

Marine mollusks of Bahía Málaga, Colombia (Tropical Eastern Pacific)

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Abstract: A checklist of mollusks reported in Bahía Málaga (Valle del Cauca, Colombia) was developed through recent samplings in the zone (2004–2012), together with bibliographic and museums' collections reviews. Species' distributions in Bahía Málaga were established through 18 different sub-regions, which included the inner, middle and outer zones of the bay. A revision of the western American distribution for the species was also carried out. A total of 426 species were found, of which 44 were new reports for the Colombian Pacific coast. Results supported the high marine biodiversity that has been reported for this region.

Key words: Tropical western coast of America; marine invertebrates; Mollusca

INTRODUCTION

Bahía Málaga (Malaga Bay) is one of the most biodiverse zones on the Pacific coast of Colombia. The high marine biodiversity of Bahía Málaga played a fundamental role in its declaration in 2010 as a marine protected area, becoming the 56th unit of the National System of Colombian Protected Areas (Sistema Nacional de Áreas Marinas Protegidas).

Zoological studies on the Colombian Pacific coast have been focused mainly on crustaceans and fishes. Bahía Málaga is not an exception; most of the scientific research in the region has been focused on these taxonomic groups (INVEMAR *et al.* 2007). There have been some attempts to make checklists and to carry out other biological studies (at specific, population, and community levels) of Mollusca, some of them focused on species of economic interest (Rubio *et al.* 1988) and others relating species with their habitats (Escallón and Cantera 1989; Cantera 1991; Lozano-Cortés *et al.* 2012) but none of them is complete. Now, with more than 20 years of research, this checklist contains all species known in the bay.

MATERIALS AND METHODS

Study site

Bahía Málaga is located in the central region of the Colombian Pacific coast (03°56'–04°05'N and 77°19'–77°21'W) (Figure 1). Due to the fact that it is a tectonic estuary, the bay is a hybrid between hard (tertiary cliffs) and soft (estuarine zones) substrates, presenting a high number of habitats and

hence high biodiversity. Its littoral zone, with an area of 136 km², is composed of different ecosystems, such as rocky and sandy shores, muddy flats, and mangrove forests (Cantera 1991).

Rocky shores in Bahía Málaga may consist of cliffs and/or boulders. The range in the size and texture of the particles present in the rocky shores allow for a variety of microhabitats, making it a very diverse ecosystem (INVEMAR *et al.* 2007). Sandy beaches consist of very fine particles that may be free or compacted, primary containing fragments of mollusk shells and decomposing vegetative matter, originating from the surrounding mangroves (Cantera *et al.* 1994). These zones have been found to be most affected by the tide action and are primary found near the bay's mouth. Mudflats consist of miry expanses resulting from erosion of coastal areas that are rich in detrital material. These zones are rich in nutrients; hence their energetic content is high (Prahl *et al.* 1990). Bahía Málaga's substrate variety leads to a fragmented distribution of mangroves. In zones where cliffs are common (north and south), dwarfed mangroves predominate, while in zones with greater influence of rivers (inner zone of the bay), mangrove forests are more developed, with tall mangrove trees and more extensive stands (INVEMAR *et al.* 2007).

Data collection

A detailed checklist for mollusks of Bahía Málaga was developed through the information gathered during three major research projects in the last nine years, both based on the projects' sampling results and on bibliographic and collection reviews. The projects were: Valuation of Marine and Coastal Diversity of Bahía Málaga, Valle del Cauca (2004–2007) (INVEMAR *et al.* 2007), Biodiversity of Vulnerable Life Cycle Stages of Marine Organisms in Bahía Málaga (Colombian Pacific) as a Conservation Criteria (2007–2010) (UNIVALLE and INVEMAR 2010) and Environmental Vulnerability of Marine and Coastal Ecosystems of Bahía Málaga (Colombian Pacific): Natural and Anthropogenic Threats (2011–2013) (UNIVALLE and INVEMAR 2013). Sampling was carried out at 18 subregions in the bay (Figure 1) between 2004 and 2012, and was based on intense sampling, rapid ecological assessments for intertidal and shallow water habitats (using snorkeling and scuba diving), and on the use of different artificial habitats as collection

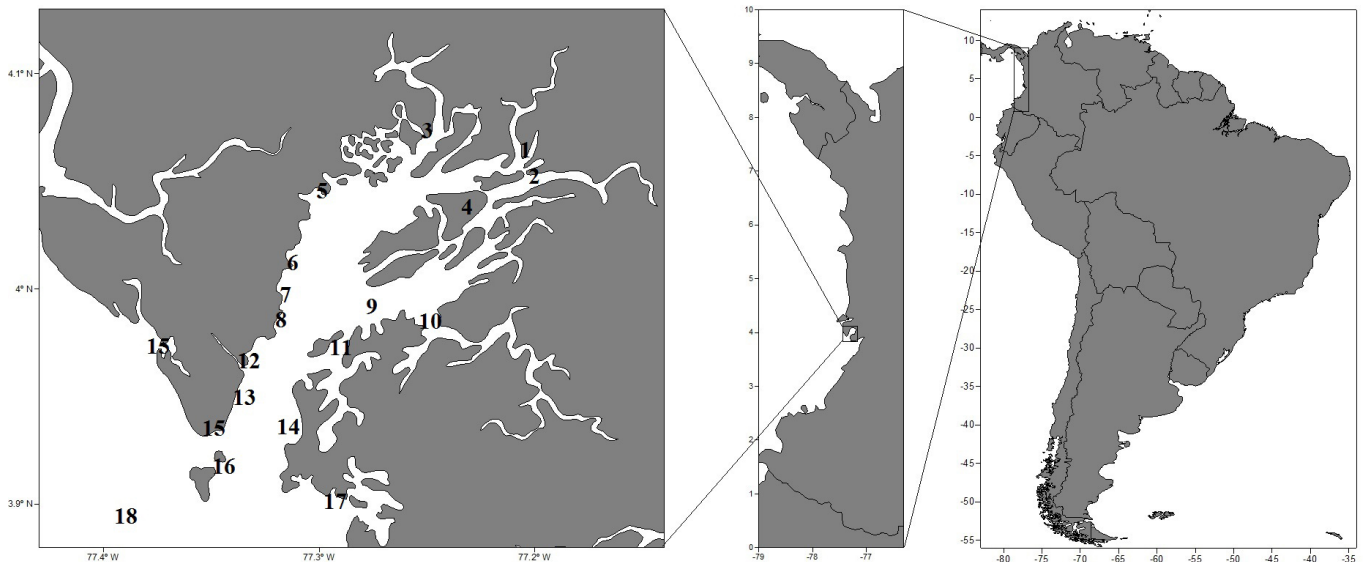


Figure 1. Bahía Málaga (left), Colombian Pacific Coast (middle), South America (right). The study area was divided in 18 subregions: 1: Isla El Aguante; Iguanero, Aguacate; 2: Luisico; 3: Estero Valencia, Estero Alegría, El Corozal; 4: La Plata, Isla Ultima, Isla Grande, Isla Cabezon; 5: Mayordomo; 6: La Muerte, Los Chorros; 7: Isla Curichiche; 8: Punta Alta, Base Naval, Rampa Suecos, La Jota; 9: Los Negros; 10: La Sierpe; 11: Isla Monos, Caleta Cabezón, Caracas; 12: Los Agujeros; 13: La Despensa; 14: Playa Chucheros; 15: La Barra, Juanchaco, Ladrilleros; 16: Isla Palma, Morro del Medio, Morro Chiquito; 17: Juan de Dios, Playa Dorada, El Tigre; 18: Los Negritos. (Map sketch provided by M.A. Ocampo).

sites for subtidal marine organisms in the bay. The artificial habitats consisted of plastic baskets filled with pieces of bricks, broken shells of *Anadara* sp. and/or coconut fiber. The baskets were tied to rocks on the sea bottom at a depth range of 2–5 m and collected three months later. The collected specimens were deposited in three different collections: Colección de Referencia Biología Marina Universidad del Valle, (Cali, Colombia), Museo Departamental de Ciencias Naturales INCIVA (Cali, Colombia) and Museo de Historia Natural Marina de Colombia, INVEMAR (Santa Marta, Colombia).

The taxonomic status of each species reported in Bahía Málaga was checked in the World Register of Marine Species online database (WoRMS 2014) (<http://www.marinespecies.org>). The geographic range of each species was also reviewed in Discover Life (2014) (<http://www.discoverlife.org>), Encyclopedia of Life (2014) (<http://eol.org>), Keen (1971), and Coan and Valentich-Scott (2012). CITES (2014) (<http://checklist.cites.org>), IUCN (2014) (<http://discover.iucnredlist.org>), and local red lists (Ardila *et al.* 2002; Castellanos *et al.* 2011) and interviews with experts of the region were reviewed in order to identify species with some state of vulnerability. Species with economic importance were identified through a review of FAO (Food and Agriculture Organization of the United Nations) literature (Fischer *et al.* 1995), as well as interviews with local people. Databases and collections from museums were reviewed in order to identify lots of marine mollusks collected in Bahía Málaga: Smithsonian National Museum of Natural History, Florida Museum of Natural History, Natural History Museum of Los Angeles County, Santa Barbara Museum of Natural History (SBMNH), Colección de Referencia Biología Marina Universidad del Valle (CRBMUV), Museo Departamental de Ciencias Naturales INCIVA (INCIVA) and Museo de Historia Natural Marina de Colombia, INVEMAR (MHNCI). Lots for Bahía Málaga were found in SBMNH, INCIVA, CRBMUV and MHNCI.

RESULTS

A total of 426 species of marine mollusks were reported in Bahía Málaga: Polyplacophora: 3 families, 7 species; Bivalvia: 34 families, 168 species; Gastropoda: 68 families, 249 species; Cephalopoda: 2 families, 2 species (Appendix 1). Between 2004 and 2012, there were 145 species newly reported in the bay (Figure 2). Forty-four of these species were new reports for the Colombian Pacific coast, hence extending their geographic distribution. Thirty-four species have been found only as empty shells in the bay. Unpublished literature, *e.g.*, Master's theses, dissertations, undergraduate projects, etc., have reported 39 species in the bay that were neither found in the surveys of the previously mentioned research projects, reported in published papers, nor found in museum collections. These species were: *Anadara multicostata* (G.B. Sowerby I, 1833); *Anadara nux* (G.B. Sowerby I, 1833); *Anadara obesa* (G.B. Sowerby I, 1833); *Anadara perlabiata* (Grant & Gale,

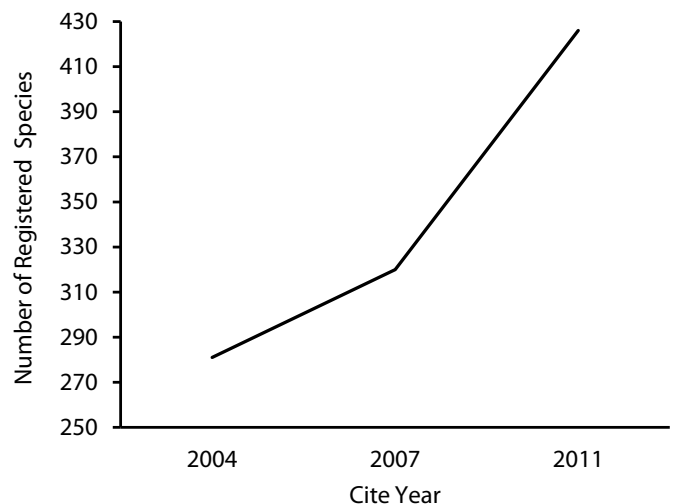


Figure 2. Increase of marine mollusk species reported for Bahía Málaga (Colombian Pacific) between 2004 and 2011.

