

# **Monitoring of Marine INNS Using Submerged Settlement Panels**

## **Stranraer Marina and Portpatrick Harbour**

**May to October 2022**

Solway Firth Partnership November 2022



**Stranraer Marina**

**Solway Firth**  
  
**Partnership**

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## 1. Introduction

The GB non-native species secretariat (2015a) defines an invasive non-native species (INNS) as “any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live.” Globally, 84% of marine ecoregions have reported marine invasion (Molnar *et al.*, 2008). In the UK marine environment INNS have the potential to pose a significant threat to native marine biodiversity and commercial interests. NatureScot is the overarching coordinator for NNS in Scotland and lead for terrestrial habitats and wetlands, whilst Marine Scotland lead for marine habitats.

Known impacts of INNS on native biodiversity are the spread of disease, competition for habitat and food and direct predation (GB NNSS, 2015b). Direct impacts include where biological indices display lower scores where INNS are present. Indirect impacts include where INNS densities are so high that a reduction in abundance of other taxa is observed (SEPA, 2013). The major pathways by which marine INNS are introduced include shipping, recreational boating, aquaculture stock movements and natural dispersal (GB NNSS, 2015c). Once INNS have established in a marine ecoregion, they are very difficult or even impossible to eradicate as many filter-feeding marine invertebrate animals live attached to solid surfaces and, along with algae, may be spread along coastlines marina-to-marina as fouling growth on the hulls of leisure craft. For this reason, early detection and monitoring of marine INNS is crucial.

## 2. Method

Six settlement panels (Photo 1) were attached to pontoons within Stranraer Marina on 26 May 2022 (Figure 1). A further two panels, at separate locations were attached to the RNLI pontoon at Portpatrick Harbour (Figure 2) on the same day.



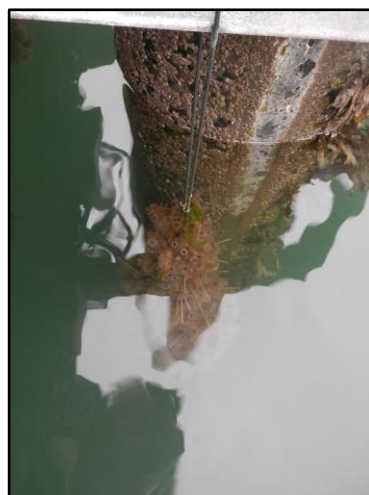
**Photo 1– Complex Correx panel structure**



