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Manx Wildlife Trust
Treisht Bea-Feie Vannin

Ramsey Harbour
Invasive Species Survey 2019

Semi-quantitative estimate of abundance of Austrominius modestus

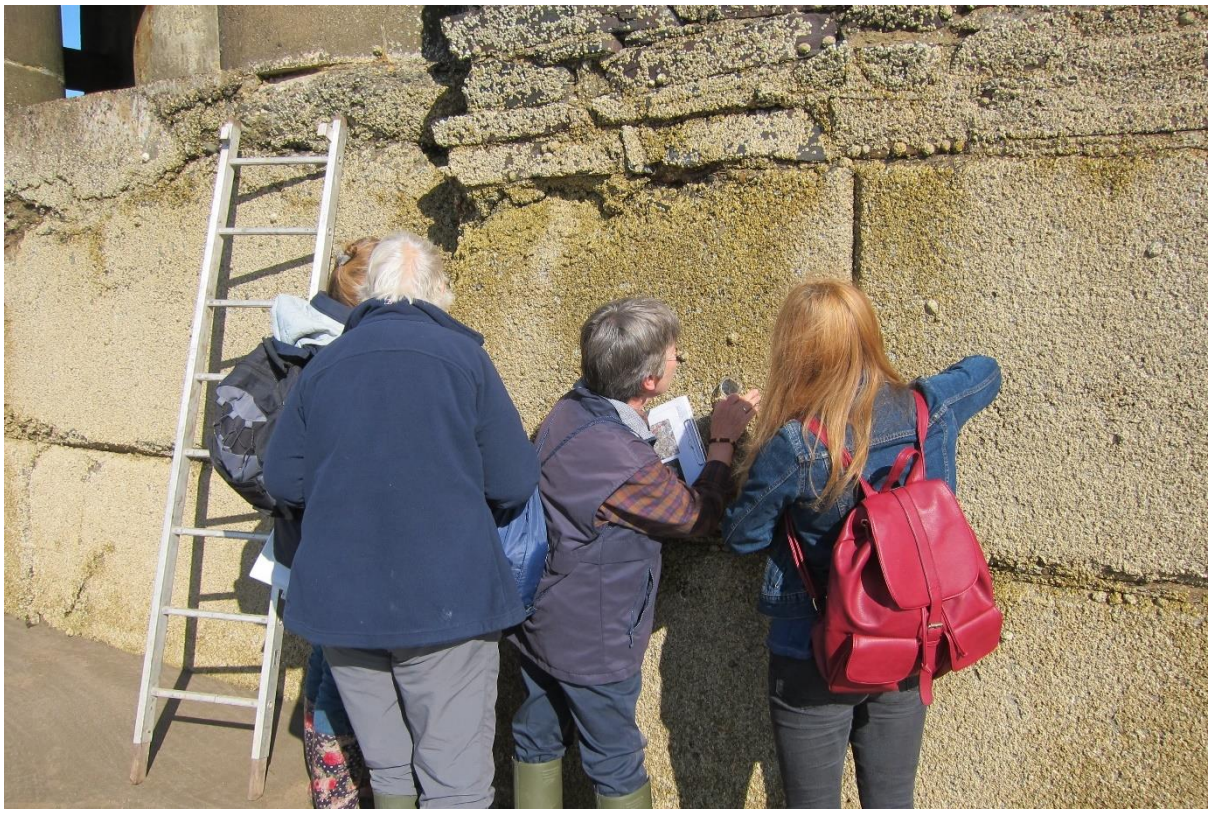

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Table of Contents

Introduction

The survey was conducted on 7th September 2019 at low water. 3 members of the public attended and were very interested in the survey and invasive species in general. Only the south side of the south wall was surveyed, as in the previous years.

Methods

All methods followed the previous year's survey methodologies (See Appendix).

