The following supplement accompanies the article

Comparative methods for evaluating climate change impacts on the foraging ecology of Alaskan groundfish

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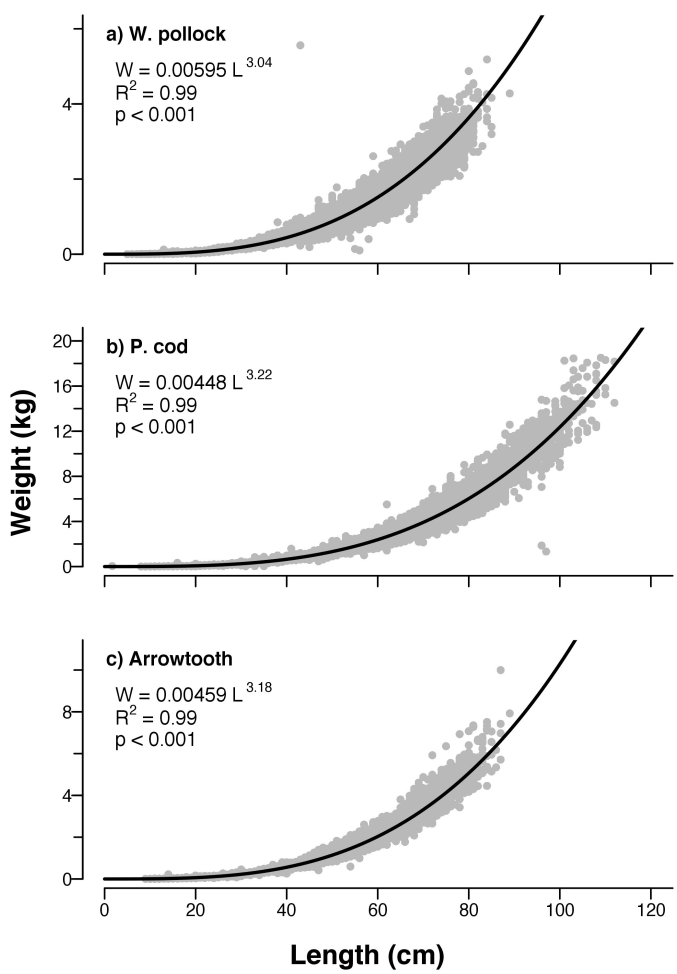

Supplemental Figure S1: Weight (W; kg) by length (L; cm) regressions for walleye pollock, Pacific cod, and arrowtooth flounder from the Bering Sea, AK. Regression coefficients are listed for each species; R^2 indicates the adjusted Pearson's correlation coefficient between predicted and observed fits; p indicates the significance of the model fit.

Supplemental Table S1. Consumption data used to derive the slope and intercept of the allometric consumption function (C_B and C_A, respectively). Fish weight (W; g), reported daily consumption (C_{obs}; g g^{-1} d^{-1}) at a given temperature (T; °C), the corresponding temperature-scaling function value ($f(T)$), and the temperature corrected maximum consumption rate (C_T).

