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Plankton community properties determined by nutrients and size-selective feeding

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Supplement. Size-selective feeding data sources and Zooplankton measurements correlated with climate indices

Table S1. Sources used for feeding parameter estimates shown in Fig. 1. Taxonomic categories: C: crustacean; G: gelatinous; P: protist; O: other. Study types: FE: feeding experiments; GC: gut contents; ME: mesocosm experiments; DO: diver observations. Size notations: [a]: equivalent spherical diameter (ESD); [b]: gastrozooid length; [c]: ESD from cylindrical volume, using length:head width relationships in Pearre (1980); [d]: average of lorica length and lorica opening diameter; [e]: lorica dimensions from Urrutxurtu (2004); [f]: length; [g]: bell diameter; [h]: prosome length; [i]: length from Hays et al. (1994); [j]: metasome length

Predator taxon	Predator size	Prey size range	Study type	Source
Dinoflagellates (P)				
Gyrodinium spirale[a]	28 mm	4.4–94.5 mm	FE	Hansen (1992)
Oxyrrhis marina[a]	18 mm	5–10 mm	FE	Hansen et al. (1996)
Gymnodinium sp.[a]	7 mm	4–10 mm	FE	Jakobsen & Hansen (1997)
Gyrodinium dominans[a]	25 mm	6–43 mm	FE	Naustvoll (2000b)

Gyrodinium fusiforme[a]	13.5–18.7 mm	6–14 mm	FE	Naustvoll (2000b)
Katodinium glaucum[a]	17–26 mm	6–12 mm	FE	Naustvoll (2000b)
Protoperidinium pallidum[a]	47 mm	10–212 mm	FE	Naustvoll (2000a)
Protoperidinium steinii[a]	26 mm	11–37 mm	FE	Naustvoll (2000a)
Zygabikodinium lenticulatum[a]	36 mm	6–212 mm	FE	Naustvoll (2000a)
Polykrikos kofoidii[a]	44 mm	16–38 mm	FE	Jeong et al. (2001)
Karlodinium armiger[a]	13.1–16.7 mm	5.6–31.4 mm	FE	Berge et al. (2008)
Siphonophores (G)				
Rhizophysa eysenhardti[b]	2.5 mm	3–15 mm	GC	Purcell (1981)
Apolemia uvaria[b]	10 mm	0.2–11.7 mm	GC	Purcell (1981)
Athorybia rosacea[b]	2.2 mm	0.4–5 mm	GC	Purcell (1981)
Forskalia spp.[b]	2.5 mm	0.4–1.4 mm	GC	Purcell (1981)
Nanomia bijuga[b]	3 mm	0.6–5 mm	GC	Purcell (1981)
Abyla trigona[b]	2.5 mm	1–1.4 mm	GC	Purcell (1981)
Bassia bassensis[b]	0.4 mm	0.4–1.2 mm	GC	Purcell (1981)
Chelophyes appendiculata[b]	0.4 mm	0.2–0.8 mm	GC	Purcell (1981)
Diphyes dispar[b]	0.9 mm	0.4–0.9 mm	GC	Purcell (1981)
Hippopodius hippopus[b]	3.3 mm	0.4–1.4 mm	GC	Purcell (1981)
Muggiaea atlantica[b]	0.5 mm	0.1–1 mm	GC	Purcell (1981)
Rosacea cymbiformis[b]	3.2 mm	0.3–5.5 mm	GC	Purcell (1981)
Sphaeronectes gracilis[b]	0.8 mm	0.1–0.9 mm	GC	Purcell (1981)
Sulculeolaria chuni[b]	1.2 mm	0.2–0.8 mm	GC	Purcell (1981)
Sulculeolaria quadrivalvis[b]	0.8 mm	0.2–0.6 mm	GC	Purcell (1981)

