

Review SUPPLEMENTARY MATERIAL

Alien species in British brackish and marine waters

Dan Minchin^{1,2}, Elizabeth J. Cook^{3*} and Paul F. Clark⁴

1 Marine Organism Investigations, Caragh, Ballina, Killaloe, Co Clare, Ireland

2 Coastal Research and Planning Institute, Klaipeda Univeristy, Klaipeda, Lithuania

3 Scottish Association for Marine Science, Scottish Marine Institute, Oban, Argyll PA37 1QA, UK

4 Natural History Museum, Cromwell Road, London, SW7 5BD, UK

E-mail: moiireland@yahoo.ie (DM), ejc@sams.ac.uk (EJC), p.clark@nhm.ac.uk (PFC)

*Corresponding author

Received: 20 April 2012 / Accepted: 3 December 2012 / Published online: 10 January 2013

Handling editor: Vadim Panov

Online article is available at http://www.aquaticinvasions.net/2013/AI_2013_1_Minchin_etal.pdf

Supplementary material

The following supplementary material is available for this article:

Appendix 1. List of alien species recorded from British brackish and marine waters.

Appendix 1. List of alien species recorded from British brackish and marine waters. Their order does not relate to date of discovery. Region: C = Celtic Seas; E = English Channel; N = North Sea; region of first introduction if known underlined>. Abbreviations for Vector/ Pathway: AQ = Aquaculture; V = Vessels; D = Natural Drift; PL = Planting; ET = Eel Transport; LF = Live Food; AF = Anthropogenic Flotsam; TI = Timber importation; BB = Bait Buckets; AQU = Aquarium.

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Magnoliophyta								
Haplosporididae								
<i>Bonamia ostreae</i> Pichot, Comps, Tigé, Grizel & Rabouin, 1980	<u>E C N</u>	1982	1982	NE Pacific	AQ, V	widespread, established	native oyster mortalities	Howard 1994; Hudson and Hill 1991; Laing 2006; Brown et al. 2006
Ocrophyta, Phaeophyceae								
Alariaceae								
<i>Undaria pinnatifida</i> (Harvey) Suringar, 1872	<u>E N</u>	1994	1994	NW Pacific	V	regionally established	fouling, possible cultivation, competition	Fletcher and Manfredi 1995; Fletcher and Farrell 1999
Scytosiphonaceae								
<i>Colpomenia peregrina</i> (Sauvageau) Hamel, 1927	<u>E C N</u>		1907	Pacific	D, AQ	widespread, established	possible competition	Mineur et al. 2008; Arenas et al. 2006; Cotton 1908; Norton 1976; Wilkinson 1975
Sargassaceae								
<i>Sargassum muticum</i> (Yendo) Fensholt, 1955	<u>E C</u>		1971	N Pacific	AQ, D	regionally established	habitat modification, affecting navigation, competition	Farnham et al. 1981; Fletcher and Farrell 1999; Withers et al. 1975; Harries et al. 2007; Critchley et al. 1983; Critchley et al. 1986; Farnham et al. 1973b
Rhodophyta, Florideophyceae								
Bonnemaisoniaceae								
<i>Bonnemaisonia hamifera</i> Hariot, 1891	<u>E C N</u>		1890	N Pacific	unknown	widespread, established	competition	Holmes 1897; Maggs and Stegenga 1999; Irvine 1982; Mineur et al. 2008; Dixon and Irvine 1977

