

Feeding ecologies of key bivalve and polychaete species in the Bering Sea as elucidated by fatty acid and compound-specific stable isotope analyses

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Table S1. Site characteristics of stations where surface sediments were collected in the Bering Sea (n = 82). Particulate organic matter (POM) samples and benthic invertebrate taxa were collected from stations when present. Sympagic POM = ice POM (i-POM), pelagic POM = p-POM, Benthos = benthic invertebrate taxa included in this study. Shelf domain letters refer to the inner (I), middle (M), and outer (O) domains and the basin (Ba).

Date	Latitude (°N)	Longitude (°W)	Station no.	Depth (m)	Shelf Domain	i-POM	p-POM	Benthos
3/25/2009	62.847	-169.022	36	36	M			
3/23/2009	62.125	-169.250	24	40	I			
3/27/2009	62.912	-174.069	41	72	M			X
3/18/2009	62.760	-173.681	9	68	M			
3/15/2009	62.591	-174.756	3	70	M			
3/18/2009	63.705	-172.540	8	50	M			X
3/13/2009	62.266	-175.193	1	80	M			
3/19/2009	62.660	-171.200	11	44	M			X
3/16/2009	62.970	-173.388	5	71	M			X
3/23/2009	62.969	-169.156	21	38	M			
4/10/2009	59.876	-175.215	19	120	O			
5/4/2009	62.193	-175.140	98	80	M			
4/14/2009	61.792	-176.802	29	113	O	X		
4/8/2009	59.903	-170.394	10	62	M			
4/15/2009	62.199	-175.145	32	80	M			
4/24/2009	56.984	-170.290	66	72	M			
4/7/2009	59.936	-170.000	9	56	M			
5/6/2009	59.444	-174.082	115	115	O		X	
4/5/2009	58.173	-169.100	3	69	M			X
4/16/2009	63.094	-173.291	35	62	M	X		X
4/29/2009	59.550	-175.096	85	133	O		X	
5/1/2009	61.589	-173.709	92	72	M	X		
4/20/2009	59.463	-167.787	50	35	I			
4/22/2009	57.445	-169.754	58	66	M			
4/26/2009	59.537	-175.205	69	133	O			
4/18/2009	61.958	-167.991	45	28	I			X
4/4/2009	57.904	-169.317	1	72	M			
4/28/2009	60.821	-174.384	83	90	M			X
6/20/2009	56.787	-167.874	32	101	M			
7/1/2009	59.910	-169.803	98	98	M			
7/5/2009	59.573	-175.250	122	136	O			
7/7/2009	62.202	-173.118	140	62	M			X
7/3/2009	59.910	-178.206	114	114	O			

