Appendix S1

Tucker, A.M., C.P. McGowan, M.J. Catalano, A. DeRose-Wilson, R.A. Robinson, and J. Zimmerman. 2019. Foraging ecology mediates response to ecological mismatch during migratory stopover. Ecosphere.

Table S1. Number of shorebirds weighed and resighted each year. Number of catches and individuals weighed only from catches with ≥ 25 individuals. We only estimated year-specific mass gain model parameters for years with > 3 catches; years with fewer catches were used to estimate global hyperparameters only. Individual leg flags were first deployed in 2004, so resighting data to estimate shorebird arrival timing was only available from 2005-2018.

	Red knot			Ruddy turnstone		
Year	Number of catches	Individuals weighed	Individuals resighted	Number of catches	Individuals weighed	Individuals resighted
1997	5	893	--	3	49	--
1998	9	645	--	12	875	--
1999	11	1250	--	11	700	--
2000	5	886	--	7	426	--
2001	10	1359	--	11	485	--
2002	8	924	--	11	909	--
2003	10	1085	--	13	1888	--
2004	10	666	--	13	508	--
2005	7	401	1196	8	352	555
2006	9	445	1730	13	451	726
2007	7	497	3411	8	354	1046
2008	5	340	2453	8	605	1357
2009	7	603	2796	9	443	1185
2010	1	55	1746	6	227	987
2011	6	423	2648	9	452	896
2012	5	222	1948	6	236	957
2013	3	52	1310	6	354	1231
2014	5	341	1873	6	421	1177
2015	6	355	3034	6	286	1030
2016	7	172	1011	6	1009	1822
2017	9	856	2318	9	1122	1784
2018	6	576	2653	10	324	1318

