

Ramsey Harbour

Invasive Species Survey 2024

Semi-quantitative estimate of abundance of Austrominius modestus



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Introduction

The survey was conducted on 28th September 2024 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 2024.

<i>Species</i>	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	A	C	C	C	C	C	A	A	C	F
<i>S. balanoides</i>	C	C	C	A	C	C	C	C	C	C	C	C
<i>C. gigas</i>	N	N	N	N	N	N	N	N	N	N	N	N
<i>M. edulis</i>	N	N	N	R	F	N	N	F	N	N	N	F



Key:

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

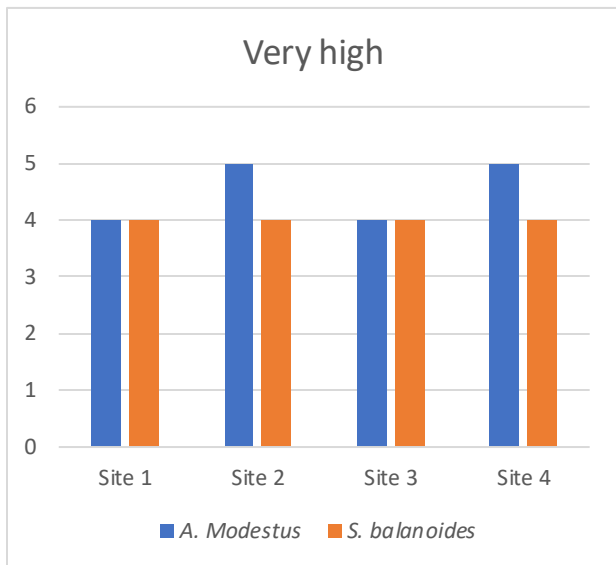
Figure 2. SACFOR scale.

Further to the above results, a total of 18 Pacific oysters were observed on the harbour wall, although not within the sample quadrats. In addition, a total of 55 dead shell were also observed. The observed oysters were generally small, and thought to be only a few years old, and were removed from the site.

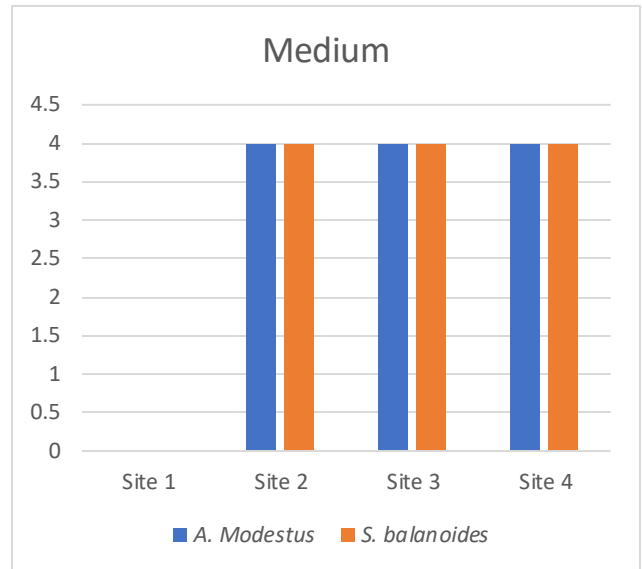
For graphical representation, a number was assigned to each level of the SACFOR scale (Table 2). Where an abundance was recorded between two levels of the scale (e.g. F/C) the number allocated was a decimal, halfway between the two values (e.g. 3.5).

Table 2. Numerical's assigned to SACFOR scale and tidal height abbreviations.

