

Pembrokeshire

Marine SAC

Biosecurity Action Plan



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APEM Ltd. and Natural Resources Wales

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Crynodeb gweithredol

Mae'r ddogfen hon yn cyflwyno Cynllun Gweithredu Boddlogelwch ar gyfer Ardal Cadwraeth Arbennig (ACA) Forol Sir Benfro. Diben y cynllun hwn yw amlinellu camau ymarferol i'w cymryd gan unigolion, sefydliadau neu grwpiau sy'n ymgymryd â gweithgareddau yn yr amgylchedd morol; a rheoleiddwyr, sefydliadau llywodraethol ac awdurdodau lleol sy'n ymwneud â gweithredu polisi, deddfwriaeth neu reoliadau (y cyfeirir atynt gyda'i gilydd fel rhanddeiliaid) er mwyn lleihau'r risgiau a'r effeithiau sy'n gysylltiedig â rhywogaethau estron goresgynnol morol (INNS).

Amcanion y cynllun hwn yw darparu:

- Gwybodaeth gefndirol am INNS morol a boddlogelwch (h.y. gweithredoedd ac ymddygiadau sy'n helpu i leihau'r risg o gyflwyno a lledaenu INNS).
- Mae hefyd yn rhoi trosolwg o'r ACA a'r gweithgareddau sy'n peri risg o gyflwyno a lledaenu INNS sy'n digwydd o fewn ffiniau'r ardal.
- Rhestr o INNS morol sydd eisoes yn bresennol yn yr ACA ac enghreifftiau o'r rhai a allai gyrraedd yn y dyfodol.
- Cyfres o dablau gweithredu sy'n rhestru camau gweithredu a [argymhellir ar gyfer rhanddeiliaid ACA](#) o dan saith elfen ffocws boddlogelwch:
 1. Deall rolau a chyfrifoldebau cyfreithiol
 2. Hyrwyddo gwybodaeth ac arweiniad ar rywogaethau estron goresgynnol a boddlogelwch.
 3. Codi ymwybyddiaeth
 4. Prosesau a gweithdrefnau boddlogelwch
 5. Cyfleusterau boddlogelwch
 6. Monitro ac adrodd
 7. Gweithio ar y cyd
- Canllawiau arfer gorau, gan gynnig camau ymarferol i roi pob cam ar waith yn effeithiol.
- Adnoddau defnyddiol a gwybodaeth atodol er mwyn rhoi camau boddlogelwch ar waith.

Mae arwyddocâd effeithiau INNS ar ardaloedd morol Cymru yn cael ei gydnabod gan Cyfoeth Naturiol Cymru, a gomisiynodd y cynllun hwn i gefnogi'r ymdrech ar y cyd i ddiogelu ACA Morol Sir Benfro rhag bygythiad INNS.

Mae Cynlluniau Gweithredu Rhywogaethau a Chynlluniau Gweithredu Llwybrau wedi cael eu datblygu ar lefel genedlaethol, ac yn cefnogi'r Cynllun Gweithredu Boddlogelwch hwn. Gellir gweld dolenni i'r rhain ar wefan [Moroedd Gwyllt Cymru](#).

Dylai darllenwyr ymgyswrtu â'r wybodaeth gefndirol a geir yn y ddogfen hon. Fodd bynnag, gan y bydd rhai eisoes yn ymwybodol o effeithiau a risgiau INNS a chysyniadau boddlogelwch, darperir canllaw cyfeirio cyflym ar y dudalen nesaf fel bo modd llywio'n gyflym drwy'r ddogfen.

Executive summary

This document presents a Biosecurity Action Plan for the Pembrokeshire Marine Special Area of Conservation (SAC). The purpose of this plan is to outline practical steps to be taken by individuals, organisations or groups undertaking activities in the marine environment; and regulators, governmental organisations and local authorities involved in the implementation of policy, legislation or regulations (collectively referred to as stakeholders) in order to reduce the risks and impacts associated with marine invasive non-native species (INNS).

The objectives of this plan are to provide:

- Background information on marine INNS and biosecurity (i.e. actions and behaviours that help to reduce the risk of introducing and spreading INNS).
- An overview of the SAC and the activities posing risks of introducing and spreading INNS that occur within its boundaries.
- A list of marine INNS already present in the SAC and examples of those that may arrive in the future.
- A series of action tables listing [recommended actions for SAC stakeholders](#) under the seven components of biosecurity focus:
 1. Understanding roles and legal responsibilities
 2. Information and guidance on INNS and biosecurity
 3. Raising awareness
 4. Biosecurity processes and procedures
 5. Biosecurity facilities
 6. Monitoring and reporting
 7. Collaborative working
- Best practice guidance, offering practical steps to effectively implement each action.
- Useful resources and supporting information for implementing biosecurity actions.

The significance of the impacts of INNS to Welsh marine areas is recognised by Natural Resources Wales, who commissioned this plan to support the collective effort to safeguard the Pembrokeshire Marine SAC against the threat of INNS.

National level Species Action Plans and Pathway Action Plans have been developed and support this Biosecurity Action Plan. Links to these can be found on the [Wild Seas Wales website](#).

Readers should familiarise themselves with the [background information](#) provided in this document. However, as some will already be aware of the impacts and risks of INNS and the concepts of biosecurity, a Quick Reference Guide is provided on the next page to aid quick navigation through the document.

Quick Reference Guide



Biosecurity Actions - this Biosecurity Action Plan provides stakeholders operating within the SAC with **a set of optional actions** intended to reduce the spread of INNS into and within the SAC. These actions have been categorised into three key Biosecurity Focus Areas: Awareness Raising and Engagement, Practical Actions, and Monitoring and Reporting.

[Biosecurity actions for the Pembrokeshire Marine SAC](#)

Implementation of these actions is supported by information provided in the sections described below.



Best Practice - provides guidance tailored to a specific sector, offering practical steps to effectively implement an action. It focuses on the "how-to" details, breaking down the actions into manageable tasks.



Useful resources and additional guidance: links to external guidance, publications, reports and information resources for INNS.



[Appendix](#)

Supporting Information - summarises the concepts, principles, and considerations that underpin the three Biosecurity Focus Areas and the recommended biosecurity actions for the SAC. The supporting Information is split into seven key components and provides stakeholders with additional insights into aspects that can influence the development, modification and implementation of biosecurity actions. The components are aligned with national priorities to provide the foundation for biosecurity planning within the SAC.

Biosecurity Focus Area 1 – Awareness Raising and Engagement

[Component 1: Understanding roles and legal responsibilities](#)

[Component 2: Information and guidance on INNS and biosecurity](#)

[Component 3: Raising awareness](#)

Biosecurity Focus Area 2 – Practical Actions

[Component 4: Biosecurity procedures and processes](#)

[Component 5: Biosecurity facilities](#)

Biosecurity Focus Area 3 – Monitoring and Reporting

[Component 6: Monitoring and reporting](#)

Common Biosecurity Focus Area – Collaborative Working

Collaboration is an important aspect of all three Biosecurity Focus Areas, ensuring that effort is shared, and all stakeholders are supported.

[Component 7: Collaborative Working](#)

Background to the Biosecurity Action Plan

What are Invasive Non-Native Species (INNS)?

Non-native species (NNS) are organisms (plants, animals or pathogens) that do not naturally occur in an area but have been moved there, by human activities (either accidentally or deliberately). NNS are also sometimes referred to as “alien species”, “non-indigenous species” or “exotic species”. Many do not have a negative impact in the area where they have been introduced. However, some 10-12% of NNS that have been introduced cause significant environmental, social or economic impacts. These are known as Invasive Non-Native Species (INNS) and, in the UK, include species such as the Chinese mitten crab, carpet sea squirt and Japanese wireweed, among many others.

Marine INNS are resilient and often capable of surviving harsh and variable conditions, making them particularly challenging to manage. Many species can endure high levels of drying, temperature fluctuations, and low nutrient availability, allowing them to persist in damp conditions for extended periods. For instance, mussels, barnacles and algae can remain viable (i.e., still able to live and/or reproduce) when attached to damp equipment, nets or boat hulls, even after days or weeks out of the water. The resilience enables them to travel long distances, hitchhiking on fishing gear, recreational boats, or clothing/equipment.

What impacts do INNS have?

INNS are one of the top five drivers of global biodiversity loss. As well as causing a myriad of environmental impacts, leading to significant ecological consequences, INNS are estimated to cost the British economy £4 billion per year, according to a [recent report](#). These costs can arise from damage to infrastructure, the loss of commercially important species, management and control of INNS, and operational costs to industry. These impacts can include:

- Damaging populations of native species by smothering, eating and outcompeting (e.g., for food and space);
- Altering habitats (e.g., changing the surface of the seafloor and impacting the ecosystem);
- Clogging and fouling structures (e.g., aquaculture equipment, navigational aids, outflow pipes and piers);
- Introducing diseases, pests and parasites (which can devastate native populations); and
- Fouling the hulls of boats and ships (resulting in more drag and higher fuel costs).

Five Species Action Plans (SAPs) have been developed for Wales as part of this project. These offer more specialised advice on the following priority INNS, links to which can be found on the [Wild Seas Wales website](#).

- The carpet sea squirt (*Didemnum vexillum*);
- The American slipper limpet (*Crepidula fornicata*);
- The Chinese mitten crab (*Eriocheir sinensis*);
- The trumpet tubeworm (*Ficopomatus enigmaticus*); and
- The American and Japanese oyster drills (*Urosalpinx cinerea* and *Ocenebrellus inornatus*).

How do INNS get here?

The mechanisms and routes by which INNS are moved from one location to another by humans are termed “pathways”. Pathways in the marine environment include commercial shipping, aquaculture and recreational boating. This movement of species by humans, accidentally or deliberately, allows INNS to overcome natural barriers that would otherwise prevent them from spreading between their native and non-native ranges, e.g., an ocean. For instance, Pacific oysters, native to Japan, would not be able to reach UK waters through natural spread, but when introduced into UK waters by human activity can survive and establish as the environmental conditions in the UK are compatible with their native range.

Pathways can be over great distances, connecting geographically separate areas, and introducing NNS to new areas outside of their native range (referred to as introduction), or they can be over short distances, facilitating short-range spreading of a species onwards from their initial introduction point (referred to as spread) (see Figure 1).



Figure 1. Photos illustrating some of the pathways in the marine environment. Left: commercial shipping. Right top: recreational boating. Right bottom: commercial fishing.

Left: Container ship. Nathan.cima, [CC BY-SA 4.0](#). Right top: Aberystwyth marina. OLU, [CC BY-SA 2.0](#). Right bottom: Trawler. Partonez, [CC BY-SA 4.0](#). All images via Wikimedia Commons.

Animals can be moved as eggs and in their larval, juvenile and adult life stages. Seaweed can be moved as fragments or spores (their reproductive structures). Larvae can be planktonic (drift with currents, unable to propel themselves against water movement) or free-swimming (can actively move and maintain their position in the water column).

Vectors are the specific, discrete parts of a pathway (i.e. means within a pathway) that facilitate the movement of INNS from one location to another (see examples in Figure 2). For example, within the commercial shipping pathway, vectors include:

- The vessel hull or hard to reach areas in the hull (e.g., sea chests) - INNS are moved when attached to these surfaces;
- Ballast water - INNS are taken up in ballast water, transported to a new location and released when the ballast water is discharged;
- Bilge tanks and other water-retaining features - INNS are taken up into these areas and released when the vessel is next used; and,
- Equipment and gear (e.g., anchor warps, life jackets and rope) – INNS can become trapped, tangled or attached to equipment used on the vessel and then moved and released as the equipment is used at another location.



Figure 2. Photos illustrating vectors that can move INNS. Left: ballast water. Right top: anchors and rope. Right bottom: equipment / kit.

Left: Discharging ballast. W.carter, CC0. Right top: Rope, buoys and anchors. Chris McAuley, [CC BY-SA 2.0](#). Right bottom: Life jackets. vastateparksstaff, [CC BY 2.0](#). All via Wikimedia Commons.

Different INNS will move via different pathways and vectors depending on several factors, including their species-specific characteristics (e.g. mussels or barnacles that attach to hard structures, or lobsters that are transported for human consumption), life stage (e.g., adult, juvenile, egg or larval), size, mobility and behaviour, creating specific challenges for biosecurity implementation. Pathway Action Plans (PAPs) have been developed for Wales, which offer more specialised guidance for individual pathways, links to which can be found on the [Wild Seas Wales website](#). These are based on PAPs developed by the GB Non-Native Species Secretariat ([GB NNSS](#)). The pathways and vectors covered by each PAP produced for the Welsh biosecurity framework are shown in Figure 3.

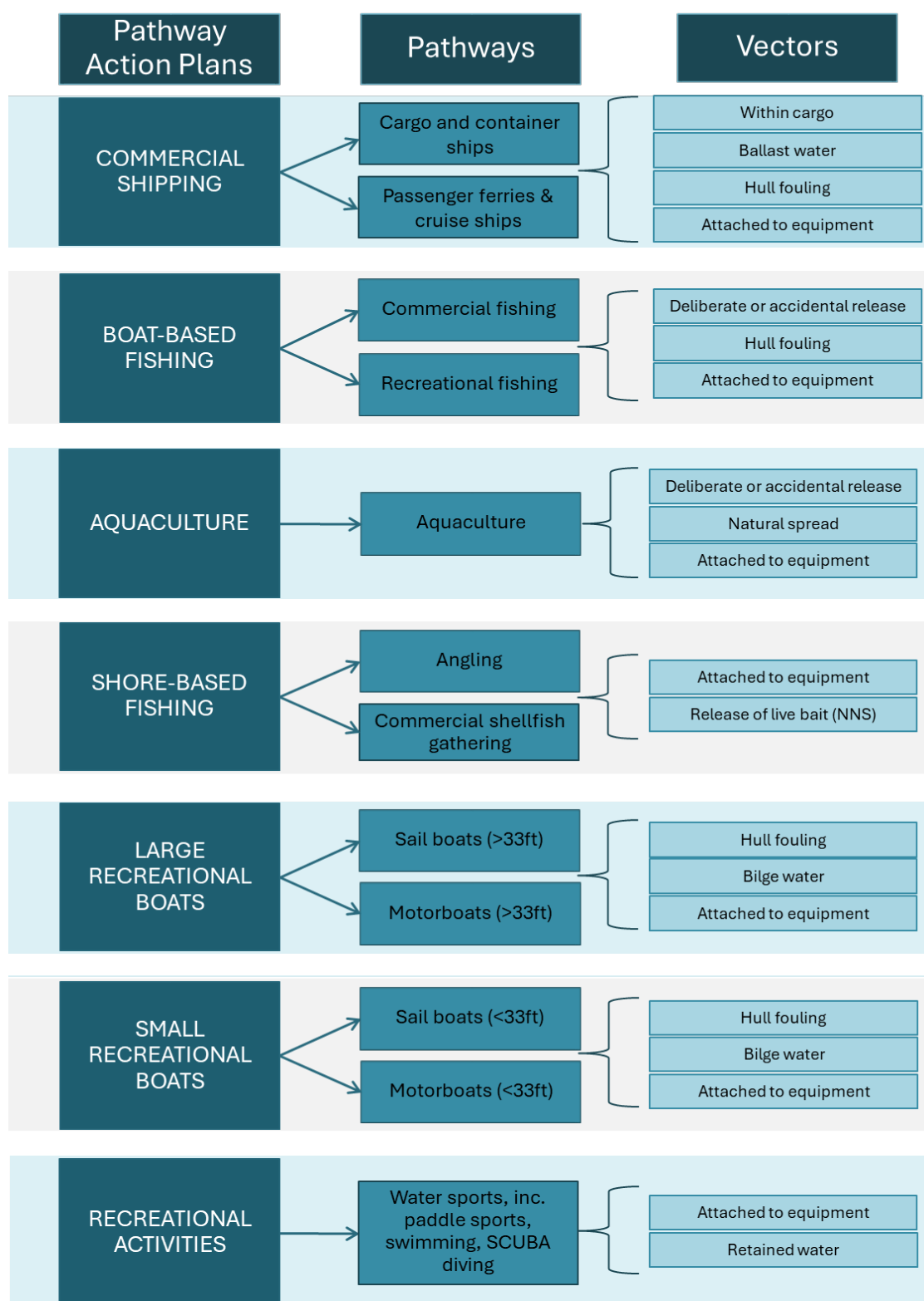


Figure 3. An overview of the Pathway Action Plans that have been developed for Wales, and the vectors associated with the pathways. Note that the list of vectors is not exhaustive.

What is biosecurity?

Biosecurity measures are actions, procedures and behaviours put in place to reduce the risk of INNS introduction and spread into, within and outside of a given area. Biosecurity measures should be realistic, pragmatic and cost-effective. Preventing the introduction and spread of INNS is by far the most effective means of management. It is significantly more costly, difficult, and time-consuming to eradicate or control INNS once they have been introduced and have established, compared to preventing their introduction and establishment in the first place. This is especially true in the marine environment, where eradication is near impossible once INNS become established.

Biosecurity comprises three key areas of focus, as shown in Figure 4:

- **Focus Area 1 - Awareness raising and engagement** – sharing knowledge and improving understanding of INNS, how they're spread, their impacts, why they should be managed and how.
- **Focus Area 2 - Practical biosecurity actions** – actions and behaviours that reduce the risk of INNS introduction and spread.
- **Focus Area 3 - Monitoring and Reporting** – looking out for INNS and reporting them improves understanding of their presence and abundance and facilitates timely response to reduce impacts.

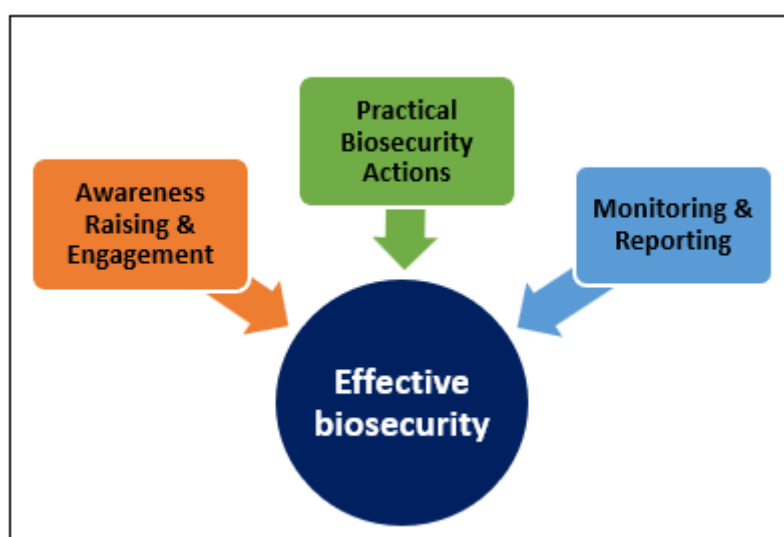


Figure 4. Biosecurity and its three key Focus Areas: Awareness Raising & Engagement; Practical Biosecurity Action; Monitoring & Reporting.

It is important to note that the spread of an INNS via natural means (i.e. currents) from where it has been introduced and has established can be challenging to manage. However, implementing biosecurity procedures, particularly at locations where INNS are likely to arrive or at locations vulnerable to the impact of INNS, can reduce the risk of impact and improve the chances that new occurrences are detected early.

What is a biosecurity action plan?

A Biosecurity Action Plan (BAP) provides practical and effective actions to minimise the risk of introducing INNS into a site or area and preventing the spread of existing INNS. A key objective is to ensure collaboration between stakeholders and a consistent approach to managing biosecurity risks. BAPs are informed by assessing and understanding the specific activities undertaken in the area and how they influence the risks associated with INNS introduction and spread. People considering creating their own BAP should include all of these elements where possible.

Key Elements of a biosecurity action plan

1) The Site

The planning process should begin with a thorough evaluation of the specific activities and pathways present at the site (the Pembrokeshire Marine SAC) and their associated risks of introducing or spreading INNS. Understanding these pathways is essential for determining appropriate and proportional actions.

2) The Stakeholders

Stakeholders are defined as any individual, group, or organisation with an interest in, or influence over, INNS risks within the SAC, should be identified and engaged early in the process. Involving stakeholders ensures that their insights and concerns are incorporated into the plan and fosters commitment to implementing biosecurity measures. This collaboration is critical for long-term uptake and continued engagement.

3) Practical Actions

Biosecurity actions should be customised to address the specific activities and sectors represented within the SAC. They should also incorporate awareness-raising, monitoring and reporting to build a proactive and holistic biosecurity framework. Including actions that are scalable ensures broad participation while empowering those who want to take a more active role in their biosecurity efforts.

4) Best Practice and Supporting Information

The BAP should provide guidance on these actions, to support a range of needs and levels of understanding. For general actions, clear and concise instructions ([best practice](#)) allow stakeholders to understand the steps required to implement an action. For those seeking more detailed background and information that provides readers with the tools to contextualise and modify relevant actions for their situation, see the [Supporting Information section in the appendix](#).

Pembrokeshire Marine SAC

The Pembrokeshire coast, located in West Wales, is protected under several designations, including as a Special Area of Conservation (SAC) under the Habitats Regulations. The Pembrokeshire Marine SAC extends from near Abereiddy in north Pembrokeshire to Manorbier in South Pembrokeshire. It includes the islands of Ramsey, Skomer, Grassholm, Skokholm, the Bishops and Clerks, and The Smalls. It also encompasses almost the entire Milford Haven Waterway to tidal limits. It is one of the largest marine SACs in Wales, covering an area of 138,069 ha.

The Pembrokeshire Marine SAC is both a popular area for recreational activity and a busy hub for commercial operations. Its extensive coastline and rich marine life attract many boaters, kayakers and divers. The SAC is also home to high levels of shipping activities (including those associated with the energy industry, both fossil fuel and renewable), associated developments, and numerous important commercial fishing areas.

A number of INNS have been recorded in the Pembrokeshire Marine SAC, in particular within the Milford Haven Waterway, which is considered a hotspot for marine INNS. These include the American slipper limpet, the trumpet tubeworm and the carpet sea squirt. More information on INNS posing a threat to the Pembrokeshire Marine SAC can be found below. For more information about the SAC and its features please visit the [NRW](#), [JNCC](#) and [SAC](#) webpages. A map displaying the SAC features can be found in Figure 5 below.

