Welsh Fishermen's Association
Cymdeithas Pysgotwyr Cymru

The national voice of Welsh fishermen

Fishermen's recording of invasive non-native marine species

May 2018

Final Report

Funded by Natural Resource Wales, Partnership Funding Programme
April 2016 to May 2018

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SUMMARY

- Funded by Natural Resource Wales' (NRW) partnership programme, the Welsh Fishermen's Association - Cymdeithas Pysgotwyr Cymru (WFA-CPC) and Succorfish developed and trialled a method for fishermen to monitor and record invasive non-native species (INNS) across Wales from April 2016 to March 2018.
- An existing fish recording mobile phone App (CatchApp) developed by Succorfish was adapted to record INNS in Welsh waters.
- Based on their suitability for monitoring by Welsh fishermen, eleven INNS were chosen for the trial: American lobster (*Homarus americanus*), American oyster drill (*Urosalpinx cinereal*), Chinese mitten crab (*Eriocheir sinensis*), American jack knife clam (*Ensis directus*), Kuruma prawn (*Penaeus japonicus*), Mantis shrimp (*Rissoides desmaresti*), Mediterranean mussel (*Mytilus galloprovincialus*), Pacific oyster (*Crasssostrea gigas*), Slipper limpet (*Crepidula fornicata*), Wakame (*Undaria pinnatifida*) and Wireweed *(Sargassum muticum*).
- INNS factsheets and identification guides were produced to inform fishermen and help identify the eleven INNS of interest. Pictures of the INNS were placed on the CatchApp and fourteen fishermen and two shellfish farmers were trained on how to identify and record the INNS during 2016.
- From July 2016 to March 2018, fourteen fishermen across Wales spent a total of 956 hours monitoring their catch in pots, lines, otter trawls and dredges and two shellfish farmers, one working a mussel lay and the other an oyster farm spent a total of 156 hours monitoring their sites.
- Two invasive species were recorded by fishermen in areas where they had been recorded in the past; Slipper limpets were recorded in Oxwich and Swansea Bays and Wireweed in the Menai Straits and Inner Caernarfon Bay. Two American lobsters were reported by pot fishermen in new areas; one was caught in an area called 'The Giblet Shoals' off Pwllheli in August 2016 (verified by NRW) and the other caught off Conwy in November 2017 (verified by a Mermaid Ltd – a local seafood merchant). An unverified report of an American jack knife clam was recorded in Caernarfon Bay in November 2017 and fishermen reported past sightings, including the capture of Chinese mitten crab off Penmaenmawr in 2014 and an American lobster beneath the Great Orme lighthouse around 2006.
- The project, especially following the reporting of the American lobsters generated a lot of publicity and articles in Fishing News, UK Marine Pathways, the Shellfish Association of Great Britain and Welsh Government (WG) newsletters.

- Following the discovery of the American lobsters, WG, NRW and WFA-CPC collaborated to produce and disseminate an information leaflet warning seafood merchants throughout Wales and the public of the dangers of releasing American lobsters into the wild and the importance of reporting sightings. WFA-CPC was also contacted by Magnus Johnson, Hull University who, along with colleagues in Norway and Sweden studied the spread of the American lobster in the North Sea.
- Although most fishermen claimed the recording of absence or presence of INNS on the CatchApp was relatively straightforward, some fishermen operating smaller vessels singlehandedly said it was awkward to record data on iphones at sea, opting to input data once on land. Some fishermen stated they needed reminding to send absence records at the end of every month and two fishermen relied on monthly verbal updates.
- Nine fishermen who participated in the trial and an additional five fishermen across Wales agreed to continue monitoring their catch for INNS voluntarily.
- Three fishermen suggested it would be useful to record other species of interest, such as ocean sunfish (*Mola mola*) and Atlantic bonito (*Sarda sarda*) that could be important indicators of climate change and species of conservation interest, such as crawfish (*Palinurus elephas*).
- The trial proved fishermen and shellfish farmers were able, supportive and willing to monitor and record the absence and presence of INNS in their fishing gear and on shellfish lays. The capture of the American lobsters and ensuing publicity alerted fishermen to the risk our native European lobster face from the invasive species (exposure to deadly diseases such as the bacterial disease gaffkaemia and competition for space and food) and generated a lot of interest within the industry.
- Further discussion with WG, NRW and Succorfish was recommended to determine how a formal INNS monitoring programme using fishermen as sentinels in key areas, such as the periphery of known INNS locations to monitor spread, could be established in Wales and how it could be funded.
- A review of whether and if so how the CatchApp could be improved to make it easier to record at sea, allow other species of interest to be easily recorded and explore whether photographs associated with recordings could be submitted was suggested.
- Involving NRW, a protocol to verify INNS reported by fishermen was recommended
- Covering the entire coast, fishermen are well placed to monitor Welsh inshore waters for INNS and combined with fishing operations, their surveillance offers a cost-effective system for Welsh Government to fulfil its duty to monitor INNS under the EU Marine Strategy Framework Directive, Water Framework Directive and EU Invasive Alien Species Regulation (2014), and inform NRW's Marine Biosecurity Plans.

1. INTRODUCTION

Operating a variety of static and mobile fishing gear and collecting shellfish along the foreshore, fishermen are well placed to monitor the Welsh coastal waters for INNS as part of their daily fishing activity. Constantly 'sampling' their nets and pots and observing their surroundings, fishermen have the potential to be sentinels providing early warning of invasive species. In terms of potential survey effort, fishermen's observations are many orders of magnitude greater than anything obtained through targeted surveys.

Early warning of the presence of INNS can inform Marine Biosecurity Plans to minimise the spread of unwanted species and where appropriate eradication. Invasive species are one of the greatest threats to biodiversity worldwide. They can have negative impacts on native species, fisheries and aquaculture and can threaten whole ecosystems causing serious problems to both the environment and the economy. If a species does arrive in our waters, early detection is essential if any attempt at clearing is to be made. For species that are apparent in isolated or sporadic locations, a level of containment or population management may be possible. However, once a species is abundant or widespread, eradication is likely to be impossible.