**Photo 2 - Attaching panels**



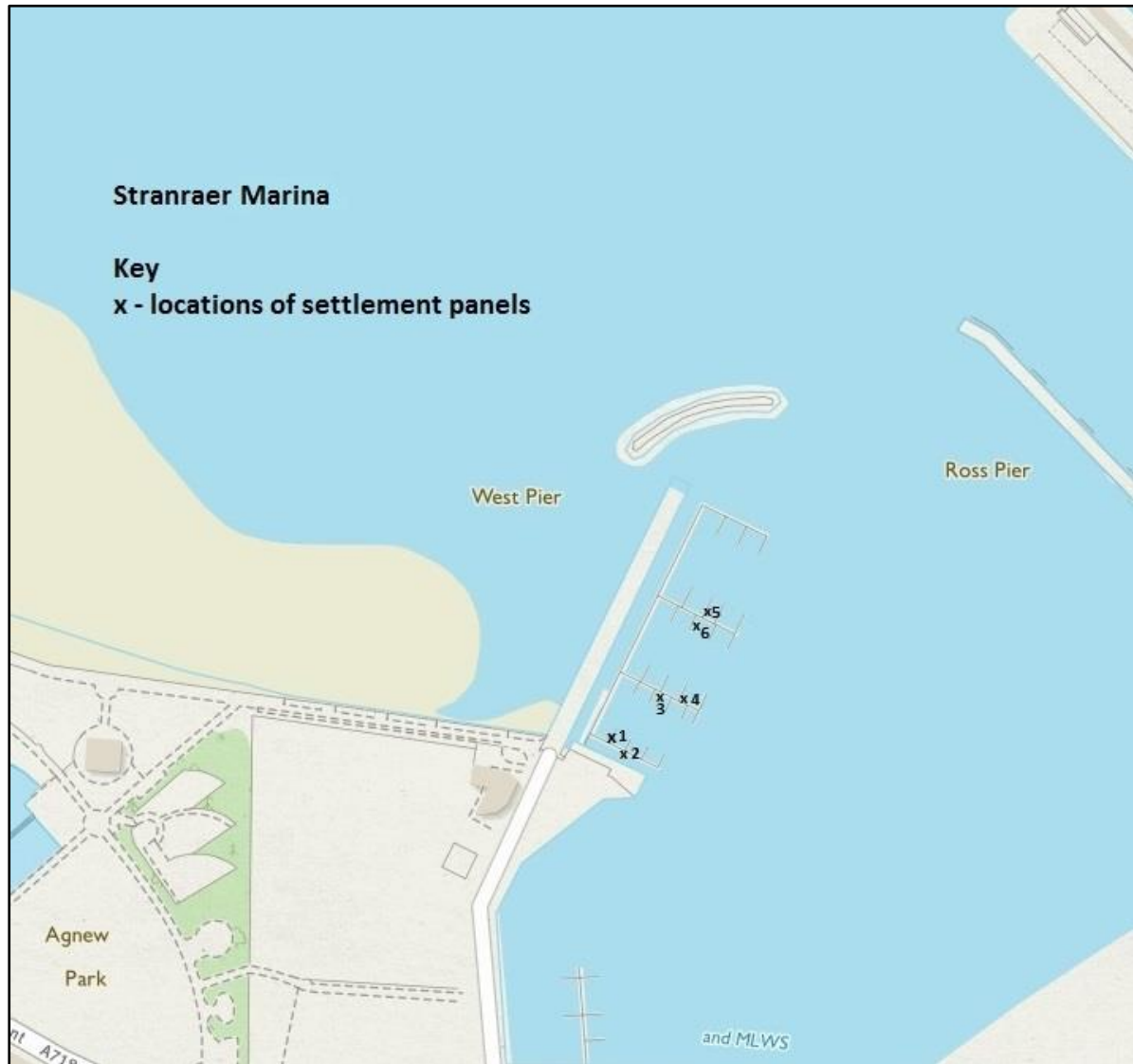
**Photo 3 - Submerged complex Correx panel**



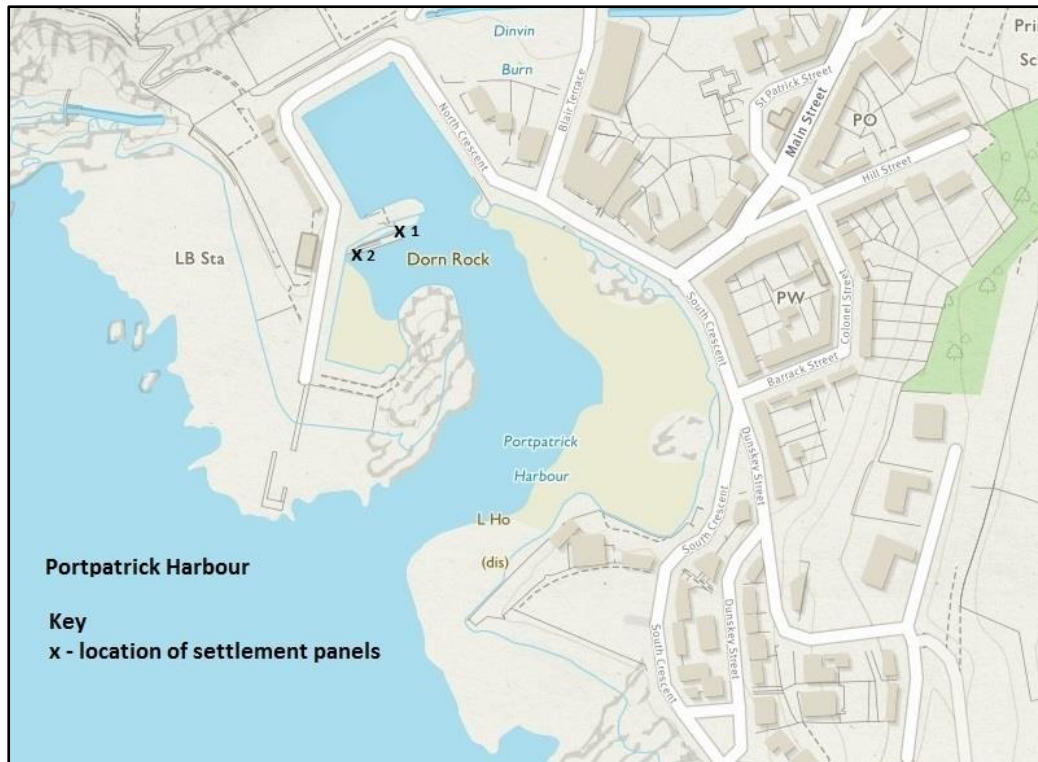
**Photo 4 – Colonised panel**

The panels were attached to the underside of the pontoons (Photos 2) and submerged to around one metre depth using strong paracord or twine and weighed down with 6 oz fishing weights (Photo 3). The panels provided a substrate for growth (Photo 4).