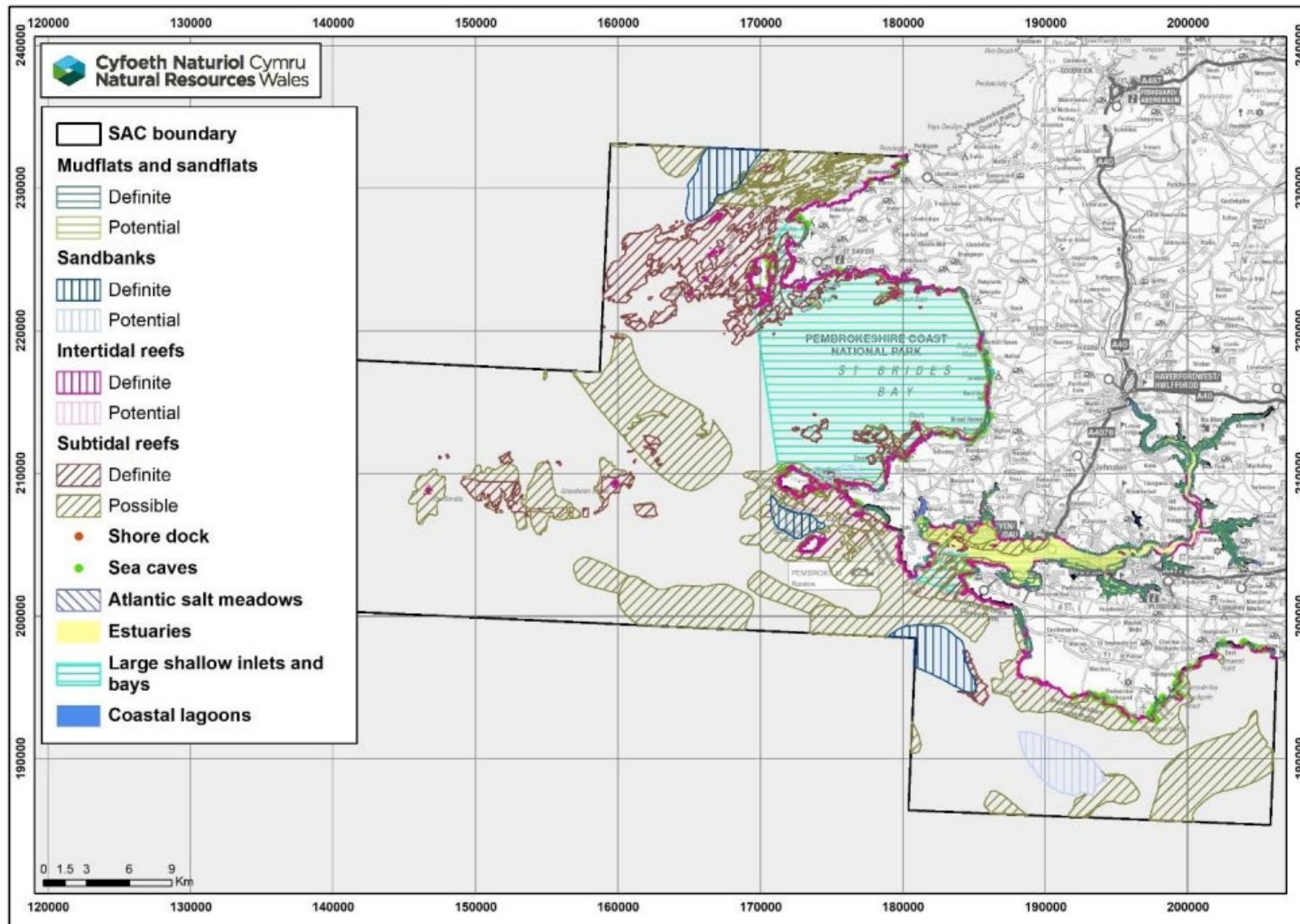


Figure 5. A map showing the site boundary and designated features of Pembrokeshire Marine SAC, accessed via the [NRW website](#) - Conservation advice for Pembrokeshire SAC.

What INNS are in the Pembrokeshire Marine SAC?

Table 1 describes High and Medium risk INNS from the [Welsh Priority Monitoring and Surveillance List](#) (WPMSL) that are known to be present and breeding in Pembrokeshire Marine SAC. Note that this is not an exhaustive list, as there are other INNS known to be spread via pathways in Pembrokeshire Marine SAC that are not listed as High or Medium risk on the WPMSL.

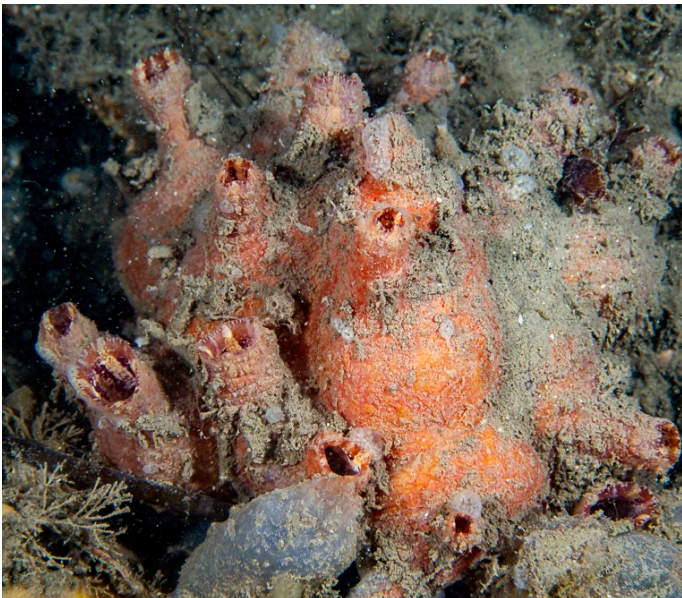
The current distributions of INNS around Pembrokeshire Marine SAC (and Wales / the UK more broadly) can be viewed by searching the database and maps on the [National Biodiversity Network Atlas](#).

An overview of the different lists of INNS that are of interest to Wales can also be found on the [NBN Atlas](#). The current distribution of INNS included on those national lists can be found on the [Wales INNS Portal](#).

Further information and links to resources developed to aid identification of INNS are available below. Further species-specific information is also available from the searchable GB NNSS [Information Portal](#).

Table 1. Invasive Non-Native Species (INNS) that have been recorded in the Pembrokeshire Marine SAC.

INNS name	Impacts	Photo	Additional information
Carpet sea squirt <i>Didemnum vexillum</i>	A fouling organism which can smother native plants and animals, commercially important mussels and oysters, and foul equipment and infrastructure. It alters seabed habitat with potential to disrupt ecosystem function.	 Photo credit: Javier [CC BY, via iNaturalist]	It can be transported attached to shellfish which are being moved. It can also be transported attached to boat hulls, and marina and industry equipment. Fragmented colonies can be transported on ocean currents and resettle on suitable surfaces. Fragments are viable for up to 30 days. Tolerant of temperatures between 2-24°C. Reproduction occurs between 14-20°C. For further information see the GB NNSS Information Portal, Risk Assessment, NBN Atlas and the 2023 alert poster. A link to the Species Action Plan can be found on the Wild Seas Wales website.

INNS name	Impacts	Photo	Additional information
Compass sea squirt <i>Asterocarpa humilis</i>	A fouling organism which may smother commercially important mussels and oysters and foul equipment. It has potential negative impacts on the abundance of shallow-water suspension-feeding sedentary invertebrates. When forming clumps, it has the potential to block intake pipes.	 Photo credit: Bernard Picton [CC BY, via iNaturalist]	It can be transported when attached to boat hulls (primarily recreational vessels) or aquaculture equipment. It may also be transported attached to shellfish which are being moved. For further information see the GB NNS Information Portal and NBN Atlas.

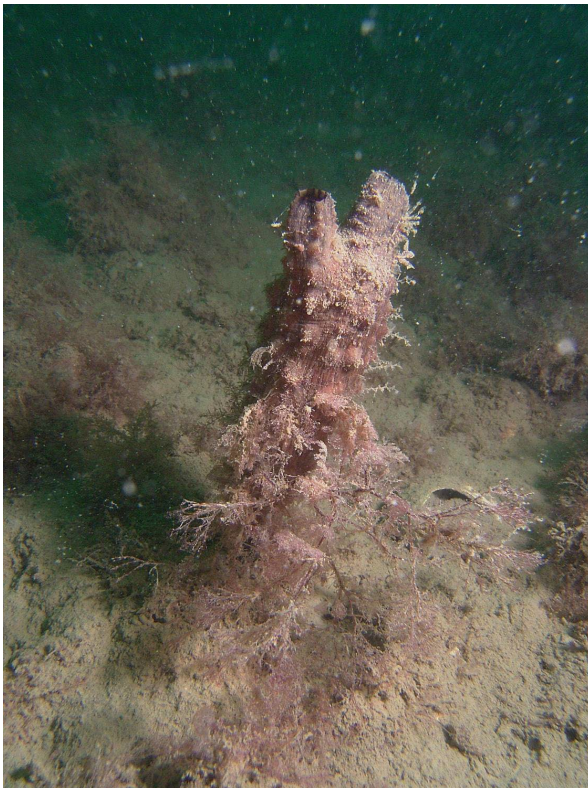
INNS name	Impacts	Photo	Additional information
Devil's tongue weed <i>Grateloupia turuturu</i>	It is large and fast growing with potential to displace native seaweed species. Rapid growth and dense mats can smother other marine life, reducing biodiversity. Its large, broad blades may shade neighbouring species. Negatively affects fisheries and aquaculture operations through the fouling of nets, ropes, and other equipment.	 Photo credit: Elena_Sherehora [CC BY, via iNaturalist]	It can be transported attached to shellfish which are being moved. It may also be transported attached to ships hulls. Spores may be transported in ship's ballast. Spores can develop at temperatures ranging between 15-20°C. Developed strands have a wide temperature tolerance (4-29°C). For further information see the GB NNS Information Portal and NBN Atlas.

INNS name	Impacts	Photo	Additional information
American slipper limpet <i>Crepidula fornicata</i>	It may compete with native species. Its consumption of planktonic larvae limits the settlement of some species including the native oyster <i>Ostrea edulis</i>. It smothers habitats affecting bivalve and reef forming species. It has economic impacts through effects on commercially important species. It affects sediment movement.	 Photo credit: Elizabeth Green [CC BY, via iNaturalist]	It can be transported attached to shellfish which are being moved. It may also be transported attached to boat hulls and fishing gear (pots and buoys). It is potentially transported when attached to mobile species such as crab, and in dredge sediment. It may also be translocated live to new locations when used as bait. Larvae can be transported long distances in ballast water and on ocean currents. Larvae are free-swimming for 4-5 weeks, so dispersal potential is high. Breeding can occur between Feb. and Oct. but peaks in May and June. Spawning is seen even at temperatures as low as 7°C. For further information see the GB NNS Information Portal, Risk Assessment and NBN Atlas. A link to the Species Action Plan can be found on the Wild Seas Wales website.

INNS name	Impacts	Photo	Additional information
Red ripple bryozoan <i>Watersipora subatra</i>	It forms large colonies with potential to impact sessile communities, changing their composition. It is resistant to copper-based antifoulants therefore potentially exacerbates fouling by other INNS. It encrusts mussels, affecting aquaculture.	 Photo credit: Jacqui Geux [CC BY, via iNaturalist]	It may be transported attached to shellfish which are being moved. It can also be transported attached to ships hulls. It may raft on seaweeds. It has a wide temperature tolerance (12-28°C) and salinity range (25-49ppt). For further information see the GB NNS Information Portal and NBN Atlas.

INNS name	Impacts	Photo	Additional information
Trumpet tubeworm <i>Ficopomatus enigmaticus</i>	Its dense growth can form reefs which structurally alter habitats and trap organic matter (e.g., faeces). It can outcompete other filter feeders for food. It can foul coastal & marine infrastructure and boat hulls requiring costly maintenance and cleaning. The weight of colonies can cause lowering and potential sinking of pontoons and small vessels.	 Photo credit: Cricket Raspet [CC BY, via iNaturalist]	It is transported attached to boat hulls, and marina and industry equipment. It can also be transported attached to shellfish which are being translocated. Larvae are planktonic for 1-3 months (high dispersal risk) and can be transported in ballast and bilge water. Wide salinity tolerance (1.6 – 55ppt) but preference for brackish environments. Minimum water temperature of 18°C needed for reproduction. For further information see the GB NNS Information Portal and NBN Atlas. A link to the Species Action Plan can be found on the Wild Seas Wales website.

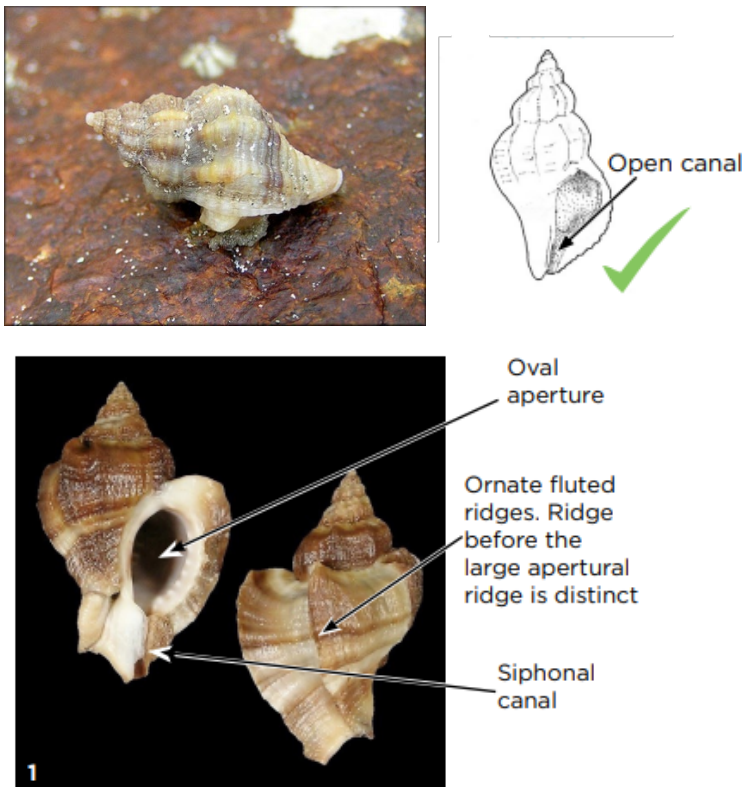
INNS name	Impacts	Photo	Additional information
Japanese wireweed <i>Sargassum muticum</i>	A fouling organism which may interfere with recreational & commercial use of waterways, especially when it forms large floating masses. It can foul fishing gear, become tangled in boat propellers, and block intake pipes and other equipment at aquaculture facilities. It can impact native subtidal communities by overgrowing and shading underlying species, which is particularly concerning for seagrasses.	 Photo credit: Susan Marley [CC BY, via iNaturalist]	Strands can become entangled around the steering gear of vessels, such as propellers. Fragments can be caught in water-retaining features of recreational sporting equipment (e.g., kayaks) or boats (e.g., in bilge tanks) and may still be viable when they are next put into the water. Fragments viable for up to 3 months. Wide tolerances of temperature (10-30°C) and salinity (7-34ppt). For further information see the GB NNSS Information Portal, Risk Assessment and NBN Atlas.

INNS name	Impacts	Photo	Additional information
Leathery sea squirt <i>Styela clava</i>	A fouling organism which has economic and recreational impact by fouling the hulls and boats, buoys and moorings, and aquaculture equipment. It may compete with and/or smother native species and commercially important species (e.g., oysters and mussels). Its leathery surface can provide area for other species to attach to.	 Photo credit: Chris Wood, Marine Conservation Society [via GB NNSS]	Adults can grow on immersed stationary vessels (hulls, propellers, keel, rudder), equipment (fenders, marker buoys) or shellfish, resulting in their transfer if these are moved. Their larvae (although only mobile for a short time) can be taken up in water-retaining features of boats and equipment (e.g., in bilge water, vessel crevices and kayak hulls). It is potentially transported when attached to mobile species such as crab, and in dredge sediment. They are hermaphroditic (possess both male and female reproductive organs) but not self-fertile. Spawning occurs in water above 15°C and larvae are planktonic for 1-3 days before they settle. For further information, see the GB NNSS Information Portal and NBN Atlas.

What INNS are on the horizon for the Pembrokeshire Marine SAC?

A horizon species is a species that is not currently recorded as present in a location but there is a high risk that it could be introduced, become established and cause environmental or socio-economic impacts. It is important to identify species that may be on the horizon so that appropriate biosecurity actions can be put in place to prevent their introduction, or surveillance programmes can be implemented to aid timely detection and response. Some species are on the horizon for the UK, some are on the horizon for Wales, and some are on the horizon for the SAC. A full list of horizon species for Wales can be found on the [Marine Invasive Non-native Species Priority Monitoring and Surveillance List for Wales](#). Table 2 describes species that are not currently present in the SAC (horizon species) but that surveillance programmes should target.

Table 2. Examples of INNS that are not currently recorded as present in Pembrokeshire Marine SAC but are likely to arrive in the future (horizon species)

INNS name	Impacts	Photo	Additional information
HORIZON SPECIES American oyster drill & Japanese oyster drill <i>Urosalpinx cinerea</i> & <i>Ocenebrellus inornatus</i>	Predator of shellfish including commercially important species, resulting in huge economic loss. Note: <i>O. inornatus</i> is a UK Alert Species.	 Top: American oyster drill: Photo credit: Bill Frank [via GB NNSS]. Diagram credit: Guy Baker Bottom: Japanese oyster drill: Photo credit: G.T. Poppe	They may be transported attached to shellfish (as larvae which emerge from eggs, or small juveniles) which are being moved. No free-swimming larval stage for either species so natural spread risk is low. For further information on <i>U. cinerea</i> see the GB NNSS Risk Assessment and NBN Atlas. For further information on <i>O. inornatus</i> see the GB NNSS Risk Assessment and NBN Atlas. A link to the Species Action Plan can be found on the Wild Seas Wales website.

INNS name	Impacts	Photo	Additional information
HORIZON SPECIES Chinese mitten crab <i>Eriocheir sinensis</i>	Adults live in freshwater where they make burrows in river and stream banks. This can destabilise banks, lead to increased flooding risk and affect the quality of the water downstream. They can compete for food and space with native species as well as directly predate on native species. They can eat fish eggs at a high rate, potentially impacting designated fish species and restoration projects. They can affect fisheries by damaging nets, killing netted fish, consuming bait & damaging gear. They can clog water intake pipes and other river infrastructure, especially during their mass migration to the sea for mating.	 Photo credit: The Food and Environment Research Agency [via GB NNSS]	Larvae and juveniles can be transported with shellfish (aquaculture) and ballast, hopper and bilge water. Juveniles can live or stowaway in spaces between fouling species on the hulls of boats. Juveniles can stowaway on intermittently submerged equipment (e.g., lines and anchor warp) and survive until they are put back into the water when the equipment is next used (potentially in a new location). For further information see the GB NNSS Risk Assessment and NBN Atlas. A link to the Species Action Plan can be found on the Wild Seas Wales website.

What are the Pathways in the SAC?

Commercial shipping and development

Commercial shipping operations (excluding [commercial fishing which is covered below](#)) and commercial development (coastal and offshore) are recognised as key pathways for the introduction and spread of NNS at all life stages (animals as eggs and in their larval, juvenile and adult life stages, and seaweeds as fragments or spores). In addition to the movement of shipping vessels themselves (e.g., cargo vessels and passenger ferries), other activities which may act as vectors for INNS include:

- Port/harbour operations;
- Vessel services and maintenance;
- Dredging – the collection and movement of sediment or aggregate;
- Construction - includes coastal development and offshore infrastructure (e.g., offshore wind turbines); and
- Maintenance and decommissioning (including part or full removal) of infrastructure.

For more information about commercial shipping and the associated INNS risks, see the Commercial Shipping Pathway Action Plan on the [Wild Seas Wales website](#).

The Pembrokeshire Marine SAC has two commercial port facilities: Pembroke Dock and Milford Haven which experience high levels of commercial vessel activity (see Figure 6 and Figure 7). The function of these ports has grown in line with the expansion and strengthening of trading links with Ireland, the rest of Britain and mainland Europe. Milford Haven is one of the largest and busiest ports in the UK because its natural depth allows it to accommodate large vessels, such as oil tankers and liquefied natural gas carriers, which are essential for importing and transporting hydrocarbons. This strategic capability enables the port to handle a significant portion of the UK's energy imports, making it a critical hub for meeting the country's hydrocarbon needs. Dredging operations, primarily maintenance dredging, are also common within the Milford Haven Waterway, potentially leading to the relocation of INNS from within the Milford Haven waterway to other areas.

The offshore industry in Pembrokeshire is also undergoing significant changes. In particular, a recent £60 million project to redevelop Pembroke Port (owned and operated by Milford Haven Port and located within the Milford Haven Waterway), which includes a new supersized slipway, has created a hub for marine energy, focusing on wind, wave, and tidal power. While outside the SAC, development and maintenance of a proposed

floating windfarm development 40km off the coast of Pembrokeshire will likely increase INNS pathway activity within the SAC in the future.

