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Appendix 1. Sample collection.

Specimen Code	Region	Fork Length (mm)	Total Length (mm)	Date collected	Collected by	Collection area
A601Y	New England	58		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A602Y	New England	51		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A603Y	New England	46		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A604Y	New England	45		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A605Y	New England	48		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A606Y	New England	47		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A607Y	New England	51		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A608Y	New England	48		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A609Y	New England	52		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A610Y	New England	48		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A611Y	New England	45		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A612Y	New England	46		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A613Y	New England	52		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A614Y	New England	49		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A615Y	New England	50		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A616Y	New England	50		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A617Y	New England	45		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A618Y	New England	50		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A619Y	New England	45		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A620Y	New England	43		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A621Y	New England	48		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A622Y	New England	44		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A623Y	New England	43		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A624Y	New England	45		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
A625Y	New England	43		8/30/2006	Gary Nelson	Gloucester, Annisquam River, MA
AS601J	U.S. south Atlantic	105	140	8/9/2006	John Archambault	Ashley River at East Accabee Flats, SC

AS602J	U.S. south Atlantic	98	130	8/9/2006	John Archambault	Ashley River at North Bridge, SC
AS603J	U.S. south Atlantic	106		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS604J	U.S. south Atlantic	107		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS605J	U.S. south Atlantic	106		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS606J	U.S. south Atlantic	105		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS607J	U.S. south Atlantic	102		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS608J	U.S. south Atlantic	94		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS609J	U.S. south Atlantic	104		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS610J	U.S. south Atlantic	107		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS611J	U.S. south Atlantic	97		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS612J	U.S. south Atlantic	111		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS613J	U.S. south Atlantic	96		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS614J	U.S. south Atlantic	99		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS615J	U.S. south Atlantic	104		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
AS616J	U.S. south Atlantic	104		8/21/2006	John Archambault	Ashley River at fresh/saltwater line, SC
C617J	U.S. south Atlantic	76		8/7/2006	John Archambault	Cooper River, above Bushy Park Landing, SC
C618J	U.S. south Atlantic	83		8/7/2006	John Archambault	Cooper River, above Bushy Park Landing, SC
C619J	U.S. south Atlantic	82		8/7/2006	John Archambault	Cooper River, above Bushy Park Landing, SC
CH26J	U.S. south Atlantic		170	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH27J	U.S. south Atlantic		181	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH28J	U.S. south Atlantic		176	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH29J	U.S. south Atlantic		173	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH30J	U.S. south Atlantic		157	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH31J	U.S. south Atlantic		160	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth

CH32J	U.S. south Atlantic		157	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH33J	U.S. south Atlantic		166	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH34J	U.S. south Atlantic		172	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH35J	U.S. south Atlantic		168	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH36J	U.S. south Atlantic		152	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH37J	U.S. south Atlantic		147	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH38J	U.S. south Atlantic		161	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH39J	U.S. south Atlantic		165	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH40J	U.S. south Atlantic		168	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CH41J	U.S. south Atlantic		169	6/25/2007	John Archambault	Charleston Harbor, near Ft. Sumter at mouth
CR620J	U.S. south Atlantic	102		8/24/2006	John Archambault	Cape Romain at Muddy Bay at Oyster Bay, East, SC
CR621J	U.S. south Atlantic	105		8/24/2006	John Archambault	Cape Romain at Muddy Bay at Oyster Bay, East, SC
D601Y	mid-Atlantic	101	118	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D602Y	mid-Atlantic	96	109	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D603Y	mid-Atlantic	102	121	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D604Y	mid-Atlantic	85	97	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D605Y	mid-Atlantic	90	105	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D606Y	mid-Atlantic	90	102	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D607Y	mid-Atlantic	91	106	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D608Y	mid-Atlantic	103	120	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D609Y	mid-Atlantic	93	106	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D610Y	mid-Atlantic	95	109	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ

D611Y	mid-Atlantic	99	113	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D612Y	mid-Atlantic	94	108	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D613Y	mid-Atlantic	98	115	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D614Y	mid-Atlantic	98	114	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D615Y	mid-Atlantic	98	114	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D616Y	mid-Atlantic	97	105	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D617Y	mid-Atlantic	110	125	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D618Y	mid-Atlantic	85	99	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D619Y	mid-Atlantic	61	70	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D620Y	mid-Atlantic	101	117	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D621Y	mid-Atlantic	65	77	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D622Y	mid-Atlantic	98	110	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D623Y	mid-Atlantic	103	117	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D624Y	mid-Atlantic	89	102	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D625Y	mid-Atlantic	70	82	8/23/2006	Heather Corbett	Fort Mott, Delaware River, NJ
D626Y	mid-Atlantic	106	122	8/23/2006	Heather Corbett	New Castle, Delaware River, NJ
D627Y	mid-Atlantic	98	116	8/23/2006	Heather Corbett	New Castle, Delaware River, NJ
D701Y	mid-Atlantic	96	110	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D702Y	mid-Atlantic	83	95	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D703Y	mid-Atlantic	87	100	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D704Y	mid-Atlantic	85	97	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D705Y	mid-Atlantic	89	100	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D706Y	mid-Atlantic	88	100	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D707Y	mid-Atlantic	89	100	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D708Y	mid-Atlantic	84	98	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D709Y	mid-Atlantic	84	97	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D710Y	mid-Atlantic	84	93	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D711Y	mid-Atlantic	77	88	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D712Y	mid-Atlantic	79	91	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D713Y	mid-Atlantic	85	102	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D714Y	mid-Atlantic	100	113	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach

D715Y	mid-Atlantic	76	88	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D716Y	mid-Atlantic	85	96	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D717Y	mid-Atlantic	99	114	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D718Y	mid-Atlantic	85	99	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D719Y	mid-Atlantic	85	98	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D720Y	mid-Atlantic	84	96	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D721Y	mid-Atlantic	87	99	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D722Y	mid-Atlantic	90	105	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D723Y	mid-Atlantic	90	104	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D724Y	mid-Atlantic	81	94	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D725Y	mid-Atlantic	80	93	6/26/2007	Heather Corbett	Delaware River, Oakwood Beach
D726J	mid-Atlantic	180	213	7/17/2007	Heather Corbett	Delaware River, Gamble's Gut
D727J	mid-Atlantic	190	219	8/2/2007	Heather Corbett	Delaware River, Gamble's Gut
D728J	mid-Atlantic	194	224	8/2/2007	Heather Corbett	Delaware River, Gamble's Gut
E622Y	U.S. south Atlantic	48	59	8/3/2006	John Archambault	Edisto River, near Willtown Bluff, SC
E623Y	U.S. south Atlantic	41	53	8/3/2006	John Archambault	Edisto River, near Willtown Bluff, SC
E624Y	U.S. south Atlantic	67		8/18/2006	John Archambault	Edisto River, west of Jehossee Island, SC
E625J	U.S. south Atlantic	113		8/18/2006	John Archambault	Edisto River at Sampson Island Creek, SC
E626J	U.S. south Atlantic	102		8/18/2006	John Archambault	Edisto River at Sampson Island Creek, SC
E627J	U.S. south Atlantic	98		8/18/2006	John Archambault	Edisto River at Sampson Island Creek, SC
E628J	U.S. south Atlantic	97		8/18/2006	John Archambault	Edisto River at Sampson Island Creek, SC
E701Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E702Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E703Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E704Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E705Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E706Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E707Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E708Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E709Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E710Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River

E711Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E712Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E713Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E714Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E715Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E716Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E717Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E718Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E719Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E720Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E721Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E722Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E723Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E724Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
E725Y	U.S. south Atlantic		b/t 28 & 33	4/24/2007	John Archambault	Edisto River
G601Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G602Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G603Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G604Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G605Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G606Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G607Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G608Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G609Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX

G610Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G611Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G612Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G613Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G614Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G615Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G616Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G617Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G618Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G619Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G620Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G621Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G622Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G623Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G624Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
G625Y	Gulf of Mexico			10/6/2006	Bill Dailey	Trinity River Delta, Galveston Bay System, TX
Gun1	Gulf of Mexico				Joel Anderson	Texas
Gun2	Gulf of Mexico				Joel Anderson	Texas
Gun3	Gulf of Mexico				Joel Anderson	Texas

