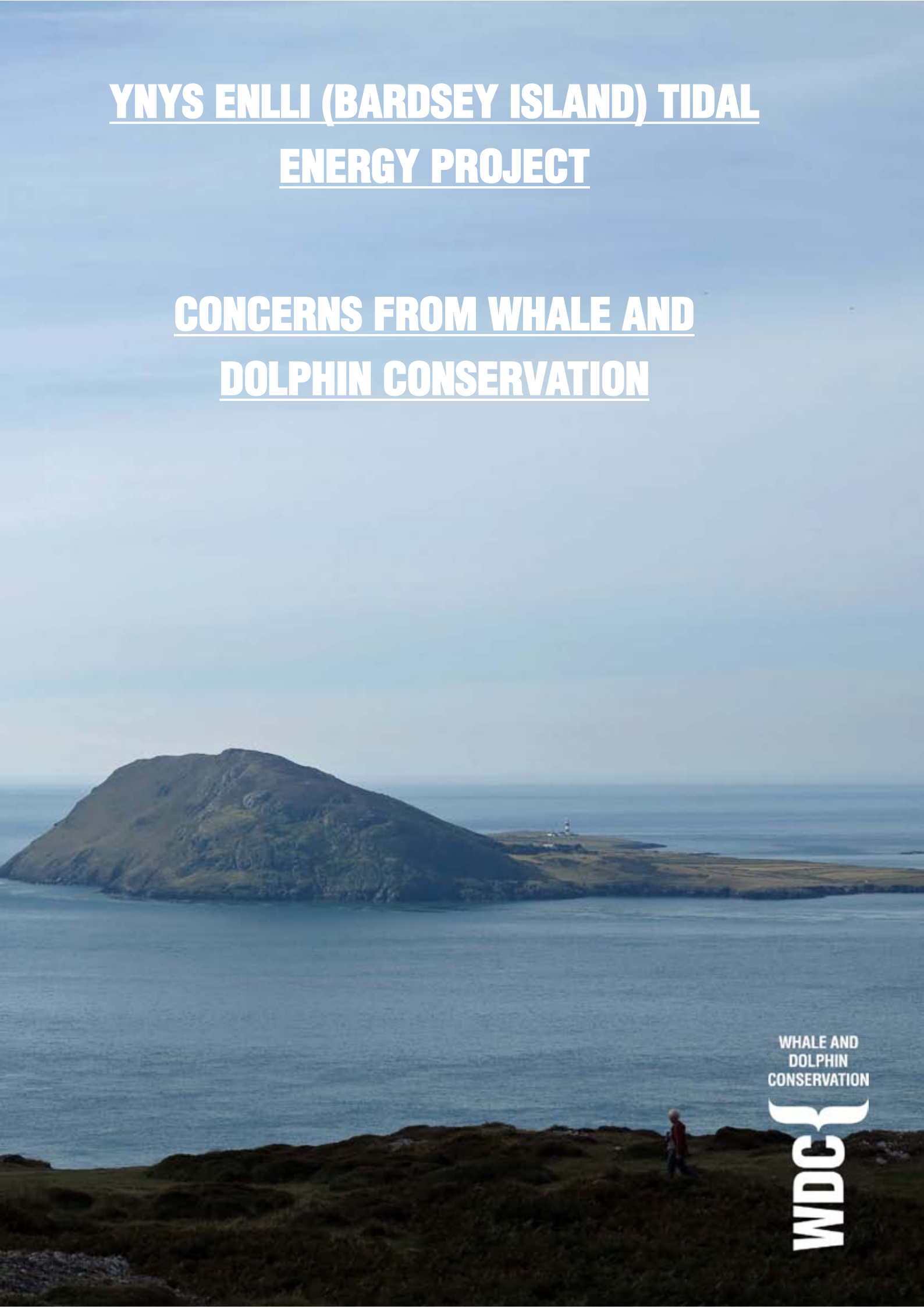
YNYS ENLLI (BARDSEY ISLAND) TIDAL ENERGY PROJECT

CONCERNS FROM WHALE AND DOLPHIN CONSERVATION



WHALE AND DOLPHIN CONSERVATION

WDC

CRYNODEB

Mewn egwyddor, mae Cadwraeth Morfilod a Dolffiniaid (WDC) yn cefnogi datblygiad ynni adnewyddadwy morol ystyriol yn ogystal ag unrhyw brosiectau sy'n lliniaru effaith chwalfa hinsawdd, sy'n fygythiad dirfodol i forfilod. Fodd bynnag, mae'n rhaid i brosiectau o'r fath beidio â bod ar draul bioamrywiaeth. Mae cysylltiad annatod rhwng argyfyngau hinsawdd a natur ac mae'n hanfodol nad ydym yn chwarae'r naill yn erbyn y llall wrth chwilio am atebion. Dylai unrhyw ddatblygiad fod yn y lle iawn ac ar y raddfa gywir. Yn achos y cynnig hwn, rydym yn pryderu am effeithiau posibl ar fywyd gwyllt, yn enwedig poblogaethau morfilod.