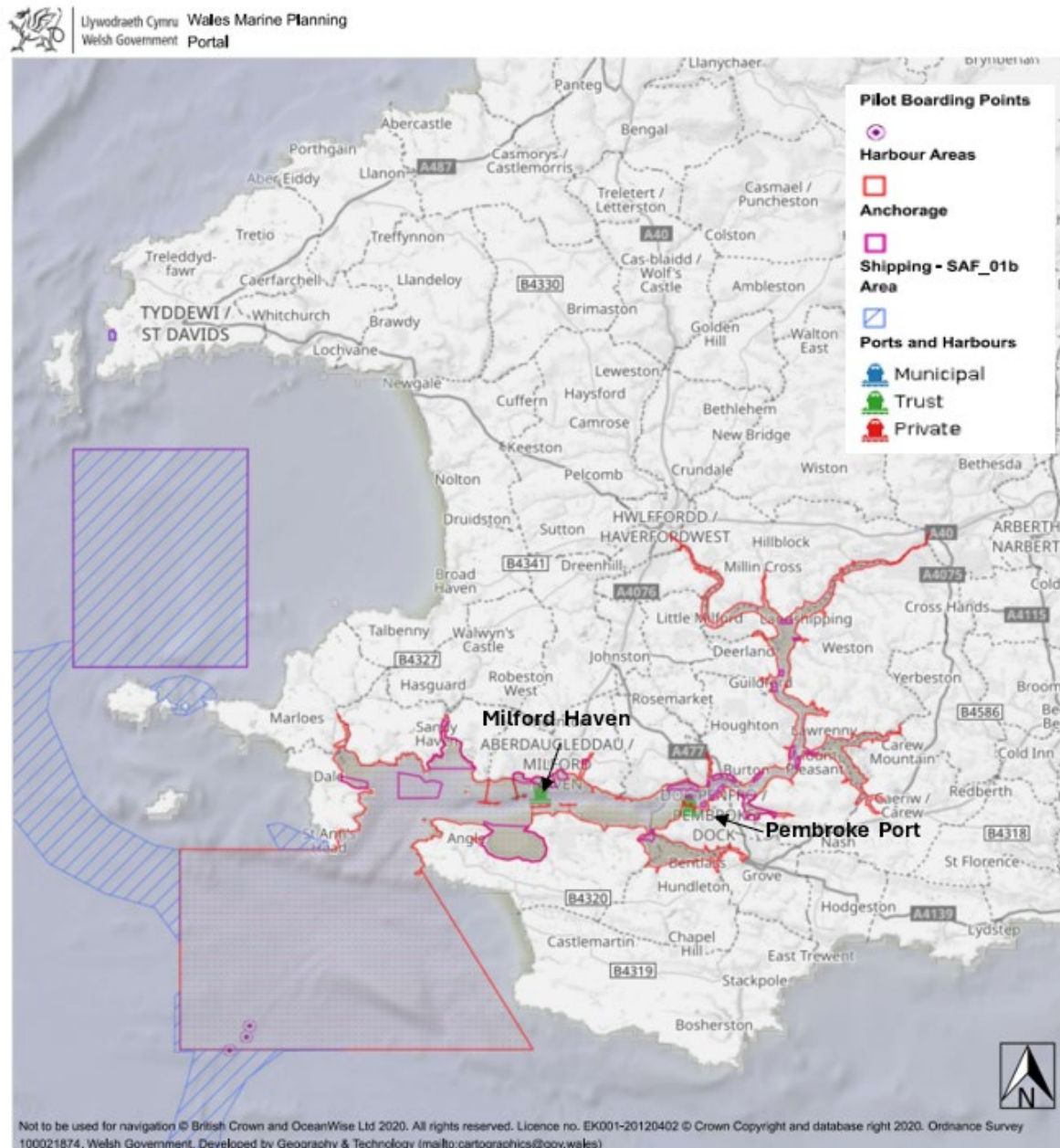


Figure 6. Map showing the port locations, harbour area boundaries, anchorage sites and shipping areas in the Pembrokeshire Marine SAC. Map created using the Wales Marine Planning Portal, February 2025.

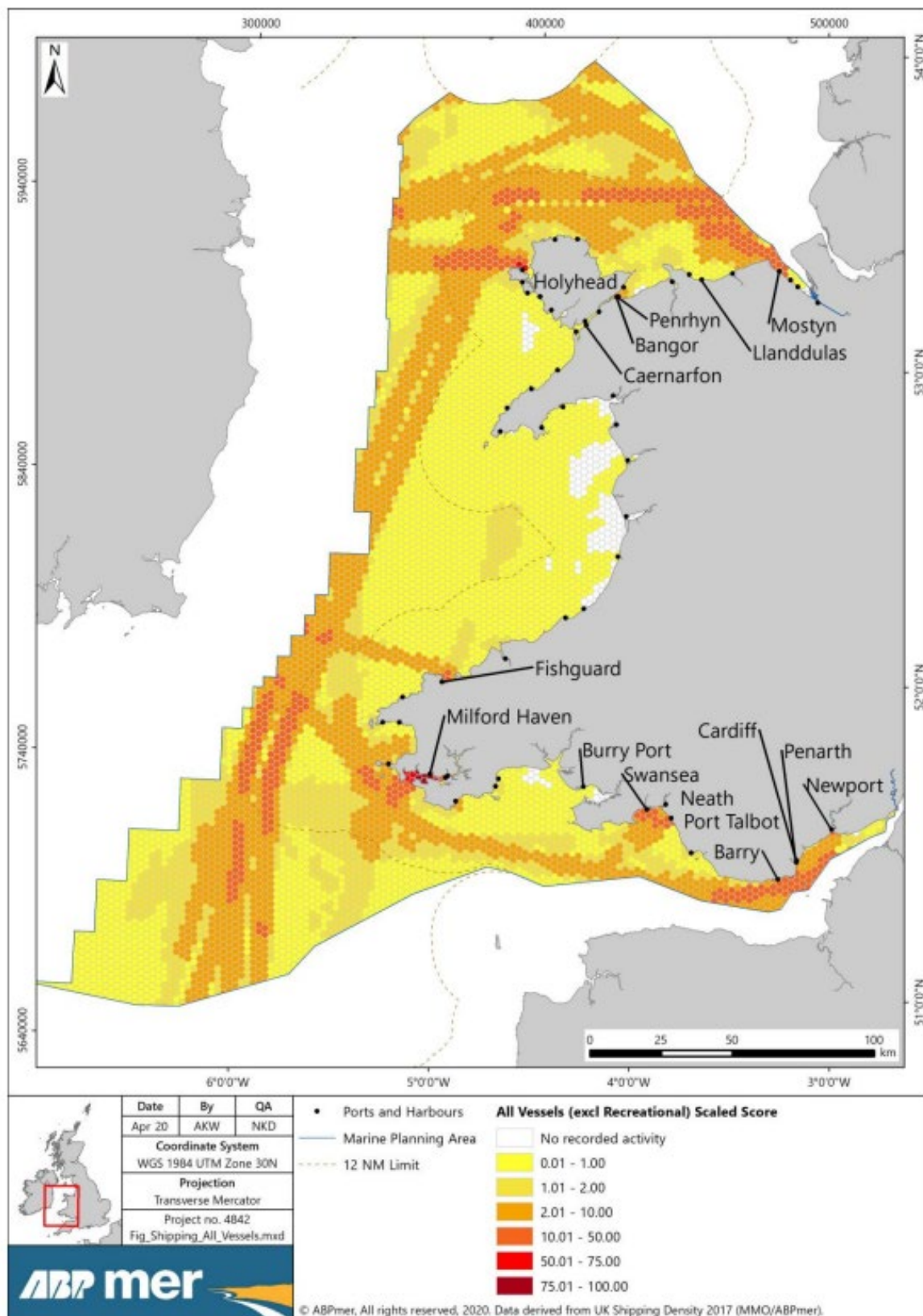


Figure 7. Commercial shipping activity heatmap for Wales. Labels indicate the location of ports and harbours. Taken from NRW report 459 (2020). The map uses combined data from the UK AIS Density Grid 2017 (Marine Management Organisation / ABPmer) and Ports and Harbours of the UK (ports.org.uk/ABPmer).

Commercial Fishing and Aquaculture

Commercial fishing and aquaculture (including shellfish production and harvesting) are key pathways for the introduction and spread of INNS at all life stages (animals as eggs and in their larval, juvenile and adult life stages, and seaweeds as fragments or spores). In some of these stages, the INNS may be microscopic and can survive in damp conditions for long periods of time. As such, INNS may be transferred between locations, especially when multiple fishing grounds are visited within the same few days or weeks. INNS can be transferred via several vectors associated with these pathways, including:

- In or on equipment (e.g., fishing gear such as lines, nets and trawls) and absorbent materials (e.g., nets, clothing and personal protective equipment (PPE));
- Materials moved with stock: equipment, containers, or other materials moved alongside harvested stock may carry INNS;
- Fouling on boats; INNS can be transported via biofouling on the hulls and other submerged parts of fishing vessels;
- Sorting catch while underway; practices such as discarding attached non-target species, potentially contaminated stock and cleaning decks during travel between fishing grounds;
- Live INNS (or dead INNS carrying viable eggs) used as bait, or attached to the bait or used as packaging material for the bait; and
- On shellfish that may have INNS attached to them.

For more information, see the relevant PAP on the [Wild Seas Wales website](#).

The Pembrokeshire Marine SAC is known for oyster and seaweed aquaculture, as well as commercial harvesting of wild shellfish. There is currently one registered shellfish aquaculture operation in the SAC, in the Milford Haven Waterway, and a seaweed aquaculture operation, located near Solva and St Davids in the north of St Bride's Bay. A rope-growing mussel farm is also operational in the Ramsey Sound towards the north of the SAC.

Fin fish, such as mackerel and sea bass, are also targeted by commercial fishers within the SAC. Milford Fish Docks, located in Milford Haven, is Wales's largest fishing port. The dock serves vessels fishing in the Celtic Sea, Irish Sea, Bristol Channel, and further afield and offers landing to both British and international fleets.

Recreational activities

Recreational activities, including recreational boating, angling and water sports, are key pathways for INNS introduction and spread. Animals (as eggs and in their larval, juvenile and adult life stages) and seaweeds (as fragments or spores) can be transferred via several vectors associated with this pathway, including:

- in vessels or watercraft (e.g., in small gaps or water-retaining features);
- attached to (i.e. fouling) vessel hulls or other submerged surfaces such as those associated with the propeller, keel, rudder etc;
- on equipment (e.g., paddles, anchors, fenders, buoyancy aids, nets and SCUBA diving gear);
- live INNS (or dead INNS carrying viable eggs) used as bait, or attached to the bait or used as packaging material for the bait; and
- on clothing (e.g., wetsuits).

Equipment and clothing that is left damp can provide a surface on which INNS can survive for weeks and then be subsequently spread to a new area when it is used again. Additionally, the highly mobile nature of this pathway increases the risk that INNS may be spread. For example, a small dinghy or paddle-craft can be taken out of the water at one location, transported across land (on a trailer or vehicle roof) and then launched at a new location within a short period. For more information, see the relevant Pathway Action Plan on the [Wild Seas Wales website](#).

Within the Pembrokeshire Marine SAC, the occurrence of recreational activity is high, owing in part to the presence of two large marinas: Milford Haven marina and Neyland Marina (see Figure 8). A wide range of water-based recreational activities take place across the SAC throughout the year, in particular, within the Milford Haven Waterway. Most of the activity is seasonal, building from April to August and then declining in September. Sailing is the most common activity. However, motor cruising, water skiing, diving, wind and kite surfing, paddle sports, coasteering, and angling also take place in the SAC. A number of local, regional and national race events take place on the Milford Haven Waterway, many of which are organised by local clubs. Charter boats offering sea angling and pleasure trips also operate within the SAC, with many offering fishing and diving experiences in the Celtic Deep, located 30 miles off the coast of Pembrokeshire, and visits to islands of conservation importance, like Skomer.

The map in Figure 9 shows locations of businesses, centres, infrastructure and clubs that may be associated with recreational activities (as of October 2024). The map also includes boat cleaning and maintenance businesses that may be undertaking work on recreational vessels. The scope and distribution of relevant recreational stakeholders are indicated on the map. It should be noted that this map is not exhaustive.

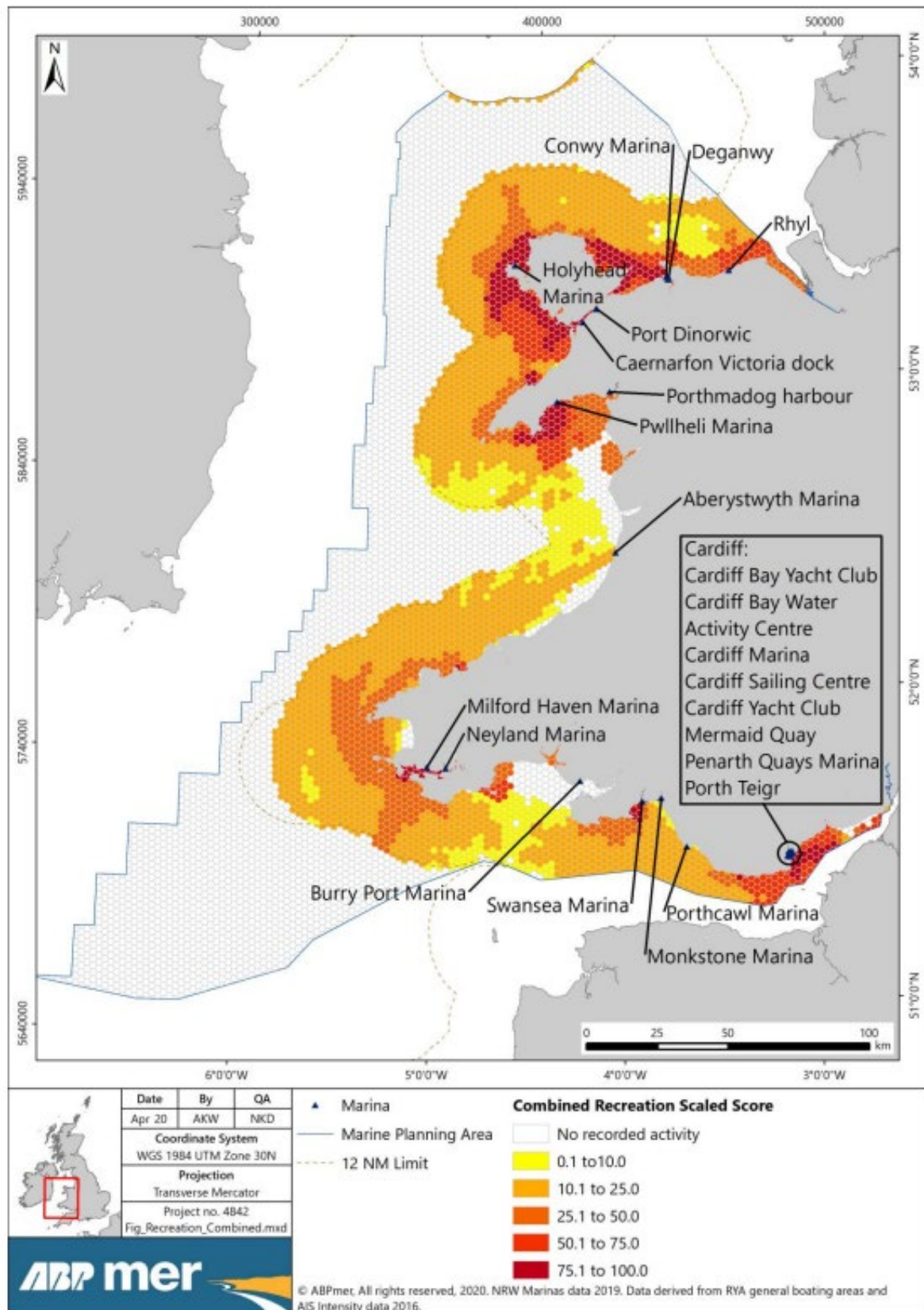


Figure 8. Recreational boating heatmap for Wales. The heatmap uses RYA recreational boating intensity data and the location of general boating areas. Labels indicate the location of marinas. Taken from NRW report 459 (2020).

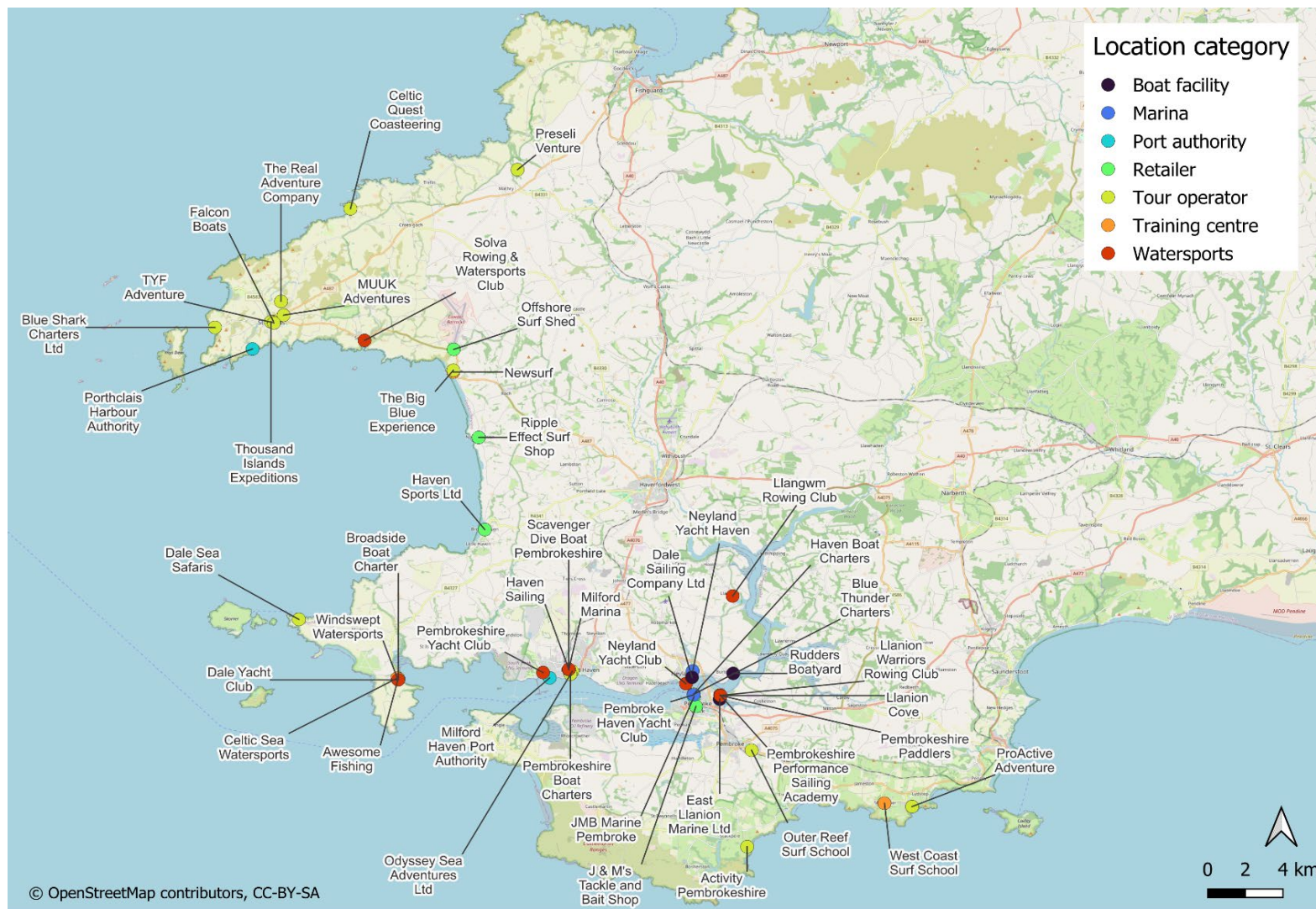


Figure 9. Map showing the locations of businesses, centres, infrastructure and clubs that may be associated with the use of the SAC for recreational purposes. Note that names and locations are accurate as of October 2024 and may be subject to change. The stakeholders shown on the map, while not exhaustive, provide an overview of the scale and breadth of recreational usage and related operations in the SAC.

Additional INNS pathway notes for the Pembrokeshire Marine SAC

Projects to restore native oyster populations and seagrass beds within the Pembrokeshire Marine SAC have been undertaken in the past and more are planned at the time of writing. While these projects will involve activities associated with the introduction and spread of INNS, they are subject to their own biosecurity planning. Biosecurity actions to mitigate risk associated with restoration work are not explicitly included in this plan. See chapter 4 of the European Native Oyster Restoration Handbook for further information: [Native oyster habitat restoration handbook](#).

Marine Biosecurity Action Plan for Pembrokeshire Marine SAC

This plan comprises biosecurity actions categorised according to the three key Biosecurity Focus Areas.

FOCUS AREA 1

Awareness Raising and Engagement

This Focus Area concerns the improvement of INNS and biosecurity awareness through clear and standardised information, effective collaboration, and communication between stakeholders, while ensuring that legal roles and responsibilities are well-defined and widely understood.

Objective: improved understanding of key concerns with respect to INNS, the roles and responsibilities of stakeholders, and the benefit of biosecurity, and enhanced collaboration locally and nationally.

FOCUS AREA 2

Practical Actions

This Focus Area concerns the implementation of robust, practical biosecurity actions, supported by appropriate facilities and guidance on procedures.

Objective: reduced risk of introducing and spreading INNS into and within the SAC through the implementation of practical biosecurity actions.

FOCUS AREA 3

Monitoring and Reporting

This Focus Area concerns the improvement of INNS monitoring and reporting within the SAC, supported by established methods, frameworks and processes.

Objective: a more accurate understanding of INNS presence and distribution, and improved ability to respond quickly to new threats.

Biosecurity Actions for the Pembrokeshire Marine SAC

Simple actions can be undertaken to reduce the risk of introducing and spreading INNS into and within the SAC. These actions often require little resource and equipment but make a huge difference. All stakeholders should consider undertaking biosecurity actions, as these not only contribute to the protection of the Welsh marine environment but will also benefit stakeholders themselves, as they are often the most financially and operationally affected by the impacts of INNS.

Biosecurity actions are often applicable to multiple stakeholders, even if they are undertaking different operations or activities (e.g., the effective cleaning of equipment, whether it is used for aquaculture or for recreation). To help stakeholders identify which actions are applicable to them, stakeholders relevant to the SAC are grouped by sector type (see Table 3). It should be noted that the requirement for practical biosecurity actions by the retail/sales sector is unlikely given that there may be no (or limited) contact with the water. Those in this activity category should focus on [awareness raising](#). Where retail/sales deal with rental or second-hand equipment, Check Clean Dry biosecurity principles should be followed, as outlined in [practical actions](#).

Table 3. This table highlights which stakeholder activity categories fall within each sector type.

Sector type	Stakeholder category
Authority	National and Local Authorities
Governing Bodies & Associations	Governing Bodies & Associations
BAP manager	BAP manager (Natural Resources Wales)
Commercial Operators	• Aquaculture & commercial fishing • Port/ harbour authorities & operators and marina operators / managers • Vessel operator (inc. cargo vessels and passenger ferries) • Energy industry, construction, maintenance and decommissioning • Tour operators • Marine services (e.g., boat maintenance) • Retail / sales
Recreational Clubs	Recreational clubs
Recreational Users	Recreational boaters, paddlers, anglers, sea swimmers, SCUBA divers etc.