Gun4	Gulf of Mexico				Joel Anderson	Texas
Gun5	Gulf of Mexico				Joel Anderson	Texas
Gun6	Gulf of Mexico				Joel Anderson	Texas
Gun7	Gulf of Mexico				Joel Anderson	Texas
Gun8	Gulf of Mexico				Joel Anderson	Texas
Gun9	Gulf of Mexico				Joel Anderson	Texas
Gun10	Gulf of Mexico				Joel Anderson	Texas
M601Y	Chesapeake Bay	37		5/22/2006	Troy Tuckey	Mattaponi River, VA
M602Y	Chesapeake Bay	34		5/22/2006	Troy Tuckey	Mattaponi River, VA
M603Y	Chesapeake Bay	37		5/22/2006	Troy Tuckey	Mattaponi River, VA
M604Y	Chesapeake Bay	38		5/22/2006	Troy Tuckey	Mattaponi River, VA
M605Y	Chesapeake Bay	38		5/22/2006	Troy Tuckey	Mattaponi River, VA
M606Y	Chesapeake Bay	34		5/22/2006	Troy Tuckey	Mattaponi River, VA
M607Y	Chesapeake Bay	27		5/22/2006	Troy Tuckey	Mattaponi River, VA
M608J	Chesapeake Bay	149		11/14/2006	Patrick Lynch	Mattaponi River, VA
M751Y	CB-late YOY	36		7/22/2007	Troy Tuckey	Mattaponi River, VA
M752Y	CB-late YOY	35		7/22/2007	Troy Tuckey	Mattaponi River, VA
M753Y	CB-late YOY	40		7/22/2007	Troy Tuckey	Mattaponi River, VA
M754Y	CB-late YOY	42		7/22/2007	Troy Tuckey	Mattaponi River, VA
M755Y	CB-late YOY	41	44	7/31/2007	Troy Tuckey	Mattaponi River, VA
M756Y	CB-late YOY	36	40	7/31/2007	Troy Tuckey	Mattaponi River, VA
M757Y	CB-late YOY	36	40	7/31/2007	Troy Tuckey	Mattaponi River, VA
M758Y	CB-late YOY	36	39	7/31/2007	Troy Tuckey	Mattaponi River, VA
M759Y	CB-late YOY	39	42	7/31/2007	Troy Tuckey	Mattaponi River, VA
M760Y	CB-late YOY	36	41	7/31/2007	Troy Tuckey	Mattaponi River, VA
M761Y	CB-late YOY	45	50	7/31/2007	Troy Tuckey	Mattaponi River, VA
M762Y	CB-late YOY	38	42	7/31/2007	Troy Tuckey	Mattaponi River, VA
M763Y	CB-late YOY	49	52	9/8/2007	Troy Tuckey	Mattaponi River, VA
M764Y	CB-late YOY	99	114	9/23/2007	Troy Tuckey	Mattaponi River, VA
M765Y	CB-late YOY	86	99	9/23/2007	Troy Tuckey	Mattaponi River, VA
M766Y	CB-late YOY	77	89	9/23/2007	Troy Tuckey	Mattaponi River, VA

P609Y	Chesapeake Bay	54		5/30/2006	Troy Tuckey	Pamunkey River, VA
P610Y	Chesapeake Bay	42		5/30/2006	Troy Tuckey	Pamunkey River, VA
P611Y	Chesapeake Bay	40		5/30/2006	Troy Tuckey	Pamunkey River, VA
P612Y	Chesapeake Bay	41		5/30/2006	Troy Tuckey	Pamunkey River, VA
P613Y	Chesapeake Bay	39		5/30/2006	Troy Tuckey	Pamunkey River, VA
P614Y	Chesapeake Bay	38		5/30/2006	Troy Tuckey	Pamunkey River, VA
P615Y	Chesapeake Bay	51		5/30/2006	Troy Tuckey	Pamunkey River, VA
P616Y	Chesapeake Bay	40		5/30/2006	Troy Tuckey	Pamunkey River, VA
P617Y	Chesapeake Bay	40		5/30/2006	Troy Tuckey	Pamunkey River, VA
P618Y	Chesapeake Bay	39		5/30/2006	Troy Tuckey	Pamunkey River, VA
P619Y	Chesapeake Bay	67		5/30/2006	Troy Tuckey	Pamunkey River, VA
P620Y	Chesapeake Bay	42		5/30/2006	Troy Tuckey	Pamunkey River, VA
P621Y	Chesapeake Bay	40		5/30/2006	Troy Tuckey	Pamunkey River, VA
P622Y	Chesapeake Bay	45		5/30/2006	Troy Tuckey	Pamunkey River, VA
P623Y	Chesapeake Bay	38		5/30/2006	Troy Tuckey	Pamunkey River, VA
P624Y	Chesapeake Bay	46		5/30/2006	Troy Tuckey	Pamunkey River, VA
P625Y	Chesapeake Bay	39		5/30/2006	Troy Tuckey	Pamunkey River, VA
P626Y	Chesapeake Bay	41		5/30/2006	Troy Tuckey	Pamunkey River, VA
Smi1	Gulf of Mexico				Joel Anderson	Texas
Smi2	Gulf of Mexico				Joel Anderson	Texas
Smi3	Gulf of Mexico				Joel Anderson	Texas
Smi4	Gulf of Mexico				Joel Anderson	Texas
Smi5	Gulf of Mexico				Joel Anderson	Texas
Smi6	Gulf of Mexico				Joel Anderson	Texas
Smi7	Gulf of Mexico				Joel Anderson	Texas
Smi8	Gulf of Mexico				Joel Anderson	Texas
Smi9	Gulf of Mexico				Joel Anderson	Texas
Smi10	Gulf of Mexico				Joel Anderson	Texas
Y627J	Chesapeake Bay	98		6/2/2006	Patrick Lynch	York River, VA
Y628J	Chesapeake Bay	157	165	8/20/2006	Andrij Horodysky	York River, VA
Y629J	Chesapeake Bay	120		6/2/2006	Patrick Lynch	York River, VA

Y630J	Chesapeake Bay	154	162	8/20/2006	Andrij Horodysky	York River, VA
Y631J	Chesapeake Bay	175		6/2/2006	Patrick Lynch	York River, VA
Y632J	Chesapeake Bay	177		10/12/2006	Patrick Lynch	York River, VA
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Y642J	Chesapeake Bay	180		10/12/2006	Patrick Lynch	York River, VA
Y643J	Chesapeake Bay	175		10/4/2006	Beth Condon	York River, VA
Y644J	Chesapeake Bay	191		10/4/2006	Beth Condon	York River, VA
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Y703Y	CB-early YOY	39	42	5/8/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y704Y	CB-early YOY	39	43	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
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Y706Y	CB-early YOY	43	47	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
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Y713Y	CB-early YOY	46	50	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y714Y	CB-early YOY	48	50	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y715Y	CB-early YOY	49	54	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y716Y	CB-early YOY	42	45	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA

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Y718Y	CB-early YOY	57	59	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y719Y	CB-early YOY	51	59	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y720Y	CB-early YOY	45	50	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y721Y	CB-early YOY	65	20	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y722Y	CB-early YOY	65	70	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y723Y	CB-early YOY	60	69	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y724Y	CB-early YOY	55	61	5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
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Y728J	CB-yearling	120		5/15/2007	Patrick Lynch	Timberneck Creek, York River, VA
Y729J	CB-yearling	115		5/19/2007	Patrick Lynch	Timberneck Creek, York River, VA
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Y733J	CB-yearling	159		6/1/2007	Patrick Lynch	Timberneck Creek, York River, VA
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Y748J	CB-yearling	83		6/10/2007	Patrick Lynch	Timberneck Creek, York River, VA
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Y768Y	CB-late YOY	94	99	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
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Y770Y	CB-late YOY	91	102	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
Y771Y	CB-late YOY	91	104	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
Y772Y	CB-late YOY	95	106	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
Y773Y	CB-late YOY	90	98	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
Y774Y	CB-late YOY	90	96	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
Y775Y	CB-late YOY	95	102	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA
Y776Y	CB-late YOY	97	107	9/20/2007	Patrick Lynch	Sarah's Creek; York River, VA

Appendix 2. Primer sequences, reagents, and PCR parameter optimizations used in the present study for mitochondrial and nuclear amplification of *Brevoortia* specimens.

Control Region

Pro-F: 5' CTA CCY CYA ACT CCC AAA GC 3' (K. Gray, unpublished)
Phe-R: 5' GTA AAG TCA CGA CCA AAC C 3' (Brendtro *et al*. 2008)

For each 10µL PCR reaction,

7.65µL sterile, filtered H_2O
1µL 10X PCR Buffer plus magnesium (Qiagen)
0.2µL 10mM dNTPs (Qiagen)
0.05µL of each 100 µM forward and reverse primer
0.05µL *Taq*, DNA polymerase (Qiagen)

1 cycle	94°C initial denaturation for 4 minutes
36 cycles	94°C denaturation for 1 minute
	54°C annealing for 1 minute
	72°C extension for 2 minutes
1 cycle	72°C extension for 5 minutes
Hold	4°C

COI

MenCOIF: 5' CTT TCG GCT ACA TGG GAA TG 3' (B. Tarbox, unpublished)
MenCOIR: 5' AGC CCT AGG AAG TGT TGT GG 3' (B. Tarbox, unpublished)

For each 10µL PCR reaction,

7.25µL sterile, filtered H_2O
1µL 10X PCR Buffer plus magnesium (Qiagen)
0.2µL 10mM dNTPs (Qiagen)
0.4µL BSA (bovine serum albumin; 1mg/mL)
0.05µL of each 100 µM forward and reverse primer
0.05µL *Taq*, DNA polymerase (Qiagen)

1 cycle	94°C initial denaturation for 4 minutes
36 cycles	94°C denaturation for 1 minute
	49.1°C annealing for 1 minute
	72°C extension for 2 minutes
1 cycle	72°C extension for 5 minutes
Hold	4°C

ITS-1

ITS-1: 5' GAG GAA GTA AAA GTC GTA ACA AGG 3' (K. Johnson, unpublished)
5.8SR1: 5' ATT CAC ATT AGT TCT CGC AGC TA 3' (K. Johnson, unpublished)