Mae prosiect ynni llanw arfaethedig Ynys Enlli wedi'i leoli mewn ardal forol warchodedig ar gyfer llamhidyddion, lle mae ymchwil WDC wedi dangos eu bod yn defnyddio'r ardal lanw arfaethedig fel ardal bwydo a magu. Mae ein hastudiaethau hefyd yn dangos bod dolffiniaid Risso yn defnyddio Swnt Enlli, a'r dyfroedd o amgylch yr Ynys, fel ardal bwydo a magu.

Dim ond ychydig o wybodaeth sydd gennym ar hyn o bryd ynglŷn â sut mae morfilod a dolffiniaid yn rhyngweithio â dyfeisiau ynni llanw, ac felly nid oes gennym ni ddata y gellir ei ddefnyddio i wneud asesiad dibynadwy o'r effeithiau ar forfilod. Mae'r ychydig dystiolaeth sy'n bodoli yn peri gofid, gan gynnwys cyfraddau cyfarfyddiad uchel â thyrbinau, gwrthdrawiadau a llafnau cylchdroi sy'n debygol o achosi anaf uniongyrchol, a marwolaeth mewn rhai achosion. Rydym yn hynod bryderus o ystyried bod astudiaethau o lamhidyddion yn dangos bod yr anifeiliaid yn defnyddio ceryntau llanw wrth fwydo a mynd i mewn neu symud allan o ardal Swnt Enlli, gan gynyddu'r tebygolrwydd o ddod i gysylltiad â thyrbinau ynni llanw. Pryder arall ar yr un lefel yw sut mae'r dyfeisiau llanw yn newid llif y llanw, a sut y gall hyn newid argaeledd ysglyfaethu ar gyfer morfilod, gan amharu ar batrymau bwydo ac o bosibl eu dadleoli o'u tiroedd bwydo.

Mae gan WDC bryderon cryf nad safle gwarchodedig o'r fath yw'r lle i dreialu technolegau nas profwyd. Nid yw trydan 'gwyrdd' yn gynaliadwy os mae ei gynhyrchu yn effeithio ar rywogaethau gwarchodedig. Gallai gosod y tyrbinau llanw hyn mewn ardaloedd gwarchodedig a chynefinoedd critigol morfilod a rhywogaethau sensitif eraill gael effeithiau sylweddol a dinistriol ac rydym yn argymell na ddylai'r cynnig hwn fynd yn ei flaen nes y gellir profi bod y dyfeisiau hyn yn ddiniwed.

Risso's dolphin, Bardsey Sound © Sonja Eisfled-Pierantonio/ WDC

SUMMARY

In principle, Whale and Dolphin Conservation (WDC) supports the development of well-considered marine renewable energy, and indeed any projects which mitigate the impact of climate breakdown, which represents an existential threat to cetaceans. Such projects must not, however, be at the expense of biodiversity. The climate and nature crises are inextricably linked and it is vital that we do not play one off against the other when seeking solutions. Any development should be in the right place and at the right scale and, in the case of this proposal, we are concerned about potential impacts on wildlife, especially cetacean populations.

The proposed Ynys Enlli tidal energy project is located within a marine protected area for harbour porpoise, where WDC's research has shown they use the proposed tidal area as a feeding and nursing ground. Our studies also show that Risso's dolphins use Bardsey Sound, and the waters around the Island as a feeding and nursing area.

There is currently very little information about how whales and dolphins interact with tidal energy devices, and therefore no data on which a reliable assessment of the impacts on cetaceans can be made. What little evidence exists demonstrates a real cause for concern, including high encounter rates with turbines with collisions with rotating blades likely to cause direct injury, and in some cases death.

We are particularly concerned given that studies of harbour porpoise show the animals use tidal currents when feeding and going into or moving out of Bardsey Sound, increasing the probability of interacting with tidal energy turbines. Of equal concern is how the tidal devices change the tidal flow, and how this can change prey availability for cetaceans, disrupting feeding patterns and potentially displace them from their feeding grounds.