Sulculeolaria quadrivalvis[b]	0.8 mm	0.2–2.5 mm	GC	Purcell (1981)
Flagellates (P)				
Ochromonas sp.[a]	2.5 mm	0.15–1.05 mm	FE	Andersson et al. (1986)
Unspecified[a]	5–20 mm	1.1–5.3 mm	FE	Sherr et al. (1991)
Bodonid[a]	4.4–4.9 mm	0.6–1.2 mm	FE	Šimek & Chrzanowski (1992)
Chrysomonad[a]	3.4 mm	0.6–1.2 mm	FE	Šimek & Chrzanowski (1992)
Chaetognaths (O)				
Sagitta elegans[c]	0.18–0.31 mm	0.04–0.12 mm	GC	Pearre (1980)
Sagitta elegans[c]	0.31–1.5 mm	0.05–0.4 mm	GC	Pearre (1980)
Sagitta elegans[c]	1.5–3.1 mm	0.1–0.4 mm	GC	Pearre (1980)
Sagitta elegans[c]	3.1–6.2 mm	0.14–0.5 mm	GC	Pearre (1980)
Sagitta elegans[c]	0.18–0.31 mm	0.04–0.15 mm	GC	Pearre (1980)
Sagitta elegans[c]	0.31–1.5 mm	0.05–0.6 mm	GC	Pearre (1980)
Sagitta elegans[c]	1.5–3.1 mm	0.15–1.5 mm	GC	Pearre (1980)
Sagitta elegans[c]	3.1–6.2 mm	0.2–1.5 mm	GC	Pearre (1980)
Sagitta enflata[c]	0.08–3.8 mm	0.09–0.9 mm	GC	Pearre (1980)
Sagitta friderici[c]	0.55–2.8 mm	0.1–0.7 mm	GC	Pearre (1980)
Sagitta hispida[c]	0.24–1.3 mm	0.07–0.25 mm	GC	Pearre (1980)
Sagitta hispida[c]	1.3–2.7 mm	0.14–0.4 mm	GC	Pearre (1980)
Sagitta minima[c]	0.22–4.3 mm	0.05–0.5 mm	GC	Pearre (1980)
Sagitta setosa[c]	0.24–1.5 mm	0.08–0.4 mm	GC	Pearre (1980)
Sagitta setosa[c]	1.5–2.4 mm	0.15–0.7 mm	GC	Pearre (1980)
Sagitta elegans[c]	0.5–0.8 mm	0.25–0.75 mm	GC	Saito & Kiørboe (2001)

Sagitta elegans[c]	0.8–1.2 mm	0.2–1.0 mm	GC	Saito & Kiørboe (2001)
Sagitta elegans[c]	1.2–1.6 mm	0.25–1.7 mm	GC	Saito & Kiørboe (2001)
Sagitta elegans[c]	1.6–2.0 mm	0.1–2.3 mm	GC	Saito & Kiørboe (2001)
Sagitta elegans[c]	1.6–2.0 mm	0.05–2.7 mm	GC	Saito & Kiørboe (2001)
Ciliates (P)				
Stenosemella ventricosa[d,e]	62 mm	1.3–27 mm	FE	Rassoulzadegan & Etienne (1981)
Lohmanniella oviformis[a]	25 mm	1.4–11.2 mm	FE	Kivi & Setälä (1995)
Strobilidium sp.[a]	40 mm	1.4–26.6 mm	FE	Kivi & Setälä (1995)
Strobilidium spiralis[a]	50–60 mm	1.4–16.8 mm	FE	Kivi & Setälä (1995)
Strombidium sp.[a]	20 mm	1.4–5.6 mm	FE	Kivi & Setälä (1995)
Strombidium spp.[a]	25 mm	1.4–9.8 mm	FE	Kivi & Setälä (1995)
Tintinnopsis beroidea[d,e]	54 mm	1.4–8.4 mm	FE	Kivi & Setälä (1995)
Balanion comatum[a]	17 mm	4–10 mm	FE	Jakobsen & Hansen (1997)
Halteria cf. *grandinella*[a]	19.3 mm	0.5–4.23 mm	FE	Jürgens & Šimek (2000)
Favella ehrenbergii[d]	130 mm	6–43 mm	FE	Kamiyama & Arima (2001)
Favella taraikaensis[d]	79 mm	5–43 mm	FE	Kamiyama & Arima (2001)
Ctenophores (G)				
Pleurobrachia bachei[f]	8 mm	0.22–3 mm	FE	Greene et al. (1986)
Mnemiopsis leidyi[a]	46–67 mm	1–10 mm	ME	Cowan & Houde (1993)
Bolinopsis infundibulum[f]	6–60 mm	0.5–11 mm	FE	Martinussen & Båmstedt (1999)
Scyphomedusae (G)				
Chrysaora quinquecirrha[a]	3.5–6.3 cm	0.1–1 cm	ME	Cowan & Houde (1993)
Chrysaora quinquecirrha[g]	0.1–2.5 cm	0.1–25 cm	FE	Purcell & Cowan (1995)