For each 10µL PCR reaction,

7.25µL sterile, filtered H_2O
1µL 10X PCR Buffer plus magnesium (Qiagen)
0.2µL 10mM dNTPs (Qiagen)
0.4µL BSA (bovine serum albumin; 1mg/mL)
0.05µL of each 100 µM forward and reverse primer
0.05µL *Taq*, DNA polymerase (Qiagen)

1 cycle	94°C initial denaturation for 4 minutes
36 cycles	94°C denaturation for 1 minute
	64.5°C annealing for 1 minute
	72°C extension for 2 minutes
1 cycle	72°C extension for 5 minutes
Hold	4°C

Microsatellites

For each 5µL PCR reaction,

2.78µL sterile, filtered H_2O
1 µL BSA (bovine serum albumin; 1mg/mL)
0.5µL 10X PCR Buffer without $MgCl_2$ (Invitrogen)
0.15µL 1.5mM Mg+ (Invitrogen)
0.1µL 10mM dNTPs (Qiagen)
0.01875µL 10µM T3 tailed forward primer
0.075µL 10µM reverse primer
0.05µL 10µM fluorescent label
0.025µL *Platinum Taq*, DNA polymerase (Invitrogen)

1 cycle	94°C initial denaturation for 3 minutes
36 cycles	94°C denaturation for 45 seconds
	variable °C annealing for 45 seconds*
	72°C extension for 45 seconds
1 cycle	72°C extension for 7 minutes
Hold	4°C

* Primers and annealing temperatures specific to each locus are listed in Table 1.

Appendix 3. **A)** Aligned mitochondrial control region sequence data, **B)** aligned mitochondrial cytochrome *c* oxidase subunit I (COI) sequence data, **C)** COI haplotypes, **D)** COI amino acid sequence data, **E)** aligned nuclear internal transcribed spacer 1 (ITS-1) sequence data, and **F)** allele scores for seven microsatellite loci (Aa16, Asa2, Asa4, AsaB020, AsaD055, AsaC334, SarBH04) collected from *Brevoortia* specimens.

A) Aligned mitochondrial control region sequence data collected from 28 *Brevoortia* specimens.

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B) Aligned mitochondrial cytochrome *c* oxidase subunit I (COI) sequence data collected from 389 *Brevoortia* specimens.

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SH727Y TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
Y701Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
P618Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
P617Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
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M761Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
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D707Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
D622Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
E723Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
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AS605J TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
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M602Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
A606Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
P612Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
D618Y  TTTGGGGTTATGTTCGTGGGGGTAAATCTAACTTTCTTC [459]
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C) Cytochrome *c* oxidase subunit I (COI) haplotypes from 389 *Brevoortia* specimens coded by region and sample.

Haplotype Code:	***B. smithi***	***B. gunteri***	***B. patronus***	***B. tyrannus***
	X			
		X		
			X	
				X
			X	X
	X	X		
	X			X
		X		X
	X	X		X
	X		X	X

haplotypes	haplotypes	haplotypes	haplotypes	haplotypes
1	30	59	88	117
2	31	60	89	118
3	32	61	90	119
4	33	62	91	120
5	34	63	92	121
6	35	64	93	122
7	36	65	94	123
8	37	66	95	124
9	38	67	96	125
10	39	68	97	126
11	40	69	98	127
12	41	70	99	128
13	42	71	100	129
14	43	72	101	130
15	44	73	102	131
16	45	74	103	132
17	46	75	104	133
18	47	76	105	134
19	48	77	106	135
20	49	78	107	136
21	50	79	108	137
22	51	80	109	138
23	52	81	110	139
24	53	82	111	140
25	54	83	112	141
26	55	84	113	142
27	56	85	114	143
28	57	86	115	144
29	58	87	116	145

haplotype	sample
1	SMI23
2	GUN25
3	GUN15
3	GUN19
3	GUN24
3	Gun3
3	Gun7
4	GUN11
5	Gun10
5	SMI14
6	GUN17
7	GUN14
8	Gun8
8	Smi2
9	Gun9
10	Gun5
11	GUN12
11	GUN13
11	GUN16
11	GUN21
11	Smi1
11	SMI15
11	SMI16
11	SMI18
11	SMI19
11	SMI24
11	SMI25
12	SMI21
13	GUN18
13	GUN23
14	GUN20
15	Smi10
16	E717Y
16	SMI20
17	GUN22
17	smi11
17	SMI22
18	SMI13
19	SMI12
20	D705Y
20	SMI17
21	E715Y
22	AS603J
23	E705Y
24	Gun4
25	A615Y
25	AS613J
26	Y729J
27	SH708Y

haplotype	sample
28	M764Y
29	D725Y
29	Y639J
30	A621Y
30	A622Y
30	CH737J
30	D603Y
30	D702Y
30	D703Y
30	Gun6
30	M605Y
30	SH718Y
30	Y707Y
30	Y711Y
30	Y719Y
30	Y745J
31	E721Y
31	GH701Y
31	M763Y
32	D723Y
33	P622Y
34	Smi8
35	D708Y
35	D712Y
35	E707Y
35	P620Y
35	Y720Y
35	Y725Y
36	Gun1
36	Gun2
36	P621Y
36	SH723Y
36	SH729Y
36	Smi5
36	Smi9
36	Y747J
37	AS608J
38	CH731J
39	Y721Y
40	AS612J
40	D701Y
40	Y716Y
40	Y738J
41	Y637J
42	Smi3
43	E624Y
44	E722Y
45	D626Y
46	A607Y

haplotype	sample
46	A612Y
46	A613Y
46	A616Y
46	AS602J
46	AS607J
46	CH726J
46	CH727J
46	CH728J
46	CH734J
46	CH735J
46	CH736J
46	CH740J
46	D611Y
46	D614Y
46	D624Y
46	D722Y
46	D724Y
46	D726Y
46	D727Y
46	E703Y
46	E704Y
46	E708Y
46	E712Y
46	GH703Y
46	M601Y
46	M751Y
46	M753Y
46	M754Y
46	M756Y
46	M759Y
46	P609Y
46	P613Y
46	P623Y
46	SH706Y
46	SH709Y
46	SH713Y
46	SH719Y
46	Y628J
46	Y642J
46	Y703Y
46	Y709Y
46	Y710Y
46	Y712Y
46	Y714Y
46	Y727J
46	Y732J
46	Y733J
46	Y773Y
46	Y776Y

haplotype	sample
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47	D709Y
47	E706Y
48	D610Y
48	M760Y
49	A617Y
50	E720Y
51	D706Y
52	G720Y
53	Y640J
54	P625Y
55	G723Y
55	Y748J
56	D711Y
56	D718Y
56	E711Y
56	G713Y
56	M603Y
56	Y734J
57	Y636J
58	P619Y
58	Y629J
58	Y635J
59	Y713Y
60	P615Y
60	P626Y
61	G614Y
62	D616Y
63	D608Y
64	E701Y
65	E623Y
66	Y724Y
67	A620Y
68	D601Y
69	A609Y
70	G604Y
71	G703Y
71	M757Y
71	P616Y
71	Y627J
71	Y774Y
72	Y632J
73	AS604J
74	D721Y
75	D620Y
76	AS611J
77	D606Y
77	M604Y
78	E716Y

haplotype	sample
78	SH722Y
79	D612Y
80	E627J
81	AS614J
81	E628J
81	E714Y
81	G712Y
81	SH705Y
81	Smi4
81	Y641J
81	Y643J
81	Y737J
82	Y706Y
83	G718Y
84	M767Y
85	AS610J
85	G602Y
85	G704Y
85	G721Y
86	G710Y
87	M766Y
87	Y771Y
88	A611Y
89	G624Y
90	A608Y
90	Smi6
91	Y739J
92	D704Y
93	G605Y
94	E724Y
95	G601Y
96	Y728J
97	Y749J
98	SH710Y
99	A603Y
99	D604Y
100	Y722Y
101	E709Y
102	CH732J
102	G702Y
102	G709Y
102	SH724Y
102	Y638J
102	Y742J
102	Y750J
103	A604Y
104	P614Y
104	P624Y
105	G708Y

haplotype	sample
106	A610Y
106	Y634J
107	SH707Y
108	D619Y
109	E713Y
110	CH738J
111	CR620J
112	D602Y
112	D625Y
112	Y735J
112	Y743J
113	E719Y
113	M606Y
114	Y704Y
115	E625J
115	SH721Y
116	G608Y
116	G622Y
117	SH717Y
118	E702Y
119	E626J
120	D627Y
121	E710Y
121	G701Y
121	G716Y
121	M758Y
121	Y768Y
122	C618J
122	CH730J
122	D717Y
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123	E725Y
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123	G714Y
123	GH702Y
123	M607Y
123	M765Y
123	SH712Y

haplotype	sample
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124	AS606J
124	P611Y
125	G611Y
126	G617Y
126	G619Y
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127	G603Y
128	CH741J
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137	G610Y
138	D716Y
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141	G707Y
141	SH728Y
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142	D617Y
142	D621Y
142	D622Y
142	D707Y
142	D710Y
142	D714Y
142	D720Y
142	E723Y
142	G606Y
142	G607Y

haplotype	sample
142	G609Y
142	G612Y
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142	G705Y
142	G706Y
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142	G725Y
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142	SH716Y
142	SH727Y
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142	Y708Y
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142	Y723Y
142	Y730J
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142	Y736J
142	Y740J
142	Y741J
142	Y744J
142	Y769Y
142	Y770Y
142	Y772Y
143	A623Y
143	M602Y
144	A606Y
145	D618Y
145	P612Y

D) Aligned mitochondrial cytochrome *c* oxidase subunit I (COI) amino acid sequence data collected from 389 *Brevoortia* specimens.