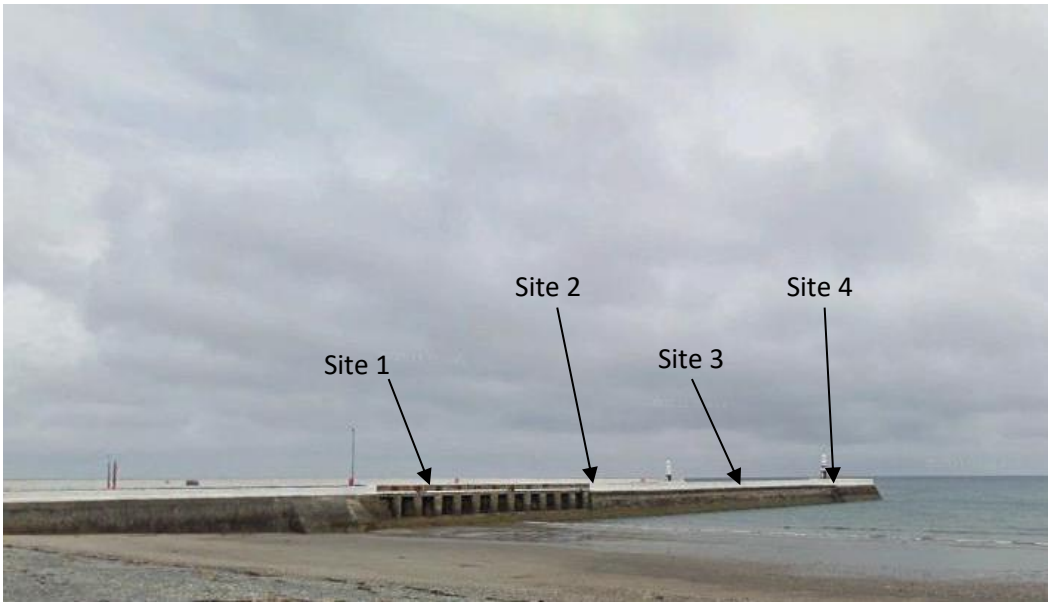

Figure 1. Positions of the four survey points along the southern wall.

Site 1: The top of the pier, at the 3rd pillar down.
Site 2: The promontory to the right of the last pillar.
Site 3: 20 rectangular blocks to the right of site 2.
Site 4: The end of the pier, immediately prior to the stepped section.

Results

2019 results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	F	F	C	C	F	C	F	F	F	C	F	O
S. balanoides	S	S	S	S	S	S	S	S	S	S	S	S
C. gigas	BEEN REMOVED ENTIRELY IN 2018											
M. edulis	N	N	N	N	N	N	N	R	N	N	N	R

Table 1. Results of the invasive species survey 2019.

2018 results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	F	F	C/F	C/F	F	C	F	F	F/C	F/C	F	R
S. balanoides	S	S	S	A	A	S	S	S	S	S	S	C/A
C. gigas	BEEN REMOVED ENTIRELY											
M. edulis	O	O	N	N	N	N	N	R	N	N	N	R

Table 2. Results of the invasive species survey 2018.

2017 Results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	F	O	C	A	C	F	O	O	F	F	O	R
S. balanoides	A	S	C	A	A	A	A	A	C/A	C	A	A
C. gigas	N	N	N	N	N	N	N	½ Shell	N	N	N	R
M. edulis	N	N	N	N	N	N	N	N	N	N	R	N

Table 3. Results of invasive species survey 2017.

2016 Results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	C	C	F	A	C	F	F	O	F	F	O	R
S. balanoides	A	S	A	S	S	C	A	A	C	A	A	A
C. gigas	N	N	N	N	N	N	N	N	N	N	N	R
M. edulis	N	N	N	R	N	N	N	O	N	N	N	R

Table 4. Results of invasive species survey 2016.

2015 Results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	F	O/F	F	F	O	F	O	O	F	O	R	N
S. balanoides	C	A	C	A	A	C	A	A	C	A	A	A
C. gigas	N	N	N	N	N	N	N	O	N	N	N	R
M. edulis	N	N	N	R	R	N	R	R	R	N	N	R

Table 5. Results of invasive species survey 2015.

2014 Results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	O	O	F	F	O	O	O	O	F	F	O	N
S. balanoides	F	A	C	A	A	C	A	A	C/F	A	A	C
C. gigas	N	N	N	N	N	N	N	O	N	N	N	O
M. edulis	N	R	N	R	R	N	R	O	N	R	R	O

Table 6. Results of invasive species survey 2014.