The WFA-CPC has been developing fishermen's capability in marine data collection to inform MPA status assessments and statutory marine monitoring since 2011. In collaboration with Swansea University, a 'Marine Ecological Survey Training' course for fishermen was created and the first course took place in Nefyn in 2012, teaching fishermen how to plan and undertake intertidal and subtidal habitat and species surveys, record and present survey data. Following the training course, fishermen assisted NRW with seabed habitat surveys using underwater video equipment in Welsh marine Special Area of Conservation (SAC) areas in 2013 and 2014, helping to verify the presence or absence of protected areas where confidence in past data was low. In Pen Llŷn a'r Sarnau SAC, high quality seabed footage was obtained from 38 sites and used to inform the SAC management plan (WFA 2014)

WFA-CPC has worked with Succorfish to develop their software 'CatchApp' designed to act as an e-log, recording catches of commercial species. The App also recorded a selection of easily identified invasive species (supported by the use of photographic guides) linked to the GPS position of the vessel using an Inshore Vessel Monitoring System (iVMS). The App was trialled by fishermen involved in the Blue Marine Foundation's Lyme Bay initiative where 45 vessels used the iVMS as part of a Fully Documented Fishery project to record species of marine conservation interest in addition to commercial species.

In 2016, the WFA-CPC obtained funding from NRW's partnership funding programme to demonstrate and trial a tool that would enable Welsh fishermen to record INNS over 18 months and encourage the voluntary adoption of the recording system thereafter.

The aim of the project was:

- To establish and trial a method for fishermen to record INNS

The objectives of the project were:

- To develop software to record the presence and absence of INNS on fishing grounds;
- To select INNS that could be captured by fishing gear used in Welsh waters and identified by fishermen;
- To produce identification guides and fact sheets for each INNS;
- To train sentinel fishermen and trial the INNS recording system across Wales for 12 months; and
- To determine whether fishermen could continue to record INNS, the suitability of the recording system and whether the software and reporting method could be improved.

2. METHOD AND APPROACH

The five elements of the project are described in detail below:

2.1 Development of the INNS recording software on CatchApp

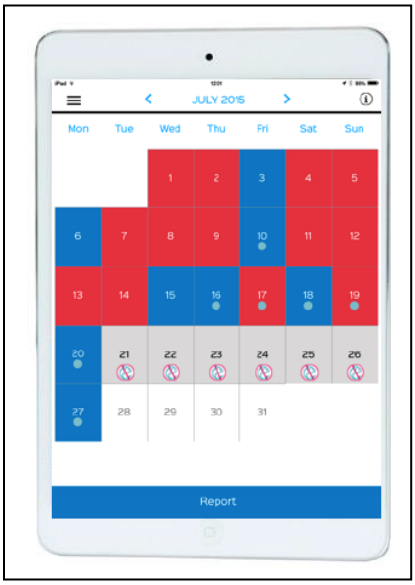
The project began with the development of a robust and credible method for fishermen to record and report the incidence of INNS. Discussions took place with Succorfish and WG to further develop Blue Marine's iVMS linked software on CatchApp to record the precise location of species in a format that fishermen could readily access and use, whilst causing minimal interference with day to day fishing activity.

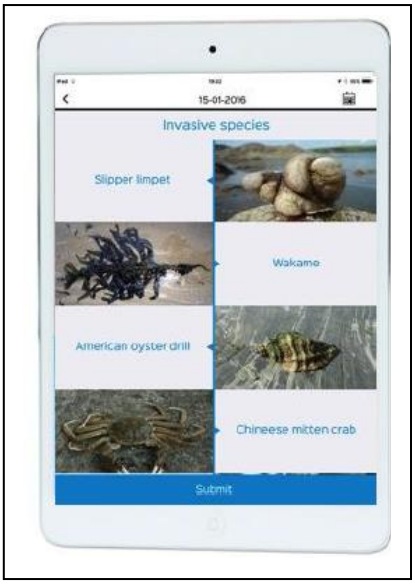
CatchApp could only be installed on iphones and ipads. Using an individual username and secure password, fishermen could login to CatchApp to record their data. The data was confidential and could not be accessed by other fishermen. Participating fishermen agreed to allow their spatial data to be shown at high resolution so as not to reveal the precise location of their fishing grounds. Fishermen whose vessels were fitted with iVMS had the option to record at sea and link the recordings to the precise position of the vessel, whilst skippers of non-iVMS fitted vessels could only record the presence or absence of INNS against a fishing ground pre-recorded on the App or entering the longtitude and latitude manually. To save a named fishing ground on the App for data recording to be assigned, fishermen sent a central coordinate of a fishing ground to Succorfish together with the name of the fishing ground.

Screen shots of the App developed for fishermen to record INNS is shown in Figure 1. below (see Succorfish 2016 for a more detailed description):

Figure 1. Screen shots of the INNS information portal within the CatchApp

A colour coded calendar screen defaults to the present day. Users choose either 'Fishing' or 'Environment' data entry. By selecting a date, users can view previous or add new records (red tiles represent missing reports).





Following an 'Invasive species' entry under 'Environment', pictures of each INNS are provided to aid identification and an absence entry option

Following the entry of an INNS, the number of individuals, the location (which can be provided by a vessel's iVMS, entered manually as latitude and longitude coordinates or a known area pre-recorded on the App can be chosen) and any additional information can be submitted

2.2 Identification of INNS for surveillance

Based on the possibility of fishermen observing INNS caught in fishing gear typically used off the coast of Wales and the relative ease of identifying, WFA-CPC and NRW agreed to monitor eleven INNS.

The suitability assessment, distribution, typical habitat and areas of interest are detailed in table 1 below.