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone 1-30psu >30psu	Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
Ceramiales							
<i>Antithamnionella spirographidis</i> (Schiffner) Wollaston, 1968	E C	1931	N Pacific	V	regionally established	unknown	Westbrook 1934; Maggs and Stegenga 1999; Brodie et al. 2007
<i>Antithamnionella ternifolia</i> (C. Agardh) Nageli, 1847	E C	1906	Indo-Pacific	unknown	regionally established	unknown	Maggs and Hommersand 1993; Maggs and Stegenga 1999; Brodie et al. 2007
<i>Asparagopsis armata</i> Harvey, 1855	C E N	1949	S Pacific	V	widespread, established	competition	Drew 1950; Irvine et al. 1975; Maggs and Stegenga 1999; Ní Cúaláin et al. 2004
Caulacanthidae							
<i>Caulacanthus ustulatus</i> (Mertens ex Turner) Kützinger, 1843	E	2004	NW Pacific	unknown	one locality, established	unknown	Mineur et al. 2006; ICES 2006
Dasyaceae							
<i>Heterosiphonia japonica</i> Yendo, 1920	N E C	2004	NW Pacific	unknown	widespread, established	competition	Bjaerke and Rueness 2004; ICES 2005b, 2006; C. Moore (pers.comm.)
Dumontiaceae							
<i>Pikea californica</i> Harvey, 1853	E	1967	N Pacific	V	localities, established	unknown	Maggs and Guiry 1987; Maggs and Ward 1996; Brodie et al. 2007
Rhodomeliaceae							
<i>Polysiphonia harveyi</i> J.W. Bailey, 1848	E C N	1908	N Pacific	unknown	widespread, established	unknown	Maggs and Hommersand 1993; Maggs and Stegenga 1999; McIvor et al. 2001; Brodie et al. 2007; Mineur et al. 2008
Halymeniaceae							
<i>Cryptonema hibernica</i> Guiry & L. Irvine, 1974	E	2000	S Atlantic	V	one locality, no recent record	unknown	Hardy and Guiry 2003
<i>Grateloupia subpectinata</i> Holmes, 1912	E	1947	Indo-Pacific	AQ	one locality, established	unknown	Farnham and Irvine 1968; Irvine 1983; Arenas et al. 2006; Guiry 2011
<i>Grateloupia turuturu</i> Yamada, 1941	E C	1969	NW Pacific	AQ	regionally established	unknown	Farnham and Irvine 1973b; Farnham 1980; Maggs and Stegenga 1999; Gavio and Fredericq 2002

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Solieriaceae								
<i>Sarcodiotheca gaudichaudi</i> , (Montagne) P.W. Gabrielson, 1982	E		1974	E Pacific	V, AQ	localities, established	unknown	Farnham and Irvine 1979; Hardy and Guiry 2003; Brodie et al. 2007
<i>Solieria chordalis</i> (C. Agardh) J. Agardh, 1842	E C		1976	Unclear	V, D	localities, established	unknown	Parke and Dixon 1976; Farnham and Irvine 1979; Farnham 1980; Hiscock and Maggs 1984; Brodie et al. 2007; C. Maggs (pers. comm.)
Chlorophyta, Bryopsidophyta								
Codiaceae								
<i>Codium fragile</i> ssp <i>fragile</i> (Proven, Booth, Todd, Beatty, & Maggs, 2008)	C E N		1891	N Pacific	unknown	widespread, established	competition	Silva 1955; Fletcher et al. 1989; Trowbridge 1998; Chapman 1999; Provan et al. 2008
Anthophyta, Poaceae								
<i>Spartina townsendii</i> var. <i>anglica</i> C.E. Hubbard	E C N		1850s	NW Atlantic	PL	widespread, established	habitat engineer	Hubbard and Stebbings 1967; Marchant 1967; Gray et al. 1991; Frid et al. 1999
Cnidaria, Anthozoa								
Diadumenidae								
<i>Diadumene lineata</i> (Verrill, 1869)	C E N	1899	1899	NW Pacific	AQ, V	widespread, established	unknown	Manuel 1981; Fautin et al. 2007
Olindiasidae								
<i>Gonionemus vertens</i> A. Agassiz, 1862	N C E	1913	1913	NW Pacific	V, AQ	widespread, established	unknown	Edwards 1976
Nematoda, Dracunculoidea								
Anguillicolidae								
<i>Anguillicoloides crassus</i> Kuwahara, Niimi & Itagaki, 1974	N C E	1987	1987	NW Pacific	ET, V	widespread, established	endoparasite of <i>Anguilla anguilla</i>	Kennedy and Fitch 1990; Kennedy 1993

