Manx Wildlife Trust
Treisht Bea-Feie Vannin

Ramsey Harbour

Invasive Species Survey 2023

Semi-quantitative estimate of abundance of Austrominius modestus

Report by Jenny Chan and Lara Howe

Table of Contents

Introduction

The survey was conducted on 23rd September 2023, at low water, by Dr Lara Howe, marine Conservation Officer, and volunteers. 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.

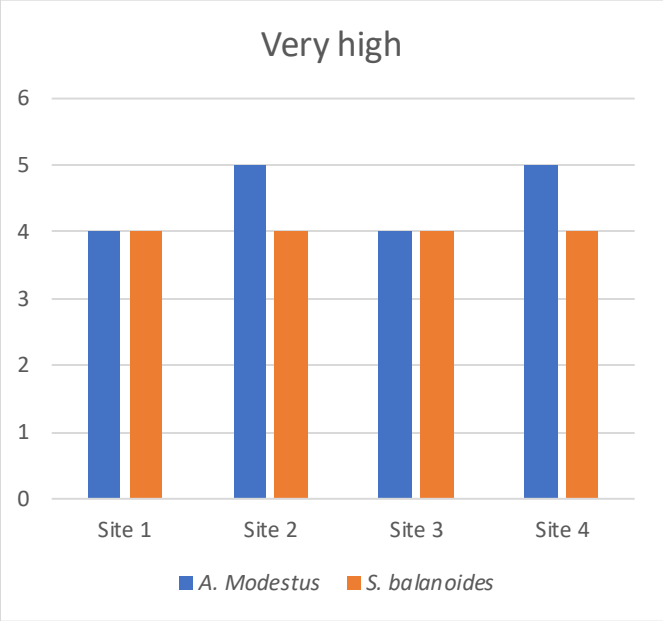
Results

Table 1. Results of the invasive species survey 2023.

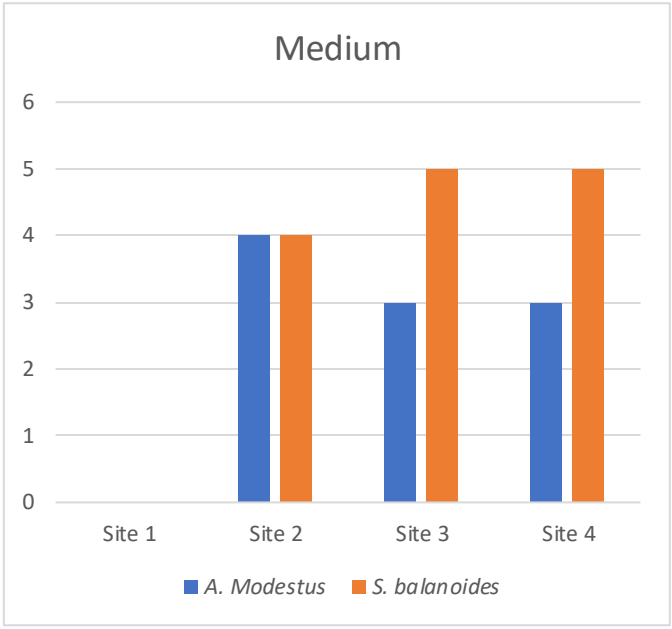
	Site 1		**Site 2**			**Site 3**			**Site 4**			
Species	**VH**	**H**	**VH**	**H**	**M**	**VH**	**H**	**M**	**VH**	**H**	**M**	**L**
A. modestus	C	A	A	A	C	C	F	F	A	C	F	O
S. balanoides	C	A	C	A	C	C	A	A	C	A	A	C
C. gigas	N	N	N	N	N	N	N	N	N	N	N	N
M. edulis	N	N	N	R	R	N	N	N	N	N	N	N

A total of 47 Pacific oysters were observed on the harbour wall, although not within the sample quadrats. A total of 21 oysters were dead shell and 26 were alive. The observed oysters were generally small and only a few years old.

