Monitoring of Marine INNS Using Submerged Settlement Panels

Stranraer Marina and Portpatrick Harbour

May to September 2019

Solway Firth Partnership October 2019

Stranraer Marina

Solway Firth Partnership

Table of Contents

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. Scottish Natural Heritage 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 introduction is crucial.

2. Method

Six settlement panels (Photo 1), were attached to pontoons within Stranraer Marina on 9 May 2019 (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

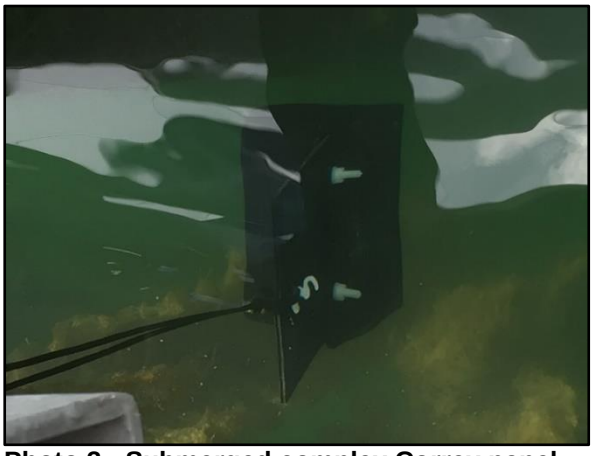

Photo 3 - Submerged complex Correx panel

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).

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.