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Trematoda, Cercarida								
<i>Cercaria sensifera</i> Stunkard & Shaw, 1981	N	1939	1939	NW Atlantic	AQ	one locality, no recent record	endoparasite of <i>Urosalpinx cinerea</i>	Cole 1942
Annelida, Polychaeta								
Serpulidae								
<i>Ficopomatus enigmaticus</i> (Fauvel, 1923)	E C N	1922	1922	Indo-Pacific	V	widespread, established	fouling	Monro 1924; Harris 1970; Hiscock and Hoare 1975; Dixon 1981; Davies et al. 1989; Zibrowius and Thorp 1989
<i>Hydroides dianthus</i> (Verrill, 1873)	E		1970	NW Atlantic	V, AQ	localities, no recent record	unknown	Zibrowius and Thorp 1989
<i>Hydroides elegans</i> (Haswell, 1883)	C		1937	Indo-Pacific	V	one locality, no recent record	unknown	Naylor 1965; ten Hove 1974; Hayward and Ryland 1995
<i>Hydroides ezoensis</i> , Okuda, 1934	E		1976	NW Pacific	V	localities, established	fouling	Thorp 1980; Thorp et al. 1987; Zibrowius and Thorp 1989
Spirorbidae								
<i>Janua braziliensis</i> (Grube, 1872)	E	1974	1974	SW Atlantic	V, D	one locality, no recent record	unknown	Knight-Jones et al. 1975; Knight Jones and Knight-Jones 1977, 1980; Critchley and Thorp 1985; Zibrowius and Thorp 1989
<i>Pileolaria berkeleyana</i> (Rioja, 1942)	E		1974	NE Pacific	V, D	localities, established	unknown	Knight-Jones et al. 1975; Knight Jones and Knight-Jones 1977, 1980; Zibrowius and Thorp 1989; Thorp 1991; Thorp et al. 1986
Goniadidae								
<i>Goniadella gracilis</i> Verrill, 1873	C		1970	NW Atlantic	V	localities, established	unknown	Walker 1972; Mackie et al. 1995

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Sabellidae								
<i>Desdemona ornata</i> Banse, 1957	E		1997	Indo-Pacific	unknown	localities, established	unknown	Smith et al. 1999
Maldanidae								
<i>Clymenella torquata</i> , (Leidy, 1855)	N	1936	1936	NW Atlantic	AQ	localities, established	unknown	Newell 1949, 1954; Zibrowius and Thorp 1989
Spionidae								
<i>Marenzelleria viridis</i> (Verrill, 1973)	N	1979	1979	NW Atlantic	V, D	localities, established	unknown	Atkins et al. 1987; Bastrop et al. 1995; Sikorski and Bick 2004; ICES 2005b
Mollusca, Gastropoda								
Hydrobiidae								
<i>Potamopyrgus antipodarum</i> (J.E. Gray, 1843)	N C E	1859		S Pacific (New Zealand)	V, Birds	widespread, established	competition	McMillan 1968; Ponder 1988
Calyptraeidae								
<i>Crepidula fornicata</i> (Linnaeus, 1758)	C E N	1872	1872	NW Atlantic	AQ	widespread, established	fouling, trophic competition	Crouch 1894; Orton 1912; Cole 1952; Walne 1956; Barnes et al. 1973; Minchin et al. 1995; Smith 1995; Arenas et al. 2006
<i>Calyptraea chinensis</i> Linnaeus, 1758	C		1957	NE Atlantic	AQ	one locality, no recent record	unknown	McMillan 1968; Minchin et al. 1987; Hayward and Ryland 1995
Muricidae								
<i>Rapana venosa</i> (Valenciennes, 1846)	N		1991	N Pacific	V, LF	single records, not established	likely bivalve predation, selective fishery	Kerckhof et al. 2006; ICES 2004a, 2007
<i>Urosalpinx cinerea</i> (Say, 1822)	N E		1920s	NW Atlantic	AQ	regionally established	oyster predator	Orton and Winkworth 1928; Orton 1930; Cole 1942; Hancock 1954, 1959; Gibbs et al. 1991

