



MILFORD HAVEN WATERWAY
ENVIRONMENTAL SURVEILLANCE GROUP

GRŴP CADW GOLWG AMGYLCHEDDOL
AR DDYFRFFORDD ABERDAUGLEDDAU



Annual Report 2019



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COVER IMAGES

Front cover: View looking westward down Milford Haven Waterway. Photo: Mike Camplin

MILFORD HAVEN WATERWAY ENVIRONMENTAL SURVEILLANCE GROUP

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Pembrokeshire Coast National Park Authority
Pembrokeshire County Council
Port of Milford Haven
Puma Energy Ltd
RWE Generation UK plc
South Hook LNG Terminal Company LTD
Valero Energy Ltd
Valero Pembrokeshire Oil Terminal Ltd
Neyland Yacht Haven Ltd
Pembrokeshire Coastal Forum

Contact the MHWESG by e-mail at
mhwesg@gmail.com

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 Preseli Pembrokeshire AM
 Mid and West Wales regional AMs

Others

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 WG Environment & Climate Change
 UK Environmental Observation Framework secretariat
 UK Marine Monitoring and Assessment Strategy secretariat
 JNCC / UK Marine Monitoring and Assessment: Healthy and Biologically Diverse Seas Evidence Group
 UK Marine Monitoring and Assessment: Clean and Safe Seas Evidence Group
 Dwr Cymru-Welsh Water
 EA Environmental Monitoring and Assessment, Peterborough
 Pembrokeshire Marine SAC
 Skomer Marine Nature Reserve
 Skomer MCZ Advisory Committee Chair
 Current and former contractors

**Milford Haven Waterway Environmental Surveillance Group
Report 2018**

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Chair's Foreword

As a person of a certain age, I sometimes struggle to keep up with the rapid progress of Information Technology – some aspects of it are not for the greater good in my opinion but that's another story. Having said that I recognise its importance in the proper and efficient functioning of every organisation including the domestic one! So we pressed ahead in 2019 to bring our website very much into the 21st century (and hopefully beyond). I know that users will find it easy to navigate and informative – go take a look www.mhwesg.org.uk/.

In the same vein, we have introduced a policy on the use of our data via a data licence agreement. I think it is reasonable to charge a fee for commercial organisations to gain access to and use our data given the time, money and effort we have put in over the years to build it. It goes without saying that academic institutions and members get free access.

I am always thinking about the future success and survival of the MHWESG in these uncertain times and a key part of that is to recruit new members. I am really pleased that Neyland Yacht Haven Ltd and the Pembrokeshire Coastal Forum have joined, and I welcome their contribution and fresh thinking I am sure they will bring.

In recent years, our focus was taken up with renewing and revising the Collaboration Agreement and updating our website along with other important and necessary work. We did not commission many research projects and a consequence of that is we built up a healthy but modest bank balance. This enabled us to take a strategic review of ongoing and future projects for the next few years. Some require considerable financial resources and careful planning and so have been 'on the shelf'. With the review complete, I am pleased to see that some have been integrated into the future work programme of the MHWESG.

Enjoy reading the reports included and I look forward to another successful year in 2020.

Paul Howells, Dragon LNG Ltd

Chair MHWESG

Rhagair y Cadeirydd

Fel un o oedran arbennig, byddaf weithiau'n cael trafferth i ymdopi gyda chynnydd cyflym Technoleg Gwybodaeth – nid yw rhai agweddau arno, yn fy marn i, er lles y mwyafrif ond stori arall yw honno. Wedi dweud hynny, rwy'n cydnabod ei bwysigrwydd yng ngweithrediad

priodol ac effeithiol pob trefniadaeth, gan gynnwys yr un ddomestig! Fe aethom ati, felly, yn 2019 i ddod â'n gwefan yn gadarn i'r unfed ganrif ar hugain (a thu hwnt i hynny gobeithio). Fe wn y bydd defnyddwyr yn ei chael yn hawdd i'w gwe-lywio ac mae'n llawn gwybodaeth – ewch i gael golwg www.mhwesg.org.uk/.

Yn yr un modd, rydym wedi cyflwyno polisi ar y defnydd o'n data trwy gyfundeb trwydded ddata. Rwy'n meddwl, o ystyried yr amser, y cyllid a'r ymdrech rydym wedi'i fuddsoddi dros y blynyddoedd i gasglu data, ei bod yn rhesymol codi tâl ar gyrrff masnachol i gael mynediad iddo a'i ddefnyddio. Mae'n amlwg y bydd sefydliadau academaidd ac aelodau yn cael mynediad yn rhad ac am ddim.

Byddaf bob amser, yn y cyfnodau ansicr yma, yn ystyried llwyddiant a goroesiad MHWESG a rhan bwysig o hynny yw recriwtio aelodau newydd. Rwy'n wirioneddol falch fod Neyland Yacht Haven Ltd a Fforwm Arfordirol Sir Benfro wedi ymuno ac rwy'n croesawu eu cyfraniad a'r ffordd newydd o feddwl a ddaw, rwy'n sicr, yn sgîl hynny.

Yn ystod y blynyddoedd diwethaf, rydym wedi canolbwyntio ar adolygu ac adnewyddu'r Cytundeb Cydweithio ac ar ddiweddarau ein gwefan ynghyd â chyflawni gwaith pwysig ac angenrheidiol arall. Wnaethon ni ddim comisiynu llawer o brosiectau ymchwil ac o ganlyniad rydym wedi adeiladau cyfrif banc iach ond cymharol fychan. Fe wnaeth hyn ein galluogi i gymryd arolwg strategol o brosiectau cyfredol a phrosiectau'r dyfodol dros yr ychydig flynyddoedd nesaf. Mae rhai ohonynt yn galw am adnoddau ariannol sylweddol a chynllunio gofalus a chawsant felly eu rhoi 'o'r neilltu'. Rwy'n falch o weld, ar ôl cwblhau'r arolwg, fod rhai ohonynt wedi cael eu cynnwys yn rhaglen waith MHWESG i'r dyfodol.

Mwynhewch ddarllen yr adroddiadau sydd ynghlwm ac edrychaf ymlaen at flwyddyn lwyddiannus arall yn 2021.

Paul Howells, Dragon LNG Ltd

Cadeirydd MHWESG

1. Introduction

This is the 19th report of the Milford Haven Waterway Environmental Surveillance Group. It covers the period January to December 2019.

The main project for 2019 was the creation of a website, consolidating over 25 years of work in one place. In addition to the website, the group have formalised how its data is distributed and managed through use of a Data Licence Agreement. Reports on both these items as well as introductions to new members to the MHWESG are provided in section 2.

The well-established annual wetland bird surveillance projects (the annual survey of summer shelduck populations and wildfowl and wader counts) are presented in sections 2.6 and 2.7 respectively.