Stranraer was chosen as a repeat site for monitoring due to the ease of installing the panels and because the site is active with both recreational and fishing boats using the port. Portpatrick was also chosen as an active harbour used by mostly small recreation, tourism and fishing boats.



**Figure 1 - Stranraer Marina, Location of Settlement Panels, 1 – 6**



**Figure 2 - Portpatrick Harbour, Location of Settlement Panels, 1 – 2**

At the end of summer (5 October 2022) the panels at Stranraer were collected, photographed (Photos 5 and 6), scored for percentage cover of surface species and then appropriately discarded. Mobile organisms, including barnacle cyprids and crabs were also noted.



**Photo 5 – Panel, Stranraer**



**Photo 6 – Panel, Portpatrick**

In addition, other species present on buoys and on the underside of the pontoon were noted (Photos 7,8).



Photo 7 – Growth on buoy, Stranraer



Photo 8 – Growth on buoy, Stranraer

### 3. Results

Five out of the six panels installed at Stranraer were successfully recovered and assessed. Both panels installed in Portpatrick marina were recovered.

#### **Stranraer Marina**

The species diversity was similar to that recorded in the 2021 survey but with lower levels of coverage of some species such as sea squirts and peacock worms. The community was again representative of a west coast harbour environment, with many individuals at a mature stage of development.

In Stranraer marina, the native tunicate, *Ascidella aspersa* (Photo 9), appeared to be prevalent on most recovered panels. However, there appeared to be a lower coverage of this species than noted in previous years. The peacock worm, *Sabella pavonina*, was again less prevalent than in previous years. The green algae, *Cladophora rupestris*, was apparent on all panels.

The native tunicates ranged in size from 1 cm to >10 cm across all recovered panels. Other commonly observed species included the sponge, *Sycon ciliatum* (Photo 10). The bryozoan, *Conopeum reticulum* (Photo 11), was recorded along with the feather star, *Antedon bifida* (Photo 12); and various crabs including the hairy or bristly crab, *Pilumnus hirtellus* (Photo 13); and a sea slug, *Polycera quadrilineata* (Photo 14). Several shells were noted including Variegated scallop, *Mimachlamys varia* and oysters, including Saddle oyster, *Anomia ephippium* (both on Photo 15). Also noted was the tube worm, *Pomatoceros triqueter* (Photo 16).

There appeared to be fewer marine invasive species in Stranraer on the settlement panels than the previous recording in 2021 – there was occasional Japanese skeleton shrimp, *Caprella mutica*, and Darwin's barnacle, *Elminius Modestus*. There were several orange-tipped sea squirt, *Corella eumyota*; although fewer than noted in previous years.

A complete species list is found at Appendix 1.



Photo 9 - Native tunicate, *Ascidiella aspersa*



Photo 10 – Sponge, *Sycon ciliatum*

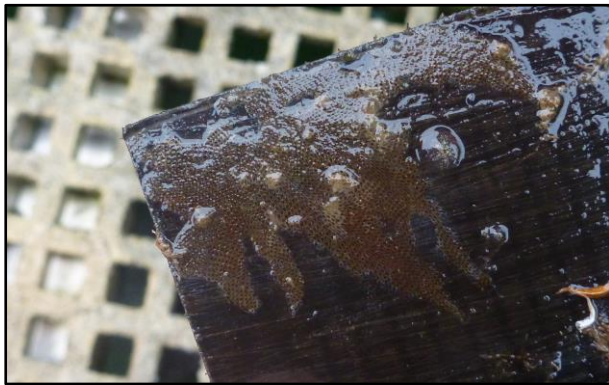


Photo 11 – Bryozoan, *Conopeum reticulum*



Photo 12 – Feather star, *Antedon bifida*



Photo 13 – Hairy crab, *Pilumnus hirtellus*



Photo 14 – Sea slug, *Polycera quadrilineata*



Photo 15 – Variegated scallop and oyster



Photo 16 – Tube worm, *Pomatoceros triqueter*

## Portpatrick Harbour

The species diversity of the two panels at Portpatrick was like that recorded in the 2021 survey.

