



MILFORD HAVEN WATERWAY
ENVIRONMENTAL SURVEILLANCE GROUP

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MILFORD HAVEN WATERWAY ROCKY SHORE SURVEILLANCE, 2020

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December 2020

Milford Haven Waterway Rocky Shore Surveillance, 2020

**A report to the Milford Haven Waterway Environmental Surveillance
Group**

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COVER IMAGE: View from Sawdern Point (Angle Bay) looking east towards the Valero refinery. Photo: John Archer-Thomson.

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MILFORD HAVEN WATERWAY ROCKY SHORE SURVEILLANCE 2020

Executive Summary

Six rocky shores within the Milford Haven Waterway were surveyed by the authors and colleagues on behalf of the Milford Haven Waterway Environmental Surveillance Group. Field surveys were carried out between 20th and 25th of July 2020. This repeated the work carried out by the Marine Biological Association of the UK in 2010, the Field Studies Council in 2013 and the present authors in 2017. The same methodology was used with the exception that for this and subsequent surveys, fixed quadrat positions have been adopted for the main survey (see methods). These were established before the biological data was collected.

The results were analysed and compared with those from previous surveys.

There was close agreement in the overall community composition between 2013, 2017 and 2020. This suggested a generally stable situation between the surveys and underlined the benefits of having the same personnel carry out the work. There were, however, some indicators of change. There were modest increases in species numbers, including the appearance of *Undaria pinnatifida* and increased abundance of *Caulacanthus okamurae*, for example, both of which are non-native.

The pattern of high biodiversity at the open coast sites (Dale Point and Great Castle Head) decreasing up the Milford Haven Waterway was consistent with previous surveys. The higher diversity usually associated with increased shelter (from wave action) may have been offset by variations in salinity, increased turbidity and deposition of fine sediment.

Barnacle percentage cover results were similar to those of 2013 and 2017. *Semibalanus balanoides* dominated on the open coast and *Austrominius modestus* dominated in the upper reaches of the Milford Haven Waterway. This was in line with expectation as *A. modestus* is tolerant of salinity fluctuations and turbid water. The abundance of juvenile barnacles mirrored that of the adult distributions with *S. balanoides* doing well on the open coast and *A. modestus* up the Milford Haven Waterway. *Chthamalus* spp. were most abundant on south-facing, exposed coasts as expected and as observed previously.

The observed trend of high limpet densities on the exposed sites, reducing with increased shelter continued from the previous surveys. Similarly, maximum limpet diameters showed an inverse relationship with limpet density. Once again there was a positive relationship between limpet density and barnacle cover and a negative relationship between limpet density and macro-algal cover.

Field observations, confirmed when the data was analysed, did show an increase in numbers of *Patella depressa* compared with those of *P. vulgata*. This is in line with predictions on changes in relative abundance of these two species as the climate warms.

For *Ascophyllum nodosum* at Cosheston Folly, Sawdern Point and Llanreath the vesicle number modal class fluctuated. There was also evidence that individuals had survived from the previous survey resulting in higher vesicle counts. At Sawdern Point there were few individuals with small numbers of vesicles indicating poor recruitment, possibly as a result of intraspecific competition for space. At Llanreath the unusual frequency distribution of vesicle numbers was partially maintained from the previous survey but the frequency distribution became bi-modal (having been uni-modal in 2017). The mean number of vesicles per individual in 2020 was significantly different at all sites (previously this only applied to Llanreath).

Surveys of Trochidae in 2017 produced broadly similar results to 2013. The main exception being the increased abundance of *Phorcus lineatus* and *Gibbula umbilicalis* at Sawdern Point. Other sites within the Milford Haven Waterway (monitored by the present authors) have shown increases in recent years. In 2020, numbers of *P. lineatus* at Sawdern Point (which had been increasing rapidly) seem to have stabilised. Nor was there much change in density of this species at Gelliswick. There was a large increase in density of *P. lineatus* at Dale Fort Jetty Beach. Density at Cosheston Folly showed a steady increase. Mean maximum diameter increased for both species at all sites except for Cosheston Folly.

Recommendations include increased frequency of surveys and continued consistency in personnel.

GWYLIADWRIAETH GLANNAU GREIGIOG DYFRFFORDD ABERDAUGLEDDAU 2020

Crynodeb Gweithredol

Gwnaethpwyd arolwg o chwe glan greigiog o fewn Dyfrffordd Aberdaugleddau gan yr awduron a chydweithwyr ar ran Grŵp Arolwg Amgylcheddol Dyfrffordd Aberdaugleddau (MHWES). Cafodd arolygon maes eu gwneud rhwng yr 20ed a'r 25ain o Orffennaf 2020. Roedd hyn yn ailadrodd y gwaith a wnaethpwyd gan Gymdeithas Fiolegol Forol y DU yn 2010, y Cyngor Astudiaethau Maes yn 2013 a chan yr awduron presennol yn 2017. Defnyddiwyd yr un fethodoleg ond yn yr arolwg yma, fel y gwneir yn arolygiadau'r dyfodol, mae safleoedd cwadrat sefydlog wedi'u mabwysiadu ar gyfer y prif arolwg (gweler dulliau). Cafodd y rhain eu sefydlu cyn i'r data biolegol gael eu casglu.

Cafodd y canlyniadau eu dadansoddi a'u cymharu â chanlyniadau'r arolygon blaenorol.

