

Monitoring of Marine INNS Using Submerged Settlement Panels

Stranraer Marina

May to September 2024

Solway Firth Partnership October 2024



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Partnership

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1. Introduction

The GB non-native species secretariat defined 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.” (GB NNSS, 2023) Globally, 84% of marine ecoregions have reported marine invasion (Molnar, et al., 2008). Whilst INNS have played a key role in 60% of global plant and animal extinctions and are recognised as one of the 5 main drivers of biodiversity loss. (IPES, 2023)

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. GB NNSS (GB Non-Native Species Secretariat) is a focal point for communication and co-ordinating reporting of INNS. (GB NNSS , n.d.)

Known impacts of INNS on native biodiversity are the spread of disease, competition for habitat and food and direct predation. (GB NNSS, 2023) As well as these serious and potentially irreversible environmental problems, they can also interfere with recreational and commercial activities by clogging propellers, damaging boats, blocking up waterways, and increasing the risk of flooding. (GB NNSS, 2017)

Direct biological impacts include biological indices displaying lower scores where INNS are present. Indirect impacts include where INNS densities are so high that there is 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.

Further details can be found in Solway Firth Partnership’s report on INNS and their impact in the Solway Firth (Solway Firth Partnership, 2024)

2. Method

Six settlement panels (Photo 1) were attached to pontoons within Stranraer Marina on 1 May 2024 at the same locations as previous years (Figure 1).



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.