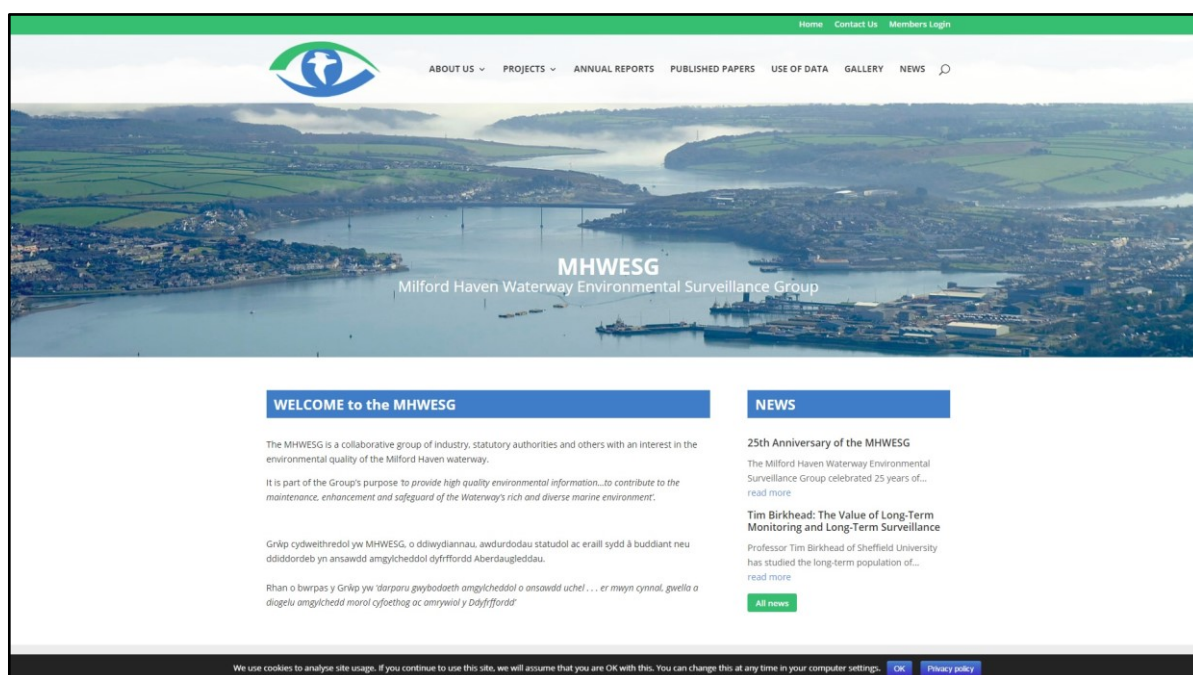
Summaries of reports are available on the website <http://mhwesg.org.uk>. Full reports for all MHWESG commissioned work are available from mhwesg@gmail.com.

2. MHWESG report 2019

2.1 Website

The MHWESG has had a webpage for many years, but in 2018 members agreed to commit resources to the further development of a more comprehensive website.

When the MHWESG became established nearly 30 years ago, the web was also invented. From those early days to the present day, web design has taken a long and winding journey from coding and basic text with hyperlinks to open access off-the-shelf website templates. Whilst it would have been possible create the same website at any stage in the last 30 years, in some ways it was worth waiting until now to embark on this task as finally it seems that the technology / software has advanced sufficiently to greatly simplify the task.



Homepage for MHWESG website <http://mhwesg.org.uk>

Despite this however, creating a website from scratch was still beyond the skill set of members of the MHWESG and the Project Co-ordinator and the expertise of a web developer was needed. Supplied with text, images and a broad vision of the structure of the site, Pembrokeshire Web Design took this information and skilfully delivered the website we see today.

The purpose of the website was manyfold. It needed to be able to showcase the work of the MHWESG to a wider community. For example, the MHWESG encourages use of its datasets in non-profit academic studies which complement the purpose and terms of reference of the group. Similarly, new development and ongoing maintenance work in the Milford Haven Waterway often require an Environmental Impact Assessment and a website would provide a useful index of existing environmental reports and data.

It is occasionally useful to remind ourselves why the MHWESG was established in the first place. Over the last 30 years or so there has been a slow, but steady, turnover of MHWESG

members as well as changes to management in parent organisations. It is hoped that having information on the origin and purpose of the group on the website will provide a point of reference for new members and others within parent organisations or industry bodies.

The website also needed to facilitate data archiving and easy access by members to MHWESG datasets. To provide this function, the website has a private log-in area for members where they can access reports and data and this facility also provides an additional back-up method for MHWESG's outputs. A further requirement was that the website needed to be easily updated by members and therefore Pembrokeshire Web Design provided training to a small group of members so that they would be able to update content when needed.

The Milford Haven Waterway provides the backdrop for many local residents, industry and other users of the waterway. It is hoped that a comprehensive website will promote the fact that the collaborative working of the MHWESG has been underway for nearly 30 years and intends to continue for more to come.

2.2 Use of MHWESG Data and introduction of a Data Licence Agreement

The MHWESG has gathered many long-term environmental datasets for the Milford Haven Waterway over the last 28 years. These datasets include surveillance of summer Shelduck populations, macrobenthic infauna, a timeline of sediment contaminants and the rocky shore.

Members of the MHWESG are entitled to use of reports and data for their own direct business needs (Environmental Impact Assessment (EIA), monitoring, internal publications or reporting). The MHWESG encourages use of its data (at no cost) in non-profit academic studies which complement the purpose and terms of reference of the group. Contractors are also encouraged to publish the data they have been commissioned to collect on behalf of the group in relevant scientific papers or fora.

However where a non-member of the MHWESG wishes to use group data or reports in an EIA for example, the approach has been that there is generally a fee. Many hundreds of thousands of pounds have gone into the MHWESG over the years, not to mention the expertise of group members in commissioning, reviewing and curating the data. Depending on the purpose for which the reports and data are being used, any fees reflect the continued commitment from members, both financial and in terms of considerable time.

When the group's data is provided to any third party e.g. a consultancy producing work on behalf of a member or non-member or an academic institution, it is important to maintain governance of the data in question. For this reason, a Data Licence Agreement was developed in 2019 to manage future dissemination of data. Essentially when data is provided to a third party, it is accompanied with an agreement that provision of the data is for a specified purpose and is time limited. If reports and data are used internally, MHWESG members do not need to arrange for a Data Licence Agreement. However, if a member needs to pass data to a third party to undertake work on their behalf, then a Data Licence Agreement is required.

For information on datasets maintained by the MHWESG, see <https://www.mhwesg.org.uk>

2.5 Introduction to New Members – Pembrokeshire Coastal Forum and Neyland Yacht Haven Ltd.

Pembrokeshire Coastal Forum

[Pembrokeshire Coastal Forum](#), through their [Marine Energy Wales](#) programme, works to establish Wales as a global leader in sustainable marine energy generation, making a significant contribution to a low carbon economy.

Marine energy is an exciting new industry for Wales, particularly in coastal communities like Pembrokeshire, boosting the economy and providing high quality employment for current and future generations.

In 2017, Marine Energy Wales initiated a [Marine Energy Test Area](#) (META) project in and around the Milford Haven Waterway. META facilitates early stage testing of wave and tidal energy devices through the provision of easy accessed and fully licensed sites for testing equipment. This provides a stepping stone between tank testing and installing devices further offshore and enables developers to prove the technology before advancing to commercial scale demonstration.