Table 1. Information on the eleven INNS chosen for fishermen to observe

Species	Common name / Type of species	Notes on suitability of monitoring by fishermen	Reported distribution (according to NBN gateway)	Typical habitat	Area of interest
Crepidula fornicata	Slipper limpet	Could be taken in shellfish dredges and observed along the shore. Often attached to other shells, inc mussels, oysters and scallops	Mersey, Milford Haven, St Brides Bay, Carmarthen Bay, Swansea Bay, Bristol Channel	Highest densities in sheltered muddy areas & often attaches to dead and living bivalves	North coast, north west coast of Pembrokeshire & Cardigan Bay
Undaria pinnatifida	Japanese kelp (wakame)	Attached to structures from LW mark down to 15 m. Possibly taken in dredges and trawls.	Holyhead and Milford Haven	Found on hard surfaces, including man-made structures down to 15 m deep.	Around Milford Haven and Holyhead
Urosalpinx cinera	American oyster drill	Shallow water species similar to native species, so may not to be possible to distinguish during normal fishing operations. More likely to be found during aquaculture operations but maybe found during mussel seed dredging.	South coast of England	Lower shore & shallow subtidal down to 12-15m, prefers muddy areas of estuaries and often found feeding on oyster beds.	South Wales, particularly Swansea Bay and Milford Haven and North Wales, particularly the Menai Straits
Eriocheir sinensis	Chinese mitten crab	Could be observed by fishermen operating in estuaries and possible caught in pots and nets in lower estuaries and offshore when adults migrate offshore to reproduce.	Dee, Conwy and Severn	Juveniles occur in lower estuaries & migrate upstream. Adults migrate into deep, open, saltwater to reproduce.	Existing areas and nearby estuaries to the Dee, Conwy and Severn.
Sargassum muticum	Wireweed	Found on fixed gear and taken in shellfish dredges working close inshore	Menai Straits, West Anglesey, North Llyn, Tremadog Bay, Aberystwyth to Llangranog, Fishguard, St Brides Bay, Milford Haven, West Carmarthen Bay, Gower, East Swansea Bay	Grows on hard surfaces in shallow waters and intertidally.	North east coast, east coast of Anglesey, south Llyn, north & south Cardigan Bay, East Carmarthen Bay

Table 1. cont. Information on the eleven INNS chosen for fishermen to observe

Species	Common name / Type of species	Notes on suitability of monitoring by fishermen	Reported distribution (according to NBN gateway)	Typical habitat	Area of interest
Crassostrea gigas	Pacific oysters	Taken in shellfish dredges close inshore and observed on the foreshore cemented to man-made structures and rocks.	Mersey, Conwy Bay, Menai Straits, Anglesey, Morfa Nefyn, Harlech, Barmouth, Milford Haven and Barry	Hard surfaces in the intertidal and subtidal areas of estuaries and coastal waters and in more sediment areas, will settle on small rocks, shells and other oysters.	Dee, Pen Llyn, Cardigan Bay, Carmarthen and Swansea Bay
Marsupenaeus japonicas	Kuruma prawn	Should be possible to distinguish during normal fishing operations, likely to be taken in any operations where native prawns are taken.	Recorded off Pembrokeshire	Coastal waters at depths of 0-90m on sandy sediments (they burrow in the sand during the day and feed on the seabed at night).	Everywhere, particularly Anglesey, Pen Llyn, Cardigan Bay, Pembrokeshire and south Wales
Homarus americanus	American lobster	Species that would be taken by normal fishing practices and would be identifiable by knowledgeable fishermen.	Recorded off the South West coast of England	Inshore and offshore in a range of habitats including mud, bedrock, clay, cobble etc	Everywhere
Ensis directus / Ensis americanus	Atlantic / american jack knife clam	More intertidal and shallow sub-tidal species, may not be found, may find dead shells if cocklers get involved.	Talacre, Gower, south Llyn and two older records in Milford Haven	Sand and muddy sand in the lower intertidal and shallow subtidal of marine and brackish waters	All sandy/muddy areas in the vicinity of known distribution.
Mytilus galloprovincialis	Mediterranean mussel	May be difficult to distinguish, but experienced mussel fishermen likely to be able to distinguish from native species.	Milford Haven, Saundersfoot, Llanbedr (Gwynedd)	From exposed rocky areas to sandy bottoms	Around known locations
Rissoides desmaresti	Mantis shrimp	Characteristic mantis-like claws that is about 10cm long and could be caught in prawn pots.	Tremadog Bay, South Cardigan Bay,	Sand, gravel and mud sediments from lower shore down to 50 m deep	Around known locations

2.3 Production of INNS identification guides and factsheets.

Fishermen were provided with identification guides and fact sheets for the eleven INNS. On their website, the Great Britain Non-native Species Secretariat which has responsibility for helping to coordinate the approach to invasive non-native species in Great Britain, had produced identification guides for five of the INNS and factsheets for nine. The WFA-CPC produced the remaining six identification guides and two factsheets.

Identification guides	*GBINNS:*	American lobster, Slipper limpet, Chinese Mitten crab, Wireweed, Wakame
	WFA:	American oyster drill, American j. knife clam, Kuruma Prawn, Mantis shrimp, Mediterranean mussel and Pacific oyster
Fact sheets	*GBINNS:*	American lobster, Slipper limpet, Chinese Mitten crab, Wireweed, Wakame, American oyster drill, American j. k. clam Kuruma Prawn, Pacific oyster
	WFA:	Mantis shrimp, Mediterranean mussel

Figure 2. An example of an INNS identification sheet produced by WFA-CPC

WFA CPC

www. welshfishermensassociation.wordpress.com

Produced by Mark Gray (WFA)

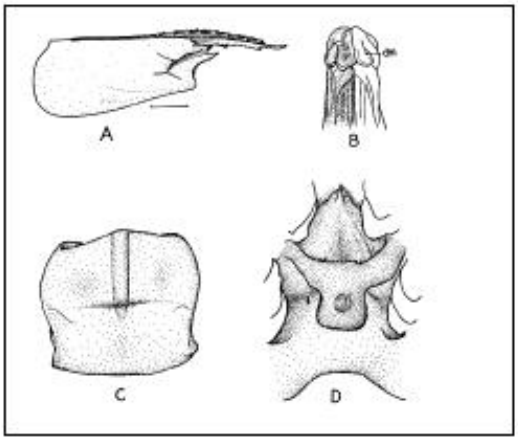
Kuruma prawn

Species Description

Scientific name:	*Penaeus japonicus*	AKA:	Banded shrimp, Japaense king prawn
Native to:	Australia, South-Central Pacific, France and Turkey.		
Habitat:	Adults inhabit coastal waters at depths of 0-90m on sandy sediments. They burrow in the sand by day and feed on the seabed by night.		

Key ID Features

Pale body with brownish red transverse bands and yellow to blue walking legs. Males of *M. japonicus* can reach a total length of 17cm (6.7in), while females may reach 27cm (11in) (Galil, 2006) and a mass of 130grams (4.6oz), making it one of the largest species in the family Penaeidae.The body is pale, with brown bands across the back, while the pereiopods and pleopods (walking and swimming legs, respectively) are pale yellow near their bases, and blue near the tips. The rostrum bears 8–10 spines on the top, and 1–2 below.