Quick Reference Guide



Biosecurity Actions - this Biosecurity Action Plan provides stakeholders operating within the SAC with **a set of optional actions** intended to reduce the spread of INNS into and within the SAC. These actions have been categorised into three key Biosecurity Focus Areas: Awareness Raising and Engagement, Practical Actions, and Monitoring and Reporting.

Biosecurity actions for the Pembrokeshire Marine SAC

Implementation of these actions is supported by information provided in the sections described below.



Best Practice - provides guidance tailored to a specific sector, offering practical steps to effectively implement an action. It focuses on the "how-to" details, breaking down the actions into manageable tasks.



Useful resources and additional guidance: links to external guidance, publications, reports and information resources for INNS.



Appendix

Supporting Information - summarises the concepts, principles, and considerations that underpin the three Biosecurity Focus Areas and the recommended biosecurity actions for the SAC. The supporting Information is split into seven key components and provides stakeholders with additional insights into aspects that can influence the development, modification and implementation of biosecurity actions. The components are aligned with national priorities to provide the foundation for biosecurity planning within the SAC.

Biosecurity Focus Area 1 – Awareness Raising and Engagement

[Component 1: Understanding roles and legal responsibilities](#)

[Component 2: Information and guidance on INNS and biosecurity](#)

[Component 3: Raising awareness](#)

Biosecurity Focus Area 2 – Practical Actions

[Component 4: Biosecurity procedures and processes](#)

[Component 5: Biosecurity facilities](#)

Biosecurity Focus Area 3 – Monitoring and Reporting

[Component 6: Monitoring and reporting](#)

Common Biosecurity Focus Area – Collaborative Working

Collaboration is an important aspect of all three Biosecurity Focus Areas, ensuring that effort is shared, and all stakeholders are supported.

[Component 7: Collaborative Working](#)

Action tables

The biosecurity actions are split into nine tables (4.1 - 4.9), each presenting recommended biosecurity actions under the seven components within the three Focus Areas:

- [Awareness Raising and Engagement](#)
- [Practical Actions](#)
- [Monitoring and Reporting](#)

When implemented, these actions will contribute to the improvement of biosecurity in Welsh seas. The sector type that each action is relevant to is denoted with a Y for yes where the action is relevant, or a N for no, where the action is not relevant. [Best Practice for implementing the biosecurity actions can be found here](#). Supporting information on each of the Focus Area components can be found in the appendix.

It is recommended that the Biosecurity To-Do-List tracker (see [Biosecurity To-Do-List Tracker template](#)) is used alongside Tables 4.1 – 4.9. It is important to remember that all actions are scalable, and it is up to each stakeholder to decide what actions they feel are relevant and appropriate.

Awareness Raising and Engagement Actions

Table 4.1. Biosecurity Actions for Understanding roles and legal responsibilities. [Jump to Best Practice here.](#)

Actions for Understanding roles and legal responsibilities	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Provide up-to-date and accessible legislation information	Y	Y	Y	N	N	N
Disseminate new information on legislation to BAP users	Y	N	Y	N	N	N
Understand how marine INNS legislation and policy could impact your activities	N	N	N	Y	Y	Y
Share information on marine INNS legislation and policy, and organisational responsibilities	Y	Y	Y	Y	Y	Y

Table 4.2. Biosecurity Actions for Information and guidance on marine INNS and biosecurity. [Jump to Best Practice here.](#)

Actions for Information and guidance on marine INNS and biosecurity	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Download/gather relevant marine biosecurity awareness raising material	N	N	Y	Y	Y	Y
Create new marine INNS/ biosecurity awareness raising material	Y	Y	N	N	N	N
Fund and/or support the creation of guidance and training material	Y	Y	N	Y	Y	N
Ensure up-to-date and accessible awareness raising material and resources are available to BAP users	Y	N	Y	N	N	N

Table 4.3. Biosecurity Actions for Raising awareness. [Jump to Best Practice here.](#)

Actions for Raising awareness	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Share the SAC BAP with all contacts within the SAC.	Y	N	Y	Y	Y	Y
Share marine INNS / biosecurity awareness raising material	Y	Y	Y	Y	Y	Y
Post marine INNS and biosecurity content on social media pages	Y	Y	Y	Y	Y	Y
Install signage/ posters	Y	N	Y	Y	Y	N
Provide or take part in training or workshops	Y	Y	N	Y	Y	Y
Run a marine INNS awareness and training course for staff	N	N	Y	Y	N	N
Circulate marine INNS ID guides (digital or printed) and reporting guidance	Y	N	Y	Y	Y	N
Promote marine INNS reporting through iRecord	Y	Y	Y	Y	Y	Y

Table 4.4. Biosecurity Actions for Collaborative working. [Jump to Best Practice here.](#)

Actions for Collaborative working	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Strengthen communication and collaboration with other SAC users	N	N	Y	Y	Y	N
Share knowledge, experience and best practice through new or existing communications networks	Y	Y	Y	Y	Y	Y
Coordinate collaborative working	Y	N	Y	N	N	N

Practical Actions

Table 4.5. Biosecurity Actions for Biosecurity procedures and processes. [Jump to Best Practice here.](#)

Actions for Biosecurity procedures and processes	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Implement biosecurity best-practice	Y	N	N	Y	Y	Y
Appoint a biosecurity champion / manager	N	N	N	Y	Y	N
Set biosecurity rules, codes of conduct, or T&Cs	Y	Y	N	Y	Y	N
Complete a biosecurity To-Do-List or create a site biosecurity plan	Y	N	N	Y	Y	N
Create biosecurity plans for higher risk events	Y	N	N	Y	Y	N
Get more pathway-specific recommendations from the Welsh PAPs	Y	Y	Y	Y	Y	Y

Table 4.6. Biosecurity Actions for Biosecurity facilities and equipment. [Jump to Best Practice here.](#)

Actions for Biosecurity facilities and equipment	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Provide well maintained on-site biosecurity facilities and/ or equipment	Y	N	N	Y	Y	N
Use biosecurity facilities	N	N	N	Y	Y	Y

Table 4.7. Biosecurity Actions for Collaborative working. [Jump to Best Practice here.](#)

Actions for Collaborative working	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Share information on marine biosecurity actions being undertaken	Y	Y	Y	Y	Y	Y
Fund and/or support research into biosecurity measures	Y	Y	N	N	N	N

Monitoring and Reporting Actions

Table 4.8. Biosecurity Actions for Monitoring and reporting. [Jump to Best Practice here.](#)

Actions for Monitoring and reporting	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Ensure users know about marine INNS reporting processes	Y	N	Y	Y	Y	N
Report marine INNS in a timely manner	N	N	Y	Y	Y	Y
Provide updates on priority INNS reports	Y	N	Y	N	N	N
Integrate marine INNS monitoring and inspection into routine activities	Y	N	N	Y	Y	N
Fund and/or support statutory monitoring in the SAC	Y	Y	Y	N	N	N

Table 4.9. Biosecurity Actions for Collaborative working. [Jump to Best Practice here.](#)

Actions for Collaborative working	Authority	Governing bodies and associations	BAP manager	Commercial Operator	Recreational clubs	Recreational users
Support / promote marine INNS report data flow	Y	Y	Y	Y	Y	Y

Biosecurity to-do list

A Biosecurity To-Do-List tracker template has been created ([see the template below](#)). This can be used by stakeholders to log what actions from Table 4 they plan to undertake and track their progress.

Given the diversity of activities represented by the sectors within the SAC, stakeholders are encouraged to adapt their approach or introduce additional actions over time to reduce the risk of introducing and spreading INNS.

- Stakeholders are encouraged to do as much as they can, but they are free to scale/remove/add actions as they wish. This can be based around the perceived risk of their activities and the resources they have available.
- It is not the intention to over burden stakeholders with actions. It is better to take on a few actions and implement them in an effective and sustainable manner than to take on too much.

Implementation and support

It can be difficult, and potentially seem overwhelming, for individual stakeholders to determine which actions may be relevant and practical for them. In such instances stakeholders should first consider the [Best Practice guidance](#) which focus on the "how-to" details of actions.

[Supporting Information](#) is also provided in the appendix for insight on the broader context of biosecurity within the SAC and offers stakeholders additional information into the aspects that can influence the development, modification and implementation of actions.

Stakeholders can contact the Biosecurity Action Plan managers, NRW for advice and support (via invasive.non.native@naturalresourceswales.gov.uk) as well as the SAC Relevant Authorities Group (RAG) (via the [SAC Officer](#)). Although plan managers are willing to support and assist if resources allow, it must be understood that these organisations may have limited capacity. Stakeholders could also use the [PAPs and SAPs](#) for additional specialised recommendations on procedures.

Finally, stakeholders could request assistance from a private environmental / ecological consultancy. This would, however, most likely be a chargeable service, and in practice will not be required for the vast majority of stakeholders.

Stakeholders are encouraged to share their biosecurity To-Do-List tracker, or at least confirm their engagement with SAC biosecurity, with the BAP manager. This will help facilitate coordination, collaboration, and ongoing engagement. Please note that no punitive measures will be applied if actions are not completed.

How will this plan be managed, updated and reviewed?

This Biosecurity Action Plan (BAP) will be managed and maintained by Natural Resources Wales with support from the SAC Relevant Authorities Group. How exactly the plan will be managed will be considered throughout the implementation stage. However, primary responsibilities of those involved in managing the plan would ideally include:

- Maintaining the BAP and making it available to stakeholders.
 - Host the BAP on an accessible online platform, along with the Biosecurity To-Do-List tracker forms and any other relevant resources.
 - Ensure that documents, forms and links are functional.
- Monitoring the implementation of the BAP.
 - Establish basic monitoring protocols to assess the effectiveness and uptake of actions and progress towards the achievement of the biosecurity objectives. For example, biannual or quarterly agenda items at existing stakeholder forum meetings to gather feedback on progress.
 - Maintain a database of stakeholder Biosecurity To-Do-List tracker forms to note who has agreed to do what actions and be able to see this information when reviewing/monitoring implementation the plan.
- Coordinating the review of the BAP.
 - The BAP should be reviewed regularly basis (e.g., annually or biennially) to monitor progress and ensure it continues to be fit for purpose. This can be a “light touch” approach.
 - This review should assess the extent to which the actions have been implemented, the success of the actions and where improvements can be made. It should also include checking that relevant links within the plan are up-to-date and functional. Stakeholder lists and key INNS relevant to the SAC should be updated to ensure that the plan best reflects the current situation in the SAC.

Potential additional actions, dependent on resource and funding, include:

- Undertaking continued stakeholder engagement activities to increase uptake and awareness of INNS and biosecurity;
- Conducting training sessions for stakeholders to improve INNS awareness and engagement with this plan;
- Maintaining communications with all identified stakeholders for the SAC;
- Issuing regular INNS and biosecurity updates through, at a minimum, email;
- Taking efforts to ensure that stakeholders are given access to all approved resources and relevant, identified opportunities (e.g., for training or funding etc.); and
- Signposting potential funding sources.

Management of the plan and the implementation of the above recommendations are resource dependent, requiring adequate funding, staffing and technical expertise to ensure effective delivery and long-term sustainability of the actions suggested.

Best Practice for implementing Biosecurity Actions

The following sections provide additional guidance on the implementation and development of actions. This guidance is arranged by the three Biosecurity Focus Areas and provides best practice guidance for the implementation of each individual action presented in [Table 4](#).

[Biosecurity Focus Area 1 – Awareness Raising and Engagement](#)

[Biosecurity Focus Area 2 – Practical Actions](#)

[Biosecurity Focus Area 3 – Monitoring and Reporting](#)

Best practice that is specific to activities or sectors is clearly signposted; however, please note that some practices/actions are universally applicable across all sectors.

While users of this plan may choose to read the best practice guidance in full, the [action tables](#) provides direct links to specific best practice guidance sections for the seven components – it is encouraged that users navigate the best practice guidance in this way.

Alongside this guidance and the [supporting information](#) in the appendix, a series of Pathway Action Plans (PAPs) and Species Action Plans (SAPs) have also been produced for priority marine pathways and INNS for Wales:

Pathway Action Plans – provide more detailed advice for prioritised introduction pathways for Welsh Marine areas. Stakeholders seeking specific, specialised advice on individual pathways should consider accessing the relevant PAP which can be found on the [Wild Seas Wales website](#).



[Recreational Boating \(small boats\)](#)

[Recreational Boating \(large boats\)](#)

[Recreational Activities](#)

[Commercial Shipping](#)

[Shore-based Fishing](#)

[Boat-based Fishing](#)

[Aquaculture](#)

Species Action Plans – provide more detailed advice for prioritised Marine INNS for Wales. Stakeholders seeking specific, specialised advice on individual INNS should consider accessing the relevant SAP which can be found on the [Wild Seas Wales website](#).



[American slipper limpet, *Crepidula fornicata*](#)

[Chinese mitten crab, *Eriocheir sinensis*](#)

[Carpet sea squirt, *Didemnum vexillum*](#)

[Trumpet tubeworm, *Ficopomatus enigmaticus*](#)

[American oyster drill, *Urosalpinx cinerea* & Japanese oyster drill,](#)

[Ocenebrellus inornatus](#)

Focus Area 1 - Awareness raising and Engagement

Component 1: Understanding legal roles and responsibilities

Provide up-to-date and accessible legislation information

- ✓ Provide up-to-date and accessible legislation information. This information should include the policy(s) for relevant regulation(s) and what is expected of stakeholders under the policy.
- ✓ Produce clear and informative press releases to inform people (e.g., members or the general public) of their biosecurity responsibilities.
- ✓ Share legislation information on accessible and searchable webpages that are relevant to stakeholders and sectors, for example, websites for:
 - Welsh government and Natural Resources Wales;
 - Local authorities;
 - National governing bodies; or
 - Trade associations.

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Disseminate new information on legislation to BAP users

- ✓ Disseminate any new information on legislation to BAP users through existing groups, communication channels and awareness-raising platforms. This could be approached through:
 - harbour information, safety updates and tide timetables;
 - newsletters, emails and social media; and
 - licencing information etc.

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Understand how marine INNS legislation and policy could impact your activities

- ✓ Make yourself aware of the relevant laws for you and your activity. The GB NNSS has outlined the relevant [INNS legislation for England and Wales](#). Links to relevant laws can also be found in [Useful resources](#).
- ✓ In Wales, boats with visible or heavy fouling should be lifted or trailered out of the water and taken to a suitable location for cleaning. This should be a contained area of hard-standing ground with appropriate drainage, above the high-tide line. This is relevant for both commercial and recreational stakeholders.
- ✓ For commercial operators, you must ensure that you know your legal responsibilities when it comes to INNS. If you are unsure, you should get in touch with a representative from NRW:
invasive.non.native@naturalresourceswales.gov.uk

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Focus Area 1: Awareness Raising and Engagement

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Share information on marine INNS legislation and policy, and organisational responsibilities

- ✓ Promote clear guidance on legal responsibilities for marine users
- ✓ For commercial operations, make staff aware of the legal responsibilities of the wider company as well as their own. Communicate this through multiple ways e.g., employee handbooks, emails, training / induction and signage.
- ✓ For commercial and recreational activities, include one of the following summaries of the Wildlife and Countryside Act (as appropriate) on awareness-raising material or in club / company policy documents (e.g., Codes of Conduct):

“Don’t release or allow the escape of any species (plant or animal) into the wild that is not ordinarily resident (i.e., a non-native species) or is on the [Wildlife and Countryside Act Schedule 9 list](#).

Schedule 9 lists non-native species that are already established in the wild, but which continue to pose a conservation threat to native biodiversity and habitats, such that further releases should be regulated.

Don’t buy or sell any species on the [Wildlife and Countryside Act 1981 Schedule 9 list](#). In the marine environment this includes the Chinese mitten crab, the American oyster drill and the American slipper limpet.”

or

“You must not release or allow the escape into the wild a species that does not ordinarily live here.”

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Focus Area 1: Awareness Raising and Engagement

Component 2: Information and guidance on INNS and biosecurity

Download/gather relevant marine biosecurity awareness raising material

- ✓ Download material that is relevant to your activity. Using existing materials can help to ensure consistency of messaging. Existing resources include:
 - [The Great Britain Non-native Species Secretariat \(GBNNSS\)](#)
 - With [specific marine biosecurity guidance here](#)
 - GB NNSS [awareness-raising materials](#)
 - The [Check Clean Dry campaign](#) from the GB NNSS has free resources, including guidance for [marine anglers](#) and [marine boating](#)
 - [The Green Blue project](#) (Royal Yachting Association)
 - [The Green Blue / RYA information video](#)
 - [GloFouling poster on biofouling for recreational boating](#)
 - [Paddle UK](#) advice on cleaning watercraft
 - [The Angling Trust](#) information on INNS
 - [International Maritime Organisation](#) information on biofouling
 - Natural Resources Wales have developed marine INNS identification guides in English and Welsh. These guides are available to download using the following links. Printed versions (waterproof) can also be requested from NRW.
 - [NRW Marine INNS ID Guide - English](#)
 - [NRW Marine INNS ID Guide - Welsh](#)
 - The [Pembrokeshire Marine SAC website](#) has educational resources and information on broader environmental aspects of the SAC.
 - Further information may be requested by contacting the SAC officer at SACofficer@PembrokeshireMarineSAC.org.uk
 - Use the information in this document!
- ✓ Periodically check for updates to biosecurity guidance from governing bodies and authorities.

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Create new marine INNS/ biosecurity awareness raising material

- ✓ Create new awareness-raising material, ensuring it is tailored to the SAC and the appropriate sectors, and, where possible, standardised with other materials. You might want to consider the following:
 - What is your focus? Are you trying to raise awareness about a particular species or putting together specific guidance for your sector or a particular activity?
 - It is important that the information in your material is accurate.
 - Make it clear what biosecurity action is expected and the consequences of not achieving this. For example, emphasise that not

removing fouling on vessel hulls can increase the risk of INNS spread, fuel consumption and maintenance costs.

- ☐ As well as text, include photos and images to engage your audience, provide some context and help with species recognition/identification. If the focus is INNS awareness, you could highlight 2 or 3 high-risk species that are relevant (or particularly impactful) for your sector.
- ✓ Collaborate with key stakeholder groups to ensure accessible and engaging guidance and information is produced.
- ✓ Develop or promote a preferred set of standard INNS and biosecurity training materials, targeting the different stakeholder groups, and referencing the approach for biosecurity in the SAC.
 - ☐ For example, a short slide-pack for commercial operators to use during staff induction/on-boarding, or for tour guides to deliver to clients during charters.

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Fund and/or support the creation of guidance and training material

- ✓ Fund and/or assist in the creation of guidance and training material to support effective biosecurity. This could include sector-specific guidelines and procedures.
 - ☐ For example, updated guidance material on boat cleaning best practice could be developed in collaboration with vessel manufacturers and shared with, for example, affiliated clubs/members.

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Ensure up-to-date and accessible awareness raising material and resources are available to BAP users

- ✓ Ensure that BAP users receive up-to-date and accessible awareness raising material and resources on INNS and biosecurity. This should include a marine INNS priority list and alerts of new INNS reported in Wales.

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Focus Area 1: Awareness Raising and Engagement

Component 3: Raising awareness

Share the SAC BAP

- ✓ Share this Pembrokeshire Marine SAC Biosecurity Action Plan with all contacts within the SAC. This can include other users in your sector as well as the wider public.

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Share marine INNS / biosecurity awareness raising material

- ✓ Share INNS and biosecurity awareness raising material with staff, members, or clients.
- ✓ Share information and guidance in multiple ways, styles and locations to aid accessibility and target both specific audiences and the wider public, including via:
 - ☐ company / department communications and in meetings,
 - ☐ harbour information,
 - ☐ safety updates,
 - ☐ interactive materials,
 - ☐ tide timetables,
 - ☐ magazines,
 - ☐ newsletters,
 - ☐ radio messaging,
 - ☐ social media (e.g., Facebook and WhatsApp groups),
 - ☐ TV reports,
 - ☐ licencing information,
 - ☐ club emails and
 - ☐ local talks.
- ✓ Link with and make use of existing groups, communication channels and awareness-raising platforms where possible.

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Post marine INNS and biosecurity content on social media pages

- ✓ Post marine INNS and biosecurity content on social media pages on a regular basis (e.g., every month) and daily during [Invasive Species Week](#), which occurs in June each year.

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Focus Area 1: Awareness Raising and Engagement

- ✓ Engage with the public through social media and established “influencer” accounts, in particular, those associated with recreational activities/watersports.

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Install signage / posters

- ✓ Put up signs and/or posters. Use existing signage material if appropriate, e.g., [Check Clean Dry](#) signage from the GB NNSS. Signage could include the following information:
 - Specific INNS to look out for;
 - The impacts of INNS to the ecosystem or to operations;
 - How INNS are spread through activity(ies)
 - How to report an INNS; and
 - Biosecurity best practice.
- ✓ Place signage appropriately to target the activity, users or location relevant to the information and guidance on the sign, e.g., at slipways, car parks, shops, notice boards, public facilities or cleaning stations (with the landowner's permission).
- ✓ For commercial operations, put up signage in mess rooms/cafeterias, kit rooms and in relevant operational areas outlining biosecurity procedures and key INNS.
- ✓ For recreational clubs, put up signage in clubhouses (e.g., on noticeboards, in dry rooms or the back of toilet cubicle doors).
- ✓ Help spread awareness to tourists/visitors by putting signs at pontoons for visiting vessels, ferry departure/arrival areas, and information centres.
- ✓ Put up the Green Blue “How Green is my Dinghy” poster at, for example, a managed slipway or boat store.
 - N.B. Coastal biosecurity signage toolkits can be ordered for free from [The Green Blue](#).

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Provide or take part in training or workshops

- ✓ Provide or take part in training, talks or workshops. Reach out to local ecological groups or charities to organise talks or workshops about INNS and biosecurity. Resources for marine biosecurity presentations can be found on the [GB NNSS website](#).
- ✓ Develop or promote a preferred set of standard INNS and biosecurity training materials, targeting the different stakeholder groups, and referencing the approach for biosecurity in the SAC.

