

Population density, survival and movement of blue crabs in estuarine salt marsh nurseries

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Supplement 1. Capture-recapture statistics, model fits and parameter estimates

Table S1. *Callinectes sapidus*. Capture-recapture summary statistics for populations of blue crabs at Prytherch Creek and Haystacks from June to October 2001, following standard Cormack-Jolly-Seber capture-recapture notation (Jolly 1965). n_i : number of crabs captured in the i th sample; m_i : number of tagged blue crabs captured in the i th sample; R_i : number of crabs captured in i and released; r_i : number of crabs released at i and subsequently recaptured; z_i : number of crabs captured before i , but not at i , that are subsequently recaptured

Date	Period	n_i	m_i	R_i	r_i	z_i
Prytherch Creek						
June 11	1	115		115	31	
June 15	2	188	16	172	21	15
June 19	3	100	10	90	17	26
June 23	4	138	21	107	10	22
June 27	5	65	13	52	7	19
July 1	6	83	10	73	4	16
July 5	7	49	8	41	3	12
July 9	8	52	7	45	1	8
July 13	9	104	4	100	3	5
July 17	10	78	8	0		
Haystacks						
August 22	1	79		79	24	
August 28	2	145	21	124	41	3
August 31	3	82	33	49	7	11
September 7	4	34	8	26	8	10
September 18	5	83	14	69	15	4
October 1	6	74	19	0		

Table S2. Quasi-adjusted Akaike's Information Criterion (QAIC_c), ΔQAIC_c, Akaike weights and number of parameters (N_p) from Cormack-Jolly-Seber capture-recapture models for Prytherch Creek and Haystacks sampling sites. Models are grouped into those that did not incorporate covariates (base models) and those that included covariates. Models were sorted by QAIC_c, with best fitting models having the lowest QAIC_c values. The model used for each site is in **bold**

Model	Survival (ϕ)	Recapture (p)	QAIC _c	Δ QAIC _c	QAIC _c weight	Model likelihood	N _p
Prytherch Creek							
I. Base models							
1	Constant	Time	624.8	3.4	0.06	0.17	10
2	Time	Constant	626.5	5.1	0.03	0.08	8
3	Constant	Constant	628.1	6.7	0.01	0.03	2
4	Time	Time	638.2	16.8	0.00	0.00	18
II. Models including covariates							
5	Constant	Time; quadratic	621.4	0	0.35	1	12
6	Constant	Time; linear	622.1	0.7	0.24	0.69	11
7	Constant; linear	Time; quadratic	623.4	2	0.13	0.37	13
8	Constant; quadratic	Time; quadratic	623.9	2.5	0.1	0.29	14
9	Constant; linear	Time; linear	624.2	2.8	0.09	0.25	12
Haystacks							
I. Base models							
1	Constant	Time	527.3	5.2	0.03	0.07	6
2	Time	Time	531.0	8.8	0.00	0.01	10
3	Time	Constant	531.8	9.7	0.00	0.00	6
4	Constant	Constant	544.2	22.1	0.00	0.00	2
II. Models including covariates							
5	Constant; linear	Time; quadratic	522.2	0	0.4	1	9
6	Constant	Time; quadratic	522.9	0.7	0.27	0.69	8
7	Constant; quadratic	Time; quadratic	524.1	1.9	0.15	0.39	10
8	Constant	Time; linear	524.2	2	0.14	0.36	7

Table S3. Apparent survival (ϕ , ϕ) and capture probabilities (p) from Cormack-Jolly-Seber (CJS) capture-recapture models for Pytherch Creek. Models are grouped into those that did not incorporate covariates (base models) and those that included covariates. The descriptors in parentheses indicate whether a parameter was held constant (c) or allowed to vary over time (t), and whether a parameter was a linear or quadratic function of size (carapace width, mm). No values for ϕ and p are presented for the final period ($i = 10$) in the $\phi(t)$, $p(t)$ model since these values are confounded and can not be estimated individually (see Lebreton et al. 1992)