Chrysaora quinquecirrha[g]	2–5 cm	0.3–1 cm	FE	Suchman & Sullivan (1998)
Cyanaea capillata[g]	3.4–29 cm	0.1–8 cm	FE	Martinussen & Båmstedt (1999)
Aurelia aurita[g]	0.35–7.5 cm	0.05–1.1 cm	FE	Martinussen & Båmstedt (1999)
Invertebrate larvae (O)				
Mytilus edulis[f]	260–264 mm	1–9 mm	FE	Sprung (1984)
Philine aperta[f]	149 mm	1.74–7.33 mm	FE	Hansen (1991)
Philine aperta[f]	239–274 mm	1.74–17.04 mm	FE	Hansen (1991)
Philine aperta[f]	392 mm	1.74–18.18 mm	FE	Hansen (1991)
Crassostrea virginica[f]	106–124 mm	1–16 mm	FE	Baldwin (1995)
Crassostrea virginica[f]	203–220 mm	1–18 mm	FE	Baldwin (1995)
Crassostrea virginica[f]	260–290 mm	2–30 mm	FE	Baldwin (1995)
Jehlius cirratus nauplii[f]	460 mm	8–60 mm	FE	Vargas et al. (2006)
Balanus flosculus nauplii[f]	860 mm	8–50 mm	FE	Vargas et al. (2006)
Concholepas concholepas[f]	247 mm	5–80 mm	FE	Vargas et al. (2006)
Concholepas concholepas[f]	1700 mm	5–120 mm	FE	Vargas et al. (2006)
Rotifers (O)				
Brachionus angularis[f]	100–140 mm	1–12 mm	FE	Rothhaupt (1990)
Brachionus rubens B[f]	200–260 mm	1–18 mm	FE	Rothhaupt (1990)
Brachionus rubens F[f]	120–180 mm	1–12 mm	FE	Rothhaupt (1990)
Brachionus calyciflorus[f]	220–285 mm	3–18 mm	FE	Rothhaupt (1990)
Krill (C)				
Euphausia hanseni[f]	18–30 mm	0.1–1.46 mm	GC	Barange et al. (1991)
Nematoscelis megalops[f]	14–26 mm	0.1–1.63 mm	GC	Barange et al. (1991)

Euphausia lucens[f]	14–16.5 mm	0.31–2.60 mm	FE	Stuart & Huggett (1992)
Meganyctiphanes norvegica[f]	5–9	0.35–1.95 mm	GC	Båmstedt & Karlson (1998)
Euphausia superba larvae[f]	5.9–8.5 mm	0.01–0.22 mm	FE	Meyer et al. (2002)
Euphausia superba juveniles[f]	28–38 mm	0.01–5 mm	FE	Atkinson et al. (2002)
Euphausia superba adults[f]	48–58 mm	0.01–5 mm	FE	Atkinson et al. (2002)
Cladocerans (C)				
Daphnia longispina juveniles[f]	700 mm	0.5–16 mm	FE	Børsheim & Andersen (1987)
Daphnia longispina adults[f]	2400 mm	0.5–30 mm	FE	Børsheim & Andersen (1987)
Bosmina longispina[f]	460 mm	0.8–16 mm	FE	Børsheim & Andersen (1987)
Daphnia cucullata[f]	810 mm	5–25 mm	FE	Bern (1990)
Penilia avirostris[f]	680 ±44 mm	2.5–150 mm	FE	Katechakis & Stibor (2004)
Podon intermedius[f]	569 ±48 mm	1–205 mm	FE	Katechakis & Stibor (2004)
Evadne nordmanni[f]	690 ±31 mm	1–210 mm	FE	Katechakis & Stibor (2004)
Penilia avirostris[f]	680 ±44 mm	2.5–100 mm	FE	Katechakis et al. (2004)
Copepods (C)				
Neocalanus plumchrus CV[h]	3.8 mm	2.8–36 mm	FE	Frost et al. (1983)
Neocalanus plumchrus CV[h]	3.8 mm	2.2–36 mm	FE	Frost et al. (1983)
Neocalanus cristatus CV[h]	6.5 mm	3.6–36 mm	FE	Frost et al. (1983)
Neocalanus cristatus CV[h]	6.5 mm	2.2–36 mm	FE	Frost et al. (1983)
Diaptomus sicilis[a]	0.58 mm	3.7–46 mm	FE	Vanderploeg et al. (1984)
Euchata elongata[f]	6.3–7.4 mm	0.22–3 mm	FE	Greene & Landry (1985)
Corycaeus anglicus[i]	1 mm	0.2–2.45 mm	FE	Landry et al. (1985)
Diaptomus sicilis[j]	1.2 mm	6–35 mm	FE	Vanderploeg & Paffenhöfer (1985)

