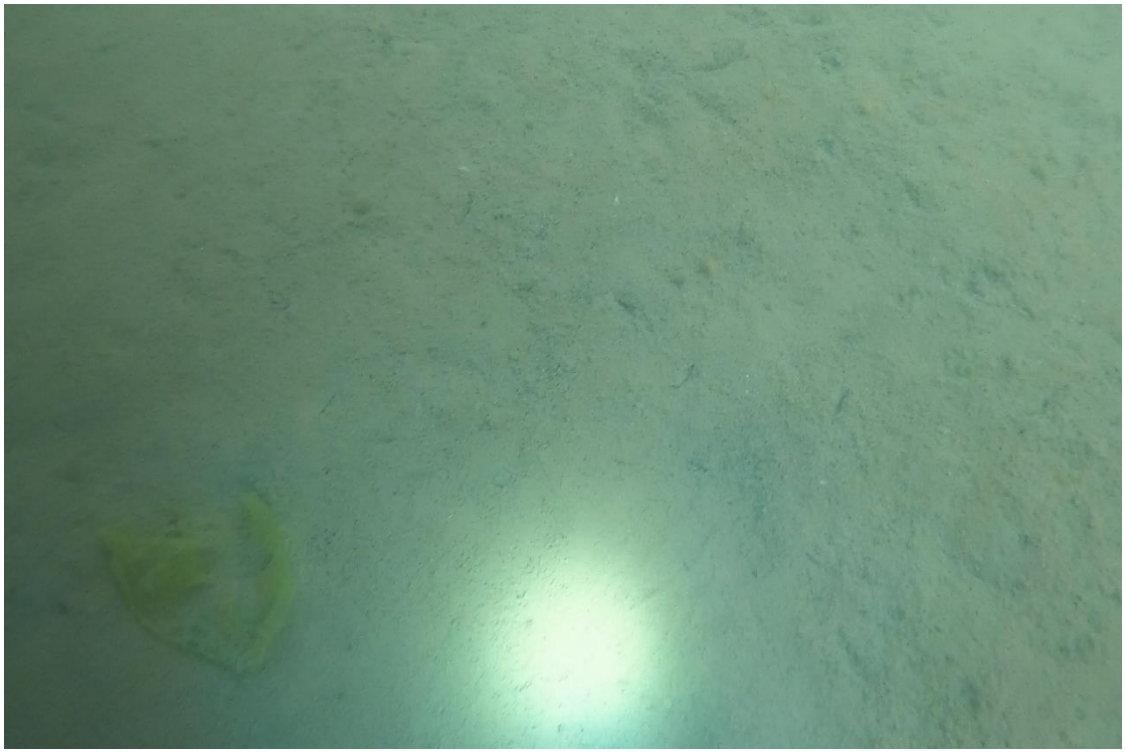

Figure 3-37: Lough Atalia Station 8.1. Soft mud sediment with an oxygenated appearance.

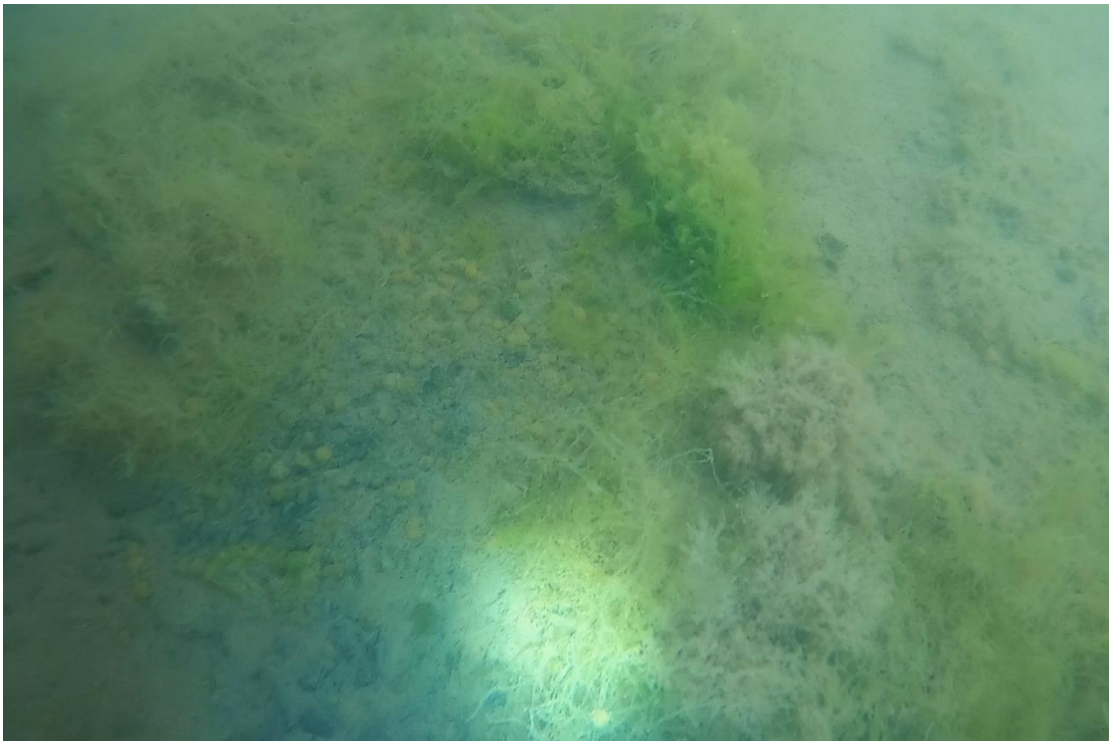

Figure 3-38: Lough Atalia Station 8.2. Patches of drift and decaying algae with anoxic sediment.