Base models (no covariates)																			
$\phi(c), p(c)$					$\phi(c), p(t)$					$\phi(t), p(c)$					$\phi(t), p(t)$				
Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE
2	0.70	0.04	0.08	0.01	2	0.80	0.06	0.17	0.05	2	1.00	0.00	0.08	0.01	2	1.00	0.00	0.14	0.04
3					3			0.05	0.02	3	0.56	0.13			3	0.57	0.16	0.07	0.03
4					4			0.10	0.03	4	1.00	0.00			4	1.00	0.00	0.09	0.03
5					5			0.05	0.02	5	0.51	0.15			5	0.57	0.24	0.07	0.04
6					6			0.04	0.02	6	0.81	0.27			6	1.00	0.00	0.05	0.02
7					7			0.03	0.02	7	0.52	0.20			7	0.72	0.49	0.04	0.03
8					8			0.03	0.02	8	0.74	0.31			8	1.00	0.00	0.03	0.02
9					9			0.02	0.01	9	0.49	0.24			9	0.62	0.59	0.02	0.02
10					10			0.03	0.02	10	0.59	0.27			10				

Models including covariates																			
$\phi(c), p(t; \text{quadratic})$					$\phi(c), p(t; \text{linear})$					$\phi(c, \text{linear}), p(t; \text{quadratic})$					$\phi(c; \text{quadratic}), p(t; \text{quadratic})$				
Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE
2	0.82	0.06	0.19	0.05	2	0.81	0.06	0.19	0.05	2	0.82	0.07	0.19	0.05	2	0.81	0.07	0.19	0.05
3			0.05	0.02	3			0.05	0.02	3			0.05	0.02	3			0.05	0.02
4			0.09	0.03	4			0.09	0.03	4			0.09	0.03	4			0.09	0.03
5			0.05	0.02	5			0.05	0.02	5			0.05	0.02	5			0.05	0.02
6			0.04	0.02	6			0.04	0.02	6			0.04	0.02	6			0.04	0.02
7			0.03	0.01	7			0.03	0.02	7			0.03	0.02	7			0.03	0.02
8			0.03	0.02	8			0.03	0.02	8			0.03	0.02	8			0.03	0.02
9			0.02	0.01	9			0.02	0.01	9			0.02	0.01	9			0.02	0.01
10			0.03	0.01	10			0.03	0.02	10			0.03	0.01	10			0.03	0.02

Table S4. Apparent survival (ϕ , ϕ) and capture probabilities (p) from Cormack-Jolly-Seber capture-recapture models for Haystacks. Models are grouped into those that did not incorporate covariates (base models) and those that included covariates. The descriptors in parentheses indicate whether a parameter was held constant (c) or allowed to vary over time (t), and whether a parameter was a linear or quadratic function of size (carapace width; mm). No values for ϕ and p are presented for the final period ($i = 6$) in the $\phi(t), p(t)$ model since these parameters are confounded and can not be estimated individually (see Lebreton et al. 1992)

Base models (no covariates)																			
$\phi(c), p(c)$					$\phi(c), p(t)$					$\phi(t), p(c)$					$\phi(t), p(t)$				
Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE
2	0.77	0.03	0.34	0.05	2	0.74	0.03	0.54	0.10	2	0.72	0.07	0.39	0.06	2	0.62	0.06	0.70	0.13
3					3			0.32	0.05	3	0.61	0.11			3	0.83	0.26	0.30	0.10
4					4			0.15	0.05	4	0.62	0.06			4	0.65	0.11	0.20	0.09
5					5			0.55	0.14	5	0.92	0.06			5	0.85	0.09	0.43	0.15
6					6			0.73	0.20	6	0.84	0.06			6				

Models including covariates																			
$\phi(c; \text{linear}), p(t; \text{quadratic})$					$\phi(c), p(t; \text{quadratic})$					$\phi(c, \text{quadratic}), p(t; \text{quadratic})$					$\phi(c), p(t; \text{linear})$				
Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE	Period	phi	SE	p	SE
2	0.73	0.025	0.628	0.118	2	0.728	0.032	0.599	0.133	2	0.723	0.027	0.629	0.114	2	0.72	0.028	0.642	0.116
3			0.287	0.051	3			0.295	0.051	3			0.293	0.053	3			0.311	0.052
4			0.138	0.051	4			0.142	0.052	4			0.141	0.052	4			0.147	0.054
5			0.577	0.14	5			0.573	0.152	5			0.592	0.142	5			0.598	0.143
6			0.877	0.151	6			0.825	0.288	6			0.919	0.157	6			0.905	0.226