Early detection of marine INNS using submerged settlement panels

Stranraer Marina and Harbour, May to August 2016

Solway Firth Partnership September 2016

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. 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 (Natural Scotland, 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

Following the methodology for monitoring marine INNS employed by John Bishop of the Marine Biological Association (MBA) of the UK, the panels were constructed from 15 x 15 cm panels made from 4 mm square black Correx polypropylene sheet. Holes are made in the top and bottom of the panel using a hole-puncher and a 6 oz fishing weight attached to the bottom hole using nylon fishing line, see Figure 1.

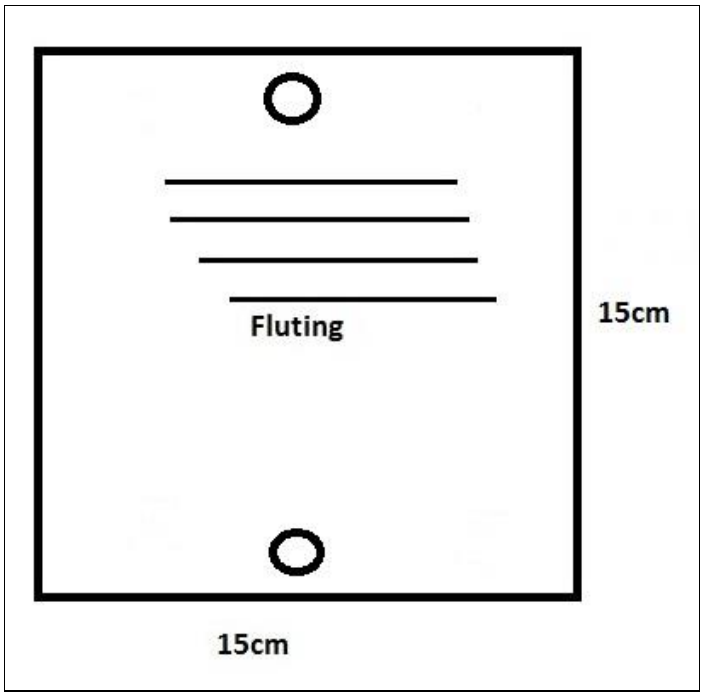


Figure One – Correx panel structure (not to scale)

Ten settlement panels were attached to pontoons within Stranraer Marina and two settlement panels attached to the pontoon within Stranraer Harbour (Figure 2) in late May 2016 (31/05/16).

The panels were attached to chain, rope or cleat, either on or underneath the pontoons, using fishing line and were weighed down with 6 oz fishing weights (Photos 1 and 2). Stranraer was chosen as a site for ease of installing the panels and because the site is active with both recreational and fishing boats using the port. After ten weeks (11/08/16) the panels were collected, photographed (Photos 3 and 4), scored for percentage cover of surface species and then discarded. Mobile organisms, including barnacle cyprids were counted individually. Each side of each panel was assessed individually for species present and percentage cover.