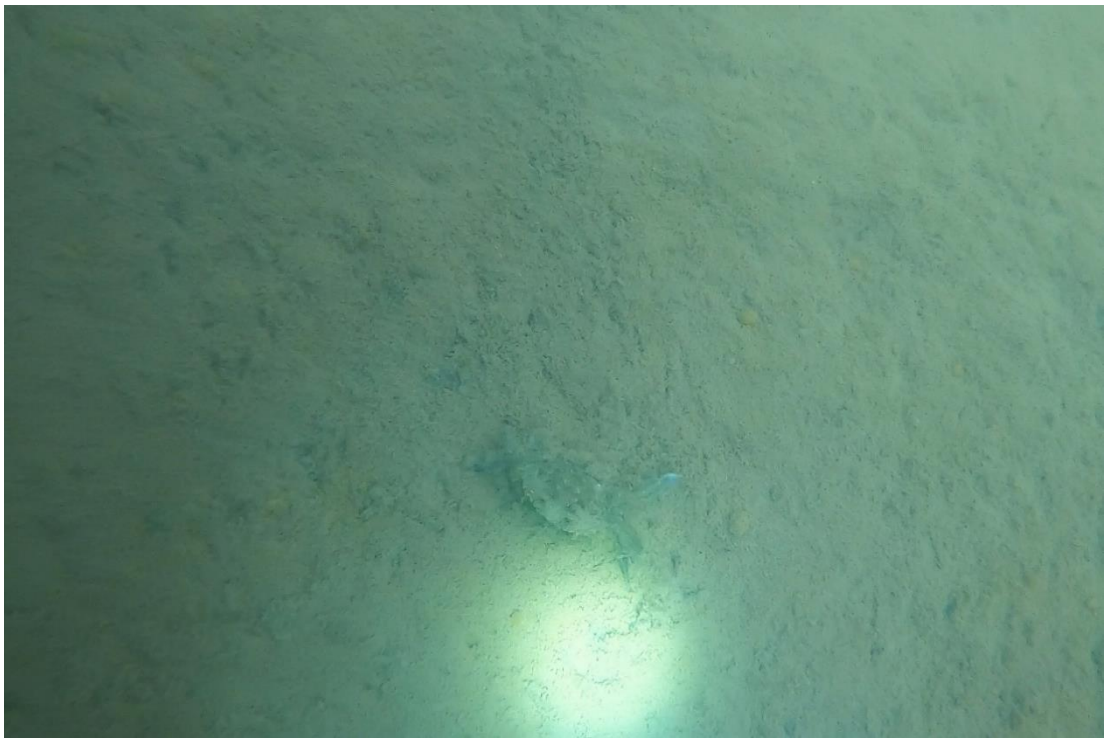

Figure 3-39: Lough Atalia Station 8.3 Shore crab.