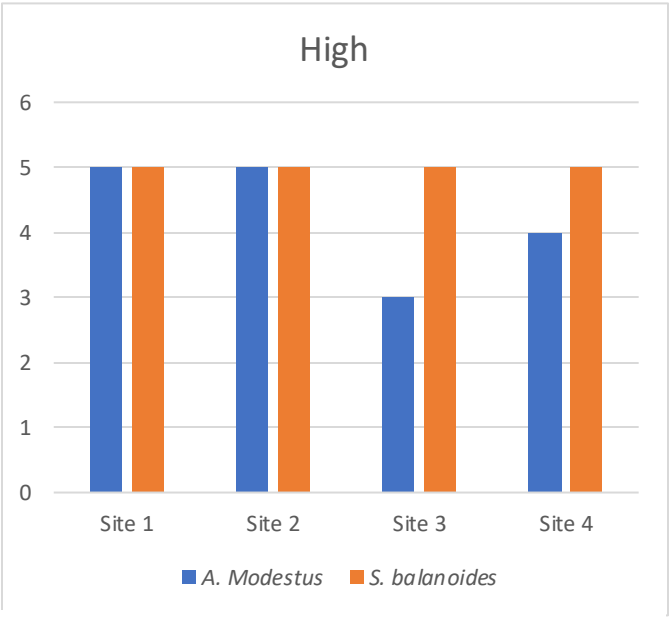
For graphical representation, a number was assigned to each level of the SACFOR scale (see Table 11, Appendix 2). Where an abundance was recorded between two levels of the scale (e.g. F/C) the number allocated was a decimal, halfway between the two values (e.g. 3.5).



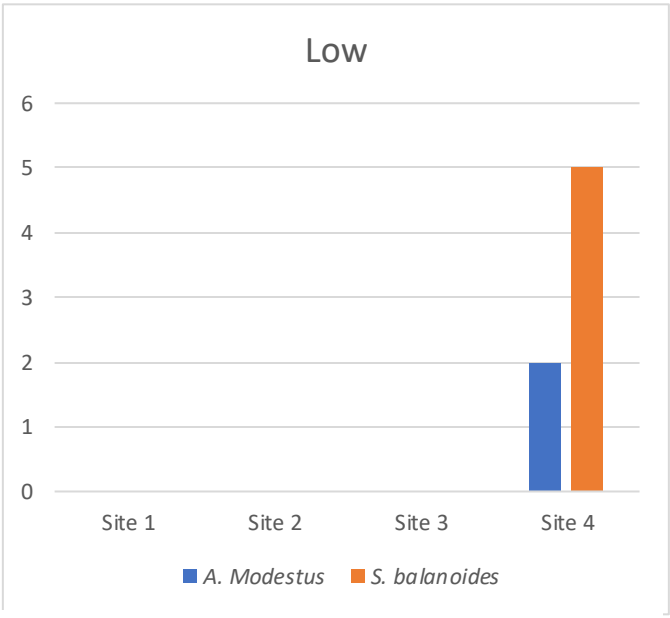
Graph 1a. Abundance of *A. modestus* and *S. balanoides* at the very high tidal level of each site.