Roedd cytundeb clos ynghylch y cyfansawdd cymunedol cyfan rhwng 2013, 2017 a 2020. Roedd hyn yn awgrymu sefyllfa sefydlog yn gyffredinol rhwng yr arolygon ac roedd yn tanlinellu'r manteision o gael yr un bobl i wneud y gwaith. Roedd yna, fodd bynnag, rai arwyddion o newid. Roedd ychydig o gynnydd yn niferoedd y rhywogaethau, gan gynnwys ymddangosiad *Undaria pinnatifida* a chyflenwad uwch o *Caulacanthus okamurae*, er enghraifft, yr un o'r ddwy rywogaeth yn rhai brodorol.

Roedd y patrwm o fioamrywiaeth uchel ar y safleoedd arfordirol agored (Trwyn Dale a Great Castle Head) a hwnnw'n lleihau i fyny Dyfrffordd Aberdaugleddu yn gyson ag arolygon blaenorol. Gallai'r amrywiaeth uwch sydd fel arfer yn cael ei gysylltu â mwy o gysgod (oddi wrth donnau'n torri) fod wedi cael ei leddfu gan amrywiaethau mewn heliedd, mwy o gymylogrwydd a dyddodiad gwaddod mân.

Roedd canlyniadau canran gorchudd cregyn llong yn debyg i rai 2013 a 2017. Roedd *Semibalanus balanoides* yn goruchafu ar yr arfordir agored ac *Austrominius modestus* yn goruchafu rhannau uchaf Dyfrffordd Aberdaugleddau. Roedd hyn yn ôl y disgwyl gan fod *A. modestus* yn oddefgar o anwadaliad heliedd a dŵr cymylog. Roedd y digonnedd o gregyn llong ifanc yn adlewyrchu dosbarthiad yr oedolion gyda *S. balanoides* yn gwneud yn dda ar yr arfordir agored ac *A. modestus* yn uwch i fyny Dyfrffordd Aberdaugleddau. Fel y disgwyliid ac fel yr arsylwyd yn gynharch, roedd *Chthamalus spp* fwyaf niferus ar yr arfordiroedd oedd yn wynebu'r de ac a oedd yn fwy agored.

Parhau roedd y duedd a welwyd mewn arolygon blaenorol o ddwysedd uchel o frennig ar y safleoedd agored a hynny'n lleihau wrth gael mwy o gysgod. Yn yr un modd, roedd diametrau mwyaf brennig yn dangos perthynas wrthdro gyda dwysedd brennig. Unwaith eto roedd perthynas bositif rhwng dwysedd brennig a gorchudd

cregyn llong a pherthynas negyddol rhwng dwysedd brennig a gorchudd macroalgaid.

Roedd arsylwadau maes yn dangos cynnydd yn niferoedd y *Patella depressa* o'i gymharu â niferoedd *P. Vulgata* a chafodd hyn ei gadarnhau pan ddadansoddwyd y data. Mae hyn yn gyson â rhagfynegiadau ynghylch newidiadau yn nigonedd cymharol y ddwy rywogaeth fel y mae'r hinsawdd yn cynhesu.

Yn achos *Ascophyllum nodosum* yn Cosheston Folly, Trwyn Sawdern a Llanreath, roedd nifer dosbarth modd y fesicl yn amrywio. Roedd tystiolaeth hefyd fod unigolion wedi goroesi o'r arolwg flaenorol ac o ganlyniad roedd cyfrifon uwch o fesiclau. Yn Nhrwyn Sawdern roedd ychydig o unigolion gyda niferoedd bychan o fesiclau oedd yn dangos recriwtrio gwael o bosib o ganlyniad i gystadleuaeth o fewn rhywogaethau i sicrhau lle. Yn Llanreath roedd dosraniad amlder anarferol o niferoedd fesiclau wedi'i gynnal yn rhannol o'r arolwg flaenorol ond daeth y dosraniad amlder yn ddau-fodal (ar ôl bod yn un-fodal yn 2017). Roedd y nifer cymedr o fesiclau fesul unigolyn yn 2020 yn dra gwahanol ar yr holl safleoedd (dim ond yn Llanreath y gwelwyd hyn yn gynharach).

Roedd y canlyniadau yn Trochidae yn 2017 yn weddol debyg i ganlyniadau 2013. Yr eithriad pwysicaf oedd y cynnydd mewn digonedd o *Phorcus lineatus* a *Gibbula umbilicalis* yn Nhrwyn Sawdern. Mae safleoedd eraill o fewn Dyfrffordd Aberdaugleddau (wedi'u monitro gan yr awduron presennol) wedi dangos cynnydd yn ystod y blynyddoedd diweddar. Mae niferoedd y *P. lineatus* yn Nhrwyn Sawdern (sydd wedi bod yn cynyddu'n gyflym) i'w gweld wedi sefydlogi yn 2020. Nid oedd fawr o newid, ychwaith, yn nwysedd y rhywogaeth yma yn Gelliswick. Roedd cynnydd sylweddol yn nwysedd *P. lineatus* yn Nhraeth Dale Fort Jetty. Roedd dwysedd yn Cosheston Folly yn dangos cynnydd cyson. Fe wnaeth y diameter cymedr uchaf gynyddu yn achos y ddwy rywogaeth ar bob un o'r safleoedd ac eithrio Cosheston Folly.

Mae argymhellion yn cynnwys gwneud mwy o arolygon a pharhau i ddefnyddio'r un personél.