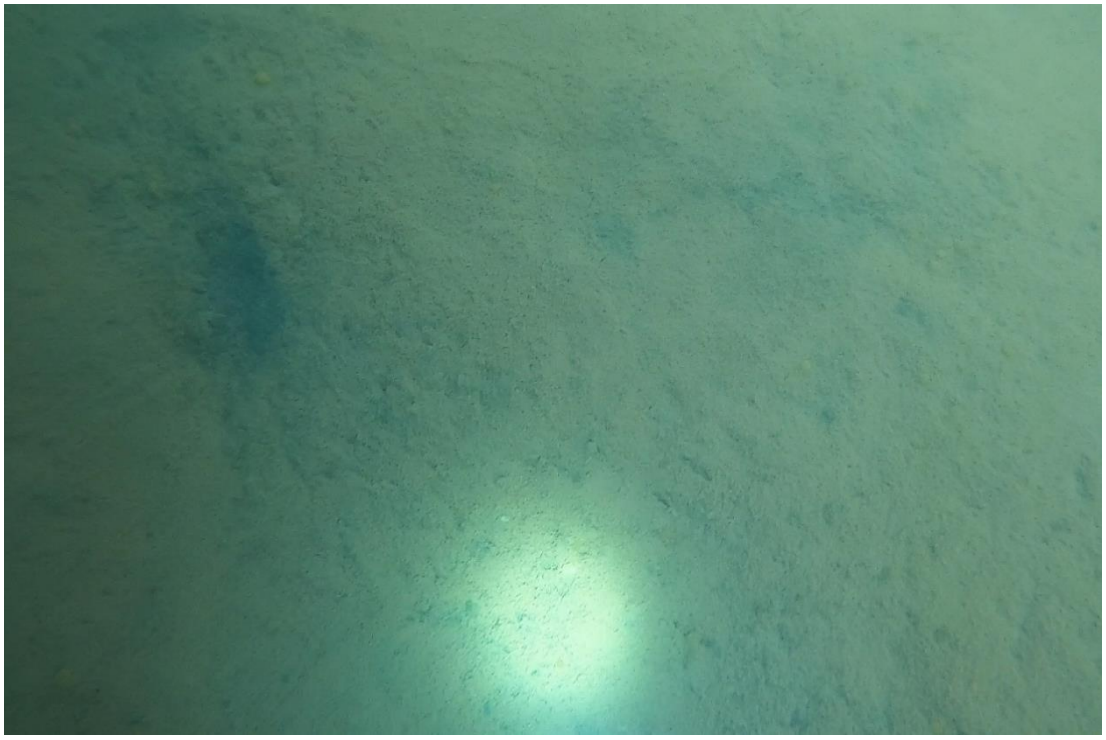

Figure 3-40: Lough Atalia Station 8.4. Tracks of mobile surface fauna and disturbed anoxic sediment.

3.2.9 Station 9

The duration of the video transect at station 9 was approximately 2 minutes long. The depth recorded at this station was less than 0.5m below chart datum. The substrate consisted of thick soft mud. While the surface for the most part seemed oxygenated, it was apparent wherever the surface was disturbed that anoxic sediment was immediately below. This is as a result of the high organic enrichment throughout Lough Atalia. Fauna recorded at this station included two gobies and the shrimp *Crangon* spp. Additionally, evidence of the movements of mobile surface fauna in the area can be seen in tracks across the surface of the mud. Small green jelly like balls which appear to be algae-like but were unable to be identified from the footage are noted to be present on top of the surface at this station which can be clearly observed in **Figure 3-44** Some drift and decaying algae were observed including *Enteromorpha*/*Ulva* spp and *Chaetomorpha linum*.

Epibiotic community: Figures 3-41– 3-45.

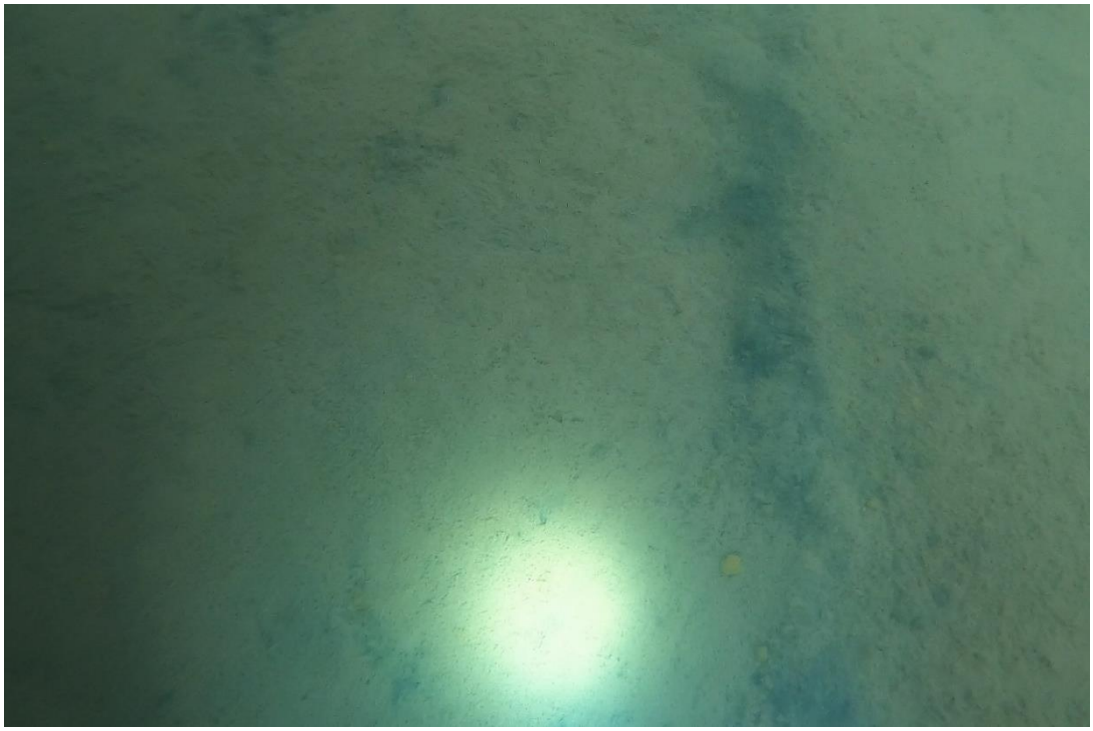

Figure 3-41: Lough Atalia Station 9.1. Soft mud with anoxic subsurface sediment exposed