META Phase 1 Test Sites. Image Credit: J Abbott

In 2019, META successfully secured a series of 5 pre-consented test sites close to Pembroke Port suitable for a range of component, sub-assembly and marine energy device tests (META Phase 1). Future plans include the securement of 3 further test sites at Dale Roads, Warrior Way and north of Freshwater West (META Phase 2). All of these existing and proposed future sites are for short-term testing and any installations are temporary. ***Sites have been identified to cover a range of water depths and sea conditions, catering for different device types and testing scenarios.***

Bethan Simes, Project Manager for META and Representative at MHWESG Steering Group said “As a community interest company with a vested interest in the waterway, we were delighted

to have the opportunity to become a member of the Milford Haven Environmental Surveillance Group. It is great to contribute to the monitoring of the haven, enabling the maintenance and enhancement of the rich and diverse environment found here.

“Through being a member of MHWESG we have benefitted from having access to substantial datasets that contributed to the production of our Environmental Impact Statement, enabling us to progress with our consenting and licensing phase of the META project.

“Furthermore, the group facilitates collaboration between key industry representatives and statutory authorities forming good working relationships that brings additional benefits to the members through a shared interest.”

META is one of four projects that make up Pembroke Dock Marine. This £60m Swansea Bay City Deal project seeks to create a Marine Energy Hub in Pembrokeshire to help find and deliver solutions to tackle climate change while reviving Pembrokeshire's economy in the wake of Covid-19.

The UK Government and Welsh Government approved the Pembroke Dock Marine project in June 2020 and it is expected to generate £73.5 million a year to the Swansea Bay City Region's economy and more than 1,800 jobs in the next 15 years. It is also part funded by the European Regional Development Fund through the Welsh Government.

<https://www.pembrokeshirecoastalforum.org.uk/>

<http://www.marineenergywales.co.uk/>

<https://www.meta.wales/>



Neyland Yacht Haven Ltd, James Cotton – Marina Director

Neyland Yacht Haven is owned by Yacht Havens Group Ltd, a family-owned business founded in the 1970s and now operating nine marinas around the UK and Europe. Nestled in Brunel Quay, the picturesque marina of Neyland Yacht Haven is split between the Upper and Lower Basin, separated by a tidal cill.

Neyland Yacht Haven carry out an annual maintenance dredging programme and are licenced to dredge from 1st October to 16th March each year in order to maintain the depth of the marina. The works are closely monitored by statutory bodies to ensure the dredging does not impact the environment within Westfield Pill, and the surrounding waterway. This dredging activity takes on a greater importance for Neyland Yacht Haven due to its location within the Pembrokeshire Marine Special Area of Conservation (SAC) and within the Pembrokeshire Coastal National Park.



View of Neyland Yacht Haven marina at Westfield Pill.

James Cotton of Neyland Yacht Haven has been following a career in the marine leisure industry since 1997, covering both marine engineering and Harbour / Marina management, becoming Director of Neyland Yacht Haven in 2012. James said “As a marina operator within the Milford Haven Waterway, Neyland Yacht Haven holds an interest in the natural dynamics of the marine environment and, as such, were pleased to become a supporting member of the MHWESG in 2019. The marina also works closely with the RYA, the Green Blue and the marine trade body British Marine to ensure the marina’s operations are all of the highest quality.”



01646 601601

neyland@yachthavens.com

www.yachthavens.com

www.facebook.com/NeylandYachtHaven

<https://twitter.com/yachthavenney>

2.6 Daugleddau Estuary and Milford Haven Waterway: annual surveillance of summer shelduck populations 2019

Jane Hodges, Ecologist

Executive summary

The Daugleddau Estuary and Milford Haven Waterway hold regionally important numbers of shelducks during the winter months. There is also a small summer population that has been the subject of annual surveillance between 1991 and 2018. The summer shelduck survey was repeated in 2019 as part of a programme of environmental surveillance work in the estuary system coordinated by the Milford Haven Waterway Environmental Surveillance Group (MHWESG). The aims, objectives and methods used to carry out the annual surveillance, and the data obtained, are described in this report.

The results indicate that in terms of the total number of broods seen in the estuary system (14), the 2019 breeding season was the best since 2006. This suggests a continuation of the modest recovery in the number of broods seen in 2018. The average brood size of 6.9 ducklings per pair recorded in 2019 suggests a resumption in the recovery (of average brood sizes) observed between 2014 and 2017 following a dip (to 5.5) in 2018.

As in previous years, predation (by avian and/or mammalian predators) is likely to have been a (or the most) significant factor affecting the numbers and sizes of broods recorded in the estuary system during the 2019 survey. Adverse weather conditions (e.g. heavy rain accompanied by low temperatures) in late April, May and June can impact on the survival of eggs to hatching and/or recently hatched ducklings. In 2019, it is possible that early-nesting shelducks may have been affected by Storm Hannah in late April e.g. as a result of water-logging of individual nests. It is unlikely however, that adverse weather conditions were a significant factor affecting the number of ducklings making it onto the water or their survival once on the water in 2019.

Disturbance e.g. from recreational activities (on land and/or on the water) may affect breeding success and subsequent survival of ducklings, although there is little evidence to suggest that this was the case in 2019. Localised impacts of factors affecting the quality of foraging habitat such as the presence of dense mats of green macro-algae (linked to elevated levels of nutrients in the estuary system) on mud flats at low tide may have played a part in breeding success and duckling growth and survival.

The number of non-breeding shelducks recorded during the June survey was 42 which was significantly lower than in 2018, and one of the lowest numbers recorded during the annual surveillance of summer shelduck populations in the estuary system. Numbers of shelduck present in the estuary system during the 2018/19 winter peaked at 336, suggesting that the decline in the numbers of shelducks electing to over-winter in the estuary system has continued. The relatively low numbers present in the winter (which are most likely to be linked to external factors Annual surveillance of summer shelduck populations in the Daugleddau Estuary & Milford Haven Waterway, 2019 such as prevailing weather conditions in the UK and in north-west Europe; the tendency for birds to “short-stop” in mild winters,

and changes in the annual moult grounds (rather than local factors)) may explain the low numbers of non-breeding shelducks recorded in June 2019.

Data collected for other wetland birds once again underlined the importance of the estuary system during migration, especially for species such as curlew.

The report concludes with a recommendation that (subject to the outcome of a separate review and evaluation of the annual surveillance of summer shelduck populations to be commissioned by the MHWESG in early 2020), the annual surveillance of the summer shelduck population in the estuary system be continued as part of the Group's annual work programme. In addition to this recommendation, potential lines of inquiry into the distribution and abundance of the favoured prey of shelducks (the mud snail *Peringia ulvae*) and links to factors affecting environmental conditions in the estuary system are identified for further consideration by the MHWESG and/or individual group members.

2.7 A review of the status of wetland birds in the Milford Haven Waterway and Daugleddau Estuary, 2019

Annie Haycock, Pembrokeshire WeBS Coordinator

Executive Summary

The Milford Haven Waterway - Daugleddau Estuary system ("the estuary system") is an important wintering ground for waders and wildfowl because of its sheltered location and open mudflats.

The estuary system is of international importance by virtue of hosting an average of over 20,000 waterbirds of around 60 species each winter. It is of national importance for its populations of wintering wigeon, teal and greenshank, and for migrating curlew. Other species have reached nationally important levels here in past winters, but either numbers have declined, or the threshold for national importance has been raised, and they no longer reach that threshold (e.g. redshank and little grebe). The estuary system holds some 14.5% of the Welsh waterbirds (on WeBS sites) in mid-winter, and just under 1% of the UK waterbirds counted on WeBS sites.

