Corrections to Updated Analyses of the Results from the Island Closure Feasibility Study for the Dassen/Robben Island Pair given in Appendix A of MARAM/IWS/DEC14/Peng/B12

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Background

DAFF have recently advised of detection of errors in the data agreed to be used to provide results from the island closure feasibility study to be presented to the Panel, as listed in document MARAM/IWS/DEC14/Peng/C1. This involves the recruit survey biomass series advised; the errors are corrected in a revised Table provided in MARAM/IWS/DEC14/Peng/C4. These errors affect only the results for method (iv) for Dassen and Robben Islands which were reported in Appendix A of MARAM/IWS/DEC14/Peng/B12. These analyses have consequently been repeated with the corrected data.

Results

Table 2 and 3 of this document repeat the corresponding Tables in Appendix A of MARAM/IWS/DEC14/Peng/B12 for Dassen and Robben Islands only (only some results for these were affected by the errors; the previous results for Bird and St Croix Islands are unaffected), and gives the comparable previous values wherever there is a difference. Figures 1-6 compare the previous and corrected values for estimates of the fishing effect parameter λ and its estimated precision.

It is evident from the comparisons in Figures 1-6 that the corrections to the data generally have only small impacts on the estimates of λ. The tallies of the signs of these estimates and their statistical significance at 15% and 5% levels shown in Table 3 also indicate little change. Of note are that there are now a greater number of instances where the catch-biomass correlation exceeds 0.7, and further that the instances of positive:negative results which are significant at the 5% level changes from 10:4 to 12:2.

Table 2: Fishing effect parameters λ with associated standard errors for (i) fixed year effects, (ii) random year effects, (iii) year effects given by spawner biomass, and (iv) year effects given by recruit biomass for the **updated datasets with the corrected recruit survey data**. Values significantly different from zero at the 15% and 5% levels are indicated by one and two asterisks respectively. Statistical significance is based on a normal approximation for the random effects model and a two-sided t-test for the other models. Cases where the correlation between the catch and the (recruit or spawning) biomass exceeds $r = 0.7$ are indicated by a †. Some results are left blank in cases where there are no degrees of freedom. The numbers in parenthesis reflect those before the recruit survey data was corrected in cases were differences resulted.

