

Characteristics of Suspended Particulate Matter, Benthic Environmental Factors, and Their Relationship to Bivalves

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Table 1. List of previous studies on the effect of particle size on the responses of various bivalve species

Bivalve Species	Test Feed	Particle Size vs. Response	Reference
<i>Mytilus edulis</i>	Mixed feed* ¹	>6 µm: ≈ 100% RE, 2 µm: 70-90% RE	Møhlenberg & Riisgård 1978
	Mixed feed* ²	300 µm: 90% Ingested 1-1.2 mm: 34% Ingested	Davenport et al. 2000
<i>Ruditapes decussatus</i>	<i>Tapes phillipinarium</i> larvae	161 µm: ≈ 90% Ingested	Lehane & Davenport 2004
	Mixed feed* ³	<3 µm: <60-70% RE >6 µm: 80-100% RE	Sobral & Widdows 2000
<i>Cardium echinatum</i>			
<i>Cardium edule</i>			
<i>Modiolus modiolus</i>			
<i>Musculus niger</i>			
<i>Cultellus pellucidus</i>	Mixed feed* ¹	>6 µm: ≈ 100% RE, 2 µm: 70-90% RE	Møhlenberg & Riisgård 1978
<i>Hiatella striata</i>			
<i>Mya arenaria</i>			
<i>Venerupis pullastra</i>			
<i>Pecten opercularis</i>	”	>6 µm: ≈ 100% RE, 2 µm: <30% RE	
<i>Pecten septemradiatus</i>			
<i>Ostrea edulis</i>	”	>6 µm: 100% RE, 2 µm: 40% RE	
<i>Artica islandica</i>	”	>6 µm: ≈ 100% RE, 1 µm: 60-70% RE	
<i>Geukensia demissa</i>			
<i>Spisula solidissima</i>	Mixed feed* ⁴	>4 µm: ≈ 100% RE, 2 µm: 35-70% RE	Riisgård 1988
<i>Brachidontes exustus</i>			
<i>Mercenaria mercenaria</i>			
<i>Crassostrea virginica</i>	”	>5 µm: 100% RE, 2 µm: 50% RE	
<i>Argopecten irradians</i>	”	>5 µm: 100% RE, 2 µm: 15% RE	

Mixed feed*¹ – mixture of *Monochrysis lutheri* (2-5 µm), *Dunaliella marina* (5-7.5 µm), *Tetraselmis suecica* (6-9.5 µm) which were all measured using an electronic particle counter. Mixed feed*² – mixture of *Artemia* sp. and *Tigriopus brevicornis*. Mixed feed*³ – mixture of fine surface mud and algal cells. Mixed feed*⁴ – mixture of bacteria, small particles and *Isochrysis galbana*, *Cryptomonas* sp. RE: retention efficiency.

Table 2. List of previous studies on the effect of particle density on the responses of various bivalve species