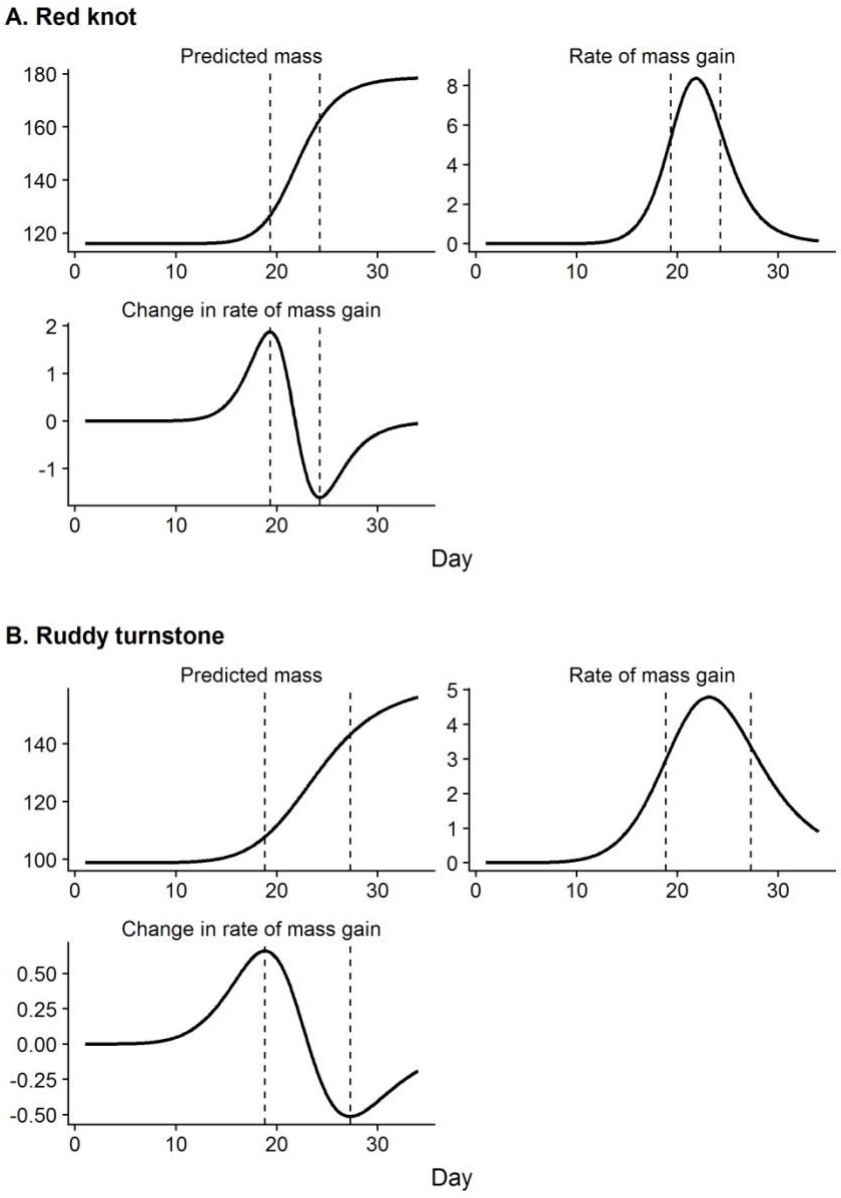

Figure S1. Derivatives for overall global average predicted curves for red knot (A) and ruddy turnstone (B). The maximum absolute second derivatives (maximum and minimum change in rate of mass gain) were used to define the window of peak refueling for each species in each year (dashed vertical lines).

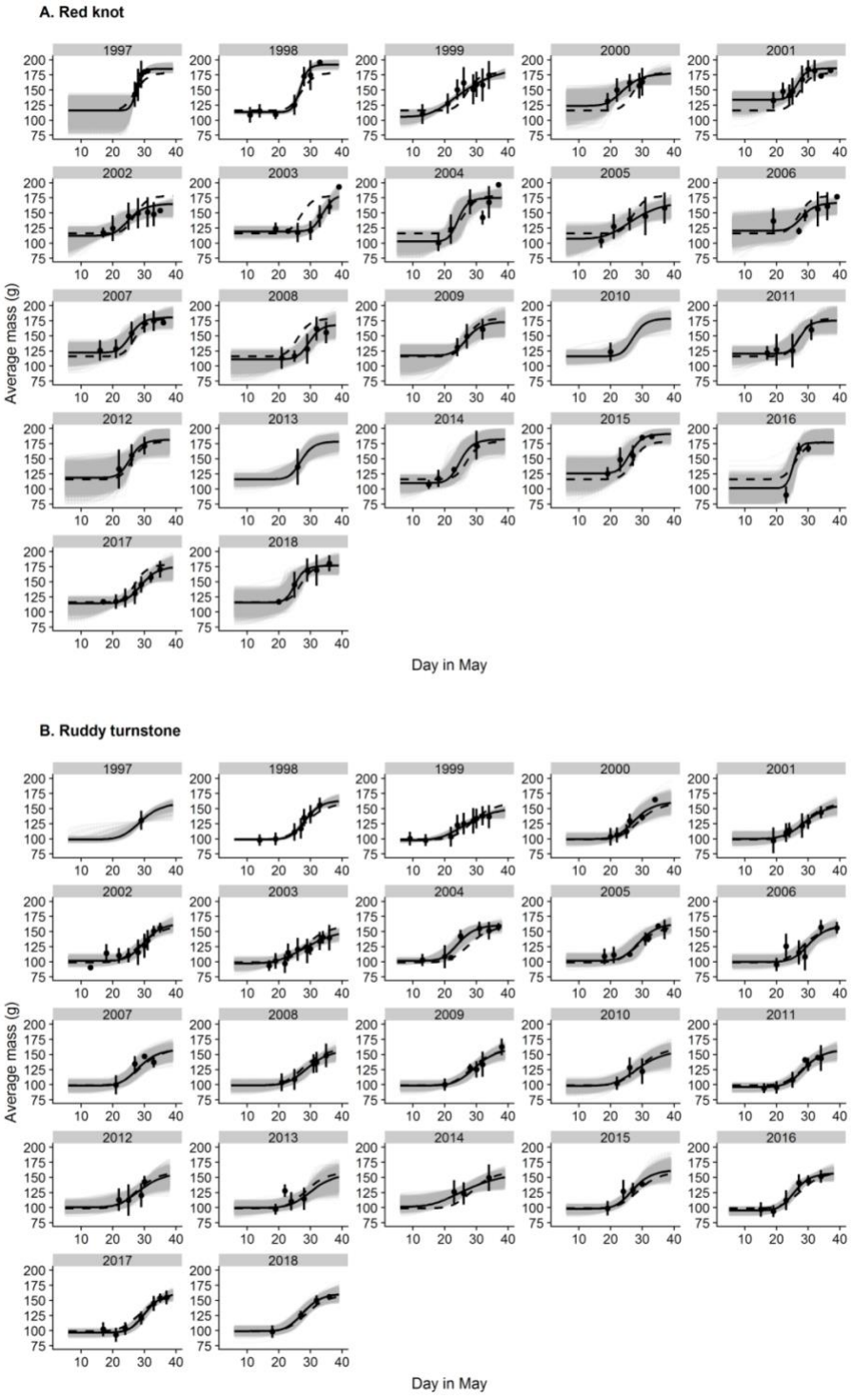

Figure S2. Predicted average masses (g) of (**A**) red knot and (**B**) ruddy turnstone across the stopover season each year. Dashed lines represent the global average and solid lines represent year-specific predicted mass. Points and vertical lines represent the average mass ± 1 standard deviation for each catch. Shaded areas show the predicted mass gain curves from 10,000 randomly selected MCMC iterations.