Date	Latitude (°N)	Longitude (°W)	Station no.	Depth (m)	Shelf Domain	i-POM	p-POM	Benthos
6/16/2009	55.969	-163.143	10	82	I			
6/22/2009	56.983	-170.288	49	71	M			
7/2/2009	59.913	-175.206	108	108	O			
6/22/2009	57.911	-169.248	45	70	M			
7/6/2009	61.868	-169.876	133	47	M			X
3/13/2010	62.046	-175.067	1	83	M	X	X	
3/14/2010	62.263	-175.402	2	84	M		X	
3/14/2010	62.418	-174.696	3	74	M		X	
3/15/2010	62.744	-173.751	6	69	M			
3/16/2010	62.946	-173.461	8	71	M	X	X	X
3/18/2010	62.567	-172.187	15.2	53	M	X	X	
3/20/2010	62.506	-171.764	23	50	M		X	
3/21/2010	62.612	-170.166	26	36	M		X	
3/23/2010	62.832	-171.420	37	50	M		X	X
3/24/2010	62.337	-173.932	39	66	M	X	X	
3/26/2010	62.971	-173.941	41	79	M	X	X	X
3/27/2010	63.273	-173.735	43	78	M	X	X	
3/28/2010	63.354	-173.221	47	72	M	X	X	X
5/11/2010	56.294	-171.052	2	141	O			
5/13/2010	56.734	-179.910	7	104	Ba			
5/15/2010	58.354	-171.803	24	102	M	X		
5/17/2010	59.337	-175.611	39	138	O			
5/19/2010	59.911	-178.953	49	489	Ba			
5/23/2010	59.075	-170.174	66	67	M			
5/25/2010	56.917	-167.317	71	78	M			
5/27/2010	58.175	-169.907	81	72	M			
5/29/2010	55.442	-168.068	87	203	O			
5/30/2010	57.141	-163.809	94	67	M			
6/2/2010	58.620	-170.286	124	72	M			
6/3/2010	59.846	-171.838	134	74	M			X
6/4/2010	61.418	-173.736	147	74	M			X
6/5/2010	62.193	-175.155	156	79	M			X
6/5/2010	62.104	-175.291	158	61	M			
6/8/2010	59.901	-175.202	170	119	O			
6/10/2010	58.839	-168.165	179	46	I			
6/10/2010	57.903	-169.247	184	67	M			
6/23/2010	57.052	-167.449	33	70	M			
6/24/2010	59.284	-167.618	39	39	I			
6/25/2010	57.889	-169.223	45	67	M			
6/27/2010	56.255	-171.110	53	189	Ba			
6/27/2010	57.279	-173.841	60	191	Ba			
6/29/2010	58.960	-173.873	69	123	O			
7/1/2010	59.900	-169.202	84	47	I			
7/2/2010	59.900	-175.200	94	118	O			
7/4/2010	59.900	-178.200	99	142	O			
7/7/2010	62.200	-169.849	124	41	M			
7/7/2010	62.200	-173.116	132	60	M			
7/8/2010	62.200	-175.905	139	90	M			
7/9/2010	62.667	-173.383	145	68	M			

Table S2. Mean $\delta^{13}\text{C}$ values (‰) of non-marker fatty acids from benthic invertebrate taxa. Values are means \pm 1SD, n.d. = no data, individuals pooled by taxon. Polychaete taxa include *L. pugettensis*, and *Nephtys* spp. and bivalve taxa include *M. calcareo*, *E. tenuis*, and *N. radiata*. Letters a to d indicate significant differences among taxa (Kruskal-Wallis one-factor ANOVA, $p < 0.0001$, Mann-Whitney *U*-test with Bonferroni correction for pairwise comparisons, $\alpha = 0.01$).

	<i>L. pugettensis</i>	<i>Nephtys</i> spp.	<i>M. calcareo</i>	<i>E. tenuis</i>	<i>N. radiata</i>
16:0	-24.7 \pm 1.9 ^{ab}	-23.2 \pm 2.2 ^a	-26.8 \pm 0.9 ^b	-26.6 \pm 0.9 ^b	-26.7 \pm 1.4 ^b
18:0	-23.9 \pm 2.2	-21.3 \pm 1.4	-26.1 \pm 1.0	-25.6 \pm 1.0	-25.5 \pm 1.0
18:1n-9	-23.1 \pm 2.4	-22.2 \pm 2.0	-24.6 \pm 3.5	-24.8 \pm 2.4	n.d.
18:1n-7	-23.5 \pm 1.4 ^{ab}	-23.0 \pm 1.3 ^a	-25.4 \pm 0.9 ^{bc}	-26.9 \pm 0.8 ^c	-26.6 \pm 0.9 ^c
20:1n-7	-23.8 \pm 1.4	-22.9 \pm 2.9	-26.5 \pm 2.9	-25.2 \pm 0.9	-24.4 \pm 2.2

Table S3. *p*-values from pairwise comparisons of fatty acid profiles of sympagic, pelagic, and benthic particulate organic matter sources. Particulate organic matter (POM) includes sympagic (i-POM), pelagic (p-POM), and benthic (b-POM) sources. **Bold**: statistically significant differences among POM sources are based on 1-way permutational multivariate analysis of variance (source as factor) and a Bonferroni adjustment for pairwise comparisons ($\alpha = 0.01$).