A carapace in lateral view (scale = 10 mm);

B distal part of petasma in ventral view, from specimen of cl 37 mm (dm = distomedian lobe);

C thelycum of adult female of cl 31 mm;

D early stage in formation of thelycum (1 = lobe-like projection).

Figure 2. cont. An example of an INNS identification sheet produced by WFA-CPC

Identification throughout the year

Same appearance throughout year

Field Signs

Small burrows in sandy sediments

Distribution

The Kuruma prawn is not thought to be established in GB waters although several records exist from various locations on the south coast of England and one caught off the coast of Pembrokeshire.

Similar Species

Pandulus serratus

Large round-bodied prawn up to 11 cm in length.

Translucent with variable markings but generally red/brown horizontal or oblique lines on the carapace and vertical on the abdomen.

First two walking legs (pereiopods) chelate with yellow and brown banding.

Head region covered by a carapace with a well-developed rostrum with distinct upward curve.

Similar Species

Pandulus elegans

Large round-bodied prawn up to 6.3 cm in length

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Translucent with variable markings but generally red/brown horizontal or oblique lines on the carapace and vertical on the abdomen.

First two walking legs (pereiopods) chelate with yellow and brown banding.

Head region covered by a carapace with a short straight rostrum.

References and further reading

B. S. Galil (November 6, 2006). "*Marsupenaeus japonicus*". Delivering Alien Invasive Species Inventories for Europe. Retrieved February 7, 2012 http://www.europe-aliens.org/pdf/Marsupenaeus_japonicus.pdf

Neal, K.J. 2008. *Palaemon elegans* A prawn. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom.

2.4 INNS recording trial

Meetings to discuss the project, demonstrate how data was recorded on the CatchApp and describe the eleven species of interest took place with fishermen throughout Wales during the summer and autumn 2016. The following fishermen agreed to voluntarily participate in the trial:

Table 2. Fishermen and shellfish farmers who monitored their catch and shellfish lays for INNS from August 2016 to March 2018

Vessel	MFN	Skipper/shellfish gatherer/shellfish farmer	Fishing gear	Fishing ground
Sea Master	BS540	Richard Dyer	Parlour pot, net and line	North West Anglesey
Harmoni	M147	Mark Roberts	Scallop dredge	North Anglesey, Cardigan
Melessa	CO336	Peter Jones	Parlour pot, whelk pot and scallop dredge	North Pen Llyn
Steel Venture	CO452	Dyfed Davis	Fixed gear and scallop dredge	North & West Pen Llyn
William Stanley	CO814	Sion Williams	Parlour pot, whelk pot, net and line	North & west Pen Llyn
Top Cat	CO6	Brett Garner	Parlour pot, net and line	South Pen Llyn
Maria Gratia	B932	John Jones	Seabed mussel cultivation (dredge)	Menai Straits
		James Wilson	Oyster farm (foreshore)	Penrhos Bay (North Anglesey)
Morgan James	CO836	Andy Owen	Parlour pot and line	Menai Straits, North East Anglesey and North Llyn
Larmorna	AB36	Llewellyn & Ryan Hughes	Parlour pot, Prawn pot, Whelk ot	Cardigan Bay
Ma-Nicks	AB229	James Hordley	Parlour pots, Prawn pot, Whelk pot	Cardigan Bay
Danny Boy	SA1	Nigel Saunders	Whelk pot and net	Swansea Bay
Sea Pie	NT28	Dai Bully	Net	Swansea Bay
Girl Eileen	LA7	Phil Wisby	Otter trawl	Swansea Bay
Grace	SA419	Martin Roberts	Otter trawl and net	Swansea Bay
Diana May	A19166	Kevin Denman	Otter trawl and net	Swansea Bay

2.5 Feedback from fishermen and recommendations

Fishermen were regularly contacted during the trial and asked for feedback on the reporting procedure, software, identification of INNS and to make recommendations on how to improve data recording. At the end of the project they were asked the following questions:

a) Was it easy to record the presence and absence of INNS? If not, why?

b) If observed, did you record the presence of INNS? And did you record absence at least every month? If not, why?

c) Will you continue to record presence and absence of INNS on your fishing grounds? If not, why?

d) Could the recording be improved? If so, how?

3. RESULTS

3.1 INNS data recording

Fourteen fishermen spent a total of 956 hours monitoring their catch in parlour pots, whelk pots, gill nets, otter trawls, dredges and on lines, and two shellfish farmers spent 156 hours monitoring their shellfish lays for INNS from July 2016 to March 2018.

Two invasive species were recorded by fishermen in areas where they had been recorded in the past; Slipper limpets were recorded in Oxwich and Swansea Bay and Wireweed in the Menai Straits and Inner Caernarfon Bay. Two American lobsters were reported by pot fishermen in new areas; one was caught in an area called 'The Giblet Shoals' off Pwllheli in August 2016 (verified by NRW) and the other caught off Conwy in November 2017 (verified by a Mermaid Ltd – a local seafood merchant). An unverified report of an American jack knife clam was recorded in Caernarfon Bay in November 2017.

Fishermen also reported past sightings of Chinese mitten crab off Penmaenmawr in 2014 and an American lobster beneath the Great Orme lighthouse around 2006.

3.2 Publicity

Following the reporting of the American lobsters caught off Pwllheli and Conwy, the project generated a lot of publicity and articles were written in:

- Fishing News
- Marine Pathways News (Issue 13 – January 2017)
- Shellfish Association of Great Britain news (Fish on Friday April 2018)
- WG internal newsletter

(see Annex for press articles)

Following the discovery of the American lobsters, WG, NRW and WFA-CPC produced and disseminated the information leaflet below warning seafood merchants throughout Wales and the public of the dangers of releasing American lobsters into the wild and the importance of reporting sightings.

WFA CPC

Cyfoeth Naturiol Cymru Natural Resources Wales

Llywodraeth Cymru Welsh Government

INVASIVE NON-NATIVE SPECIES INFORMATION NOTE

American Lobster (*Homarus americanus*)

Invasive non-native species (INNS) are species that are outside of their natural range and cause significant impacts to native biodiversity, our economic activity and human health.