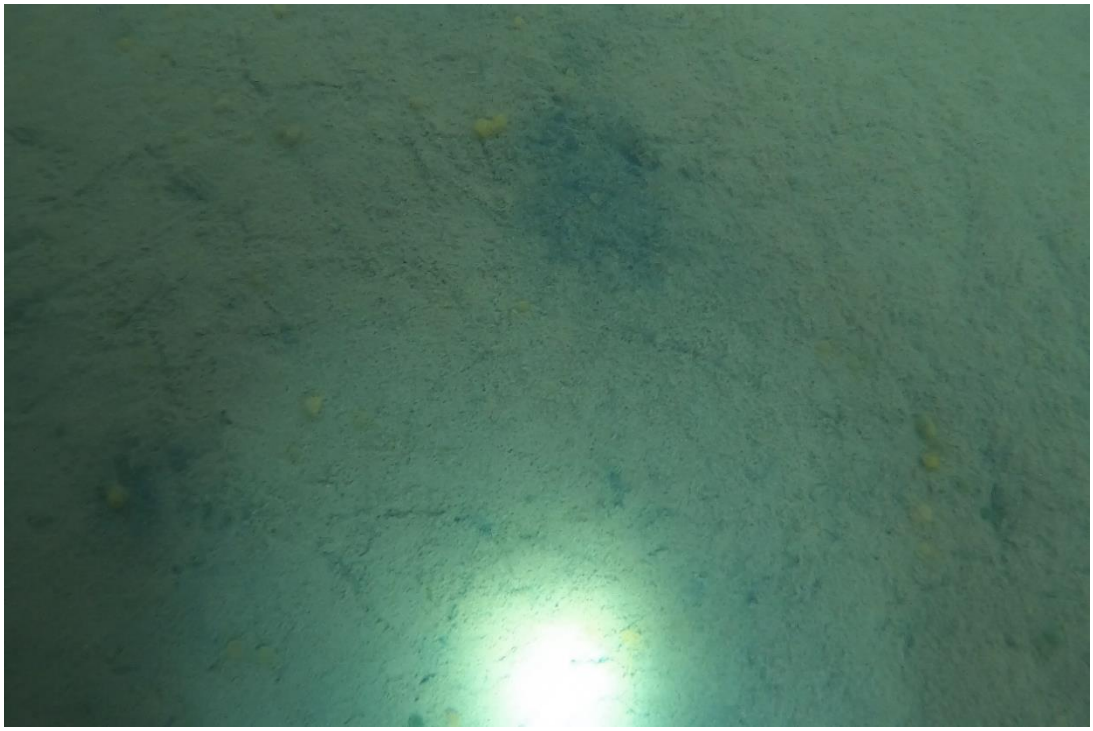

Figure 3-42: Lough Atalia Station 9.2. Tracks of mobile surface fauna exposing anoxic subsurface conditions

Figure 3-43: Lough Atalia. Station 9.3. Patch of algae (possibly *Chaetomorpha linum*) on sediment surface. Unidentified ball-like plant matter.

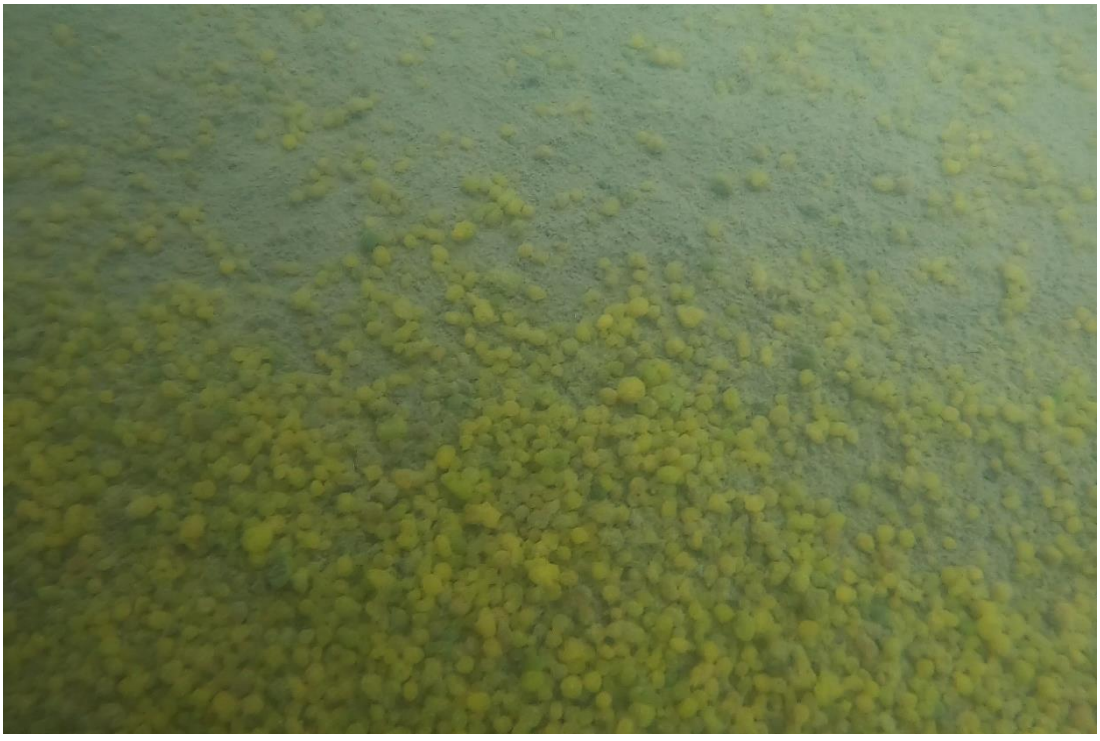

Figure 3-44: Lough Atalia Station 9.4. Large patch of unidentifiable plant matter