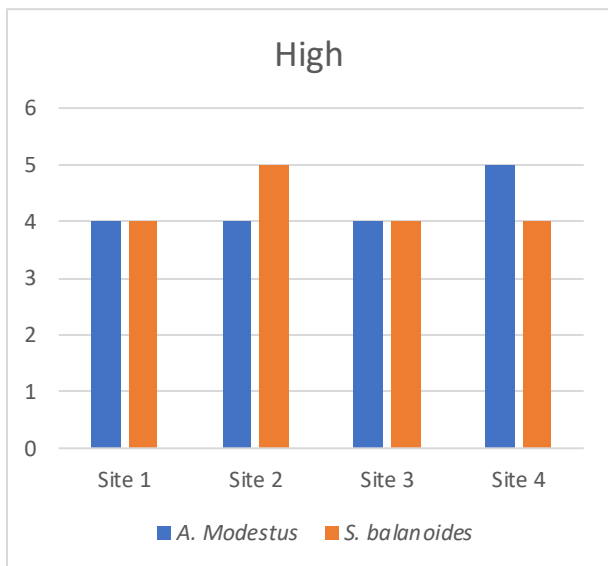
Key:		No. of	Tidal height	
S =	Superabundant	6	VH =	Very high
A =	Abundant	5	H =	High
C =	Common	4	M =	Mid
F =	Frequent	3	L =	Low
O =	Occasional	2		
R =	Rare	1		
N =	Not present	0		



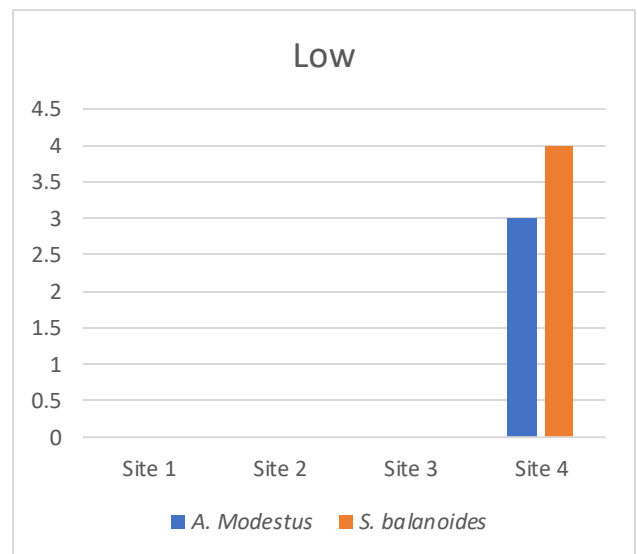
Graph 1a. Abundance of *A. modestus* and *S. balanoides* at the very high tidal level of each site.



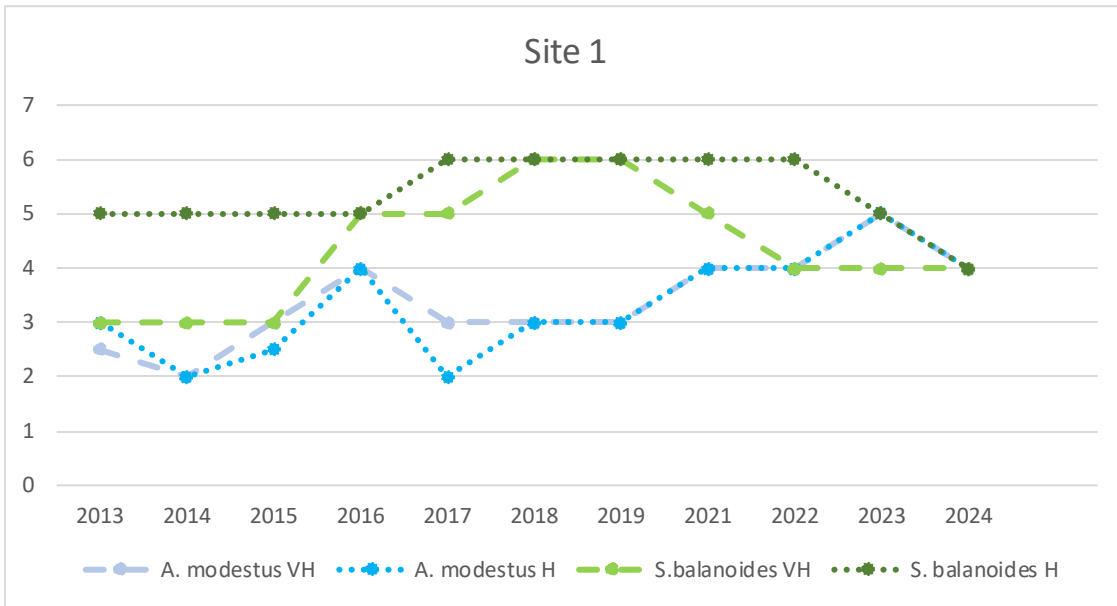
Graph 1b. Abundance of *A. modestus* and *S. balanoides* at the medium tidal level of each site.