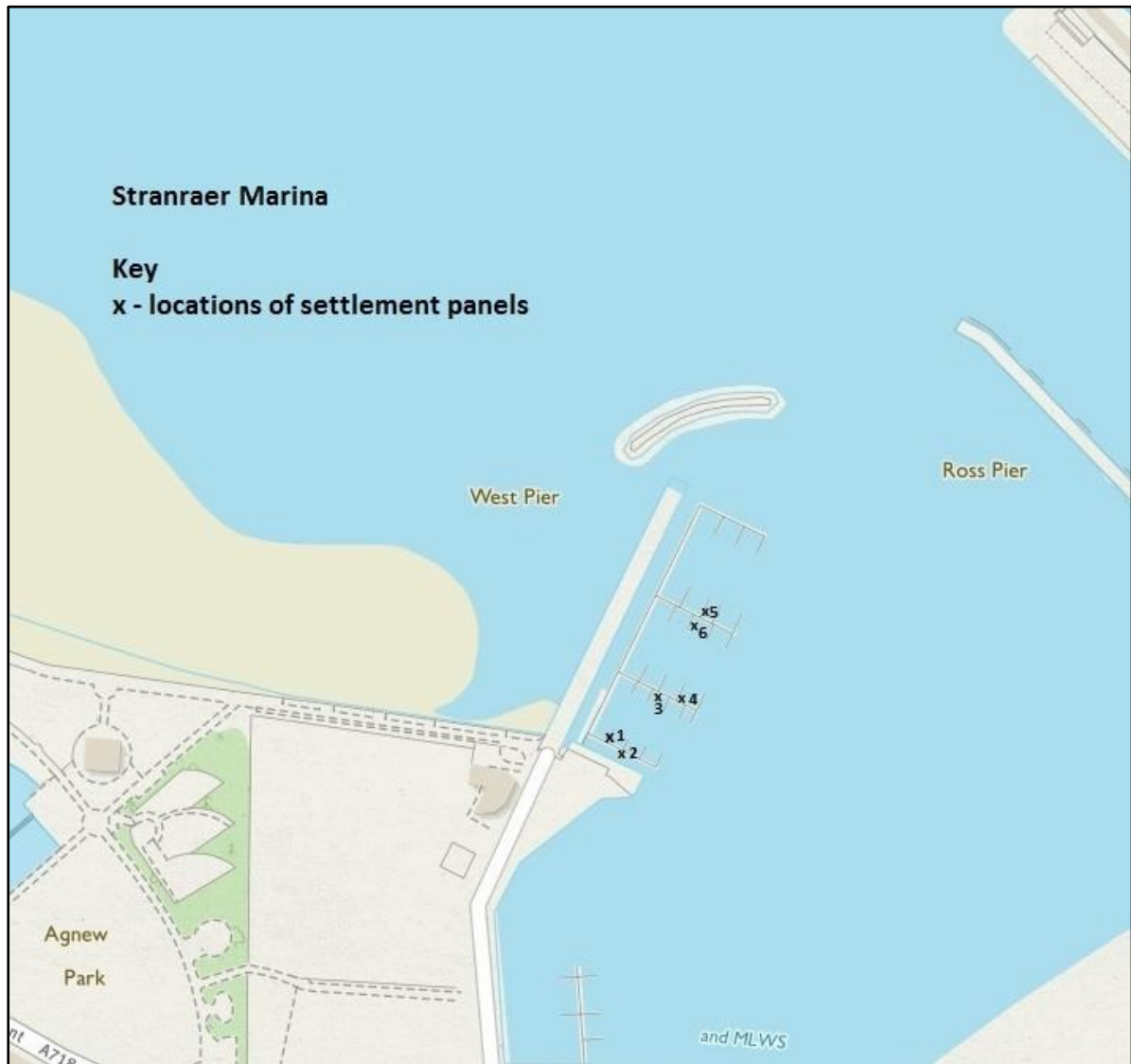


Figure 1 - Stranraer Marina, Location of Settlement Panels, 1 – 6

At the end of summer (23 September 2024) the panels at Stranraer were collected, photographed (Photos 5 and 6), scored for percentage cover of surface species and then appropriately discarded. Mobile organisms such as crabs were also noted.



Photo 5 – Panel Removal



Photo 6 – Assessing Panel

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



Photo 7 – Underside of Pontoon, Stranraer



Photo 8 – Wakame from pontoon, Stranraer

3. Results

Five out of the six panels installed at Stranraer were successfully recovered and assessed.

The species diversity was similar to that recorded in the 2023 survey but with less diversity of some species such as sea squirts and less of other species such as peacock worms. There was a greater number and variety of crabs noted this year.

In Stranraer marina, there were several native tunicates noted, the sea squirt, *Asciidiella aspersa* (Photo 9) and sea vase, *Ciona intestinalis* (Photo 9); but no lightbulb sea squirt, *Clavelina lepadiformis* which had been recorded in 2023. There was still a high percentage coverage of sea squirts this year including the unidentified pink sea squirt which may be *Ascidia mentula*. The peacock worm, *Sabella pavonine* (Photo 9) was again less prevalent than in previous years. The green algae, *Cladophora rupestris*, was apparent on all panels at a low density.

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 11); the bryozoan, *Conopeum reticulum* (Photo 12 & 13); the feather star, *Antedon bifida* (Photo 14); various crabs, including the spider crab, *Macropodia rostrata* (Photo 15) and the edible crab, *Cancer pagurus* (Photo 16); several brittlestar, *Macropodia rostrata* (Photo 17); occasional butterflyfish, *Phollis gunellus* (Photo 18). Several unidentified barnacles were noted, perhaps Darwin barnacle, *Elminius modestus* and another species, possibly perforated barnacle, *Perforatus perforatus*. Star ascidian, *Botryllus shlosseri* (Photo 12) was found on most panels, as was the tube worm, *Pomatoceros triqueter* (Photo 16). Other species noted included the annelid worm, *Eupolymnia nebulosa* (Photo 19) and sea lettuce, *Ulva lactuca* (Photo 20).

There appeared to be fewer marine invasive species in Stranraer on the settlement panels than the previous recording in 2023 – there were no Japanese skeleton shrimp, *Caprella mutica*, and fewer barnacles that may have been Darwin's barnacle, *Elminius modestus*. There were no orange-tipped sea squirt, *Corella eumyota* recorded on the panels at Stranraer Marina. The leathery sea squirt, *Styela clava* was not recorded this year although Japanese wakame, *Undaria pinnatifida* (Photo 22) was noted both on one panel and on the underside of a pontoon (Photo 8).

A complete species list is found at Appendix 1.