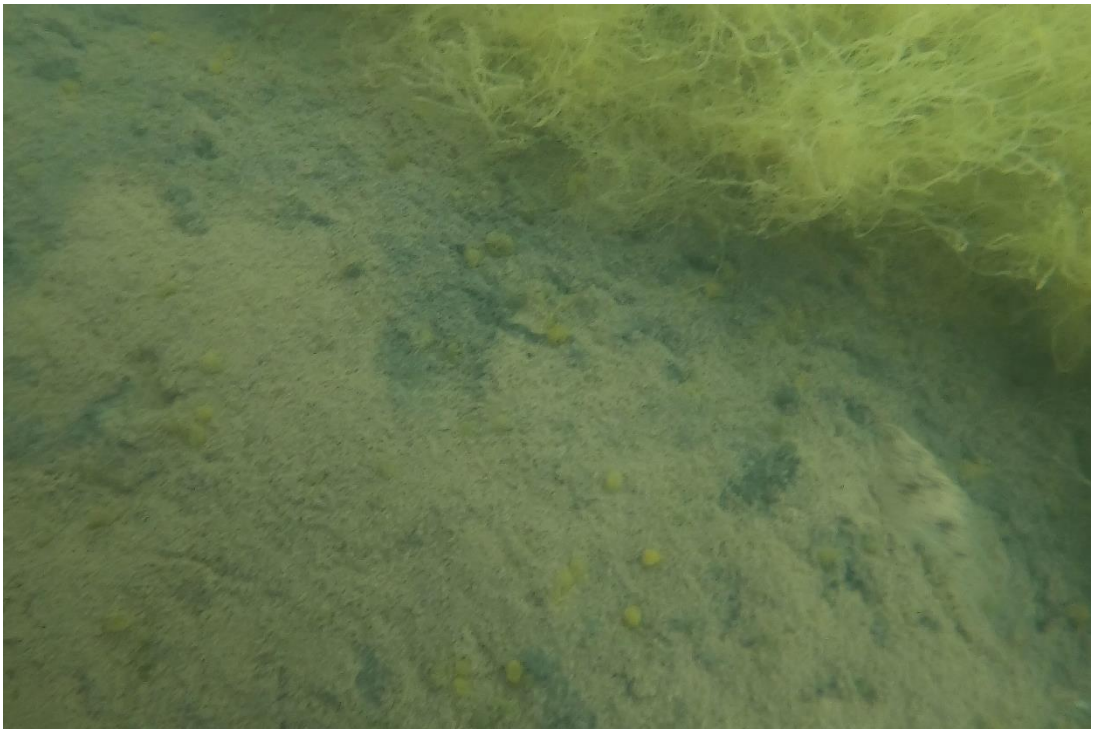

Figure 3-45: Lough Atalia Station 9.5. Soft muddy substrate with anoxic subsurface conditions. Patch of algae present (*Chaetomorpha linum*).

3.2.10 Station 10

The duration of the transect at station 10 was approximately 1.5 minutes long. The depth recorded at this station was less than 0.5m below chart datum. The substrate consisted of thick mud. While the surface for the most part seemed oxygenated, it was apparent wherever the surface was disturbed that anoxic sediment was immediately below. There was also a small patch of *Beggiatoa* observed. This is as a result of the high organic enrichment throughout Lough Atalia. No fauna was recorded at this station on the DDV however evidence of the movements of crabs in the area can be seen in tracks across the surface of the mud. The same small green nodules observed in station 9, which appear to be algal like but were unable to be identified from the footage, are noted to be present on top of the surface at this station which can be clearly observed in **Figure 3-49**. Some drift and decaying algae were observed including Enteromorpha/*Ulva* spp and *Chaetomorpha linum*.

Epibiotic community: Figures 3-46 – 3-50.