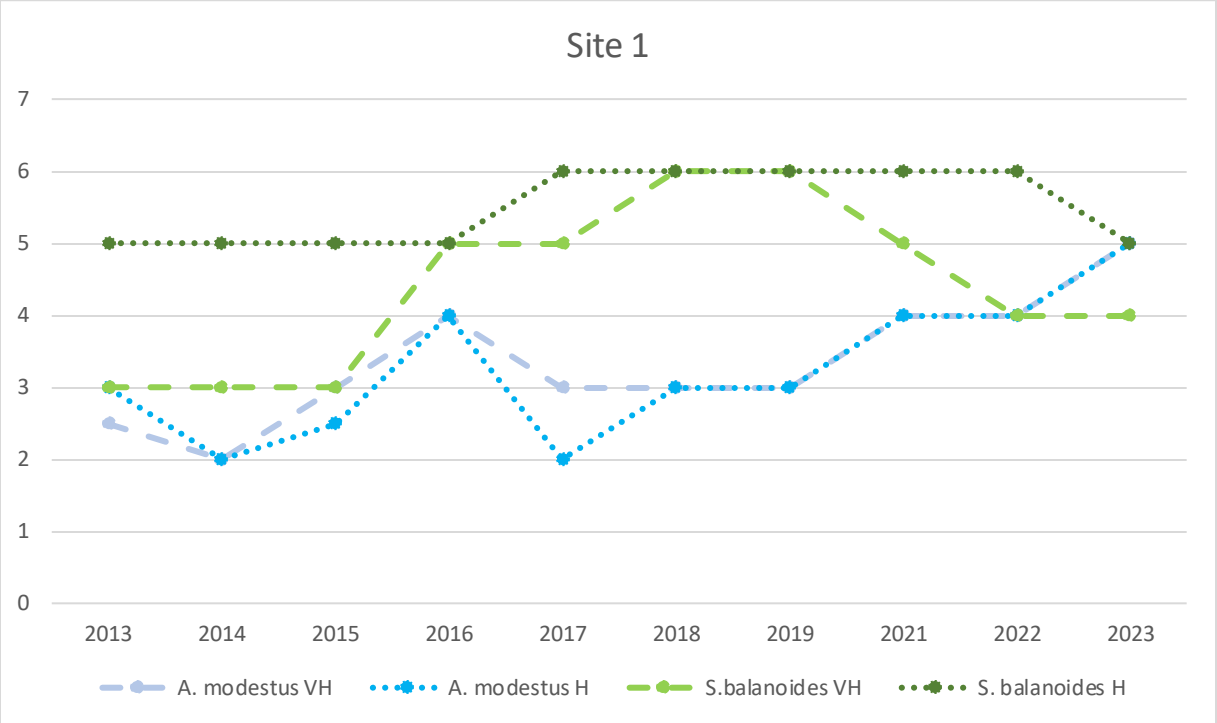
Graph 1b. Abundance of *A. modestus* and *S. balanoides* at the medium tidal level of each site.