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References	
		1-30psu	>30psu						
Bivalvia									
Mytilidae									
<i>Brachidontes exustus</i> Linnaeus, 1758	C		1977	W Atlantic	AF	single record, not established	none	J Light (pers. comm.)	
<i>Aulacomya ater</i> (Molina, 1782)	N		1994	S Atlantic, SE Pacific	V	one locality, no recent record	none	McKay 1994; B Leyshon (pers. comm.)	
<i>Choromytilus chorus</i> (Molina, 1782)	C E N		1967	SW Atlantic, SE Pacific	AQ	not established	unknown	ICES 1972; Utting and Spencer 1992	
Ostreidae									
<i>Crassostrea gigas</i> (Thunberg, 1793)	E C N		1926	1926	N Pacific	AQ	widespread for cultivation, regionally established in wild (C, E)	fouling, trophic competition, aquaculture	Walne and Helm 1979; Utting and Spencer 1992; Spencer et al. 1994; Drinkwaard 1998; Eno 1998; O'Foighil et al. 1998; Couzens 2006; ICES 2009
<i>Crassostrea rhizophorae</i> Guilding, 1828	C			1980	W Atlantic	AQ	not established	experimental culture	Utting and Spencer 1992
<i>Crassostrea virginica</i> (Gmelin, 1791)	N C E		1872	1872	NW Atlantic	AQ	not established	once cultivated	Utting and Spencer 1992
<i>Lopha folium</i> , (Linnaeus, 1758)	E			1986	NW Atlantic	AF	not established	none	Turk 1988
<i>Tiostrea chilensis</i> (Philippi, 1845)	C			1963	S Pacific	AQ	one locality, established	experimental culture	Walne 1979; Buroker et al. 1983; Utting and Spencer 1992; Richardson et al. 1993; Jeffs et al. 1997; Eno 1998
Atrinidae									
<i>Atrina rigida</i> (Lightfoot, 1786)	E			1986	NW Atlantic	AF	not established	none	Turk 1988

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Dreissenidae								
<i>Dreissena polymorpha</i> (Pallas, 1771)	N E	1824		Ponto-Caspian	TI	regionally, established	fouling, trophic competition	Aldridge et al. 2004; Kerney 1976; Kerney and Morton 1970
<i>Mytilopsis leucophaeta</i> Conrad, 1831	C	1998		W Atlantic	V	one locality, no recent record	unknown	Oliver et al. 1998; Eno 1998; Bamber and Taylor 2002
Corbiculidae								
<i>Corbicula fluminea</i> (O.F. Müller, 1774)	N	1998		NW Pacific	BB, V, AQU	regionally established	trophic competition	Elliott and zu Ermgassen 2008; Baker et al. 1999; Morton and Tong 1985; Aldridge and Müller 2001
Petricolidae								
<i>Petricola pholadiformis</i> Lamark, 1818	N E	1890	1890	NW Atlantic	AQ	regionally established	borer	Purchon 1955; Tebble 1966; Eno 1998; ICES 1972; Duval 1963
Pharidae								
<i>Ensis directus</i> (Conrad, 1843)	N E C		1989	NW Atlantic	D	regionally established	competition, potential fishery	Howlett 1990; Eno 1998; Palmer 2004; Dansey 2011
Pinctadidae								
<i>Pinctada radiata</i> , (Leach, 1814)	E		1986	NW Atlantic	AF	not established	unknown	Turk 1988
Pteriidae								
<i>Pteria colymbus</i> (Röding, 1798)	E		1986	NW Atlantic	AF	not established	unknown	Turk 1988
Veneridae								
<i>Mercenaria mercenaria</i> (Linnaeus, 1758)	N E C		1860	NW Atlantic	V	regionally, established	localised fishery	Heppel 1961; Ansell 1963; Tebble 1966; Mitchell 1974; Cox 1991
<i>Venerupis philippinarum</i> (Adams & Reeve, 1850)	C E N	1980	1980	NW Pacific	AQ	widespread established, recruits in wild (E)	in cultivation	Utting and Spencer 1992; Kaiser et al. 1996; Ashelby et al. 2004; Jensen et al. 2004; Caldow et al. 2007; ICES 2007