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- For example, a short slide-pack for commercial operators to use during staff induction/on-boarding, or for tour guides to deliver to clients during charters.
- ✓ For authorities, train officers/rangers/etc. to provide best practice advice and act as a point of contact for INNS questions and issues from stakeholders.
- ✓ For recreational clubs, invite a speaker to give a talk about INNS and biosecurity at an evening club event, e.g., a representative from Natural Resources Wales or the Wildlife Trust.
- ✓ Include information about INNS and biosecurity during inductions for new club/group members or employees.
- ✓ Use existing training resources, including:
 - [GB NNSS Biosecurity eLearning](#)
 - [Interactive training, Gather](#), for recreational boating and paddling organisations, marina operators and water sport centres.
 - An INNS kit has been developed and can be borrowed by anyone who is running a supervised workshop for adults as a way to train recorders looking out for INNS (see [Useful Resources](#)).

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Run a marine INNS awareness and training course for staff

- ✓ Include information on INNS, biosecurity best-practice, procedures for inspections and reporting in, for example, mandatory staff training (e.g., induction training or “Toolbox Talks”), and conduct a dedicated INNS awareness course for new staff covering:
 - introduction to INNS and impacts;
 - how INNS are spread;
 - biosecurity procedures;
 - ID guides and basic monitoring; and
 - how to report sightings.

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Circulate marine INNS ID guides (digital or printed) and reporting guidance

- ✓ Circulate marine INNS ID guides (digital or printed), along with details on how to report an INNS sighting. These details should include what information should be recorded when reporting a sighting, including:
 - Taking photos from multiple angles and close up
 - Recording the date, time and location (ideally use GPS co-ordinates)

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- ☐ Noting any additional information (e.g., abundance, habitat type, sex, is it dead or alive)
- ✓ Download or share guides using the following links. Printed versions (waterproof) can also be requested from NRW.
 - ☐ [NRW Marine INNS ID Guide - English](#)
 - ☐ [NRW Marine INNS ID Guide - Welsh](#)

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Promote marine INNS reporting through iRecord

- ✓ Promote the use of the iRecord platform and app to report sightings to marine users and stakeholders. Consider adding a link or logo for iRecord into emails or websites. Share the following link:
 - ☐ **iRecord:** <https://irecord.org.uk/>



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Focus Area 2 - Practical Actions

Component 4: Biosecurity procedures and processes

Implement biosecurity best-practice

Best practice for authorities

- ✓ Develop standardised sector-specific guidance for commercial operators outlining recommended standard operating procedures (SOPs) and include these SOPs or biosecurity best practice in public information.
- ✓ Field workers operating on behalf of authorities should ensure that equipment and clothing are cleaned and dried before they are brought into, used in, and moved off site.

Best practice for Commercial Operators

This section covers best-practice guidance for aquaculture operators, commercial fishers, vessel operators (inc. cargo vessels and passenger ferries), port/harbour authorities and operators, marina operators, marine services (such as boat maintenance), retail/sales, tour operators and energy industry construction, maintenance and decommissioning. For further information on additional actions please also refer to the appropriate [Pathway Action Plan](#) for your activity.

Best practice for aquaculture (site operators and personnel):

- ✓ Ensure that cages, trestles and other aquaculture equipment are regularly checked for fouling and cleaned appropriately.
- ✓ Provide equipment (including PPE) to be used and stay on site where possible
- ✓ Check aquaculture stock prior to movement onto or off site for contamination or signs of disease, and quarantine stock prior to introduction.
- ✓ Remove unused equipment and surplus/failed stock from the water.
- ✓ Remove submerged equipment from the water, and ensure it is thoroughly cleaned and dried before relocating to a new site / location.
- ✓ Use or explore the use of rotating containers (ortacs) or bags that can be turned by hand (for oyster cultivation) to reduce the risk of fouling INNS settling.

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Best practice for commercial fishers:

- ✓ Refrain from using non-native species as bait.
- ✓ Avoid discarding unwanted catch back into the ocean away from where it was caught (e.g. cleaning decks while underway). If it is suspected that an INNS is within the unwanted catch – dispose of it appropriately on land.
- ✓ Ensure that nets, broken pots or other debris are not discarded or left in the water as this can facilitate the transport of INNS. Dispose of this equipment appropriately on land.
- ✓ Wash down equipment into the same water body or wash down well away from the water's edge. For example, if you haul and clean your creels either wash them down in the area they have been hauled from or onshore away from the water's edge where no residues can return to the sea.
- ✓ Use either a waste-capture washdown facility when your boat is hauled out or wash your boat as far away from the water's edge as you can, well above the high-water line, and make sure wastewater and debris does not enter back into the sea.

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Best practice for vessel operators:

- ✓ Adhere to Ballast water regulations as outlined in the [Merchant Shipping \(Control and Management of Ships' Ballast Water and Sediments\) Regulations 2022](#).
- ✓ Adhere to [International Maritime Organisation \(IMO\) biofouling guidelines](#).
- ✓ Ensure that antifouling treatment on vessel hulls and submerged surfaces is maintained and renewed as appropriate, adhering to [Merchant Shipping \(Anti-Fouling Systems\) Regulations 2024](#).
- ✓ Check vessel fouling regularly and remove as necessary, ensuring that debris is collected and does not re-enter the water.

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Best practice for port authorities and operators:

- ✓ Remove any unused structures and equipment from the water (e.g., buoys, ropes, fenders, warps, moorings and any derelict infrastructure).
- ✓ Ensure that antifouling treatment is maintained on submerged infrastructure where appropriate.
- ✓ Clean and dry infrastructure and equipment before they are introduced into, moved within, or moved off site. This is especially important when infrastructure is moved between locations (i.e. it is not new).

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Best practice for marina operators / managers:

- ✓ Clean and dry infrastructure and equipment before it is introduced into, moved within, or moved off, site. This is especially when infrastructure is moved between locations (i.e. it is not new).
- ✓ Remove any unused equipment from the water (e.g., buoys, ropes and moorings).
- ✓ Check infrastructure for biofouling regularly and clean or remove when necessary. If possible, clean removeable structures and equipment (e.g., floating pontoons and mooring buoys) on land, ensuring that debris does not re-enter the water.
- ✓ Encourage users to check and clean their boats and equipment when entering and leaving the site. This could be emphasised by a 'clean boat' policy which outlines permitted biofouling levels and provides guidance on how to follow the policy.
- ✓ Provide or promote existing biosecurity stations/cleaning facilities. Wastewater and debris should be collected and not re-enter the water when cleaning. Instructions on their use should be included in member/ boating policy information packs.

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Best practice for marine services (such as boat maintenance):

- ✓ In Wales, boats with visible or heavy fouling should be lifted or trailered out of the water and taken to a suitable location for cleaning. This should ideally be a contained area of hard-standing ground with appropriate drainage, above the high-tide line.
- ✓ A suitable waste-capture facility should be used for boat cleaning. If this isn't available, wash boats as far away from the water's edge as you can, ideally on a contained area of hard standing ground, well above the extreme high-water line, and make sure wastewater and debris do not enter back into the sea. This material

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and water might not only contain flakes of anti-fouling paint that could harm local ecosystems but also INNS that may be able to re-establish populations if they re-enter the water.

- ✓ Remove any unused structures and equipment from the water (e.g., buoys, ropes, fenders, warps, moorings and any derelict infrastructure).
- ✓ Ensure that antifouling treatment is maintained on boats and submerged infrastructure where appropriate.
- ✓ Clean and dry equipment before reintroduction into water

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Best practice for retail/sales:

- ✓ Provide and promote best practice biosecurity actions to customers and members
 - e.g., encourage to Check, Clean, Dry equipment, install signage and provide leaflets in store, add awareness information to website and communications.

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Best practice for tour operators:

- ✓ Check boats regularly for fouling on immersed surfaces (e.g., on the hull) and debris or standing water on board (e.g., in anchor lockers).
- ✓ Ensure boats have antifouling treatment or are cleaned regularly enough that fouling is kept to just a slime layer. Biosecurity/cleaning facilities should be used where possible. When cleaning, wastewater and debris should be collected, if possible, so they do not re-enter the water.
- ✓ Check ropes, warp and chains for any animals, plants or debris when hauling anchor and clean them off before equipment is stored. If possible, wash down the anchor warp (ideally with freshwater) before storing.
- ✓ If hosting recreational activities such as angling or diving trips, follow and promote best practice guidance for these users as described in the [Recreational Users section](#).

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Best practice for energy industry, construction, maintenance and decommissioning:

- ✓ Ensure that antifouling treatment on vessel hulls and submerged infrastructure and surfaces is maintained and renewed as appropriate, adhering to [Merchant Shipping \(Anti-Fouling Systems\) Regulations 2024](#).
- ✓ Check infrastructure and work boats for biofouling regularly and clean or remove them from the water when necessary. If possible, clean removable structures and equipment on land, ensuring that wastewater and debris does not re-enter the water.
- ✓ Remove any unused structures and equipment from the water (e.g., buoys, ropes, fenders, warps, moorings and any derelict infrastructure).
- ✓ Clean and dry infrastructure and equipment before they are introduced into, moved within, or moved off site. This is especially important when infrastructure is moved between locations (i.e. it is not new).
- ✓ Expose to fresh water. Make the most of any natural flows of freshwater into your site. Expose INNS to fresh water through immersion or wash down.

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Best practice for Recreational Clubs and Users

This section covers guidance for groups, clubs or individuals undertaking recreational boating, paddling, angling, sea swimming, scuba diving or other watersports. All recreational users should **Check, Clean and Dry** equipment, boats and clothing after use.

CHECK	Check your equipment, boat and clothing after leaving the water for animals, plants and other debris. Remove anything you find and leave it at the site.
CLEAN	Clean everything thoroughly as soon as you can, paying attention to areas that are damp or hard to access. Use specific cleaning stations, if available. Do not let wastewater or debris re-enter the water.
DRY	Dry everything for as long as you can before using elsewhere – some invasive species can survive over two weeks in damp conditions.

Recreational clubs should:

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- ✓ Encourage members to undertake biosecurity best-practice (e.g., check, clean and dry their equipment and clothing (including PPE)) at the start and end of their activity.

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Recreational boaters should:

- ✓ Check boats regularly for fouling on immersed surfaces (e.g., on the hull) and organic debris or standing water on board (e.g., in anchor lockers).
- ✓ Ensure boats have antifouling treatment or are cleaned regularly enough that fouling is kept to just a slime layer.
- ✓ Check ropes, warp and chains for any animals, plants or debris when hauling anchor and clean (with freshwater if possible) and dry before storing.

Best practice for boat cleaning:

- ✓ In Wales, boats with visible or heavy fouling should be lifted or trailered out of the water and taken to a suitable location for cleaning. This should ideally be a contained area of hard-standing ground with appropriate drainage, above the high-tide line.
- ✓ The material that is cleaned off the boat, and the water used to clean it off with, should not be allowed to go back into the sea. This material and water might not only contain flakes of anti-fouling paint that could harm local ecosystems but also INNS that may be able to re-establish populations if they re-enter the water.
- ✓ The [Green Blue](#) has compiled a list of UK marinas, harbour and boatyards that provide “environmental facilities”, including pump-out facilities and filtered boat washdown systems.
- ✓ Regular maintenance, including the appropriate application of antifouling, is key to preventing the build-up of biofouling. Resources on biofouling management have been developed by:
 - [Check, Clean, Dry Campaign](#)
 - [The Green Blue project](#)
 - [International Maritime Organisation](#)
- ✓ Detailed guidance is also included in the Recreational Boating Pathway Action Plan for Great Britain ([Sections 4 -10](#)).

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Best practice for paddlers:

- ✓ Ensure that paddleboards, kayaks, surfboards or other watersports equipment are free of organic debris and that any standing water (e.g., in crevices) is drained and dried. Use a towel or sponge to dry surfaces thoroughly.
- ✓ Wash and dry additional equipment (e.g., buoyancy aids, dry bags etc.).
- ✓ Information resources on best practice have been developed by [Paddle UK](#)
- ✓ If equipment is being used abroad, ensure that it is clean and dry before travelling out of the SAC and before bringing it back into the SAC.

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Best practice for anglers:

- ✓ Refrain from using non-native species as bait.
- ✓ Ensure that all equipment and clothing is cleaned and dried before and after use.
- ✓ If equipment is being used abroad, ensure that it is clean and dry before travelling out of the SAC and before bringing it back into the SAC.

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Best practice for sea swimmers and SCUBA divers:

- ✓ Ensure that wetsuits, clothing and equipment (including BCDs, weight belts and regulators) are checked and cleaned (and dried if possible) before next use.
- ✓ If visiting more than one area in a short period of time, use spare, dry clothing and equipment, in the second area, if possible. If this is not possible, check and clean clothing and equipment before leaving an area, ensuring that any animal/plant material is kept at that site and not moved to the next area.
- ✓ Clean any kit, equipment and clothing (including PPE), preferably with freshwater, paying attention to water-retaining or hard-to-access areas.
- ✓ Dry equipment and clothing for as long as possible between uses.

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Appoint a Biosecurity champion / manager

- ✓ A biosecurity manager/champion role could be created, or specific biosecurity actions could be appended to a existing role, e.g., an environmental manager.
- ✓ The role of biosecurity champion or manager does not need to be onerous or time-consuming but should ensure that biosecurity procedures are communicated, understood and performed correctly. They could undertake some of the following tasks:
 - Organise training, workshops or talks with local organisations or INNS experts.
 - Check that any biosecurity facilities are being used correctly and maintained. If needed, provide protocols for use.
 - Lead the creation of sector-, site- or event-specific biosecurity action plans, codes of conduct and terms and conditions for site use for users, new staff and visitors where appropriate to ensure good practices are followed. Action and progress may be facilitated by using a [Biosecurity To-Do-List](#).
 - Create specific biosecurity plans for high-risk events e.g., regattas, water-based races where attendees bring equipment from different locations, or for maintenance and construction work.
- ✓ It should be ensured by persons/bodies overseeing an operation or activity that the biosecurity manager, or the person taking on the biosecurity role, has sufficient resources and training to undertake their actions.

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Set biosecurity rules, codes of conduct, or T&Cs

- ✓ Include biosecurity clauses in T&Cs for site use and ensure that non-resident vessels (i.e., visiting vessels) in particular, are made aware of site requirements. If possible, check that visiting vessels are clean when entering your site or are promptly removed for cleaning at dedicated biosecurity washdowns.
- ✓ Encourage users to check and clean their boats and equipment when entering and leaving the site. This could be emphasized by a 'clean boat' policy which outlines permitted biofouling levels and provides guidance on how to follow the policy.
- ✓ For commercial operators, include clauses in contracts for employees and external contractors.
- ✓ For recreational clubs, include biosecurity and cleaning clauses and guidance in T&Cs for club membership. An example could be:

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‘Our Club can contribute to protecting the marine ecosystem from the threats of INNS. Our actions do not need to be costly or burdensome to affect meaningful change. ‘

Our Club expects members to:

- 1. Follow the principles of Check Clean Dry.*
- 2. Take the initiative to improve their understanding of INNS and biosecurity.*
- 3. The Club will signpost courses, training and interesting material where possible.*
- 4. Promote and share awareness of INNS and biosecurity best practice between members.*
- 5. Report any suspected INNS sightings by submitting records to iRecord.*
- 6. Comply with all regulations and guidelines issued by the relevant authority.*

- ✓ Site managers (such as Ports, harbours and marinas) could include a clean boat policy in their T&C's:
 - A clean boat policy outlines a maximum amount of hull fouling that is permitted for a vessel entering the site (unless immediately being removed from the water for cleaning) or the maximum amount of hull fouling allowed to accumulate on a vessel moored at the site before the vessel must be cleaned.
 - They can be included, for example, in the Terms and Conditions for mooring, membership conditions for yacht clubs or mooring rental agreements.
 - The [GB Recreational Boating PAP](#) includes the following biosecurity clause example which can be added in to berthing terms and conditions:

“You must ensure the vessel is free of hull fouling before it is placed into the Berth [or mooring] and while it is kept there.

If Hull fouling is present, you must lift and clean the vessel, preventing any removed material from re-entering the water. You must inform the company and agree a timescale over which to clear the vessel. If the vessel is not cleaned within this time, the Company reserves the right to lift and clean the vessel at your expense.”
 - Ensure that the terms of any clean-boat policies are publicly accessible and made clear to any visiting vessels prior to their entry.

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Complete a biosecurity To-Do-List or create an INNS biosecurity plan

- ✓ Complete a biosecurity To-Do-List tracker (see the template [below](#)).
- ✓ Consider developing and implementing a dedicated biosecurity plan for the site which includes the following:
 - Biosecurity requirements and protocols for staff, members or 3rd party contractors;
 - Monitoring programmes (including locations, timeframes and methods);
 - Rapid Response Procedures and Contingency Plans for priority/alert species sightings and the occurrence of high-risk events (e.g., the arrival of a heavily fouled vessel).
- ✓ Look at guidance for writing a biosecurity plan on the [GB NNSS website](#).
- ✓ Aim to review your biosecurity plans regularly and assess how well the actions/measures within it are being implemented. Consider whether it needs to be revised or updated. There may be some advice from the BAP manager or authorities on this.

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Create biosecurity plans for higher risk events

- ✓ Recreational events, like triathlons or regattas, pose a heightened risk. Consider what additional biosecurity measures might be needed for these events. Guidance for event biosecurity can be found on the [GB NNSS website](#).
- ✓ Consider the following:
 - Include INNS and biosecurity information (and cleaning guidance) in pre-event materials so participants are aware of requirements in advance. Where available, use resources from the relevant governing bodies and authorities to ensure consistent messaging.
 - Ensure that all participants have clean equipment/boats before entering the water and that they are cleaned when removed from the water. This should be in the conditions of participation.
 - Provide adequate facilities and apparatus for cleaning (e.g., mobile washdown) to accommodate the number of participants.
 - Invite a representative from a statutory body (e.g., Natural Resources Wales) or an environmental charity (e.g., the Wildlife Trust) to provide information about INNS and biosecurity during the event.
- ✓ Construction, maintenance or other similar works could be viewed as “events” and may pose an increased risk of introducing or spreading INNS. As such, care should be taken to ensure that risks are assessed, and robust biosecurity is undertaken. If the activity requires a marine licence this will most likely include a [biosecurity risk assessment and management plan](#).

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Get more pathway-specific recommendations from the Welsh PAPs

- ✓ The Pathway Action Plans provide more detailed advice for prioritised introduction pathways for Welsh Marine areas. For more detailed, pathway-specific recommendations, the links to the PAPs listed below can be found on the [Wild Seas Wales website](#).
 - [Recreational Boating \(small boats\)](#)
 - [Recreational Boating \(large boats\)](#)
 - [Recreational Activities](#)
 - [Commercial Shipping](#)
 - [Shore-based Fishing](#)
 - [Boat-based Fishing](#)
 - [Aquaculture](#)

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Component 5: Biosecurity facilities

Provide well maintained on-site biosecurity facilities and/ or equipment

To note, it is difficult to provide a one-size-fits-all recommendation for biosecurity facilities without knowledge of a specific site. However, the GBNNSS provides good background information and a [\(recreation focused\) biosecurity facility support tool](#).

- ✓ When planning installations, consider the following requirements, among other aspects like space and financial resources:
 - The scale of the facility in proportion to the risk posed by the activity or location e.g.
 - Dip tank for washing/disinfecting equipment
 - Installation of running water and hose pipe for more effective cleaning with freshwater.
 - Cleaning apparatus (brushes, boot hooks, wet-vacs etc.) to facilitate cleaning.
 - Installation of high-pressure water to improve the efficacy of cleaning.
 - Availability of hot water to increase the efficacy against organisms.
 - Drying room to speed up drying.
 - Slipway for hauling out to improve cleaning and drying.

BEST PRACTICE

Focus Area 2: Practical Actions

- Infrastructure required for the collection and disposal of wastewater and waste material in a biosecure way, to prevent INNS re-entering (e.g., water tanks and biological waste bins).
 - Supply of necessary resources, like water and electricity
- ✓ Guidance on the use of apparatus and facilities should be prominently displayed to ensure the correct application of the biosecurity measures.
- ✓ Guidance should include information on cleaning all underwater surfaces (e.g., hulls, propellers, sea chests and rudders) and removing standing/entrained water from bilges, as well as information on anti-fouling (e.g., the suitability of different coating types and how they should be maintained).
- ✓ Invest in local schemes / sites to provide resources for the installation and maintenance of biosecurity facilities.
- ✓ Promote existing biosecurity stations / cleaning facilities. The [Green Blue](#) has compiled a list of UK marinas, harbour and boatyards that provide environmental facilities, including pump-out facilities and filtered boat washdown systems.

Additionally, authorities should:

- ✓ Consider opportunities for identifying and seeking funding/grants to assist stakeholders install biosecurity facilities at high-risk locations.
- ✓ Issue guidance and support on facility best practice and decision making. Include clear guidance on the expectations for installation. For example, if a high-risk location is identified, the authority should consider setting/suggesting a minimum standard of biosecurity that is deemed appropriate to the INNS risk of that site.

[To return to the action tables click here](#)

Use biosecurity facilities

- ✓ Use cleaning facilities if they are provided. Read instructions properly and follow them as closely as possible.
- ✓ Ensure that your kit is cleaned before heading to a new location.
- ✓ Report any damage/faulty equipment.
- ✓ Look out for sector- or activity- specific guidance.
- ✓ In preparation for when biosecurity facilities are not available, consider purchasing some simple tools (e.g. a stiff brush, hose/jet wash, buckets etc.) to clean equipment either before leaving a site or when you arrive home.

[To return to the action tables click here](#)

Focus Area 3 - Monitoring and Reporting

Component 6: Monitoring and Reporting

Ensure users know about marine INNS reporting processes

Authorities could:

- ✓ Provide stakeholders with current and active contacts for additional INNS reporting advice.
- ✓ Publish clear guidance in multi-stakeholder relevant publications and forums for the preferred method for reporting INNS.
- ✓ Display clear information on how to report INNS sightings on relevant public notice boards.

Commercial operators could:

- ✓ Provide information to operatives on how and where to report INNS sightings as part of job inductions or in company communications.
- ✓ Download the iRecord app onto all work phones or encourage staff to download the app on their personal phones if they are not supplied with a work phone.
- ✓ Add a QR code for the iRecord web browser on relevant signage.