Species	W	C_{obs}	T	$f(T)$	C_T	
Pollock	40.59	0.01	5.0	0.79	0.013	a
	157.12	0.012	5.0	0.79	0.016	a
	172.07	0.009	5.0	0.79	0.012	a
	203.15	0.007	5.0	0.79	0.009	a
	311.66	0.008	5.0	0.79	0.01	a
	419.67	0.007	5.0	0.79	0.009	a
	18.34	0.022	5.5	0.82	0.027	b
	49.09	0.018	5.5	0.82	0.022	b
	85.02	0.015	5.5	0.82	0.018	b
	100.53	0.015	5.5	0.82	0.019	b
	187.05	0.008	5.5	0.82	0.01	b
	210.77	0.008	5.5	0.82	0.01	b
	226.35	0.007	5.5	0.82	0.008	b
	254.81	0.007	5.5	0.82	0.009	b
	267.29	0.008	5.5	0.82	0.01	b
	302.36	0.004	5.5	0.82	0.005	b
	35.90	0.027	5.5	0.82	0.033	b
Pacific cod	333.71	0.005	4.5	0.58	0.009	c
	375.55	0.007	4.5	0.58	0.012	c
	363.74	0.008	4.5	0.58	0.014	c
	439.54	0.009	4.5	0.58	0.015	c
	330.02	0.009	4.5	0.58	0.016	c
	264.84	0.009	4.5	0.58	0.015	c
	41.27	0.008	4.5	0.58	0.014	c
	230.61	0.01	4.5	0.58	0.018	c
	349.95	0.011	4.5	0.58	0.019	c
	244.25	0.013	4.5	0.58	0.023	c
	5140.00	0.006	6.5	0.70	0.008	c
	4850.00	0.012	6.5	0.70	0.018	c
	3190.00	0.008	6.5	0.70	0.012	c
	2050.00	0.008	6.5	0.70	0.012	c
	2360.00	0.014	6.5	0.70	0.02	c
	2310.00	0.016	6.5	0.70	0.023	c
	1970.00	0.016	6.5	0.70	0.023	c
	1540.00	0.012	6.5	0.70	0.017	c
	1320.00	0.013	6.5	0.70	0.019	c
	1320.00	0.011	6.5	0.70	0.016	c
	765.00	0.012	6.5	0.70	0.017	c
	402.00	0.019	6.5	0.70	0.028	c
	416.00	0.017	6.5	0.70	0.024	c
	212.00	0.018	6.5	0.70	0.026	c
	269.00	0.016	6.5	0.70	0.023	c
	187.00	0.016	6.5	0.70	0.023	c
	198.00	0.016	6.5	0.70	0.023	c
	359.00	0.013	6.5	0.70	0.019	c
	343.00	0.013	6.5	0.70	0.019	c
	141.00	0.013	6.5	0.70	0.019	c

	124.00	0.013	6.5	0.70	0.019	c
	207.00	0.012	6.5	0.70	0.018	c
	306.00	0.012	6.5	0.70	0.017	c
	398.00	0.012	6.5	0.70	0.017	c
Arrowtooth*	38.06	0.011	2.0	0.17	0.065	d
	36.12	0.019	6.0	0.29	0.069	d
	111.50	0.032	10.0	0.56	0.057	d
	43.58	0.041	14.0	0.66	0.063	d
	40.54	0.068	18.0	0.98	0.073	d
	9.35	0.087	22.0	1.00	0.088	d

a. Smith et al. 1988
b. Smith et al. 1986
c. Paul et al. 1986
d. Fonds et al. 1992

* Values are for plaice (*Pleuronectes platessa*).

Supplemental Table S2: Summary results for generalized additive models of daily ration ($\hat{C}_j^{1}$; g g^{-1} d^{-1}) and relative foraging rate (RFR) as a function of sub-regional strata, bottom temperature (T; °C), fish weight (W; g), and the interacting effects of weight and temperature (WxT). Degrees of freedom and parameter significance for the linear main effect of strata (df_{strata} *and* P_{strata}, respectively); effective degrees of freedom and parameter significance for temperature, weight, and temperature by weight interaction covariates (edf_T, edf_W , edf_{WxT}, P_T , P_W, P_{WxT}, respectively); generalized cross validation criterion scores (GVC); number of observations (*n*).