Photos 9 and 10 – Sea squirts, *Ascidiella aspersa*; *Ciona intestinalis*; *Ascidia mentula*



Photo 11 – Scallop (*Mimachlamys varia*); blue mussel (*Mytilus edulis*); Sponge (*Sycon ciliatum*)



Photo 12 – Star Ascidian (*Botryllus shlosseri*) with Bryozoan (*Conopeum reticulum*) to right



Photo 13 – Close up Bryozoan (*Conopeum reticulum*) Photo 14 – Feather star (*Antedon bifida*)



Photo 15 – Spider crab (*Macropodia rostrata*)



Photo 16 – Edible crab (*Cancer pagurus*)



Photo 17 – Brittlestar (*Ophiothrix fragilis*)



Photo 18 – Butterfish (*Pholis gunellus*)



Photo 19 – Annelid worm (*Eupolymnia nebulosa*)



Photo 20 – Sea lettuce (*Ulva lactuca*)

4. Conclusion

No invasive Japanese skeleton shrimp, *Caprella mutica* or orange-tipped sea squirt, *Corella eumyota* was found in Stanraer marina in 2024 although the orange-tipped sea squirt, *Corella eumyota*, was found in Portpatrick (appearing in lower numbers than in previous years). In addition, the leathery sea squirt, *Styela clava*, which was recorded in 2023 was not found in Stanraer marina in 2024.

The current study suggests re-visiting the marina again in the growing season of 2025 to see if species assemblage or if the spread of INNS has changed. The site 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. 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

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Appendix 1 – List of Species Recorded

STRANRAER MARINA

Date recovered - 23/09/2024

Panel

No	Grid Ref	Species - Common Name	Species - Latin Name	Abundance	Invasive sp
S1	NX0587861181	Sea squirt	<i>Ascidrella aspersa</i>	C	N
	NX0587861181	Sea squirt (sea vase)	<i>Ciona intestinalis</i>	A	N
	NX0587861181	Sponge	<i>Sycon ciliatum</i>	R	N
	NX0587861181	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NX0587861181	Sea lettuce	<i>Ulva lactuca</i>	O	N
	NX0587861181	Green seaweed	<i>Cladophora rupestris</i>	R	N
	NX0587861181	Darwin barnacle (?)	<i>Elminius modestus</i>	?	Y
	NX0587861181	Feather star	<i>Antedon bifida</i>	R	N
	NX0587861181	Peacock worm	<i>Sabella pavonina</i>	R	N
	NX0587861181	Annelid worm (orange)	<i>Eupolyornia nebulosa</i>	R	N
	NX0587861181	Shore crab	<i>Carcinus maenas</i>	O	N
	NX0587861181	Bryozoan	<i>Conopeum reticulum</i>	R	N
	NX0587861181	Butterfish	<i>Phollis gunellus</i>	R	N
	NX0587861181	Annelid	?	R	
	NX0587861181	Furrowed Crab	<i>Xantho hydrophilus</i>	R	
	NX0587861181	Jelly (colonial sea squirt/ bryozoan??)	<i>Unsure of species</i>	R	
	NX0587861181	Barnacle		R	

Abbrev	Scale	%
S	Super Abundant	80 - 100
A	Abundant	40 - 80
C	Common	20 - 40
F	Frequent	10 - 20
O	Occasional	5 - 10
R	Rare	<5%

S2	NX0588561176	Sea squirt	<i>Ascidrella aspersa</i>	A	N
	NX0588561176	Sea squirt (sea vase)	<i>Ciona intestinalis</i>	A	N
	NX0588561176	Sea squirt (pink)	<i>Ascidia mentula</i>	?	N
	NX0588561176	Sponge	<i>Sycon ciliatum</i>	F	N
	NX0588561176	Sea lettuce	<i>Ulva lactuca</i>	R	N
	NX0588561176	Green seaweed	<i>Cladophora rupestris</i>	O	N
	NX0588561176	Feather star	<i>Antedon bifida</i>	R	N
	NX0588561176	Peacock worm	<i>Sabella pavonina</i>	O	N

	NX0588561176	Annelid worm (orange)	(??) <i>Eupolymnia nebulosa</i>	R	N
	NX0588561176	Shore Crab	<i>Carcinus maenas</i>	R	N
	NX0588561176	Bryozoan	<i>Conopeum reticulum</i>	O	N
	NX0588561176	Furrowed Crab	<i>Xantho hydrophilus</i>	R	N