WDC has strong concerns that such a protected site is not the place to trial untested technologies. 'Green' electricity is not sustainable if its production impacts on protected species. Placing these tidal turbines in protected areas and critical habitats of cetaceans and other sensitive species could have significant and devastating impacts and we recommend that this proposal should not go ahead until these devices can be proven to be benign.

Risso's dolphin, Bardsey Sound © Sonja Eisfled-Pierantonio/ WDC

BACKGROUND

WDC have been engaging with the UK government, Welsh decision makers and developers for several years regarding marine renewable energy. Specifically, we have provided expert advice aimed at limiting the impact of marine renewable energy developments on whales, dolphins and porpoises (cetaceans).

The seas around Ynys Enlli are some of the most protected around the UK, being covered by three international designations. The Island itself is also designated, along with the mainland Llŷn Peninsula.

- **Gorllewin Cymru Forol / West Wales Marine Special Area of Conservation (SAC)**.
  Designated for Harbour Porpoise. The conservation objectives for the West Wales Marine SAC are to ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:


Harbour porpoise © Nicola Hodgins/ WDC

  1. Harbour porpoise is a viable component of the site;
  2. There is no significant disturbance of the species; and
  3. The condition of supporting habitats and processes, and the availability of prey is maintained.

- **Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island Special Protection Area (SPA)**.
  Designated for Manx shearwater and Chough;

- **Pen Llyn a`r Sarnau/ Llŷn Peninsula and the Sarnau SAC.**
  Annex II species present as a qualifying feature, but not a primary reason for site selection- Bottlenose dolphin, Grey seal and Otter;

- **Bardsey National Nature Reserves (NNR)**
  Bardsey Island itself is a National Nature Reserve and a Site of Special Scientific Interest (SSSI)

- **Llŷn Area of Outstanding Natural Beauty (AONB)**
  The designation aims to conserve and enhance the natural beauty of the area, which includes protecting flora, fauna and geological as well as landscape features. There are also numerous SSSI's around the Coast.

- **Species**
  All cetaceans have strict protection under The Habitat Regulations and are protected under the 1981 Wildlife and Countryside Act. Seals are protected under The Habitat Regulations, 1981 W&C Act and the 1970 Conservation of Seals Act. All birds are protected against deliberate killing under the 1981 W&C Act.


Risso's dolphin, Bardsey Island © Sonja Eisfeld-Pierantonio/ WDC

IMPORTANCE OF ENLLI WATERS FOR CETACEANS

The location of the proposed development is situated within the West Wales Marine (SAC) designated for harbour porpoise; and within the Pen Llŷn a`r Sarnau SAC where bottlenose dolphins are a secondary feature. WDC have been studying the cetaceans in the waters around Enlli since 1999, focussing on the harbour porpoise and Risso's dolphins in particular. The data collected clearly demonstrate that the waters around Enlli, including Bardsey Sound (Swnt Enlli) especially, are of significant importance for harbour porpoises, particularly as a nursing ground, and the unique tidal flows are a prime feeding area. This research was fundamental in supporting the designation of the West Wales Marine SAC.

WDC's research has been focussed in the spring and summer months in particular and it is likely that harbour porpoises use the areas of Bardsey Sound year round. In other areas where numbers are seen throughout the summer, they are also consistently recorded in the winter, it would be reasonable to infer that it would be the same in the waters around Enlli, and that harbour porpoises use the waters there throughout the year for feeding. Figure 1 below shows the sightings from land-based surveys from 2001 – 2014, and the tidal lease area.