(a) Dassen Island

Penguin response	Fish	Area	λ				s.e.			
			(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
Chick condition	Sardine	10 nmi	0.10	-0.03	-0.07 †	-0.01	0.26	0.19	0.18	0.22
		20 nmi	0.28	0.07	-0.02	0.07	0.37	0.25	0.25	0.30
		30 nmi	0.42	0.17	0.02	0.08	0.34	0.21	0.24	0.27 (0.26)
	Anchovy	10 nmi	-0.67 *	-0.22 *	0.01	0.04 (0.01)	0.17	0.20	0.23	0.21 (0.22)
		20 nmi	-0.36	-0.15	0.06	0.06	0.23	0.23	0.29	0.26 (0.27)
		30 nmi	-0.97	0.10	0.11	0.09 (0.13)	0.89	0.29	0.33	0.32
	Total	10 nmi	-0.80 *	-0.14	0.03	0.01 (0.00)	0.23	0.22	0.23	0.23
		20 nmi	-0.37	-0.04	0.12	0.06 (0.07)	0.30	0.28	0.31	0.30 (0.31)
		30 nmi	-0.39	0.16	0.25	0.15 (0.18)	1.12	0.37	0.39	0.40
Active nest proportion	Sardine	10 nmi	0.97 *	0.54 **	0.29	0.35 (0.41)	0.58	0.27	0.31	0.32 (0.26)
		20 nmi	1.39	0.79 **	0.66 **	0.74 ** (0.68)	1.01	0.27	0.31	0.31 (0.27)
		30 nmi	0.88	0.86 **	0.80 **	0.92 ** (0.77)	1.14	0.29	0.34	0.36 (0.30)
	Anchovy	10 nmi	0.15	0.15	0.04	0.27 (0.38)	0.38	0.35	0.60	0.52 (0.47)
		20 nmi	0.10	0.23	0.77	0.75 (0.85)	0.42	0.41	0.75	0.66 (0.58)
		30 nmi	0.59	0.59	0.93	0.71 (0.89)	0.91	0.81	1.11	0.99 (0.88)
	Total	10 nmi	0.26	0.31	0.31	0.47	0.37	0.35	0.61	0.52 (0.47)
		20 nmi	0.54	0.90 **	1.44 **	1.34 ** (1.12)	0.47	0.44	0.65	0.57 (0.51)
		30 nmi	1.11	1.72 **	2.06 **	1.78 ** (1.50)	0.93	0.69	0.82	0.75 (0.68)
Fledging success	Sardine	10 nmi	0.30 **	0.07	0.10 †	0.09	0.09	0.11	0.14	0.13
		20 nmi	0.23	0.09	0.13 †	0.12 (0.09)	0.17	0.12	0.16	0.14 (0.15)
		30 nmi	0.48	0.04	0.19 †	0.16 (0.13)	0.45	0.15	0.20	0.17 (0.18)
	Anchovy	10 nmi	0.13	0.10 *	0.04	0.02 (0.00)	0.09	0.08	0.12	0.13 (0.14)
		20 nmi	0.15	0.12 *	-0.01	-0.01 (-0.04)	0.10	0.10	0.14	0.16 (0.17)
		30 nmi	0.37 **	0.17 *	0.02	-0.02 (-0.07)	0.14	0.11	0.14	0.17
	Total	10 nmi	0.16	0.17 *	0.10	0.06 (0.05)	0.12	0.11	0.14	0.16 (0.17)
		20 nmi	0.24	0.20 *	0.09	0.08 (0.05)	0.15	0.13	0.18	0.20 (0.21)
		30 nmi	0.51 *	0.22 *	0.17	0.14 (0.08)	0.25	0.19	0.24	0.27 (0.29)
Chick growth	Sardine	10 nmi	-	0.11 **	0.08	0.12 ** (0.10)	-	0.06	0.06	0.05 (0.07)
		20 nmi	-	0.15 **	0.11 †	0.16 ** (0.15)	-	0.06	0.08	0.06 (0.07)
		30 nmi	-	0.20 **	0.23 **†	0.19 ** (0.20)	-	0.06	0.10	0.06 (0.07)
	Anchovy	10 nmi	-	-0.06	-0.03	-0.05	-	0.07	0.08	0.07
		20 nmi	-	-0.18**	-0.11	-0.12 (-0.15)	-	0.07	0.10	0.09 (0.08)
		30 nmi	-	-0.17**	-0.15 *	-0.14 * (-0.15)	-	0.06	0.08	0.07 (0.06)
	Total	10 nmi	-	0.00	0.01	0.01	-	0.10	0.11	0.11
		20 nmi	-	0.02	0.07	0.02	-	0.16	0.17	0.18 (0.17)
		30 nmi	-	-0.23 *	-0.12	-0.16 (-0.14)	-	0.20	0.22	0.22 (0.21)
Foraging path length	Sardine	10 nmi	-0.24	0.09	-0.10	0.14 † (0.09)	0.70	0.10	0.10	0.13 (0.11)
		20 nmi	-0.80	0.08	-0.13	0.12 † (0.07)	0.75	0.13	0.11	0.17 (0.13)
		30 nmi	-0.63	0.08	-0.12	0.14 † (0.08)	0.87	0.12	0.11	0.17 (0.13)
	Anchovy	10 nmi	-0.07	0.03	0.13	0.12 (0.09)	0.43	0.25	0.26	0.27
		20 nmi	-0.27	0.26	0.27	0.25 (0.24)	0.33	0.26	0.26	0.27 (0.26)
		30 nmi	-0.74	0.07	0.15	0.12 (0.16)	0.75	0.27	0.26	0.28 (0.27)
	Total	10 nmi	0.02	0.17	0.11	0.16 (0.15)	0.34	0.24	0.24	0.26 (0.25)
		20 nmi	-0.21	0.25 *	0.17	0.25 (0.23)	0.41	0.23	0.24	0.25 (0.24)
		30 nmi	-0.76	0.17	0.09	0.18	1.09	0.23	0.23	0.25 (0.23)
Foraging trip duration	Sardine	10 nmi	0.31	0.12 **	0.08	0.13 † (0.12)	0.79	0.07	0.10	0.09 (0.07)
		20 nmi	-0.55	0.12 *	0.07	0.12 †	0.95	0.09	0.11	0.12 (0.09)
		30 nmi	-0.66	0.12 *	0.06	0.12 †	1.00	0.09	0.11	0.12 (0.09)
	Anchovy	10 nmi	0.07	0.37 **	0.39 **	0.38 ** (0.36)	0.42	0.16	0.16	0.16 (0.17)
		20 nmi	-0.04	0.18	0.24	0.23 (0.22)	0.33	0.19	0.20	0.20
		30 nmi	-0.17	-0.05	-0.03	-0.03 (-0.02)	0.85	0.20	0.21	0.21 (0.20)
	Total	10 nmi	0.24	0.41 **	0.40 **	0.41 **	0.33	0.14	0.15	0.15
		20 nmi	0.13	0.26 *	0.24	0.27 (0.26)	0.44	0.17	0.19	0.18
		30 nmi	0.03	0.10	0.07	0.11	1.32	0.17	0.19	0.19 (0.18)

Table 2: Continued.