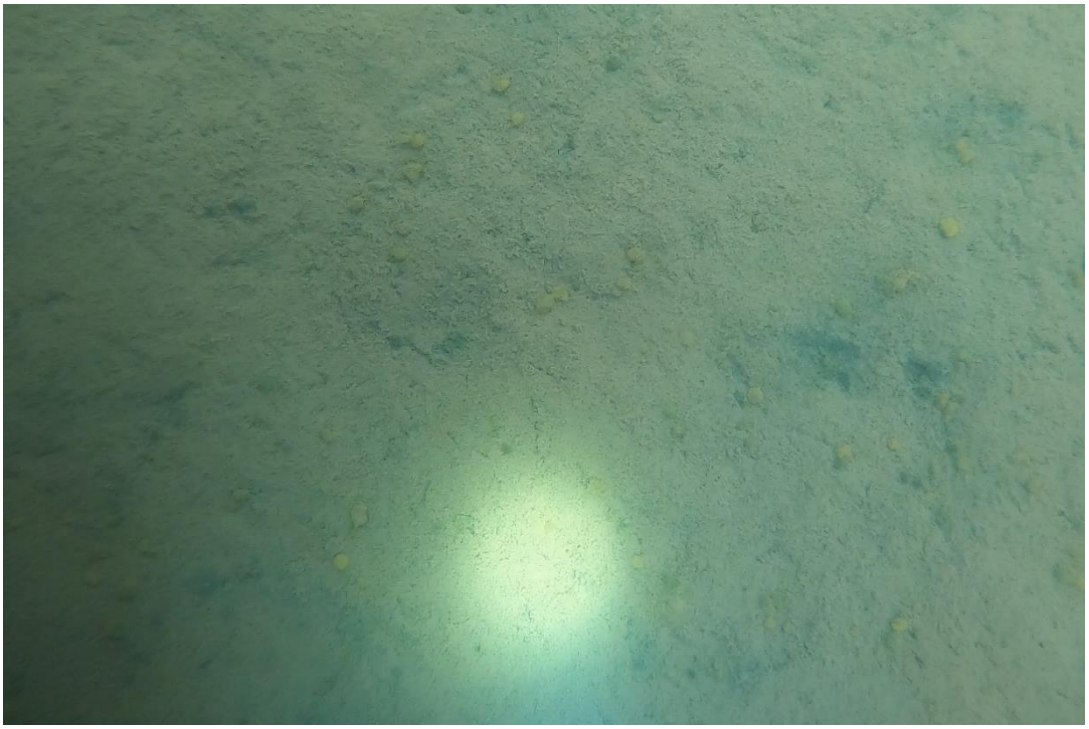

Figure 3-46: Lough Atalia Station 10.1 Soft mud with an oxygenated appearance.

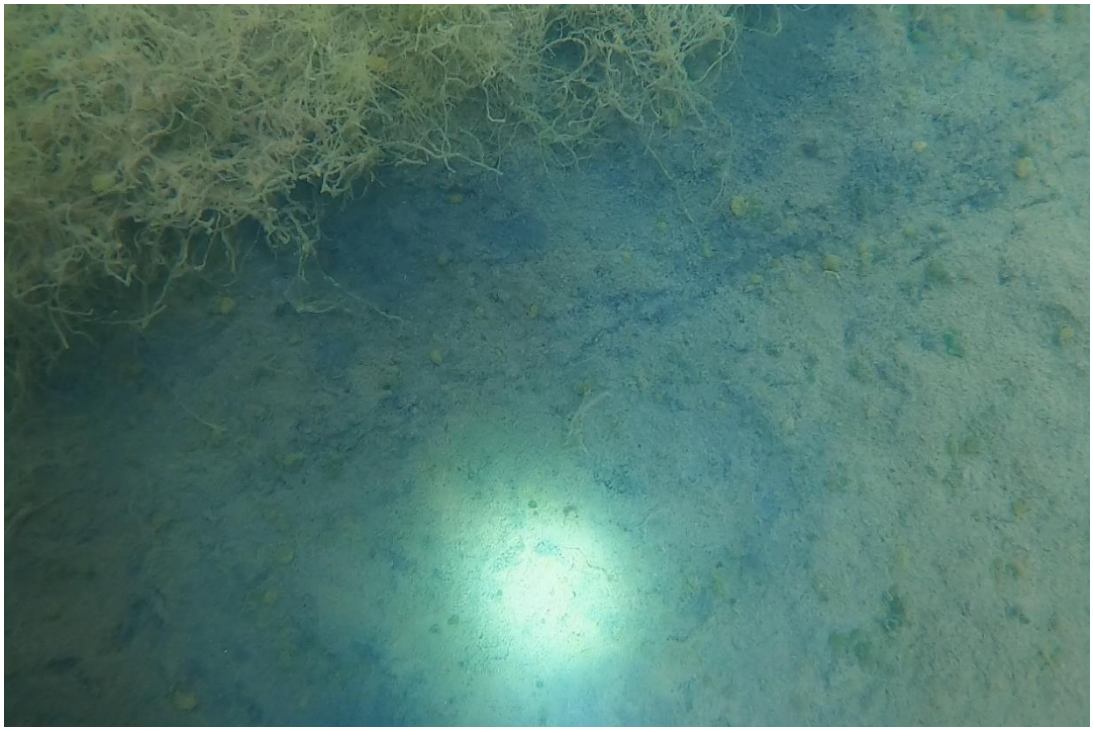

Figure 3-47: Lough Atalia Station 10.2 Patch of decaying algae and exposed anoxic sediment.