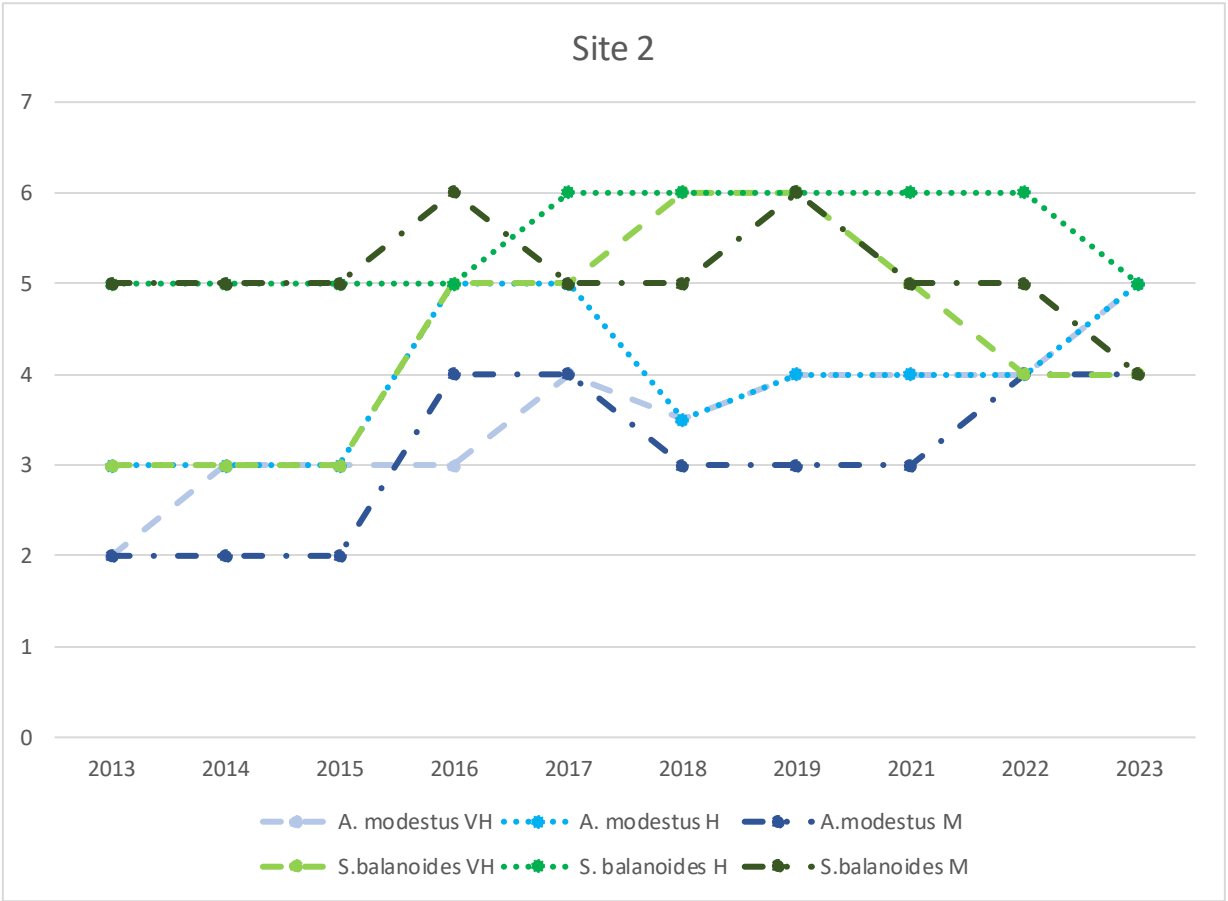


Graph 1c. Abundance of *A. modestus* and *S.balanoides* at the high tidal level of each site.



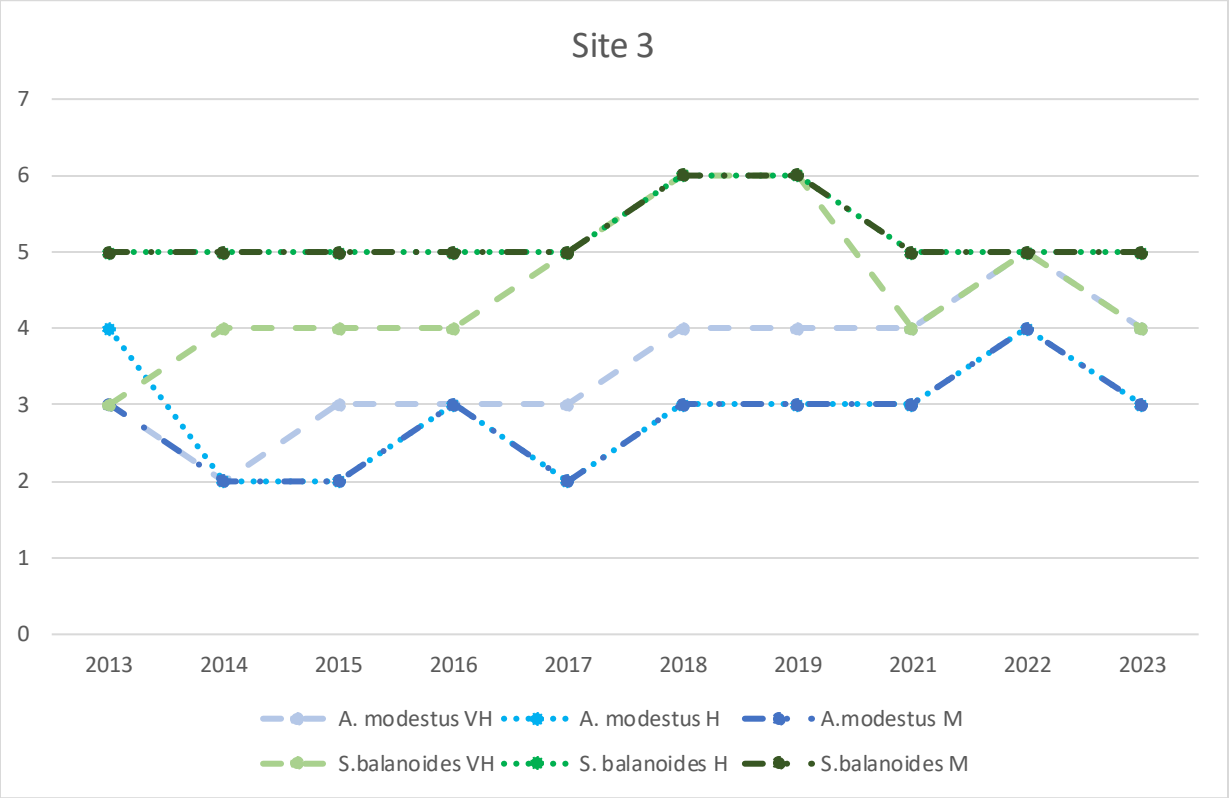
Graph 1a. Abundance of *A. modestus* and *S.balanoides* at the very high tidal level of each site.