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E) Aligned nuclear internal transcribed spacer 1 (ITS-1) sequence data collected from 12 × 5 clones of *Brevoortia* specimens with outgroup *Gadus morhua*.

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smithiD      GTGC-GTTCGAAGGG-TCGATGATCAATGTGTCCTGCAATTCACATTAATTCTCGCAGCT [58]
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G622YA       AGCTGCGTTCTTCATC-GACGCACGAGCCGAG-TGATCCACCGCTAAGAGTTGTACTCTT [116]
E626YE       AGCTGCGTTCTTCATC-GACGCACGAGCCGAG-TGATCCACCGCTAAGAGTTGTACTCTT [116]
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gunteriD     TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACGAACAGGGCGCG--GGTTGCAGCCT [172]
gunteriA     TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACGAACAGGGCGCG--GGTTGCAGCCT [172]
Y634JE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
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smithiD      TGTTTGA-TTCGTTTGGGCCCTC-GAACCGGAGACGACCAGGGTGCG--GGTT--AGCTT [170]
smithiC      TGTTTGA-TTCGTTTGGGCCCTC-GAACCGGAGACGACCGGGGTGCG--GGTT--AGCTT [170]
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smithiA      TGTTTGA-TCGGTTTGGGCCCTC-GAACCGGAGACGACCAGGGTGCG--GGTT--AGCCT [170]
P613YE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
AS603JB      TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCAT [170]
AS603JA      TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCAT [170]
A608YE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCCT [170]
A608YD       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCCT [171]
A608YC       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCCT [170]
A608YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCCT [170]
A608YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGCG--GGTT--AGCCT [170]
A607YE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
A607YD       TGTTTGA-TCTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGTTT [170]
A607YC       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
A607YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]
A607YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
P613YD       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
P613YC       TGTTCGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
P613YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
P613YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
gunteriE     TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACGAACAGGGCGCG--GGTTGCAGCCT [172]
gunteriC     TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACGAACAGGGCGCG--GGTTGCAGCCT [172]
E625YC       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGCG--GGTT--AGCTT [170]
E625YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGCG--GGTT--AGCTT [170]
E625YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
Y634JA       TGTTTGG-TTCGTTTAGGCCCTT-GAACCGGAGACGAAAAGGGTGTGAGGGTTAGAGTCT [174]
D614YE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
D614YD       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]
D614YC       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
D614YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
D614YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
D610YE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]
D610YD       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]
D610YC       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
D610YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
E626YC       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
E626YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
E626YD       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
E626YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
E625YE       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGCG--GGTT--AGCTT [170]
E625YD       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
AS603JD      TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCAT [170]
D610YA       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
AS603JE      TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCAT [170]
G622YD       TGTTTGAGTTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]
G622YC       TGTTTGAGTTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]
G622YB       TGTTTGA-TTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
G622YA       TGTTTGA-TCTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [170]
E626YE       TGTTTGATTTTGTTTGGGCCCTT-GAACCGGAGACAAACAGGGTGTG--GGTT--AGCTT [171]

Gadus_morhua CGGGGCTAACCCACAGGCGCCGCGCCACACCACACCCCGTGGCCCGACGCGGTCATGAAC [222]
G622YE       CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
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gunteriB      CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGACGGAGGTC [232]
gunteriD      CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [232]
gunteriA      CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [232]
Y634JE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
Y634JD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
smithiE       CTGACCGAGCGCCCCGGGTCGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
smithiD       CTGACCGAGCGCCCCGGGTCGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
smithiC       CTGACCGAGCGCCCCGGGTCGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
smithiB       CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [229]
Y634JB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
Y634JC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
smithiA       CTGACCGAGCGCCCCGGGTCGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
P613YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
AS603JB       CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
AS603JA       CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A608YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A608YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGCC [231]
A608YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A608YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A608YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A607YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A607YD        CTGACCGAGCGCCCCGGGTGGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A607YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
A607YB        CTGACCGTGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
A607YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
P613YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
P613YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
P613YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
P613YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
gunteriE      CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [232]
gunteriC      CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [232]
E625YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E625YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E625YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
Y634JA        TTGACCGAGCGCCCCGGGCTGGGGGAACTTTAAGCCGCCCGCCGGGGCTCACCAGAGGTC [234]
D614YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
D614YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
D614YC        CTGACCGAGCGCCACGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
D614YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
D614YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
D610YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
D610YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
D610YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
D610YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E626YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E626YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E626YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E626YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E625YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E625YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
AS603JD       CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
D610YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
AS603JE       CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
G622YD        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
G622YC        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]
G622YB        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
G622YA        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [230]
E626YE        CTGACCGAGCGCCCCGGGTTGGGGGAACTTTAAGCCGCCCGCCGAGGCGTGCCGGAGGTC [231]

Gadus_morhua CCCTCGCCCACCTG-CGTGACAGGCGGGAGAGTGT--GTTAGGGTACCTGCGAGCGCACA [279]
G622YE        CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCAGCCCCCTCCGGAGA [287]
gunteriB      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [289]
gunteriD      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGTCCCCTCCGGAGA [289]
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gunteriA     CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGTCCCCTCCGGAGA [289]
Y634JE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
Y634JD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
smithiE      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
smithiD      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
smithiC      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
smithiB      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [286]
Y634JB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
Y634JC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
smithiA      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
P613YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
AS603JB      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
AS603JA      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
A608YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
A608YD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
A608YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
A608YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
A608YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCAGCCCTCTCCCAAAA [287]
A607YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
A607YD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCTGTCGGCCCCCTCCGGAGA [287]
A607YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
A607YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
A607YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
P613YD       CCCTCTCGGGGTCC-TCCGCCCCGGCAGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
P613YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
P613YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
P613YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
gunteriE     CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCTGTCGGTCCCCTCCGGAGA [289]
gunteriC     CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGTCCCCTCCGGAGA [289]
E625YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E625YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E625YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
Y634JA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACCCGGTCAGCCCCCTCCAGAGA [291]
D614YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
D614YD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGG [288]
D614YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
D614YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
D614YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCAGTCGGCCCCCTCCGGAGA [287]
D610YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
D610YD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
D610YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
D610YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E626YC       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E626YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E626YD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E626YA       CCCTCTCGGGGTCC-TCCGCCACGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E625YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E625YD       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
AS603JD      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
D610YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
AS603JE      CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
G622YD       CCCTCTCGGGGTCC-TCCGCCCCAGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
G622YC       CCCTCTCGGGGTCC-TCCGCCCCAGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]
G622YB       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
G622YA       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [287]
E626YE       CCCTCTCGGGGTCC-TCCGCCCCGGCGGAGTTGGT--ACTCGGTCGGCCCCCTCCGGAGA [288]

Gadus_morhua G--TGGTTCGGTCAGGTCGACACCGAGCTGCGCTTAGTTTTGTCCG--AGCAAAGCGGGG [335]
G622YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
gunteriB     G---GGGGCTTTTGGGTGAGTTCC-GGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
gunteriD     G---GGGGCTTTTGGGTGAGTTCCTGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [344]
gunteriA     G---GGGGCTTTTGGGTGAGTTCCTGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [344]
Y634JE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
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Y634JD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
smithiE      G---GGGGCTTTTGGGTGAGTTCC-GGGTAGCTTTTCACCCGCCGA--AGCGGAGCGAAA [341]
smithiD      G---GGGGCTTTTGGGTGAGTTCC-GGGTAGCTTTTCACCCGCCGA--AGCGGAGCGAAA [341]
smithiC      G---GGGGCTTTTGGGTGAGTTCC-GGGTAGCTTTTCACCCGCCGA--AGCGGAGCGAAA [341]
smithiB      G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [341]
Y634JB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
Y634JC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
smithiA      G---GGGGCTTTGGGGTGAGTTCC-GGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [341]
P613YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGGGCGAAA [342]
AS603JB      G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
AS603JA      G---GGGGCCTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
A608YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
A608YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
A608YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
A608YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
A608YA       GA-CGGGGCTTTTCAGTGAGTTCCCGGGTAGCTTTTCACCCGCCGA--AGCGGAGCGAAA [344]
A607YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
A607YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCCCCCGCCGA--AGCGGAGAGAAA [342]
A607YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
A607YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
A607YA       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
P613YD       G---GGGGCTTTTGGGTGAGTCCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
P613YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
P613YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
P613YA       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
gunteriE     G---GGGGCTTTTGGGTGAGTTCCTGGGTAGCTTTTCGCCCGCCGA--AGCAGAGCGAAA [344]
gunteriC     G---GGGGCTTTTGGGTGAGTTCCTGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [344]
E625YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E625YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E625YA       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
Y634JA       G---GGGGCTTTTCAGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [346]
D614YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
D614YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
D614YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCCTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
D614YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
D614YA       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
D610YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
D610YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
D610YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
D610YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E626YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E626YB       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E626YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E626YA       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E625YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCCTTTCGCCCCCCGA--AGCGGAGCGAAA [342]
E625YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
AS603JD      G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
D610YA       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
AS603JE      G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
G622YD       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
G622YC       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]
G622YB       G---GGGGCTTTTGGTTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
G622YA       G---GGGGCTTTTGGTTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [342]
E626YE       G---GGGGCTTTTGGGTGAGTTCCCGGGTAGCTTTTCGCCCGCCGA--AGCGGAGCGAAA [343]