- Almost all the shelduck in Pembrokeshire in winter are found on the estuary system. Numbers of wintering shelduck have fallen, both here and across the UK. Breeding success fell to an all-time low in 2013, and has remained low.
- Wigeon numbers have increased dramatically since 2003, particularly on Pembroke River. They move on, either to other parts of the estuary system or out of the estuary system altogether, as soon as their food supply (*Zostera*) is exhausted in mid-winter.
- Teal numbers have fluctuated over the past decade, but remain just over the threshold for national importance. The fluctuations are thought to be caused by the recent run of mild winters and an increase in the protected areas on mainland Europe allowing larger numbers of birds to remain further north and east.
- Mid-winter peak counts of curlew have decreased on the estuary system, and in both the UK (27% decline in 25 years) and Europe in general. However, data indicate that the estuary system is still an important migratory stop-over for curlew.
- Greenshank numbers have increased following a period of low counts in the 1990s. The estuary system is one of the top ten wintering sites for this species in the UK, and almost half of the birds wintering in Wales are found here.
- Black-tailed Godwit numbers have increased on the Cleddau and on other UK sites. This appears to be linked to increases in the breeding population in Iceland.
- Little egret numbers increased rapidly between 1995 and 2005, then levelled out. The cold winters of 2010 and 2011 reduced their numbers considerably, although there are now signs of a recovery.
- The Canada goose population rose considerably in the 1990s, in line with the trends for the Welsh and the UK populations. Birds are most often found between Llangwm and Boulston, although they also feed away from the estuary. There is no clear evidence yet that they are affecting the numbers or distribution of other bird species, however, they may have an effect

on the flora through trampling and eutrophication.

- Greylag geese were rarely recorded on the estuary before 2005, but have since increased to over 100 in 2018-19. There is increasing evidence of them breeding locally, and they may or may not be a future cause for concern.
- Grey herons breed at three main sites on the Cleddau system, totalling around 15 nests each year in the 1990s. Numbers of nests appear to have declined, however, counts are sporadic and no conclusions can be drawn about the breeding population.
- Although little grebes no longer reach numbers of National Importance on the estuary system, 14% of the Welsh wintering population (on WeBS sites) are found here, and it is the second-most important site in Wales for them.

Most of the changes in bird populations on the estuary system are reflected at other sites, either in Wales or in the UK as a whole. For example, some of the observed changes in numbers using the estuary system in winter may reflect the run of mild winters between 1995 and 2009 (which may or may not suggest long-term climate change), so birds do not have to travel so far south and/or west to escape harsh winter weather. Data suggest that large numbers of birds are more likely to visit the estuary system during periods of extreme weather, but during normal weather would prefer the conditions (including a better food supply) on the east coast.

Winter distribution may also be affected by the increase in protected areas on the European mainland, which have resulted in birds, e.g. teal, that are susceptible to hunting pressure, to remain in those areas.

Counts done at low tide in 1997-98, 2005-06 and 2013-14 show the main feeding areas for most species to be Pembroke River, Angle Bay, Fowborough Point, Carew River and Gann Estuary.

Incidental data collected during annual breeding shelduck surveys in June/July and early August since 1992 have demonstrated the importance of the estuary system as a migration stop-over for several additional species, notably curlew.

The Cleddau estuary system continues to be of international importance for wintering and migrating wetland birds, and it is vital that the full range of their requirements (eg undisturbed good quality feeding habitat and high tide roosts) continue to be met here.

Why do we need to keep counting?

Annual monitoring will pick up trends in the numbers of birds at local and national levels, and will flag up changes that may require further consideration or investigation (eg water quality and recreational use) in the estuary system.

For example, in winter 2012-13 the wigeon arrived in September as usual, but left early, with the peak count some 3000 less than in recent winters. The peak count was 1200 lower still in 2013-14 but recovered in the two subsequent winters. In 2018-19 a greater proportion were found in Angle Bay. These may be one-off event or short term events; they may have been caused by events away from the estuary; there may have been some disturbance that kept the birds away, or it may indicate some (temporary) change in the food supply in Pembroke River

and Angle Bay.

Redshank numbers dropped by half in the early 1990s but have been reasonably stable since then. This is part of a national/international trend affecting other west coast estuaries.

Low tide counts are undertaken only every eight years or so. The 2013-14 counts indicated a considerable drop in dunlin numbers feeding on the mudflats. This was consistent with the regular high tide counts in that season. However, the annual monitoring showed that this was a one-off low season that affected all sites around Britain.

Long-running datasets are very rare but are extremely valuable in picking up both long-term and short-term changes. It is therefore important to continue with annual surveillance of wetland birds within the estuary system, both as part of the UK dataset and in terms of SSSI monitoring.

3. Other activity in the waterway

3.1 National Award for SWEPT Project

The MHWESG 2018 annual report gave an account of the SWEPT project (Surveying the Waterway Environment for Pollution Threats) – an initiative which saw over 100 volunteers conduct repeat surveys of shores within the Milford Haven Waterway testing water samples for levels of nitrates and phosphates.

Since then, SWEPT has won a national award which has helped to raise the profile of the project and the issue of nutrient pollution from land run-off on the marine environment. Project partners and participants were all delighted at the success of the project. The Park Protector Award, run by Campaign for National Parks, the charity for England and Wales' 13 National Parks, celebrates and supports projects that make a difference to protecting some of the most famous countryside in the world. Six projects from across the UK were shortlisted for the Park Protector Award in a year that saw the most applicants apply in the competition history. SWEPT was the only project from Wales to be shortlisted. The award included a grant of £2000 sponsored by the Ramblers Holiday's Charitable Trust.



Sue Burton, Pembrokeshire Marine Special Area of Conservation Officer, and Anne Bunker and Simon Shorten from Natural Resources Wales received the Campaign for National Parks Park Protector Award for SWEPT at a parliamentary reception on July 10th at the House of Commons.

The quality and amount of data generated far exceeded project expectations. During the four months of repeat surveying, 2105 photos and 881 nitrate and phosphate tests were taken by volunteers. Four canoe trips collected data from hard to reach areas. Results saw a myriad of different freshwater inputs from seeps and mini waterfalls to pipes and streams. Mapped results showed nitrate levels to be very high in many locations. Phosphate was generally low throughout. No significant temporal difference in pollution levels was found although higher rainfall was noted to accompany higher levels of pollution. Three university students aided data handling and analysis and two students utilised SWEPT data for their theses (both receiving a first). In line with previous comparison studies (Biggs *et al.* 2016), SWEPT concluded that PackTest kits are a quick, easy and cost-effective way for citizen scientists to identify nutrient pollution over large areas. The colour-change field kits were less accurate than laboratory test comparisons, but importantly they did identify pollution where it existed and were less likely to provide false positives.

Marine features of the Pembrokeshire Marine SAC (which extends around the Pembrokeshire coast and includes the Milford Haven waterway to tidal limits) are in unfavourable condition due in part to nutrient pollution from agricultural run-off carrying fertilizers and sewage. The

waterway has also failed to meet 'Good' status which is required for Water Framework Directive compliance by 2027. SWEPT data will supplement that already gathered by Natural Resources Wales (NRW) and will help NRW to prioritise land conservation actions and lead to environmental improvements.