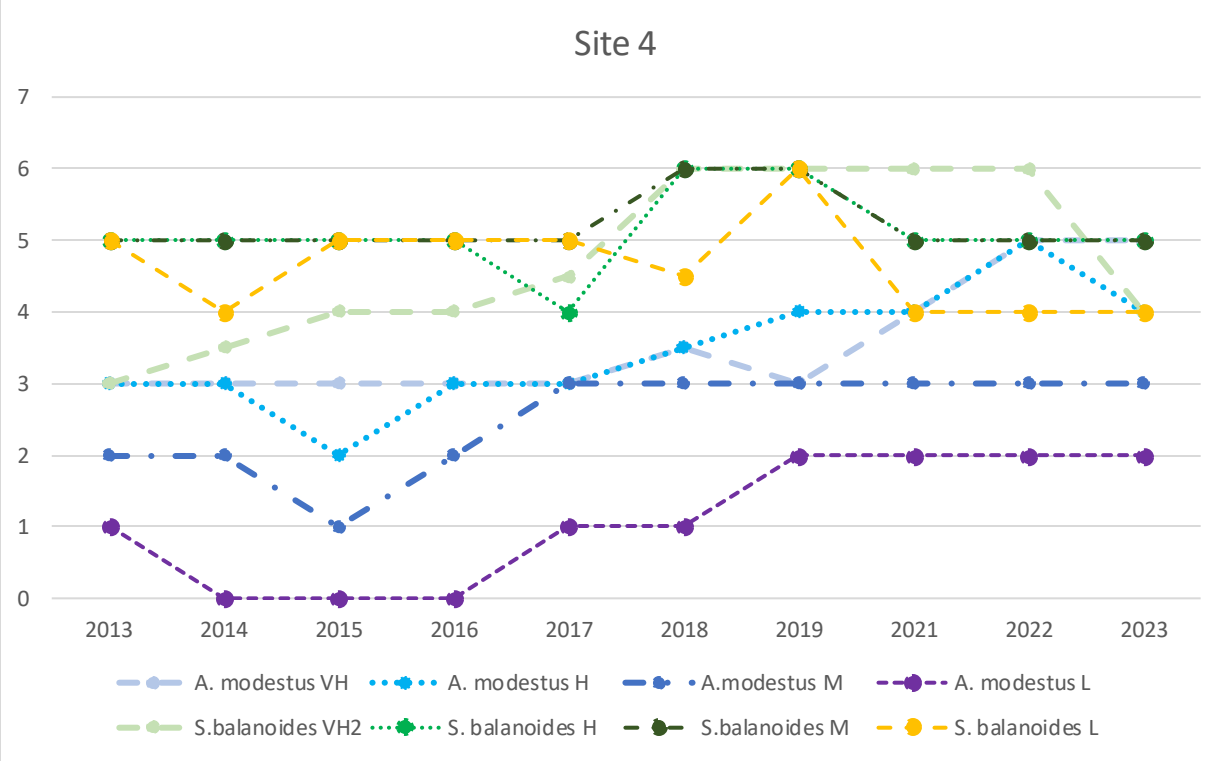




Graph 2a. Abundance of *A. modestus* and *S. balanoides* at site 1 at the very high (VH) and high (H) tidal levels.