American lobster is classified as an invasive non-native species in the UK because it is outside its natural range of North Eastern America and it can cause impacts to our local lobster and crab populations. Impacts are caused by outcompeting native populations for food and shelter and the spread of disease.

It is not currently illegal to import American lobsters into the UK. Imports are controlled by the Fish Health Inspectorate through the Lobsters (Control of Deposit) Order 1981 and the Lobster (Control of Importation) Order 1981. However, it is an offence under Section 14 (1) of the Wildlife and Countryside Act 1981 to release or allow to escape in to the wild any animal which is not ordinarily resident or a regular visitor to Great Britain.

Welsh seas are dynamic and support a diverse range of habitats and species. The Welsh Government is committed to maintaining and enhancing our marine life and we are working with partners to prevent the introduction and spread of INNS.

The deliberate or unintentional release of American lobster and other INNS into Welsh waters can have devastating effects. We require the support of all, including local merchants, to raise awareness of the impacts of releasing INNS into our waters.

Please help to maintain and enhance our marine life by reporting any suspected sightings or catches of INNS to either of the following bodies:

- Natural Resources Wales, incidence number: 0800 807060 (24-hour service) or by email enquiries@naturalresourceswales.gov.uk
- Welsh Fishermen's Association (WFA), via mobile phone app Succorfish Catch App.
- GB Invasive Non-Native Species Secretariat website, which also provides further information on INNS, their impacts and how to identify them. http://www.nonnativespecies.org

An identification sheet for American lobster is attached.

WFA-CPC was also contacted by Magnus Johnson, Hull University who, along with colleagues in Norway and Sweden studied the spread of the American lobster in the North Sea.

3.3 Fishermen's feedback

Feedback from the participating fishermen is tabulated below

Questions	Feedback
Was it easy to record the presence and absence of INNS? If not, why?	Eight fishermen and the two shellfish farmers found it straightforward to record data on the App (despite periodic logging in problems as noted below), although seven fishermen found the App too difficult to use at sea and opted to input data on land. Part of the difficulty was the size of iphone screens and number of steps to submit information. Six fishermen reported difficulty logging on to the App at some point during the project.
If observed, did you record the presence of INNS? And did you record absence at least every month? If not, why?	All fishermen said they would have recorded INNS on the App had they observed them. Six fishermen and one shellfish farmer chose not to record absence on the App and report verbally instead. Six fishermen claimed intermittent logging in problems prevented regular data submission. Three fishermen admitted that they needed reminding to submit data via the App every month.
Will you continue to record presence and absence of INNS on your fishing grounds? If not, why?	Nine fishermen who participated in the trial and an additional five fishermen across Wales agreed to continue monitoring their catch for INNS voluntarily. Two fishermen stated they would no longer continue due to ill health and one fishermen stated pressure of work prevented further involvement.
Could the recording be improved? If so, how?	Three fishermen suggested it would be useful to record other species of interest, such as sunfish (*Mola mola*) and Atlantic bonito (*Sarda sarda*) that could be important indicators of climate change and species of conservation interest, such as crawfish (*Palinurus elephas*). Four fishermen suggested more robust, waterproof data recording devices for use at sea

4. DISCUSSION

The trial demonstrated fishermen and shellfish farmers were capable of monitoring, identifying and recording both the presence and absence of INNS on an App. Most of the fishermen involved in the trial and new fishermen were willing to continue to monitor and record data on the App voluntarily, however, further discussion with WG, NRW and Succorfish was recommended to determine how a formal INNS monitoring programme using fishermen as sentinels in key areas could be established in Wales and how it could be funded.

Covering the entire coast, fishermen are well placed to monitor Welsh inshore waters for INNS and combined with fishing operations, their surveillance provides a cost-effective system for Welsh Government to fulfil its duty to monitor for INNS under the EU Marine Strategy Framework Directive, Water Framework Directive and and EU Invasive Alien Species Regulation (2014).

Some fishermen found reporting at sea too difficult (especially when using an iphone) and recorded their data on land and some fishermen opted to report absence verbally which may have been due to the absence option on the App being installed part way through the project. The use of large screens such as an ipad and fewer steps to input data on the App could persuade more fishermen to record at sea.

The project generated a lot of support from industry and a willingness to continue monitoring and recording following the end of the trial. Fishermen recommended expanding the App to record other species of interest (note the App already has this facility). The ability to send pictures from sea to shore could also be considered.

The unconfirmed report of an American jack knife clam caught in Caernarfon Bay showed there was a need to establish a verification procedure, perhaps with NRW whereby staff could be alerted to the recording of an INNS on the App and arrange validation with the recorder.

5. RECOMMENDATIONS

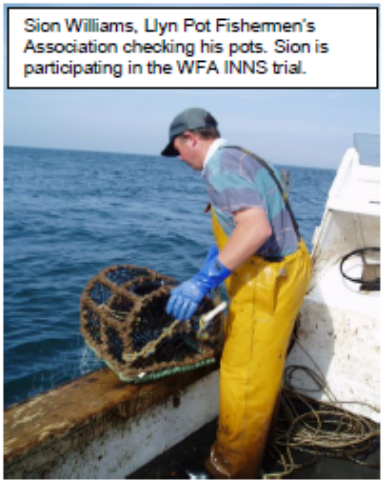
- In collaboration with WG and NRW, decide how fishermen can continue monitoring and recording the absence and presence of INNS, determining which species and where monitoring should be focused.
- Consider revising the App to simplify the submission of data to make it easier to record at sea and improve the ability to record other species of interest and possibly include the provision to record photographs associated with recordings.
- Develop an INNS verification protocol with NRW to validate fishermen's INNS reports.

Annex

Article in Fishing News February 2017

Welsh Sentinel Fishermen Keep Lookout for Invasive Non-native Species

All year round, fishermen at sea and on the foreshore are constantly checking their nets and pots to see what has been caught. This makes them ideally placed to provide early warning of invasive non-native species.



Sion Williams, Llyn Pot Fishermen's Association checking his pots. Sion is participating in the WFA INNS trial.

Invasive non-native species (INNS) are species that are outside of their natural range and cause significant impacts to native marine life, human health and our economic activity.

We are fortunate in Wales to have dynamic seas that support a diverse range of native habitats and species. The Welsh Government works in partnership with marine users to maintain and enhance marine life to ensure our seas remain healthy and productive to support the sustainable use of our seas now and for future generations.

