

Ramsey Harbour Invasive Species Survey 2014

Semi-quantitative estimate of abundance of *Elminus modestus* and *Crassostrea gigas*

Introduction

The survey was conducted on 20th September 2014 to coincide with low water at 4.15pm. Five volunteers helped conduct the survey. Due to the limited number of volunteers only the south side of the south wall was surveyed, as in the previous year.

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

<i>Species</i>	Site 1		Site 2			Site 3			Site 4			
	VH	H	VH	H	M	VH	H	M	VH	H	M	L
<i>E. 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 1. 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>E. 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 2. Results of invasive species survey 2013.

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

Table 3. Key to tables 1 and 2 (see Appendix for SACFOR scale).

Number of *C. gigas* counted along the entire length of the south wall in 2013 was 240 compared to 115 this year. Shell remnants on the wall equated to 57 and the 'holes' in the barnacle cover where the oysters are likely to have previously been attached was 14. Tallying these together brings the total to 186. Four individuals were also seen on the sand at the base of the wall, still intact.

Discussion

M. edulis results showed a similar pattern to the previous year but site 3 shows a small decline in numbers whilst site 4 shows a small increase. The abundance has only changed up or down one position on the SACFOR scale so the variation in numbers is not dramatic and likely a result of natural fluctuations in the population.

C. gigas numbers have declined since the previous survey in 2013, from 240 to 115. Although this year's results suggest that very few were found on the lower shore, where they are expected to be found, there were higher numbers of individuals lower down the shore than the upper shore zone but this was observed whilst conducting the survey.

A possible reason for the decline in the numbers this year could be due to the warm weather we have had, well above the normal conditions expected but as *C. gigas* originates from warmer climates and is thought to spawn at temperatures of at least 18-20°C (Kobayashi *et al.*, 1997). The warmer conditions should have led to an increase in abundance and not a decrease. Another option for the decline in the overall numbers of *C. gigas* may be as a result of the strong winds that have hit our coast this year and resulted in storm conditions. The harbour walls are covered in barnacles and this makes a less stable anchoring platform for the oysters and may have led to their removal, unlike the mussels which can wedge themselves into cracks in the wall and aid their protection from big waves and strong currents. This is hinted at by the four intact oysters seen on the sand at the base of the wall whilst conducting the survey.

The native *S. Balanoides* has increased somewhat since last year but again only by one scale point so it could be due to natural fluctuations or in the volunteer's opinion of what is common and what is frequent. This perception of abundance will vary from person to person and this will apply to each species assessed in this survey. The invasive species, *E. modestus* shows very little change in terms of abundance and it is likely that any small change is a result of natural fluctuations. This hasn't changed since the earlier surveys back in the 1950's (Crisp, 1958 and Crisp and Southward,

1959). This suggests that the species is not impacting on our native barnacles. Its distribution up the shore hasn't changed much either, with its dominance higher up the shore.

It is positive to see that the population of *E. modestus* has remained fairly constant since the 1950's and that *C. gigas* has actually declined since last year. This would suggest that the native populations are not being adversely affected by these invasive species. However, to ensure this remains the situation further monitoring will be required.

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

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 *Elminius modestus* (Darwin's 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 (Appendix 1). 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 at 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.