Gadus_morhua GGCGAG-ACCCGGTCTCCCAGCTACGGCACTCCAGTTAGGGCCTCCCCAGACGCC-TGCA [393]
G622YE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
gunteriB     AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [390]
gunteriD     AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTTG [391]
gunteriA     AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTTG [391]
Y634JE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [389]
Y634JD       AAAAA--AGAGGGG-----AGGGAGGGAACCAGAG---AGACCGAGGCGG--GCC-CGCG [389]
smithiE      AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [388]
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smithiD      AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [388]
smithiC      AAAAA---GAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [387]
smithiB      AAAAA--AGAGGGG-----AGGGAGGGAACCAGAG---AGACCGAGGCGG--GCC-CGCG [388]
Y634JB       AAAAAA-AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]
Y634JC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [390]
smithiA      AAAAA--AGAGGGG-----AGGGAGGGAACCAGAG---AGACCGAGGCGG--GCC-CGCG [388]
P613YE       AAAAA--AGAGGGG-----AGGGAAGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
AS603JB      AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [389]
AS603JA      AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [389]
A608YE       AAAAA---GAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [388]
A608YD       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]
A608YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
A608YB       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
A608YA       AAAAA----AGGCG-----ACGGAGGGAAC-GGAG---AGACCGAGGCGA--GCC-TGCG [388]
A607YE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
A607YD       AAAAA--AGAGGGG-----AGGGAGGGAACCAGAG---AGACCGAGGCGG--GCC-CGCG [389]
A607YC       AAAAA--AGAGGGG-----AGGGAGGGAACCAGAG---AGACCGAGGCGG--GCC-CGCG [389]
A607YB       AAAAA--AGAGGGG-----AGGGAGGGAACCAGAG---AGACCGAGGCGG--GCC-CGCG [390]
A607YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
P613YD       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
P613YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
P613YB       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
P613YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
gunteriE     AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTTG [391]
gunteriC     AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTTG [391]
E625YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
E625YB       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
E625YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
Y634JA       ATAAA--AGAGGGG-----AGGGAGGGAACCCGAG---AGACCGAGGCGG--GCC-TGCG [393]
D614YE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [389]
D614YD       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [390]
D614YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
D614YB       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [389]
D614YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
D610YE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]
D610YD       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]
D610YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
D610YB       AAAAA-----GGCG-----ACGGAGGGAAC-GGAG---AGACCGAGGCGA--GCC-TGCG [385]
E626YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
E626YB       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
E626YD       AAAA---AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [388]
E626YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
E625YE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGTGG--GCC-CGCG [389]
E625YD       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
AS603JD      AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [389]
D610YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [389]
AS603JE      AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CTCG [389]
G622YD       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]
G622YC       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]
G622YB       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [389]
G622YA       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CACG [389]
E626YE       AAAAA--AGAGGGG-----AGGGAGGGAACCGGAG---AGACCGAGGCGG--GCC-CGCG [390]

Gadus_morhua CCGCGTGCTCTGTCAGACCTCA--GAGAA-CGCCGC--GTCACAGTGCGGTCCGGGGTGG [448]
G622YE       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
gunteriB     CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [435]
gunteriD     CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [436]
gunteriA     CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [436]
Y634JE       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
Y634JD       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
smithiE      CCCCTACCTC----GGTCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [433]
smithiD      CCCCTACCTC----GGTCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [433]
smithiC      CCCCTACCTC----GGTCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [432]
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smithiB      CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [433]
Y634JB       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
Y634JC       CCCCTACCTCA---AGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [438]
smithiA      CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [433]
P613YE       CCCCTACCTCA---AGCCCCCG--CCGAC-CGCC------CTTCGCTCACCCTCGTGTGT [437]
AS603JB      CCCCTACCTCA---AGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
AS603JA      CCCCTACCTCA---AGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
A608YE       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTCTGT [433]
A608YD       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTCTGT [435]
A608YC       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
A608YB       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTCTGT [434]
A608YA       CCCCTACCTC----GGCCCCC----CGG---ACC------CTCCGCTCACCCTCGTCTGT [431]
A607YE       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
A607YD       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
A607YC       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
A607YB       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [435]
A607YA       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
P613YD       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
P613YC       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
P613YB       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCTTCGTGTGT [434]
P613YA       CCCCTACCTCA---AGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
gunteriE     CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [436]
gunteriC     CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCGCCCTCGTCCGT [436]
E625YC       CCCCTACCTCA---GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
E625YB       CCCCTACCTCA---GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
E625YA       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
Y634JA       CCCCTACCTCA---GCCCCCC----CAGT-CGCC------CTCTGCTCACCCTCGTCTGT [439]
D614YE       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
D614YD       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
D614YC       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
D614YB       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
D614YA       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
D610YE       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
D610YD       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
D610YC       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
D610YB       CCCCTACCTC----GGCCCCC----CGG---ACC------CTCCGCTCACCCTCGTCTGT [428]
E626YC       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
E626YB       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGCGTGT [436]
E626YD       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [435]
E626YA       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
E625YE       CCCCTACCTCA---GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
E625YD       CCCCTACCTCA---GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
AS603JD      CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
D610YA       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [436]
AS603JE      CCCCTACCTCA---AGCCCC----CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [435]
G622YD       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
G622YC       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]
G622YB       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
G622YA       CCCCTACCTC----GGCCCCC----CGGC-CGCC------CTCCGCTCACCCTCGTGTGT [434]
E626YE       CCCCTACCTC----GGCCCCCG--CCGGC-CGCC------CTCCGCTCACCCTCGTGTGT [437]

Gadus_morhua GCTGGTAGGGGGGCTTACGTGGCAGTGCGCAGCCGGTCGG--GATTCACACCCCTCCCAA [506]
G622YE       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
gunteriB     GGCACCAGACCCTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [493]
gunteriD     GGCACCAGACACTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
gunteriA     GGCACCAGACACTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
Y634JE       GGCACTAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
Y634JD       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
smithiE      GGTACCAGACCCTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [491]
smithiD      GGTACCAGACCCTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [491]
smithiC      GGTACCAGACCCCCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [490]
smithiB      GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [491]
Y634JB       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
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Y634JC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [496]
smithiA       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [491]
P613YE        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
AS603JB       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
AS603JA       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
A608YE        GGTACTAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [491]
A608YD        GGTACTAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [493]
A608YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
A608YB        GGTACTAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
A608YA        GGTTC-CGACACCTCGGCAGCCCGAGACGGGCCTCCCCG---CACTCGTGCGCGTACCGT [487]
A607YE        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
A607YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
A607YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
A607YB        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [493]
A607YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
P613YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
P613YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
P613YB        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
P613YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
gunteriE      GGCACCAGACACTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
gunteriC      GGCACCAGACACTCCGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
E625YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
E625YB        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
E625YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
Y634JA        GGTCC-TGACACTTCTGCAGCCCAAGGCGGGCCTCCCCA---CACTCGTGCATGTACCGT [495]
D614YE        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
D614YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
D614YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
D614YB        GGTAC-AGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [491]
D614YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
D610YE        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
D610YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
D610YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
D610YB        GGTTC-CGACACCTCGGCAGCCCGAGACGGGCCTCCCCG---CACTCGTGCGCGTACCGT [484]
E626YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
E626YB        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
E626YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [493]
E626YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
E625YE        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
E625YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCTCGA--CACTCGTGCGCGTACCGT [495]
AS603JD       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
D610YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [494]
AS603JE       GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [493]
G622YD        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
G622YC        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]
G622YB        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGT--CACTCGTGCGCGTACCGT [492]
G622YA        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [492]
E626YE        GGTACCAGACCCTCTGGCAGCCCGAGGCGGGCCTCCCCGA--CACTCGTGCGCGTACCGT [495]