(b) Robben Island

Penguin response	Fish	Area	λ					s.e.			
			(i)	(ii)	(iii)	(iv)		(i)	(ii)	(iii)	(iv)
Chick condition	Sardine	10 nmi	-0.11	0.16	-0.04	0.17		0.33	0.17	0.22	0.20
		20 nmi	0.12	0.26	-0.01	0.34		0.48	0.28	0.34	0.34 (0.33)
		30 nmi	0.49	0.37 **	0.16 †	0.38		0.60	0.22	0.48	0.24
	Anchovy	10 nmi	0.34 *	-0.02	-0.12	-0.17	(-0.13)	0.15	0.17	0.19	0.19 (0.20)
		20 nmi	-0.05	-0.08	-0.06	-0.15	(-0.08)	0.21	0.21	0.25	0.27 (0.28)
		30 nmi	-0.61	0.17	0.18	0.15	(0.23)	0.79	0.25	0.27	0.29 (0.30)
	Total	10 nmi	0.44 *	-0.07	-0.14	-0.14	(-0.12)	0.18	0.18	0.19	0.19
		20 nmi	-0.04	-0.08	-0.07	-0.11	(-0.07)	0.26	0.24	0.26	0.28 (0.29)
		30 nmi	-0.04	0.29	0.34	0.28	(0.34)	0.90	0.29	0.30	0.33
Active nest proportion	Sardine	10 nmi	0.71 *	0.41 **	0.16	0.18	(0.28)	0.35	0.17	0.19	0.20 (0.17)
		20 nmi	0.84	0.44 **	0.25	0.29		0.55	0.18	0.22	0.24 (0.20)
		30 nmi	0.70	0.57 **	0.38	0.49 *†	(0.39)	0.83	0.24	0.29	0.32 (0.25)
	Anchovy	10 nmi	1.02 **	0.98 **	0.69	0.73 *	(0.66)	0.32	0.29	0.50	0.42 (0.38)
		20 nmi	1.44 **	1.37 **	1.10 *	0.95 *	(1.00)	0.33	0.32	0.60	0.53 (0.46)
		30 nmi	1.41 **	1.20 **	0.67	0.56	(0.70)	0.63	0.56	0.78	0.68 (0.61)
	Total	10 nmi	1.05 **	1.01 **	0.73 *	0.86 **	(0.92)	0.28	0.27	0.48	0.41 (0.36)
		20 nmi	1.39 **	1.40 **	1.25 **	1.15 **	(1.32)	0.35	0.34	0.54	0.47 (0.41)
		30 nmi	1.86 **	1.89 **	1.29 *	1.13 *	(1.43)	0.75	0.59	0.73	0.66 (0.58)
Fledging success	Sardine	10 nmi	0.59 **	-0.14**	-0.14**	-0.15 **		0.15	0.04	0.05	0.05 (0.04)
		20 nmi	0.27	-0.17**	-0.17**	-0.21 **	(-0.19)	0.20	0.06	0.07	0.07 (0.06)
		30 nmi	0.30	-0.16**	-0.15 *	-0.18 *	(-0.19)	0.33	0.07	0.09	0.09 (0.07)
	Anchovy	10 nmi	-0.10	-0.07	-0.03	-0.07		0.10	0.08	0.09	0.10
		20 nmi	0.03	0.01	0.03	-0.02	(-0.03)	0.12	0.09	0.11	0.13 (0.12)
		30 nmi	0.37 *	0.14 *	0.08	0.07		0.19	0.13	0.13	0.14
	Total	10 nmi	-0.09	-0.13 *	-0.09	-0.14		0.11	0.08	0.09	0.10
		20 nmi	0.04	-0.10	-0.08	-0.19	(-0.20)	0.14	0.11	0.13	0.14
		30 nmi	0.36	-0.06	-0.03	-0.17	(-0.19)	0.26	0.16	0.17	0.19 (0.18)
Chick growth	Sardine	10 nmi	-	0.17 **	0.07 †	0.19 *	(0.18)	-	0.09	0.14	0.08 (0.10)
		20 nmi	-	0.27 **	0.08 †	0.28 *		-	0.16	0.33	0.14 (0.17)
		30 nmi	-	0.23 **	0.32 †	0.23 **		-	0.10	0.26	0.10 (0.11)
	Anchovy	10 nmi	-	0.05	0.05 †	0.06 †	(0.07)	-	0.13	0.16	0.15
		20 nmi	-	0.06	0.04	0.09 †	(0.14)	-	0.09	0.17	0.17 (0.16)
		30 nmi	-	-0.04	-0.00	0.04 †	(0.08)	-	0.12	0.15	0.16 (0.15)
	Total	10 nmi	-	0.02	-0.01	0.04 †		-	0.14	0.17	0.16
		20 nmi	-	0.06	0.02	0.08 †	(0.09)	-	0.16	0.19	0.20
		30 nmi	-	0.00	0.05	0.11 †	(0.13)	-	0.18	0.22	0.22
Foraging path length	Sardine	10 nmi	-0.33	0.16 *	-0.12 †	0.22	(0.15)	0.92	0.14	0.13	0.17 (0.14)
		20 nmi	-0.91	0.18 *	-0.12 †	0.23	(0.17)	0.86	0.15	0.14	0.19 (0.16)
		30 nmi	-0.82	0.21 *	-0.13 †	0.29 †	(0.19)	1.15	0.17	0.16	0.22 (0.18)
	Anchovy	10 nmi	0.14	0.17	0.17	0.16	(0.25)	0.35	0.24	0.26	0.28 (0.27)
		20 nmi	0.17	0.37 *	0.33	0.34	(0.44)	0.30	0.28	0.29	0.32 (0.30)
		30 nmi	-0.45	0.50 *	0.53 *	0.50	(0.61)	0.91	0.33	0.33	0.36 (0.34)
	Total	10 nmi	0.08	0.26 *	0.13	0.23	(0.28)	0.28	0.24	0.25	0.27 (0.25)
		20 nmi	0.08	0.43 *	0.31	0.43	(0.47)	0.40	0.27	0.28	0.31 (0.28)
		30 nmi	-0.65	0.63 **	0.51 *	0.64 *	(0.67)	1.45	0.31	0.32	0.35 (0.34)
Foraging trip duration	Sardine	10 nmi	0.36	0.12 *	0.07 †	0.13	(0.12)	1.04	0.10	0.13	0.12 (0.10)
		20 nmi	-0.66	0.13 *	0.05 †	0.13		1.09	0.11	0.14	0.14 (0.12)
		30 nmi	-0.90	0.15 *	0.05 †	0.15 †	(0.14)	1.32	0.12	0.16	0.16 (0.13)
	Anchovy	10 nmi	0.27	0.15	0.12	0.12	(0.16)	0.34	0.15	0.16	0.17
		20 nmi	0.45	0.32 *	0.25	0.28	(0.31)	0.30	0.20	0.22	0.24 (0.23)
		30 nmi	0.36	0.44 **	0.41 *	0.42	(0.46)	1.04	0.24	0.26	0.28 (0.26)
	Total	10 nmi	0.20	0.18 *	0.15	0.17	(0.19)	0.27	0.14	0.15	0.15 (0.14)
		20 nmi	0.43	0.31 *	0.28	0.32	(0.33)	0.43	0.20	0.22	0.22 (0.21)
		30 nmi	0.43	0.48 **	0.43 *	0.48 *	(0.49)	1.75	0.24	0.26	0.27 (0.25)

Table 3: Tallies of positive and negative values of λ, those significantly different from zero at the 15% level, and those significantly different from zero at the 5% level for the **updated datasets with the corrected recruit survey data**. "Both no †" tallies omit instances where the catch-biomass correlation exceeds $r = 0.7$. The numbers in *italics* in the rows named *Previous* reflect those before the recruit survey data was corrected in cases were differences resulted.