Species	df_{strata}	edf_W	edf_T	edf_{WxT}	P_{strata}	P_W	P_T	P_{WxT}	R^2	GVC	*n*
					Ration ($\hat{C}_j^{1}$; g g^{-1} d^{-1})						
EBS W. pollock	5	3.00	2.64	3.63	0.000	0.000	0.000	0.000	0.17	1.29	57868
AI W. pollock	8	1.00	2.13	3.84	0.001	0.831	0.000	0.000	0.13	1.33	2868
GOA W. pollock	8	2.83	2.73	3.40	0.001	0.000	0.000	0.000	0.20	1.31	7174
EBS P. cod	5	2.89	0.73	3.90	0.000	0.000	0.000	0.000	0.07	1.14	30011
AI P. cod	8	2.94	2.05	1.94	0.287	0.000	0.000	0.000	0.07	1.25	2856
GOA P. cod	6	2.94	2.10	2.42	0.000	0.000	0.000	0.000	0.05	1.16	5123
EBS Arrowtooth	5	1.00	2.80	3.88	0.000	0.436	0.000	0.000	0.06	2.05	8581
AI Arrowtooth	8	1.00	0.88	1.94	0.000	0.002	0.000	0.000	0.06	2.01	1683
GOA Arrowtooth	8	2.97	2.79	1.97	0.238	0.000	0.000	0.000	0.07	2.45	5596
					RFR ($\hat{C}_j^{1}$/$\hat{C}_j^{3}$)						
EBS W. pollock	5	1.00	2.61	3.79	0.000	0.000	0.000	0.000	0.03	2.04	57868
AI W. pollock	8	1.00	1.98	1.94	0.001	0.000	0.000	0.000	0.02	2.16	2868
GOA W. pollock	8	1.00	2.84	3.14	0.014	0.349	0.000	0.000	0.04	1.89	7174
EBS P. cod	5	2.97	2.47	3.89	0.000	0.000	0.000	0.000	0.11	1.37	30011
AI P. cod	8	2.89	2.00	1.94	0.781	0.001	0.000	0.000	0.03	1.64	2856
GOA P. cod	6	2.93	2.06	1.97	0.000	0.000	0.000	0.000	0.01	1.48	5123
EBS Arrowtooth	5	2.82	2.80	3.90	0.000	0.000	0.000	0.000	0.07	2.88	8581
AI Arrowtooth	8	2.19	0.88	1.94	0.000	0.000	0.000	0.000	0.04	2.64	1683
GOA Arrowtooth	8	2.96	2.76	1.97	0.248	0.000	0.000	0.000	0.03	3.18	5596

Supplemental Table S3: AIC model selection results for generalized additive models of daily ration ($\bar{C}$; g g^{-1} d^{-1}) and relative foraging rate (RFR) as a function of sub-regional strata (S), bottom temperature (T; ^{o}C), fish weight (W; g), and the interacting effects of weight and temperature (WxT). Effective degrees of freedom for each model *i* (edf_i); delta AIC values (ΔAIC_i), AIC model weight (w_i), rank (r_i), standardized AIC weight (w_i') and cumulative AIC weight ($\sum w_i'$). Models whose cumulative weights include 0.95 are indicated by an asterisk (*) and are considered in the top set of AIC selected models. EBS: eastern Bering Sea; AI: Aleutian Islands; GOA: Gulf of Alaska.

Model	edf_i	ΔAIC_i	w_i	r_i	w_i'	$\sum w_i'$	
			Ration ($\bar{C}$; g g^{-1} d^{-1})				
			Walleye pollock				
EBS							
S+f(T)+f(W)+f(TxW)	15.7	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	13.0	182.3	0.00	2	0.00	1.00	
S+f(W)	10.0	611.3	0.00	3	0.00	1.00	
S+f(T)	9.9	8986.0	0.00	4	0.00	1.00	
AI							
S+f(T)+f(W)+f(TxW)	16.1	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	15.2	25.5	0.00	2	0.00	1.00	
S+f(W)	12.9	44.1	0.00	3	0.00	1.00	
S+f(T)	12.8	215.9	0.00	4	0.00	1.00	
GOA							
S+f(T)+f(W)+f(TxW)	18.1	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	15.8	14.8	0.00	2	0.00	1.00	
S+f(W)	13.0	452.6	0.00	3	0.00	1.00	
S+f(T)	12.5	914.5	0.00	4	0.00	1.00	
			Pacific cod				
BS							
S+f(T)+f(W)+f(TxW)	13.9	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	10.9	38.3	0.00	2	0.00	1.00	
S+f(W)	9.9	325.3	0.00	3	0.00	1.00	
S+f(T)	9.1	941.2	0.00	4	0.00	1.00	
AI							
S+f(T)+f(W)	15.1	0.0	1.00	1	0.68	0.68	*
S+f(T)+f(W)+f(TxW)	16.1	1.5	0.46	2	0.32	1.00	*
S+f(T)	12.2	22.4	0.00	3	0.00	1.00	
S+f(W)	12.9	152.4	0.00	4	0.00	1.00	
GOA							
S+f(T)+f(W)	13.1	0.0	1.00	1	0.69	0.69	*
S+f(T)+f(W)+f(TxW)	14.6	1.6	0.46	2	0.31	1.00	*
S+f(T)	10.2	95.3	0.00	3	0.00	1.00	
S+f(W)	11.0	153.8	0.00	4	0.00	1.00	
			Arrowtooth flounder				
BS							
S+f(T)+f(W)+f(TxW)	14.0	0.0	1.00	1	1.00	1.00	*