1931); *Callistoctopus macropus* (Risso, 1826); *Cancellaria gemmulata* G.B. Sowerby I, 1832; *Coralliophila costata* (Blainville, 1832); *Crossata ventricosa* (Broderip, 1833); *Donax obesulus* Reeve, 1854; *Donax punctatostriatus* Hanley, 1843; *Emarginula longifissa* G.B. Sowerby II, 1866; *Gastrochaena ovata* Sowerby I, 1834; *Gemophos gemmatus* (Reeve, 1846); *Hindsiclava hertleini* Emerson & Radwin, 1969; *Hindsiclava resina* (Dall, 1908); *Hysteroconcha multispinosa* (G.B. Sowerby II, 1851); *Iphigenia altior* (G.B. Sowerby I, 1833); *Knefastia funiculata* (Kiener, 1840); *Laevicardium elatum* (G. B. Sowerby I, 1833); *Lithophaga attenuata* (Deshayes, 1836); *Lolliguncula diomedea* (Hoyle, 1904); *Lottia pediculus* (Philippi, 1846); *Marinula rhoadsi* Pilsbry, 1910; *Nassarius iodes* (Dall, 1917); *Niveria rubescens* (Gray, 1833); *Nuculana costellata* (G. B. Sowerby I, 1833); *Odostomia subturrita* Dall and Bartsch, 1909; *Oliva spicata* (Röding, 1798); *Oliva undatella* Lamarck, 1811; *Olivella rehderi* Olsson, 1956; *Olivella aureocincta* Carpenter, 1857; *Petalocochus* aff. *macrophragma* (Carpenter, 1856); *Phyllonotus peratus* Keen, 1960; *Plesiocystiscus palantirulus* (Roth & Coan, 1968); *Semele tortuosa* (C.B. Adams, 1852); *Strombus gracilior* G.B. Sowerby I, 1825; *Tellina regia* Hanley, 1844; *Tellina virgo* Hanley, 1844; *Volvarina taeniolata* Morch, 1860.

Only five species have been reported as vulnerable (moderate risk of extinction) in published literature: *Anadara grandis* (Broderip & G.B. Sowerby I, 1829), *Anadara similis* (C.B. Adams, 1852), *Anadara tuberculosa* (G.B. Sowerby I, 1833), *Pinctada mazatlanica* (Hanley, 1856), and *Lobatus galeatus* (Swainson, 1823). We identified 21 species with some degree of vulnerability, eleven of which local experts state that must be evaluated under IUCN criteria. All but one of the vulnerable species are economically important. There are 75 economically important species in the bay. Information about the species' habitats in the bay was available in 94% of the species.

DISCUSSION

Bahía Málaga is the marine protected area of the Colombian Pacific coast with the second highest species richness of marine mollusks: Isla Gorgona: 661, Malpelo: 393, Utría: 316, Sanquianga: 356 (UNIVALLE and INVEMAR 2010). Gorgona Island is one of the few regions along the South American Pacific coast with coral reef formations (Barrios and López 2001), which are known to bear high diversities of mollusks (Cantera *et al.* 1979; Cosel 1984). The high diversity of marine mollusks in Bahía Málaga is the result of the different marine ecosystems and substrate heterogeneity that can be found in the bay. Previous studies have evidenced that mollusks' species richness gradually increases from the inner to the outer (closer to the ocean) zone of the bay, which coincides with an increase in substrate heterogeneity and spatial complexity (López de Mesa 2011).

The increase in species reported for the bay between 2007 and 2012 (Figure 2) is the result of the sampling carried out in subtidal habitats through the implementation of artificial habitats. Subtidal benthic organisms were scarcely studied because of the difficult accessibility of their habitats through traditional techniques (scuba diving, mud grabber, nets) due to the natural conditions of the bay (low visibility, the bottom composition is a mixture of mud and rocks) (UNIVALLE and INVEMAR 2010). Most of the new reports for the Colombian Pacific coast are micromollusks, mollusks with the greatest

shell dimension <10 mm (Kay 1980), a group that currently has a scarce bibliography for the American Pacific coast. The results of this study show the lack of knowledge of the marine micromollusks of the Colombian Pacific. The study of micromollusks requires special techniques not only for sampling but also for sorting, preparing and identifying the samples. Presently, no studies focusing on micromollusks have been carried out in Colombian coasts. It is estimated that most of undescribed species of mollusks are micromollusks (Geiger *et al.* 2007), and it is expected that there are more new reports and probably new species of mollusks in the Colombian benthos.

The species in the bay that are currently identified as vulnerable are intensively harvested for local consumption (UNIVALLE and INVEMAR 2013). Castellanos-Galindo *et al.* (2011) stated that the decrease in number and size of individuals of *Anadara* spp. populations in the last years might be evidence of over-exploitation of this natural resource. The evidence of population decline of ark shells (*A. similis* and *A. tuberculosa*) along the tropical and subtropical American Pacific coast (MacKenzie, 2001) might be evidence of some vulnerability level for these species. We believe it would be appropriate to analyze the situation of *A. similis* and *A. tuberculosa* in future IUCN Red List assessment workshops. The species that local experts suspect might be in some sort of danger are also locally harvested for human consumption, but currently the Colombian environmental authorities are not concerned about the condition of their populations. Absence of information about molluscan populations inhabiting the Colombian Pacific coast is frequent. We consider that given the scarce population data of molluscan species in Bahía Málaga, population studies of harvested molluscan species in the Pacific coast of Colombia must be carried out, as well as ecosystem monitoring programs, in order to develop efficient conservation strategies.

ACKNOWLEDGMENTS

Special thanks are due to all the members of the scientific team of the three mentioned research projects, especially María Alejandra Ocampo and Luis Miguel Cuellar, who helped identifying samples, and Angela María Oviedo who contributed with the bibliographical review. Most of the information presented here was gathered in projects funded by Colciencias (projects Nos. 210-509-16821, 1106-405-20155, 1106-521-28786), supported and conducted in cooperation with INVEMAR and Universidad del Valle. We want to thank Dr. Phillip Silverstone, M.Sc. Anne-Marie Gavlas and B.Sc. Patricia Cockett for assistance with English.

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Authors' contribution statement: JRC identified specimens of CRBMUV collected prior 2007. LALdM identified specimens collected in 2005–2006 (100%) and 2008–2010 (80%). JRC reviewed the identification of the new reports for the Colombian Pacific collected in Bahía Málaga in 2007–2010. LALdM updated the species' names and carried out the reviews of museums' data bases. JRC and LALdM analyzed the data and wrote the text.

Received: August 2014

Accepted: November 2014

Editorial responsibility: Robert G. Forsyth

Appendix 1. Checklist of marine mollusks registered for Bahía Málaga, Colombian Pacific. Species marked with + indicates that only empty shells have been found in the zone. CO* indicates new reports for the Colombian Pacific coast (hence extension of the geographical distribution).

Degree of vulnerability: V: vulnerable (as assessed by UNIVALLE and INVEMAR (2013), or ER, local experts consider the species must be evaluated); E: economic importance according to FAO; L: economic importance to local communities. Empty cells indicate lack of information. **West American distribution:** ARC: Arctic; CA: Canada, British Columbia; CH: Chile; CI: Cocos Island; CO: Colombia; CR: Costa Rica; EC: Ecuador; GI: Galápagos Islands; HO: Honduras; ME: Mexico; NI: Nicaragua; PAC: Pacific; PE: Peru; PN: Panama; SL: Salvador; US: United States of America. **Distribution in Bahía Málaga (Bahía Málaga Sites):** 1: Isla El Aguante; Iguanero, Aguacate; 2: Luisico; 3: Estero Valencia, Estero Alegría, El Corozal; 4: La Plata, Isla Ultima, Isla Grande, Isla Cabezon; 5: Mayordomo; 6: La Muerte, Los Chorros; 7: Isla Curichiche; 8: Punta Alta, Base Naval, Rampa Suecos, La Jota; 9: Los Negros; 10: La Sierpe; 11: Isla Monos, Caleta Cabezón, Caracas; 12: Los Agujeros; 13: La Despensa; 14: Playa Chucheros; 15: La Barra, Juanchaco, Ladrilleros; 16: Isla Palma, Morro del Medio, Morro Chiquito; 17: Juan de Dios, Playa Dorada, El Tigre; 18: Los Negritos. **Depth range (Depth):** ELT: extreme low tides; I: intertidal; ST: subtidal; SW: shallow waters; TP: tide pools. **Substratum:** AH: artificial habitats; C: empty conch or shell; DW: dead wood; FLM: fallen log mangrove trees; LRM: leaves and roots of mangrove trees; M: muddy; MA: mangrove; MDL: mud with dead leaves; Mtrunk: mangrove tree trunk; PEL: pelagic; R: rocky; RT: mangrove tree roots; RTM: roots and truck of mangrove trees; S: sandy, SC: soft coral; W: wood. **Museum collection acronyms:** CRBMUV: Colección de Referencia Biología Marina Universidad del Valle; IMCN: Museo Departamental de Ciencias Naturales INCIVA (B bivalvia, G: gastropoda); INV-MOL: Museo de Historia Natural Marina de Colombia, INVEMAR (Santa Marta, Colombia), SBMNH: Santa Barbara Museum Natural History.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
POLYPLACOPHORA								
Ischnochitonidae								
<i>Callistochiton elenensis</i> (G.B. Sowerby I in Broderip & G.B. Sowerby I, 1832)	ME-EC	7, 9, 16, 18	I–5	AH, R				CRBMUV 2006032
<i>Callistochiton pulchrior</i> Carpenter MS, Pilsbry, 1893	NI-CO	4, 5, 6, 7, 9, 16, 18	I–5	AH, M-R-S				CRBMUV 2006017, 2006043, 2011617-BC, 20111487-BC
<i>Ischnochiton (Ischnochiton) dispar</i> (G.B. Sowerby I in Broderip & G.B. Sowerby I, 1832)	US-CH	5, 7, 9, 16, 18	I–5	AH, R				CRBMUV 2006010, 2006019, 2006031, 2006036, 2007001, 2011049-BC
<i>Stenoplax (Stenoplax) limaciformis</i> (G.B. Sowerby I in Broderip & G.B. Sowerby I, 1832)	US-PE	18	ST	R				CRBMUV 2006008, 2007002, 2011263-BC
Chitonidae								
<i>Chiton (Chiton) stokesii</i> Broderip in Broderip & G.B. Sowerby I, 1832	ME-CH	16	I	R		■		INVEMAR <i>et al.</i> 2007
Acanthochitonidae								
<i>Acanthochitona avicula</i> (Carpenter, 1857)	US-EC	16, 18	3–5	AH				CRBMUV 2006045, 2007009
<i>Acanthochitona hirudiniformis</i> (G.B. Sowerby I, 1832)	US-PE	5, 7, 13, 15, 16, 18	I–5	AH, M-R, R				CRBMUV 2006006, 2006049, 2011077-BC, 2011078-BC
BIVALVIA								
Nuculanidae								
<i>Nuculana elenensis</i> (G.B. Sowerby I, 1833)	ME-PE	5, 7		M-R, R				CRBMUV 85388, 86097
Mytilidae								
<i>Brachidontes adamsianus</i> (Dunker, 1857)	US-PE, GI	4, 16	I–5	AH, R				CRBMUV E3IPM008aM, H3ARP190aM
<i>Brachidontes playasensis</i> (Pilsbry & Olsson, 1935)	CO*-PE	1, 4, 5, 7, 9	I	M				CRBMUV 80368, 81088, 81090, 81091, 81127, 85290, 85300, 86093
<i>Brachidontes puntarenensis</i> (Pilsbry & Lowe, 1932)	ME-PE, GI	5, 7	I	R				CRBMUV (lot in process)
<i>Brachidontes semilaevis</i> (Menke, 1849)	ME-PE	1, 4, 5, 7, 17	I	Mtrunk, R				CRBMUV 85298, 85299, 85389, 86068, 86077, 86096
<i>Crenella aff. decussata</i> (Montagu, 1808)	US-CH	7, 18	I-OS	AH, R				CRBMUV H2CHI107M, H3IPM266M, H3LNG010M, H3LNG049M, H3LNG208M, H4LNE026M
<i>Gregariella coarctata</i> (Carpenter, 1857)	US-PE, GI	7, 8, 14, 18	I–16	AH, M-S, R				CRBMUV 85282, 85283, 85296, 85301
<i>Leiosolenus spatiosus</i> (Carpenter, 1857)	ME-EC	5, 7, 16, 18	I	C, R				CRBMUV 85288, 86060, 86094
<i>Lithophaga aristata</i> (Dillwyn, 1817)	US-CH	4, 7, 9, 13, 15	I	C, R				CRBMUV 75215, 80366, 85286, 85287, 85293, 86059
<i>Lithophaga hastasia</i> (Olsson, 1961)	ME-PE	5, 11	I	M-R				CRBMUV 86053, 86062
<i>Lithophaga plumula</i> (Hanley, 1843)	US-PE	1, 7, 8, 12, 13	I-SW	C, R				CRBMUV 81086, 81087, 85284, 85385, 85389, 86054, 86063, 86065 INVMOL 8186, 8201