Source	<i>p</i>	Permutations
i-POM x p-POM	0.001	999
i-POM x b-POM	0.001	999
b-POM x p-POM	0.001	999

Table S4. Relative proportions of (% total) and mean $\delta^{13}\text{C}$ values (‰) of algal marker fatty acids for sympagic, pelagic, and benthic particulate organic matter. Algal marker fatty acids are 16:1n-7, 20:5n-3, and 22:6n-3 (means \pm 1SD, samples pooled by source, n.d. = no data). Particulate organic matter (POM) includes sympagic (i-POM), pelagic (p-POM), and benthic (b-POM) sources. Letters a-c indicate significant differences among taxa (Kruskal-Wallis one-factor ANOVA, $p < 0.001$, Mann-Whitney *U*-test with Bonferroni adjustment for pairwise comparisons, $\alpha = 0.01$).

	i-POM	p-POM	b-POM
16:1n-7 (%)	15.7 \pm 6.7 ^a	16.2 \pm 12.9 ^a	27.8 \pm 16.1 ^b
(‰)	-23.6 \pm 5.6 ^a	-29.2 \pm 1.6 ^b	-26.7 \pm 1.0 ^a
20:5n-3 (%)	20.1 \pm 6.8 ^a	11.7 \pm 7.0 ^b	3.5 \pm 2.4 ^c
(‰)	-26.3 \pm 2.8 ^a	-29.7 \pm 1.6 ^b	-26.9 \pm 1.7 ^a
22:6n-3 (%)	2.3 \pm 0.8 ^a	4.9 \pm 3.2 ^b	1.0 \pm 0.8 ^c
(‰)	-24.2 \pm 3.2 ^a	-27.9 \pm 2.4 ^b	-27.2 \pm 2.0 ^{ab}

Table S5. Relative proportions (% total) of fatty acids (FAs) from sympagic, pelagic, and benthic particulate organic matter (POM). Values are means \pm 1SD, n = sample sizes, samples pooled by particulate organic matter source. Sympagic POM = ice POM (i-POM), benthic POM = b-POM, pelagic POM = p-POM. (PUFAs = polyunsaturated FAs, MUFAs = monunsaturates, SFAs = saturates, Bac = odd branched chain FAs.)