The two panels in Portpatrick had less growth than in Stranraer (Photos 17 and 18) with Panel 2 having less coverage of tunicates than Panel 1. However, it did have more growth of green algae, *Cladophora rupestris*.



Photo 17 - Panel 1, Portpatrick



Photo 18 - Panel 2, Portpatrick

The panels both showed growth of several species of sea squirt including the tunicate, *Asciidiella aspersa* (Photo 19), the orange-tipped sea squirt, *Corella eumyota* and a sea squirt, possibly *Ciona intestinalis* (Photo 20). Other species noted included various

small crabs (Photo 21), Star Ascidian, *Botryllus shlosseri* (Photo 22); the green algae, *Cladophera rupestris* (Photo 23) and Coralweed, *Corallina officinalis* (Photo 24).



Photo 19 – sea squirt, *Ascidella aspersa*



Photo 20 - possibly *Ciona intestinalis*



Photo 21 – Edible Crab, *Cancer pagurus*



Photo 22 – Star Ascidian, *Botryllus shlosseri*

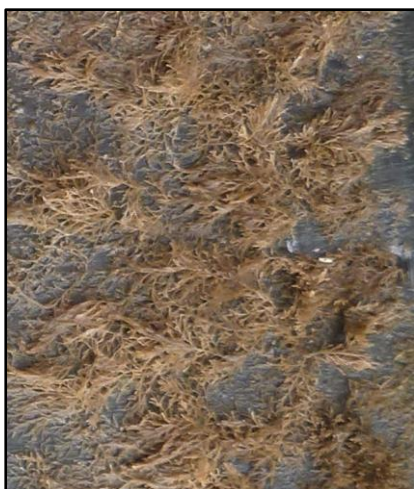


Photo 23 - *Cladophera rupestris*



Photo 24 – Coralweed, *Corallina officinalis*

#### 4. Conclusion

Both the invasive Japanese skeleton shrimp, *Caprella mutica*, and the orange-tipped sea squirt, *Corella eumyota*, were found in the current study, although in much lower numbers than in previous years.

The current study suggests re-visiting both marinas again in the growing season of 2023 to see if species assemblage or if the spread of INNS has changed. Both sites would also benefit from another rapid site assessment, to allow for a more thorough INNS assessment, beyond the area in which the panels had been deployed.

Continued awareness of INNS gained from the use of the panels and the rapid site assessments will allow for improved biosecurity control of invasives at the two locations. It is recommended the use of the current 3D scratched surface panel design is continued, as this seems to encourage a representative level of growth.

Panels should also aim to be removed prior to any major storms, as even though this may result in a reduced soak time, it could prevent the loss of panels to the environment.

## 5. References

Finlay, J.A., Callow, M.E., Schultz, M.P., Swain, G.W. and Callow, J.A., (2002). Adhesion strength of settled spores of the green alga *Enteromorpha*.

Molnar JL, Gamboa RL, Revenga C & Spalding MD (2008). Assessing the global threat of invasive species to marine biodiversity. *Frontiers in Ecology and the Environment*, 6. 485-492.

GB NNSS (2015a). *Definition of Terms*. Online at <http://www.nonnativespecies.org/index.cfm?pageid=64> [accessed 01.10.18].

GB NNSS (2015b). *Check, Clean, Dry*. Online at <http://www.nonnativespecies.org/checkcleandry/index.cfm> [accessed 18/03/15].

GB NNSS (2015c). *Monitoring for NNS*. Online at <http://www.nonnativespecies.org/index.cfm?pageid=477> [accessed 01.10.18].

SEPA (2013). Natural Scotland Managing Invasive Non-Native Species in Scotland's Water Environment. A supplementary Plan to the River Basin Management Plans. SEPA on behalf of the Scottish Government. December 2013. Available at: [https://www.sepa.org.uk/media/37362/managing-invasive-non-native-species\\_plan.pdf](https://www.sepa.org.uk/media/37362/managing-invasive-non-native-species_plan.pdf) [accessed 01.10.18].