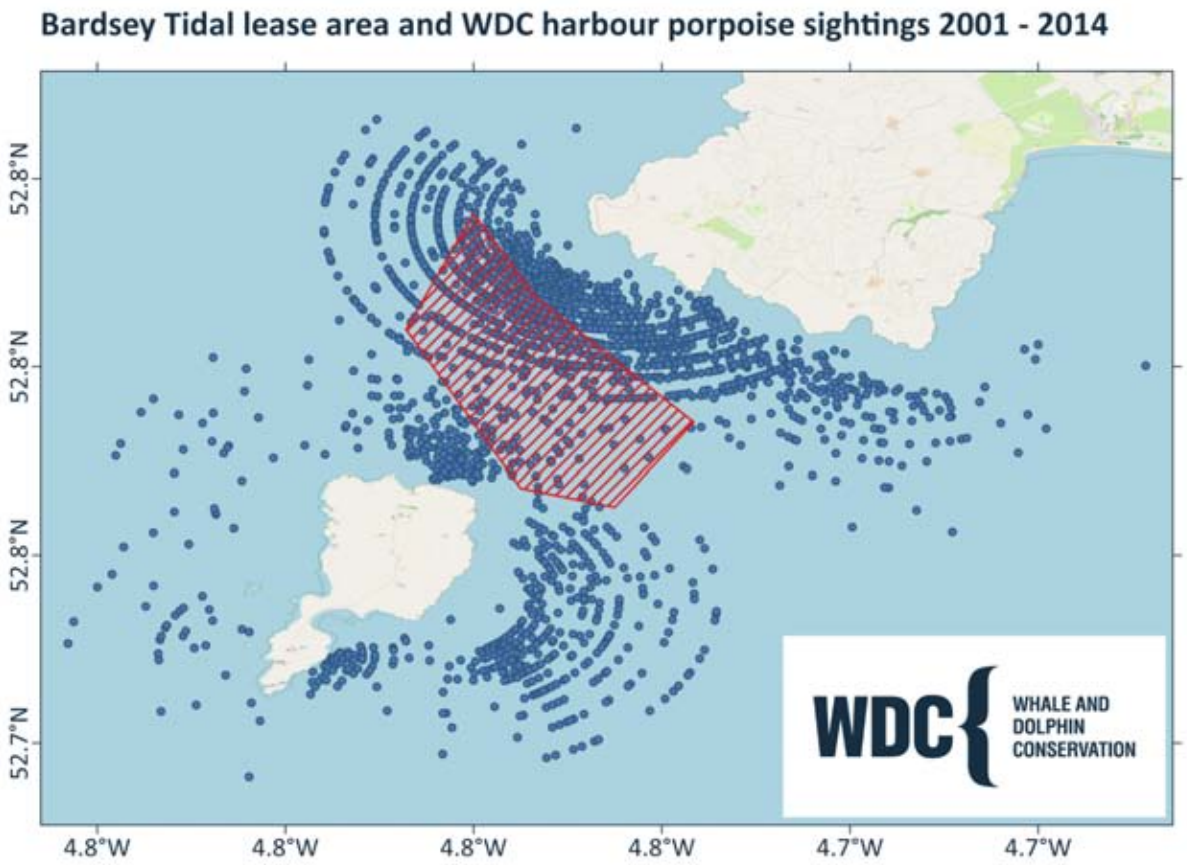


Figure 1 Harbour porpoise sightings from land-based surveys from 2001 – 2014, and the tidal lease area.

Additionally the research has shown that the area is important for Risso's dolphins, with animals sighted arriving in spring and present through late summer/early autumn. Risso's dolphins are regularly seen with very young calves and feeding in the waters around Enlli, including Bardsey Sound. As with harbour porpoises, the waters around Enlli are an important feeding and nursing ground for Risso's dolphins.

TIDAL ENERGY DEVELOPMENT IMPACTS ON CETACEANS

The wave and tidal industry is still very much in its infancy, with the devices used to generate electricity still very much untested for their impacts on the marine environment. Some devices have been tested at demonstration zones – small scale test sites of usually one device, to see the efficiency of devices, and with minimal monitoring of impacts on the marine environment.

There are a very small number of sites where full-scale devices have been deployed. Some have had operational issues, whilst others are providing electricity to the grid, however, very little remains known about the efficiency of these

devices, and the impacts on cetaceans in particular due to lack of robust monitoring. One study on harbour porpoises found that during turbine deployment and operations, activity was significantly reduced closest to the turbine and increased at 1,700m away[1], suggesting that the turbine operations displaced the harbour porpoises from the immediate vicinity. Another study found that the impacts from tidal developments could be particularly severe for marine mammals with high site fidelity[2]. Such an impact at Enlli, where the turbines are proposed to be placed where harbour porpoises feed, could displace harbour porpoises out of their feeding area entirely.


Harbour porpoise © Nicola Hodgins/ WDC

To date, there have been no devices (test size or full scale) in important feeding or nursing habitat, or protected areas, for cetaceans, so there is no data on which an assessment of the impact of Enlli tidal development can be based. For example, whilst the developer for the proposed tidal development, Nova Innovation, has other tidal energy sites, such as at Bluemull Sound in Scotland, the ecology of this site is very different to the waters around Enlli. These areas are not identified as important for harbour porpoises, and do not have the population of cetaceans in the area, so results are not comparable, and it would be inappropriate to try and draw any conclusions between the two sites.

