



Manx Wildlife Trust
Treisht Bea-Feie Vannin 

Ramsey Harbour Invasive Species Survey 2021

Semi-quantitative estimate of abundance of Austrominius modestus



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Table of Contents

Introduction	3
Methods.....	3
Results.....	3
Discussion.....	7
References	9
Appendix 1	9
Appendix 2	10

Introduction

The survey was conducted on 24th September 2021, at low water, by Dr Lara Howe, Marine Conservation Officer and Clare Rogerson, Marine Conservation Assistant. 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 1).



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

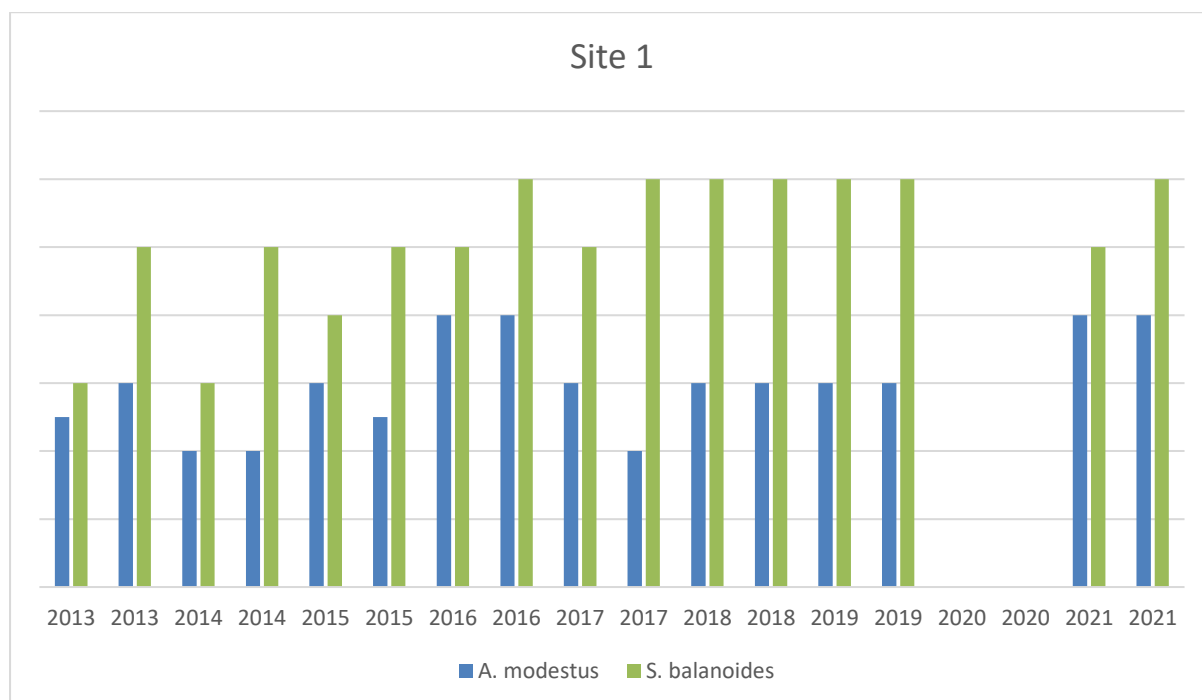
2021 results

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

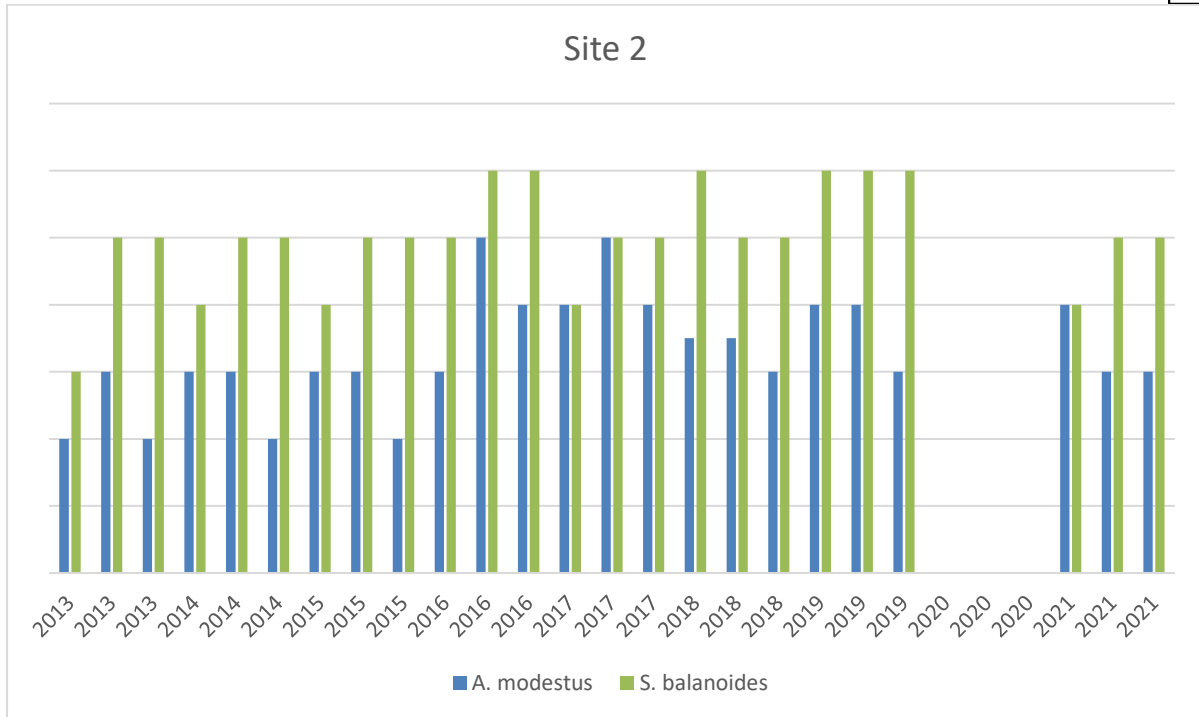
Table 1. Results of the invasive species survey 2021.

A total of nine pacific oysters were observed on the harbour wall, although not within the sample quadrats.

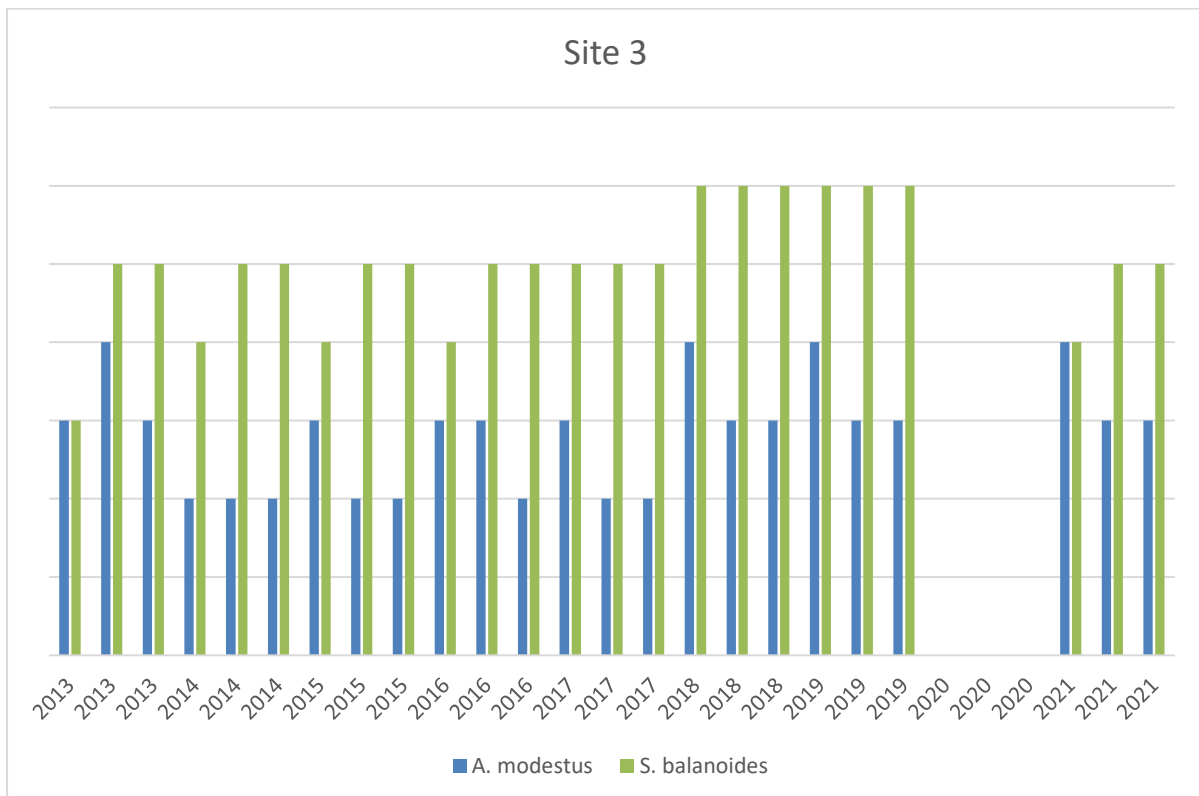
For graphical representation, a number was assigned to each of levels of the SACFOR scale, (see Table 9, Appendix 2). Where an abundance was recorded between two levels of the scale (e.g. F/C) the number allocated was a decimal, halfway between the two values (e.g. 3.5).