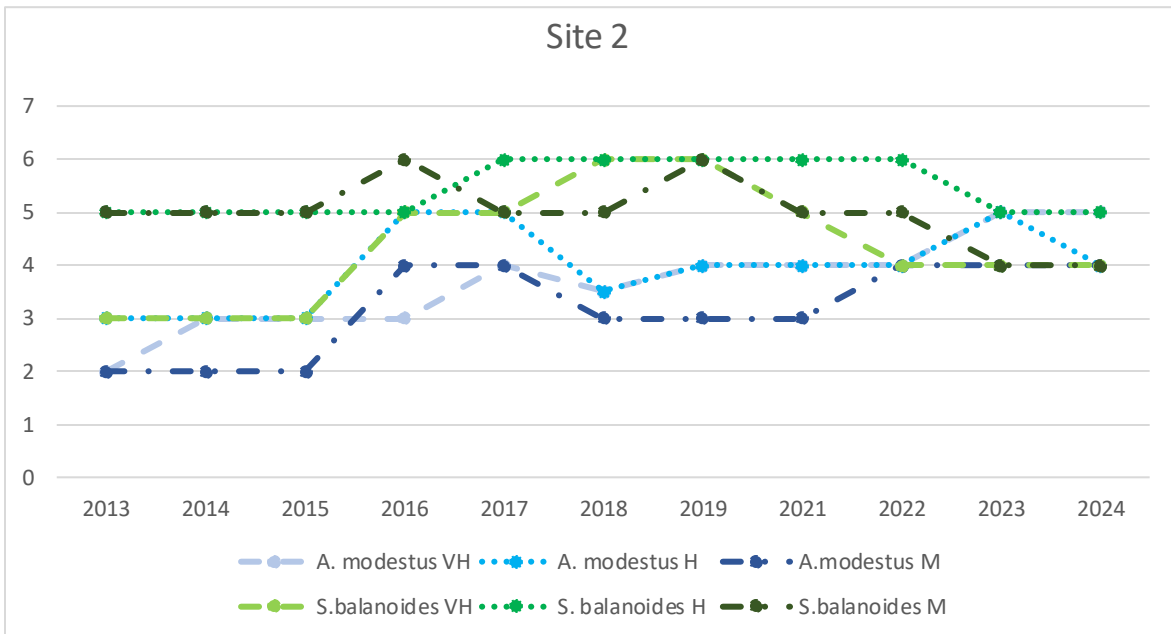
Graph 1c. Abundance of *A. modestus* and *S. balanoides* at the high tidal level of each site.