Graph 2b. Abundance of *A. modestus* and *S. balanoides* at site 2 at the very high (VH), high (H) and mid (M) tidal levels.





Graph 2c. Abundance of *A. modestus* and *S. balanoides* at site 3 at the very high (VH), high (H) and mid (M) tidal levels.

Graph 2b. Abundance of *A. modestus* and *S. balanoides* at site 2 at the very high (VH), high (H), mid (M) and low (L) tidal levels.

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 *A. modestus* has increased in abundance over the past years resulting in all sites now showing abundance as frequent, common, or abundant, with the exception of site 4 at low water which was recorded as occasional. This is not surprising as the species is associated with the upper shore. Since the last survey in 2022, there has been an increase in *A. modestus* at sites 1 and 2 at the very high and high tidal ranges but, a decrease in abundance at sites 3 and 4. The level of abundance has mostly stayed the same at the mid and low tidal levels. At Site 1, there has been an increase in abundance of *A. modestus* from common to abundant at both tidal ranges. At Site 2, an increase in abundance from common to abundant at very high and high tidal ranges and no change at mid tidal range. At site 3, a decrease in abundance from common to frequent at high and mid tidal ranges and a decrease from abundance to common at very high tidal range. At site 4, there was no change in abundance at the very high, mid or low tidal range but, there was a decrease from abundant to common at high tidal range.

Since the last survey in 2022, there has been a decrease in the abundance of native *S. balanoides*. At the very high tidal range of site 1 and 3 the abundance of has decreased from abundant to common. At site 4 the abundance has decreased from superabundant to common. At site 2, a decrease in abundance from superabundant to abundant at the high tidal range and a decrease from abundant to common at the mid tidal range. The abundance of *S. balanoides* has remained the same at the remaining tidal range points.

A total of 26 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 and an increase in abundance since the last survey in 2022. All individuals were identified between sites 3 & 4 and beyond, but none within the surveyed quadrats. This shows that spat is drifting in from other areas, possible from NW England or the Galloway coast. These were removed from the harbour wall on the 24th of October 2023. These individuals should be removed annually to prevent further population growth and spread.

It should be noted that the SACFOR scale has its limitations, originally developed for standardised, semi-qualitative surveys for experienced biologist to undertake roving surveying techniques (Hiscock, 1998), it can still lead to recorder bias which is subjective leading to observer variability and not considered sufficiently quantitative for close monitoring purposes. Nevertheless, the findings from this annual survey show that the presence of *A. modestus* is increasing. However, there appears to be no significant impact on our native *B. balanoides*.

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

2022 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	C	A	C	A	C	F	A	A	F	O
S. balanoides	A	SA	C	A	A	A	A	A	SA	A	A	C
C. gigas	N	N	N	N	N	N	N	N	N	N	N	N
M. edulis	N	N	N	N	N	N	N	N	N	N	N	N

Table A1. Results of the invasive species survey 2022.

2021 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	C	F	F	C	F	F	C	C	F	O
S. balanoides	A	SA	C	A	A	C	A	A	S	A	A	C
C. gigas	BEEN REMOVED ENTIRELY IN 2018											
M. edulis	N	N	N	N	N	N	N	R	N	N	N	R

Table A2. Results of the invasive species survey 2021.

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

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 A3. 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 A4. 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 A5. 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 A6. 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 A7. 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 A8. 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 A9. 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 A10. 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 A11. Numerical's assigned to SACFOR scale.