In addition to the water quality results, volunteers also collected information on marine litter, non-natives and any other pollution threats such as oil or fly tipping. All immediate pollution concerns logged during the fieldwork were followed up and resolved by NRW. A Big River Clean-up, led by a Pembrokeshire Coast National Park Ranger, removed and recycled a considerable amount of marine litter from 'hot spots' highlighted by survey volunteers.

SWEPT proved popular with participants and undoubtedly raised awareness of the issue of land run-off affecting the marine environment. Including local people in local environmental issues aids awareness and understanding of human impacts and can provide real impetus for environmental protection.

A report on SWEPT is available from Sue Burton sue@pembrokeshirermarinesac.org.uk
www.PembrokeshireMarineSAC.org.uk



[@PembsMarineLife](https://twitter.com/PembsMarineLife)



[@PembrokeshireMarineWildlife](https://www.facebook.com/PembrokeshireMarineWildlife)

4. Future work programme

In 2018, the MHWESG reviewed its work programme in order to set a clear direction for the coming years. This review encompassed projects that are already established, projects that have survived previous reviews but have not been enacted for various reasons as well as newly proposed projects.

Legislation introduced in the last 2 decades has required the establishment of long-term monitoring in the waterway by statutory bodies and this has been a major consideration in reviewing MHWESG priority surveillance projects. For example, Natural Resources Wales (NRW) have established a programme of surveillance for sublittoral rock, water quality, opportunistic macroalgae and saltmarsh. Whilst these projects were identified as priorities for environmental surveillance of the waterway, they do not feature in the MHWESG's work programme as they are already being addressed within NRW's monitoring.

Already established MHWESG projects were reaffirmed as priorities for the MHWESG e.g. rockyshore, macrobenthic and sediment contaminant surveillance. These projects compliment surveillance carried out by NRW for example by providing more comprehensive coverage of the waterway, or as a result of the sampling design provide specific localised data as opposed to a broadscale overview.

In 1987 the Institute of Petroleum commissioned a study of isotope dated deep cores in the waterway with the aim of assessing the importance of oil industry contaminant inputs relative to urban and light industry sources. The MHWESG seek to repeat this work, but with a slightly different objective of determining the status of sediment contamination generally over the last few decades, but with particular emphasis on banned contaminants e.g. tributyl tin (TBT) and dichloro-diphenyl trichloroethane (DDT) and emerging novel contaminants. A further project identified as a priority for the MHWESG is to repeat a study of bioaccumulation of contaminants in the waterway (previously undertaken in 2007 and 2010), ideally coupled with a look at sublethal stress indicators in biota. However, these contaminant projects are anticipated to be costly, and whether all or any are implemented depends on available finances.

Scheduled projects for 2020 include the summer shelduck survey, the wetland bird report and rocky shore surveillance survey. An external review of the annual summer shelduck dataset and survey method is scheduled for 2020 and this will inform a future evaluation of this project. Planning for the deep core and bioaccumulation projects in terms of scope and sampling design are also timetabled for 2020 with a view to implementing either in the Autumn of 2020 or the following year.

Appendices

Appendix 1: Purpose and terms of reference

The Milford Haven Waterway¹ is an extensive natural inlet of the sea with a long and distinguished maritime history. Its deep waters provide a natural harbour of significant economic importance. It is one of the best examples of a ria system in Britain and supports a particularly diverse range of high quality marine and estuarine habitats and biological communities.

The identification and consideration of political and management issues or the setting of environmental standards are specifically excluded from these Terms of Reference. However, group members are free, and are expected to use the group's outputs to help meet their own requirements.

Purpose

To provide high quality environmental information to enable members of the Group, and other authorities and industry working in and adjacent to the Waterway, to contribute to the maintenance and enhancement of the rich and diverse marine environment of the Waterway.

Terms of Reference

The Milford Haven Waterway Environmental Monitoring Steering Group will:

1. Maintain surveillance of the quality of the marine physico-chemical environment, marine biology and ornithology of the Milford Haven Waterway
2. Undertake surveillance of the foreshore, seabed and waters of the Milford Haven Waterway from a line between St Anne's Head and Sheep Island to the tidal reaches of the Eastern and Western Cleddau Rivers and other tributaries to normal tidal limits by:
 - 2.1 keeping under review all relevant survey, surveillance and monitoring;
 - 2.2 commissioning surveys to fill gaps in knowledge and to establish baselines;
 - 2.3 undertaking surveillance projects;
 - 2.4 maintaining a literature and information database.
3. Jointly maintain, and keep under review, a prioritised programme of survey and surveillance projects.
4. Share technical output equally under joint ownership and copyright.
5. Function as a technical, science based, group.
6. Form and appoint specific sub-groups to undertake specific responsibilities as required.

¹ The term Waterway in this document specifically refers to the waters, seabed and foreshore of the Milford Haven Waterway and the Daugleddau Estuary from a line between St Anne's Head and Sheep Island to the tidal reaches of the Eastern and Western Cleddau Rivers and other tributaries to normal tidal limits.

7. Publish an annual report which will comprise a summary of work undertaken, the executive summaries from individual project reports, a financial statement and the planned work programme.
8. Make its output available to the wider community in addition to its membership.

Membership and Funding

Membership is comprised of statutory authorities, industry and others with an interest in the environmental quality of the Waterway. Membership will be at the invitation and discretion of the Group's existing members.

Each member will contribute to the functioning of the group, either in monetary terms or 'in kind'.

Appendix 2: Milford Haven Waterway Environmental Surveillance Group Knowledge Collaboration Agreement

Agreement dated 17 January 2017 between:

- 1) Dragon LNG Limited
- 2) Milford Haven Port Authority
- 3) Natural Resources Wales
- 4) Pembrokeshire Coast National Park Authority
- 5) Pembrokeshire County Council
- 6) Puma Energy (UK) Ltd
- 7) RWE Generation UK Plc
- 8) Semlogistics Milford Haven Ltd
- 9) South Hook LNG Terminal Company Ltd
- 10) Valero Energy Ltd

PREAMBLE

The Milford Haven Waterway is an extensive natural inlet of the sea with a long and distinguished maritime history. Its deep waters provide a natural harbour of significant economic importance as a port handling strategic energy resources and ferry services sustaining many valuable long-term jobs in Pembrokeshire. It is one of the best examples of a ria system in Britain and supports a particularly diverse range of high quality marine and estuarine habitats and biological communities.

RECITALS

- (A) The Group Members agree to work collaboratively in a non-binding knowledge collaboration as the **Milford Haven Waterway Environmental Surveillance Group** in order to provide high quality environmental information to the Group Members, so enabling the Group Members to contribute to the maintenance and enhancement of the rich and diverse marine environment of the Waterway whilst sharing this information with the local and scientific communities, and to perform the objects set out in clause 3.2.
- (B) This Agreement serves to continue the successful collaborative Milford Haven Waterway Environmental Surveillance Group that began with establishment of the Milford Haven Waterway Environmental Monitoring Steering Group in 1991 and resulted in a Memorandum of Agreement being entered into by the members of the Group on 1 July 2004.
- (C) The Memorandum of Agreement has gradually been overtaken by time and is now recognised as being insufficiently flexible for an evolving membership.
- (D) Accordingly, on the date of this Agreement the Group Members have agreed to terminate the Memorandum of Agreement on the basis that the Group would be reconstituted as a non-binding knowledge collaboration Group in order to continue fulfilling the Objects of the Group.