(a) Western Cape

		Fixed year effects			Random year effects			Spawner Biomass			Recruit Biomass		
		all	15%	5%	all	15%	5%	all	15%	5%	all	15%	5%
Chick condition	Dassen	3:6	0:2	0:0	4:5	0:1	0:0	7:2	0:0	0:0	8:1	0:0	0:0
	Robben	4:5	2:0	0:0	5:4	1:0	1:0	3:6	0:0	0:0	5:4	0:0	0:0
Active nest proportion	Dassen	9:0	1:0	0:0	9:0	5:0	5:0	9:0	4:0	4:0	9:0	4:0	4:0
	Previous											*5:0*	
	Robben	9:0	7:0	6:0	9:0	9:0	9:0	9:0	4:0	1:0	9:0	6:0	2:0
	Previous											*8:0*	*4:0*
Fledging success	Dassen	9:0	3:0	2:0	9:0	6:0	0:0	8:1	0:0	0:0	7:2	0:0	0:0
	Robben	7:2	2:0	1:0	2:7	1:4	0:3	2:7	0:3	0:2	1:8	0:3	0:2
	Previous												*0:3*
Chick growth	Dassen				5:4	3:3	3:2	5:4	1:1	1:0	5:4	3:1	3:0
	Previous											*2:2*	*1:1*
	Robben				8:1	3:0	3:0	7:2	0:0	0:0	9:0	3:0	1:0
	Previous												*0:0*
Foraging path length	Dassen	1:8	0:0	0:0	9:0	1:0	0:0	6:3	0:0	0:0	9:0	0:0	0:0
	Robben	4:5	0:0	0:0	9:0	8:0	1:0	6:3	2:0	0:0	9:0	1:0	0:0
	Previous											*3:0*	
Foraging trip duration	Dassen	5:4	0:0	0:0	8:1	6:0	3:0	8:1	2:0	2:0	8:1	2:0	2:0
	Previous											*3:0*	*1:0*
	Robben	7:2	0:0	0:0	9:0	8:0	2:0	9:0	2:0	0:0	9:0	1:0	0:0
	Previous											*3:0*	
Total	Dassen	27:18	4:2	2:0	44:10	21:4	11:2	43:11	7:1	7:0	47:8	9:1	9:0
	Previous										*46:8*	*10:2*	*6:1*
	Robben	31:14	11:0	7:0	42:12	30:4	16:3	36:18	8:3	1:2	42:12	11:3	3:2
	Previous											*17:3*	*4:3*
	Both	58:32	15:2	9:0	86:22	51:8	27:5	79:29	15:4	8:2	89:20	20:4	12:2
	Previous										*88:20*	*27:5*	*10:4*
	Both no †							66:25	14:4	7:2	74:20	19:4	12:2
	Previous										*82:20*	*27:5*	*10:4*