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Arthropoda,								
Maxillopoda,								
Copepoda,								
Calanoida								
Acartiidae								
<i>Acartia tonsa</i> Dana, 1849	E N	1956		N Pacific	V	regionally, established	unknown	Conover 1957; Brylinski 1981; Taylor 1987
Temoridae								
<i>Eurytemora americana</i> L.W. Williams, 1906	E	1931		NW Atlantic	V	localities, no recent record	unknown	Lowndes 1931, 1932; Gurney 1933
Ostracoda								
Sarsiellidae								
<i>Eusarsiella zostericola</i> Cushman, 1906	N E	>1870	>1870	NW Atlantic	AQ	regionally, established	unknown	Bamber 1987a, 1987b; ICES 2006
Thecostraca,								
Cirripedia,								
Thoracica								
Archaeobalanidae								
<i>Austrominius modestus</i> (Darwin, 1854)	E C N	1943	1943	S Pacific	V	widespread, established	fouling, competition	Bishop 1947; Stubbings 1950; Crisp 1958; Barnes and Barnes 1960; Hiscock et al. 1978; Muxagata et al. 2004; O'Riordan 2009
Balanidae								
<i>Balanus amphitrite</i> Darwin, 1854	E C		1937	circum-tropical	V	not established	fouling	Bishop 1950; Pitombo 2004
<i>Balanus trigonus</i> Darwin, 1854	E		1986	W Atlantic	AF	not established	unknown	Turk 1988

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Malacostraca,								
Amphipoda								
Caprellidae								
<i>Caprella mutica</i> Schurin, 1935	C E N		2000	NW Pacific	V	widespread, established	fouling	Willis et al. 2004; Cook et al. 2007; Ashton et al. 2008 ; Ashelby 2005
Aoridae								
<i>Grandidierella japonica</i> Stephensen, 1938	E		1997	NW Pacific	V	one locality, no recent record	unknown	Smith et al. 1999
<i>Gammarus tigrinus</i> Sexton, 1939	C		1939	NW Atlantic	V	localities, established	competitor	Hynes 1954; Lincoln 1979
Decapoda								
Palaemonidae								
<i>Palaemon macrodactylus</i> Rathbun, 1902	N		2001	NW Pacific	V	localities, established	unknown	Ashelby et al. 2004; Worsfold and Ashelby 2008
Penaeeidae								
<i>Marsupenaeus japonicus</i> (Bate, 1888)	E C		1989	Indo-Pacific	AQ	individual records, not established	unknown	Clark 1990; Lockley 2004; D Quigley (pers. comm.); A Crosnier (pers. comm.)
Nephropidae								
<i>Homarus americanus</i> (H. Milne Edwards, 1837)	N		1988	NW Atlantic	LF, escapes and deliberate introduction	individual records, not established	possible hybridisation	Stebbing et al. 2012
Portunidae								
<i>Callinectes sapidus</i> Rathbun, 1896	E N		1975	NW Atlantic	V	four records, not established	unknown	Ingle 1980; Clark 1984
Varunidae								
<i>Eriochier sinensis</i> (H. Milne Edwards, 1853)	N C E		1935	NW Pacific	V	many localities, established	bank erosion	Harold 1935
<i>Brachyotus sexdentatus</i> (Risso, 1827)	C		1957	Medi-terranean	V	one locality, no recent record	unknown	Naylor 1957, 1965