- (E) Consequently, the Group Members have agreed to enter into this Agreement on the terms and conditions set out below.

The Group Members agree as follows:

1 INTERPRETATION

- 1.1 In this Agreement, unless there be anything in the context inconsistent therewith the following expressions shall have the following meanings:

“Committee” has the meaning ascribed to it by clause 4.1;

“Group” means the Milford Haven Waterway Environmental Surveillance Group reconstituted under this Agreement and any agreement supplemental to it;

“Group Members” means all of the parties listed on page 2 of this Agreement and Group Member shall have a corresponding meaning;

“Intellectual Property” means all intellectual property rights of whatever nature including without limitation copyright, patents, know-how, trade secrets, trademarks, trade names, design right, get-up, database right, utility models, service rights, moral rights, domain names and all similar rights and, in each case:

- a) whether registered or not;
- b) including any applications to protect or register such rights and the right to make such applications;
- c) including all renewals, continuations and extensions of such rights or applications;
- d) whether vested, contingent or future; and
- e) wherever existing;

“IP Rights” all rights which may now or in the future subsist in respect of or derived from any Intellectual Property.

“Memorandum of Agreement” means the Memorandum of Agreement dated 1 July 2004 entered into between the parties;

“Objects” means the objects of the Group itemised in clause 3.2;

“Waterway” means the waters, seabed and foreshore of the Milford Haven Waterway and the Daugleddau Estuary from a line between St Anne’s Head and Sheep Island to the tidal reaches of the Eastern and Western Cleddau Rivers and other tributaries to the normal tidal limits.

2 TERMINATION OF THE MEMORANDUM OF AGREEMENT

- 2.1 The Group Members agree that as at the date of this Agreement the Memorandum of Agreement shall immediately terminate and be replaced by the terms and conditions contained in this Agreement.

- 2.2 From the date of this Agreement any monies held pursuant to the Memorandum of Agreement shall be subject to this Agreement and in particular the terms of clause 5.2.

3 SCOPE OF THE COLLABORATION

- 3.1 The Group Members agree with one another to enter into this Agreement to generate and share high quality environmental information to assist the Group Members to contribute to the maintenance and enhancement of the rich and diverse marine environment of the Waterway and to perform the objects set out in clause 3.2 under the terms of this Agreement.
- 3.2 The Objects of the Group are to maintain surveillance of the quality of the marine physico-chemical environment, marine biology and ornithology of the foreshore, seabed and waters of the Milford Haven Waterway, by:
- a) keeping under review all relevant surveys, surveillance and monitoring;
 - b) undertaking surveys to improve current knowledge and establish baselines;
 - c) undertaking surveillance projects;
 - d) maintaining a literature and information database.
- 3.3 The Group will:
- a) maintain under review a work programme of agreed projects;
 - b) share technical output equally under joint ownership and copyright;
 - c) function as a technical, science based, group;
 - d) make its findings available to the wider community in addition to the Group Members.
- 3.4 Membership of the Group comprises statutory authorities, industry and others with an interest in the environmental quality of the Waterway. Membership will be at the invitation and discretion of the Group's existing members.
- 3.5 Any Group Member may, at their discretion, share with the other Group Members any information and /or data generated by their own environmental survey, monitoring or surveillance activities. In these instances, any such member shall retain its IP rights to that information or data. However, for the avoidance of doubt, this clause does not constrain the Group's use of information provided by any member to regulatory authorities, for example to meet statutory consenting processes, which has thereby entered the public domain.
- 3.6 For the avoidance of doubt:
- a) any survey, surveillance and monitoring agreed by the Group will be limited to crown foreshore, seabed and/or waters of the Waterway and will specifically exclude the premises, whether freehold or held under the terms of a commercial operating lease or license of any Group Member;
 - b) nothing in this Agreement shall be deemed to override or in any way restrict the statutory obligations of any of the Group Members;
 - c) the identification and consideration of political and management issues or the setting of environmental standards are specifically excluded from this Agreement. However, Group members are free, and are expected to use the Group's outputs, to help meet their own requirements.

4 CONTROL AND MANAGEMENT

- 4.1 A Committee comprising of one or more representatives nominated by each of the Group Members will be maintained for the purposes of:
- a) discussing, determining and approving the purpose, terms of reference and work programme of the Group;
 - b) exchanging information;
 - c) implementing the agreed work programme;
 - d) reporting on progress, including publishing an annual report that comprises of a summary of all work undertaken for the year and work planned for the forthcoming year.
- 4.2 Each Group Member shall notify the Chairperson, or Secretary, in writing of their nominated representative and shall be entitled to appoint alternative representatives.
- 4.3 The Committee shall appoint a chairperson from its number to chair Committee meetings and a vice chairperson to chair committee meetings in the absence of the chair. In the absence of both the chair and the vice chair those nominated representatives present shall appoint one of their members present to act as chair for that particular meeting. The appointment of the chair and the vice Chair will be subject to biennial review, at which time the incumbent vice chair will normally be expected to assume the role of chair and a new vice-chair appointed, subject at all times to principles of good governance and best practice. Notwithstanding the above and subject to the agreement of Committee representatives, the term of the serving chair may be extended or any other representative appointed chair, depending on the circumstances then prevailing.
- 4.4 The quorum for meetings of the Committee shall be 5 nominated representatives of the Group Members. Notes of all meetings of the Committee shall be taken and copies of such notes circulated to Group Members as soon as practicable after each meeting.
- 4.5 Every effort will be made to ensure Committee business is conducted by consensus. In the event of issues arising at a meeting of the Committee that cannot be resolved by consensus, they shall be decided by a majority of votes and each nominated representative shall have one vote. In the case of an equality of votes the chairperson of the meeting shall have a casting vote.
- 4.6 The Committee may delegate any of its functions to sub-committees or to other persons as it considers appropriate for the task; provided that the delegation and the reasons therefore are recorded in writing.
- 4.7 The Committee will meet as often as necessary or desirable for the purposes of achieving the Objects at a convenient time and venue.
- 4.8 The Group Members shall at all times co-operate with each other and act in good faith to enable the Objects to be attained.

5 RESOURCING

- 5.1 Each of the Group Members will provide either a monetary contribution and/or some other contribution, e.g. services, premises, that shall be agreed by all the Group Members for the furtherance of the Objects of the Group in accordance with the work programme

referred to in clause 3.3(a). The contributions are to be provided promptly within the time frame agreed for contributions.

- 5.2 Milford Haven Port Authority shall receive all financial contributions by Group Members and shall keep such monies in a separate interest bearing bank account in trust for the Group.
- 5.3 Other contributions for the furtherance of the Objects of the Group, as identified in clause 5.1, may include (where applicable) the sharing of environmental surveillance or monitoring data, information or reports collected by members for their own purposes or to meet legal obligations, as identified in clause 3.5.