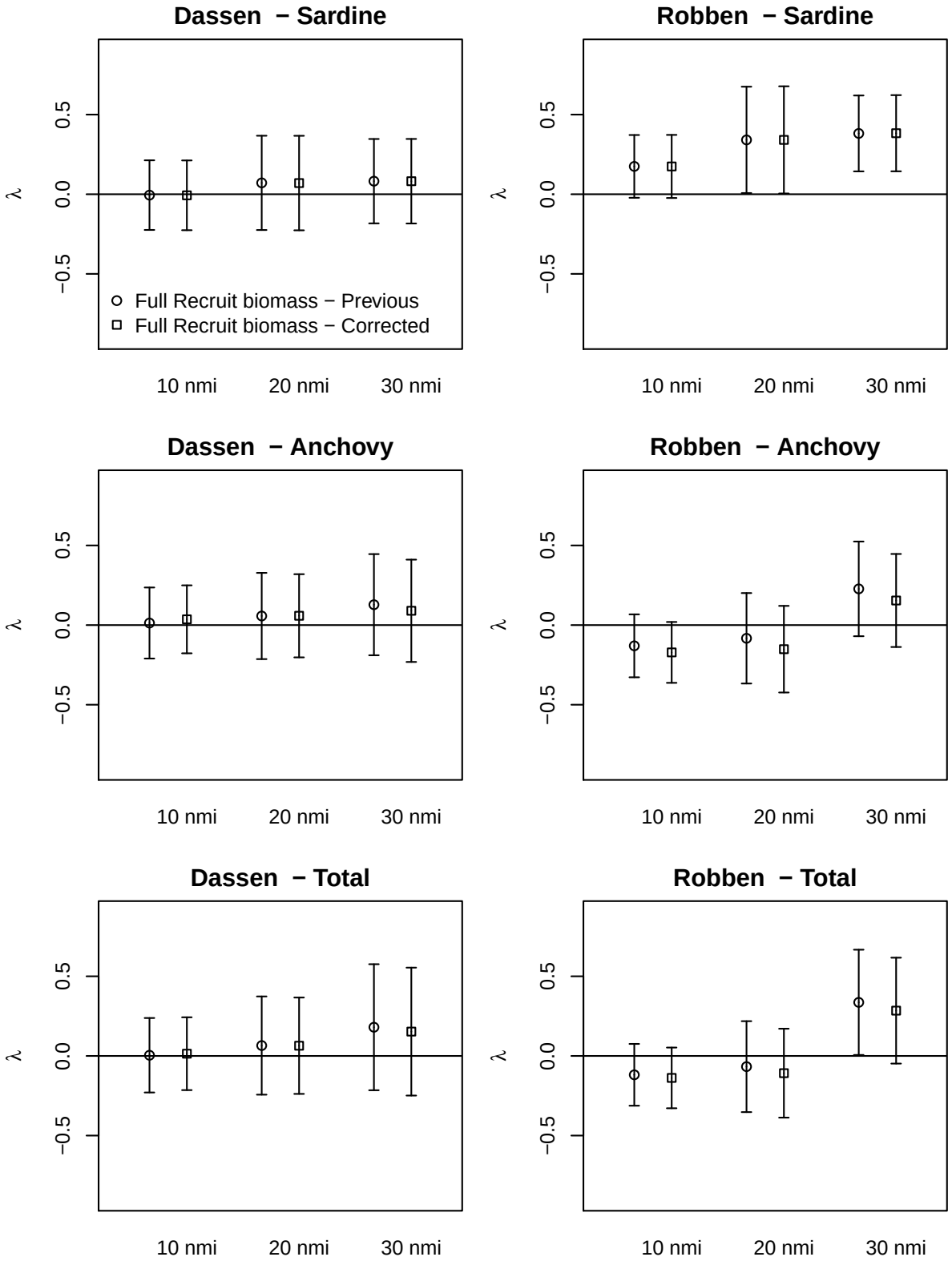

Figure 1: Dassen and Robben Islands fishing effect parameter estimates: for the **chick condition** response variable. Bars indicate one standard error. Note: "Previous" refers to the results in MARAM/IWS/DEC14/Peng/B12, Appendix A.

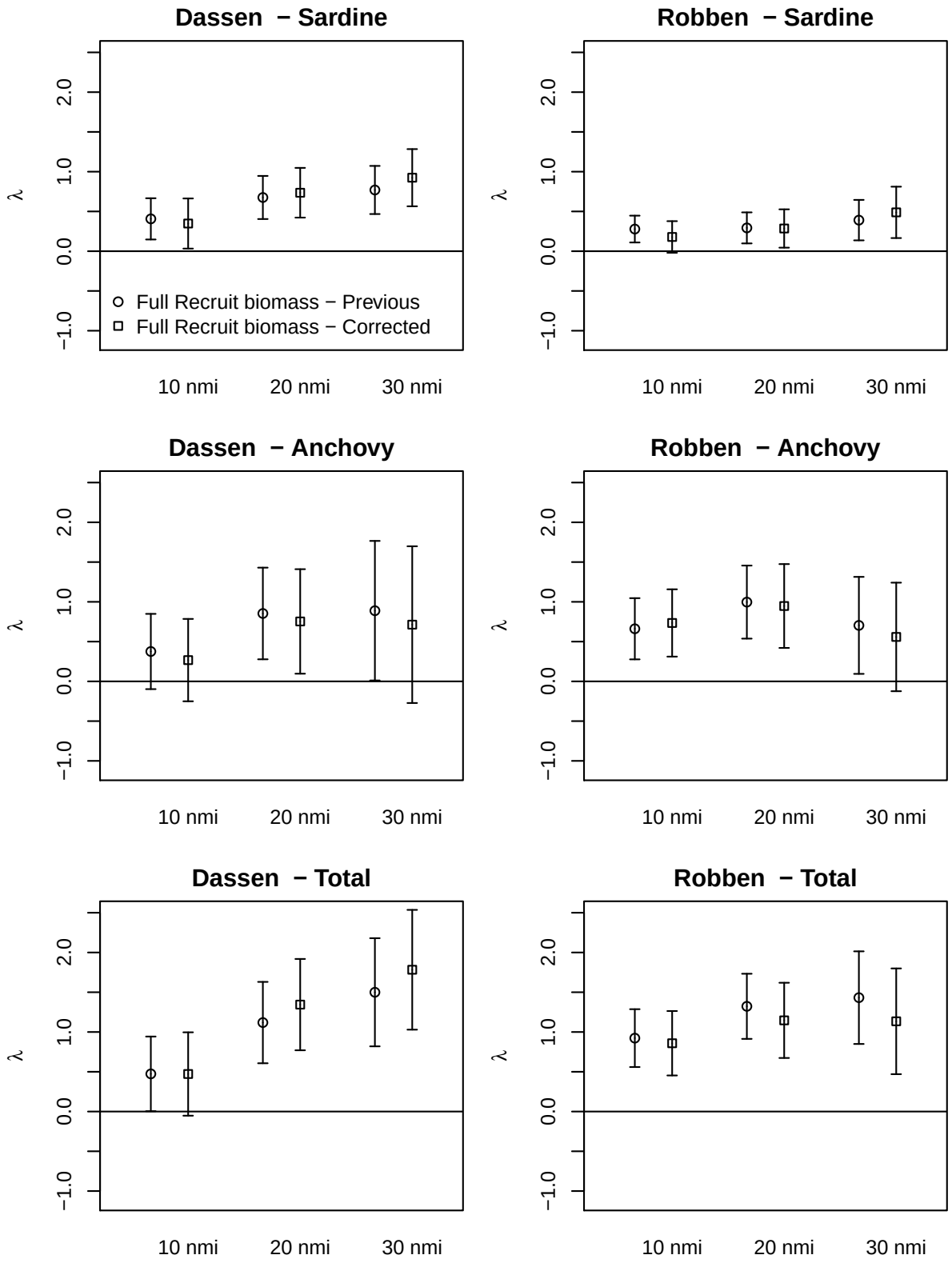

Figure 2: Dassen and Robben Islands fishing effect parameter estimates: for the **active nest proportion** response variable. Bars indicate one standard error. Note: "Previous" refers to the results in MARAM/IWS/DEC14/Peng/B12, Appendix A.