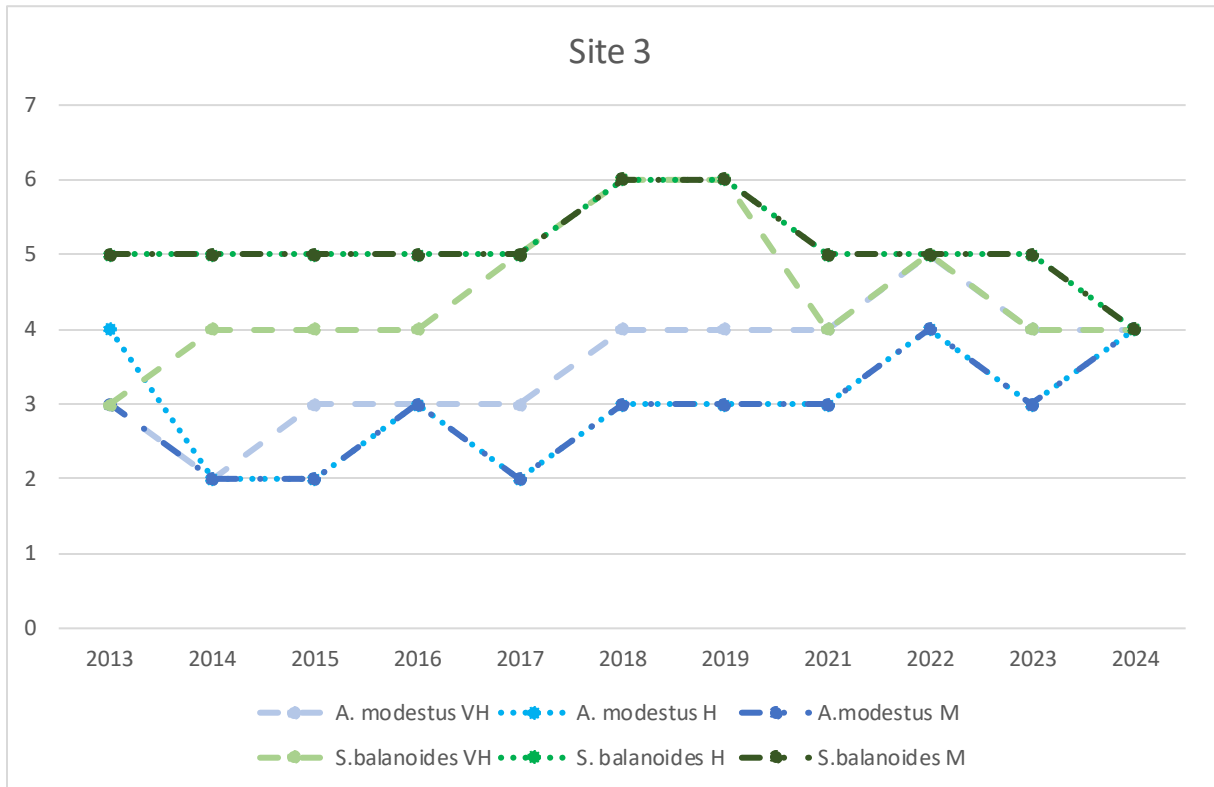
Graph 1d. Abundance of *A. modestus* and *S. balanoides* at the low tidal level.



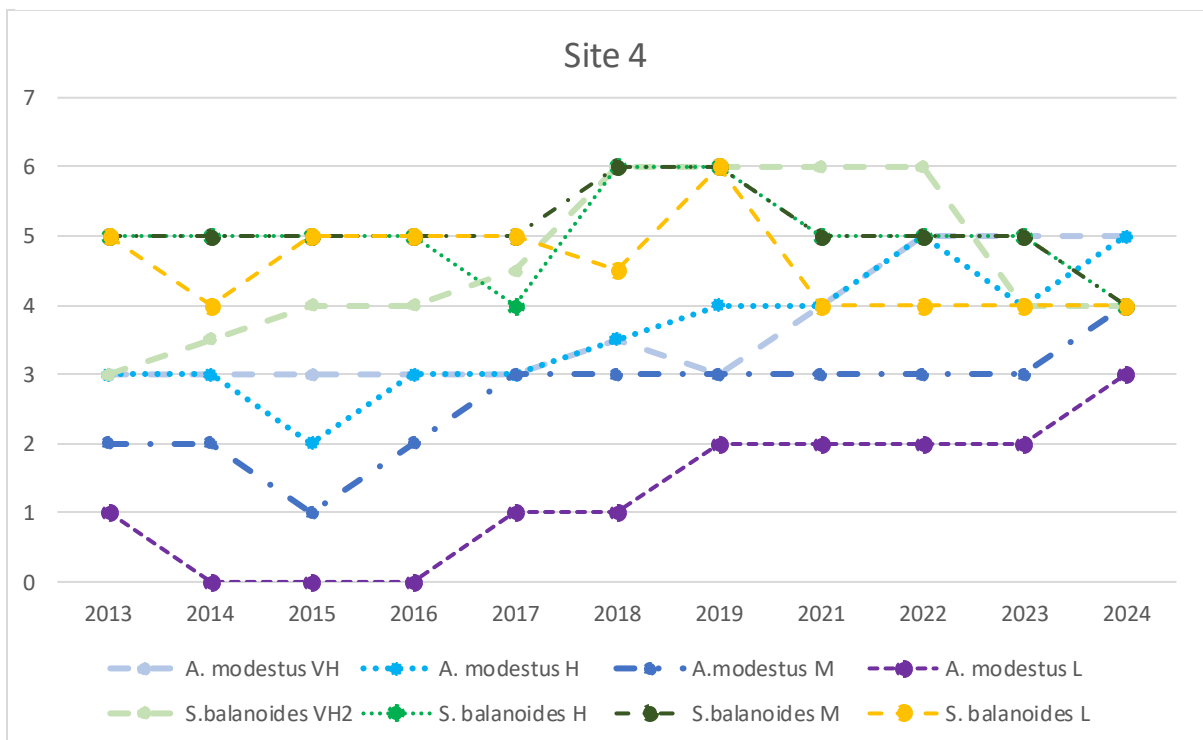
Graph 2a. Abundance of *A. modestus* and *S. balanoides* at site 1 at the very high (VH) and high (H) tidal levels.