6 CONTRACTS

Under the terms of this Agreement, the members agree that:

- 6.1 Milford Haven Port Authority shall have the authority to, and be the sole Group member to let contracts with third parties on behalf of the Group in order to achieve the Group's Objects, including the appointment of professionals, advisers and consultants on behalf of the Group, subject to request from and prior approval of the Committee, and clause 6.3. MHPA shall only let contracts with third parties on behalf of the Group upon written instruction from Group compliant with the terms of clause 7.1. Responsibilities and liabilities arising from contracts will be owned by the Group; MHPA is the contract letting agent for administrative purposes.
- 6.2 Milford Haven Port Authority shall make payments on behalf of the Group in respect of contracts agreed at clause 6.1 but may not make any other payments or commitments on behalf of the Group without the prior approval of the Committee. Milford Haven Port Authority shall provide regular statements to the Committee in respect of such account.
- 6.3 No such contract shall be entered into unless there are sufficient funds available within the interest bearing bank account referred to in clause 5.2 to meet the obligations of Milford Haven Port Authority acting on behalf of the Group under the relevant contract.
- 6.4 Consultants and/or contractors will be engaged pursuant to MHPA's contract Terms and Conditions.

7 LIABILITY

- 7.1 Risk of liability will be minimised by:
 - a) agreeing to works and requesting contracts be let only when sufficient funds are available as set out in clause 6.3;
 - b) ensuring prospective contractors have appropriate levels of expertise, experience, competence and responsibility,
 - c) requiring contractors to carry appropriate liability insurance for damages arising as a result of fieldwork (prior to letting contracts (as stipulated in clause 6.1) and excluding liability arising from force majeure (as defined in clause 7.3);
 - d) requiring Contractors to submit an appropriate Risk Assessment and Method Statement prior to the commencement of works;
 - e) review and approval of Contractor's Risk Assessment and Method Statements by appropriate Group members, and / or delegated individual(s), most suited to the task, and maintaining written records of such reviews and approvals;

- f) ensuring appropriate oversight of fieldwork and Contractors adherence to Risk Assessment and Method Statements by appropriate Group members, and / or delegated individual(s), most suited to the task, and maintaining written records of such oversight;
 - g) including a liability exclusion statement in all Group reports.
- 7.2 The costs or consequences of any legal action against the Group or against MHPA in connection with the activities of MHSWEG will be shared equally and the MHPA's risk as the party letting contracts will be mitigated through the measures set out in clause 7.1.
- 7.3 Consequently, as at the date of this Agreement the Group Members shall ensure that the Group has effected public liability insurance with a minimum limit of liability of £5,000,000 (five million pounds) in respect of each and every occurrence to cover the potential liability of the Group Members in relation to this Agreement and shall maintain such insurance until the date of termination of this Agreement.
- 7.4 The Group shall not be liable for losses, damages, costs and/or expenses incurred as a result of force majeure which shall include without limitation any failure or delay attributable to facts beyond the control of the Group such as wars, hostilities, boycotts, embargoes, public disorders, sabotage, strikes, lockouts, floods, fires or acts of God.

8 INTELLECTUAL PROPERTY RIGHTS

- 8.1 All IP Rights developed or generated by the Group in pursuance of the Objects shall be owned by the Group Members jointly.
- 8.2 Any Group member that withdraws from the Agreement will retain joint ownership of Group IP Rights developed or generated during the period of their membership of the Group.
- 8.3 Any Group Member shall be entitled to use any IP Rights free of charge provided that any such use shall not compromise the Objects of the Group and provided further that if any Group Member wishes to license or authorise any third party to use or exploit any IP Rights owned by the Group, the Group Members shall jointly agree and grant such a licence to such third party and such third party shall be required to pay a licence fee.
- 8.4 All costs and expenses and all receipts in respect of any IP Rights owned jointly by the Group Members shall be shared equally by the Group Members.
- 8.5 Each Group Member shall retain all rights to Intellectual Property in all materials, information etc. contributed by that Group Member as stipulated in clause 3.5.

9 TERM AND TERMINATION

- 9.1 The provisions of this Agreement shall come into force on the date stated above.
- 9.2 A Group Member may at any time terminate its participation in respect of this Agreement subject to having given notice in writing to the Chairperson with no right of return of financial contributions.
- 9.3 In the event that any Group Member is in breach of this Agreement which they fail to remedy within 14 days of written request by the Committee then such Group Member's involvement in the Group may be terminated by notice given to them by the Committee at any time following expiry of the said period of 14 days, with no right of return of financial contributions.

9.4 Subject to clauses 8.2 and 8.3 this Agreement will terminate on completion of the Objects stated in clause 3.

9.5 Upon termination of this Agreement the Group shall either be:

- a) reconstituted as appropriate to fulfil the Objects of the Group; or
- b) terminated forthwith and the Group Members shall take such further steps as may be necessary in order to wind up the Group in a fair and reasonable manner.

The financial assets of the Group at winding up should be distributed or shared pro rata to the direct financial contributions by Group Members.

9.6 If a Group Member's participation in the Group is terminated in accordance with clause 8.2 or 8.3 the provisions of clauses 6.1 to 6.3 shall no longer apply in respect of that Group Member.

10 THIRD PARTIES

10.1 Nothing in this Agreement shall create any rights for third parties under the Contracts (Rights of Third Parties) Act 1999. No variation to this Agreement and no supplemental or ancillary agreement to this Agreement shall create any such rights unless expressly so stated in any such agreement by the Group Members to this Agreement. This does not affect any right or remedy of a third party that exists or is available apart from that Act.

11 NO BINDING PARTNERSHIP

11.1 Nothing in this Agreement shall be construed as establishing or implying any legally binding partnership between the Group Members.

12 SUCCESSORS

12.1 References in this Agreement to the Group Members shall include their respective heirs, successors in title, permitted assigns and personal representatives.

13 ASSIGNMENT

13.1 No Group Member should assign its interests in this Agreement without prior approval of the Committee (not to be unreasonably withheld) except that no such approval is required for an assignment to a company in the same group as the Group Member.

14 GENERAL

14.1 Provisions which by their terms or intent are to survive termination of this Agreement will do so.

14.2 No amendment or variation of this Agreement will be valid unless agreed in writing by an authorised signatory of each party.

14.3 Unless otherwise expressly agreed, no delay, act or omission by either party in exercising any right or remedy will be deemed a waiver of that, or any other, right or remedy.

14.4 Each party will do all further acts and execute all further documents necessary to give effect to this Agreement.

15 INFORMATION SHARING AND DATA PROTECTION

15.1 Several members of the Group (public bodies) are subject to the Freedom of Information (FoI) Act and Environmental Information Regulations (EIR) whilst others (industry bodies) are not. Whilst circumstances under which valid FoI and/or EIR requests may

be submitted to the Group are anticipated to be limited since the Group operates transparently, places all outputs in public domain, and commercial tender assessments and contract details are protected by confidentiality exemptions, every effort will be made to meet any such request, taking into account advice and guidance from the Information Commissioner's Office and the obligations on public bodies.

15.2 The Group will comply with the Data Protection Act and adhere to the data protection principles to ensure personal data is safeguarded.

16 REVIEW

This Agreement will be subject to review and reaffirmation at five yearly intervals from the date of the Agreement.

17 COUNTERPARTS

This Agreement may be executed in any number of counterparts, each of which is an original and which together have the same effect as if each Group Member had signed the same document.