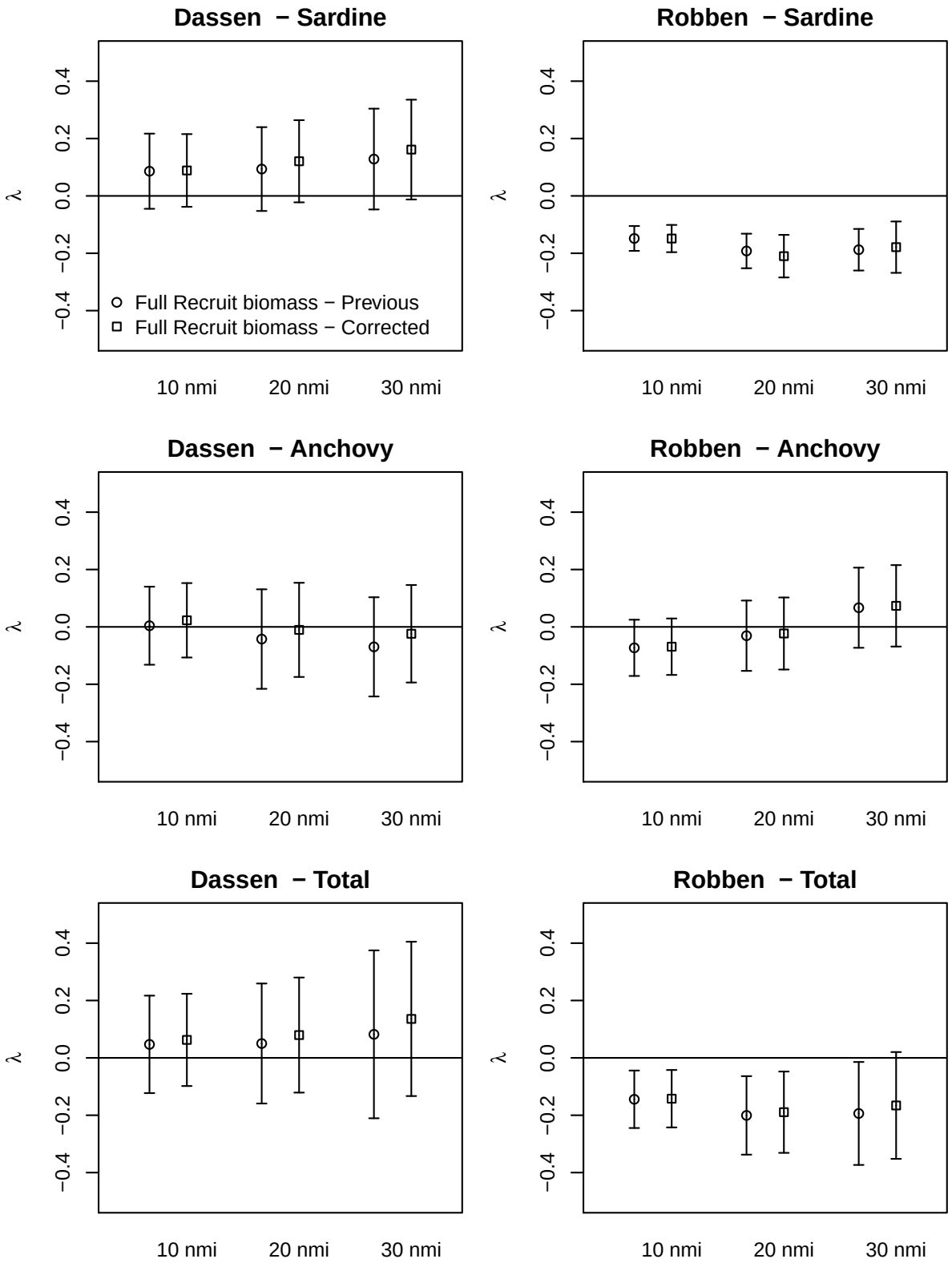

Figure 3: Dassen and Robben Islands fishing effect parameter estimates: for the **fledging success** response variable. Bars indicate one standard error. Note: "Previous" refers to the results in MARAM/IWS/DEC14/Peng/B12, Appendix A.