Gadus_morhua CGATCGCTCGGGAGGTTGAGAGGTT---TCCTCGGGGAGAGCGGTGGTCTCGGGTGTCGG [563]
G622YE        TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
gunteriB      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [543]
gunteriD      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
gunteriA      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
Y634JE        TAATGATCCT-----TCCGCAGGTT---CACCTACGGGAACC--TTGTTACGACTTTTAC [542]
Y634JD        TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
smithiE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [541]
smithiD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [541]
smithiC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [540]
smithiB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [541]
Y634JB        TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
Y634JC        TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [546]
smithiA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [541]
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P613YE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
AS603JB      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
AS603JA      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
A608YE       TAATGATCCC-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [541]
A608YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [543]
A608YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
A608YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
A608YA       CAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [537]
A607YE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
A607YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
A607YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
A607YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [543]
A607YA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
P613YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
P613YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
P613YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
P613YA       TAATGGTCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
gunteriE     TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
gunteriC     TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
E625YC       TAATGATCCT-----CCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
E625YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
E625YA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
Y634JA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
D614YE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
D614YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
D614YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
D614YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [541]
D614YA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
D610YE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
D610YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
D610YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
D610YB       CAATGATCCT-----TCCGCAGGTT---CACCCACGGAAACC--TTGTTACGACTTTTAC [534]
E626YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
E626YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
E626YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [543]
E626YA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
E625YE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
E625YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
AS603JD      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
D610YA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [544]
AS603JE      TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [543]
G622YD       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
G622YC       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]
G622YB       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
G622YA       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [542]
E626YE       TAATGATCCT-----TCCGCAGGTT---CACCTACGGAAACC--TTGTTACGACTTTTAC [545]

Gadus_morhua CCCGTC [569]
G622YE       TTCCTC [550]
gunteriB     TTCCTC [549]
gunteriD     TTCCTC [550]
gunteriA     TTCCTC [550]
Y634JE       TTCCTC [548]
Y634JD       TTCCTC [548]
smithiE      TTCCTC [547]
smithiD      TTCCTC [547]
smithiC      TTCCTC [546]
smithiB      TTCCTC [547]
Y634JB       TTCCTC [551]
Y634JC       TTCCTC [552]
smithiA      TTCCTC [547]
P613YE       TTCCTC [551]
AS603JB      TTCCTC [551]
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AS603JA	TTCCTC	[551]
A608YE	TTCCTC	[547]
A608YD	TTCCTC	[549]
A608YC	TTCCTC	[550]
A608YB	TTCCTC	[548]
A608YA	TTCCTC	[543]
A607YE	TTCCTC	[548]
A607YD	TTCCTC	[548]
A607YC	TTCCTC	[548]
A607YB	TTCCTC	[549]
A607YA	TTCCTC	[550]
P613YD	TTCCTC	[550]
P613YC	TTCCTC	[550]
P613YB	TTCCTC	[548]
P613YA	TTCCTC	[551]
gunteriE	TTCCTC	[550]
gunteriC	TTCCTC	[550]
E625YC	TTCCTC	[551]
E625YB	TTCCTC	[551]
E625YA	TTCCTC	[550]
Y634JA	TTCCTC	[551]
D614YE	TTCCTC	[548]
D614YD	TTCCTC	[551]
D614YC	TTCCTC	[550]
D614YB	TTCCTC	[547]
D614YA	TTCCTC	[550]
D610YE	TTCCTC	[551]
D610YD	TTCCTC	[551]
D610YC	TTCCTC	[550]
D610YB	TTCCTC	[540]
E626YC	TTCCTC	[550]
E626YB	TTCCTC	[550]
E626YD	TTCCTC	[549]
E626YA	TTCCTC	[550]
E625YE	TTCCTC	[551]
E625YD	TTCCTC	[551]
AS603JD	TTCCTC	[548]
D610YA	TTCCTC	[550]
AS603JE	TTCCTC	[549]
G622YD	TTCCTC	[551]
G622YC	TTCCTC	[551]
G622YB	TTCCTC	[548]
G622YA	TTCCTC	[548]
E626YE	TTCCTC	[551]

F) Allele scores for seven microsatellite loci collected from 389 *Brevoortia* specimens.

	Asa2		Asa4		Aa16		AsaB020		AsaD055		AsaC334		SarBH04	
A601Y	222	222	168	171	139	147	151	163	286	290	134	142	211	211
A602Y	222	225	171	171	151	155	151	154	270	270	130	130	211	211
A603Y	222	225	171	171	153	155	154	154	278	290	130	130	181	213
A604Y	216	222	174	180	153	155	157	181	258	286	130	130	181	211
A605Y					153	153	154	169	262	274	130	130	181	209
A606Y	222	225	171	186	153	155	148	157	286	302	126	138	211	211
A607Y	222	225	171	174	139	151	157	157	262	278	134	134	211	211
A608Y	222	222	171	171	153	155	145	160	290	298	130	138	211	215
A609Y	225	225	171	183	151	155	142	151	286	302	126	130	181	181
A610Y	225	228	168	171	153	153	151	166	254	254	130	130	209	211
A611Y			171	174	153	155	148	157	262	262	130	130	181	211
A612Y	225	225	168	174	151	153	145	160	278	286	134	134	211	211
A613Y	225	228	168	174	139	139	145	151	262	302	130	130	205	211
A614Y	222	222			153	155	157	157						
A615Y	222	225	168	168	153	153	154	154	286	286	130	134	211	211
A616Y	222	225	168	174	153	153	151	160	274	274	126	130	209	211
A617Y	216	222	171	171	153	155	151	169	270	270	130	134	205	209
A618Y	222	222	168	168	139	153	163	166	254	282	130	138	179	181
A619Y	222	222	168	168	153	153	154	157	282	302	130	138	181	207
A620Y	225	228	171	174	151	153	157	184			130	130	181	209
A621Y			168	174	153	153	151	151	274	314	130	134	211	211
A622Y	222	222	171	192	139	151	151	166	270	286	130	130	209	209
A623Y	216	228	171	174	153	153	148	163	262	262	130	130	209	211
A624Y	216	222	171	174	151	153	148	148	270	290	130	142	181	211
A625Y	216	225	174	174	151	153	157	172	286	298	130	130	207	211
AS601J	216	222	180	201	151	155	157	187	270	278	130	134	209	211
AS602J	222	237	171	171	139	153	154	157	274	294	122	130	181	181
AS603J	222	222	180	195	153	153	145	151	298	302	126	138	181	205
AS604J	216	225					148	163	274	282	130	130	181	211

AS605J	222	222			139	153	148	163	286	302	126	130	211	215
AS606J	222	222	168	177	139	153	145	169	238	238	130	134	209	211
AS607J	225	225	171	177	143	155	166	169	254	294	130	130	209	211
AS608J	222	222			155	155	142	157	270	278	130	134	181	211
AS609J			174	177	139	153	157	157	290	290	130	130	203	211
AS610J	222	225			151	153	151	157	290	290	130	134	211	211
AS611J	222	228	168	168	153	155	154	157	282	302	130	134	209	209
AS612J	216	219	168	174	153	153	145	154	274	282	134	134	211	211
AS613J	216	222	171	174	153	155	145	154	262	286	130	130	205	211
AS614J	222	225	168	174	153	153	160	184	286	290	130	130	181	209
AS615J	222	231	174	177	151	155	151	160	254	286	130	130	209	209
AS616J	216	222	168	171	139	153	145	184	274	274	130	134	199	211
C617J	216	222			153	153	151	157	290	294	130	130	211	211
C618J	222	222	168	171	151	153	148	151	286	294	130	134	181	209
C619J	222	228	165	177	153	155	145	163	274	298	134	134	181	211
CH726J	225	225	174	192	153	153	160	160	282	290	134	134	179	179
CH727J	216	222	168	183	151	155	163	172	294	314	126	134	179	211
CH728J	222	222	171	180	139	153	133	157	270	294	130	130	211	211
CH729J	222	237			139	151	157	157	278	290	118	134		
CH730J	222	222	168	171	151	155	145	160	274	290	130	134	179	179
CH731J	222	225	171	177	139	151	142	181	286	298	134	134	211	211
CH732J	228	231	180	186	153	153	145	157	282	298	130	130	203	205
CH733J	222	222	165	174	155	155	151	163	262	290	130	138	179	179
CH734J	216	222			139	153	145	145	266	274	130	134		
CH735J	219	225	168	171	153	153	163	175	286	290	126	130		
CH736J	222	228	171	174	151	153	136	169	270	286	130	134	211	211
CH737J	222	225	177	183	155	155	157	160	286	314	130	134		
CH738J	225	225	171	171	153	153	145	166	274	298	130	134	211	213
CH739J	216	225			153	155	148	160	238	290	130	130		
CH740J	228	231	177	177	147	151	154	163	254	270	130	130		
CH741J	216	231			153	153	181	184	278	290	134	134		
CR620J	216	222	171	180	153	153	136	160	290	310	126	130	209	209