Bivalve Species	Particles	Particle Density	Response	Reference
<i>Mytilus edulis</i>	fine surface sediments	0-350 mg L ⁻¹	CR - negative relationship as particle density increased within this range	Widdows et al. 1979
	Mixture feed* ¹	0-5 mg L ⁻¹	32-34% incr. in CR and 30-70% incr. in GR relative to control	Kjørboe et al. 1981
<i>Atrina zelandica</i>	natural sediments	0.15-0.43 mg L ⁻¹	4-6 L g ⁻¹ h ⁻¹ CR	Strohmeier et al. 2009
	Mixture feed* ²	10 mg L ⁻¹	0.70-1.10 L h ⁻¹ CR	Ellis et al. 2002
		20 mg L ⁻¹	0.61-0.95 L h ⁻¹ CR	
		80 mg L ⁻¹	0.40-0.60 L h ⁻¹ CR	
<i>Mercenaria mercenaria</i>	Mixture feed* ³	20 mg L ⁻¹	31% decr. in CR relative to control	Brice & Malouf 1984
		40 mg L ⁻¹	52% decr. in CR relative to control	
<i>Cerastoderma edule</i>	natural sediments	5 mg L ⁻¹	>5 mg h ⁻¹ FR, ≈ 2.5 mg h ⁻¹ IR	Navarro et al. 1992
		30 mg L ⁻¹	>20 mg h ⁻¹ FR, 5 mg h ⁻¹ IR	
	Mixture feed* ⁴	1.6 mg L ⁻¹	Highest CR (1.79 ± 0.20 L h ⁻¹)	Navarro & Widdows 1997
		526 mg L ⁻¹	Lowest CR (0.060 ± 0.026 L h ⁻¹)	
<i>Placopecten magellanicus</i>	<i>Chroomonas salina</i>	10 ⁶ cells L ⁻¹	Highest CR (13.71 L h ⁻¹)	Wildish et al. 1992
	Mixture feed* ⁵	1-14 mg L ⁻¹	CR decr. from 5.0-2.0 L h ⁻¹	Bacon et al. 1998
<i>Mya arenaria</i>	Mixture feed* ⁵	1-14 mg L ⁻¹	CR decr. from 3.0-1.5 L h ⁻¹	Bacon et al. 1998
<i>Pecten maximus</i>	natural sediments	0.15-0.43 mg L ⁻¹	9-12 L g ⁻¹ h ⁻¹ CR	Strohmeier et al. 2009

Mixture feed*¹ – mixture of natural silt and *Phaeodactylum tricornutum*. Mixture feed*² – mixture of sediment slurry, *Chaetoceros* sp. and *Isochrysis* sp. Mixture feed*³ – mixture of bottom sediments and *Pseudoisochrysis paradoxa*. Mixture feed*⁴ – mixture of fine surficial sediment and *Isochrysis galbana*. Mixture feed*⁵ – mixture of *Chaetoceros muelleri* and silica. CR: Clearance rate; FR: Filtration rate; IR: Ingestion rate; GR: Growth rate; SL: Shell length; decr.: decrease; incr.: increase.

Table 3. List of previous studies on how current velocity influences the responses of various bivalve species

Bivalve Species	Current Velocity	Response	Reference
<i>Mytilus edulis</i>	0.2-0.6 m s ⁻¹	CR decr. continuously within this range	Nielsen & Vismann 2014
	>0.6 m s ⁻¹	CR = 0 L h ⁻¹ ind. ⁻¹	
	0-0.8 m s ⁻¹	CR - highest	Widdows et al. 2002
	>0.8 m s ⁻¹	decr. in CR	
	0.1-0.3 m s ⁻¹	decr. in FR	Newell et al. 2001
	0.06-0.22 m s ⁻¹	decr. in FR	Wildish & Miyares 1990
<i>Placopecten magellanicus</i>	>0.25 m s ⁻¹	FR <10%	
	0.02-0.1 m s ⁻¹	Optimum Growth	Wildish et al. 1987
	>0.1 m s ⁻¹	Inhibited Growth	
<i>Crassostrea virginica</i>	≈ 0.1 m s ⁻¹	Optimum Growth	Wildish et al. 1992
	0.04-0.07 m s ⁻¹	Growth - highest	Lenihan et al. 1996
<i>Ruditapes decussatus</i>	0-0.005 m s ⁻¹	Growth - lowest	
	<0.08 m s ⁻¹	CR - highest	Sobral & Widdows 2000
<i>Argopecten irradians concentricus</i>	>0.17 m s ⁻¹	decr. in CR	
	0.017-0.039 m s ⁻¹	Growth - unaffected	Eckman et al. 1989
<i>Pinctada maxima</i>	0.014-0.172 m s ⁻¹	decr. in Growth	
	0.08 m s ⁻¹	FR & IR - highest	Supii et al. 2012

CR: Clearance rate; FR: Filtration rate; IR: Ingestion rate; decr.: decrease.