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Modiolus aff. eiseni</i> Strong & Hertlein, 1937	US-EC	7, 18	3–5	AH				CRBMUV H2IPM185M, H3CHI050M, H3IPM172M, H3LNG835M, H4LNE025M
<i>Modiolus tumbezensis</i> Pilsbry & Olsson, 1935	ME-PE	5	I	M (MA)				CRBMUV E3MAY360M
<i>Mytella guyanensis</i> (Lamarck, 1819)	ME-PE	3, 4, 5, 6, 8, 11	I	M (MA)	■	■		CRBMUV 80370, 80370, 85292, 85295, 86051, 86052, 86058 IMCN-B 304 INV-MOL 8056
<i>Septifer zeteki</i> Hertlein & Strong, 1946	ME-PE	5, 7, 15, 16, 18	I–5	AH, R				CRBMUV H2LNE216M, H3IPM259M, H3IPM332M, H3LNE710M, H3LNE719M, H3LNE736M, H4LNE055M
Arcidae								
<i>Acar gradata</i> (Broderip & G.B. Sowerby I, 1829)	US-PE	9	3–5	AH				CRBMUV E2LNE031M, H3LNG067M, H3LNG213M
<i>Acar rostrata</i> Berry, 1954	ME-EC	18	I					INVMOL 8054
<i>Anadara aequatorialis</i> (d'Orbigny, 1846)	ME-PE		I	M-S, S				INMC-B 303 INVMOL 8057
<i>Anadara bifrons</i> (Carpenter, 1857)	US-PE	15	I	M-S				CRBMUV 76174
<i>Anadara concinna</i> (G.B. Sowerby I, 1833)	ME-EC		I	S				CRBMUV 91234
<i>Anadara emarginata</i> (G.B. Sowerby I, 1833)	US-PE	4, 17	I–5	AH, S				CRBMUV H3ARP013bM
<i>Anadara esmeralda</i> (Pilsbry & Olsson, 1941)	ME-PE	14	I (TP)	S, R				CRBMUV 80357
<i>Anadara formosa</i> (G.B. Sowerby I, 1833)	ME-PE	4, 7, 9, 16, 18	I (TP) –5	AH, S, R				CRBMUV H3ARP013bM, H3LNG077M INV-MOL 8174, 8194
<i>Anadara grandis</i> (Broderip & G.B. Sowerby I, 1829)	ME-PE	1, 3, 4, 6, 11	ELT	M (MA), S, S-M	■	■	■	CRBMUV 79180, 85276
<i>Anadara reinharti</i> (Lowe, 1935)	ME-PE		SW					CRBMUV 80359
<i>Anadara similis</i> (C.B. Adams, 1852)	ME-EC	1, 3, 4, 6, 8, 11, 15	I–4	M (MA)	■	■	■	CRBMUV 00185, 75212, 85273
<i>Anadara tuberculosa</i> (G.B. Sowerby I, 1833)	ME-PE	1, 2, 3, 4, 6, 10, 14, 15	I	M (MA)	■	■	■	CRBMUV 00187, 85384 INV-MOL 8115
<i>Arca mutabilis</i> (G.B. Sowerby I, 1833)	ME-EC	9	I	R				CRBMUV E4LNG016M
<i>Arca pacifica</i> (G.B. Sowerby I, 1833)	ME-PE		I (TP)	R		■		CRBMUV E4LNG016M
<i>Barbatia alternata</i> (G.B. Sowerby I, 1833)	ME-EC	7	3–5	AH				CRBMUV H2CHI112M
<i>Barbatia illota</i> (G.B. Sowerby I, 1833)	ME-PE	7, 9, 18	I	M-R				CRBMUV 80350, 81077, 85272 INVMO 8048
<i>Barbatia reeveana</i> (d'Orbigny, 1846)	ME-PE	7, 9	I	R				CRBMUV 85268, 85269, 85270, 85271 INVMOL 8157
<i>Lunarca brevivfrons</i> (G.B. Sowerby I, 1833)	ME-PE	8, 10, 15, 17	I	M, S				CRBMUV 76176, 76182, 76183, 76184, 85281
Noetidae								
<i>Arcopsis solida</i> (G.B. Sowerby I, 1833)	US-PE, GI	7, 9	I	R				CRBMUV 80431, 85278, 85279
<i>Noetia reversa</i> (G.B. Sowerby I, 1833)	ME-PE	15, 17	I–5	S				CRBMUV 76185
Pteriidae								
<i>Pinctada mazatlanica</i> (Hanley, 1856)	ME-PE	1, 7, 8, 9, 16, 18	I	M-R, R	■	■	■	CRBMUV 85321, 85322 INV-MOL 8158
<i>Isognomon janus</i> Carpenter, 1857	ME-PE	1, 4, 5, 6, 7, 8, 9, 11, 13, 15, 16, 18,	I	R		■		CRBMUV 80371, 81094, 81600, 85294, 85302, 85303, 85304, 85305, 85307, 85308, 85309, 85310, 85313, 85314, 85315, 85316, 85355, 85600, 86055, 200622 IMCN-B 267, 306 INV-MOL 8038, 8039, 8097
<i>Isognomon recognitus</i> (Mabille, 1895)	ME-CH	4, 5	I	R		■		CRBMUV 86056, 86057
<i>Pteria sterna</i> (Gould, 1851)	ME-PE	8, 9, 18	SW	R		■		CRBMUV 77337, 85291
Pinnidae								
<i>Pinna rugosa</i> G.B. Sowerby I, 1835	US-PE	16, 18	3–5	AH		■	■	CRBMUV H3IPM285M, H3IPM317M, H4LNE001M
Ostreidae								
<i>Crassostrea columbiensis</i> (Hanley, 1846)	ME-CH	1, 3, 4, 5, 6, 7, 8, 11	I	MA (RT)		■	■	CRBMUV 00237, 85323, 85324, 85326, 96268
<i>Saccostrea palmula</i> (Carpenter, 1857)	ME-EC, GI	1, 5, 7, 13, 15, 16	I–7	R		■	■	CRBMUV 80379, 85325, 85327, 85328, 85329, 85333, 85341, 86072

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Striostrea prismatica</i> (Gray, 1825)	ME-PE	1, 3, 4, 5, 6, 7, 8, 9, 11, 13, 15, 16, 17	1–15	AH, R	■	■	CRBMUV 00222, 00224, 00225, 00226, 00227, 00232, 00233, 1874, 84032, 85045, 85331, 85332, 85335, 85336, 85337, 85339, 85342, 85343, 85344, 85345, 85346, 85347, 85348 INVMOL 8053	
Anomiidae								
<i>Anomia peruviana</i> d'Orbigny, 1846	US-PE	6, 18	3–5	C, AH, R			CRBMUV H3LNE232M	
<i>Pododesmus foliatus</i> (Broderip, 1834)	ME-PE	1, 4, 7, 8, 11	I	R (MA)			CRBMUV 80374, 81095, 85318, 85319, 86069	
Pectinidae								
<i>Argopecten ventricosus</i> (G. B. Sowerby II, 1842)	US-PE, GI	7, 14	I-ST	S			CRBMUV 80384 IMCN-B 273 INV-MOL 8142	
<i>Leptopecten tumbesensis</i> (Orbigny, 1846)	ME-PE	7, 15	14–72	R, S			CRBMUV 80384, 80438 IMCN-B 270	
<i>Leptopecten velero</i> (Hertlein, 1935)	ME-PE	5, 7, 8, 9, 16, 18	3–5	AH			CRBMUV 80381, 85352, 86073	
Propeamussiidae								
<i>Cyclopecten cocosensi</i> (Dall, 1908)	CR, PN-CO*	8	ST	M-R, R, S-R			INVMAR <i>et al.</i> 2007	
Spondylidae								
<i>Spondylus limbatus</i> G.B. Sowerby II, 1847	US-EC	18	3–20	R			CRBMUV 2003001	
Limidae								
<i>Lima tetrica</i> Gould, 1851	ME-EC	18	3–5	AH			CRBMUV SASLNE0209C-A1	
<i>Limaria pacifica</i> (d'Orbigny, 1846)	ME-PE, GI	5, 7, 18	I	AH, M-S, R			CRBMUV E1LNE009M, E3LNE028M	
Lucinidae								
<i>Ctena galapagana</i> (Dall, 1901)	ME-EC, GI	18	ST	M-S			CRBMUV (lot in process)	
<i>Parvilucina mazatlanica</i> (Carpenter, 1857)	ME-PE	7	3–5	AH			CRBMUV H2CHI052C	
Carditidae								
<i>Carditamera affinis</i> (G.B. Sowerby I, 1833)	US-PE, GI	4, 6, 7, 8, 9, 11, 13, 15, 16, 17	I	R			CRBMUV 00219, 75230, 75232, 76192, 77371, 79148, 80401, 81105, 85358, 85359, 85360, 85357 IMCN-B 275 INV-MOL 8091, 8118, 8149, 8170, 8171, 8196, 8215	
<i>Carditamera radiata</i> (G.B. Sowerby I, 1833)	SL-EC	15	I	S			CRBMUV H2CHI093M, H2CHI105M	
Crassatellidae								
<i>Crassinella ecuadoriana</i> Olsson, 1961	ME-PE	7, 9, 16, 18	3–5	AH			CRBMUV H2LNE111M, H2LNE166M, H2LNE211M, H3IPM091M, H3IPM325M, H3IPM340M, H3LNG825M	
Cardiidae								
<i>Acrosterigma pristipleura</i> (Dall, 1901)+	ME-EC, GI						INV-MOL 8184	
<i>Americardia biangulata</i> (Broderip & G.B. Sowerby I, 1829)+	US-EC						INV-MOL 8072	
<i>Americardia planicostata</i> (Broderip & G.B. Sowerby I, 1833)	ME-PE	7, 16	I	M-S, S			CRBMUV 85361, 2000221	
<i>Apiocardia obovalis</i> (G.B. Sowerby I in Broderip & Sowerby I, 1833)	ME-PE	15	I	S			CRBMUV 00250	
<i>Dallocardia senticosa</i> (G.B. Sowerby I, 1833)	ME-PE	7, 14, 17	SW	M			CRBMUV 00258, 80407 INV-MOL 8081, 8206, 32526	
<i>Laevicardium clarionense</i> (Hertlein & Strong, 1947)	ME-EC	7	I	R, S			CRBMUV 80406	
<i>Laevicardium substriatum</i> (Conrad, 1837)	US-PE	7	I	M-R-S			CRBMUV 80443, 80446	
<i>Papyridea aspersa</i> (G.B. Sowerby I, 1833)+	ME-PE						INV-MOL 8141, 8172, 8212	
<i>Trachycardium procerum</i> (G.B. Sowerby I, 1833)	ME-CH	14, 16, 17	I	M-S	■		CRBMUV 00220, 00261	
<i>Trigoniocardia granifera</i> (Broderip & G.B. Sowerby I, 1829)	ME-PE	7, 14	I	M-S			CRBMUV 80387, 80402, 80439	
Chamidae								
<i>Arcinella</i> sp.		7	3–5	AH			CRBMUV SASCHI0609E-A	
<i>Chama frondosa</i> Broderip, 1835	US-EC, GI	7, 18	I-SW	R			CRBMUV 89391	
<i>Pseudochama corrugata</i> (Broderip, 1835)	ME-PE	7, 16, 18		R			INVMAR <i>et al.</i> 2007	
<i>Pseudochama janus</i> (Reeve, 1847)	ME-EC, GI	18	3–5	AH			CRBMUV H3LNE159M	
<i>Pseudochama panamensis</i> (Reeve, 1847)	ME-CO*	16	I	R			CRBMUV 2001001	