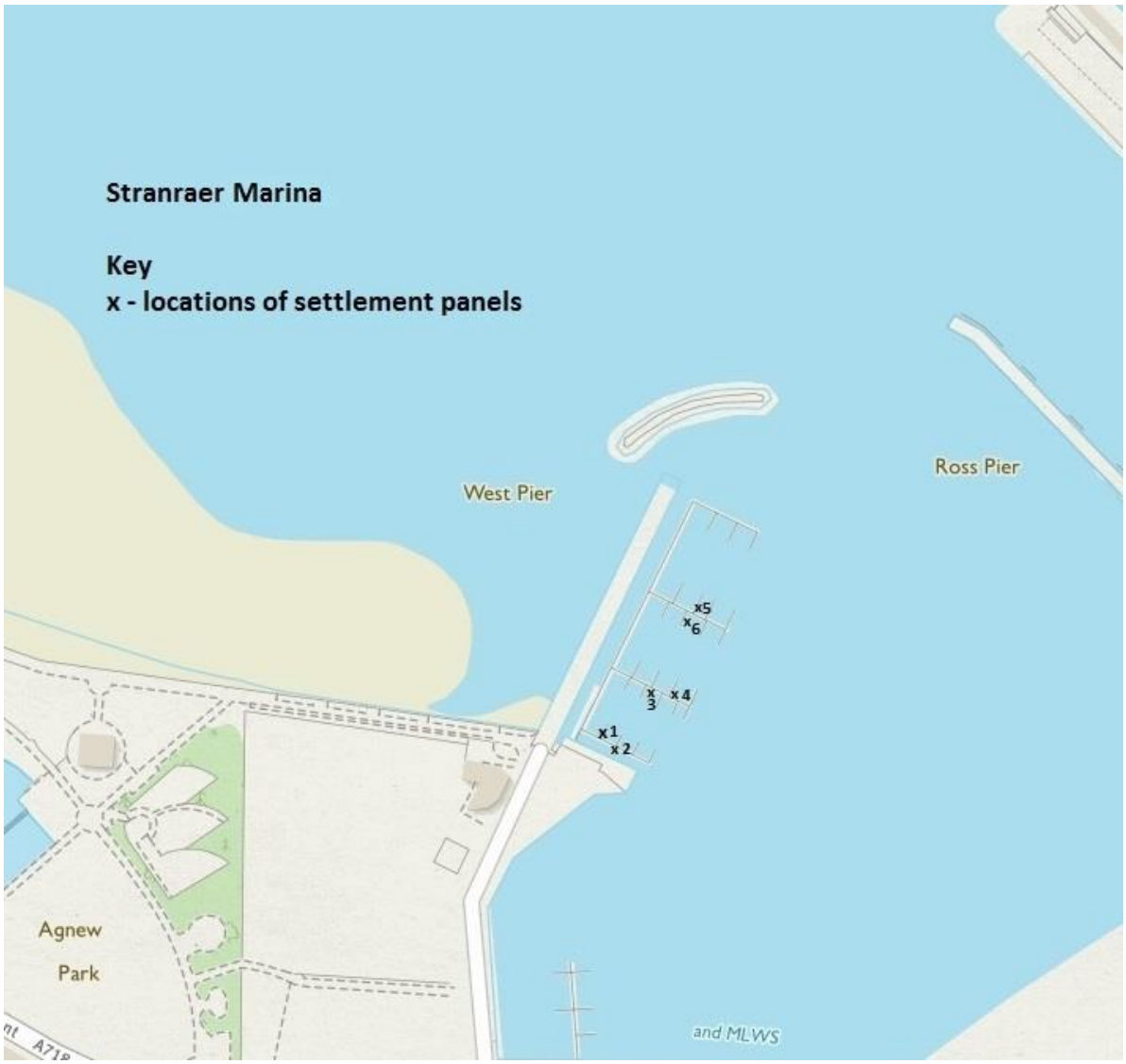

Figure 1 - Stranraer Marina, Location of Settlement Panels, 1 – 6

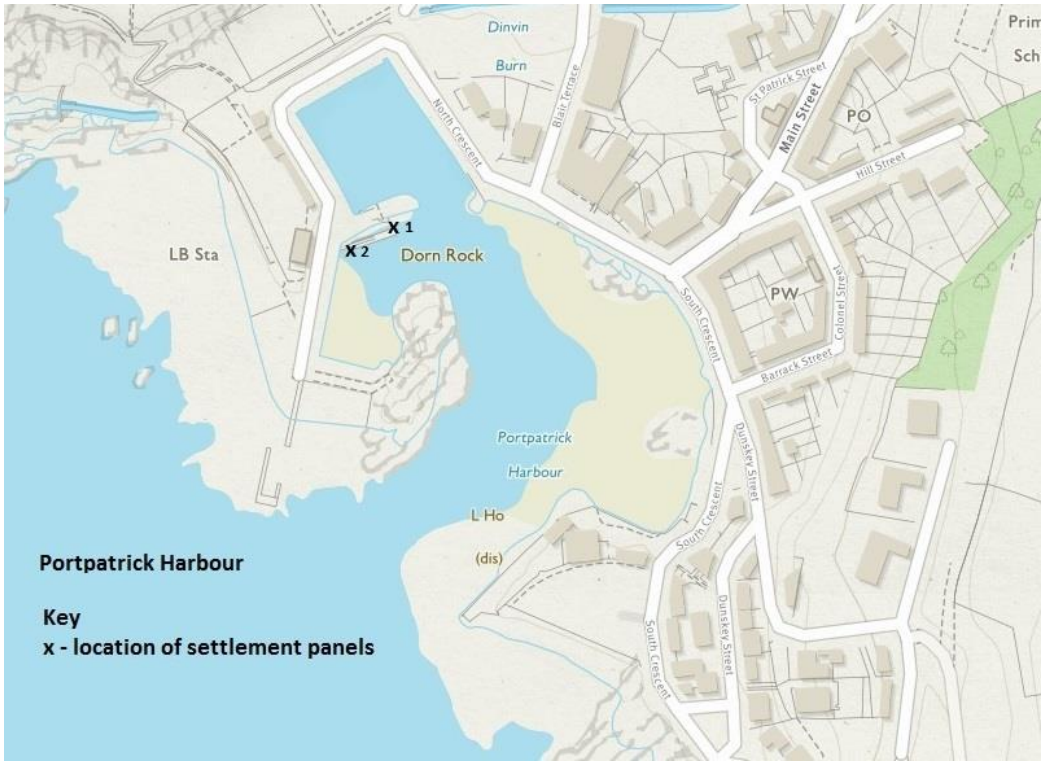

Figure 2 - Portpatrick Harbour, Location of Settlement Panels, 1 – 2

At the end of summer (30 September 2019) the panels at Stranraer were collected, photographed (Photos 4 and 5), scored for percentage cover of surface species and then discarded. Mobile organisms, including barnacle cyprids and crabs were counted individually.

Photo 4 – Panel with growth

Photo 5 – Panel at Stranraer Marina

In addition, other species present on buoys and on the underside of the pontoon were recorded (Photos 6 and 7).

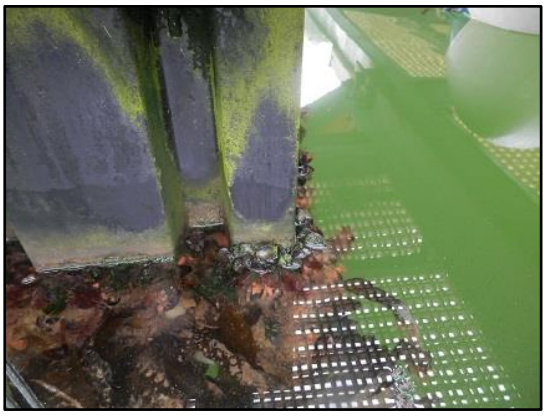

Photo 6 – Underside of a pontoon

Photo 7 – Growth on pontoon

3. Results

Five of the six panels installed at Stranraer were successfully recovered and assessed. In addition, a panel overlooked last year was also rediscovered and assessed. Neither of the two panels installed in Portpatrick marina were recovered. It was thought that a new twine that had been used on the Portpatrick panels and one of the Stranraer panels disintegrated in the water.

