

2010

# The effect marina design and recreational boating has on the spread of Non Indigenous Species

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<http://hdl.handle.net/10026.1/13902>

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The Plymouth Student Scientist

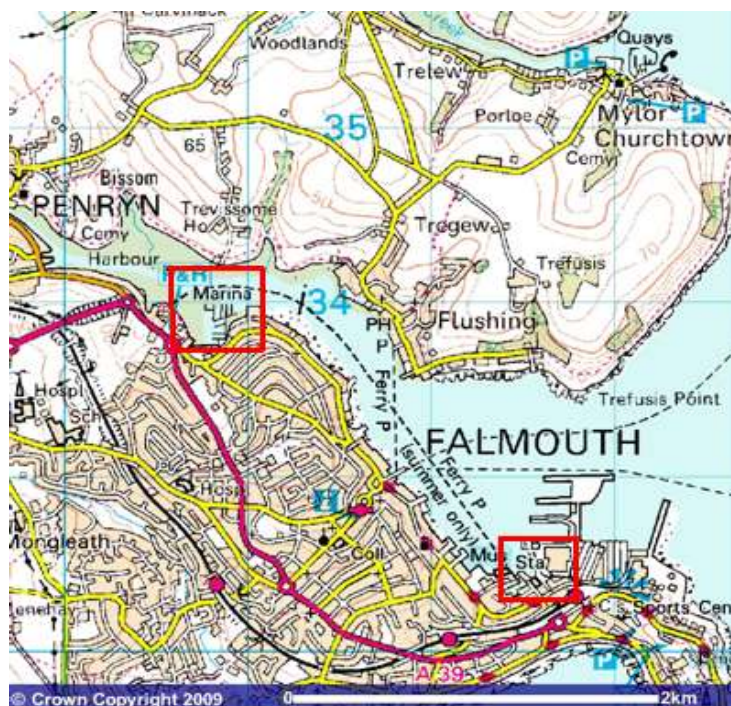
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## Appendices

### Appendix 1. Ordnance Survey map of sampling sites (Ordnance Survey 2009).



Premier marina on the left, Port Pendennis marina on the right

**Appendix 2.** A sheet representative of those used for recording the short term panels

	EA S		EA D		EB S		EB D		SA S		SA D		SB S		SB D	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Hydroid sp.																
Erect Bryozoan																
Botryllus																
Diplosoma																
Solitary ascidian																

EA = Exposed A

EB = Exposed B

SA = Sheltered A

SB = Sheltered B

S = Surface

D = Deep

1 = Side 1 (of panel)

2 = Side 2 (of panel)

**Appendix 3.** The prepared sheet used when recording the long term panels, any other species identified could be added during the process.

<b>Date</b>	<b>Site</b>	<b>Position</b>			
<b>FAMILY</b>	<b>PHYLLUM</b>	Side A Primary	Secondary	Side B Primary	Secondary
<b>Sponges</b>	Sycon ciliatum Scypha compressa Halichondria bowerbanki				
<b>HYDROIDS</b>	Tubularia sp. Plumularia setacea				
<b>ANEMONES</b>	Metridium senile				
<b>BARNACLES</b>	Elminius modestus				
<b>BRYOZOANS</b>	Bugula neritina Tricellaria inopinata Membranipora membranacea Celleporella hyalina Cryptosula pallasiana				
<b>ASCIDIANS</b>					
<b>Colonial</b>	Botryllus schlosseri Botrylloides violaceus Clavelina lepadiformis Diplosoma listerianum Diplosoma spongiforme Morchellium argus Perophora japonica				
<b>Unitary</b>	Styela clava Molgula socialis Ciona intestinalis Asciella aspersa Corella eumyota				
<b>ANNELIDA</b>	Sabella pavonina pomatostegus				

## Appendix 4.

The raw cumulative data over all sampling periods (5 months) for total species found on short term panels.

	PR								PE								Total
	EA S	EA D	EB S	EB D	SA A	SA D	SB S	SB D	EA S	EA D	EA S	EA D	SA A	SA D	SB S		
Hydroid sp.	22	41	17	33	34	25	20	37	20	14	15	12	7	9	8	<b>319</b>	
Tubularia	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	<b>4</b>	
Erect Bryzoan	5	1	2	3	3	3	6	7	4	2	7	1	3	2	1	<b>52</b>	
Elminius	3	1	15	4	0	5	4	3	3	62	32	5	4	4	11	<b>160</b>	
Ascidian Solidary	3	6	4	10	10	5	8	17	5	9	3	8	0	2	11	<b>111</b>	
Ciona	0	0	0	0	0	0	0	0	0	5	0	3	6	15	10	<b>45</b>	
Botryllodies	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	<b>3</b>	
Botryllus	1	8	4	3	5	8	19	15	1	3	10	3	9	7	6	<b>107</b>	
Diplosoma	16	22	17	21	19	21	32	49	17	21	27	36	26	31	34	<b>419</b>	
Spirorbid	1	0	0	1	0	0	0	0	0	3	0	0	0	0	0	<b>5</b>	