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
Cyrenidae								
<i>Polymesoda inflata</i> (Philippi, 1851)	ME-PE	1, 3, 4	I	S, R (MA)	ER	■		INVEMAR <i>et al.</i> 2007
Galeommatidae								
<i>Scintilla dubia</i> (Deshayes, 1856)	ME-EC							CRBMUV 84390
MACTRIDAE								
<i>Macra</i> sp.		7	3–5	AH				CRBMUV H2CHI031M
<i>Mactrotoma californica</i> (Conrad, 1837)	US-EC	7	I	M-S		■		CRBMUV 81142
<i>Mactrotoma isthmica</i> (Pilsbry & Lowe, 1932)	NI-PN	4, 7	I	M-R, R				CRBMUV E1ARPO56M
<i>Mactrellona exoleta</i> (Gray, 1837)	ME-CH	15						CRBMUV 76237
<i>Mactrellona subalata</i> (Mörch, 1861)	ME-PE	17	I	S				CRBMUV (lot in process)
<i>Mulinia pallida</i> (Broderip & G.B. Sowerby I, 1829)	ME-PE							INVEMAR <i>et al.</i> 2007
Tellinidae								
<i>Macoma lamproleuca</i> (Pilsbry & Lowe, 1932)	ME-EC	15						CRBMUV 00338
<i>Psammotreta asthenodon</i> (Pilsbry & Lowe, 1932)+	SL-PE	14	I	M-S (MA)				CRBMUV (lot in process)
<i>Psammotreta dombei</i> (Hanley, 1844)	PN-PE		I	S				INVEMAR <i>et al.</i> 2007
<i>Strigilla chroma</i> Salisbury, 1934	ME-EC	15, 17	I	S				CRBMUV 75256 INV-MOL 8049
<i>Strigilla dichotoma</i> (Philippi, 1846)	ME-EC	14	I	M, S				INVEMAR <i>et al.</i> 2007
<i>Strigilla disjuncta</i> (Carpenter, 1856)	US-PE	14	I	S				CRBMUV 00344 IMCN-B 262 INV-MOL 8089
<i>Tellidora burneti</i> (Broderip & G.B. Sowerby I, 1829)	ME-EC	14	10–15	S				CRBMUV 89399
<i>Tellina purpurea</i> (Broderip & G.B. Sowerby I, 1829)	ME-EC	14	I	S				CRBMUV 77445
<i>Temnoconcha cognata</i> (C.B. Adams, 1852)	ME-EC	17	I	S				IMCN-B 269
Donacidae								
<i>Donax asper</i> Hanley, 1845	ME-PE	15	I	S	ER	■	■	CRBMUV 76215 SBMNH 348475
<i>Donax assimilis</i> Hanley, 1845	ME-PE	8, 14, 15	I	M-S, S				CRBMUV 77425 IMCN-B 298
<i>Donax californicus</i> Conrad, 1837	US-PE	14	I	S	ER	■	■	INVEMAR <i>et al.</i> 2007
<i>Donax carinatus</i> Hanley, 1843	ME-EC, GI	14, 17	I	S	ER	■		CRBMUV 74015, 76218 IMCN-B 305 INV-MOL 8055, 8219
<i>Donax dentifer</i> Hanley, 1843	NI-PE	14, 15	I	S	ER	■	■	SBMNH 348476
<i>Donax ecuadorianus</i> Olsson, 1961	PN-EC	14, 15	I	S	ER	■	■	CRBMUV 75249, 76231 SBMNH 348471, 348472
<i>Donax gracilis</i> Hanley, 1845	US-PE	14	I	S	ER	■		CRBMUV 80430
<i>Donax transversus</i> G.B. Sowerby I, 1825	ME-EC	15	I	S				CRBMUV 76227
Psammobiidae								
<i>Psammotella bertini</i> (Pilsbry & Lowe, 1932)	ME-PE	14, 15	I	S				CRBMUV 76234
<i>Sanguinolaria tellinoides</i> A. Adams, 1850	ME-EC	14, 15	I	S				CRBMUV SF006 IMCN-B 299 INV-MOL 8100
Semelidae								
<i>Abra tepocana</i> Dall, 1915	ME, CR, CO*							UNIVALLE and INVEMAR
<i>Cumingia lamellosa</i> G.B. Sowerby I, 1833	US-PE	4, 5, 7, 9	I–2	M-R, R				CRBMUV 85392, 85393, 86100, 86101, 86102
<i>Semele pallida</i> (G.B. Sowerby I, 1833)	ME-EC	7, 18	3–5	AH				CRBMUV H2CHI102M, H2CHI151M, H2CHI157M, H2CHI168M, H3LNE063M, H3LNE207M
Solecurtidae								
<i>Solecurtus broggi</i> Pilsbry & Olsson, 1941	PN-PE	14		M-S				INVEMAR <i>et al.</i> 2007
<i>Tagelus affinis</i> (C. B. Adams, 1852)	US-PE	5, 6, 14	I	M				CRBMUV 81153
<i>Tagelus longisinuatus</i> Pilsbry & Lowe, 1932+	ME, CO*	14	I	S				CRBMUV (lot in process)
<i>Tagelus peruanus</i> (Dunker, 1862)	ME-PE	1	ST	M-S, M-R		■		CRBMUV 85400
Ungulinidae								
<i>Diplodonta sericata</i> (Reeve, 1850)	ME-PE	7	I	M-R				CRBMUV 81190
<i>Diplodonta subquadrata</i> Carpenter, 1856	US-PE, GI	1, 4	I	M-R				CRBMUV 85411, 86108
Veneridae								
<i>Chione subimbricata</i> (G.B. Sowerby I, 1835)	ME-PE	16	I	M-S, R, S				CRBMUV 2000224 INV-MOL 32554, 32569
<i>Chionopsis amathusia</i> (Philippi, 1844)	ME-PE	14, 15	I	M-S				CRBMUV 00290, 76210, 76212
<i>Chionopsis ornatisissima</i> (Broderip & G.B. Sowerby I, 1835)	PN-EC	15		S				CRBMUV 00283, 00289, 00291
<i>Cyclinella jadisi</i> Olsson, 1961	ME-EC	14	ST	M-S				INVEMAR <i>et al.</i> 2007

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Dosinia dunkeri</i> (Philippi, 1844)	ME-PE	7, 14	ST	M, S	■			CRBMUV 81157 INV-MOL 8041
<i>Hysteroconcha brevispinosa</i> (G.B. Sowerby II, 1851)	ME-EC	15, 17	I	S				CRBMUV 76196, 77385 IMCN-B 301 INV-MOL 8037
<i>Hysteroconcha lupanaria</i> (Lesson, 1831)	ME-PE	15, 17	I	S				CRBMUV 00314, 76193, 76195
<i>Hysteroconcha rosea</i> (Broderip & G.B. Sowerby I, 1829)	ME-EC	15	I	R, S				CRBMUV 76197, 77397
<i>Illochione subrugosa</i> (Wood, 1828)	ME-PE	1, 4, 5, 6, 7, 10, 11, 15	I-ST	M-R, R-S	ER	■	■	CRBMUV 00284, 00287, 76213, 77412, 80420, 80421, 80422, 81112, 85368, 85369, 85370, 85371, 85372, 85373, 85374, 85375, 96204
<i>Lamelliconcha unicolor</i> (G.B. Sowerby I, 1835)	ME-PE	7, 15, 17	I	M-S, S		■		CRBMUV 00272, 96198, 96217, 96218
<i>Lamelliconcha concinna</i> (G.B. Sowerby I, 1835)	ME-PE	11	I (TP)	M-R, S				CRBMUV 81128
<i>Lamelliconcha paytensis</i> Orbigny, 1845	ME-PE	7	3–5	AH				CRBMUV 8153, 96211
<i>Lamelliconcha vinacea</i> Olsson, 1961	ME-EC	14		S				CRBMUV 76200, 86086, 96220 IMCN-B 271 INV-MOL 8096
<i>Leukoma asperrima</i> (G.B. Sowerby I, 1835)	ME-CH	1, 3, 4, 5, 6, 7, 11	I	M (MA)		■	■	CRBMUV 80700, 85365, 86067, 86083, 86366, 96222
<i>Leukoma ecuadoriana</i> (Olsson, 1961)	SL-PE	1, 3, 5, 7, 11	I	M-R				CRBMUV 80440, 86095
<i>Leukoma grata</i> (Say, 1831)+	US-CH	1, 3, 4, 6, 7	I	M (MA), M-R		■	■	CRBMUV 80322
<i>Leukoma metodon</i> (Pilsbry & Lowe, 1932)	ME-PE	7, 14	ST	M-S				CRBMUV 00319
<i>Megapitaria aurantiaca</i> (G.B. Sowerby I, 1831)+	ME-EC	6, 7, 9, 16	ST	R, S		■		CRBMUV 00217, 75244, 75254, 81110 INV-MOL 8065
<i>Megapitaria squalida</i> (G.B. Sowerby I, 1835)	US-PE		I	R		■		INVMAR <i>et al.</i> 2007
<i>Paphonotia aff. elliptica</i> (G.B. Sowerby I, 1834)	ME-CH	7	3–5	AH				CRBMUV SASCHI0409E-B
<i>Petricola aff. insignis</i> (Deshayes, 1854)+	ME-EC	4, 5	I	M				CRBMUV 86078
<i>Petricola botula</i> Olsson, 1961	ME-EC	5	I	M-R				CRBMUV 86109
<i>Petricola concinna</i> G.B. Sowerby I, 1834 +	NI-PE, GI	7	I	R				CRBMUV 81128
<i>Petricola denticulata</i> G.B. Sowerby I, 1834	US-PE, GI	5, 7, 11, 13, 14, 15, 16, 17	I	R				CRBMUV 76236, 80389, 80414, 81108, 85413, 86075, 86111, SF00 IMCN-B 308
<i>Petricola exarata</i> (Carpenter, 1857)	ME-PE	4, 5, 7, 9, 18	I	R				CRBMUV 86076
<i>Petricola olssoni</i> F. R. Bernard, 1983	PN-PE	1, 5, 15	I	R				CRBMUV 85414
<i>Petricolaria cognata</i> (C.B. Adams, 1852)	ME-PE		I	R				INVMAR <i>et al.</i> 2007
<i>Pitar consanguineus</i> (C.B. Adams, 1852)	ME-PE	7	I	M-S				CRBMUV 80370
<i>Tivela argentina</i> (Broderip & G.B. Sowerby I, 1835)+	ME-EC	7, 15	5–11	M-S, S				CRBMUV 76205
<i>Tivela byronensis</i> (Gray, 1838)+	US-EC	15	I-ST	S		■		CRBMUV 76203 INV-MOL 8127
<i>Tivela hindsii</i> (Hanley, 1844)	ME-EC	15	I	S				CRBMUV 76204
<i>Tivela planulata</i> (Broderip & G.B. Sowerby I, 1830) + MYIDAE	ME-PE, GI	15, 17	I	S		■		CRBMUV 76207
<i>Sphenia fragilis</i> (H. Adams & A. Adams, 1854)	US-PE	4, 5, 7, 9, 16, 18	I	M-R, R				CRBMUV 85394, 85395.1, 85401, 86103
Corbulidae								
<i>Caryocorbula amethystina</i> (Olsson, 1961)	ME-EC	5	I	M-R				CRBMUV 86087
<i>Caryocorbula biradiata</i> (G.B. Sowerby I, 1833)	ME-PE	4, 5, 7, 9, 11	I	M (MA), R				CRBMUV 80246, 81117, 81118, 85381, 860861
<i>Caryocorbula nasuta</i> (G.B. Sowerby I, 1833)	ME-PE	7, 9	I–5	AH, M, M-S				CRBMUV H2CHI008M
<i>Caryocorbula ovulata</i> (G.B. Sowerby I, 1833)	ME-PE	5, 14, 15, 17	I	M (MA), R				CRBMUV 00295, 00299, 76214, 86091 IMCN-B 272
<i>Caryocorbula porcella</i> (Dall, 1916)	US-EC	7	ST	M-S				CRBMUV 80323
<i>Juliacorbula bicarinata</i> (G.B. Sowerby I, 1833)	ME-EC	3, 4, 5, 7, 9, 16, 18	I	AH, M (MA), R, R-S				CRBMUV 81116, 85378, 85380, 85382, 85383, 86090, 80426, 81117, 85381, 86086.1
<i>Panamicorbula ventricosa</i> (A. Adams & Reeve, 1850)	ME-PE	2, 5	I	M, M-R, M-S				CRBMUV 86089 IMCN-B 260
Pholadidae								
<i>Barnea subtruncata</i> (G.B. Sowerby I, 1834)	US-PE			DW (MA)				Cantera 2010