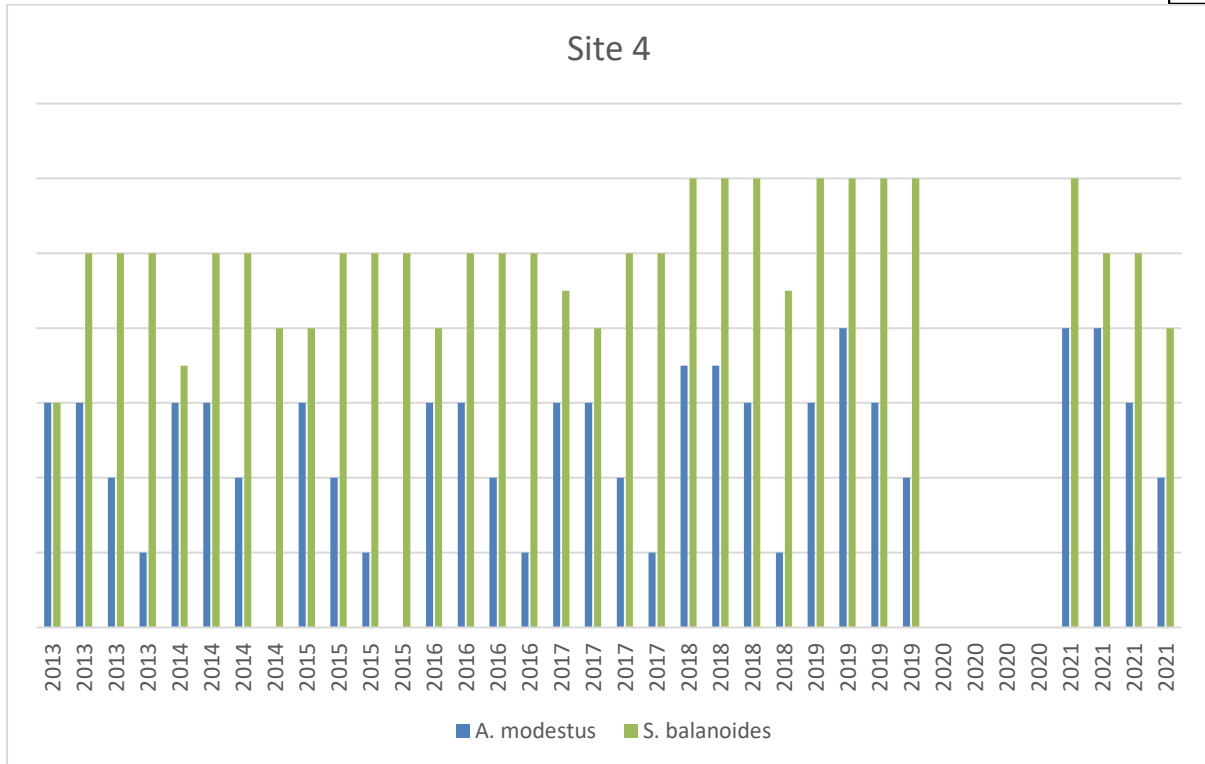
Graph 1. Results of the invasive species survey 2021, Site 1.