Pr = Premier marina

Pe = Port Pendennis marina

EA = Exposed A

EB = Exposed B

SA = Sheltered A

SB = Sheltered B

S = Surface

D = Deep

## Appendix 5.

The raw cumulative data over the 5 month sampling period for total Non Indigenous Species

	EA S	EA D	EB S	EB D	SA A	SA D	SB S	SB D	EA S	EA D	EA S	EA D	SA A	SA D	SB S	SB D	Total
<b>Erect Bryzoan</b>	5	1	2	3	3	3	6	7	4	2	7	1	3	2	1	2	<b>52</b>
<b>Elminius</b>	3	1	15	4	0	5	4	3	3	62	32	5	4	4	11	4	<b>160</b>
<b>Botryllodies</b>	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	<b>3</b>

	EA S	EA D	EB S	EB D	SA A	SA D	SB S	SB D	EA S	EA D	EA S	EA D	SA A	SA D	SB S	SB D	Total
<b>Erect Bryzoan</b>	5	1	2	3	3	3	6	7	4	2	7	1	3	2	1	2	<b>52</b>
<b>Elminius</b>	3	1	15	4	0	5	4	3	3	62	32	5	4	4	11	4	<b>160</b>
<b>Botryllodies</b>	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	<b>3</b>

Pr = Premier marina

Pe = Port Pendennis marina

EA = Exposed A

EB = Exposed B

SA = Sheltered A

SB = Sheltered B

S = Surface

D = Deep

## Appendix 6.

The raw cumulative data of species assemblages, over the 5 month sampling period across long term panels. Premier marina this page, Pendennis marina overleaf.

### Premier marina

SPECIES	PR										TOTAL
	SA		SB		EA		EB				
	S	D	S	D	S	D	S	D	S	D	
Sycon ciliatum		0	0	0	1	0	3	8	3.5		15.5
Hydroid sp.		4	0	11	0	0	0	0	0		15
Obelia longissima		45	0	35	3	5	7	12	10		117
Elminius modestus		1	17	2	28	16	31	27	23		145
Bugula neritina		0	38	18	44	2	2	3	0		107



## Appendix 7.

The similarity matrix used as a basis for all multivariate analysis of long term panels.

	Pr 1	Pr 2	Pr 3	Pr 4	Pr 5	Pr 6	Pr 7	Pr 8
	54.842							
Pr 2	165							
	76.605	71.194						
Pr 3	668	176						
	58.223	82.279	68.752					
Pr 4	32	185	464					
	57.060	68.098	60.547	68.233				
Pr 5	862	332	924	281				
	61.825	71.027	65.078	71.234	61.072			
Pr 6	55	164	855	505	368			
	61.409	64.899	70.065	71.821	71.497	73.539		
Pr 7	42	352	108	993	917	022		
	54.918	66.167	53.919	67.002	74.172	69.129	77.761	
Pr 8	793	683	653	036	818	71	199	
	44.568	59.495	53.436	50.053	53.355	55.243	49.043	51.492
Pe 1	133	184	575	814	772	934	534	111
	35.286	49.778	37.815	37.548	38.247	49.075	34.828	47.519
Pe 2	497	036	752	466	989	662	096	82
	47.268	60.709	57.884	53.639	50.657	53.389	52.684	49.758
Pe 3	274	901	439	379	893	421	942	825
	16.378	39.921	20.943	27.409	22.393	37.531	21.861	33.501
Pe 4	792	69	873	815	196	109	327	42
	48.978	63.034	52.673	51.561	52.143	50.341	51.165	51.982
Pe 5	225	513	577	999	687	841	932	566
	43.893	59.009	51.262	47.578	46.782	53.039	46.955	54.725
Pe 6	888	968	403	707	409	215	302	487
	49.451	71.189	60.880	62.337	54.673	61.516	57.286	61.502
Pe 7	053	194	89	554	217	396	334	179
	23.922	34.322	27.789	28.962	23.429	33.494	25.190	27.893
Pe 8	459	413	068	921	392	421	557	523

	Pe 1	Pe 2	Pe 3	Pe 4	Pe 5	Pe 6	Pe 7
Pr 2							
Pr 3							
Pr 4							
Pr 5							
Pr 6							
Pr 7							
Pr 8							
Pe 1							
	60.4148						
Pe 2	14						
	76.3507	67.4356					
Pe 3	53	47					



	41.4472	71.2283	47.0059					
Pe 4	43	74	9					
	63.3584	75.1399	68.4853	54.7428				
Pe 5	84	75	22	21				
	76.9499	82.8422	81.2487	61.0626	77.2713			
Pe 6	25	83	58	07	19			
	69.1931	69.2459	80.7220	55.0284	71.1267	75.9004		
Pe 7	77	13	16	36	63	64		
	42.8825	71.2610	56.9040	81.6662	54.5496	60.9442	54.4741	
Pe 8	79	1	66	11	26	29	78	