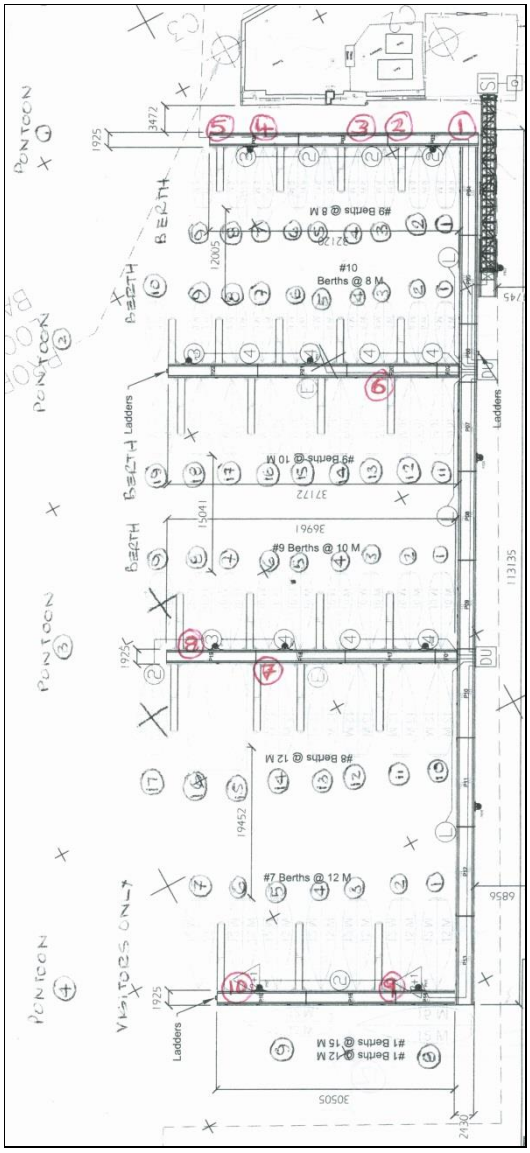
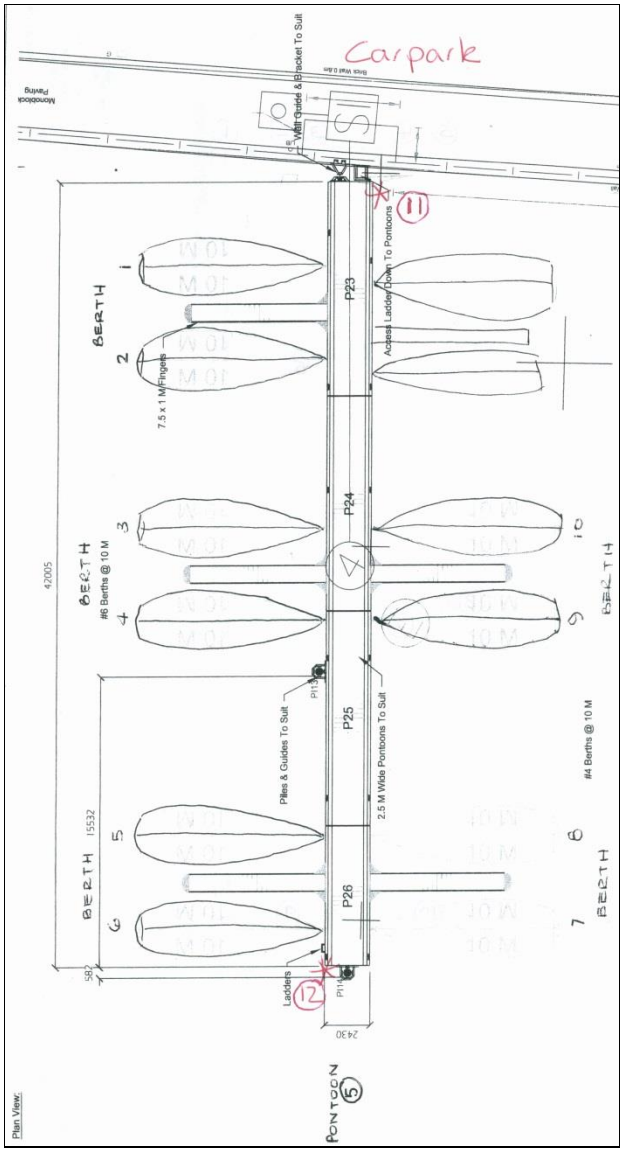