Recreational clubs and users could:

- ✓ Promote the use of iRecord on social media platforms or in club newsletters.
 - Consider adding a link to iRecord and a reminder to upload sightings at the bottom of club newsletter emails.
- ✓ Add a QR code for the iRecord web browser on relevant signage.

[To return to the action tables click here](#)

Report marine INNS in a timely manner

If you suspect that you have seen an INNS:

- ✓ Record the date, time and location (ideally use GPS co-ordinates)
- ✓ Take a photo of the species (try to take photos from multiple angles as well as close-up as this might aid identity verification)
- ✓ Note any additional information (e.g., abundance, habitat type, sex, is it dead or alive)
- ✓ Report your sighting to one of the following locations:
 - **iRecord:** <https://irecord.org.uk/> (if you have a good idea of what the species might be). The **iRecord** platform is accessible both from a web browser and as a mobile phone application.



- ☐ INNS sightings can also be reported directly to NRW at:
invasive.non.native@naturalresourceswales.gov.uk
- ✓ Some commercial operations may have their own internal reporting systems. However, it is vital that records made on any internal systems are reported externally so that appropriate action can be taken in a timely manner.

Are there any priority species that need to be reported?

- ✓ Yes. Records of all marine INNS are encouraged and welcomed, however there are currently two marine species of particular focus (listed on the GB alert list):
 - ☐ [American lobster \(*Homarus americanus*\)](#)
 - ☐ [Japanese oyster drill \(*Ocenebrellus inornatus*\)](#)

Resources for species ID

- Natural Resources Wales INNS guides: [Welsh ID Guide](#), [English ID Guide](#)
- Marine Biological Association [INNS ID guide](#)
- Cefas Non-Indigenous Species [Quick Reference Survey Guide](#)
- GB NNSS: [Species ID sheets](#)

[To return to the action tables click here](#)

Provide updates on priority marine INNS reports

Authorities could:

- ✓ Set up an alert on iRecord to be notified of new records for priority INNS.
- ✓ Inform the BAP manager when a confirmed or suspected report of a priority INNS is made in the SAC.

The BAP manager could:

- ✓ Set up an alert on iRecord to be notified of new records for target INNS.
- ✓ Distribute key information about a confirmed report of a priority INNS made in the SAC to relevant stakeholders, encouraging vigilance.

[To return to the action tables click here](#)

Integrate marine INNS monitoring and inspection into routine activities

Programmes of monitoring and inspection

- ✓ Implement a programme of INNS monitoring and inspection as part of routine activities.
- ✓ Inspect vessels, equipment and infrastructure for INNS. This may be best approached by introducing a standardised monitoring and inspection procedure to help with data comparisons and recording.
 - For example, have a set procedure or protocol for marina operatives to visually inspect boat hulls following guidelines in the [IMO biofouling guidelines](#), or a set of instructions for all citizen scientists to follow when surveying an area.
- ✓ Where possible, relevant marina / port staff, boat cleaners and recreational boaters themselves should undertake regular inspections as part of routine vessel and structure maintenance and cleaning processes.
- ✓ Make use of existing inspections by divers (e.g., on the condition of submerged infrastructure) and request that fouling is photographed and suspected INNS are reported.
- ✓ Join a citizen science survey group (e.g. [Seasearch](#)).

[To return to the action tables click here](#)

Fund and/or support statutory monitoring in the SAC

- ✓ Secure funding and implement long-term monitoring programmes for priority INNS or high-risk locations.
- ✓ Collaborate in applications for national funding.
- ✓ Create links between local authorities, businesses and ecologists to support ways for stakeholders to contribute to a statutory monitoring programme at a site, business or club.
 - For example, a stakeholder site may be suitable for the installation of a settlement panel. This panel is put into the water and left for growth to accumulate on it. It is then checked periodically (e.g., every month) by the stakeholder, ecologists or authorities. This passive monitoring technique is a low-cost, low effort method of monitoring for fouling species.
 - It is important that advice, support and co-operation is achieved before deploying any structure in the water and that the panel does not hinder site use, cause any hazard/obstruction or is at risk of floating away and becoming litter.

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Component 7: Collaborative working

Awareness raising and Engagement

- ✓ Work together and share resources and actions with other sectors where possible and appropriate.
- ✓ Create links with academia and existing research groups to support routine or bespoke research and biosecurity measures (e.g., through offering your site to facilitate research).
- ✓ Undertake stakeholder engagement or surveys to determine the uptake of biosecurity and increases to INNS awareness within the SAC's user groups.
- ✓ Collaborate (authorities, national bodies, commercial operations, environmental groups and other relevant parties) to create or update sector-specific (or activity-specific) awareness-raising material.

[To return to the action tables click here](#)

Practical Actions

- ✓ Communicate to maintain an understanding of the biosecurity actions being undertaken by stakeholders and share updates on successes.
 - i.e., if you are undertaking actions, inform the BAP manager and other users in your sector. Note if you have changed your procedures or activity to facilitate implementing biosecurity.
- ✓ Monitor and manage the implementation of the biosecurity plan – including assessment of stakeholder “biosecurity To-Do-Lists” to support and guide the implementation of appropriate actions.
- ✓ Co-ordinate funding applications for biosecurity (e.g., installing or upgrading biosecurity facilities).
- ✓ Collaborate (authorities, national bodies, commercial operations, recreational clubs/users and other relevant parties) to create or update activity-specific biosecurity guidance.
- ✓ Create links with academia and existing research groups to support research into the efficacy of biosecurity measures. Share results.
- ✓ Promote the Natural Resources Wales list of high priority evidence needs and research ideas page: [Natural Resources Wales / Marine and coastal evidence priorities](#).

[To return to the action tables click here](#)

BEST PRACTICE

Collaborative working

Monitoring and Reporting

- ✓ Liaise with academia, consultancies, and stakeholders to understand ongoing monitoring and surveillance in the SAC.
- ✓ Publish/promote a list of priority monitoring locations, pathways, or species.
- ✓ Collaborate with statutory bodies, environmental monitoring groups and other relevant parties to create sector-specific inspection / surveillance / monitoring programme guidance that can be undertaken by affiliated clubs and businesses.
- ✓ Encourage uptake of inspection/surveillance/monitoring programmes by affiliated clubs and businesses.
- ✓ Establish links with groups and authorities that can be called upon for assistance by clubs and businesses undertaking inspection / surveillance / monitoring programmes.
- ✓ Link with universities, consultancies and taxonomic specialists to establish routes for the identification of suspected INNS.
- ✓ Establish links with [Local Environmental Records Centres](#) and local representatives from Natural Resources Wales through which INNS records (suspected or confirmed) can be passed.
- ✓ Consider appointing a person who can act as a go-between for submitting INNS records on behalf of, for example, cocklers and fishers.

[To return to the action tables click here](#)

Useful resources and additional guidance

General resources

GB Non-Native Species Secretariat:

- [GB Non-Native Species Secretariat Homepage](#)
- [GB Non-Native Species Secretariat Information Portal](#)
- [GB Non-Native Species Secretariat Pathway Action Plans](#)
- [GB Non-Native Species Secretariat Invasive Species Week Page](#)
- [Marine biosecurity guidance and planning](#)
- [GB Non-Native Species Secretariat biosecurity and pathways](#)
- [Awareness Raising Materials](#)
- [Biosecurity Facility Decision Support Tool and user guide](#)
- [Training and educational resources](#)
- [RAPID INNS Marine Management Toolkit](#)
- [Marine Biosecurity Best Practice by Sector](#)
- [Recording INNS](#)

Pembrokeshire Marine SAC

- [JNCC Pembrokeshire Marine SAC features](#)
- [Pembrokeshire Marine SAC website](#)
- [Pembrokeshire Coastal Forum website](#)
- [Milford Haven Waterway Environmental Surveillance Group \(MHWESG\) website](#)
- [Conservation Advice for European marine sites \(Reg 37\)](#)
- [Natural Resources Wales marine and coastal evidence priorities](#)
- [West Wales Biodiversity Information Centre](#)

Welsh Marine Licencing information

- [Home information page](#)
- [Activities that need a marine licence](#)

- [Activities that may be exempt from requiring a marine licence](#)
- [Applying for a marine licence](#)

Legislation

- [List of legislation in England and Wales](#)
- [The Wildlife and Countryside Act 1981](#)
- [The Water Environment Regulations 2017](#)
- [The Marine Strategy Regulations 2010](#)
- [The Merchant Shipping \(control and management of ships ballast water and sediment\) regulations 2022](#)
- [The Conservation of Habitats and Species Regulations 2017](#)

Codes of Conduct

- [Pembrokeshire Marine Code](#)
- [The Countryside Code](#)
- [Marine and coastal wildlife code](#)
- [European Code of Conduct on Recreational Fishing and Invasive Alien Species](#)
- [European Code of Conduct on Recreational Boating and Invasive Alien Species](#)
- [IMO biofouling management guidance](#)
- [IMO biofouling page](#)

Marine INNS ID Guides

- [Natural Resources Wales Marine INNS ID Guide in Welsh](#)
- [Natural Resources Wales Marine INNS ID Guide in English](#)
- [Cefas Non-Indigenous Species Quick Reference Survey Guide](#)

Citizen science groups

- [Seasearch](#)
- [Shoresearch](#)

- [National Bioblitz Network](#)

Resources by sector:

Aquaculture

- [European Native Oyster Restoration Handbook](#)
- [ICES Code of Practice on the Introductions and Transfers of Marine Organisms 2005](#)
- [IOC-UNESCO and GEF-UNDP-IMO GloFouling Partnerships report on “Biofouling Prevention and Management in the Marine Aquaculture Industry”](#)
- [Bangor Mussel Producers Limited Code of Good Practice for mussel seed movements, 2019 version](#)
- [Bangor Mussel Producers Limited Code of Good Practice for mussel seed movements, 2008 version](#)

Commercial shipping

- [IMO GloFouling resources](#)
- [IMO guidance on implementing the Ballast Water Management Convention](#)
- [Maritime information note on the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004](#)
- [IMO GloBallast Partnerships webpage](#)
- [IMO GloBallast Partnerships e-learning course](#)
- [IMO e-Learning platform](#)
- [IMO 2023 Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species](#)
- [Guidance on Marine Best Practice by sector from the RAPID INNS Management Toolkit \(RAPID LIFE was a European Union funded project led by the Animal and Plant Health Agency \(APHA\) in partnership with Natural England and Bristol Zoological Society and supported by a number of further technical partners\)](#)

Commercial fishing and Angling

- [GB Angling Pathway Action Plan](#)

- [Angling Trust INNS](#)
- [Marine Anglers leaflet](#)
- [MMO CatchRecording app \(10m fishing vessel owners\)](#)

Recreational users

General information for all recreational users

- [Blue Flag website](#)
- [Ecostructure Project](#)
- [Gather App](#)

Recreational boating

- [GB Recreational Boating Pathway Action Plan](#)
- [The Green Blue Invasive Species Prevention](#)
- [The Green Blue boating pledge](#)
- [Environmental facilities map \(for UK marinas, harbours and boatyards\)](#)
- [Go Paddling canoe, kayak and SUP cleaning guide](#)
- [Marine Boating leaflet](#)
- [RYA Affiliation](#)
- [RYA video on invasive species and recreational boating](#)
- [Blue Flag for boat owners](#)
- [GloFouling-hosted report: Marine Biofouling: Non-indigenous species and management across sectors](#)
- [GloFouling poster for recreational boating](#)

Check Clean Dry Guidance:

- [General Check Clean Dry guidance](#)
- [Canoe and paddle users](#)
- [Clubs and managers of waterbodies](#)
- [Guidance for event organisers](#)

- [Event and biosecurity support pack](#)

Posters (English)

- [Canoeists and Kayakers](#)
- [Stand Up Paddleboarders](#)
- [Anglers](#)
- [Marine Boaters](#)
- [Dinghy](#)
- [Wind Surfers](#)
- [RIB Users](#)
- [Wildlife Best Practice](#)
- [Coastal Biosecurity Signage Kit](#)
- [Boating Banner](#)

Posters (bilingual)

- [Canoeists and Kayakers](#)
- [Marine Boaters](#)
- [Anglers](#)
- [Coastal Poster Set](#)

Species:

- [Marine Invasive Non-Native Species Priority Monitoring and Surveillance List for Wales](#)
- [GB Non-Native Species Secretariat Information Portal](#)
- [The National Biodiversity Network Atlas](#)
- [Wales INNS Portal](#)
- [Overview of Wales INNS Portal species lists](#)

Carpet sea squirt, *Didemnum vexillum*

- [GB NNSS Risk Assessment](#)
- [NBN Atlas](#)
- [Natural Resources Wales guidance](#)

Compass Sea Squirt, *Asterocarpa humilis*

- [GB NNSS Overview](#)
- [NBN Atlas](#)

Devil's Tongue Weed, *Grateloupia turuturu*

- [GB NNSS Overview](#)
- [NBN Atlas](#)

American Slipper Limpet, *Crepidula fornicata*

- [GB NNSS Risk Assessment](#)
- [NBN Atlas](#)

Red Ripple Bryozoan, *Watersipora subatra*

- [GB NNSS Overview](#)
- [NBN Atlas](#)

Trumpet Tubeworm, *Ficopomatus enigmaticus*

- [GB NNSS Overview](#)
- [NBN Atlas](#)

Chinese mitten crab, *Eriocheir sinensis*

- [GB NNSS Overview](#)
- [GB NNSS Risk Assessment](#)
- [NBN Atlas](#)

American oyster drill, *Urosalpinx cinerea*

- [GB NNSS Risk Assessment](#)
- [NBN Atlas](#)

Japanese oyster drill, *Ocenebrellus inornatus*

- [GB NNSS Overview](#)

- [GB NNSS Risk Assessment](#)
- [NBN Atlas](#)

Links to Pathway Action Plans (PAPs) and Species Action Plans (SAPs):

Links to the action plans listed below can be found on the [Wild Seas Wales website](#).

- American slipper limpet, *Crepidula fornicata* SAP
- Chinese mitten crab, *Eriocheir sinensis* SAP
- Carpet sea squirt, *Didemnum vexillum* SAP
- Trumpet tubeworm, *Ficopomatus enigmaticus* SAP
- American oyster drill, *Urosalpinx cinerea* & Japanese oyster drill, *Ocenebrellus inornatus* SAP
- Recreational Boating (small boats) PAP
- Recreational Boating (large boats) PAP
- Recreational Activities PAP
- Commercial Shipping PAP
- Shore-based Fishing PAP
- Boat-based Fishing PAP
- Aquaculture PAP

Additional reading of interest

- Vye, S.R., Wynne-Jones, S., Masterson-Algar, P. and Jenkins, S.R., 2020. Exploring perceptions of marine biosecurity interventions: insights from the commercial marina sector. *Marine Policy*, 118 [<https://doi.org/10.1016/j.marpol.2020.104027>].
- Eschen, R., Kadzamira, M., Stutz, S., Ogunmodede, A., Djeddour, D., Shaw, R., Pratt, C., Varia, S., Constantine, K. and Williams, F., 2023. An updated assessment of the direct costs of invasive non-native species to the United Kingdom. *Biological Invasions*, 25, 3265-3276.
- Dewey, N., Pack, K., Williamson, D., & Walsh, A. (2020). Welsh Marine Invasive Non-Native Pathways Assessment NRW Evidence Report No: 459, 90pp, Natural Resources Wales, Bangor.
- Tillin, H.M., Kessel, C., Sewell, J., Wood, C.A., Bishop, J.D.D. 2020. Assessing the impact of key Marine Invasive Non-Native Species on Welsh MPA habitat features, fisheries and aquaculture. NRW Evidence Report. Report No: 454, 260pp, Natural Resources Wales, Bangor.

Biosecurity To-Do-List Tracker template

Guidance for this Biosecurity To-Do-List tracker

Below are all the column names and what information needs to be put in all of them

Biosecurity To Do List Date	This should be the date on which the biosecurity to do list was written up and agreed on. This date should not have to change when any updates are made.
Representative Name	This should be the name of the person(s) who will be acting as liaison to the plan managers on the progress of the biosecurity actions. Please ensure that this is updated if it changes.
Name of Organisation	This should be the name of the organisation, business, club, group, individual etc who is agreeing to undertake these actions. This name is then used in the biosecurity action table.
Contact email	This should be the email address of the representative person(s). Please ensure that this is updated if it changes.
Contact telephone	This should be the phone numbers of the representative person(s). Please ensure that this is updated if it changes.
Sector type	Sector that the stakeholders fall into. This should be similar or the same as what is used in the Biosecurity Action Plan (i.e., Individual, Recreational club/group, Commercial, Governing body / Association, Statutory / Authority or Other). Choose the description that best suits the main activity of the organisation for whom this To-Do-List is written.

Focus Area	One of the three Focus Areas for biosecurity
Focus Area component	One of the six components of the Focus Areas
Action	The action that falls under the Focus Area component. Note that not all of these actions will be relevant, based on sector type and use of the marine environment.
Approach	Here you can provide details on how you are planning to achieve the action. This might include assigning the action to a person, tying in action in with a specific event or noting a source of information you might wish to use.
Timeframe	This should outline the period of time in which this action is aimed to be completed or set in motion if the action is ongoing. This does not necessarily have to be a set date - for example, it could be "by the start of the boating season" or "after the next AGM". This could be set up in consultation with plan managers.
Progress log	Here you can describe any progress that has been made towards completing the action (e.g. "have contacted GB NNSS to request posters" or "action is complete and will be repeated on X date"). This is also a place where you can say if an action is not possible or needs more assistance/support to complete.

Biosecurity To Do List Date	
Representative Name	
Name of Organisation	
Contact email	
Contact telephone	
Sector type	

Focus Area	Focus Area Component	Action	Approach	Timeframe	Progress log
Awareness raising and engagement	Legal roles and responsibilities	Provide up-to-date and accessible legislation information			
		Disseminate new information on legislation to BAP users			
		Understand how INNS legislation and policy could impact your activities			
		Share information on INNS legislation and policy, and			

Focus Area	Focus Area Component	Action	Approach	Timeframe	Progress log
		organisational responsibilities			
	Information and guidance on INNS and biosecurity	Download/gather relevant biosecurity awareness raising material			
		Create new INNS/ biosecurity awareness raising material			
		Fund and/or support the creation of guidance and training material			
		Ensure up-to-date and accessible awareness raising material and resources are available to BAP users			
	Raising awareness	Share the SAC BAP			

Focus Area	Focus Area Component	Action	Approach	Timeframe	Progress log
		Share INNS / biosecurity awareness raising material			
		Post INNS and biosecurity content on social media pages			
		Install signage / posters			
		Provide or take part in training or workshops			
		Run an INNS awareness and training course for staff			
		Circulate INNS ID guides (digital or printed) and reporting guidance			
		Promote INNS reporting through iRecord			

Focus Area	Focus Area Component	Action	Approach	Timeframe	Progress log
	Collaborative working	Strengthen communication and collaboration with other SAC users			
		Share knowledge, experience and best practice through new or existing communications networks			
		Coordinate collaborative working			
Practical actions	Biosecurity procedures and processes	Implement biosecurity best-practice			
		Appoint a Biosecurity champion / manager			
		Set biosecurity rules, codes of conduct, or T&Cs			
		Complete a biosecurity To-Do-List or create an			

Focus Area	Focus Area Component	Action	Approach	Timeframe	Progress log
		INNS biosecurity plan			
		Create biosecurity plans for higher risk events			
		Get more pathway-specific recommendations from the Welsh PAPs			
	Biosecurity facilities and equipment	Provide well maintained on-site biosecurity facilities and/ or equipment			
		Use biosecurity facilities			
	Collaborative working	Share information on biosecurity actions being undertaken			
		Fund and/or support research into biosecurity measures			

Focus Area	Focus Area Component	Action	Approach	Timeframe	Progress log
Monitoring and reporting	Monitoring and reporting	Ensure users know about INNS reporting processes			
		Report INNS in a timely manner			
		Provide updates on priority INNS reports			
		Integrate INNS monitoring and inspection into routine activities			
		Fund and/or support statutory monitoring in the SAC			
	Collaborative working	Support / promote INNS report data flow			

Check-in log

The check-in does not need to be laborious or onerous. The aim is to see how/if the actions are being achieved and seeing if there are ways of improving/assisting stakeholders. It should include the names of the people carrying out the check-in and the date that the check-in is carried out. There is no set timescale for this.

Appendix

Supporting Information for implementing Biosecurity Actions

This section provides supporting information arranged by the biosecurity focus areas, and respective components. Although there is some overlap with best practice guidance above, the purpose of this supporting information is to provide a greater level of detail to help inform the development and implementation of biosecurity actions.

While users may choose to read the material in full, the links below take users to specific sections which can help to save time and facilitate acquisition of the specific information being sought. Users are encouraged to navigate the supporting information using the links below.



Supporting Information - summarises the concepts, principles, and considerations that underpin the three Biosecurity Focus Areas and the recommended biosecurity actions for the SAC. The supporting Information is split into seven key components and provides stakeholders with additional insights into aspects that can influence the development, modification and implementation of biosecurity actions. The components are aligned with national priorities to provide the foundation for biosecurity planning within the SAC.

Biosecurity Focus Area 1 – Awareness Raising and Engagement

[Component 1: Understanding roles and legal responsibilities](#)

[Component 2: Information and guidance on INNS and biosecurity](#)

[Component 3: Raising awareness](#)

Biosecurity Focus Area 2 – Practical Actions

[Component 4: Biosecurity processes and procedures](#)

[Component 5: Biosecurity facilities](#)

Biosecurity Focus Area 3 – Monitoring and Reporting

[Component 6: Monitoring and reporting](#)

Common Biosecurity Focus Area – Collaborative Working

[Component 7: Collaborative Working](#)

Component 1: Understanding roles and legal responsibilities

Introduction

This component involves providing stakeholders with clear and accessible guidelines on the policy and legislation surrounding marine INNS. These guidelines should detail the relevant laws, responsibilities and expectations. The aim is to ensure stakeholders are equipped with the knowledge needed to align their actions with current policies and legal requirements.