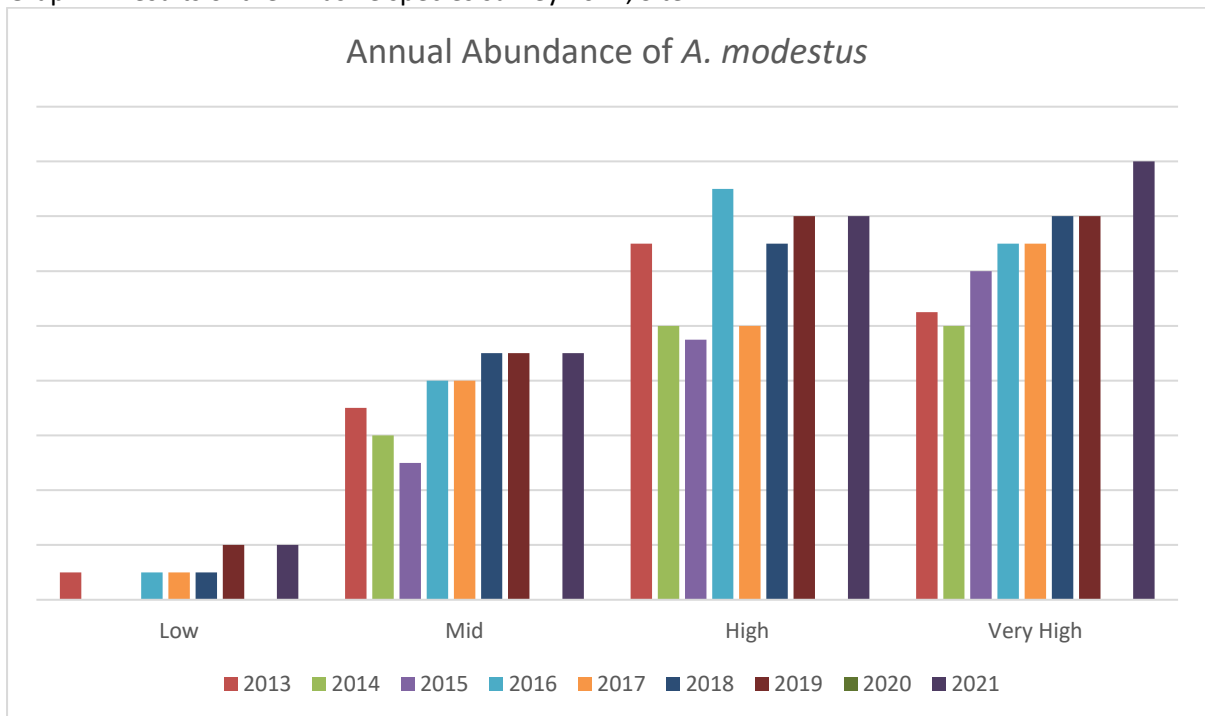
Graph 2. Results of the invasive species survey 2021, Site 2.



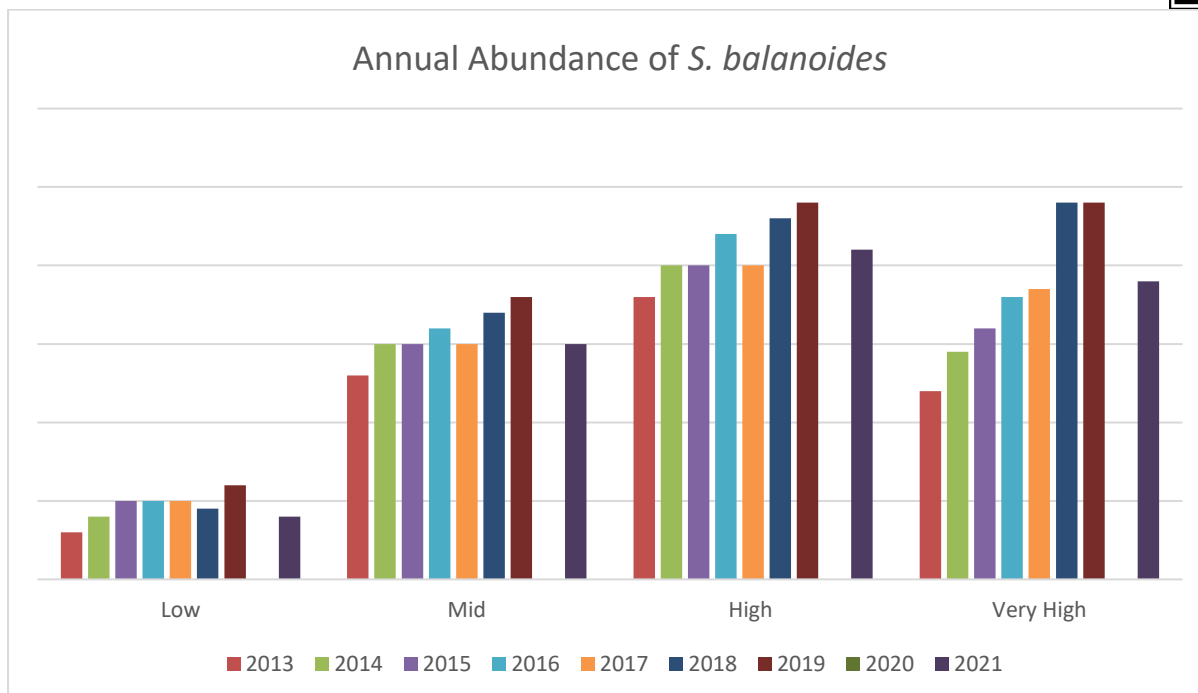
Graph 3. Results of the invasive species survey 2021, Site 3.