Table S2. Year-specific estimates for red knot, presented as posterior means and 95% credible intervals. Minimum average mass, maximum average mass, inflection point, and maximum rate of mass gain are the estimated parameters of the four-parameter logistic curve. Start day, stop day, and average rate of mass gain were calculated by finding the absolute maximum second derivative of the curves. The derivatives were estimated for a randomly-selected 50% of the MCMC iterations.

Year	Minimum average mass (g)	Maximum average mass (g)	Inflection point (day in May)	Maximum rate of mass gain (g/day)	Start day (day in May)	Stop day (day in May)	Average rate of mass gain (g/day)
1997	116.2 (92.8, 135.6)	185 (180.7, 190.2)	22.4 (21.8, 23)	25.9 (18.2, 38.9)	21.2 (20.2, 22.2)	23.5 (23.1, 24)	15.9 (13.2, 19.4)
1998	113.4 (111.6, 115.2)	192.2 (187.6, 196.9)	21.8 (21.5, 22.1)	18.5 (14.8, 22.9)	20.1 (19.6, 20.6)	23.2 (22.8, 23.6)	14 (11.8, 16.7)
1999	105.7 (97.4, 112.8)	193.1 (178, 213.2)	21.5 (18.8, 24.8)	3.5 (2.6, 4.7)	10.4 (6.8, 13.1)	25 (22, 28.5)	3.3 (2.9, 3.9)
2000	123.7 (103.5, 143.6)	178.3 (161.6, 204.8)	19.2 (14.7, 24.9)	6.8 (1.5, 24.3)	10.6 (1, 18.7)	21.1 (14.9, 28)	3.7 (1.5, 11)
2001	133.8 (118.3, 143.7)	185.8 (177.3, 198.7)	21.4 (19.8, 22.9)	14.5 (5.1, 28.6)	18.8 (13.8, 21.3)	23.3 (21.7, 25.3)	7 (3.9, 11.3)
2002	112.2 (93.9, 122.9)	165.5 (146.8, 192.6)	20.1 (15.7, 25.7)	8.2 (1.7, 29.4)	11.2 (1, 18.4)	22.1 (16.5, 28.9)	3.7 (1.6, 10.5)
2003	119.3 (113.5, 124.4)	181 (163.6, 203.2)	29 (27.3, 30.9)	16.9 (10.6, 27)	26.4 (24.7, 28.1)	31.2 (28.8, 33.6)	7.4 (5.1, 10.6)
2004	103 (89.5, 114.2)	174.8 (164.2, 191.6)	20.2 (18.1, 23)	13.5 (4.8, 28.3)	17.4 (13.6, 20.5)	22.2 (19.3, 26.2)	9.8 (4.5, 19.4)
2005	107.4 (88.3, 122.9)	171.6 (147.8, 193.8)	22.5 (17.2, 27.9)	4.6 (1.7, 15.3)	11 (1, 19.4)	25.2 (17.6, 31.8)	2.7 (1.4, 6.2)
2006	120.4 (100.7, 137.8)	167 (153.8, 190.5)	23.1 (18.3, 26.9)	10.9 (0.8, 28.2)	16.4 (1, 23.5)	24.5 (11.7, 29.9)	4.2 (1.2, 10.2)
2007	122.2 (108.1, 133.9)	180.7 (167.5, 201.5)	20.7 (18, 23.6)	11 (3.1, 31.2)	16.3 (8.6, 20.1)	23 (20.1, 27.2)	6.1 (2.6, 14.9)
2008	111.2 (95.9, 121.2)	169 (152.7, 190.3)	25.6 (22.9, 28.4)	14.1 (4.6, 29)	22.1 (15.9, 25.2)	28 (25, 32.1)	6.3 (3, 11.6)
2009	117.5 (98.4, 131)	173.8 (155.3, 196.3)	22.1 (19.3, 25.7)	9.7 (3.3, 23.1)	17.3 (10.5, 21.3)	24.8 (21, 29.5)	4.8 (2.4, 8.9)
2010	116 (108.8, 122.5)	178.8 (169.7, 189.1)	22.1 (20.8, 23.6)	11.7 (4, 19.1)	18.7 (12.8, 20.9)	24.4 (22.5, 26.9)	7 (2.9, 11)
2011	120.6 (111, 128.2)	175.4 (160.2, 197.4)	22.4 (19.6, 25.4)	13.7 (3.7, 30.2)	18.9 (11.3, 22.3)	24.5 (21.3, 28.6)	6.7 (2.7, 13.3)
2012	118.7 (97.6, 139.4)	181.8 (164.3, 203.9)	21.5 (18.6, 24.5)	11.6 (2.7, 27.5)	17.5 (7.8, 21.2)	23.7 (20.5, 27.8)	6.9 (2.1, 14.9)
2013	116 (108.8, 122.5)	178.8 (169.7, 189.1)	22.1 (20.8, 23.6)	11.7 (4, 19.1)	18.7 (12.7, 20.9)	24.4 (22.5, 26.9)	7 (2.9, 11)
2014	110.1 (101.2, 118.3)	182.3 (164.9, 206)	19.9 (17.4, 23.1)	10.7 (3.8, 24.8)	16.1 (10.9, 19.6)	22.2 (19, 26.4)	8 (3.6, 16.8)
2015	125.6 (104.7, 144.5)	191.3 (180.3, 208.9)	21.1 (17.9, 23.6)	11.6 (4.2, 26.3)	17.5 (11.8, 21.6)	23.3 (20.1, 26.2)	7.1 (3.8, 13.1)
2016	101.4 (82.8, 118.4)	176.9 (163.4, 194.3)	21.2 (19.7, 22.5)	21.6 (9.8, 37.5)	19.6 (17.5, 21.2)	22.5 (20.8, 24.4)	15.7 (7.6, 26.7)
2017	114.4 (103.1, 121.3)	176.3 (158.1, 198.1)	24.1 (21.7, 26.6)	9.3 (4.1, 19.9)	19.2 (13.8, 22.2)	27 (24.1, 30.6)	4.8 (3, 8.3)
2018	115.5 (99.3, 130.2)	176.7 (166.3, 194.3)	20.2 (17.7, 22.5)	13.4 (4.4, 30.7)	17.2 (12.2, 20.2)	22.2 (19.5, 25.5)	8.1 (3.7, 16.9)