Including a comprehensive description of INNS legislation and policy in communications is crucial for several reasons:

- Improving understanding: Clear guidelines help stakeholders better understand their legal obligations and the broader policy framework related to marine INNS.
- Enhancing compliance: By making it easier to understand responsibilities, stakeholders are more likely to adhere to regulations, reducing the risk of non-compliance.
- Streamlining a coordinated approach: A shared understanding of policy fosters collaboration among stakeholders, enabling unified efforts to address INNS threats.

However, there is currently a lack of clarity within stakeholder groups (of all pathways) regarding the status of INNS under existing legislation. Stakeholders require more guidance on how their activities intersect with INNS legislation, and what is required under current policy (if anything) to achieve compliance (i.e., voluntary vs. mandatory actions).

How can this be addressed?

All stakeholders should consider actions within this area of focus as a priority. However, authorities and national stakeholders are inevitably more likely to be a focal point of this action.

- Authorities should produce a policy position or statement relevant to existing or new INNS-focused legislation and regulation. This policy(s) should provide stakeholders with an explanation of how INNS legislation or regulation might affect them. This needs to be communicated through an appropriate medium, ensuring that the information reaches all relevant stakeholders.
 - If legislation or regulation exists, but enforcement policy is undefined, it is recommended that stakeholders are still offered advice on this matter.
 - Official statements should be summarised and shared between relevant stakeholders, using plain, accessible language. Information could be included in trade association newsletters or governing body communications to relevant stakeholders (e.g., updates from national

Supporting Information

Focus Area 1: Awareness Raising and Engagement

aquaculture trade associations, Fish Health Inspectorate etc.) so that all stakeholders are aware of any legal responsibilities with regards to INNS.

- In cases where an authority-produced statement is unavailable, national and local stakeholders are encouraged to look at **relevant regulations and provide advice to their members as appropriate.**
- Stakeholders should ensure that they have a clear understanding of the Welsh Government/NRW policy on INNS, as well as the associated legislation.
- It is important to communicate how fulfilling their responsibilities can benefit all stakeholders (both commercial and recreational).
 - For example, by not allowing the escape of an INNS, they can minimise the spread of INNS that can compete with fishery species or cause biofouling, thereby protecting their assets.

What are my legal responsibilities?

- The GB NNSS has outlined the relevant [INNS legislation for England and Wales](#).
- Key legislation relating to INNS includes:
 - The Wildlife and Countryside Act 1981 (WCA)
 - The Water Environment Regulations 2017
 - The Marine Strategy Regulations 2010
 - The Merchant Shipping (control and management of ships ballast water and sediment) regulations 2022
 - The Conservation of Habitats and Species Regulations 2017
- Links to these laws can be found in [Useful resources](#).
- In Wales, boats with visible or heavy fouling (greater than just a slime layer) must not be cleaned in the water. They should be lifted or trailered out of the water and taken to a suitable location for cleaning.
- Your legal requirements and responsibilities will depend on the activity that you are undertaking (e.g., for commercial or recreational purposes).
- There may be specific requirements that must be followed as part of licensing conditions for certain activities e.g., construction or dredging.
- Commercial operators must ensure that they know their legal responsibilities when it comes to INNS. If you are unsure, you should get in touch with a representative from NRW: invasive.non.native@naturalresourceswales.gov.uk.
- All recreational users should fulfil their responsibilities as outlined in the WCA. This can be summarised as follows:

“Don’t release or allow the escape of any species (plant or animal) into the wild that is not ordinarily resident (i.e., a non-native species) or is on the [WCA Schedule 9 list](#).

Schedule 9 lists non-native species that are already established in the wild, but which continue to pose a conservation threat to native biodiversity and habitats, such that further releases should be regulated.

Don’t buy or sell any species on the [WCA Schedule 9 list](#). In the marine environment this includes the Chinese mitten crab, the American oyster drill and the American slipper limpet.”

Component 2: Information and guidance on INNS and biosecurity

Introduction

It is important to ensure that there is clear and accessible information and guidance on INNS and biosecurity so stakeholders are informed about the risks that INNS pose to their activities and the marine environment and know what actions they can/should take to address these risks.

All stakeholders should make use of existing materials. However, proactive stakeholders should feel enabled to adapt the information and guidance that is available to them, making it more applicable to their own activities.

Although there is a wealth of freely accessible information available on INNS and biosecurity, it is often fragmented and challenging to navigate. This can make it difficult for stakeholders, particularly those with limited prior knowledge of biosecurity, to find and use the most relevant resources.

How can this be addressed?

All stakeholders should consider actions within this component. However, actions taken at the national level (Wales or UK) could have a much more widespread impact.

It is important to ensure that the primary information resources on marine INNS for Wales are appropriate for use at all scales, including the SAC-level. The [useful resources and additional information](#) section in this BAP contains links to relevant resources that can form the basis of awareness raising for all stakeholders.

- Authorities should coordinate the production of national-level marine INNS and biosecurity awareness raising materials to improve INNS biosecurity in all Welsh marine areas. The primary aims should be to:
 - Ensure that Welsh stakeholders have access to up-to-date and relevant INNS awareness-raising materials.
 - Provide a defined (and updated) list of priority INNS of concern – also see the section on [INNS in the SAC](#).
 - Publish INNS ALERTS when a population is newly established or spreading.
- The BAP manager, in collaboration with authorities and national stakeholders, should aim to facilitate a consistent approach to other SAC/national awareness raising efforts. This should produce a cohesive and unified effort that builds on and enhances existing resources, maximising the effectiveness of INNS awareness raising.
- Governing bodies and associations should consider how they could access and/or produce consistent, high-quality and appropriate INNS and biosecurity information and resources that are relevant to their members or associated users.
 - The INNS information resources could include self-produced material; however, a simpler option could be to review and compile existing material (see [Useful Resources](#)).

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Focus Area 1: Awareness Raising and Engagement

- If stakeholders decide to create their own resources, ensure that these are appropriate for the SAC and tailor specific guidance to their relevant operations/activities.
- It is hoped that as national marine biosecurity progresses, the availability of consistent resources will increase.
- Although existing guidance may not currently be SAC-specific or relevant to all pathways, the biosecurity principles within them will generally be applicable more broadly and can be used as the basis for new or updated guidance.

What existing materials can I use?

- Resources have been developed by several groups including:
 - [The Great Britain Non-native Species Secretariat \(GB NNSS\)](#)
 - [With specific marine biosecurity guidance here](#)
 - [The Green Blue project](#) (Royal Yachting Association)
 - [Paddle UK](#)
 - [The Angling Trust](#)
 - [International Maritime Organisation](#)
- The [Check Clean Dry campaign](#) from the GB NNSS has free resources including guidance for [marine anglers](#) and [marine boating](#).
- Natural Resources Wales have developed marine INNS identification guides in English and Welsh. These guides are available to download using the following links. Printed versions (waterproof) can also be requested from NRW.
 - [NRW Marine INNS ID Guide - English](#)
 - [NRW Marine INNS ID Guide - Welsh](#)
- The [Pembrokeshire Marine SAC website](#) has educational resources and information on broader environmental aspects of the SAC.
 - Further information may be requested by contacting the SAC officer at SACofficer@PembrokeshireMarineSAC.org.uk

How do I choose the right format and content?

- Share resources and messages that are simple, engaging and easy to understand.
- Use existing campaigns e.g., Check, Clean Dry.
- Think about the most useful format for who you are sharing information with. For example, if you are promoting INNS information to an active recreational club, use small pocket guides or mobile phone apps which might provide the most suitable identification guides for use “on-the-go”.
 - See GB NNSS guidance on [methods for recording](#)
- In general, ensure the content is relevant to the target user. This might involve using examples of INNS impacts relevant to the intended audience e.g., how INNS might disrupt their hobbies, cause financial losses in their sector etc.

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Focus Area 1: Awareness Raising and Engagement

- Choose material that focuses on the INNS and pathways that are relevant to the area or audience to prevent overwhelming readers with information.

What if I want to make my own materials and resources?

If you want to create your own awareness-raising material, you might want to consider the following:

- What is your focus? For example, are you trying to raise awareness about a particular INNS or are you putting together specific guidance for your club?
- Make it clear what biosecurity action is expected and the consequences of not achieving this. For example, emphasise that not removing fouling on vessel hulls can increase the risk of INNS spread, and increase fuel consumption and maintenance costs.
- As well as text, include photos and images to engage your audience, provide some context and help with INNS recognition/identification. You could highlight 2 or 3 priority INNS that are relevant (or particularly impactful) for your sector.
- Use existing materials as guidance for your own and then tailor it to address your requirements. It is important that the messaging on biosecurity is consistent.
- Use non-scientific language as much as possible. If you do use scientific language, make sure it is defined or explained properly. Only use Latin names for species where necessary, e.g., when demonstrating how to record a species. More detailed information is more suitable for educational events.
- It is important to remember not to overcrowd communication materials or include too much information. Use QR codes and links as a useful tool for directing people to further information.

Component 3: Awareness raising

Introduction

Increasing awareness of the impacts of INNS and of biosecurity and its benefits can encourage more people to adopt best practice biosecurity procedures. It can also improve an individuals' ability to recognise specific INNS and foster confidence to encourage reporting of sightings. This can lead to:

- Improved biosecurity, reducing the risk that INNS will spread and cause impact within the SAC.
- Improved reporting, increasing the likelihood that new introductions or increased spread can be managed.

This section offers guidance on sharing the information compiled or created through implementation of actions within Component 2 ([Information and guidance on INNS and biosecurity](#)), to facilitate and encourage the uptake of biosecurity among all relevant stakeholders within Wales, but specifically the SAC. Stakeholders themselves are best

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Focus Area 1: Awareness Raising and Engagement

placed to understand the most effective and practical methods for them to share awareness raising materials. All stakeholders are encouraged to help spread messages as widely as possible, including through outward facing public channels (e.g., social media posts).

However, currently, many stakeholders operating within the SAC are not aware of INNS and their impacts, or what biosecurity is. All stakeholders would benefit from INNS and biosecurity awareness raising activities.

How can this be addressed?

All stakeholders should consider actions within this component as a priority. Stakeholders can make use of the general resources provided within this BAP. It is hoped that as national awareness increases, all stakeholders will increase their knowledge of INNS and biosecurity, eventually producing their own tailored resources, further amplifying awareness and engagement.

- All stakeholders play a role in raising awareness of INNS and biosecurity by promoting and disseminating existing information regarding INNS and key biosecurity messages.
- The [Useful Resources](#) within this BAP include links to existing high-quality information sources which can be used as the basis for awareness raising.
- Relevant signage should be installed in visible areas to be seen by employees, club members, the public, or others, as appropriate. Information contained within signage can range from general actions and national guidance (e.g., the GB NNSS Check, Clean, Dry campaign), to site specific biosecurity protocols, depending on the intended audience (see [Useful Resources](#) for links to signage resources). Landowner permission should be considered (if applicable or required).
- Equipment cleaning guidance (e.g., the GB NNSS Check, Clean, Dry campaign) should be shared by all relevant organisations and staff. For boats or submerged equipment, guidance should include information on cleaning all underwater surfaces (e.g., hulls, propellers, sea chests and rudders) and removing standing/entrained water from bilges, as well as information on anti-fouling (e.g., the suitability of different coating types and how they should be maintained).

How can I raise awareness?

- Make use of existing communication channels to ensure that information reaches the target audience (e.g., include INNS information in materials like tide timetables, club newsletters, marine safety updates or license packs).
- Check whether there are relevant organisations or groups that are running similar campaigns to identify collaboration opportunities and increase the reach of communications. This could include national governing bodies like the RYA or Local Action Groups like [Arwain Sir Benfro](#).
- Make use of national awareness-raising campaigns e.g., [Invasive Species Week](#) which takes place in June every year.

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Focus Area 1: Awareness Raising and Engagement

- Maximise the reach of your communications by sharing materials in multiple ways and through multiple channels.
 - Social media channels (e.g., Facebook, Instagram),
 - Email correspondence,
 - Club or membership newsletters or magazines.
- Tips and guidance for boat cleaning would be useful to include in newsletters to berth holders or recreational boating clubs to ensure that users know how, when and, importantly, where to clean their vessels.
- Information could be provided on leaflets at checkout desks, hire centres, information centres, lifeguard stations, or attached to vessels and equipment for sale.
- Vessel cleaning guidance should also ideally accompany all boating policy and information documents. These documents could include T&Cs of berthing / mooring, marina information for visiting vessels or boat care guidance at the point of sale.

How can I encourage people to engage?

- It is important to communicate how proper cleaning can benefit the vessel user directly.
 - For example, ensuring that fouling is not allowed to build up on boat hulls through regular and thorough cleaning can both improve the efficiency of the vessel when underway and extend the life of submerged surfaces.
- It is important to highlight both the benefits of undertaking biosecurity and the potential impacts to people from INNS (e.g., potential loss of use, increased cost).
- Information like this can provide an incentive to users who may not otherwise be engaged with the environmental benefits of reducing the spread of INNS.

Raising awareness through signage

Installing signage can be an easy way of spreading awareness of INNS and biosecurity to people who may not be reached by other forms of communication, e.g., ad hoc day visitors to marinas or solitary marine anglers.

Firstly, check the information that already exists to prevent unnecessary duplication and to ensure a consistent approach to biosecurity messaging.

What information should the signage contain?

- Signage could give viewers information on what to look out for, what impacts INNS could have and the actions they can take to reduce the risk of spreading INNS (e.g., the national Check Clean Dry campaign).

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- The information should be relevant to the activity, users or location being targeted. For example, a sign at a busy slipway used to launch small boats might highlight parts of a boat where INNS might stowaway and should be given attention when cleaning.
- If reporting information is provided on a sign (e.g., how to record and where to report a sighting), it must be accurate and up-to-date.

Where should signage be erected?

- To reach the most people, erect signs in busy areas such as popular entry points, slipways, coastal car parks, public marinas and harbours.
 - For example, from discussions with stakeholders, West Angle Bay (SA71 5BE) and Gelliswick Beach (SA73 3RS) have been proposed as locations where signage may be seen by many recreational users.
- At busy harbour/marina slipways, users may not have time to read signage when launching or removing vessels. As such, signage may be better placed in the areas where people wait for the slipway to be available.
- Put up signs on club notice boards, at biosecurity facilities (e.g., dry rooms or washdowns), or at shops selling or renting watersports equipment. In these locations, they are likely to be seen by more regular water users, reminding them about biosecurity.
- A highly visible location where signs are likely to be read is the back of a toilet cubicle door in, for example, a clubhouse, coastal café or activity centre.
- You must ensure that the landowner has given permission for the sign to be erected.

Where can I find existing signage?

- The GB Non-Native Species Secretariat (GB NNSS) has produced posters, signs and leaflets for several key pathways of INNS spread, including [boating](#), [canoeing](#), [stand-up paddleboarding](#) and [marine angling](#). These posters are free to download. Signage is also available in Welsh for [boating](#), [angling](#) and [canoeing](#).
- You can find a full list of free awareness raising materials from the GB NNSS [here](#) which you can either download or request as free hard copies.
- The Green Blue, part of the RYA, has produced a series of posters with information on how to make your vessel 'green', which includes removing INNS. These cover [dinghies](#), [windsurfs](#), [RIBs](#) and [general good practice](#). [Welsh posters are also available](#). A free [coastal biosecurity kit](#) can be requested from the Green Blue.
- More robust outdoor signage may need to be printed by professional services.

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Two of the signs and posters that are available for download on the [GB NNSS website](https://www.naturalresourceswales.gov.uk/non-native-species/).

What if I want to make my own signage?

- You can use the existing signage as guidance for your own and then tailor it to address your requirements. For example, if you have a washdown facility, the sign should include information on how to use equipment and how to contain waste. If there are no facilities, advise alternative actions (e.g., air dry kit).
- Try to include information that is relevant and engaging to the target audience. For example, pointing out the potential boat maintenance impacts and financial burden from some INNS may encourage more involvement from boat owners.
- It is important to remember not to overcrowd the sign or overload it with information. QR codes are a useful tool for directing people to further information.
- Please note that information must be accurate and in accordance with legislation and local bylaws.
- Advice on signage may be available from Natural Resources Wales (invasive.non.native@naturalresourceswales.gov.uk).



INNS workshops and training

Providing workshops and training can provide valuable information, including providing guidance on INNS (e.g. background, identification, how they are spread), biosecurity best practice they should be undertaking, existing monitoring and opportunities to expand monitoring and improve reporting.

What could/should training include?

- Providing and sharing information on biosecurity best practice is the most important aspect of training. If biosecurity is implemented thoroughly and effectively, it will help to stop the spread of all INNS.
- Training could be given on how to create a biosecurity plan for a site, club or activity and how to assess the risks that activities pose to introducing or spreading INNS.
- Training could include how to identify key relevant INNS and how to report sightings.
- Please remember, there is no expectation that you should be an INNS expert at the end of training or be an INNS expert to give training to others.

When and how should training / workshops take place?

- Where possible, integrate biosecurity training into existing programmes. For example, train staff on biosecurity best-practice, inspection methods and INNS reporting as part of job inductions.
- Include INNS awareness and biosecurity information in recreational activity training, activity courses/lessons or guided sessions (e.g., guided rock-pooling excursions).
- Organise workshops and educational events through local groups as part of public outreach.
- Consider using intermediaries to facilitate biosecurity awareness-raising in groups or sectors that may be harder to reach.
- Consider designating individuals within organisations to lead training, e.g., an environmental manager or biosecurity 'champion', the roles of which are outlined under Component 4 ([Biosecurity procedures and processes](#)).

What resources are there for workshops and training?

- Training and educational resources are available on the GB NNSS website: [GB NNSS Training resources](#).
- A free interactive training and education tool, [Gather](#) (developed by the [Ecostructure project](#)) has been created for recreational boating and paddling organisations, marina operators and water sport centres.
- [Toolkits have been developed for marine biosecurity](#) as part of the RAPID LIFE project, available from the GB NNSS.
- The GB NNSS has created a [banner for events and training](#) that is free to order.
- Statutory bodies are not always able to provide direct training for all sectors but may be able to provide standardised, sector-specific guidance for use in inductions and biosecurity training. To find out more about training materials and opportunities from NRW or the SAC officer, contact the following email addresses
 - invasive.non.native@naturalresourceswales.gov.uk
 - SACofficer@PembrokeshireMarineSAC.org.uk
- An INNS kit has been developed and can be borrowed by anyone who is running a supervised workshop for adults as a way to train recorders looking out for INNS. It is free to borrow, but courier or transport costs must be paid for. It includes specimens, images, distribution data and species information. To borrow the kit, please contact Anna Holmes:
anna.holmes@museumwales.ac.uk

Environmental pledges and accreditations

Joining and promoting environmental pledges could provide an opportunity to raise awareness on biosecurity matters which may facilitate a commitment from businesses, organisations and recreational clubs and their members to undertake environmental good practices.

Biosecurity is not often comprehensively (or even explicitly) discussed in many of the existing environmental pledges. However, the best practice that is encouraged as part of these pledges may ultimately coincide with biosecurity aims and improve the general understanding of environmental issues in the marine environment. For more detailed guidance on how to include biosecurity clauses and best-practice principles in Codes of Conduct, see [Component 4](#).

What pledges are there for the marine environment?

- [Blue Flag](#) (operated by the Foundation for Environmental Education) has accreditations for beaches, marinas and tourism boats (including bird watching, recreational diving and recreational fishing). They also promote an [Environmental Code of Conduct for private boat owners](#). There are a series of criteria that are required in order to be awarded a Blue Flag.
- The [Green Blue](#) (an environmental programme developed by the RYA and British Marine) promotes [The Boating Pledge](#) which is aimed for “anyone who enjoys getting out on the water in a more environmentally sustainable way and wants to pledge to Respect, Protect, and Enjoy our inland and marine waters, wildlife and habitats”. Resources with this pledge include guidance on keeping hulls and equipment clean for INNS prevention.
- Additionally, [RYA affiliation](#) comes with expertise, resources and training for clubs/centres, including environmental information.
- There is work underway to examine how INNS and biosecurity might be included into these existing pledges or how marine INNS might be included in existing pledges for biosecurity in other environments (e.g., the [AQUA scheme](#), for recreational freshwater users).

What if I don't want to join a pledge?

- Although being part of a recognised environmental campaign or pledge may provide visibility for the good practices you are undertaking, meeting all the criteria for a pledge may be burdensome or unrealistic for your site or organisation.
- For guidance on how to include biosecurity clauses and best-practice principles in Codes of Conduct, see [Component 4](#).

Component 4: Biosecurity procedures and processes

Introduction

Having a defined set of instructions for what INNS biosecurity procedures (e.g. Check Clean Dry, or increased INNS monitoring during operations) are expected or required at a site, by staff or users, or during particular events (e.g. recreational competitions or construction activities) can improve the likelihood that biosecurity will be undertaken consistently and effectively. This guidance is primarily intended to encourage stakeholders to enhance biosecurity procedures for INNS.

However, although many stakeholders do undertake aspects of INNS biosecurity procedures, there is currently limited oversight and standardisation of these actions. All stakeholders should strive for continuous improvement and inclusion of best practice in standard procedures.

How can this be addressed?

All stakeholders should consider actions within this area of focus as a priority. However, small business and individual users may not feel the need to formalise such procedures and could simply act in accordance with best practice guidance.

- Stakeholders are encouraged to review and update their protocols and practical procedures to ensure that operational biosecurity comprehensively addresses INNS pathways and is consistently applied. Continuous improvement is also encouraged. These updates do not need to be onerous or burdensome. Enhancements can make use of existing best practices, integrate pathway/species-specific biosecurity actions (see links to the PAPs and SAPs on the [Wild Seas Wales website](#)), or adopt innovative approaches tailored by the stakeholders themselves.
- Conduct research, invest and participate in the development and testing of new methods and technologies to manage INNS. For example, working with a research body / professional.
 - Authorities should consult and collaborate with the aquaculture industry to ensure best practice is encouraged and enabled. The onus should be placed on pragmatic changes to procedures which do not negatively impact Welsh blue growth or individual operators. For example, authorities could:
 - Provide support to national and local aquaculture stakeholders (including operators) for the implementation of improved biosecurity at aquaculture sites, or associated locations.
 - Regularly review emerging methods and technologies that offer INNS risk reduction.