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 2d. Abundance of *A. modestus* and *S. balanoides* at site 4 at the very high (VH), high (H), mid (M) and low (L) tidal levels.



Discussion

The abundance of two species of barnacles were measured - the invasive barnacle *Austrominius modestus* and the native *Semibalanus balanoides*. The non-native *A. modestus* has increased in abundance over the past few years resulting in all sites now showing abundance as frequent, common, or abundant. However, since the last survey in 2023, a decrease could be seen in both species at Site 1 at the high tide position, dropping from abundant to common. Similar results to the previous year could be seen at Site 2, apart from the results for *A. modestus* at the high tide position which dropped from abundant to common. Site 3 showed a rise in *A. modestus* at high and medium tidal positions, rising from frequent to common. However, at these tidal levels, *S. balanoides* dropped from abundant to common. The biggest annual differences could be seen at Site 4 where *A. modestus* increased from common to abundant at the high tide position, frequent to common at medium tide position and occasional to frequent at the low tide position. Whereas *S. balanoides*, which had been common at very high and low tide positions, and abundant at the high-medium tide positions, became common across the range.

Pacific oysters (*C. gigas*) were not found in the quadrats during the survey, although a total of 18 were observed along the harbour wall. This shows a drop from the 26 Pacific oysters found last year. However, some of these may have made up the 55 dead shells recorded this year. Nevertheless, number are fairly stable and show no signs of significant increase above what has been reported previously. These 18 individuals were removed from the harbour wall.

M. edulis was also not observed on the harbour wall apart from a few individuals which were found at Site 2 at the high tide location, and scattered patches found at Site 2 and 3 at the medium tide location and Site 4 at the low tide position. This is a reflection of the unsuitable habitat for anchoring on rather than impacts associated with the presence of the Pacific oyster.

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* or the other species. All four species appear to show natural fluctuations in their abundance.



Appendix 1 – Survey methods

Survey Methods

Those species which we expected to find were the non-native species *Austrominius modestus* (Australian barnacle) and *Crassostrea gigas* (Pacific oyster). Plus, 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). All 4 species that were expected were found and quantified (although *C. gigas* was not observed in the quadrats).

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

2023 results

Table A2.1. Results of the invasive species survey 2023.

<i>Species</i>	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	A	A	A	C	C	F	F	A	C	F	O
<i>S. balanoides</i>	C	A	C	A	C	C	A	A	C	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	R	R	N	N	N	N	N	N	N

2022 results

Table A2.2. Results of the invasive species survey 2022.

<i>Species</i>	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	A	C	A	C	F	A	A	F	O
<i>S. balanoides</i>	A	SA	C	A	A	A	A	A	SA	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

2021 results

Table A2.3. Results of the invasive species survey 2021.

<i>Species</i>	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	SA	C	A	A	C	A	A	S	A	A	C
<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



2016 Results

Table A2.7. Results of invasive species survey 2016.

<i>Species</i>	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

2015 Results

Table A2.8. Results of invasive species survey 2015.

<i>Species</i>	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

2014 Results

Table A2.9. Results of invasive species survey 2014.

<i>Species</i>	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



2013 Results

Table A2.10. Results of invasive species survey 2013.

<i>Species</i>	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			