What little is known about impacts from tidal energy development, the key impacts expected are:

- **Alteration of waves and sea currents** - Studies have shown that tidal installations will have substantial impacts on local tidal flow, in the immediate wake of devices in particular where there are complex currents[3]. The size of the area where the tidal flow will be changed will depend on the placement of the turbines; this is likely to be a significant area as devices are usually placed to avoid the wake influences of neighbouring turbines[3]. Bardsey Sound is an area of sea that is influenced by a particularly complex system of tides and currents[4]. The changes in tidal flow are likely to cause changes in movement of the prey species of harbour porpoises, which need to feed almost continuously to meet energy needs and are therefore highly sensitive to disturbance.

- **Changes in prey availability** - Harbour porpoises need to feed almost continuously to meet energy needs, they are highly sensitive to disturbance[5,6], therefore any displacement of their prey from the area could be very significant and lead to significantly fewer prey capture attempts[5,7]. Additionally harbour porpoise can lose 4% of their body weight in just 24 hours from starvation[7,8] .

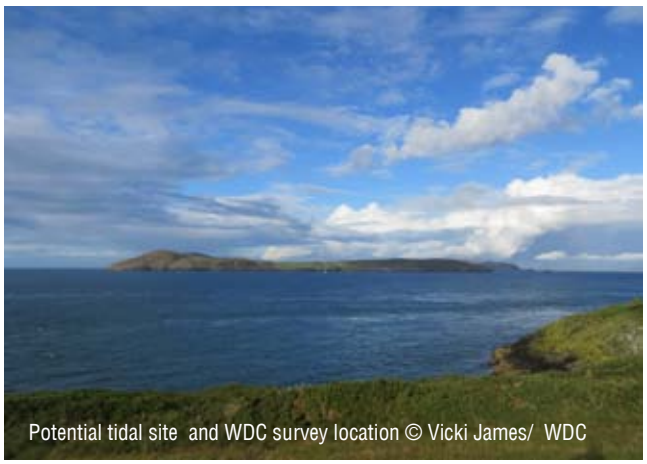
- **Changing of substrates, sediment transit and deposition** – The underwater turbines proposed for Enlli are likely to have gravity foundations (large concrete blocks on the base which hold the device in place by weight), but there may be additional fixing to the seabed to secure the device in heavy seas or strong currents such as in Bardsey Sound. Scouring of the seabed is likely to level the seabed for the 'feet' of the turbines, this has the potential to change the seabed and therefore the currents and therefore prey availability.

1 - Baseline presence of and effects of tidal turbine installation and operations on harbour porpoise in Mias Passage, Bay of Fundy, Canada. http://d92381143ccd30809f56ed62.smruconsulting.netdna-cdn.com/wp-content/uploads/2019/09/Tollit-et-al-2019-BOF_CPODs.pdf
2 - Forney, K. A., B.L. Southall, E. Slooten, S. Dawson, A.J. Read, R.W. Baird, and R. L. Brownell Jr. 2017. Nowhere to go: noise impact assessments for marine mammal populations with high site fidelity. Endangered Species Research DOI: 10.3354/esr00820
3 - Chen, Y., Lin, B., Lin, J. and Wang, S. 2015. Effects of stream turbine array configuration on tidal current energy extraction near an island. Computers and Geosciences 77, 20-28. https://www.sciencedirect.com/science/article/pii/S0098300415000096?via%3Dihub
4 - Elliot, A.J., Bowers, D.G. and Jones, B. 1995. Tidal currents near Bardsey Sound. The Hydrographic Journal, No. 78.
5 - Wisniewska, D.M., Johnson, M., Teilmann, J., Siebert, U., Galatius, A., Dietz, R., Madsen, P.T., 2018b. High rates of vessel noise disrupt foraging in wild harbour porpoises (Phocoena phocoena). Proc. R. Soc. B Biol. Sci. 285, 20172314. https://doi.org/10.1098/rspb.2017.2314
6 - Wisniewska, D.M., Johnson, M., Teilmann, J., Rojano-Doñate, L., Shearer, J., Sveegaard, S., Miller, L.A., Siebert, U., Madsen, P.T., 2016. Ultra-High Foraging Rates of Harbor Porpoises Make Them Vulnerable to Anthropogenic Disturbance. Curr. Biol. 26, 1441–1446. https://doi.org/10.1016/j.cub.2016.03.069
7 - Kastelein, R., 2018. Harbour porpoise (Phocoena phocoena) energetics and fish catch ability related to offshore pile driving. [WWW Document]. SMRU Consult. URL http://www.smruconsulting.com/inpas-abstracts-announced/
8 - Dyndo, M., Wiśniewska, D.M., Rojano-Doñate, L., Madsen, P.T., 2015. Harbour porpoises react to low levels of high frequency vessel noise. Sci. Rep. 5. https://doi.org/10.1038/srep11083