With an ever changing environment, the Welsh Fishermen's Association (WFA) continues to evolve and has been developing fishermen's capabilities in marine data collection to help inform the management and monitoring of our seas.

With their valuable local knowledge and expertise Welsh fishermen are currently involved in surveying and monitoring for the presence of INNS in our waters thanks to a 2-year trial part funded by Natural Resources Wales and the WFA.

The trial has established 12 sentinel fishermen trained in recording INNS using a mobile phone app, Succorfish Catch App, with the help of photographic guides. The app, developed in collaboration with Succorfish, uses GPS through the Inshore Vessel Monitoring System (iVMS) to enable fishermen to provide accurate and real-time data on the location and type of invasive species found. This information will play a key role in understanding the distribution of INNS around Wales and potential threats to native marine life.

The Welsh Government's Cabinet Secretary for Environment and Rural Affairs, Lesley Griffiths (left) welcomes the support of the WFA and its members in collecting INNS data: "I am committed to ensuring Welsh seas are biologically diverse, healthy and productive now and for future generations" she said. "The data collected will increase our understanding of INNS and help towards tackling the threats posed by invasive species to marine life, human health and our economy in Wales".

Together we are working to prevent the introduction and control the spread of INNS and following a successful trial the app will be made more widely available to enable all users to help tackle the threat of INNS.

Article in Marine Pathways News Issue 13 – January 2017

Marine Pathways
Managing marine non-native species

Marine Pathways News

Issue 13 – Jan 2017

Marine pathways work continues throughout Great Britain and Ireland. Here are some updates on the subject of non-native species and on Marine Pathways work.

Carpet sea squirt confirmed in Loch Creran, Scotland

The Carpet sea squirt, *Didemnum vexillum*, has been confirmed in Loch Creran near Oban on the west coast of Scotland. This finding follows previous unconfirmed reports received in January 2016. Loch Creran hosts a number of shellfish and finfish aquaculture sites, marinas, boat services to a nearby port and is popular with recreational divers. Loch Creran is designated under the Habitats Directive as a Special Area of Conservation and is also a nature conservation Marine Protected Area, due to its internationally important biogenic habitats, including serpulid worm reefs, flame shell beds and horse mussel beds. There is a risk that *D. vexillum* may affect these habitats and work will be carried out in 2017 to assess this.

Marine Scotland is working in partnership with the Scottish Environment Protection Agency, Scottish Natural Heritage and with local stakeholders (including relevant industries and the Scottish Association for Marine Science) with a view to containing and limiting the spread of *D. vexillum* and minimising the risk to businesses and the protected features of the loch.

Report Assessing the Impact of Non-Native Species on MPAs

A new report on investigating the impacts of 8 marine non-native species on Marine Protected Areas (MPAs) by SAMs Research Service Limited has recently been published by Natural England. The aim was to gather evidence of impacts of species which don't yet have risk assessments (or would be useful to update our understanding of) and specifically to focus on the impacts to MPA features. A survey was also carried out by experts and stakeholders to identify any useful unpublished and anecdotal information on environmental and socioeconomic impacts.

One of the species assessed in the report - Orange ripple bryozoan (*Schizoporella japonica*)- pictured on a mooring buoy.

The report provides a useful up to date reference source to help assess the condition of our MPAs and their potential susceptibility to these INNS and will also be useful to feed into future risk assessment work. Interesting feedback on potential socioeconomic impacts from survey respondents included necessary hand removal of the leathery sea squirt *Styela clava* from mussel lines, because it is too tough to be removed by the automated brushing system that cleans off native sea squirt species.

American Lobster in Wales

American lobsters are considered a potentially invasive non-native species in the UK due to their potential impact on native species such as lobster and edible crab. Impacts can range from outcompeting native populations for food and shelter and the spread of disease. Last summer off the coast of Pwllheli on the Llŷn Peninsula, a north Wales fisherman caught an American lobster – the first confirmed catch in Welsh waters.

The American Lobster.

The Fisherman reported the catch to the Welsh Fishermen's Association and sent the lobster to Natural Resources Wales (NRW) for identification. NRW positively identified the species using the ventral tooth under the rostrum to distinguish the American lobster from its European cousin, *Homarus gammarus*.

Definition:

Invasive non-native species (INNS):

'A species which has been introduced outside its natural, past or present distribution and has a negative environmental, economic or social impact.'

Case Species:

Caprella mutica (Japanese skeleton shrimp)-

Elizabeth J Cook

Native range:

Sub-boreal waters of North-East Asia.

Impacts:

- Potential to outcompete native species and impact on benthic communities.
- Economic impact associated with fouling of aquaculture equipment.

The Welsh Government is committed to maintaining and enhancing diverse marine life and is working with partners to prevent the introduction and spread of INNS.

Working with the Welsh Fishermen's Association and NRW an information note was produced and widely distributed to raise awareness of the American lobster issue and the devastating affects the deliberate or unintentional release of INNS can have on native populations. The information note also seeks to encourage the reporting of INNS to the relevant authorities.

Welsh Sentinel Fishermen look out for INNS

With their valuable local knowledge and expertise, fishermen are helping to survey and monitor the presence of invasive non-native species (INNS) in Welsh waters. Since 2010, the Welsh Fishermen's Association (WFA) has been working to develop fishermen's capabilities in marine data collection to help inform the management of Marine Protected Areas and statutory marine monitoring.

Sion Williams (Llyn Pot Fishermen's Association) checking his pots. Sion is participating in the INNS app recorder trial.

More recently, working in partnership, the WFA and Succorfish have enhanced an existing mobile phone app to also record invasive species supported by the use of photographic guides. Using GPS through the Inshore Vehicle Management System (iVMS) fishermen are now able to provide accurate and real-time data on the location and type of invasive species found to managers and scientists, information which plays a key role in reducing the spread of INNS around Wales.

In April 2016, part funded by and in collaboration with Natural Resource Wales (NRW), the WFA initiated a two year project to establish sentinel fishermen to record the presence of INNS using the mobile phone app, Succorfish Catch App. A series of workshops were held by the WFA in North, Mid and South Wales where twelve fishermen were trained and are now actively using the app to record INNS, with focus on species including American lobster, American oyster drill, Chinese mitten crab, wireweed, Pacific oysters, Kuruma prawn and slipper limpet.