2013 Results

	Site 1		Site 2			Site 3			Site 4			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	O/F	F	O	F	O	F	C	F	F	F	O	R
S. balanoides	F	A	F	A	A	F	A	A	F	A	A	A
C. gigas	N		N			O			F			
M. edulis	N		N			O			N			

Table 7. Results of invasive species survey 2013.

Key:			S =	Superabundant
VH =	Very high		A =	Abundant
H =	High		C =	Common
M =	Mid		F =	Frequent
L =	Low		O =	Occasional
			R =	Rare
			N =	Not present

Table 7. Key to tables 1-4 (see Appendix for detailed SACFOR scale).

Discussion

The abundance of two species of barnacles was measured; the invasive Australian species of barnacle, *Austrominius modestus* and the native *Semibalanus balanoides*. The non-native, invasive *A. modestus* has increased in abundance over the past years resulting in all sites (besides one) now showing abundance as frequent or common. The least abundant site remains the lowest site at the end of the pier (site 4). Although this is a little concerning, the abundance of the native *S. balanoides* has also increased and does not appear to be affected by their increasing invasive counterparts. The abundance of our native barnacle has remained consistently high over the past years and now *S. balanoides* is deemed superabundant at all locations. This is a record high compared with previous results since surveys began back in 2013. Until 2018, they had not been reported as being superabundant in more than 3 sites since 2016 and never before then. This is positive as it shows that although the invasive species abundance is increasing, so is the native barnacle.

Last year saw a slight increase in *M. edulis*, our native mussel, however, this has reduced again and is similar to previous years findings. The lack of crevices for the mussels to anchor to and other environmental factors such as wave action, is likely why numbers have remained fairly consistent over the survey period. No oysters (*C. gigas)* were observed during the survey, showing no new recruitment to the site.

To conclude, the removal of pacific oysters *(C. gigas)* in 2018 was a success, native mussels remain stable, whilst both barnacle species have seen an increase in abundance. However, recorder bias should be taken into consideration as the SOCFAR scale is a subjective.

References

Crisp, J. 1985. The spread of *Elminius modestus* Darwin in North-West Europe. 37: 483-520.

Crisp, J. & Southward, J. 1959. The further spread of *Elminius modestus* in the British Isles to 1959. Marin Biological Association of the U.K. 38: 429-437.

Kobayashi, M., Hofman, E.E., Powell, E.N., Klinck, J.M. and Kusaka, K. 1997. A population dynamics model for the Japanese oyster, *Crassostrea gigas*. Aquaculture 149: 285-321.

Appendix

Scales:	Small Barnacles	Mussels
S = Superabundant	3-5cm^{-2}	50-79% cover
A = Abundant	> 1cm^{-2}	>20% cover
C = Common	0.1-1cm^{-2}	Large patches
F = Frequent	100-1000m^{-2}	Scattered individuals/small patches
O = Occasional	1-100m^{-2}	Scattered individuals, no patches
R = Rare	Few found	Few found
N = Not found	None found	None found

Survey Methods

All 4 species that were expected were found and quantified. These were the non-native species *Austrominius modestus* (Australian barnacle) and *Crassostrea gigas* (Pacific oyster) and two morphologically similar species which were selected as appropriate indicator proxies for assessment of the two non-native species: *Mytilus edulis* (edible mussel) and *Semibalanus balanoides* (barnacle). Survey methodology was based on the SACFOR scale, which uses several native species as representative size/morphology types for measuring abundance (See above). The scales for *Small Barnacles* and *Mussels* were used for the barnacle and oyster/mussel species respectively.

For barnacle abundance only, each survey station was divided vertically by eye according to tidal height marks on the wall associated with barnacle abundance. These 4 zones were classified as 'very high shore/intertidal', 'high shore', 'mid shore' and 'low shore'. Due to the beach gradient and reach of the tide up the pier wall, not all stations had all zones present. At each present zone of each station, a horizontal area of a few metres was examined by several teams of 2-3 individual surveyors and the abundance score determined. Subsequently, all survey teams agreed on a final abundance score for the zone, taking account of each team assessment. A tally of all *C. gigas* was kept independently by 2 different recorders and compared at the end. Data was recorded onto pre-designed recording sheets.