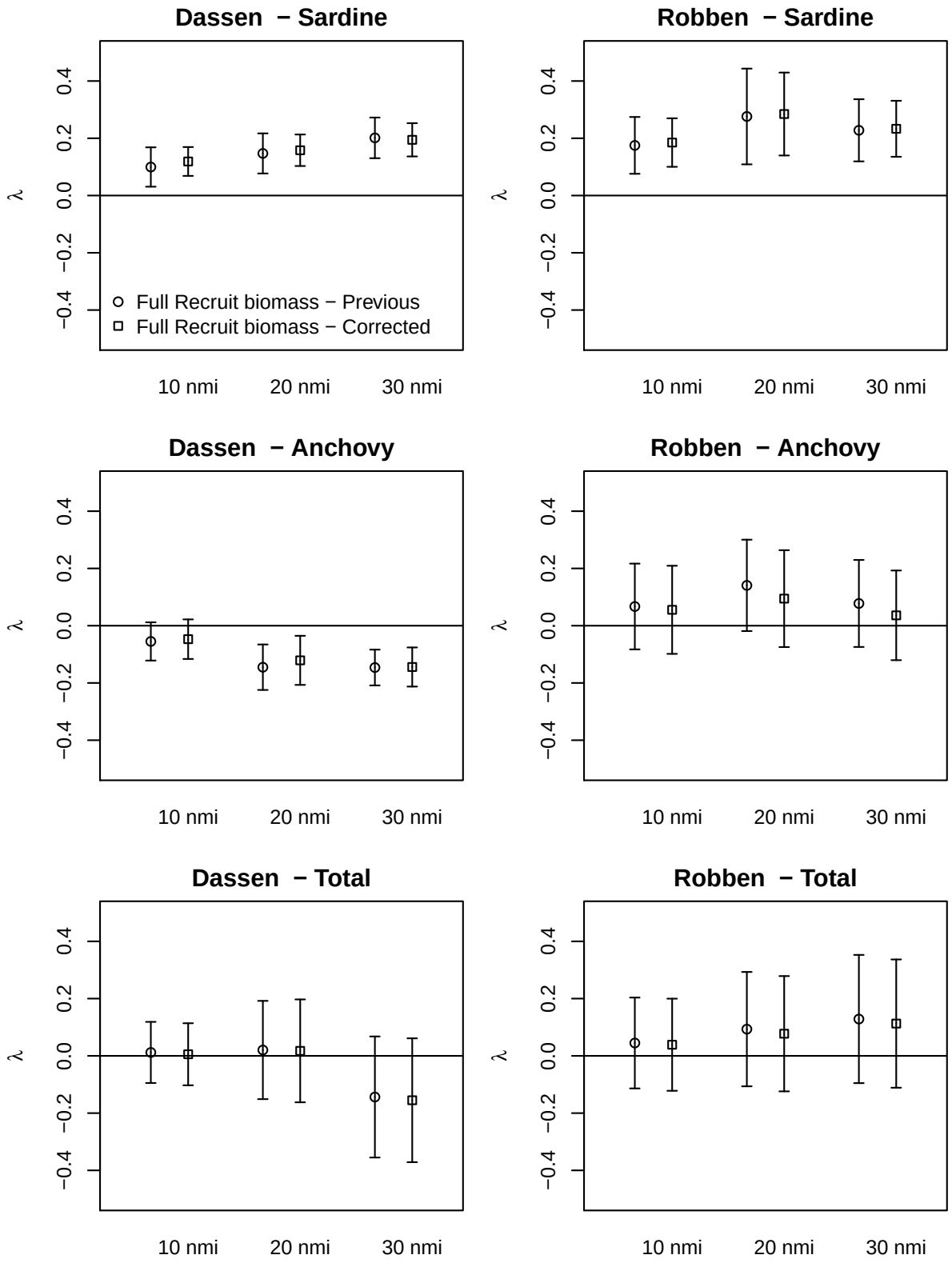

Figure 4: Dassen and Robben Islands fishing effect parameter estimates: for the **chick growth rate** response variable. Bars indicate one standard error. Note: "Previous" refers to the results in MARAM/IWS/DEC14/Peng/B12, Appendix A.