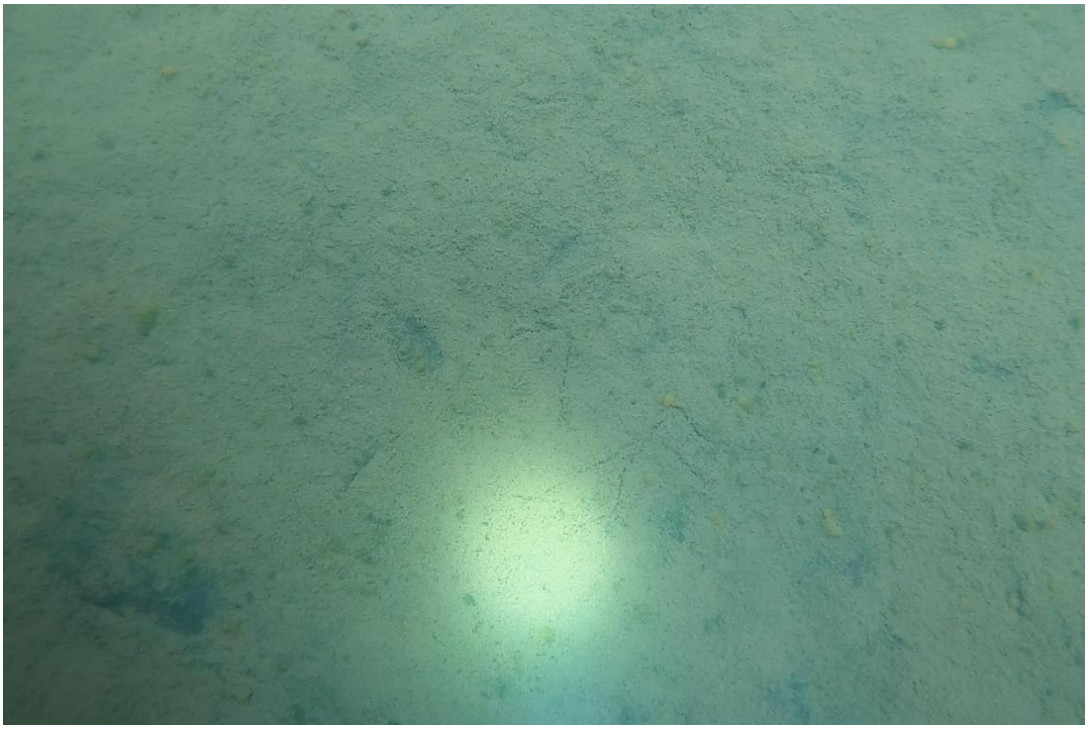

Figure 3-48: Lough Atalia Station 10.3. Tracks of mobile surface fauna.

Figure 3-49: Lough Atalia Station 10.4. Unidentified green algal-like structures. Anoxic sediment.

Figure 3-50: Lough Atalia Station 10.5 Close up of a patch of drift algae (*Chaetopmorpha linum*).

3.3 Renmore Lough sweep net survey

The sweep survey was carried out at 2 stations (see **Figure 3-51, Figure 3-52**) and showed a similar composition of lagoonal specialist species as those observed in a previous monitoring survey in 2016 carried out by AQUAFACT for the National Parks and Wildlife Services (NPWS) and the Environmental Protection Agency (EPA) as part of the 'Coastal Lagoon Monitoring Programme 2016-2017' (Roche *et al*., 2017) and shared some similarities with the benthic survey for the original EIS.

In **Table 3-3** we can see the overlap of species in the original surveys in 2013, the most recent survey in 2016 and the current survey in 2024. All four lagoonal specialists (*Palaemon varians, Enochrus bicolor, Ecrobia ventrosa* and *Ruppia* sp.) in the 2016 survey were documented again in the most recent survey, and *Ecrobia ventrosa* and *Ruppia sp.* were recorded in all 3 surveys.

During the sweep survey a strong odour of hydrogen sulphide was noted at survey stations, indicating anoxic conditions in the sediment of the lagoon.

Figure 3-51: Station 1 at Renmore Lough.

Figure 3-52: Station 2 at Renmore Lough.

Table 3-3: Faunal species in Renmore Lough in 2013, 2016 & 2023.
Highlighted green cells = reoccurring species * = Lagoon specialist

2013	2016	2024
Heterochaeta costata	*Clava multicornis*	*Gammarus duebeni*
Nitokra spinipes	Ostracoda (indet.)	*Palaemon varians* *
Asellus sp.	*Gammarus duebeni*	*Jaera* sp. Female
Cyprideis torosa	*Palaemon varians* *	Chironomidae
Zygoptera	Chironomidae	*Chironomus* sp.
Dytiscidae	*Ephydra riparia*	*Ecrobia ventrosa* *
Ecrobia ventrosa *	*Enochrus bicolor* *	*Lekanesphaera hookeri*
Gasterosteus aculeatus	Acarina indet.	*Ischnura elegans*
Anguilla anguilla	*Ecrobia ventrosa* *	*Enochrus* sp. Larva *
	Gasterosteus aculeatus	
Ruppia sp. *	*Ruppia* sp. *	*Ruppia* sp. *