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Cyrtopleura crucigera</i> (G.B. Sowerby I, 1834)	US-PE	1, 5, 11, 14, 16	I	R				CRBMUV 80458, 81151, 81152, 85403, 85405, 86105, 86106 IMCN-B 261
<i>Jounanetia pectinata</i> (Conrad, 1849)	ME-PE	7, 16	I	R				CRBMUV 2003002, 2006028
<i>Martesia striata</i> (Linnaeus, 1758)	US-CH	1, 3, 7, 10		DW (MA)				CRBMUV 85397
<i>Parapholas calva</i> (G.B. Sowerby I, 1834)	US-EC	7	3–5	AH				CRBMUV SASCHIO409C-B
<i>Pholadidea melanura</i> (G.B. Sowerby I, 1834)	ME-EC	16	I	R				INVEMAR <i>et al.</i> 2007
<i>Pholadidea quadra</i> (G.B. Sowerby I, 1834)	PN-EC	16	I	R				INVEMAR <i>et al.</i> 2007
<i>Pholadidea tubifera</i> (G.B. Sowerby I, 1834)	US-EC	5, 7, 14, 15, 16, 17	I	R				CRBMUV E3IPM006M, E3CHIO52aM
<i>Pholas chiloensis</i> Molina, 1782	ME-CH	5, 10, 11, 14, 16	I	R, DW (MA)	■			CRBMUV 85402, 85404, 85405, 86104, 96269
Teredinidae								
<i>Bankia destructa</i> Clench & Turner, 1946	HO-EC							Cantera 2010
<i>Bankia</i> sp.		5, 7, 18	3–5	AH				CRBMUV SASMAY0209E-A, SASLNE0409E-D, SASCHIO409E-D, SASMAY0409C-C
<i>Lyrodus pedicellatus</i> (Quatrefages, 1849)	US-PE			W				Cantera 2010
<i>Nausitora dryas</i> (Dall, 1909)	ME-PE			W				Cantera 2010
<i>Nausitora excolpa</i> (Bartsch, 1922)	ME-EC			W				Cantera 2010
<i>Teredo bartschi</i> Clapp, 1923	US-EC			W				Cantera 2010
<i>Teredo furcifera</i> Martens, 1894	US-EC			W				Cantera 2010
Hiatellidae								
<i>Hiatella arctica</i> (Linnaeus, 1767)	ARC-CH	11	I	R				CRBMUV 85396
Pharidae								
<i>Ensis californicus</i> Dall, 1899	US-PE	5	I	M-R				CRBMUV 86048
Periplomatidae								
<i>Periploma</i> aff. <i>lenticulare</i> G.B. Sowerby I, 1834	PN-EC	7	3–5	AH				CRBMUV H2CHI109M
<i>Periploma planiusculum</i> G.B. Sowerby I, 1834	US-PE	15						CRBMUV 76241, 76242
GASTROPODA								
Lottiidae								
<i>Lottia filosa</i> (Carpenter, 1865)	SL-CO, GI	11, 15, 16	LT	R				CRBMUV 96227, 2001002
<i>Lottia mesoleuca</i> (Menke, 1851)	US-PE	8, 13, 14, 15, 16, 17	I	R				CRBMUV 75009, 77013, 77015, 79004, 85024, 85025, 85027, 85028, 86001, 96228, 2002202
<i>Lottia subrotundata</i> (Carpenter, 1865)	SL-CO*	15	I	R				CRBMUV 86052
<i>Notoacmea biradiata</i> (Reeve, 1855)	ME-EC	16	I	R				CRBMUV 96226, 2001001
Fissurellidae								
<i>Diodora digueti</i> (Mabille, 1895)	ME-EC	7, 9	I	R				CRBMUV 85029, 85030
<i>Diodora inaequalis</i> (G.B. Sowerby I, 1835)	US-EC, GI	1, 3, 5, 7, 9, 18	I–5	R				CRBMUV 80001, 81001, 85010, 85011, 85012, 85013, 85015 INV-MOL 8070
<i>Diodora saturnalis</i> (Carpenter, 1864)	ME-EC, GI	1, 7, 8, 9, 11, 15, 16, 17, 18	I–5	R				CRBMUV 75002, 75004, 77001, 80002, 80003, 85016, 85017, 85018, 85020, 85021, 86024, 86025
<i>Fissurella microtrema</i> G.B. Sowerby I, 1835	ME-PE, CI, GI	7, 18	I	R				CRBMUV 77002, 80007 INV-MOL 8145, 8163
<i>Fissurella virescens</i> G.B. Sowerby I, 1835	ME-CH	7, 8, 9, 15, 16, 18	I–5	R		■		CRBMUV 75006, 77004, 77006, 78005, 79001, 79002 INV-MOL 8188
Calliostomidae								
<i>Calliostoma</i> aff. <i>leanum</i> (C.B. Adams, 1852)	ME-EC, GI	16	3–5	AH				CRBMUV H2IPM101M, H2IPM129M, H2IPM159M, H2IPM170M
<i>Calliostoma</i> aff. <i>sanjaimense</i> Mc Lean, 1970	ME, CR, CO*	5, 7, 16, 18	I–5	AH				CRBMUV E3LNE011aM, H3IPM176M
Turbinidae								
<i>Turbo saxosus</i> Wood, 1828	US-CH	7, 16, 18	LT-ST	R		■		CRBMUV 2004005
<i>Uvanilla babelis</i> (P. Fischer, 1874)	US-EC	18	LT	R				CRBMUV (lot in process)
<i>Uvanilla buschii</i> (Philippi, 1844)	US-PE	15	LT	R				CRBMUV 75018
<i>Uvanilla unguis</i> (W. Wood, 1828)	ME-EC	15	I	R				CRBMUV 74002

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
Areneidae								
<i>Arene</i> sp.		18	3–5	AH				CRBMUV H2LNE104M, H2LNE155M, H2LNE-183aM, H3LNE704M
Tegulidae								
<i>Tegula panamensis</i> (Philippi, 1849)	ME-PE	18	I	R				CRBMUV E2LNE010M, E3LNE011bM, E1LNE017M, E2LNE033M
<i>Tegula verrucosa</i> McLean, 1970	ME-PE	13, 15	I	R				CRBMUV 77032, 79011
Liotiidae								
<i>Macrarena</i> cf. <i>lepidoptera</i> McLean, 1970	ME, CO*	7, 9, 16, 18	3–5	AH				CRBMUV H3LNG063M, H3LNG066M, H2CHI087M, H2CHI167M, H3IPM309M, H3LNG017M
Phasianellidae								
<i>Tricola</i> aff. <i>perforata</i> (Philippi, 1848)	ME-CH	18	3–5	AH				CRBMUV H2LNE143M, H2LNE145M, H2LNE183M, H2LNE213M, H3LNE717M, H2LNE122M
Neritidae								
<i>Nerita funiculata</i> Menke, 1851	US-PE	1, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 18	I	R				CRBMUV 75024, 77046 INV-MOL 8126
<i>Nerita scabricosta</i> Lamarck, 1822	ME-EC	4, 6, 9, 14, 16	I	R				CRBMUV 75020, 85030
<i>Neritina latissima</i> Broderip, 1833	ME-EC	14, 15						INVMAR <i>et al.</i> 2007
<i>Theodoxus luteofasciatus</i> Miller, 1879	ME-PE	1, 3, 4, 6, 7, 9, 11, 13, 16, 18	I–5	AH, M, R				CRBMUV 86020
Cerithiidae								
<i>Alabina</i> sp.		5	3–5	AH				CRBMUV H2MAY138M, H2MAY155M
<i>Bittium peruvianum</i> (d'Orbigny 1840)	CO*, PE, CH	7	3–5	AH				CRBMUV H2CHI096M
<i>Cerithium adustum</i> Kiener, 1841	US-EC, GI	18	I	M-R, S				CRBMUV E1LNG068M INV-MOL 8164
<i>Cerithium maculosum</i> Kiener, 1841+	ME-CO*, GI							INV-MOL 8179, 8180
<i>Cerithium stercusmuscarum</i> Valenciennes, 1833	ME (BC)-PE	1, 3, 4, 5, 6, 7, 11	I	M, R, S				CRBMUV 75046, 85101, 85102, 85103, 85104, 85105, 85106, 85107, 85109, 85110, 85111, 85112, 85113, 85116, 85117 INV-MOL 8195
<i>Cerithium uncinatum</i> (Gmelin, 1791)	ME-EC	1, 16	I	LTM				INVMAR <i>et al.</i> 2007
Modulidae								
<i>Modulus catenulatus</i> (Philippi, 1849)	ME-PE	1, 5, 6	I	M-R				CRBMUV 75040, 80075, 85094, 85095, 85096, 86011, 86012
<i>Modulus disculus</i> (Philippi, 1846)+	ME-CO*, GI							INV-MOL 8204
Planaxidae								
<i>Fossarus porcatus</i> (Philippi, 1845)	CO*, GI	1, 9, 17, 18	I	R				CRBMUV 85123
<i>Planaxis planicostatus</i> G.B. Sowerby I, 1825	ME-PE, GI	13, 14, 15	I	R				CRBMUV 79042
Potamididae								
<i>Cerithidea mazatlanica</i> Carpenter, 1857	US-EC	1, 4, 5, 6	I	M-S (MA)				CRBMUV 85118, 85119, 86016, 86017 IMCN-G 263 INV-MOL 8093
<i>Cerithidea pulchra</i> (C.B. Adams, 1852)	US-EC	3, 4, 6, 7, 10, 17	I	M-S (MA)				CRBMUV 85120, 85121, 85122, 86018 IMCN-G 292 INV-MOL 8104
<i>Cerithidea valida</i> (C.B. Adams, 1852)	ME-PE	6		M				INVMAR <i>et al.</i> 2007
Turritellidae								
<i>Turritella leucostoma</i> Valenciennes, 1832+	US-PE	14	ST	S				IMCN-G 286 INV-MOL 8060, 8218
<i>Turritella nodulosa</i> King & Broderip, 1832	US-CH	8, 14, 15	ST	R-S				CRBMUV 77058, 77059, 80068
<i>Turritella rubescens</i> Reeve, 1849	US-PE	7, 13	ST	R-S				CRBMUV 79031
<i>Vermicularia pellucida</i> (Broderip & G.B. Sowerby I, 1829)	US-EC	1, 6, 7, 9, 11, 13, 18	I–5	AH, R				CRBMUV 79033, 80074, 80078, 80080, 81008, 81009, 84007, 85088, 85090, 85091, 85092, 85093, 86013, 86014 INV-MOL 8185, 8207