CR621J	216	222	171	180	151	155	151	172	254	282	130	130	209	209
D601Y	222	222	165	177	151	151	148	154	274	302	130	130	209	211
D602Y							145	151	254	286	130	130	211	213
D603Y	216	222	177	177	151	155	151	178	270	326	130	130	211	219
D604Y	222	225	174	177	139	155	169	178	286	310	130	130	211	211
D605Y	222	222	168	174	153	153	151	166	278	282	134	134	209	213
D606Y	216	216	162	174	151	153	151	160	274	302	130	138	181	203
D607Y	222	222	171	177	151	153	148	160	294	314	122	130	211	221
D608Y	225	225	174	189	151	155	136	145	254	294	126	130	181	211
D609Y	225	225	168	171	153	153			286	290	130	130	211	211
D610Y	222	234	168	171	153	153			278	278			211	211
D611Y	222	222			153	155					130	134	209	209
D612Y	216	222	168	174	139	153	163	184			130	134	205	209
D613Y	222	222			153	153	133	172			130	130		
D614Y	216	228	168	171	153	153	148	157			130	130	181	211
D615Y	222	222	171	180	151	155	145	148			130	130	209	209
D616Y	222	225	171	174	153	153	142	175			130	134	209	211
D617Y	222	222	171	180	139	155	157	160			130	134	209	211
D618Y	222	228	168	174	151	155	157	157			130	134	195	209
D619Y	222	225	171	177	153	155	145	163			134	134	211	211
D620Y	216	222	171	171	151	153	151	151	294	302	130	130	179	209
D621Y	222	222	174	174	153	153	148	160	274	274	130	130	181	211
D622Y	216	216	171	180	153	153	148	163	254	286	130	130	181	209
D623Y	216	225	171	177	153	153	154	193	254	274	130	130	199	199
D624Y	222	222	183	222	151	153	148	148	298	302	130	130	181	211
D625Y	222	222	168	168	153	155	148	148	286	302	130	130	209	211
D626Y	222	222	174	183	153	153	145	181			130	130	209	211
D627Y	225	228	171	177	151	151	145	151	294	298	130	134	209	211
D701Y	222	222	171	174	153	155	148	184	262	262	130	134		
D702Y	219	225	171	174	151	153	154	169			126	130	211	221
D703Y	225	231	180	180	153	155	136	157			130	134	181	209
D704Y	222	225	177	180	139	155	133	172	294	298	130	134	209	209

D705Y	216	222	174	174	153	153	151	154	278	302	130	130	181	211
D706Y	213	216	174	177	139	153	145	151	282	286	130	134	181	215
D707Y	222	225	168	183	153	155	145	148			130	134	209	215
D708Y	216	222			139	153	145	148	282	290	126	130	211	211
D709Y	225	228	171	183	153	153	145	163	282	290	130	130	209	211
D710Y			171	174	153	153	148	160			130	130	213	221
D711Y	222	225	177	180	153	155	145	151			130	130	211	211
D712Y	225	225	174	180	151	153	145	148	286	290	130	130	209	211
D714Y	222	231	171	195	139	151	148	160	270	282	130	130	181	211
D716Y	222	228	174	189	153	153	130	145	270	282	130	134	209	209
D717Y	216	225	174	174	151	153	130	154	278	286	134	134	203	209
D718Y	222	222	168	174	153	155	148	157	270	274	130	134	209	209
D719Y	216	222	177	177	153	153	148	184	294	298	126	130	181	209
D720Y	222	222	165	165	155	155	148	184	254	278	130	130	209	209
D721Y	225	231	171	174	147	151	145	145	282	294	130	134	181	211
D722Y	222	222	171	174	153	155	151	163	282	294	130	130	181	181
D723Y	222	222	174	180	153	153	151	157	282	302	126	130	209	215
D724Y	216	231	180	201	153	153	142	166	282	302	130	130	211	211
D725Y	222	225			153	153	154	169	286	290	126	130	181	199
D726J	222	222	168	171	139	153	148	151	290	294	130	130		
D727J	222	222	174	183	151	153	130	151			130	130	209	211
E622Y	222	222	171	174	139	155	145	145	286	290			205	211
E623Y	222	222	168	168	153	153	145	160	298	306	130	130	209	211
E624Y	222	225	171	171	151	155	148	157	274	278	130	130	211	213
E625J	222	225	168	183	139	153	145	169	274	278	130	134	199	211
E626J	225	225	177	183	153	155	148	178	262	262	130	134	199	201
E627J	225	228	171	171	153	153	145	145	262	286	130	134	209	211
E628J	216	228	168	189	147	153	154	157	266	270	130	134	207	211
E701Y	222	222			153	155	145	145	294	302				
E702Y	222	222			155	155					126	130		
E703Y	222	225	168	189	151	153	157	160			126	130	211	211
E704Y	222	225	168	171	153	155	157	181	262	270	126	130	181	209

E705Y	222	225	174	174	153	153	148	151	282	302	130	130	179	179
E706Y	219	222	171	171	139	153					130	134	181	215
E707Y	222	222	174	174	151	155	148	157	294	310	126	130	211	211
E708Y	222	222			151	153	151	172	274	278	134	134	201	211
E709Y	222	225			139	153	151	169	278	278				
E710Y	225	225	168	183	139	155	151	151			130	134		
E711Y	222	225			151	155			290	326				
E712Y	222	222	168	171	155	155	145	169			130	130	181	209
E713Y	222	225	171	174	139	155	145	151	278	282	130	130	181	209
E714Y	222	225			153	153	157	157	290	294			209	209
E715Y	222	225	171	171	139	153	148	157	262	270	130	134	209	211
E716Y	222	225	171	174	139	153	130	145	270	298	130	134	181	209
E717Y	225	228	168	171	151	153	145	148						
E718Y	222	222			153	155	157	157	290	306	130	130	209	209
E719Y	222	222	171	180	139	157	157	163	278	294	130	130	181	203
E720Y	222	225	174	174	139	139	145	154	254	286	126	130	205	221
E721Y	219	222	171	177	151	153	142	148	286	306	130	130	211	211
E722Y	222	222	168	168	153	155	145	163	278	286	130	130	181	221
E723Y	222	225	171	171	153	153	145	157	294	314	134	138	181	181
E724Y	222	225	171	171	153	155	145	154	286	298	126	134	199	211
E725Y	216	222	171	171	155	157	157	157	278	302	130	130	181	213
G601Y	216	222	171	171	155	157	160	166	294	294	126	134	181	181
G602Y	216	225	168	171	151	155	160	181	282	326	134	134	181	181
G603Y	225	228	171	174	155	155	157	160	282	290	122	126	183	211
G604Y	222	222	174	177	153	155	172	181	270	298	122	134	181	181
G605Y	222	228	177	186	155	155	130	172	278	306	122	134	181	183
G606Y	222	222	177	177	155	155	169	175	294	294	118	122	181	181
G607Y	222	225	171	171	155	155	175	181	310	330	126	142	181	181
G608Y	222	222	168	171	139	155	145	163	298	318	122	130	181	181
G609Y	216	222	168	168	147	147	145	151	258	286	122	130	181	209
G610Y	222	225	171	174	155	155	178	178	282	314	122	146	181	185
G611Y	222	225	171	174	155	157	148	163	294	294	126	138	183	205

G612Y	216	225	174	177	155	157	160	187	306	318	134	138	181	181
G613Y	222	222			155	155	151	172	274	322	122	134	181	209
G614Y	222	225	174	177	155	155	145	175			130	130	181	195
G615Y	222	228	171	177	155	155	166	169					181	181
G616Y	222	222			155	155	169	178			122	142	181	181
G617Y	237	237	174	174	155	155	157	196	282	310	126	142	181	207
G618Y	225	234	168	174	155	157	166	178	286	294	126	146	181	181
G619Y	225	225	174	174	155	155	163	166	302	302	126	126	181	181
G620Y	222	225	177	180	155	161	145	145	302	310	118	126	181	181
G621Y	222	225	177	180	155	161	145	145	282	302	118	126	181	181
G622Y	222	225	171	174	155	155	157	160	282	302	126	142	183	183
G623Y	222	222	168	168	155	155	148	157	262	278	122	130	181	211
G624Y	222	225	168	171	135	155	160	163	282	294	142	142	181	211
G625Y	222	225	168	168	135	155	178	184	290	298	122	122	183	185
G701Y	222	225			153	155	157	163	282	294	126	130	181	181
G702Y	222	237	174	180	153	155	145	163	270	302	134	142	181	181
G703Y	222	225	171	171	155	155	157	160	290	298	130	146	181	181
G704Y	222	228	168	171	153	155	151	169	270	282	126	134	181	181
G705Y	222	222	168	171	155	155	145	181	278	286	122	126	181	181
G706Y	222	222	165	171	153	155	154	154	274	298	122	138	181	181
G707Y	216	231	171	171	153	155	148	169	282	306	134	142	169	181
G708Y	216	222	165	171	155	155	163	190	282	294	130	138	181	181
G709Y	216	222			153	153			302	318	122	130		
G710Y					153	155			282	298	126	138		
G711Y	222	225	177	198	155	155	160	166	290	310	126	146	181	181
G712Y	222	222					145	154			122	146		
G713Y	222	225	180	189	147	155	145	148	274	306	118	122		
G714Y	222	225	174	177	155	155	130	175	274	306	126	138		
G715Y	222	222	165	177	155	155	175	184			138	154	181	181
G716Y	222	225	168	174	155	155	133	145	290	294	122	134	179	181
G717Y	222	222	171	171	155	155	172	181	286	290	118	138	181	181
G718Y	225	225	171	171	153	155	151	151	294	298	122	130	181	181