The Trumpet Tubeworm causes problems in Marina

The Trumpet Tubeworm (*Ficopotamus enigmaticus*) has established a superabundant population in a marina on the North West English coast. Surveys conducted in a collaborative effort by Cumbria Wildlife Trust, Natural England and Marine Biological Association, highlighted the potential impacts of this species. The worms aggregate to build large calcareous reefs on hard surfaces which can frequently reach more than 10cm thick. Settlement panels were densely colonised by mature individuals just eight weeks after deployment, demonstrating the tubeworms capacity to settle and grow rapidly. The tubeworm has also spread to a neighbouring marina since last year on vessel hulls.

A small part of a Trumpet Tubeworm calcareous reef.

Extensive fouling is a significant problem for vessels that are berthed on infested pontoons, as the thick covering of tubeworms can cause significant drag. Consequently, vessel hulls need to be cleaned on a much more regular basis if colonised by the tubeworm, which can be a costly procedure for boat owners. Marina operators are keen to eradicate the tubeworm, and have been advised to flush water through the lock gates regularly in order to minimise larval retention in the otherwise enclosed water body. If larvae are flushed into the open sea they are unable to survive and colonise new sites, as the tubeworm favors nutrient rich, shallow, brackish waters such as marinas and estuaries. Despite these efforts, the superabundant population has remained stable. Other management options may need to be explored to reduce numbers and prevent further spread.

Of interest:

The Honolulu Challenge - The UK Government commits to spending £2.75 million on assisting its Overseas Territories to develop comprehensive biosecurity for invasive non-native species. This includes a commitment of £1 million towards developing comprehensive biosecurity for the Overseas Territories by providing them with access to UK expertise on risk analysis, pathway management, pest identification, horizon scanning, contingency planning, rapid response capability and species management.

Coming up:

Project studying Mitten crab genetics in Europe.

Paul Clark, from the Natural History Museum taking morphometric data from Dee Mitten Crabs as part of DNA analysis work for the project

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Article on SAGB Fish on Friday blog April 2018

FEATURES

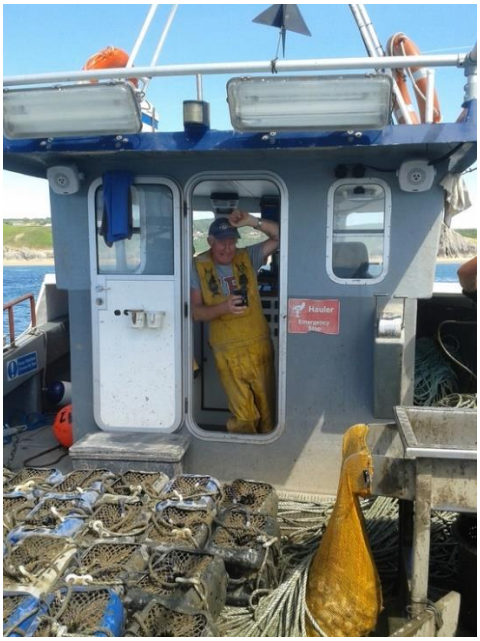
Recording invasive species

Posted on April 13, 2018

Invasive non-native species are one of the greatest threats to biodiversity worldwide.

Quick to establish themselves, invasive species can threaten whole ecosystems and cause serious problems to both the environment and the economy. In Britain, the most problematic land-based invasive species are well known, such as the North American grey squirrel, which has nearly wiped out the UK's native red squirrel, as well as the notoriously fast-spreading Japanese knotweed and rhododendron. Whilst a lot of research has been done on our land-locked invasive species, the impact of our invasive, marine species is less publicised.

Funded by Natural Resource Wales (NRW), and in collaboration with Succorfish, the Welsh Fishermen's Association (WFA-CPC) trained twelve fishermen during 2016 to monitor their catch for invasive species and report their presence on a multi-purpose mobile phone app called Catch App. This innovative app is helping to revolutionise fisheries management as it allows fishermen to instantly collect, record and share fishing data using just their mobile phones. Typically, this information would be recorded using the traditional method of paper and pen, which can result in hours of work for the fishermen!



Nigel Saunders, who works pots for whelks and lobsters, and nets for ray and bass

For this study, the selected fishermen have been monitoring their catch for eleven, pesky invasive species, such as the slipper limpet and the American oyster drill. One of the most concerning invasive species they're looking out for is the presence of the American lobster, which could have a profound effect on the European lobster, as it is far more aggressive and carries a deadly disease that our lobsters aren't resistant to.

Nigel holding a slipper limpet he's caught in Swansea Bay

Since the study launched, slipper limpets and wire-weed have been regularly recorded, whilst two American lobsters have been reported by pot fishermen operating in Tremadog & Conwy Bay. The WFA-CPC, NRW and Welsh Government are urging fishermen and merchants to report catches and sightings. 'If a species does arrive in our waters, early detection is essential if any attempt at clearing is to be made. Reporting non-native species helps to protect commercial species by

identifying sources of potential introduction and promotes good practice to minimise their spread.' If you're a fisherman and would like to participate, please contact Mark Gray: mark@wfa-cpc.co.uk.

For further information about the work of the Welsh Fishermen's Association, sign up to their newsletter at www.WFA-CPC.Wales.

The American lobster caught in Tremadog Bay. Note its distinguishing features – red tipped spines on its rostum, underside of claws usually orange-red and olive green/greenish brown body

Gallery of some of the fishermen participating in the project

January 2017

Photographs of participating fishermen, their vessels, fishing gear and species of interest.