Alien species in British brackish and marine waters

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone 1-30psu >30psu	Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
Pilumnoididae							
<i>Pilumnoides perlatus</i> (Poeppig, 1836)	E	1898	E Pacific	V	single record, not established	unknown	Valentin 1900; Ingle 1980; Clark 1986;
Panopeinae							
<i>Dyspanopeus sayi</i> (S.I. Smith, 1869)	C	1950s	W Atlantic	V	single record, not established	none	Naylor 1965
<i>Rhithropanopeus harrisi</i> (Gould, 1841)	C	1996	NW Atlantic	V	one locality, established	unknown	Naylor 1965; Ingle 1980; D. Minchin (pers. obs.)
Pycnogonida							
Ammotheidae							
<i>Ammothea hilgendorfi</i> (Böhm, 1879)	E	<1912	S Pacific	V	localities, established	unknown	Bamber 1985; S Trewhella (pers. comm.)
Bryozoa							
Bugulidae							
<i>Bugula neritina</i> (Linnaeus, 1758)	E C	<1911	unclear	V, AQ	regionally, established	fouling	Ryland 1960; Hayward and Ryland 1995; Arenas et al. 2006; Ryland et al. 2011
<i>Bugula simplex</i> Hinks, 1886	C E N	<1900	W. Atlantic	V, AQ	localities,	unknown	Ryland 1958; Ryland et al. 2011
<i>Bugula stolonifera</i> Ryland, 1960	CE	<1960	Atlantic	V	localities established	unknown	Ashelby 2005; Ryland and Hayward 1997; Ryland et al. 2011
Candidae							
<i>Tricellaria inopinata</i> d'Hondt & Occhipinti Ambrogi, 1985	E C	1998	NW Pacific	V	regionally, established	fouling	Dyrynda et al. 2000
Watersiporidae							
<i>Watersipora subtorquata</i> (d'Orbigny, 1952)	E	2008	unclear	V	localities, established	unknown	Ryland et al. 2009

Appendix 1 (continued).

Species	Region	Date of first record placed within the salinity range of the recipient zone		Native Range	Likely Vector/ Pathway	Current status	Impact (known or expected in Britain)	References
		1-30psu	>30psu					
Cordata, Ascidiacea								
Botryllidae								
<i>Botrylloides violaceus</i> Oka, 1927	E C	2004		NW Pacific	V	regionally, established	fouling	Arenas et al. 2006; JS Ryland (pers. comm.)
<i>Botrylloides c.f. diegensis</i> (Ritter & Forsyth, 1917)	E	2004		N Pacific	V	localities, established	unknown	Faasse 2006; A. Gittenberger (pers. comm.)
Corellidae								
<i>Corella eumyota</i> Traustedt, 1882	E C	2004		circum sub-Antarctic	V	regionally, established	fouling	Arenas et al. 2006; Dupont et al. 2007; Collin et al. 2010; J Nunn (pers. comm.); JDD Bishop & JS Ryland (unpub.)
Perophoridae								
<i>Perophora japonica</i> Oka, 1927	E	1999		NW Pacific	V	localities, established	unknown	Nishikawa et al. 2000; Baldock and Bishop 2001, JDD Bishop (pers. comm.)
Styelidae								
<i>Styela clava</i> Herdman, 1882	E C N	1953	1953	NW Pacific	V, AQ	widespread, established	fouling	Carlisle 1954; Millar 1970; Coughlan 1985; Minchin and Duggan 1988; Lützen 1999; Ashton et al. 2006a; Davis et al. 2007a, b
Didemnidae								
<i>Didemnum vexillum</i> Kott, 2002	E C	2005		NW Pacific	V, AQ	regionally, established	fouling	Holt et al. 2008; Griffith et al. 2009; Stefaniak et al. 2009
Chordata, Pisces								
Salmonidae								
<i>Oncorhynchus gorbuscha</i> (Walbaum, 1792)	C N	1960		N Pacific	AQ	individuals, not established	unknown	Wheeler 1969; Svetovidov 1986;
<i>Oncorhynchus mykiss</i> (Walbaum, 1792)	C	1884	1884	NE Pacific	AQ	localities, established	unknown	MacCrimmon 1971; Frost 1974;
<i>Oncorhynchus keta</i> (Walbaum in Artedi, 1792)			1960s	N Pacific	AQ	individual, not established	unknown	Eno et al. 1997
<i>Oncorhynchus kisutch</i> (Walbaum, 1792)	E		1975	NE Pacific	AQ	individual, not established	unknown	Eno et al. 1997; Svetovidov 1986