S+f(T)+f(W)	13.0	42.2	0.00	2	0.00	1.00	
S+f(W)	10.0	86.6	0.00	3	0.00	1.00	
S+f(T)	10.0	146.8	0.00	4	0.00	1.00	
AI							
S+f(T)+f(W)+f(TxW)	13.0	0.0	1.00	1	0.75	0.75	*
S+f(T)	12.8	3.2	0.21	2	0.15	0.90	*
S+f(T)+f(W)	13.8	4.1	0.13	3	0.10	1.00	*
S+f(W)	11.0	37.1	0.00	4	0.00	1.00	
GOA							
S+f(T)+f(W)+f(TxW)	16.8	0.0	1.00	1	0.65	0.65	*
S+f(T)+f(W)	15.8	1.3	0.53	2	0.35	1.00	*
S+f(T)	12.9	167.4	0.00	3	0.00	1.00	
S+f(W)	13.0	178.1	0.00	4	0.00	1.00	
RFR (C_j^1/C_j^3)							
Walleye pollock							
BS							
S+f(T)+f(W)+f(TxW)	13.8	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	12.7	115.4	0.00	2	0.00	1.00	
S+f(W)	9.5	253.0	0.00	3	0.00	1.00	
S+f(T)	9.9	878.3	0.00	4	0.00	1.00	
AI							
S+f(T)+f(W)+f(TxW)	14.0	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	13.4	13.7	0.00	2	0.00	1.00	
S+f(W)	11.0	19.9	0.00	3	0.00	1.00	
S+f(T)	12.3	27.6	0.00	4	0.00	1.00	
GOA							
S+f(T)+f(W)+f(TxW)	16.1	0.0	1.00	1	0.94	0.94	*
S+f(T)+f(W)	14.8	5.6	0.06	2	0.06	1.00	*
S+f(T)	12.9	19.8	0.00	3	0.00	1.00	
S+f(W)	11.5	235.5	0.00	4	0.00	1.00	
Pacific cod							
BS							
S+f(T)+f(W)+f(TxW)	15.7	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	12.4	37.8	0.00	2	0.00	1.00	
S+f(W)	9.6	64.3	0.00	3	0.00	1.00	
S+f(T)	9.6	2176.0	0.00	4	0.00	1.00	
AI							
S+f(T)+f(W)	15.0	0.0	1.00	1	0.63	0.63	*
S+f(T)+f(W)+f(TxW)	16.0	1.1	0.58	2	0.37	1.00	*
S+f(T)	12.2	30.1	0.00	3	0.00	1.00	
S+f(W)	12.9	46.4	0.00	4	0.00	1.00	
GOA							
S+f(T)+f(W)	13.1	0.0	1.00	1	0.55	0.55	*
S+f(T)+f(W)+f(TxW)	14.1	0.4	0.80	2	0.44	1.00	*
S+f(W)	10.9	11.1	0.00	3	0.00	1.00	

S+f(T)	10.2	32.2	0.00	4	0.00	1.00	
			Arrowtooth flounder				
BS							
S+f(T)+f(W)+f(TxW)	15.8	0.0	1.00	1	1.00	1.00	*
S+f(T)+f(W)	12.9	34.0	0.00	2	0.00	1.00	
S+f(T)	10.0	67.6	0.00	3	0.00	1.00	
S+f(W)	9.9	160.2	0.00	4	0.00	1.00	
AI							
S+f(T)+f(W)+f(TxW)	14.2	0.0	1.00	1	0.89	0.89	*
S+f(T)+f(W)	13.1	5.4	0.07	2	0.06	0.94	*
S+f(W)	12.1	5.5	0.06	3	0.06	1.00	*
S+f(T)	12.8	27.3	0.00	4	0.00	1.00	
GOA							
S+f(T)+f(W)+f(TxW)	16.8	0.0	1.00	1	0.77	0.77	*
S+f(T)+f(W)	15.8	2.4	0.30	2	0.23	1.00	*
S+f(W)	13.0	55.8	0.00	3	0.00	1.00	
S+f(T)	12.9	73.2	0.00	4	0.00	1.00	