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Focus Area 2: Practical Actions

- Appointing a biosecurity manager or champion who is equipped with relevant knowledge or a defined responsibility for biosecurity can help to ensure that biosecurity actions are being undertaken appropriately and effectively for a site, club, business or organisation.
- Including biosecurity actions/clauses and best-practice in Codes of Conduct or terms and conditions (T&Cs) can help to increase the uptake of biosecurity good practice for those to whom the codes apply, leading to a reduction in the risk of INNS being introduced and spread. Read on for further information.
- Joining, promoting or updating environmental pledges could provide an opportunity to raise awareness on biosecurity matters which may facilitate a commitment from businesses, organisations and recreational clubs and their members to undertake environmental good practices.
- At the most basic level, INNS biosecurity can be achieved simply through 'Check Clean Dry' procedures.



Check

Check your equipment, boat, and clothing after leaving the water for mud, aquatic animals or plant material. Remove anything you find and leave it at the site.



Clean

Clean everything thoroughly as soon as you can, paying attention to areas that are damp or hard to access. Use hot water if possible.



Dry

Dry everything for as long as you can before using elsewhere as some invasive plants and animals can survive for over two weeks in damp conditions.

- Having a pre-defined strategy for events and competitions can help to reduce the increased biosecurity risks posed by such events. It also provides an opportunity to reach wider user-groups. With increasing numbers of vessels, equipment and participants moving in and out of the area, the chances of introducing or transferring INNS are significantly increased, particularly when they are travelling from long distances.

Biosecurity managers and champions

A biosecurity manager or champion can help to ensure that biosecurity actions are being undertaken appropriately and effectively for a site, club, business or organisation.

Who should the biosecurity manager or champion be?

- A biosecurity manager is more likely to be a paid role within an organisation. Depending on the size of the business/organisation, this may be a stand-alone, dedicated role or it could be an existing staff member (e.g., an environmental manager) already in post with biosecurity responsibilities appended to their role.
- A biosecurity champion is more likely to be a voluntary role taken on by a club or organisation member. The champion should be familiar with the site and general practices of the club/group.

What should their responsibilities be?

- The biosecurity manager/champion should become familiar with the key INNS and biosecurity concept, perhaps through training (e.g., GB NNSS [online training](#)) and be able to communicate these concepts, and any biosecurity procedures, to other staff, club members or users.
- The scale and scope of the biosecurity manager/champion's responsibilities will depend on what biosecurity is done at the site or by the club/group as well as the nature of the activity/pathway that is being undertaken.
- The biosecurity manager/champion should oversee the [Biosecurity To-Do-List](#) actions (if one is created) and keep the plan managers informed of progress.
- They should ensure that any biosecurity facilities are being used correctly and maintained. This may involve organising periodic maintenance when needed.
- They could organise training, workshops or talks in conjunction with local NRW representatives or local NGOs (e.g., South and West Wales Wildlife Trust or Sea Trust).
- The responsibilities of this role should be clearly laid out so that they can be understood and later communicated to others should the role be taken on by someone else.
- Please note that this does not need to be an onerous or time-consuming role, and it is acknowledged that many club's roles are voluntary.

Biosecurity rules, Codes of Conduct and Terms and Conditions

Including biosecurity actions and best-practice in Codes of Conduct and terms and conditions (T&Cs) can help to increase the uptake of biosecurity good practice for those to whom the codes apply, leading to a reduction in the risk of INNS being introduced and spread.

Codes of Conduct may already be in use that are relevant to many of the pathways in the SAC such as the [Pembrokeshire Marine Code](#), [Marine and Coastal Wildlife Code](#), the [Countryside Code](#) and regulations (and expected practice) for recreational clubs. However, they might not yet include clauses on biosecurity.

How can biosecurity be included in a Code of Conduct?

- Including a biosecurity clause can help to raise awareness of INNS, provide clarity on biosecurity expectations and facilitate a standardised approach to biosecurity.
- It should be tailored to a specific pathway and outline instructions on how to abide by biosecurity requirements at the level of an individual.
- The GB NNSS RAPID LIFE project has guidance documents for [best practice by sector](#) which can be used to help create biosecurity clauses. For example:
 - Aim not to move any sediment, water or other material such as weed from one site to another.
 - Thoroughly dry out all the kit you can between uses including wet/dry suits, booties, dinghies and lifejackets.
- If you own or manage a site that visitors/guests bring their own equipment onto, for example, a caravan park, holiday let or campsite, you could include the following in the conditions of use:
 - You must ensure that all personal watersports equipment and clothing are free of sediment, water or biological material before arriving on site, i.e., follow the principles of Check Clean Dry.
- Other resources include the [European Code of Conduct on Recreational Boating and Invasive Alien Species](#) and the [European Code of Conduct on Recreational Fishing and Invasive Alien Species](#).
- Any biosecurity clause should be simple and easy to read, be relevant to the user, and plainly outline what is expected of the user.

Component 5: Biosecurity facilities

Introduction

The term “biosecurity facility” is applied to a designated site or area where practical biosecurity actions, like cleaning and drying, can be carried out. The facility will contain equipment or infrastructure for biosecure cleaning, which can vary greatly, ranging from a simple freshwater hose or dip tank (a trough with fresh water and disinfectant to dunk clothing/equipment into) to a purpose-built waste-capture washdown system.

The availability of biosecurity facilities or the supply of appropriate cleaning equipment plays a vital role in reducing the risk of transferring INNS between locations. Key benefits include:

- **Risk mitigation:** Effective cleaning practices minimise the likelihood of INNS being introduced or spread to new areas, protecting local ecosystems and biodiversity.
- **Improved accessibility:** Providing dedicated facilities or field-kits ensures stakeholders have the necessary tools to clean equipment and PPE properly, even in remote or resource-limited areas.
- **Raising awareness:** Visible biosecurity measures promote awareness among stakeholders about the importance of preventing INNS spread, encouraging consistent cleaning practices.
- **Cost efficiency:** Proactive cleaning reduces the long-term costs associated with managing and controlling established INNS populations.

Simple actions, such as ensuring recreational users clean their equipment with hot water rather than cold, or freshwater rather than seawater can significantly improve biosecurity outcomes.

Stakeholders suggested that the presence of washdown facilities in the SAC is limited (however, note that there has not been a review of available washdown facilities within the SAC). A lack of funding and a lack of understanding of what makes an appropriate washdown facility is also a barrier to the development and uptake of facilities.

How can this be addressed:

- **Primary Responsibility:** asset owners and managers

Stakeholders such as aquaculture operators, marina and harbour managers, and local authorities are ideally positioned to install and maintain biosecurity facilities/equipment. They manage areas where INNS risks are heightened due to frequent equipment and vessel movements.

- **Secondary Responsibility:** all stakeholders

Individuals and organisations interacting with marine environments, including recreational users, research teams, and tour operators, can contribute by improving their access to and use of washdown facilities or field-kits. Simple measures like

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Focus Area 2: Practical Actions

cleaning with hot water instead of cold (or freshwater instead of seawater) can make a significant difference in preventing the spread of INNS.

It is acknowledged that biosecurity facilities may be multi-purpose at many locations and caveated that facilities do not need to be overly complicated or technical (e.g. using hot or cold fresh water to clean rather than cold seawater). Biosecurity facilities that include multiple features (e.g., mechanical cleaning with hot, fresh water and wastewater capture) are more effective than simple measures. Investment in more advanced facilities is therefore encouraged where possible, practical and appropriate.

When planning installations, the following requirements, among other aspects like space and financial resources, should be considered.

- The scale of the facility in proportion to the risk posed by the activity or location e.g.
 - Dip tank for washing/disinfecting equipment
 - Installation of running water and hose pipe for more effective cleaning with freshwater.
 - Cleaning equipment (brushes, boot hooks, wet-vacs etc.) to facilitate cleaning.
 - Installation of high-pressure water to improve the efficacy of cleaning.
 - Availability of hot water to increase the efficacy against organisms.
 - Drying room to speed up drying
 - Slipway for hauling out to improve cleaning and drying.
- Infrastructure required for the collection and disposal of wastewater and waste material in a biosecure way, to prevent INNS from re-entering the marine environment (e.g., water tanks and biological waste bins).
- Supply of necessary resources, like water and electricity
- Guidance on the use of equipment at the facilities, which should be prominently displayed to ensure the correct application of the biosecurity measures.

Additional note: It is difficult to provide a one-size-fits-all recommendation for biosecurity facilities without understanding of a particular site; however, the GBNNSS provide good background information and a (recreation focused) [biosecurity facility support tool](#).

Component 6: Monitoring and reporting

Introduction

Improved INNS monitoring and surveillance are essential for several reasons:

- Establishing a baseline: Systematic monitoring helps to create a comprehensive understanding of which INNS are present and establishes a reference point for detecting changes over time.
- Early detection: Timely identification of new INNS incursions enables stakeholders to respond swiftly, minimising ecological and economic impacts.
- Enhanced understanding: Recording and reporting sightings of INNS provide valuable data on their distribution, behaviours, and potential impacts, aiding informed decision-making and policy development on INNS management.
- Collaborative action: Sharing INNS reports promptly and effectively ensures that stakeholders and authorities remain up to date with species distribution, fostering collaboration and coordinated responses.

INNS monitoring requires an integrated approach by authorities, local stakeholders, and national bodies. By working collaboratively, stakeholders can build on and enhance existing programmes, ensuring a cohesive and unified effort. Such integration maximises the effectiveness of monitoring across all marine pathways and action plans, ultimately strengthening the overall biosecurity framework.

INNS monitoring and surveillance are insufficient in certain areas. Stakeholders are often unaware of what and where to report *ad hoc* sightings. Additionally, data flow is fragmented, data administration slow, and existing mechanisms for reports of priority species reaching authorities are inconsistent, which may delay management response.

How can this be addressed:

- Enhance monitoring and surveillance efforts within the SAC by leveraging activities already conducted by stakeholders. This involves integrating regular inspections, surveys, and reporting into existing workflows (i.e., operational practices) to identify and track INNS.
- **Primary Responsibility:** commercial and asset-managing stakeholders
Organisations such as aquaculture operators, harbour authorities, and other commercial operators that within the SAC could implement more structured surveillance programmes as part of their regular operations (under direction from, or in collaboration with authorities) or ensure that *ad hoc* INNS monitoring takes place as part of routine inspections.
- **Secondary Responsibility:** all stakeholders
Individual users, such as recreational visitors and community members, should also prioritise monitoring and reporting INNS sightings. These efforts may be less formal and can follow best practice guidance but nevertheless provide valuable contributions to the broader surveillance network.

As frequent and knowledgeable users of the marine environment, local stakeholders are best placed to notice when new organisms arrive, or changes occur. It is important that this is reported so that the authorities can be made aware of any new species or changes to species populations. This information can then be used to inform management approaches. Commercial operations and recreational organisations alike should encourage a culture of reporting.

It is important to remember that you don't need to be a marine biologist to be on the lookout for INNS.

If an unusual species or very quick overgrowth of areas that seems out of the ordinary is spotted, that might be a sign that something isn't quite right and should be reported.

Inspection procedures

Methods can range from intensive monitoring programs to routine inspections, to *ad hoc* reporting of sightings. The use of any of these approaches will be reliant on a number of factors including resources (financial, personnel and time), expertise and suitability for the stakeholder (i.e., what fits into their remit). It is, therefore, up to the individual or group to decide what approach to monitoring they are able to implement.

What is needed?

- Standardising monitoring and inspection programmes will help with data comparisons and ensuring a consistent approach to recording. This might include a protocol for marina operatives to visually inspect boat hulls or a set of instructions for all citizen scientists to follow when surveying an area.
- Better recording of INNS sightings is required to help inform decisions by authorities on what, if any, action is needed. This should be encouraged by providing training on identifying and reporting INNS (see [Component 3](#)).
- Stakeholders who are most likely to see marine INNS should be targeted for involvement as much as possible, such as fishers and boat maintenance operatives.
- Incentivise monitoring and inspections by communicating the benefits of understanding the presence and distribution of INNS and tailoring the messaging to the relevant stakeholder.
- To achieve the best survey outcomes, it is recommended that multiple methods are employed (see Table 5). This will enable a thorough approach to covering all relevant habitats and species.
- Survey programmes should be developed or led by authorities or relevant academic institutions. However, all stakeholders can play a role in surveys by, for example, allowing access to their sites, helping with data collection (where appropriate) or deploying equipment.

- Potential methods for use in the marine environment include:
 - Rapid assessment surveys: timed, targeted searches for INNS. These are optimal for detecting fouling organisms but not for planktonic or soft bottom habitat species.
 - Settlement plates/panels: panels placed in key areas for a pre-determined amount of time and checked periodically for marine growth or analysed in a lab. These are optimal for detecting fouling organisms but not for planktonic or soft bottom habitat species.
 - eDNA: requires samples to be sent for laboratory analysis. Can detect the DNA of species that may not be seen during visual surveys.
 - Visual surveys: from the shore, snorkelling or diving.

To note, some of the methods listed above are time consuming, costly and highly specialist. This document is not recommending that all stakeholders undertake these methods. Rather, that these methods (and those in Table 5) could be used in the marine environment.

- Although it is important to fully understand the distribution of INNS, implementing a regular program of surveys for an entire area is often not feasible because of time, budget and resource constraints. As such, some prioritisation of sites should be made based on their risk of introducing or spreading INNS e.g., at key hotspots, such as marinas and ports. The financial costs of some types of surveys can be high. As such, more funding should be allocated for survey programs and research into the risks and pathways of horizon INNS.
- Make sure to [report](#) any *ad hoc* sightings of INNS.

How can I get involved?

- Get involved with citizen science projects and events. For example, the [National Bioblitz Network](#), [Shoresearch](#) or [Seasearch](#).
- Where possible, relevant marina staff, boat cleaners and recreational boaters themselves should inspect their vessels for INNS as part of a regular maintenance and cleaning process. Enhance your species identification skills and get into the habit of taking photographs of fouling on vessels which can be used to cross-reference INNS, using images from the [INSS Gallery](#).
- The inspection process could involve a visual inspection of the watercraft from the surface of pontoons/docks and as the vessel is hauled out for cleaning. INNS should be reported / recorded on iRecord.
- Have an inspection strategy in place for your site in the event of a high-risk incident e.g., the arrival of a visibly heavily fouled vessel. Part of this response could include directly reporting any concerning species to authorities.
- Link with local ecologists, universities or your representatives from Natural Resources Wales to get direction and support on more active approaches to monitoring at your site.
 - For example, they might suggest that your site would be suitable for a settlement panel. This panel is put into the water and left for growth to accumulate on it. It is then checked periodically (e.g., every month). It is important that advice and support is sought by authorities before deploying any structure in the water and that the panel does not hinder site use, cause any hazard/obstruction or is at risk of floating away and becoming litter.
 - You may require help to analyse the species on the panel as many fouling species can be difficult to identify, this could come with a cost.
 - Make sure to report any *ad hoc* sightings of marine INNS. [See reporting best practice](#).

Table 5, summarises some of the survey techniques that could be employed for INNS monitoring in the marine environment. The detail in this table is only intended to provide information on these techniques to aid general understanding. Monitoring methods and survey programmes must be thoroughly and robustly developed before implementing.

Supporting Information

Focus Area 3: Monitoring & Reporting

Table 5. Examples of marine INNS survey methods, the target species groups they may capture, an overview of the method and when they might be undertaken throughout the year. Grey cells annotated with a ‘N’ denote generally sub-optimal monitoring months and blue cells annotated with a ‘Y’ denote generally optimal monitoring months.

Method	Target groups	Method overview	J	F	M	A	M	J	J	A	S	O	N	D
Rapid Assessment Surveys	Fouling species, macroalgae (floating or attached)	Identify several priority sites to survey that represent a cross-section of high-risk or vulnerable areas. Undertake RAS at these sites in the summer months following the Marine Biological Association’s technique . Repeat RAS annually.	N	N	N	N	Y	Y	Y	Y	Y	N	N	N
Trapping	Benthic predatory species (e.g., crabs)	Deploy baited trap and leave for a period of time before retrieving and assessing catch. Deploy multiple traps in different priority locations.	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N
Settlement panels	Fouling organisms	Deploy at the beginning of spring. Check monthly after deployment, photographing the panels at each check and flagging suspected INNS for validation (e.g., removal and testing). Remove panel for the winter months (depending on panel design and material).	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Imaging - diver surveys	Fouling species, macroalgae (floating or attached), benthic and pelagic organisms that can be photographed	Divers take photographs of submerged structures when undertaking inspections or maintenance. Report suspected INNS for verification and response.	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N

Supporting Information

Focus Area 3: Monitoring & Reporting

Method	Target groups	Method overview	J	F	M	A	M	J	J	A	S	O	N	D
Imaging - BRUVS	Benthic and pelagic predatory species, sessile attached macroalgae	Deploy a Baited Remote Underwater Video System (BRUVS) and leave in situ for an appropriate length of time as relates to recording capacity, battery life and daylight hours (e.g., 2 hours). Retrieve and review footage, noting suspected INNS.	N	N	N	N	Y	Y	Y	Y	Y	N	N	N
Imaging - ex situ	Fouling species, macroalgae	Photograph submerged structures and vessels when they are lifted, beached or removed from the water. Report suspected INNS for verification and response.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
eDNA	All species	Sample at priority locations. Repeat sampling at the same locations at regular intervals (e.g. every 6 months). Follow the analysis protocol most appropriate to the monitoring purpose (i.e. targeted PCR for detection of specific species or metabarcoding for a broader, community-based approach).	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Citizen science	All visible species	Citizen scientists report ad hoc sightings for verification or via organised survey events	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

INNS reporting

Reporting INNS sightings can enhance the understanding of the distribution of INNS and their potential impacts.

Which platform should I use and promote?

- A key platform is iRecord, available online at www.irecord.org.uk/ and as the iRecord App (available on Google Play).
- Sightings can also be reported to Natural Resources Wales by email. invasive.non.native@naturalresourceswales.gov.uk
- Getting in touch with the SAC officer may also be useful. SACofficer@PembrokeshireMarineSAC.org.uk



How should I encourage people to record and report INNS?

- Mention and link the key reporting platform ([iRecord](http://www.irecord.org.uk/)) on educational materials, at workshops and in social media engagements. QR codes are a handy way to link readers to the right place.
- Include clear and simple information on how and where to report sightings in all biosecurity materials and resources.
- Encourage users to take photos of sightings and make a note of the sighting location (ideally with GPS coordinates). If possible, they should take some notes about the surroundings (e.g., substrate type, other species in the area, tidal height).
- It should be explained that confirmed or suspected INNS should be reported so that the distribution of INNS can be determined. In turn, this facilitates the production of risk and impact assessments and informs management actions (if required).
- Authorities and other groups using the data should provide regular updates to users of reporting platforms to demonstrate how the data is being used (e.g., new sightings, INNS density/frequency/extent) or publicise success stories (e.g., 'bioblitz'). This will encourage people to keep recording their sightings and continue to engage with INNS monitoring.
 - An example of this could be outreach through NRW social media channels.

Component 7: Collaborative working

Introduction:

Biosecurity is most effective when undertaken collaboratively, particularly across large geographical areas such as an SAC. Open communication, fostering trust, cooperative decision-making, and the sharing of resources and expertise can address challenges more effectively and significantly enhance the likelihood of success.

However, without clear guidance and support from regulators and authorities, stakeholders are uncertain about proceeding with biosecurity implementation. Stakeholders have concerns regarding the early adoption of biosecurity without recognition that their peers are also implementing similar procedures.

How can this be addressed:

- Top-down leadership or active SAC coordination is required and should be complemented by inter-stakeholder collaboration and networks. Mechanisms for dataflow, sharing information, practical advice, and bespoke guidance tailored to both national and local stakeholder needs must be developed and prioritised.
- All stakeholders should work to strengthen communication and collaboration mechanisms, ensuring that practical improvements, best practices and the expert knowledge of stakeholders are effectively shared and considered within national and regional biosecurity implementation.
- Authorities could consider taking the leadership/coordinating role in this process by setting clear frameworks, facilitating dialogue, and ensuring that all voices are heard.
- Impartial guidance is critical in driving coordinated efforts, updating national policy, maintaining transparency, and promoting a proportional approach.
- All stakeholders should endeavour to work collaboratively. However, authorities and national stakeholders are inevitably more likely to be a focal point of collaboration.
- Current research gaps could be published more widely to provide drivers to academia. These in turn should be shared with industry to lead to more widespread practical actions.
 - For example, Natural Resources Wales has published [a list of research priorities for Marine and Coastal Evidence](#).

INNS data flow

Introduction:

Data flow refers to the movement or transfer of data. In the context of INNS reporting, data flow typically involves the collection, transmission, processing, and sharing of INNS records among stakeholders (e.g., researchers, authorities, and other involved parties). Effective data flow ensures that information is efficiently and accurately delivered to the right recipients at the right time. This requires that stakeholders and authorities to work together and keep up to date with species distribution, which, in turn, facilitates early responses to new INNS incursion and supports decision-making and action.

- There is a need for better, more frequent and more widespread data sharing between sectors.
- Authorities should keep open communication channels with local groups, citizen science surveying groups (e.g., Seasearch), the Local Environmental Records Centre ([West Wales Biodiversity Information Centre](#)) and non-governmental organisations (NGOs) (e.g., the Sea Trust and the South and West Wales Wildlife Trust), so that all groups are kept up to date on best practice and data flow developments, knowledge is shared and relevant issues can be discussed.
- Set up or improve data-sharing links and ensure that sightings of high-risk species or new introductions of horizon species are passed to the relevant authority and acted on in a timely manner.
- Universities should be encouraged to advise on best practice and possibly be leveraged for monitoring activities in collaboration with regulators.
- Consider registering for alerts on [iRecord](#) to be notified of new records for target INNS.

How can recording and reporting be made easier?

- Fishers are likely to see INNS in bycatch but do not necessarily have the time to report sightings. Consider ways to streamline reporting or promoting an intermediate step between a sighting and submitting a record.
 - For example, INNS could be added to the [CatchRecording App](#) which commercial fishers use to report their catch.
 - Fishers could collate any INNS sightings for the day/week on paper or in a spreadsheet and an intermediary could input the information on the recording platform.
 - This intermediary could be a volunteer of a local organization such as the Wildlife Trust.