	i-POM	p-POM	b-POM
n	21	55	79
12:0	0.0 \pm 0.0	0.0 \pm 0.0	0.8 \pm 1.7
13:0	0.0 \pm 0.0	0.0 \pm 0.0	0.8 \pm 1.3
<i>i</i> -14:0	0.3 \pm 0.3	0.3 \pm 0.2	0.4 \pm 0.3
14:0	6.9 \pm 2.1	5.2 \pm 1.9	5.5 \pm 2.4
14:1n-9	0.0 \pm 0.1	0.1 \pm 0.2	0.3 \pm 0.3
14:1n-7	0.2 \pm 0.1	0.3 \pm 0.3	0.3 \pm 0.1
14:1n-5	0.6 \pm 0.4	0.4 \pm 0.2	0.4 \pm 0.2
<i>i</i> -15:0	0.1 \pm 0.1	0.3 \pm 0.2	1.0 \pm 0.9
<i>ai</i> -15:0	0.1 \pm 0.1	0.2 \pm 0.1	1.1 \pm 0.8
15:0	0.4 \pm 0.3	0.6 \pm 0.2	1.0 \pm 0.5
<i>i</i> -16:0	0.2 \pm 0.3	0.4 \pm 0.5	0.4 \pm 0.3
16:0	12.0 \pm 2.2	16.1 \pm 4.2	17.0 \pm 3.8
16:1n-11	2.1 \pm 2.0	1.1 \pm 0.9	0.3 \pm 0.2
16:1n-9	0.4 \pm 0.7	0.6 \pm 0.8	1.4 \pm 0.7
16:1n-7	15.7 \pm 6.7	16.2 \pm 12.9	27.8 \pm 16.1
16:1n-5	0.3 \pm 0.1	0.8 \pm 0.7	0.9 \pm 0.4
<i>i</i> -17:0	0.1 \pm 0.4	0.2 \pm 0.1	0.4 \pm 0.4
<i>ai</i> -17:0	0.1 \pm 0.1	0.4 \pm 0.3	1.1 \pm 1.7
16:2n-4	2.7 \pm 0.9	1.1 \pm 0.9	0.6 \pm 0.3
17:0	0.1 \pm 0.1	0.2 \pm 0.2	0.4 \pm 0.2
16:3n-4	2.0 \pm 1.5	1.1 \pm 1.0	0.4 \pm 0.3
17:1	0.1 \pm 0.1	0.1 \pm 0.1	0.6 \pm 0.5
16:4n-1	8.2 \pm 2.4	3.5 \pm 4.0	0.8 \pm 0.7
18:0	2.9 \pm 2.1	6.8 \pm 5.1	3.1 \pm 1.9
18:1n-13	0.1 \pm 0.3	0.2 \pm 0.2	0.2 \pm 0.2
18:1n-11	0.1 \pm 0.2	0.2 \pm 0.2	0.2 \pm 0.2
18:1n-9	8.9 \pm 7.6	10.4 \pm 10.5	4.3 \pm 2.5
18:1n-7	0.5 \pm 0.3	1.4 \pm 0.7	4.3 \pm 2.4
18:1n-5	0.2 \pm 0.5	0.5 \pm 0.8	0.8 \pm 1.0
18:2d5,11	0.1 \pm 0.0	0.2 \pm 0.2	0.4 \pm 0.2
18:2n-6	2.5 \pm 1.3	3.3 \pm 2.3	0.7 \pm 0.3
18:2n-4	0.1 \pm 0.1	0.1 \pm 0.1	0.2 \pm 0.2
18:3n-6	0.5 \pm 0.4	0.2 \pm 0.2	0.2 \pm 1.0
18:3n-4	0.1 \pm 0.1	0.1 \pm 0.1	0.5 \pm 0.9
18:3n-3	0.3 \pm 0.2	0.6 \pm 0.6	0.4 \pm 0.5
18:3n-1	0.2 \pm 0.1	0.1 \pm 0.1	0.8 \pm 1.3
18:4n-3	2.4 \pm 1.3	2.8 \pm 1.8	0.6 \pm 0.5
18:4n-1	0.2 \pm 0.2	0.2 \pm 0.3	1.1 \pm 1.4
20:0	0.1 \pm 0.1	0.2 \pm 0.2	0.6 \pm 0.4
20:1n-11	0.1 \pm 0.1	0.1 \pm 0.1	0.4 \pm 0.5
20:1n-9	0.2 \pm 0.2	0.6 \pm 1.5	0.6 \pm 0.5
20:1n-7	1.0 \pm 1.3	1.5 \pm 1.6	1.4 \pm 1.0

	i-POM	p-POM	b-POM
20:4n-6	0.3 ± 0.2	0.2 ± 0.1	0.6 ± 0.5
20:5n-3	20.1 ± 6.8	11.7 ± 7.0	3.5 ± 2.4
22:0	0.2 ± 0.1	0.2 ± 0.2	0.5 ± 0.7
22:1n-11	0.1 ± 0.1	0.1 ± 0.1	1.8 ± 3.7
22:1n-9	0.7 ± 1.1	0.6 ± 0.5	2.2 ± 2.5
22:1n-7	0.0 ± 0.0	0.0 ± 0.0	0.2 ± 0.2
21:5n-3	0.2 ± 0.2	0.3 ± 0.2	0.3 ± 0.3
23:0	0.2 ± 0.2	0.4 ± 0.4	0.6 ± 0.4
22:5n-6	0.3 ± 0.1	0.3 ± 0.2	0.1 ± 0.1
22:4n-3	0.0 ± 0.0	0.0 ± 0.0	0.4 ± 0.4
24:0	0.2 ± 0.1	0.2 ± 0.2	1.7 ± 1.4
22:6n-3	2.3 ± 0.8	4.9 ± 3.2	1.0 ± 0.8
24:1	0.1 ± 0.1	0.1 ± 0.1	0.5 ± 1.9
ΣPUFAs	43.4 ± 9.7 ^a	31.4 ± 12.7 ^b	13.6 ± 5.3 ^c
ΣMUFAs	31.7 ± 7.2 ^a	35.5 ± 10.3 ^a	48.6 ± 8.0 ^b
ΣSFAs	22.3 ± 4.3 ^a	28.7 ± 7.8 ^b	29.3 ± 4.1 ^b
ΣBac	0.4 ± 0.6 ^a	1.1 ± 0.7 ^b	3.6 ± 2.8 ^c