S3	NX0590261199	Sea squirt	<i>Asciella aspersa</i>	C	N
	NX0590261199	Spider Crab	<i>Macropodia rostrata</i>	R	N
	NX0590261199	Tube worm	<i>Pomatoceros triqueter</i>	R	N
	NX0590261199	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NX0590261199	Sea lettuce	<i>Ulva lactuca</i>	F	N
	NX0590261199	Green seaweed	<i>Cladophora rupestris</i>	C	N
	NX0590261199	Peacock worm	<i>Sabella pavonina</i>	R	N
	NX0590261199	Annelid worm (orange)	<i>Eupolymnia nebulosa</i>	R	N
	NX0590261199	Bootlace weed	<i>Chorda filum</i>	R	N
	NX0590261199	Brittle Star	<i>Ophiothrix fragilis</i>	F	N
	NX0590261199	Edible Crab	<i>Cancer pagurus</i>	O	N
	NX0590261199	Oysters / Saddle oysters		R	
	NX0590261199	Gammarid shrimp	<i>Gammarus sp</i>	R	
	NX0590261199	Red seaweed		O	
	NX0590261199	Barnacle		R	
	NX0590261199	Wakame		R	Y

S4	NX0591261198	Sea squirt	<i>Asciella aspersa</i>	S	N
	NX0591261198	Sea squirt (sea vase)	<i>Ciona intestinalis</i>	A	N
	NX0591261198	Sponge	<i>Sycon ciliatum</i>	R	N
	NX0591261198	Tube worm	<i>Pomatoceros triqueter</i>	R	N
	NX0591261198	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NX0591261198	Green seaweed	<i>Cladophora rupestris</i>	C	N
	NX0591261198	Peacock worm	<i>Sabella pavonina</i>	R	N
	NX0591261198	Annelid worm (orange)	<i>Eupolymnia nebulosa</i>	R	N
	NX0591261198	Furrowed Crab	<i>Xantho hydrophilus</i>	R	N

	NX0591261198	Prawn	<i>Palaemon sp</i>	R	N
	NX0591261198	Blue Mussel	<i>Mytilus edulis</i>	R	N
	NX0591261198	Brittle Star	<i>Ophiothrix fragilis?</i>	O	N
	NX0591261198	Gammarid shrimp	<i>Gammarus sp</i>	R	N

S5	NX0591961232	Sea squirt	<i>Asciidiella aspersa</i>	C	N
	NX0591961232	Sea squirt (sea vase)	<i>Ciona intestinalis</i>	C	N
	NX0591961232	Sponge	<i>Sycon ciliatum</i>	O	N
	NX0591961232	Spider Crab	<i>Macropodia rostrata</i>	O	N
	NX0591961232	Tube worm	<i>Pomatoceros triqueter</i>	R	N
	NX0591961232	Star ascidian	<i>Botryllus shlosseri</i>	R	N
	NX0591961232	Sea lettuce	<i>Ulva lactuca</i>	O	N
	NX0591961232	Green seaweed	<i>Cladophora rupestris</i>	C	N
	NX0591961232	Feather star	<i>Antedon bifida</i>	O	N
	NX0591961232	Peacock worm	<i>Sabella pavonina</i>	R	N
	NX0591961232	Annelid worm (orange)	<i>Eupolymnia nebulosa</i>	R	N
	NX0591961232	Bryozoan	<i>Conopeum reticulum</i>	R	N
	NX0591961232	Prawn sp	<i>Palaemon sp</i>	R	N
	NX0591961232	Brittle Star	<i>Ophiothrix fragilis</i>	R	N
	NX0591961232	Edible Crab	<i>Cancer pagurus</i>	R	N
	NX0591961232	Oysters / Saddle oysters		R	N
	NX0591961232	Gammarid shrimp	<i>Gammarus sp</i>	R	N
	NX0591961232	Barnacle	<i>Perforatus perforatus ?</i>	R	N

S6 LOST

Other Species Noted	Limpet	Present	N
	Scallop	Present	N