A Rapid Assessment Survey (RAS) was also conducted at Stranraer, looking at the pontoons, buoys and vessels present. There were no additional species noted that were not recorded on the settlement panels. An assessment was not conducted at Portpatrick, as the floating pontoon where the panels were anchored was relatively small with no buoys available for inspection.

Species diversity was similar to that recorded in the 2018 survey but with some additional species not noted previously. The community was again representative of a west coast harbour environment, with many individuals at a mature stage of development.

The native tunicate, *Ascidiella aspersa* (Photo 8) *as* well as the green algae, *Cladophora rupestris,* appeared to dominate the assemblage of most recovered panels. The peacock worm, *Sabella pavonina,* was less prevalent than in the previous year.

The native tunicates ranged in size from 1 cm to >10 cm across all recovered panels. Other commonly observed species included: the encrusting worm, *Pomatoceros triqueter*; saddle oyster, *Anomia ephippium;* blue mussel, *Mytilus edulis;* Shore Crab, *Carcinus maenas;* star ascidian*, Botryllus shloesseri* (Photo 9)*;* sea louse*, Species unknown;* sea lettuce*, Ulva lactuca;* Darwins barnacles*, Elminius modestus* and the sponge *Sycon silicium* (Photo 10).

Stranraer panels hosted species that had not been found in previous monitoring surveys. These included the annelid worm, *Eupolymnia nebulosi* (Photos 11, 12); variegated scallop, *Chlamys varia* (Photo 13) and an unidentified species of colonial sea squirt (Photo 14). A complete species list is found at Appendix 1.

The marine invasive species identified in Stranraer on the settlement panels were the same as last year - orange-tipped sea squirt, *Corella eumyota*; Japanese skeleton

shrimp, *Caprella mutica* (Photos 15, 16, 17) and Darwin's barnacle, *Elminius modestus.* The Harbour Master will be sent a copy of this report.

Photo 8 - Native tunicate, *Ascidiella aspersa*

Photo 9 – Star ascidian

Photo 10 – Sponge, *Sycon ciliatum*

Photo 11 - Annelid worm, *Eupolymnia nebulosa*

Photo 12 - Annelid worm, *Eupolymnia nebulosa*

Photo 13 - Variegated scallop, *Chlamys varia*

Photo 14 – Unidentified sea squirt

Photo 15 – Japanese skeleton shrimp

Photo 16 – Japanese skeleton shrimp

Photo 17 – Japanese skeleton shrimp

4. Conclusion

Both the invasive Japanese skeleton shrimp, *Caprella mutica*, and the orange-tipped sea squirt, *Corella eumyota* were found in the current study, as had been recorded in previous years.

The current study suggests re-visiting both marinas again in the growing season of 2020 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.

It is suggested that different fishing weights are used, perhaps the ring-shaped fishing weights ‘sinkers’ to allow for more secure attachment to the panel. 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 [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: Stranraer settlement panel results

STRANRAER MARINA

Panel No	Grid Ref	Species - Common Name	Species - Latin Name	Abundance	Invasive sp	Abbrev	Scale	%
1	NX0587861181	Sea squirt	*Ascidiella aspersa*	C	N	S	Super Abudant	80 - 100
	NX0587861181	Sponge	*Sycon ciliatum*	R	N	A	Abundant	40 - 80
	NX0587861181	Peacock worm	*Sabella pavonina*	O	N	C	Common	20 - 40
	NX0587861181	Shore Crab	*Carcinus maenas*	R	N	F	Frequent	10 - 20
	NX0587861181	Tube worm	*Pomatoceros triqueter*	R	N	O	Occasional	5 - 10
	NX0587861181	Star ascidian	*Botryllus shlosseri*	R	N	R	Rare	<5%
	NX0587861181	Bryozoan	*Conopeum reticulum*	R	N			
	NX0587861181	Green seaweed	*Cladophora rupestris*	O	N			
	NX0587861181	Saddle oyster	*Anomia ephippium*	O	N			
	NX0587861181	Orange-tipped sea squirt	*Corella eumyota*	O	Y			
	NX0587861181	Annelid worm	*Eupolymnia nebulosa*	R	N			
	NX0587861181	Feather star	*Antedon bifia*	R	N			
	NX0587861181	Sea louse	*Unsure*	R	N			
2	NX0588561176	Orange tipped sea squirt	*Corella eumyota*	R	Y			
	NX0588561176	Sponge	*Sycon ciliatum*	R	N			
	NX0588561176	Sea squirt	*Ascidiella aspersa*	C	N			
	NX0588561176	Green seaweed	*Cladophora rupestris*	R	N			
	NX0588561176	Tube worm	*Pomatoceros triqueter*	O	N			
	NX0588561176	Saddle oyster	*Anomia ephippium*	O	N			
	NX0588561176	Darwins Barnacle	*Elminius modestus*	R	Y			
	NX0588561176	Bryozoan	*Conopeum reticulum*	R	N			
	NX0588561176	Butterfish	*Pholis gunnellus*	R	N			