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
Calyptraeidae								
<i>Bostrycapulus aculeatus</i> (Gmelin, 1791)	US-PE	1, 4, 5, 6, 7, 9, 15, 16, 18	I-5	AH, R		■		CRBMUV 75057, 75058, 75059, 75060, 75061, 77107, 80106, 80107, 81011, 85133, 85134, 2004006 IMCN-G 278 INV-MOL 8063, 8088, 8167
<i>Calyptraea mamillaris</i> Broderip, 1834+	CA-PE	5, 7	I	M-S, R				CRBMUV 80102
<i>Crepidula arenata</i> (Broderip, 1834)	ME-CH	1, 3, 4, 5, 6, 7, 8, 10, 11	I	M-S				CRBMUV 85135, 85136, 85137, 85138, 85140, 85141, 85142, 85143, 85145, 85146, 85147, 85148, 85149, 85150, 85151, 85152, 85154, 86021, 86022 IMCN-G 276
<i>Crepidula cf. marginalis</i> (Broderip, 1834)	SL-PE	4	I	R (MA)				CRBMUV H3ARP122M
<i>Crepidula excavata</i> (Broderip, 1834)	CA-PE	1, 5, 6, 7, 11	I-5	AH, R		■		CRBMUV 85155, 85156
<i>Crepidula incurva</i> (Broderip, 1834)	CA-PE	6	I	C				INVEMAR <i>et al.</i> 2007
<i>Crepidula lessonii</i> (Broderip, 1834)	ME-PE	1, 5, 6, 7	I-5	AH, R				CRBMUV 80108, 80109, 85156
<i>Crepidula striolata</i> Menke, 1851	US-CH	4, 5, 7	I-5	AH, R				CRBMUV H2MAY031M, H2MAY066M, H3ARP133M, E1ARP001M, E1ARP050M, E3ARP005M, E3ARP009M, E3MAY306M
<i>Crucibulum monticulus</i> Berry, 1969	ME-EC	7, 9	I-5	AH, R				CRBMUV 84009
<i>Crucibulum personatum</i> Keen, 1958	ME-CO*	5, 7, 9, 16	I-5	AH, R				CRBMUV 80110, 80111, 85157, 85158, 85159, 85160, 86023
<i>Crucibulum scutellatum</i> (Wood, 1828)+	ME-CH, GI							INV-MOL 8154
<i>Crucibulum spinosum</i> (G. B. Sowerby I, 1824)	US-CH	7, 16	I-5	AH, R				CRBMUV 00028, 85161, 85162, 85163 INV-MOL 8071, 8205
Cypraeidae								
<i>Macrocypraea cervinetta</i> (Kiener, 1843)	ME-PE, GI	7, 9, 16, 18	I-5	AH, R		■		CRBMUV 00038, 00040, 75082, 75083, 75084, 80154, 81025, 84010
<i>Pseudozonaria arabicula</i> (Lamarck, 1811)	ME-CHI, GI	7, 9, 18	I-5	AH, R		■		CRBMUV H2LNE101M, H2LNE170M, H3LNE411M INV-MOL 8169
<i>Pseudozonaria robertsi</i> (Hidalgo, 1906)	ME-PE, GI	6, 7, 8, 9, 12, 15, 16, 17, 18	I-5	AH, R		■		CRBMUV 00043, 81026, 85170, 85171, 75088, 2004002, 2006021 IMCN-G 284 INV-MOL 8155, 8213
Ovulidae								
<i>Phenacovolva brevirostris</i> (Schumacher, 1817)	CO	7, 16	5-25	SC		ER		UNIVALLE and INVEMAR 2013
<i>Simnia avena</i> (G.B. Sowerby II, 1832)	ME-PE	9	5	SC				CRBMUV 81027
<i>Simnialena rufa</i> (G.B. Sowerby II, 1832)	US-EC	7, 8, 9, 12	5	SC				CRBMUV 81029, 81030, 81031, 81032, 81033, 81034, 81035, 81036, 81038, 81039, 85172, 85173, 85174
Ficidae								
<i>Ficus ventricosa</i> (G. B. Sowerby I, 1825)	US-PE	17	ST	S				INV-MOL 8125, 8192
LITTORINIDAE								
<i>Echinolittorina conspersa</i> (Philippi, 1847)	ME-EC, CI, GI	9, 15, 16, 18	I	R				CRBMUV 2011130-BC, 2011688-BC COD Barcoding
<i>Littoraria aff. aberrans</i> (Philippi, 1846)	CR-CO	1, 4, 6, 7, 8, 15	I	LTM				CRBMUV 85087, 86006, 86007, 86008, 86009
<i>Littoraria varia</i> (G.B. Sowerby I, 1832)	ME-EC, GI	1, 4, 5, 6, 7, 8, 11, 14, 15	I	R (MA)		ER	■	CRBMUV 85052, 85053, 85054, 85055, 85056, 85057, 85058, 85059, 85061, 85062, 85063, 85064, 85065, 85066, 85074, 85083 IMCN-G 256
<i>Littoraria variegata</i> Souleyet in Eydoux & Souleyet, 1852	ME-EC	1, 5, 6, 7, 8, 11, 14, 15	I	LRM		ER	■	CRBMUV 75028, 85044, 85045, 85046, 85047, 85048, 85049, 85050 IMCN-G 258

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Littoraria zebra</i> (Donovan, 1825)	US-PE	1, 5, 6, 7, 8, 10, 11, 14, 15	I	RTM, R (MA)	ER	■		CRBMUV 75033, 77054, 81005, 85067, 85068, 85069, 85070, 85071, 85073, 85075, 85076, 85077, 85078, 85079, 85080, 85081, 85084, 85085, 85086, 96229
Naticidae								
<i>Mammilla caprae</i> (Philippi, 1852)	ME-PE, GI	7, 8, 14	I-10	M-R-S				CRBMUV 00034, 77126, 80130
<i>Natica broderipiana</i> Récluz, 1844	ME-PE	8, 11, 14, 15	I	M-R		■		CRBMUV 00033, 77123, 80126, 85168
<i>Natica chemnitzii</i> L. Pfeiffer, 1840	US-PE, GI	8, 15	I-5	AH, M		■		CRBMUV 00029, 77119 INV-MOL 8086
<i>Natica unifasciata</i> Lamarck, 1822	ME-PE	1, 4, 5, 6, 7, 8, 11, 13, 14, 17	I-5	AH, M-R, S		■		CRBMUV 00030, 00031, 75069, 77120, 80122, 81017, 85164, 85165, 85167 IMCN-259
<i>Polinices panamaensis</i> (Récluz, 1844) + <i>Polinices uber</i> (Valenciennes, 1832)+ <i>Stigmaulax elenae</i> (Récluz, 1844)	CR-PE US-CH, GI ME-EC	11, 14 5, 14	I I	M-R M-R				CRBMUV 80139 INV-MOL 8208 CRBMUV 80127
Rissoiidae								
<i>Lapsigyrus mutans</i> (Carpenter, 1857)	ME, CO*	7	3-5	AH				CRBMUV H2CHI113M
<i>Rissoina effusa</i> (Mörch, 1860)	ME-CO*	7, 9	3-5	AH				CRBMUV H2CHI108M, H2CHI136M, H2LNG174M, H3LNG019M
Barleeiidae								
<i>Barleeia</i> sp.		4	I					CRBMUV E1ARP039M
CAECIDAE								
<i>Caecum (Elephantulum)</i> sp.		7, 18	3-5	AH				CRBMUV SASLNE1108E-A, SASLNE1108E-B, SASCHIO209C-C, SASLNE0209E-A, SASLNE0209C-B, SASLNE0209C-C, SASLNE0209E-D
<i>Caecum (Fartulum)</i> sp.		18	3-5	AH				CRBMUV E2CHI145M, H3LNG001M, H3LNG822M
<i>Caecum clathratum</i> Carpenter, 1857	ME-CO*	14	I	M-R				CRBMUV E2CHIO16M, H2CHIO97M, H2CHIO94M, H2CHI114M, H3LNG22cM
Tornidae								
<i>Cyclostremiscus</i> aff. <i>panamensis</i> (C.B. Adams, 1852)	ME-CO*	7, 9, 18	3-5	AH				CRBMUV E1LNG092M, E1LNG109M, H3LNE438M, H3LNG006bM
Strombidae								
<i>Lobatus galeatus</i> (Swainson, 1823)	ME-EC	9, 18	LT (TP)	R, R-S	■	■	■	INVEMAR <i>et al.</i> 2007
<i>Lobatus peruvianus</i> (Swainson, 1823)	ME-PE	7, 8, 9	LT (TP)	M-R, R		■	■	INVEMAR <i>et al.</i> 2007
Tonnidae								
<i>Malea ringens</i> (Swainson, 1822)	US-PE, GI	7, 14	I	M-R-S		■	■	CRBMUV 00052, 74011, 80161
Cassidae								
<i>Semicassis centiquadrata</i> (Valenciennes, 1832)	US-CH	6	SW	S		■		CRBMUV 00058
Bursidae								
<i>Bursa corrugata</i> (Perry, 1811)	ME-PE, GI	7, 9, 13, 16, 18	I-5	AH, M-R				CRBMUV 75113, 80180, 80181, 80182, 85174, 86026 INV-MOL 8159, 8214
Personidae								
<i>Distorsio constricta</i> (Broderip, 1833)	ME-EC							INVEMAR <i>et al.</i> 2007
<i>Distorsio decussata</i> (Valenciennes, 1832)+	ME-EC	17	ST	R		■		CRBMUV (lot in process)
Ranellidae								
<i>Monoplex pilearis</i> (Linnaeus, 1758)	US-EC, GI	7	I	R				CRBMUV 75104
<i>Monoplex vestitus</i> (Hinds, 1844)	ME-CO*, GI	7	I	M-R, R				CRBMUV 75105
<i>Monoplex wiegmanni</i> (Anton, 1839)	ME-PE, GI	15	I	M-R				CRBMUV 75102, 76081, 77143
<i>Turritriton gibbosus</i> (Broderip, 1833)	ME-PE, GI	6	LT	R				CRBMUV 78150
Vanikoridae								
<i>Vanikoro</i> sp.		16	I	R				CRBMUV E1IPM006M

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
Hipponicidae								
<i>Cheilea cepacea</i> (Broderip, 1834)	ME-CH	7	I	M-R-S				CRBMUV 80104, 80105 INV-MOL 8074
<i>Cheilea corrugata</i> (Broderip, 1834)+	ME-PE, GI							INV-MOL 8084, 8123
<i>Hipponix grayanus</i> Menke, 1853	ME-PE, GI	3, 5, 7, 18	I	R				CRBMUV E3LNE018aM INV-MOL 8064, 8065
<i>Hipponix panamensis</i> C.B. Adams, 1852	ME-PE, GI	4, 7	I	R				CRBMUV E2ARP038M, E2ARP061M, INV-MOL 8175
<i>Pilosabia trigona</i> (Gmelin, 1791)	US-EC	18	3–5	AH				CRBMUV H2LNE016M
Triviidae								
<i>Erato panamensis</i> Carpenter, 1856	PN-CO*	7, 9	3–5	AH				CRBMUV H2CHI083M
<i>Hesperato</i> aff. <i>galapagensis</i> Schilder, 1933	CO*, GI	7, 9	3–5	AH				CRBMUV H4CHI326M, H4CHI345M, H4LNG080M
<i>Hesperato</i> aff. <i>columbella</i> (Menke, 1847)	US-EC	7, 9	1–5	AH				CRBMUV E2LNG033M, H3CHI007M, H3CHI317M
<i>Hesperato</i> <i>scabriuscula</i> (G.B. Sowerby II, 1832)	ME-EC	7	3–5	AH				CRBMUV SASCHI1108C-A
<i>Niveria pacifica</i> (G.B. Sowerby I, 1832)	ME-EC, GI	7, 18	1–5	AH				CRBMUV 80144
<i>Pusula radians</i> (Lamarck, 1810)+	ME-PE	15	I	R				CRBMUV 78112
<i>Pusula solandri</i> (G.B. Sowerby I, 1832)	US-PE	15	I	R				CRBMUV 78114
<i>Trivia</i> sp.		7	3–5	AH				INVEMAR <i>et al.</i> 2007
Vermetidae								
<i>Petalochonchus complicatus</i> Dall, 1908	US-CO*	1, 5, 7, 8, 15	I-ST	M-R-S (MA)				CRBMUV 85098, 85099, 85100, 86015
<i>Petalochonchus innumerabilis</i> Pilsbry & Olsson, 1935	ME-PE	15	I	M-R (MA)				CRBMUV 00006
<i>Tripsyca</i> sp.		15	I	M-R				INVEMAR <i>et al.</i> 2007
<i>Vermetus</i> sp.		7, 9	1–5	AH, R				CRBMUV E3CHI068M, H3IPM260M
Epitoniidae								
<i>Alora gouldii</i> (A. Adams, 1857)	ME-CO*	9	I	M-R-S				CRBMUV E1LNG069M
<i>Epitonium</i> aff. <i>acapulcanum</i> Dall, 1917	ME, PN, CO*	7	3–5	AH				CRBMUV SASCHI0409C-C
<i>Epitonium gradatum</i> (G. B. Sowerby I, 1844)+	ME-EC	15		S				CRBMUV 76164
Eulimidae								
<i>Balcis</i> sp.		5	I	MA				CRBMUV E1MAY012M
Triphoridae								
<i>Triphora</i> aff. <i>hannai</i> Baker, 1926	ME, CO*, GI	4, 5, 7, 9, 16, 18	3–5	AH				CRBMUV H2MAY154M, H2MAY170M, H2MAY197M, H2MAY198M, H2MAY226M, H2ARP255M, H3IPM066aM, H3IPM093M, H3IPM290M, H2IPM168M, H2IPM169M, H2IPM177M, H3LNG068M, H3IPM313M, H3IPM314M, H3IPM324M, H3CHI219aM, H3CHI287M, H2LNE215M, H3IPM316M, H3IPM431M, H3LNE713M, H3MAY061M, H4MAY231M
Cerithiopsidae								
<i>Cerithiopsis aurea</i> Bartsch, 1911	ME, CO*	5, 7	1–5	AH, MA				CRBMUV H2CHI104M, H2CHI107M
<i>Seila assimolata</i> (C.B. Adams, 1852)	US-CO*	9	I	M-R				CRBMUV E1LNG076M, E3LNG028M
Buccinidae								
<i>Clivipollia pulchra</i> (Reeve, 1846)	ME-EC, GI	7, 15	1–5	AH, R				CRBMUV 76095, 80249, 85221, 85222
<i>Engina</i> aff. <i>fusiformis</i> Pease, 1865	ME-CO*	7	I	R				CRBMUV E3CHI012M
<i>Engina</i> aff. <i>tabogaensis</i> Bartsch, 1931	ME-PE	7, 16, 18	1–5	AH, R				CRBMUV E2CHI069M, H2IPM037M, H2IPM155M, H2CHI047M
<i>Engina macleani</i> Olsson, 1971	ME-PE	16	3–5	AH				CRBMUV E2CHI069M
<i>Engina maura</i> (G.B. Sowerby I, 1832)	US-EC, GI	7, 16, 18	1–5	AH				CRBMUV 80245, 85220
<i>Gemophos ringens</i> (Reeve, 1846)	ME-EC, GI	7, 15, 16, 17, 18	1–5	AH				CRBMUV 00201, 74012, 80240, 85214, 85215, 85216, 85217, 85218
<i>Gemophos sanguinolentus</i> (Duclos, 1833)	US-PE, GI	13, 18	I	R				CRBMUV 74012
<i>Hesperisternia</i> aff. <i>jugosa</i> (C.B. Adams, 1852)	ME-EC	16	3–5	AH				CRBMUV H2IPM019M, H2IPM155M