Paracalanus sp.[j]	0.7 mm	10–35 mm	FE	Vanderploeg & Paffenhöfer (1985)
Eucalanus pileatis[j]	1.9 mm	10–70 mm	FE	Vanderploeg & Paffenhöfer (1985)
Cyclops scutifer[f]	0.9 mm	0.8–5 mm	FE	Børsheim & Andersen (1987)
Calanus finmarchicus[h]	2.68 mm	10–50 mm	FE	Levinsen et al. (2000)
Calanus finmarchicus[h]	2.68 mm	13–54 mm	FE	Levinsen et al. (2000)
Calanus hyperboreus[h]	6.45 mm	13–50 mm	FE	Levinsen et al. (2000)
Calanus hyperboreus[h]	6.45 mm	15–50 mm	FE	Levinsen et al. (2000)
Acartia clausi[f]	920 ± 31 mm	7.5–210 mm	FE	Katechakis et al. (2004)
Doliolids (G)				
Dolioletta gegenbauri[f]	10 mm	0.2–102 mm	FE	Crocker et al. (1991)
Doliolum denticulatum[f]	1.48 ± 0.13 mm	1–75 mm	FE	Katechakis et al. (2004)
Salps (G)				
6 species[f]	5–10 cm	1–1000 mm	DO	Madin (1974)
Cyclosalpa bakeri[f]	1–10 cm	5–100 mm	GC	Madin & Purcell (1992)
Thalia democratica[f]	7.7 mm	1–62 mm	FE	Vargas & Madin (2004)
Salpa cylindrica[f]	4.1 mm	3–130 mm	FE	Vargas & Madin (2004)
Cyclosalpa affinis[f]	13.7 mm	1 to138 mm	FE	Vargas & Madin (2004)

Table S2. Examples of relationships between generalist predators and temperature or climate index from ≥5 yr time series. The winter/spring North Atlantic Oscillation (NAO) is positively correlated with temperature in the North Atlantic, and the Pacific Decadal Oscillation (PDO) is positively correlated with temperature in the northeast Pacific. T: temperature; NS: North Sea; CCS: California Current System. [a]: Relationships were apparent graphically but were not quantified statistically

Taxon/measure	(Relation) Variable	System	Study period	Source
Cladocerans				
Bosmina spp.				
Abundance	(+) Spring NAO	2 European lakes	1979–1994	Straile & Adrian (2000)
Date of peak abundance	(–) Winter NAO	German lake	1979–1999	Gerten & Adrian (2000)
Daphnia spp.				
Abundance	(+) Spring NAO	2 European lakes	1979–1994	Straile & Adrian (2000)
Date of peak abundance	(–) Spring T	German lake	1979–1999	Gerten & Adrian (2000)
Date of peak abundance	(–) T, PDO	L. Washington, USA	1976–2002	Winder & Schindler (2004)
Leptodora kindtii				
Biomass	(+[a]) T	German reservoir	1982–1999	Wagner & Benndorf (2007)
Ctenophores				
Mnemiopsis leidyi				
Abundance	(+[a]) Min. winter T	Black Sea	1992–1997	Shiganova (1998)
Date of appearance	(–[a]) T, NAO	Narragansett Bay	1950–1999	Sullivan et al. (2001)
Peak abundance	(+[a]) T, NAO	Narragansett Bay	1950–1999	Sullivan et al. (2001)
Jellyfish				
Aurelia aurita				
Max., median abundance	(–) Winter NAO	NS, W of N Denmark	1971–1986	Lynam et al. (2005)
Median abundance	(–) Winter NAO	NS, E of Scotland	1971–1986	Lynam et al. (2005)
Max. abundance	(+) Winter NAO	NS, N of Scotland	1971–1986	Lynam et al. (2005)
Cyanea capillata				

Median abundance	(–) Winter NAO	NS, E of Scotland	1971–1986	Lynam et al. (2005)
Cyanea lamarckii				
Max., median abundance	(–) Winter NAO	NS, W of N Denmark	1971–1986	Lynam et al. (2005)
Max. abundance	(+) Winter NAO	NS, N of Scotland	1971–1986	Lynam et al. (2005)
Chrysaora quinquecirrha				
Presence	(+) T	Chesapeake Bay	1987–2000	Decker et al. (2007)
Abundance	(+[a]) T	Chesapeake Bay	1987–2000	Decker et al. (2007)
Abundance	(–) Winter NAO	Chesapeake Bay	1960–1995	Purcell & Decker (2005)
Pelagia noctiluca				
Occurrence	(+) Summer T	W Mediterranean	1875–1986	Goy et al. (1989)
Unspecified				
Biomass	(+[a]) Mean T	Bering Sea	1979–1997	Brodeur et al. (1999)
Frequency	(+) Winter NAO	Central North Sea	1958–2000	Attrill et al. (2007)
Krill				
Euphausia gibboides, *E. recurva*, *E. eximia*, *Nyctiphanes simplex*				
Spring abundance	(+) PDO	CCS, S California	1950–2002	Brinton & Townsend (2003)
Euphausia pacifica				
Spring abundance	(–) PDO	CCS, S California	1950–2002	Brinton & Townsend (2003)
Salps				
Cyclosalpa affinis, *Pegea socia*, *C. bakeri*, *Salpa maxima*				
Biomass	(–[a]) PDO	CCS, S California	1951–2002	Lavaniegos & Ohman (2003)
Thalia domocratica				
Abundance	(+[a]) T	NW Mediterranean	1974–1999	Licandro et al. (2006)

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