Graph 4. Results of the invasive species survey 2021, Site 4.



Graph 5. Abundance of *A. modestus* at each tide height.



Graph 6. Abundance of *S. balanoides* at each tide height.

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 now showing abundance as frequent or common, with the exception of site 4 at low water which was recorded as occasional. This is not surprising as *A. modestus* prefers the upper shore. Since the last survey in 2019, (during 2020, no data was collected due to restrictions in place for the mitigation of the Covid 19 virus) no increase in abundance was recorded at the low, mid or high tidal areas, however an increase in abundance from frequent/common to common was recorded at the very high location.

Since the last survey in 2019, the abundance of *S. balanoides* has decreased in all four tidal ranges. The abundance of this native barnacle was recorded as abundant or superabundant at nine of the twelve sites in 2021, compared with superabundant at all twelve sites in 2019.

There have been no significant variations in the population of *M. edulis* recorded since the survey began in 2013, we could therefore conclude that *M. edulis* has limited value as an indicator species when looking at the variances in barnacle and other species colonisation in this particular area. Absence of this species is more likely due to the unsuitable habitat/substrate the area provides, rather than direct competition from invasive or other species.

A total of nine Pacific oysters (*C. gigas*) were observed during the survey, showing new recruitment to the site since the complete eradication of all visible specimens in 2018. All were identified below the high tide mark, between sites 3 & 4 and beyond. The oysters spotted in 2021 were relatively



small suggesting they had potentially established since the removal of specimens in 2018 or were previously in the early stages of settlement and development (spat) and not easily identifiable, visually.

It must be highlighted that the SACFOR scale was originally developed as a standardised, semi-quantitative, methodology for experienced biologists undertaking roving surveying techniques such as diving, rapid intertidal surveys and subtidal video collection (Hiscock, [1998](#)). Recorder bias should be taken into consideration as the SACFOR scale is very subjective. SACFOR classifications are often applied in a subjective manner, despite being supported by quantitative thresholds, leading to intra and inter-observer variability.

To conclude, although the removal of Pacific oysters (*C. gigas*) in 2018 was a success, their re-occurrence in 2021 signifies that they have not been completely eradicated or new settlement has occurred since the 2018 removal and should be monitored and removed annually to prevent population growth. Manual removal of the mature specimens identified has proved to be effective in limiting the abundance of the species, in this area. Their rapid growth suggests that further investigation of the Ramsey Bay/Harbour area would be advantageous in providing a more detailed profile of the abundance of this invasive species. Native mussels were no longer present at any of the survey sites, but this was not deemed significant in relation to the abundance of non-native species. Whilst both barnacle species have seen an increase in abundance since records began in 2013, no increase in abundance was recorded in *A. modestus* at any of the sites and a minimal decrease in abundance of *S. balanoides* was recorded at all four sites in the 2021 survey.

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. Marine 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 1 – Survey methods

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.

Appendix 2 – Previous results

During 2020, no data was collected due to restrictions in place for the mitigation of the Covid 19 virus.

2019 results

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

Table 1. Results of the invasive species survey 2019.

2018 results

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

Table 2. Results of the invasive species survey 2018.

2017 Results

Species	Site 1		Site 2			Site 3			Site 4			
	VH	H	VH	H	M	VH	H	M	VH	H	M	L
<i>A. modestus</i>	F	O	C	A	C	F	O	O	F	F	O	R
<i>S. balanoides</i>	A	S	C	A	A	A	A	A	C/A	C	A	A
<i>C. gigas</i>	N	N	N	N	N	N	N	$\frac{1}{2}$ Shell	N	N	N	R
<i>M. edulis</i>	N	N	N	N	N	N	N	N	N	N	R	N

Table 3. Results of invasive species survey 2017.

2016 Results

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

Table 4. Results of invasive species survey 2016.

2015 Results

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

Table 5. Results of invasive species survey 2015.

2014 Results

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

Table 6. Results of invasive species survey 2014.

2013 Results

Species	Site 1		Site 2			Site 3			Site 4			
	VH	H	VH	H	M	VH	H	M	VH	H	M	L
<i>A. modestus</i>	O/F	F	O	F	O	F	C	F	F	F	O	R
<i>S. balanoides</i>	F	A	F	A	A	F	A	A	F	A	A	A
<i>C. gigas</i>	N		N			O			F			
<i>M. edulis</i>	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 8. Key to tables 1-7 (see Appendix 1 for detailed SACFOR scale).

S =	Superabundant	6
A =	Abundant	5
C =	Common	4
F =	Frequent	3
O =	Occasional	2
R =	Rare	1
N =	Not present	0

Table 9. Numericals assigned to SACFOR scale.