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Northia pristin</i> (Deshayes in Lamarck, 1844)	ME-EC	15	15	MDL	ER			Guevara-Fletcher <i>et al.</i> 2011 DONDE QUEDARON LOS BICHOS DE LA TESIS DE FLETCHER?
Columbellidae								
<i>Anachis aff. pardalis</i> (Hinds, 1843)	ME-EC	5, 7, 9	1–5	AH, M-R				CRBMUV E1LNG078M, H3LNG006M
<i>Anachis aff. gracilis</i> (Adams, 1852)	ME-EC	7, 9	3–5	AH				CRBMUV H2CHI018M, H3LNG826M
<i>Anachis aff. lentiginosa</i> (Hinds, 1844)	ME-PE	9, 18	1	M-R				CRBMUV E3LNE003M, E4LNG009M
<i>Anachis aff. pygmaea</i> (G. B. Sowerby I, 1832)	ME-PE	4, 5, 7, 9, 16, 18	1–5	AH, M-R, R				CRBMUV E2CHI017M, E2CHI053M, E1MAY149M, H3ARP008M, H3MAY012M, H3LNG035M, H3IPM314M, H3MAY515M
<i>Anachis aff. spadicea</i> (Philippi, 1846)	ME-CO*, GI	7	1	R				CRBMUV E2CHI150M
<i>Anachis dalli</i> Bartsch, 1931	ME-EC	5, 7	2–5	AH, M-R				CRBMUV 85237
<i>Anachis decimdentata</i> Pilsbry & Lowe, 1932	ME-EC	7, 9	1–5	AH, M-R				CRBMUV H2CHI090M, H3LNG826M
<i>Anachis lyrata</i> (G. B. Sowerby I, 1832)	NI-EC	7, 9, 16	1–5	AH, M-R				CRBMUV H2CHI014M, H2CHI048M, H2CHI100M, H2LNG126M, H2LNG197M, E3CHI016M, H3IPM084bM, H3CHI262M, H3CHI339M, H3LNG083M, H4LNG030M, H4LNG031M
<i>Anachis nigricans</i> (G.B. Sowerby I, 1844)	US-PE, GI	1, 4, 5, 7, 8, 9, 16	1–5	AH, M-R, R			■	CRBMUV 81051, 81052, 85223, 85224, 86034
<i>Anachis rugosa</i> (G.B. Sowerby I, 1832)	ME-PE	1, 3, 4, 6, 7, 11	1	C, LTM, M				CRBMUV E2ARP013M, E3ARP001aM
<i>Anachis scalarina</i> (G.B. Sowerby I, 1832)	ME-CO*	7, 9, 16, 18	1–5	AH, R				CRBMUV E3ARP001aM
<i>Anachis varia</i> (G.B. Sowerby I, 1832)	ME-PE, GI	5, 7	1	FLM, M, R				CRBMUV 86035
<i>Bifurcium bicanaliferum</i> (G.B. Sowerby I, 1832)+	ME-PE, GI	15	1	S				CRBMUV 76103
<i>Columbella fuscata</i> G.B. Sowerby I, 1832	US-PE, GI	16, 18	1–5	AH, R				CRBMUV H2LNE014M, H3IPM089M
<i>Columbella major</i> G.B. Sowerby I, 1832	ME-PE	7, 18	1–5	AH, R			■	CRBMUV 80263, E3L-NE013M, H3CHI007M, H3LNE086M, H3LNE129M, H3LNE166M, H3LNE236M
<i>Columbella strombiformis</i> Lamarck, 1822+	US-EC, GI	16						IMCN-G 300 INV-MOL 8181
<i>Cosmioconcha modesta</i> (Powys, 1835)+	SL-EC	11	1	M-S				CRBMUV 85238
<i>Cosmioconcha rehderi</i> (Hertlein & Strong, 1951)	ME-EC	7	1	R				CRBMUV 85239
<i>Mitrella elegans</i> (Dall, 1871)	ME-CO, GI	4, 7, 18	1–5	AH, R				CRBMUV 85240, 85241
<i>Nassarina aff. conspicua</i> (C.B. Adams, 1852)	PN, CO*	18	3–5	AH				CRBMUV E1LNE010M, H2LNE218bM
<i>Nassarina melanosticta</i> (Pilsbry & Lowe, 1932)	ME-EC	16, 18	3–5	AH				CRBMUV H2IPM021M, H2IPM108M, H2IPM127M, H2IPM164M, H3IPM088bM, H3IPM092M, H3IPM256M, H3IPM258M, H3IPM330bM, H3IPM347M, H3LNE134M, H3LNE447M, H3LNE718M
<i>Strombina maculosa</i> (G.B. Sowerby I, 1832)	ME-CO*	15	1	M-S				CRBMUV 00108
Fascioliariidae								
<i>Leucozonia cerata</i> (Wood, 1828)	ME-PE, GI	7, 16, 18	1	M-R, R				CRBMUV 85250
<i>Opeatostoma pseudodon</i> (Burrow, 1815)	ME-PE, GI	16, 18	1–5	R				CRBMUV 2004003 INV-MOL 8182
<i>Pustulaturus mediamericanus</i> (Hertlein & Strong, 1951)	ME-EC	7, 9, 10, 18	1	R				CRBMUV 75155, 80294, 81058, 84016, 85249, 86037
<i>Triplofusus princeps</i> (G.B. Sowerby I, 1825)	ME-PE, GI	7, 16, 18	1	R			■ ■	CRBMUV 00119
Nassariidae								
<i>Nassarius aff. versicolor</i> (C.B. Adams, 1852)	ME-PE, GI	7	3–5	AH				CRBMUV H3CHI327bM
<i>Nassarius catallus</i> (Dall, 1908)+	US-PE, GI	14	1	R				CRBMUV 80278
<i>Nassarius collarius</i> (C.B. Adams, 1852)	GU-PE	7	3–5	AH				CRBMUV H2CHI101M
<i>Nassarius luteostomus</i> (Broderip & G. B. Sowerby I, 1829)	ME-PE	1, 4, 5, 11, 14	1	M-R (MA)				CRBMUV 80290, 85244, 85245, 85246
<i>Nassarius nassiformis</i> (Lesson, 1842)	ME-EC	13	ELT	M-R				INVEMAR <i>et al.</i> 2007

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Nassarius pagodus</i> (Reeve, 1844)	ME-EC	6, 13, 15, 17	I	R, S				CRBMUV 80286, 85242, 85243
Melongenidae								
<i>Melongenella patula</i> (Linnaeus, 1758)	ME-PE	1, 15	I	M, S	ER	■		CRBMUV 77232, 85247, 85248, 86036
Muricidae								
<i>Acanthais brevidentata</i> (Wood, 1828)	ME-PE, GI	7, 9, 11, 13, 14, 15, 16, 17, 18	I	R, S				CRBMUV 75135, 75137, 77177, 79109, 80228, 85208, 85209, 85210, 85211, 85213 INV-MOL 8187
<i>Acanthais triangularis</i> (Bruguière, 1832)	ME-PE, GI	7, 9, 13, 15, 16	I-5	AH, R				CRBMUV 00089, 79104, 80216, 85191
<i>Coralliophila macleani</i> Shasky, 1970	ME-CO*	6, 7, 8, 9, 12	2-10	R, SC				CRBMUV 81046, 83004, 85181, 85182, 85183, 85184, 85185, 85186
<i>Coralliophila monodonta</i> (Blainville, 1832)+	ME, CO*, EC	7	I	M-R-S				CRBMUV 80212
<i>Cymia tectum</i> (Wood, 1828)+	ME-CH	15, 18	I-5	AH, R		■		CRBMUV 78178
<i>Haustellotyphis cumingii</i> (Broderip, 1833)	ME-EC	14, 17	I	R				IMCN-G 282
<i>Hexaplex radix</i> (Gmelin, 1791)	ME-PE	1, 5, 6, 7, 8, 9, 11, 13, 14, 15	I	M-R, R		■	■	CRBMUV 75126, 77158, 80192, 80193, 85177, 85178, 85179, 85188, 85190
<i>Hexaplex regius</i> (Swainson, 1821)	ME-PE	6, 7, 8, 9	ELT	R		■	■	CRBMUV 75117, 75118
<i>Mexacanthina lugubris</i> (G.B. Sowerby I, 1821)	ME-PE, GI	6, 7	I	M-R, R				INVMAR <i>et al.</i> 2007
<i>Murexsul zeteki</i> (Hertlein & Strong, 1951)	ME-PE	7, 9, 18	I-5	AH, R, SC				CRBMUV 81043, 81044 INV-MOL 8161
<i>Neorapana muricata</i> (Broderip, 1832)	ME-PE, GI	16	I	R				INVMAR <i>et al.</i> 2007
<i>Plicopurpura columellaris</i> (Lamarck, 1816)	ME-CH, GI	16	I	R				INVMAR <i>et al.</i> 2007
<i>Plicopurpura pansa</i> (Gould, 1853)	ME-PE, GI	16	I	R				INVMAR <i>et al.</i> 2007
<i>Stramonita biserialis</i> (Blainville, 1832)	ME-CH	1, 4, 6, 9, 13, 15, 17	I-5	AH, R		■		CRBMUV 75131, 00098.3, 0098.4, 78173, 79105, 80221, 85192, 85193 IMCN-G 285
<i>Thaisella kiosquiformis</i> (Duclos, 1832)	US-PE, GI	1, 2, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16		RTM, R				CRBMUV 00093, 85195, 85196, 85197, 85199, 85200, 85198 IMCN-G 277 INV-MOL 8121
<i>Trachypollia lugubris</i> (C.B. Adams, 1852)	US-EC, GI	4, 7, 9, 18	I-5	AH, R				CRBMUV E2LNG031M, E3CHI015M, E3CHI044aM, E3CHI045aM, E3LNG015M, E3LNG025M, H2CHI019M, H2CHI034M, H2LNG030M, H2LNG138M, H2LNG222M, H2LNG225M, H3CHI329M, H3CHI363M, H3CHI400M, H3CHI420M, H3IPM406M, H3IPM428aM, H3IPM436M, H3LNE428M, H3LNE458M, H3LNE716M, H3LNE729M, H3LNG011M, H3LNG072M, H3LNG153M, H4LNG034M, H6LNG003M
<i>Vasula melones</i> (Duclos, 1832)	US-PE, GI	3, 7, 8, 9, 10, 11, 13, 14, 16, 17, 18	I	R		■		CRBMUV 00095, 00096, 75133, 80227, 85201, 85202, 85203, 85204, 85206, 85207, 86030 INV-MOL 8183
<i>Vasula speciosa</i> (Valenciennes, 1832)	US-PE, GI	18	3-5	AH				CRBMUV H3LNE085M, H3LNE420M, H4LNE003M INV-MOL 8191
<i>Vitularia salebrosa</i> (King & Broderip, 1832)	US-PE, GI	7, 9	2-3	R				CRBMUV 85180
<i>Vokesimurex recurvirostris</i> (Broderip, 1833)	ME-EC	6, 8, 10, 14	1-5	R		■		CRBMUV 00065, 77150, 80183, 80184, 85175
Cystiscidae								
<i>Gibberula</i> sp.		18	3-5	AH				CRBMUV H2LNE190M
Marginellidae								
<i>Prunum</i> sp.		16, 18	3-5	AH				CRBMUV H3IPM343M
Mitridae								
<i>Mitra effusa</i> Broderip, 1836	ME-PE, GI	18	3-5	AH				CRBMUV H2LNE017M
<i>Mitra inca</i> d'Orbigny, 1841	ME-PE	7, 9, 18	I-5	AH, R				CRBMUV 80306, 85254