Solway Firth Partnership (2012). Marine Invasive Non-Native Species in the Solway. A report prepared by the Solway Firth Partnership. Available at: <http://www.solwayfirthpartnership.co.uk/uploads/Marine%20Invasive%20Non-native%20Species/Marine%20INNS%20in%20Solway%202013.pdf> [accessed 01.10.18].

Solway Firth Partnership (2015). Marine Invasive Non-Native Species in the Solway, Revised for 2015-18.

A report prepared by the Solway Firth Partnership. Available at: <http://www.solwayfirthpartnership.co.uk/uploads/Marine%20Invasive%20Non-native%20Species/Marine%20INNS%20in%20Solway%202013.pdf> [accessed 01.10.18].

## Appendix 1 – List of Species Recorded

STRANRAER MARINA								
Panel No	Grid Ref	Species - Common Name	Species - Latin Name	Abundance	Invasive sp	Abbrev	Scale Super	%
1	NX0587861181	Sea squirt	<i>Ascidrella aspersa</i>	A	N	S	Abundant	80 - 100
	NX0587861181	Sponge	<i>Sycon ciliatum</i>	O	N	A	Abundant	40 - 80
	NX0587861181	Orange-tipped sea squirt	<i>Corella eumyota</i>	O	Y	C	Common	20 - 40
	NX0587861181	Shore Crab	<i>Carcinus maenas</i> <i>Pomatoceros</i>	R	N	F	Frequent	10 - 20
	NX0587861181	Tube worm	<i>triqueter</i>	R	N	O	Occasional	5 - 10
	NX0587861181	Star ascidian	<i>Botryllus shlosseri</i>	R	N	R	Rare	<5%
	NX0587861181	Sea lettuce	<i>Ulva lactuca</i> <i>Cladophora</i>	R	N			
	NX0587861181	Green seaweed	<i>rupestris</i>	O	N			
	NX0587861181	Saddle oyster	<i>Anomia ephippium</i>	O	N			
	NX0587861181	Darwin barnacle	<i>Elminius modestus</i>	O	Y			
	NX0587861181	Variable scallop	<i>Chlamys varia</i>	R	N			
	NX0587861181	Feather star	<i>Antedon bifida</i>	R	N			
2	NX0588561176	Sea squirt	<i>Ascidrella aspersa</i>	F	N			
	NX0588561176	Sponge	<i>Sycon ciliatum</i>	O	N			
	NX0588561176	Orange-tipped sea squirt	<i>Corella eumyota</i>	O	Y			
	NX0588561176	Hairy Crab	<i>Pilumnus hirtellus</i> <i>Pomatoceros</i>	R	N			
	NX0588561176	Tube worm	<i>triqueter</i>	R	N			

3	NX0588561176	Sea lettuce	<i>Ulva lactuca</i>	R	N
			<i>Cladophora</i>		
	NX0588561176	Green seaweed	<i>rupestris</i>	O	N
	NX0588561176	Saddle oyster	<i>Anomia ephippium</i>	O	N
			<i>Conopeum</i>		
	NX0588561176	Bryozoan	<i>reticulum</i>	O	Y
	NX0588561176	Peacock worm	<i>Sabella pavonina</i>	R	N
	NX0588561176	Feather star	<i>Antedon bifida</i>	R	N
			<i>Eupolymnia</i>		
	NX0588561176	Annelid worm	<i>nebulosa</i>	R	N
	NX0590261199	Sponge	<i>Sycon ciliatum</i>	R	N
	NX0590261199	Sea squirt	<i>Ascidella aspersa</i>	F	N
			<i>Cladophora</i>	O	
	NX0590261199	Green seaweed	<i>rupestris</i>		N
	NX0590261199	Leathery sea squirt	<i>Styela clava</i>	R	Y
	NX0590261199	Sea lettuce	<i>Ulva lactuca</i>	R	N
	NX0590261199	Peacock worm	<i>Sabella pavonina</i>	O	N
	NX0590261199	Feather star	<i>Antedon bifida</i>	R	N
	NX0590261199	Saddle oyster	<i>Anomia ephippium</i>	R	N
	NX0590261199	Star ascidian	<i>Botryllus shlosseri</i>	R	N
			<i>Pomatoceros</i>	R	
	NX0590261199	Tube worm	<i>triqueter</i>		N
	NX0590261199	Velvet crab	<i>Necora puber</i>	1	N
	NX0590261199	Darwin barnacle	<i>Elminius modestus</i>	R	Y
		Long Clawed Porcelain		R	
	NX0590261199	Crab	<i>Pisidia longicornis</i>		N