	NX0588561176	Sea lettuce	*Ulva lactuca*	R	N
	NX0588561176	Peacock worm	*Sabella pavonina*	R	N
	NX0588561176	Annelid worm	*Eupolymnia nebulosa*	R	N
	NX0588561176	Sea louse	*Unsure*	R	N
	NX0588561176	Star ascidian	*Botryllus shlosseri*	R	N
	NX0588561176	Feather star	*Antedon bifida*	R	N
	NX0590261199	Orange tipped sea squirt	*Corella eumyota*	O	Y
	NX0590261199	Japanese skeleton shrimp	*Caprella mutica*	R	Y
	NX0590261199	Sponge	*Sycon ciliatum*	O	N
	NX0590261199	Sea squirt	*Ascidiella aspersa*	O	N
	NX0590261199	Green seaweed	*Cladophora rupestris*	O	N
	NX0590261199	Tube worm	*Pomatoceros triqueter*	O	N
	NX0590261199	Saddle oyster	*Anomia ephippium*	O	N
	NX0590261199	Darwins Barnacle	*Elminius modestus*	R	Y
	NX0590261199	Bryozoan	*Conopeum reticulum*	R	N
3	NX0590261199	Sugar kelp	*Saccharina latissima*	R	N
	NX0590261199	Bladderwrack	*Fucus vesiculosus*	R	N
	NX0590261199	Sea lettuce	*Ulva lactuca*	R	N
	NX0590261199	Boot lace weed	*Chorda filum*	R	N
	NX0590261199	Peacock worm	*Sabella pavonina*	R	N
	NX0590261199	Annelid worm	*Eupolymnia nebulosa*	R	N
	NX0590261199	Sea louse	*Unsure*	R	N
	NX0590261199	Shore Crab	*Carcinus maenas*	R	N
	NX0590261199	Coral Weed	*Corallina officinalis*	R	N
	NX0590261199	Common Prawn	*Palaemon serratus*	R	N
4	NX0591261198	PANEL LOST			

	NX0591961232	Orange tipped sea squirt	*Corella eumyota*	O	Y
	NX0591961232	Sea squirt	*Ascidiella aspersa*	A	N
	NX0591961232	Green seaweed	*Cladophora rupestris*	F	N
	NX0591961232	Tube worm	*Pomatoceros triqueter*	O	N
	NX0591961232	Sponge	*Sycon ciliatum*	O	N
	NX0591961232	Sea lettuce	*Ulva lactuca*	R	N
	NX0591961232	Japanese skeleton shrimp	*Caprella mutica*	A	Y
	NX0591961232	Sugar kelp	*Saccharina latissima*	O	N
5	NX0591961232	Blue mussel	*Mytilus edulis*	R	N
	NX0591961232	Star ascidian	*Botryllus shlosseri*	R	N
	NX0591961232	Peacock worm	*Sabella pavonina*	O	N
	NX0591961232	Bladderwrack	*Fucus vesiculosus*	R	N
	NX0591961232	Common Prawn	*Palaemon serratus*	R	N
	NX0591961232	Annelid worm	*Eupolymnia nebulosa*	R	N
	NX0591961232	Feather star	*Antedon bifida*	R	N
	NX0591961232	Coral Weed	*Corallina officinalis*	R	N
	NX0591961232	Shore Crab	*Carcinus maenas*	R	N
	NX0592661231	Orange tipped sea squirt	*Corella eumyota*	O	Y
	NX0592661231	Sea squirt	*Ascidiella aspersa*	A	N
	NX0592661231	Green seaweed	*Cladophora rupestris*	F	N
	NX0592661231	Tube worm	*Pomatoceros triqueter*	O	N
6	NX0592661231	Sponge	*Sycon ciliatum*	O	N
	NX0592661231	Sea lettuce	*Ulva lactuca*	R	N
	NX0592661231	Japanese skeleton shrimp	*Caprella mutica*	O	Y
	NX0592661231	Star ascidian	*Botryllus shlosseri*	R	N
	NX0592661231	Peacock worm	*Sabella pavonina*	R	N

NX0592661231	Saddle oyster	*Anomia ephippium*	R	N
NX0592661231	Darwins Barnacle	*Elminius modestus*	R	Y
NX0592661231	Annelid worm	*Eupolymnia nebulosa*	R	N
NX0592661231	Bryozoan	*Conopeum reticulum*	O	N
Additional Species	Plumose anemone	*Metridium dianthus*		N
	Common Limpet	*Patella vulgata*		N