Appendix 3: Chronological list of MHWEMSG / MHWESG² reports**1992**

Hobbs, G and Morgan, C I (eds.) (1992). *A review of the current state of environmental knowledge of the Milford Haven Waterway*. Report from Oil Pollution Research Unit; xi & 140pp

Hobbs, G and Morgan, C I (eds.) (1992). *A review of the current state of environmental knowledge of the Milford Haven Waterway; Executive Summary*. Report from Oil Pollution Research Unit, 12pp

MHWEMSG (1992). *Report of the Milford Haven Waterway Environmental Monitoring Steering Group 1992*. 6pp

1993

Hodges, J E (1993). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey: report for 1993*. Report from Pembrokeshire Coast National Park Authority, 8pp + appendices

1994

Ellis, R & Poole, A (1994). *Cleddau Estuary wader and wildfowl counts 1993 – 94*. 20 pp + appendices

Hodges, J E (1995). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey: report for 1995*. Report from Pembrokeshire Coast National Park Authority, 8pp + appendices

Levell, D, Smith, J and Hobbs, G (1994). *Milford Haven macrobenthic survey October 1993*. Report from Oil Pollution Research Unit; xii, 26pp + figures, tables & data appendices.

MHWEMSG (1994). *Report of the Milford Haven Waterway Environmental Monitoring Steering Group 1993/94*. 20pp

Smith, J and Hobbs, G (1994). *Metal concentrations in Milford Haven sea bed sediments - data storage, analysis and initial interpretation*. Report from Oil Pollution Research Unit; v, 8pp + tables & maps

1995

Hodges, J E (1995). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey: report for 1995*. Report from Pembrokeshire Coast National Park Authority 10pp + appendices

Howe, M (1995). *Monitoring of eelgrass populations in the Milford Haven waterway and Daugleddau Estuary*. Report from Pembrokeshire Coast National Park Authority; 7pp

MHWEMSG (1995). *Report of the Milford Haven Waterway Environmental Monitoring Steering Group 1994/95*. 19pp

Poole, A & Ellis, R (1995). *Cleddau Estuary including Milford Haven Waterway: wildfowl and wader counts 1994 – 95*. 30pp

Rostron, D M (1995). *The macrobenthos of the foreshore soft sediments of Milford Haven, 1994*. Report from SubSea Survey; 2 vols, 17pp + maps, figures & data appendices

² The Group changed its name in 2000

1996

Hodges, J E (1996). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey: report for 1996*. Report from Pembrokeshire Coast National Park Authority, 8pp + appendices

MHWEMSG (1996). *Report of the Milford Haven Waterway Environmental Monitoring Steering Group 1995/96*. 14pp

Poole, A (1996). *Milford Haven and Cleddau Estuary wetland bird survey 1995-96*. 18pp

1997

Hodges, J E (1997). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey: report for 1997*. Report from Pembrokeshire Coast National Park Authority. 10pp + tables & appendices

MHWEMSG (1997). *Report of the Milford Haven Waterway Environmental Monitoring Steering Group 1996/97*. 36pp

Moore, J J (1997). *Rocky shore transect monitoring in Milford Haven, October 1995*. Report from Oil Pollution Research Unit. OPRU Report No OPRU/14/96. 36pp + appendices

Poole, A (1997). *Milford Haven Waterway and Cleddau Estuary bird survey 1996-97*. 13pp + appendices

1998

Hodges, J E (1998). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey – report for 1998*. Report from Pembrokeshire Coast National Park Authority. 9pp + tables & appendices

Munro, C (1999). *Monitoring of the rocky sub-littoral of Milford Haven: May-July 1998*. Report from Marine Biological Surveys. v, 38pp + appendices, photographs and videorecording

Poole, A (1998). *Milford Haven Waterway and Cleddau Estuary bird survey 1997-98*. 12pp + appendices

1999

Hodges, J E (1999). *Daugleddau Estuary and Milford Haven Waterway annual shelduck survey – report for 1999*. Report from Pembrokeshire Coast National Park Authority. 8pp + tables & appendices

Kitts, H (1999). *Quantification of inputs to Milford Haven*. Report from Hyder Ltd. 29pp + tables & appendices

MHWEMSG (1999). *Report of the Milford Haven Waterway Environmental Monitoring Steering Group 1997 - 1999*. 25pp

Poole, A (1999). *Milford Haven Waterway and Cleddau Estuary Bird Survey 1998-99*. 13pp + appendices

Posford Duvivier (2000). *A survey of subtidal Zostera beds in Milford Haven*. 36pp + appendices

2000

Bent, E J (2000). *A review of environmental studies in Milford Haven Waterway 1992 – 2000*. iv, 65 pp + tables & maps

Hodges, J E (2000). *Daugleddau Estuary and Milford Haven Waterway annual shelduck Survey – Report for 2000*. Report from Pembrokeshire Coast National Park Authority. 10pp + tables + appendices

MHWESG (2000). *Milford Haven Waterway Environmental Surveillance Group Annual Report 1999 - 2000*. 20pp & appendices

Poole, A (2000). *Milford Haven waterway and Cleddau Estuary Bird Survey 1999-2000*. 15pp + appendices

2001

Hodges, J E (2001). *Daugleddau Estuary and Milford Haven Waterway surveillance of summer shelduck populations: report for 2001*. Report from Pembrokeshire Coast National Park Authority. 8pp + appendices

Poole, A (2001). *Milford Haven Waterway and Cleddau Estuary bird survey 2000-01*. 14pp + appendices

2002

Hodges, J E (2002). *Daugleddau Estuary and Milford Haven Waterway surveillance of summer shelduck populations: report for 2002*. Report from Pembrokeshire Coast National Park Authority. 8pp + appendices

Poole, A (2002). *Milford Haven Waterway and Cleddau Estuary bird survey 2001-02*. 12pp + appendices

2003

Bent, E J (2003). *Milford Haven Waterway review of work programme 2000 – 2010*. 32pp

Hodges, J E (2004). *Daugleddau Estuary and Milford Haven waterway surveillance of summer shelduck populations: report for 2003*. Report from Pembrokeshire Coast National Park Authority. 9pp + appendices

Poole, A (2003). *Milford Haven Waterway and Cleddau Estuary bird survey 2002-03*. 16pp + appendices

Prosser, M V & Wallace H L (2003). *Milford Haven salt-marsh survey 2002*. Report from Ecological Surveys (Bangor). 2 vols. 58pp + appendices, photographs & maps

2004

Hodges, J E (2004). *Daugleddau Estuary and Milford Haven Waterway surveillance of summer shelduck populations: report for 2004*. Report from Pembrokeshire Coast National Park Authority. 7pp + appendices

Haycock, A (2004). *Milford Haven Waterway and Cleddau Estuary Bird Survey 2003-04*. 14pp + appendices

2005

Atkins (2005). *Development of an Inputs Budget for Milford Haven Waterway*. 68pp + cd database & GIS data

Hodges, J E (2005). *Daugleddau Estuary and Milford Haven Waterway surveillance of summer shelduck populations: report for 2005*. Report from Pembrokeshire Coast National Park Authority. 8pp + appendices

Haycock, A (2005). *Milford Haven Waterway and Cleddau Estuary Bird Survey 2004-05*. 7pp + appendices

2006

Hodges, J E (2006). *Daugleddau Estuary and Milford Haven Waterway surveillance of summer shelduck populations: report for 2005*. Report from Pembrokeshire Coast National Park Authority. 8pp + appendices

Haycock, A (2006). *Milford Haven Waterway and Cleddau Estuary Bird Survey 2004-05*. 7pp + appendices

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2007

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