This panel was lost

NX0591961232	Sponge	<i>Sycon ciliatum</i>	O	N
NX0591961232	Sea squirt	<i>Ascidrella aspersa</i>	F	N
		<i>Cladophora</i>	O	
NX0591961232	Green seaweed	<i>rupestris</i>		N
NX0591961232	Saddle oyster	<i>Anomia ephippium</i>	O	N
NX0591961232	Peacock worm	<i>Sabella pavonina</i>	O	N
NX0591961232	Sea lettuce	<i>Ulva lactuca</i>	R	N
NX0591961232	Prawn sp	<i>Palaemon sp</i>	R	N
		<i>Pomatoceros</i>	O	
NX0591961232	Tube worm	<i>triqueter</i>		N
NX0591961232	Boot-lace weed	<i>Chorda filum</i>	R	N
NX0591961232	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	Long Clawed Porcelain		R	
NX0591961232	Crab	<i>Pisidia longicornis</i>		N
NX0591961232	Feather star	<i>Antedon bifida</i>	R	N
		<i>Conopeum</i>	R	
NX0591961232	Bryozoan	<i>reticulum</i>		N
NX0591961232	Darwin barnacle	<i>Elminius modestus</i>	R	Y

6	NX0592661231	Sponge	<i>Sycon ciliatum</i>	R	N
	NX0592661231	Sea squirt	<i>Ascidella aspersa</i>	A	N
			<i>Cladophora</i>	F	
			<i>rupestris</i>		N
	NX0592661231	Green seaweed			
	NX0592661231	Peacock worm	<i>Sabella pavonina</i>	O	N
	NX0592661231	Sea lettuce	<i>Ulva lactuca</i>	R	N
			<i>Pomatoceros</i>	O	
			<i>triqueter</i>		N
	NX0592661231	Tube worm	<i>Eupolymnia</i>	R	
			<i>nebulosa</i>		N
	NX0592661231	Annelid worm			
	NX0592661231	Variable scallop	<i>Chlamys varia</i>	R	N
	NX0592661231	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NX0592661231	Saddle oyster	<i>Anomia ephippium</i>	R	N
	NX0592661231	Irish Moss	<i>Chondus crispus</i>	R	N
	NX0592661231	Long Clawed Porcelain		R	
	NX0592661231	Crab	<i>Pisidia longicornis</i>		N
	NX0592661231	Japanese skeleton shrimp	<i>Caprella mutica</i>	O	Y
	NX0592661231	Feather star	<i>Antedon bifida</i>	R	N

Other species on buoys

Chitin sp	
Common Mussel	
Anemone sp	
	<i>Polycera</i>
Sea slug	<i>quadrilineata</i>

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PORTPATRICK MARINA Panel No	Grid Ref	Species - Common Name	Species - Latin Name	Abundance	Invasive sp
1	NW9981354146	Sea squirt	<i>Ascidrella aspersa</i> <i>Cladophora</i>	O	N
	NW9981354146	Green seaweed	<i>rupestris</i>	A	N
	NW9981354146	Sea squirt	<i>Ciona intestinalis</i>	R	N
	NW9981354146	Sea lettuce	<i>Ulva lactuca</i>	R	N
	NW9981354146	Edible Crab	<i>Cancer pagurus</i>	R	N
	NW9981354146	Oyster sp	<i>Unsure</i>	R	N
	NW9981354146	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NW9981354146	Sponge	<i>Sycon ciliatum</i>	O	N
2	NW9979154137	Sponge	<i>Sycon ciliatum</i>	O	N
	NW9979154137	Sea squirt	<i>Ascidrella aspersa</i> <i>Cladophora</i>	F	N
	NW9979154137	Green seaweed	<i>rupestris</i> <i>Pomatoceros</i>	C	N
	NW9979154137	Tube worm	<i>triqueter</i>	O	N
	NW9979154137	Sea lettuce	<i>Ulva lactuca</i>	R	N
	NW9979154137	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NW9979154137	Orange-tipped sea squirt	<i>Corella eumyota</i>	O	Y
	NW9979154137	Coralweed	<i>Corallina officinalis</i>	O	N
	NW9979154137	Oyster sp	<i>Unsure</i>	R	N
	NW9979154137	Sea squirt	<i>Ciona intestinalis</i>	R	N
	NW9979154137	Edible Crab	<i>Cancer pagurus</i>	R	N