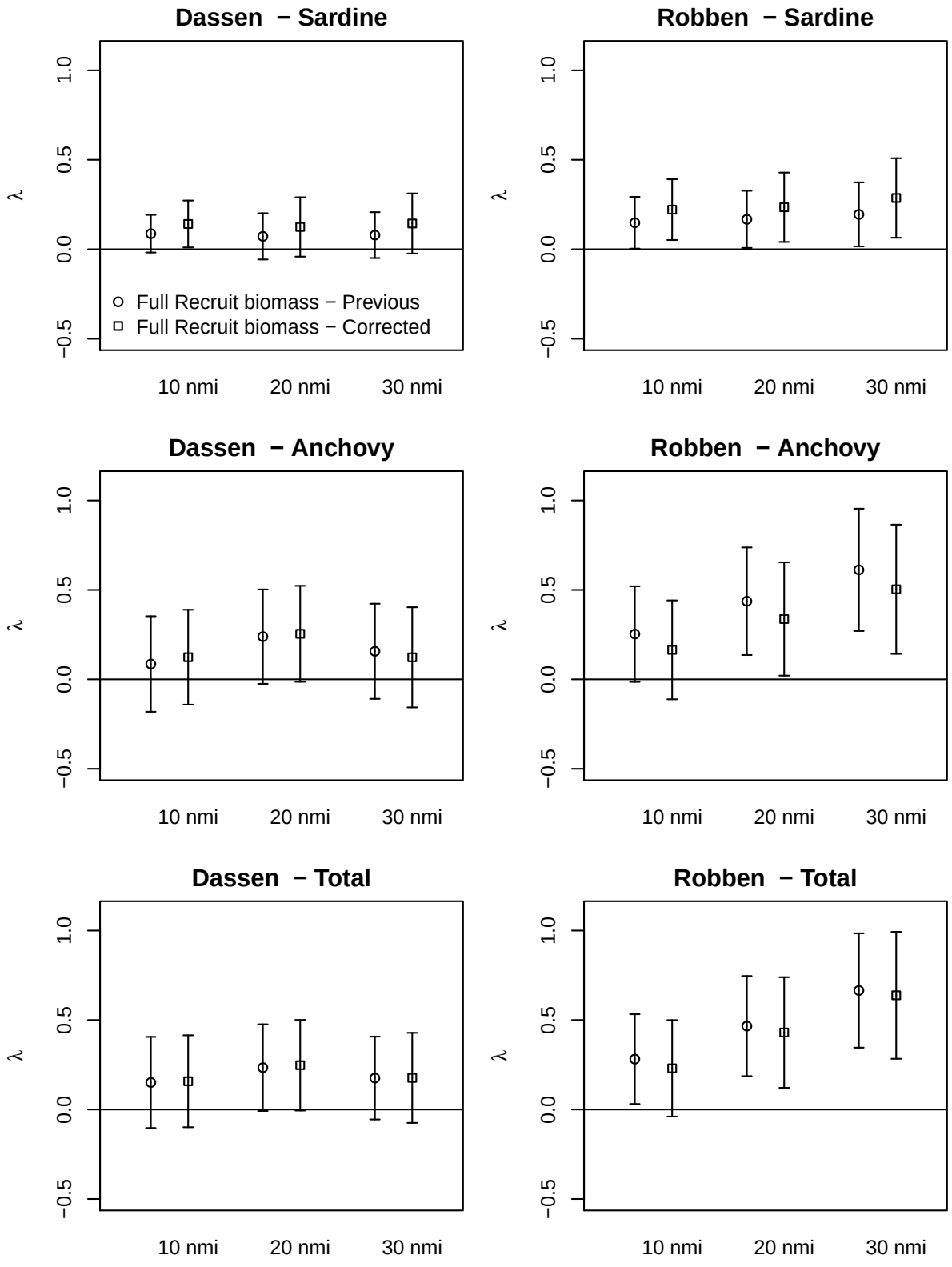

Figure 5: Dassen and Robben Islands fishing effect parameter estimates: for the **foraging path length** response variable. Bars indicate one standard error. Note: "Previous" refers to the results in MARAM/IWS/DEC14/Peng/B12, Appendix A.

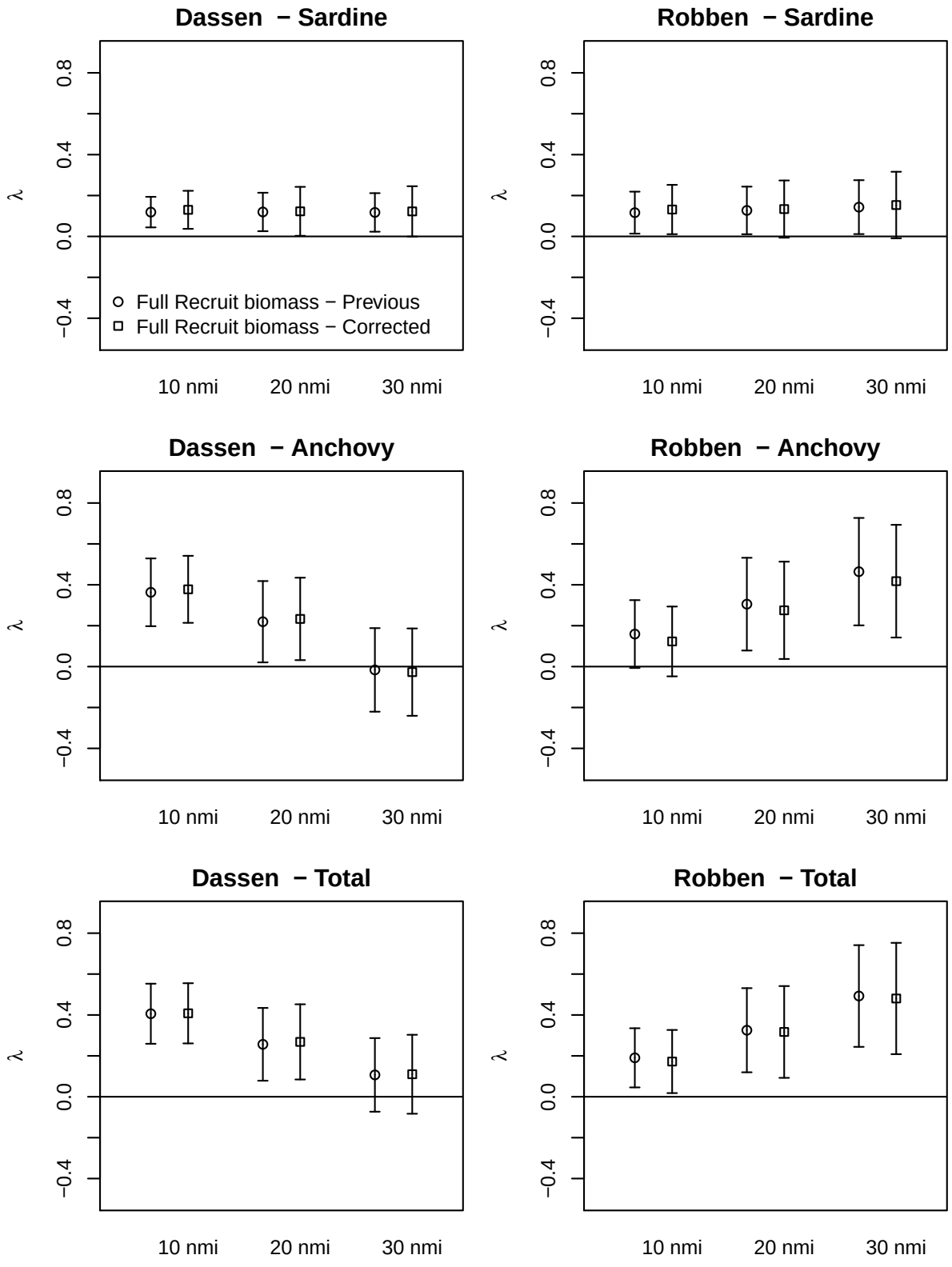

Figure 6: Dassen and Robben Islands fishing effect parameter estimates: for the **foraging trip duration** response variable. Bars indicate one standard error. Note: "Previous" refers to the results in MARAM/IWS/DEC14/Peng/B12, Appendix A.