4 Discussion

4.1 Lough Atalia

The DDV survey documented similar conditions in Lough Atalia from the stations sampled previously in 2013. At nine of the ten stations soft, thick mud was recorded, the exception being the Station 1 which had coarse sand and shell debris due to the fast flow of water into and out of Lough Atalia from Galway Bay during the turning of the tide. The surface of the mud was covered in places with benthic diatoms and the redox layer was at or just under the surface indicating anoxic conditions. At five station transects, filamentous bacterial mats of *Beggiatoa* were recorded in a number of places. This is indicative of highly impacted anoxic sediments. Flora recorded include *Ulva* spp., *Enteromorpha* spp., fucoids, *Chondrus crispus/Mastocarpus stellatus, Cladomorpha linum,* and a filamentous alga (possibly *Chaetomorpha* or *Vaucheria*). Unattached masses of *Cladomorpha linum* were previously recorded in Lough Atalia and were recorded again at stations 1, 8, and 10. Station 1 nearest to the open sea, was, as expected the most diverse of the stations. This transect recorded a more varied substrate than the other 9 stations, and included boulders, mussel shell debris, coarse sand and silt. The epiflora on the boulders included *Ulva* spp., fucoids, *Chondrus crispus/Mastocarpus stellatus*, and and a filamentous alga (possibly *Chaetomorpha* or *Vaucheria*). The fauna recorded at station 1 include

the crabs *Necora puber* and *Carcinus maenus*, the polychaetes *Arenicola marina* and *Spirobranchus* spp., and the common goby *Pomatoschistus microps*. Comparisons of 2013 and 2024 data can be seen below in **Table 4-1**.

The condition of many of the stations is indicative of impacted/highly impacted anoxic sediments. The water chemistry results showed salinity readings of 22.26 – 26.08, these are indicatory of brackish water and fall within the same ranges as those noted in the original EIS. Average readings taken at stations 3, 8, 9 and one reading at station 5 show a chlorophyll level above the 5µg/ml target set out in the conservation objectives for lagoons (NPWS, 2013). The turbidity was noted to be highest at stations with higher chlorophyll levels. Station 1 showed a larger variety in substrate, similar to as seen in the previous survey.

Table 4-1: Comparisons of 2013 and 2024 data in Lough Atalia.

Station	2013	2024
1	7 taxa, H_2S smell (anoxic)	Mussel shell debris, coarse sand, some boulders with fucoids, *Chondrus cripsus/Mastocarpus stellatus, Arenicola marina, Necora puber, Carcinus maenus, Spirobranchus spp., Pomatoschistus microps* and a mysid shrimp.
2	No fauna, H_2S smell (anoxic)	Anoxic silt, patches of *Beggiatoa*, 1 shore crab (*Carcinus maenas*)
3	2 amphipods (Melitidae) H_2S smell (anoxic)	Anoxic silt, patches of *Beggiatoa*
4	No fauna, H_2S smell(anoxic)	Anoxic silt, patches of *Beggiatoa*, *Ulva* spp., *Enteromorpha* spp., 1 shore crab (*Carcinus maenas*)
5	1 amphipod (*Gammarus salinus*) H_2S smell (anoxic)	Anoxic silt
6	No fauna, H_2S smell (anoxic)	Anoxic silt, patches of *Beggiatoa*, *Pomatoschistus microps*
7	No fauna, H_2S smell(anoxic)	Anoxic silt, *Pomatoschistus microps*
8	No fauna, H_2S smell (anoxic)	Anoxic silt, *Pomatoschistus microps*, *Ulva* spp., *Cladophora linum*
9	1 amphipod (*Gammarus salinus*) H_2S smell (anoxic)	Anoxic silt, *Pomatoschistus microps*
10	No fauna, H_2S smell (anoxic)	Anoxic silt, patches of *Beggiatoa*, *Cladophora linum*

4.2 Renmore Lough

The sweep survey showed a similar faunal composition as those observed in a previous monitoring survey in 2016 carried out by AQUAFACT for the National Parks and Wildlife Services (NPWS) and the Environmental Protection Agency (EPA) as part of the 'Coastal Lagoon Monitoring Programme 2016-2017' (Roche *et al*., 2017) and shared some similarities with the benthic survey for the original EIS. The lagoonal specialists *Ruppia* sp. and *Ecrobia ventrosa* were recorded in all 3 surveys.

The water chemistry results showed salinity readings of 5.88 – 14.6, these are indicatory of brackish water and fall within the same ranges as those noted in the original EIS. Both readings taken at stations 1 and 2 show a chlorophyll level above the 5µg/ml target set out in the conservation objectives for lagoons (NPWS, 2013). Overall, the conditions at Renmore Lough were considered to be poor.

5 Conclusion

Following the field survey, it is confirmed that the conclusions in relation to the Lough Atalia benthic habitat remain valid as no significant changes to the baseline have occurred since the EIS and associated documentation were submitted.

6 References

NPWS. (2013). Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS. (2013). Galway Bay Complex SAC (site code 268) Conservation objectives supporting document - Lagoons. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Roche, C., Oliver, G.A. & Roden, C. (2017) Coastal Lagoon Monitoring Programme 2016-2017 Volume I Background Document for Conservation Status of the Habitat Coastal Lagoons 1150. Irish Wildlife Manuals. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Ireland