- **Noise pollution during installation and operation**
  Noise pollution during construction of other offshore renewables energy developments caused behavioural changes in harbour porpoises, with populations leaving the area during construction and in many cases did not later return to their usual numbers. Whilst the construction parameters will be different for this tidal development, and likely to produce lower noise levels, similar impacts cannot be ruled out. Tidal power infrastructure will also require construction and maintenance, and will likely drive increased boat traffic which could disrupt marine wildlife and raise the potential of boat collisions[9].

- **Alteration of ecosystems for regional organisms**
  In addition, slightly but repeatedly modifying the flow of water could disrupt the migration and foraging of some fish species while the circulation of sediment could affect seafloor animals.

- **Potential strikes by any moving parts of the tidal system.**
  The risk of collision with the underwater devices, especially the moving blades, is of particular concern, as there is the potential for injury or even death. To date there has been limited study into the collision risk that can reliably inform an assessment on the collision rate of cetaceans with the devices, and these studies have been located at sites with low densities of harbour porpoises and not in MPAs. However these studies have clearly demonstrated potential for collision risk in these areas, which will be substantially higher if turbines had been deployed in other habitats[10] (those with high densities of harbour porpoises including MPAs). Modelling is used in the place of observation at existing developments. The modelling for Morlais gave unacceptable collision risks for cetaceans and showed collision deaths could wipe out seabird colonies[11].


Potential tidal site and WDC survey location © Vicki James/ WDC

These concerns, and other potential impacts from the proposed development, are shown in annexe 1. Several applications for consent for tidal developments have stated that if negative impacts occurred, mitigation measures would be put into place. However, there are no known or proven mitigation measures. The application for the Morlais development off Anglesey proposed mitigation but gave no details of what this would involve. We have seen no detailed monitoring on arrays published.

Plugging these significant knowledge gaps, on how these devices impact cetaceans has been the focus at conferences and workshops run by Marine Energy Wales, and Offshore Renewables Joint Industry Programme (ORJIP), and attended by government bodies and agencies. The impacts on cetaceans were identified as the area most lacking in knowledge and an urgent research requirement[12]. It was also agreed that until these gaps in knowledge are filled, that a precautionary approach must be followed as we are not at the stage of de-risking the consenting of tidal energy devices.

Recent reports have emphasised the lack of knowledge, and excerpts from two are given below:

From: *Review of potential collision between tidal stream devices and marine animals.*
NRW Evidence Report No. 444)[13]

The key evidence gaps for all marine animals relate to avoidance or encounter rates, as well as confirming if an actual collision has occurred and what the effects of a collision would be. In addition, the limited monitoring data

9 - Marine Renewable Energy: A Global Review of the Extent of Marine Renewable Energy Developments, the Developing Technologies and Possible Conservation Implications for Cetaceans Vicki James Version 1. November 2013 https://uk.whales.org/wp-content/uploads/sites/6/2018/08/wdc-marine-renewable-energy-report.pdf
10 - Wilson, B., Wilson et al., "Estimates of Collision Risk of Harbour Porpoises and Marine Renewable Energy Devices at Sites of High Tidal-Stream Energy."2014 Estimates of Collision Risk of Harbour Porpoises and Marine Renewable Energy Devices at Sites of High Tidal-Stream Energy https://www.gov.scot/publications/estimates-collision-risk-harbour-porpoises-marine-renewable-energy-devices-sites/
11 - Morlais Project Marine Mammals Revised Collision Risk Modelling Signposting document https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001836-MMC368%20MOR-RHDHV-DOC-0154%20Marine%20Mammal%20Revised%20CRM%20Signposting.pdf
12 - ORJIP Ocean Energy. Wave and Tidal Stream Critical Evidence Needs November 2020. http://www.orjip.org.uk/sites/default/files/ORJIP%20Ocean%20Energy%20critical%20evidence%20needs%20document_V2.pdf
13 - https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-001765-MMC290%20MOR-EXT-DOC-035%20Review%20of%20potential%20collision%20between%20tidal%20stream%20devices%20and%20marine%20animals.pdf

that is currently available is species, location and device specific and may therefore, not be transferable or applicable to the assessment of other tidal stream projects. Other key gaps are the potential implication of collision mortality on individual animals' welfare, impact on family structure and survival at a local level and at the wider population level along with the cumulative effects of deploying multiple tidal devices and arrays in the marine environment. More information on the physical consequences of a collision (with the blade or pressure differential) is also required to fully understand the potential for death or injury. There may be some relevant evidence or lessons that can be learned from other similar types of development (e.g. tidal lagoons or tidal range projects) that have the potential to result in a collision, but this review focussed wholly on tidal stream devices. Of particular interest is the impact and effect of any pressure differential, caused by the rotating blades, this has been studied in other ocean energy devices but available evidence from tidal stream devices is currently lacking.