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Mitra lens</i> Wood, 1828	US-PE, GI	18	3–5	AH				CRBMUV H4LNE022M
<i>Mitra tristis</i> Broderip, 1836	ME-PE, GI	7, 18	I	R				CRBMUV E3LNE014M
<i>Subcancilla sulcata</i> (Swainson, 1825)	ME-EC	11	I	R				CRBMUV 85255
<i>Ziba gigantea</i> (Reeve, 1844)+	US-PE	17	I	R				CRBMUV (lot in process)
Olividae								
<i>Agaronia testacea</i> (Lamarck, 1811)	ME-PE	8, 13, 15	I	S			■	CRBMUV 00128, 76127, 77247
<i>Oliva incrassata</i> (Lightfoot, 1786)+	US-PE	14, 15	LT	S			■	CRBMUV 76110, 76111, 76112, 76113, 76114 IMCN-G 302 INV-MOL 8128
<i>Oliva julieta</i> Duclos, 1835+	ME-PE	17	I	R				CRBMUV (lot in process)
<i>Oliva splendidula</i> (G.B. Sowerby I, 1825)+	ME-PE, GI							INV-MOL 8166
Olivellidae								
<i>Olivella semistriata</i> (Gray, 1839)	ME-PE	14, 15	I	S				INVMAR <i>et al.</i> 2007
<i>Olivella sphoni</i> Burch & Campbell, 1963	ME-CO*	6						CRBMUV 77252
<i>Olivella volutella</i> (Lamarck, 1811)	ME-PE	8, 9, 14, 15	I	M			■	CRBMUV 76129, 76130, 77253, 77254, 77255, 81063, 85253
Pseudolividae								
<i>Nicema subrostrata</i> (Wood, 1828)+	ME-CO	15	I	M-S				CRBMUV 77203, 79117
<i>Triumphis distorta</i> (Wood, 1828)+	ME-PE	15	I	M-R				CRBMUV 77202
Conidae								
<i>Conus bruneus</i> Wood, 1828	ME-EC, GI	18	3–5	AH				CRBMUV H4LNE020M
<i>Conus gladiator</i> Broderip, 1833	ME-PE, GI	7, 9	I	R				CRBMUV 80320
<i>Conus nux</i> Broderip, 1833	US-EC, GI	18	I–5	AH, R				CRBMUV E1LNE021M, E2LNE036M, E3LNE001M, H3LNE126M, H3LNE142M, H3LNE167aM, H4LNE016M
<i>Conus patricius</i> Hinds, 1843+	ME-PE, GI	15, 17	I	R	ER		■	CRBMUV 76150, 76152, 71153
<i>Conus perplexus</i> G. B. Sowerby II, 1857+	US-PE	6, 8, 15, 17	I	S			■	CRBMUV 77282, 77283, 77284, 77288
<i>Conus princeps</i> Linnaeus, 1758	US-PE, GI	7, 18	I–5	AH, R				CRBMUV 75177, 2004004
<i>Conus purpurascens</i> G. B. Sowerby I, 1833	ME-CH, GI	7, 18	I–5	AH, R				CRBMUV 00142, H4LNE019M
<i>Conus virgatus</i> Reeve, 1849	US-PE	7, 17	I	M-R				CRBMUV 75185
<i>Conus ximenes</i> Gray, 1839+	ME-PE, GI	8, 10, 17	I	M-S			■	CRBMUV 77286, 85256
MANGELIIDAE								
<i>Agathotoma aff. finitima</i> (Pilsbry & Lowe, 1932)	NI-EC	9	3–5	AH				CRBMUV H3LNG058cM
<i>Agathotoma alcippe</i> (Dall, 1918)	ME-EC, GI	7, 9	3–5	AH				CRBMUV H2CHI101M, H3LNG058bM
<i>Kurtzia cf. arteaga</i> (Dall & Batsch, 1910)	CA-CR, CO*	7	3–5	AH				CRBMUV H3LNG058cM
<i>Kurtziella cyrene</i> (Dall, 1919)	ME-CO*	9	3–5	AH				CRBMUV H3LNG058dM, H3LNG081bM
<i>Pyrgocythara</i> sp.		7, 9, 18	3–5	AH				CRBMUV H2LNE226M, H3CHI394M
Drilliidae								
<i>Kylix woodringi</i> McLean & Poorman, 1971+	PN-CO*	15						CRBMUV 00162
Pseudomelatomidae								
<i>Carinodrillia halis</i> (Dall, 1919)+	ME-EC	17	I	S				CRBMUV (lot in process)
<i>Hindsiclava resina</i> (Dall, 1908)+	ME-PE							INV-MOL 8075
<i>Knefastia olivacea</i> (G.B. Sowerby I, 1834)+	ME-EC	15	I	S				CRBMUV 00161, 75204
<i>Pilsbryspira aterrima</i> (G.B. Sowerby I, 1834)	ME-PE	7	I	M-R				CRBMUV 80338
<i>Pilsbryspira collaris</i> (G.B. Sowerby I, 1834)	ME-PE	7	3–5	AH				CRBMUV H2CHIO40M, H2CHI089M, H3CHI358M, H3CHI375M
<i>Pilsbryspira melchersi</i> (Menke, 1852)+	ME-EC	7	I	M-R				CRBMUV 80335
<i>Zonulispira grandimaculata</i> (C.B. Adams, 1852)	ME-EC	7	I	R				CRBMUV 85260
Terebridae								
<i>Oxymeris strigata</i> (G.B. Sowerby I, 1825)+	ME-PE, GI	17	I	S				CRBMUV (lot in process)
<i>Pristiterebra glauca</i> (Hinds, 1844)	ME-PE, GI	7, 11, 17	I	M-S, S				CRBMUV 85257 IMCN-G 264 INV-MOL 8051
<i>Pristiterebra tuberculosa</i> (Hinds, 1844)+	ME-EC	17	I	S				CRBMUV (lot in process)
<i>Terebra robusta</i> Hinds, 1844+	ME-PE, GI	1, 14, 15	I	S	ER		■	CRBMUV 79160, 85258 INV-MOL 8085

Appendix 1. Continued.

Taxa	West American Distribution	Bahía Málaga Sites	Depth (m)	Substratum	Degree of Vulnerability			Museum Specimens Examined
					V	E	L	
<i>Terebra variegata</i> Gray, 1834+	US-PE, GI	8, 10	ST	M-S			■	CRBMUV 85259
Turridae								
<i>Polystira picta</i> (Reeve, 1843)+	ME-PE	15	I	M-S				CRBMUV 00158
Cancellariidae								
<i>Cancellaria (Pyrucilia) solida</i> G.B. Sowerby I, 1832	ME-PE	15						CRBMUV 00137
<i>Hertleinia mitriformis</i> (G.B. Sowerby I, 1832)+	US-PE	8, 14, 15	I	S				CRBMUV 00134, 135, 77261, 80312
Architectonicidae								
<i>Architectonica nobilis</i> Röding, 1798+	ME-PE	15	I	S				CRBMUV 74003
Pyramidellidae								
<i>Odostomia aff. clathratula</i> (C.B. Adams, 1852)	ME, PN-CO*, GI	7, 9	3–5	AH				CRBMUV H2CHI110M, H3LNG052M
<i>Odostomia aff. dotella</i> Dall & Bartsch, 1909	ME, PN-CO*	7	3–5	AH				CRBMUV H2CHIO94M, H2CHI108aM
<i>Turbonilla</i> sp.	CHI, IPM, LNE, LNG		I–5	AH				CRBMUV E2CHI146M, H2LNG179M, H3CHI221bM, H3IPM061M, H3IPM066bM, H3IPM268M, H3IPM322bM, H3LN-G004aM, H3LNG815M
Bullidae								
<i>Bulla gouldiana</i> Pilsbry, 1895	CA-PE	7, 18	I–5	AH				CRBMUV 80342
<i>Bulla punctulata</i> A. Adams in G.B. Sowerby I, 1850	US-CH, GI	7	I	R				INV-MOL 8217
Aglajidae								
<i>Navanax aenigmaticus</i> (Bergh, 1893)	US-PE	16, 18	3–5	R				CRBMUV H4IPM025M
Aplysiidae								
<i>Dolabrifera dolabrifera</i> (Rang, 1828)	ME-EC	16	I	R				INVEMAR <i>et al.</i> 2007
Plakobranchidae								
<i>Elysia diomedea</i> (Bergh, 1894)	ME-CO	9, 16	I–5	AH, R				CRBMUV H4LNG030M
Pleurobranchidae								
<i>Berthillina ilisima</i> Ev. Marcus & Er. Marcus, 1967	ME-CO	9, 18	3–5	R				Lozano <i>et al.</i> 2012 FOTOS
Chromodorididae								
<i>Doriprismatica sedna</i> (Ev. Marcus & Er. Marcus, 1967)	US-EC, GI	18	3–5	R				Lozano <i>et al.</i> 2012 FOTOS
<i>Felimare agassizii</i> (Bergh, 1894)	ME-CO, GI	7, 8, 9, 18	SW	R				INVEMAR <i>et al.</i> 2007
<i>Felimida sphoni</i> Ev. Marcus, 1971	ME-EC, GI	9, 18	ELT–5	R				CRBMUV E1LNG-A, E1LNG-B
<i>Hypselodoris californiensis</i> (Bergh, 1879)	US-ME, CO	16	3–5	R				Lozano <i>et al.</i> 2012 FOTOS
Siphonariidae								
<i>Siphonaria maura</i> G.B. Sowerby I, 1835	ME-PE	4, 8, 13, 14, 15, 16, 17, 18	I	R				CRBMUV 77303, 78293, 79167, 85261, 85262, 85263, 85264
<i>Siphonaria gigas</i> G.B. Sowerby I, 1825	ME-PE, CI, GI	15, 16	I	R			■ ■	CRBMUV 00169, E3IPM018M
Ellobiidae								
<i>Detracia graminea</i> Morrison, 1946	PN-CO*	5	3–5	AH				CRBMUV H3MAY135M
<i>Detracia zeteki</i> Pilsbry, 1920	PN-CO*	18	3–5	AH				CRBMUV SASLNE0209C-A2
<i>Ellobium stagnalis</i> (d'Orbigny, 1835)	SL-EC, GI	6	I	MA				CRBMUV 00173, 85265, 85266
<i>Marinula concinna</i> (C.B. Adams, 1852)	PN-PE	1, 4, 11	I	R, MA				CRBMUV 85265, 85266
<i>Melampus carolianus</i> (Lesson, 1842)	CR-PE, GI	7, 8	I	MA				CRBMUV 85267
<i>Melampus olivaceus</i> Carpenter, 1857	US, ME, PN-CO*	9	3–5	AH			■	CRBMUV H3LNG071M
<i>Pedipes aff. unisulcatus</i> Cooper, 1868	US-ME, CO*, GI	4, 5	I	MA				CRBMUV E2MAY037M, E3ARP008bM
<i>Pedipes liratus</i> Binney, 1860	US-ME, CO*	5	I	MA				CRBMUV E1MAY132M
Onchidiidae								
<i>Onchidella</i> sp.		5, 6, 15, 16	I	R				CRBMUN E1IPM003M, E1ARP013M, E3MAY309M, H3MAY010M
CEPHALOPODA								
Loliginidae								
<i>Lolliguncula panamensis</i> Berry, 1911	ME-EC	4, 6, 16	5–15	PEL			■ ■	INVEMAR <i>et al.</i> 2007
Octopodidae								
<i>Octopus selene</i> Voss, 1971	CR-CO	15	I	R			■ ■	INVEMAR <i>et al.</i> 2007