Skipper:	Sion Williams
Fishing vessel:	CO814 William Stanley
Fishing gear:	Pot, net and line
Target species:	lobster, brown crab, whelk, bass, mullet, codling & herring

Sion checking pots (August 2017)

Male cuckoo wrasse (*Labrus mixtus*) (August 2017)

Skipper:	Brett Garner
Fishing vessel:	CO6 Top Cat
Fishing gear:	Pot, net and line
Target species:	lobster, brown crab, bass, mullet and codling

Common goose barnacle (*Lepas (Anatifa) anatifera*) attached to a dhan

(August 2017)

Sponge crab (*Dromia personata*) attached to a lobster pot

(August 2017)

Skipper:	Peter Jones	Fishing vessel:	CO366 Melessa
Fishing gear:	Scallops, pot & net	Target species:	King scallops, whelk, lobster, crab and herring

Skipper: Mark Roberts

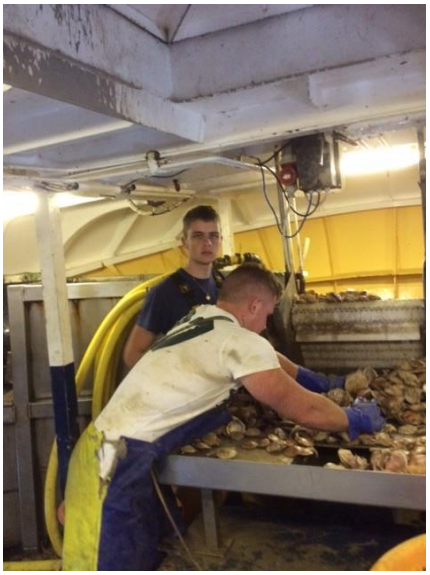
Fishing vessel: M47 Harmoni

Fishing gear: Newhaven spring loaded dredge (king scallops), queenie dredge

Target species: King scallops and queenies

Conveyor taking the catch of king scallops and bycatch below deck for processing

(January 2017)



Sorting the catch of king scallops below deck

(January 2017)

Company: Deppdock Ltd

Fishing vessel: B92 Mare Gratia

Fishing gear: Mussel dredge

Target species: Blue mussel

Washing the mussels

(October 2017)

Sorting mussels on the conveyor grill

(October 2017)

Aquaculture Business: Deepdock Ltd

Activity: Mussel seed speculation

Mussel seed settlement at Whiteford Point

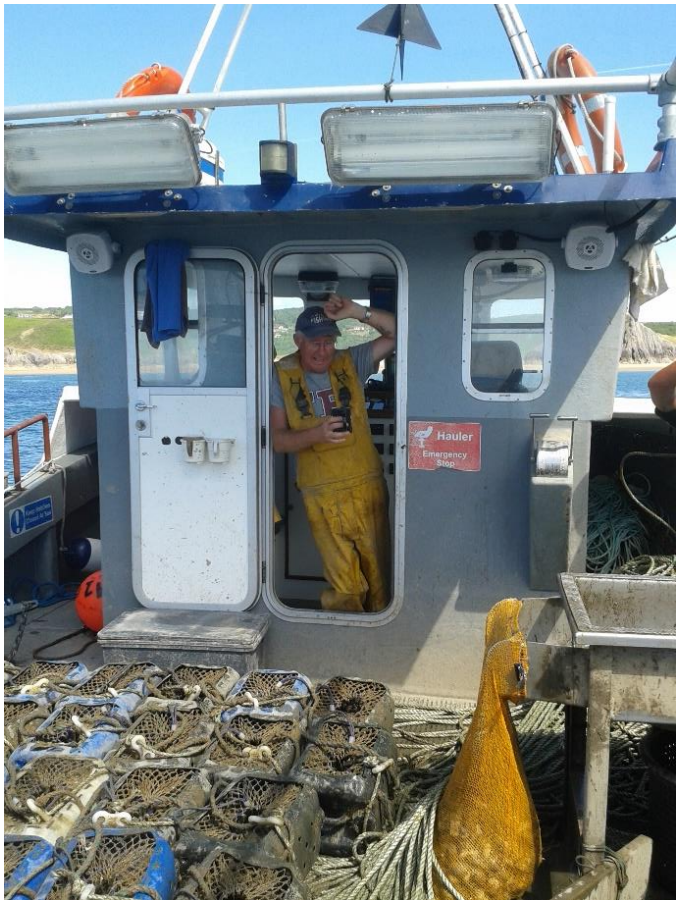
Mussels covered with gut weed, *Ulva intestinalis* at Whiteford Point

Skipper: Nigel Saunders

Fishing vessel: SA1 Danny Buoy

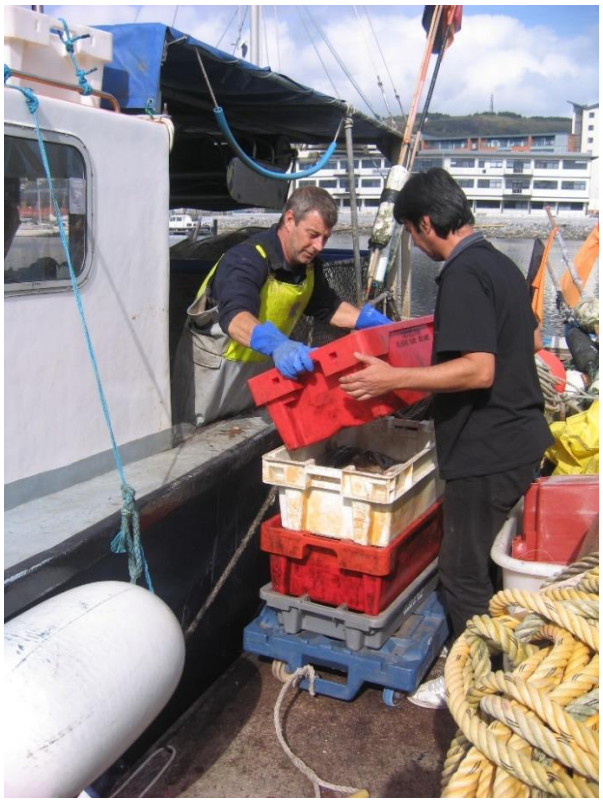
Fishing gear: Whelk pots, lobster pots, ray nets, bass nets, rod and line bass, long line bass fishing.

Target species: Whelk, lobster, ray, bass, crab



Nigel Saunders holding a slipper limpet caught in Oxwich Bay

June 2017



Skipper:	Dai Bulley
Fishing vessel:	NT 28 Sea Pie
Fishing gear:	Ray nets, bass nets, Dover sole nets.
Target species:	Ray, bass and Dover sole,

Skipper:	Dyfed Davies
Fishing vessel:	CO 452 Steel Venture
Fishing gear:	Newhaven spring-loaded scallop dredge, whelk pots.
Target species:	King scallops & whelks

Aquaculture Business:	Mon Shellfish Ltd
Activity:	Oyster farming

Gut weed, *Ulva intestinalis* attached to the legs of oyster frames at Penrhos Bay

June 2017