From OES-Environmental 2020 State of the Science Report: Environmental Effects of Marine Renewable Energy Development Around the World[14]

COLLISION RISK FOR ANIMALS AROUND TURBINES

Tidal and river energy devices may pose a risk of collision to marine mammals, fish, and diving seabirds. To date, there have been no observations of a marine mammal or seabird colliding with a turbine, and the limited number of interactions of fish in close proximity to a turbine have not resulted in obvious harm to the fish. It is expected that collisions, if they occur, will be very rare events that will be difficult to observe in the fast-moving often murky waters. In addition, the likely consequences of a collision are not known, with outcomes ranging from injuries from which the animal may recover to the death of the animal. There is limited evidence and understanding of how marine animals behave in the presence of underwater structures; it is difficult to determine how well marine mammals, fish, and seabirds may be able to sense, react to, and avoid an operating turbine. In the absence of this behavioural information, most progress in understanding collision risk focuses on understanding the presence of marine animals of interest in the vicinity of turbines, supported by computer modelling that simulates nearfield behaviour and potential collision events.

RISK TO MARINE ANIMALS FROM UNDERWATER NOISE GENERATED BY MARINE RENEWABLE ENERGY DEVICES

Marine animals use sound in the ocean like terrestrial animals and humans use sight on land—to communicate, navigate, find food, socialize, and evade predators. Anthropogenic noise in the marine environment has the potential to interfere with these activities. Progress on quantifying the direct and indirect effects of underwater noise on marine animals has been complicated by the relatively small number of MRE devices that have been deployed. Difficulties in accurately measuring noise from MRE devices and the challenge of understanding how underwater noise affects the behaviour of marine animals, confound our understanding. However, international technical specifications provide a standardized approach for measuring noise from MRE devices. The underwater noise from several MRE devices has been measured using this specification and found to fall below regulatory action levels and guidance developed in the United States for protecting marine mammals and fish from harm due to underwater noise. Evidence suggests that underwater noise emitted from operational MRE devices is unlikely to significantly alter behaviour or cause physical harm to marine animals.


Risso's dolphin, Bardsey Island © Sonja Eisfeld-Pierantonio/ WDC

14 - OES-Environmental 2020 State of the Science Report: Environmental Effects of Marine Renewable Energy Development Around the World https://tethys.pnnl.gov/publications/state-of-the-science-2020

OTHER CONCERNS OF YNYS ENLLI PROPOSED TIDAL ENERGY PROJECT

The Scoping Report upon which assessments are being made, including the Environmental Impact Assessment, is out-of-date. The project parameters have changed significantly, however there are no plans to undertake an updated Scoping Report. WDC strongly recommends that there needs to be a new scoping exercise to cover all aspects of the current proposed siting and project design. The scoping should follow best practice as outlined in the Guidelines on Ecological Impact Assessment from the Chartered Institute of Ecology and Environmental Management.

In addition, the Scoping Report was produced before the SAC designation and it has been acknowledged by the author that the report is a result of testing the guidelines given in *Guidance to inform marine mammal site characterisation requirements at wave and tidal stream energy sites in Wales*[15], which are very much open to interpretation depending on the bias of the individual or organisation undertaking the assessment. In this case the assessment was undertaken from the point of view of the developer.

Additionally, the Scoping Report excluded a number of issues. In particular the impacts on the tidal flow in Bardsey Sound and the changes in tidal flow may have on the movement of the prey species of harbour porpoises. WDC first raised these issues in 2017, yet have seen no steps to address these. As a result any assessments and conclusions will be woefully inaccurate, and will not be indicative of the impacts on cetaceans.


Bardsey Island from boat transect. © Vicki James/ WDC

Current plans for Enlli tidal are for a phased approach, where one device is deployed and the impacts monitored for a period of time before a second device is installed, until the full array is installed. The impacts of each device must be assessed, both individually and cumulatively before deployment, as impacts are likely to increase as the number of devices are increased especially within a small area.