Figure Two (a): Stranraer Marina
Location of Settlement Panels, 1 – 10



(b) Stranraer Harbour
Location of Settlement Panels, 11 - 12

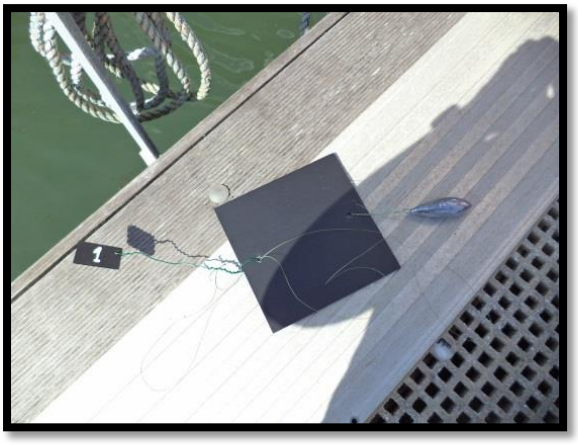


Photo One: Settlement panel with weight

Photo Two: Panel attached under water

Photo Three: Panel 2 after ten weeks

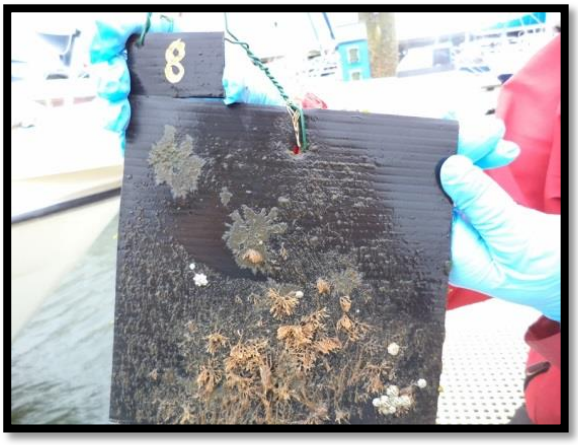


Photo Four: Panel 8 showing bryozoan

3. Results

Panel 10 was lost and so could not be included in the analysis. Species found included the green algae *Cladophora rupestris*; sea lettuce, *Ulva lactuca*; Darwin's barnacle, *Elminius modestus*; an unidentified barnacle species; a bryozoan, *Conopeum reticulum* (Photo 4); and the sea slug, *Polycera quadrilineata* (Photo 5).

Photo Five: *Polycera quadrilineata*

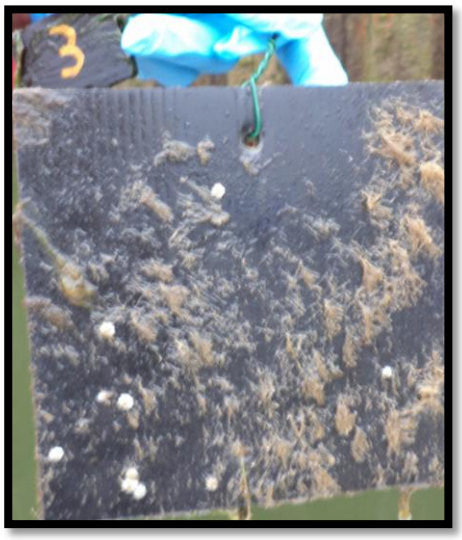


Photo SIx: *Elminius modestus* growing

Despite evidence that there are several INNS present in Stranraer harbour (SFP, 2012), only Darwin's barnacle, *Elminius modestus* (Photo 6) was found attached to three of the panels in clusters of up to ~50 individuals, including those still in the cyprid growth stage. *Cladophora rupestris* appeared to be the most dominant species present and was identified growing on eight of the panels, and in particular in high percentages on sheltered panels in sunlight.

Panel sides facing away from direct sunlight appeared to have very little growth in comparison to sides exposed to sunlight. Shading appeared to be a limiting factor in primary settlement of algal growth. Nine of the eleven analysed panels were recovered from sheltered areas, with two of these in very sheltered areas of the harbour. The three panels in relatively exposed areas consistently had lower percentage covers. However on one sheltered and one exposed panel, the bryozoan, *Conopeum reticulum* was found, suggesting that it may have a higher tolerance for exposure.

4. Conclusion

This assessment found only one invasive non-native species (INNS) (Darwin's barnacle) although other INNS are known to inhabit the harbour waters, including Japanese wireweed, *Sargassum muticum*; leathery seasquirt, *Styela clava;* Japanese skeleton shrimp, *Caprella mutica*; and *Codium fragile* (green sea fingers) (SFP, 2012). The attachment of primary colonisers such as biofilms and algae is required for the secondary succession of crustaceans and molluscs, so panels in the shade without algal growth could not allow this.

Both species richness and species evenness appeared low on the settlement panels as in total, only five species were found (discounting the unidentified barnacles) and of these, *Cladophora rupestris* appeared dominant. This was in contrast to the visible biodiversity growing in the surrounding marina waters. *Conopeum reticulum* may have been able to colonise on both exposed and sheltered areas as the flat structure of the bryozoan would mean that it would only be exposed to very low shear forces that could dislodge other organisms (Finley *et al*., 2002). The current study suggests re-visiting Stranraer harbour in September 2016 to conduct a rapid site assessment, to allow for a more thorough INNS assessment. Control methods and biosecurity plans need to be further developed and improved to accurately identify and quantify the scale of the INNS problem at this site.

5.References

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