Table S3. Year-specific estimates for ruddy turnstone, presented as posterior means and 95% credible intervals. Minimum average mass, maximum average mass, inflection point, and maximum rate of mass gain are the estimated parameters of the four-parameter logistic curve. Start day, stop day, and average rate of mass gain were calculated by finding the absolute maximum second derivative of the curves. The derivatives were estimated for a randomly-selected 50% of the MCMC iterations.

Year	Minimum average mass (g)	Maximum average mass (g)	Inflection point (day in May)	Maximum rate of mass gain (g/day)	Start day (day in May)	Stop day (day in May)	Average rate of mass gain (g/day)
1997	98.9 (96.3, 101.6)	160.7 (153.8, 168.7)	24 (23, 25.1)	7.3 (5.3, 9.8)	18.7 (16.6, 20.3)	27.3 (25.9, 28.9)	4.1 (3.1, 5.2)
1998	98.9 (97.8, 100.1)	164.3 (157.6, 173.2)	23.4 (22.8, 24.3)	9.6 (7.8, 11.6)	19.7 (19, 20.3)	26.1 (25.1, 27.3)	5.8 (5.1, 6.5)
1999	97.6 (95.4, 99.4)	154.5 (138.2, 167.8)	22.4 (19.2, 25.1)	4.6 (3.1, 8.2)	13.4 (10.1, 16.3)	26.1 (21.8, 29.4)	2.6 (2.1, 3.7)
2000	99.5 (93.9, 105.2)	162.4 (149.9, 177)	22.6 (20.7, 25)	7.4 (4.3, 12.4)	17.4 (13.9, 19.8)	25.7 (23, 28.9)	4.5 (2.7, 7.1)
2001	99.9 (93.7, 106.8)	160.8 (148.9, 173.2)	24.6 (22.3, 26.9)	6.3 (3.9, 10.2)	17.9 (13.6, 21.6)	28.3 (25.5, 31.1)	3.4 (2.3, 4.9)
2002	101.5 (96, 107.7)	164.5 (155.4, 178.2)	25 (23.3, 26.7)	9 (5.5, 15.1)	20.5 (17.2, 23.2)	28.1 (26.2, 30.4)	4.9 (3.4, 7)
2003	97.2 (90.3, 102.8)	158.5 (145.1, 169.9)	24.9 (22, 27.7)	4.4 (2.9, 6.7)	14.9 (9.6, 19.2)	29 (25.5, 32.3)	2.4 (1.8, 3.2)
2004	101.7 (98.1, 104.7)	161.3 (153.2, 174.7)	20.5 (18.6, 23.2)	8 (3.5, 14.9)	15.7 (10.7, 18.3)	23.2 (20.8, 27)	5 (2.7, 8.7)
2005	101.5 (95.9, 108.6)	164.6 (155.4, 177.9)	24.1 (21.5, 26.4)	8.4 (4.5, 14.4)	19.2 (14.3, 22.9)	27.2 (24.5, 29.8)	4.7 (3, 7.2)
2006	99.7 (93.7, 106.4)	162 (152.7, 173)	25.5 (23.5, 27.4)	8.9 (4.9, 15.4)	20.6 (16.4, 23.9)	28.6 (26.4, 31.1)	4.6 (2.9, 7.3)
2007	98.4 (92.6, 104)	159.7 (146.2, 172.4)	23.4 (20.9, 26.3)	7.8 (4.2, 14.1)	18.1 (14.2, 21)	26.5 (23.1, 30.3)	4.4 (2.5, 7.6)
2008	98.9 (92.6, 104.8)	159 (146.1, 170.9)	25.4 (23, 27.5)	7.3 (4.5, 11.6)	19.5 (15.7, 22.8)	28.9 (25.9, 31.5)	3.7 (2.6, 5.3)
2009	98.5 (93.4, 103.1)	162.4 (151.4, 175)	24.9 (22.9, 27)	7.1 (4.6, 10.5)	19.1 (15.5, 21.8)	28.4 (26, 31)	4 (2.8, 5.5)
2010	98.1 (91, 104.6)	158.7 (141.6, 172)	24.1 (20.9, 27.2)	5.9 (3, 9.8)	16.6 (9.8, 20.7)	27.7 (23.6, 31.6)	3.3 (1.7, 5.2)
2011	96.1 (91.4, 100.1)	159.3 (146.5, 171.6)	23.9 (21.9, 25.8)	7.9 (5, 12)	18.8 (16.1, 20.9)	27 (24.4, 29.7)	4.5 (3.1, 6.3)
2012	100.4 (94.1, 107.9)	159.6 (144.6, 172.7)	24.9 (22.1, 27.6)	6.6 (2.3, 12.5)	17.5 (5.3, 22.6)	28.3 (24.7, 31.8)	3.4 (1.4, 6.1)
2013	99.8 (93.1, 106.8)	158.1 (139.5, 171.6)	25.7 (23, 28.7)	7 (2.6, 13.6)	18.5 (8, 23.2)	29.2 (25.7, 33.2)	3.5 (1.4, 6.7)
2014	101.6 (94.8, 112.5)	162.9 (151.3, 176.4)	22.9 (19.5, 26.4)	3.5 (1.3, 7)	9.6 (1, 18.1)	25.3 (16.3, 29.9)	2.2 (1.3, 3.6)
2015	98.1 (92.9, 102.7)	163.3 (151, 179.3)	22.2 (20.6, 23.9)	7.7 (4.7, 12.1)	17.4 (14.4, 19.6)	25.2 (23.2, 27.6)	4.9 (3.2, 7.3)
2016	95.3 (90.6, 99.1)	157.6 (147.4, 169.1)	21.7 (20, 23.4)	8.9 (6, 13.9)	17.7 (16, 19.2)	24.3 (21.9, 26.7)	5.4 (4.2, 7.6)
2017	96.5 (92.3, 100.2)	162.2 (154.3, 172.6)	25.2 (24.1, 26.5)	10 (7.1, 14)	21.3 (19.5, 22.8)	28 (26.5, 29.8)	5.6 (4.4, 7.2)
2018	99 (94.3, 104)	162.5 (152.5, 175.5)	22.9 (21.1, 24.8)	8.1 (5, 12.6)	18.2 (15.1, 20.5)	25.9 (23.6, 28.4)	4.8 (3.3, 6.9)