Whilst Nova Innovation have another tidal energy site in Bluemull Sound, Scotland, where monitoring of collisions with cetaceans has been undertaken, this site has a very low density of cetaceans, in particular harbour porpoises, and is not an MPA or identified as an area of importance for cetaceans. Therefore there is no comparable data to base any conclusions of the collision risk of these devices in Bardsey Sound. WDC is very concerned by the erroneous assumptions that are being made that, as there are no collisions in Bluemull Sound, therefore there will be none in Bardsey Sound. Collision with devices, and moving blades, has the potential to cause injury and even death. Due to where these devices need to be placed, in the most intense flow, it will be impossible to place turbines in areas that harbour porpoises do not use.

Due to the lack of knowledge of the impacts of tidal energy devices on cetaceans WDC's strong recommendation is that until tidal devices are demonstrated to be benign, this development should not be allowed in the highly protected waters of Bardsey Sound which are important for cetaceans and other species, or, indeed, in any other protected area for cetaceans.

We are happy to meet to discuss any of these issues further.

Contact: Vicki James, Policy Officer. vicki.james@whales.org

15 - Sparling et al., "Guidance to Inform Marine Mammal Site Characterisation Requirements at Wave and Tidal Stream Energy Sites in Wales.https://naturalresourceswales.gov.uk/media/681871/guidance-to-inform-marine-mammal-site-characterisation-requirements-at-w.pdf

How green is marine energy?

Everybody wants to see a green recovery. But undersea turbines can only be green if they are developed in harmony with nature – rather than destroying it

It sounds like a dream
Harness the relentless power of undersea currents to help decarbonise Wales's electricity supply, while generating new jobs and development. Welsh waters are rich in marine energy – and, unlike wind turbines, underwater versions could provide a steady supply 24 hours a day.

So what's the catch?
The areas earmarked for development are also biodiversity hotspots. Strong currents create upwellings of nutrients that allow plankton – the basis of the marine food chain – to grow. So these areas are where the food is. And where the top predators gather: seabirds, seals, basking sharks and cetaceans.

Can turbines and marine life get along?
No one knows yet. But the biggest proposed development, a Tidal Stream Demonstration Zone off Anglesey, estimates that its 620 turbines would kill hundreds of marine mammals. Every year.

What measures are developers taking?
They want to go ahead anyway, promising to adapt as new facts come to light – so-called 'learning by doing'. But they have not developed technologies to monitor the impacts, or provided plans with enforceable safeguards if limits are breached.

What is the solution?
Climate change is one of the biggest threats to nature and people, but extracting power from sea currents is a technology in its infancy. We simply say: start small, learn and develop safe ways to do it. Don't roll out large-scale projects which could worsen the existing biodiversity crisis in our seas.

Main gannet: David Chapman. Common dolphins: Janet Baxter

Illustration: www.hilliard.design

1 Strong currents stir up seabed nutrients. Plant plankton blooms at the surface.

2 Animal plankton follows, feeding on the microscopic plants.

3 Fish thrive on the abundant food source. A food web begins.

4 Cetaceans, seals and seabirds harvest the fish. Basking sharks thrive on the plankton.

Paul Naylor

Ken Sullivan

COASTAL COMMUNITIES
Welsh tourism and fisheries depend on healthy seas. A green recovery must include the recovery of our marine life.

COLLISION DANGER
Turbine blades pose a danger to large, mobile animals.

CHANGED HABITAT
Construction creates noise and disturbance. Valuable habitat is lost. Species are forced to move to less productive areas.

MARINE TURBINES COULD CAUSE EXTINCTIONS OF MARINE MAMMALS IN WALES

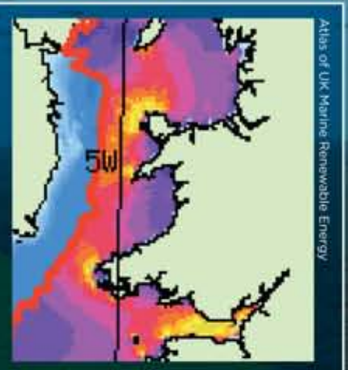
Our request to the Welsh Government

1 Start small
Require initial development to be small-scale, to keep risk to a minimum.

2 Learn what is safe
Discover what technology keeps the impact to natural systems within agreed limits.

3 Move to larger scale
Allow development only when low impact is proven – and continue monitoring impacts.

Areas of high marine energy (yellow and orange) are heavily used by marine animals.



Atlas of UK Marine Renewable Energy

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WILDLIFE TRUSTS WALES