G719Y	222	225	168	171	153	155	148	169	290	290	122	134	181	181
G720Y	219	222	174	174	155	155	154	163	282	294	118	122	181	213
G721Y	222	222	171	180	155	155	151	178	294	294	126	138	181	215
G722Y	225	225	168	171	155	155	157	160	286	290	122	138	181	215
G723Y	213	222	171	174	143	155	151	172	282	294	122	126	169	181
G724Y	210	225	171	171	155	155	148	154			122	138	169	181
G725Y	222	222	171	192	155	157	166	175	270	278	130	134	181	181
GH701Y	222	222	171	174	153	153	148	157			126	130	211	211
GH702Y	222	222	171	177	153	153	145	145	254	298	130	130	181	199
GH703Y	222	225	171	171	139	151	145	148	254	274	130	130	209	209
GH704Y	222	222	174	180	151	153	145	148	294	294	130	134	209	211
M601Y	225	225	174	186	139	139	145	148	274	282	130	130	209	211
M602Y	216	225	171	177	153	155	157	187	238	278	130	138	209	211
M603Y	222	225	171	180	139	153	157	175	286	310	130	130	181	181
M604Y	222	222			153	153	145	145	286	310	126	130	211	211
M605Y	225	225	174	177	151	153	145	157	282	294	130	130	181	209
M606Y	222	222	174	177	153	153			282	294			211	211
M607Y	222	228	174	177	153	153	163	181	266	278	130	130	209	209
M608J	222	228	171	174	151	153	163	181	266	278	134	134	211	213
M751Y	222	228	171	174	153	155	148	154	294	302	134	134	179	179
M752Y	216	225	168	171	153	153	148	148	274	278	130	138	179	179
M753Y	216	225	168	171	139	153	157	166	262	290	134	134	179	179
M754Y	222	225			153	153	154	160	286	318	130	134	209	215
M755Y	222	228	171	171	151	153	145	148	282	298	130	142	209	211
M756Y	222	222	174	177	153	155	139	157	274	294	130	134	211	211
M757Y	222	222	171	180	153	153	145	157	266	282	130	138	179	181
M758Y	222	222	171	171	151	155	145	169	274	286	134	134	209	209
M759Y	222	222	174	174	151	153	157	175	278	298	130	138	179	179
M760Y	222	225	168	174	153	153	145	148	286	298	130	134	179	209
M761Y	222	225	174	174	151	153	148	196	274	286	130	134	209	209
M763Y	222	222	168	174	139	155	148	175	274	290	130	134	209	209
M764Y	222	225	171	180	139	153	148	184	286	290	130	134	209	211

M765Y	222	222	168	189	153	153	154	157	274	310	126	134	209	209
M766Y	222	225	171	180	153	153	151	154	282	286	130	134	211	211
P609Y	225	231	177	180	153	153			270	274	126	130	209	211
P610Y	222	231	174	177	153	153	145	148	286	294	130	130	201	211
P611Y	222	225	168	180	151	153	151	181	286	298	130	130	209	213
P612Y	222	225			153	153	145	157	286	290	130	130	211	211
P613Y	222	231	174	177	153	153	151	181	262	262	130	134	181	211
P614Y	222	222	177	177	153	155	130	136	294	302	126	130	209	211
P615Y	225	225	174	177	153	153	154	175			130	130	209	211
P616Y	222	222			151	155	130	130	274	298	130	134	209	221
P617Y	210	225	171	183	151	151	145	151	302	318	130	134	211	213
P618Y	222	228	180	180	151	153	148	157	278	294	130	130	207	211
P619Y			174	177	153	153	148	151			130	134	205	209
P620Y	222	222	171	174	139	151	136	136	270	302	130	146	211	221
P621Y	222	222	168	192	139	153	145	151	290	302	130	134	179	213
P622Y	222	225	174	183	153	153	148	169	262	282	126	134	181	209
P623Y	222	222	174	177	139	155	157	163	294	294	134	134	211	211
P624Y					153	153	151	154			130	130	179	211
P625Y	219	222			153	153	142	169			134	134	181	211
P626Y	222	222			153	153	163	175	282	294				
SH705Y	222	225	171	174	139	151	154	160	270	278	130	134	181	213
SH706Y			168	171	153	155	145	169	290	298	126	130		
SH707Y	225	237	168	180	143	155	145	148	274	278	130	130	195	209
SH708Y	222	225	174	183	147	155	154	154	274	286	126	130	209	211
SH709Y	222	225			147	155	160	181	274	286	126	130	209	211
SH710Y	216	225	171	180	153	153	160	181	286	290	126	134	211	211
SH711Y			171	171			145	151			130	130		
SH712Y			171	174					298	298	122	130		
SH713Y	222	225			153	155					130	146		
SH714Y	222	225					145	145	274	294	130	130		
SH716Y	222	228	171	174	153	155			286	286	126	138	181	211
SH717Y	222	222	168	171	153	155	148	154	286	306	134	134		

SH718Y	222	222	171	174	153	153	157	169	278	298	130	134	211	211
SH719Y	222	225	171	204	151	155	148	172	262	302	134	134	209	211
SH721Y	222	222			155	155	145	148	254	262	130	138		
SH722Y	216	222	168	177	151	151	142	151	290	290	130	130		
SH723Y	222	222	171	174	139	153	145	145	286	290	118	134	197	211
SH724Y	210	222	171	177	153	153	151	169	262	274	130	134		
SH727Y	222	225	171	174	139	139	145	151			130	130	209	211
SH728Y	222	222	171	171	155	155	148	154	266	270	130	130	197	211
SH729Y	222	222	171	174	139	153	166	169	262	298	130	134	209	221
Y627J	225	225	168	171	139	153	148	157	254	286	130	130	181	209
Y628J	222	222	168	171	151	151	148	157	270	278	126	126	209	209
Y629J	222	228	177	180	139	153	145	157	290	302	130	134	211	211
Y630J	222	222	177	180	139	153	151	175	286	290	130	130	179	211
Y631J	222	225			153	155	145	154	286	290	130	130	211	211
Y632J							145	148			130	130	209	209
Y633J	225	225	171	171	153	155	145	148	278	294	130	134	209	211
Y634J	222	222	171	186	153	153	151	151	282	286	130	130	181	211
Y635J	225	225	171	198	153	153	148	154	258	286	130	138	209	211
Y636J	219	225	171	174	147	153	145	181	286	294	134	134	205	213
Y637J	222	222	180	183	153	153	142	148	290	290	130	142	181	211
Y638J	222	222	171	177	147	153	145	160	254	306	130	130	209	211
Y639J	222	228	168	174	151	153	145	148	278	278	130	134	211	211
Y640J	222	225	168	168	153	153	148	172	286	302	130	134	209	211
Y641J	225	225			153	153	145	148	286	302	130	134		
Y642J	225	225	168	171	139	153	145	148	286	286	130	130	205	209
Y643J	222	225			153	153	145	178	254	286	130	130	209	211
Y644J	222	228	168	174	151	153	148	157	278	278	130	134		
Y701Y	222	222	168	171	151	155	148	172	274	290	130	130	211	211
Y703Y	216	225			151	153	145	148	286	290	130	130		
Y704Y	219	222	168	177	151	153	148	160	286	294	130	130	203	209
Y705Y	216	225	168	180	153	153	151	160	270	298	130	134	205	211
Y706Y	222	225	162	165	151	153	136	169	254	286	130	134	209	211

Y707Y	222	222	174	183	153	153	145	157	286	294	134	134	213	213
Y708Y	222	222	168	168	153	153	160	166	286	298	130	134	209	211
Y709Y	216	231	168	168	139	153	151	157	290	298	130	134	211	211
Y710Y	222	222	171	171	153	155	145	157	302	334	134	134	181	209
Y711Y	210	225	174	177	153	155	148	181	290	306	130	134	209	211
Y712Y	222	225	174	183	153	155	148	166	262	270	126	130	197	211
Y713Y	216	225	168	174	147	153	157	160	258	294	134	138	181	209
Y714Y	222	222	168	168	153	153	157	169	290	298	130	130	211	215
Y715Y	222	222	174	174	139	153	151	151	290	302	130	138	209	209
Y716Y	222	228	174	177	151	153	154	157	278	286	130	134	209	211
Y717Y	225	225	168	171	153	153	136	169	282	290	126	130	209	209
Y718Y	228	237	171	180	139	155	157	181	254	294	122	130	209	209
Y719Y	216	222			139	155	148	151	278	294	130	134	211	211
Y720Y	216	222	174	177	151	155	139	148	286	290	130	134	209	211
Y721Y	216	225	174	177	153	155	151	157	286	318	130	134	179	209
Y722Y	222	228	174	174	151	151	145	145	278	278	126	134	209	209
Y723Y	222	222	171	177	153	155	145	148	282	294	134	134	209	211
Y724Y	222	222	171	174	153	153	151	163	274	294	130	134	211	211
Y725Y	225	228	171	174	153	153	160	175	278	282	126	134	179	209
Y726J	222	222	171	177	155	155	145	178	306	310	126	134	209	211
Y727J	222	222	174	174	155	155	145	157	286	306	126	134	209	211
Y728J	222	228	171	171	147	151	157	163	238	270	130	130	199	209
Y729J	222	222	180	186	139	151	154	169	282	290	130	130	211	211
Y730J	222	225	171	177	153	155	148	151	282	294	130	134	179	211
Y731J	222	225	168	177	139	155	151	160	270	290	130	130	209	211
Y732J	222	222	168	168	153	153	145	163	254	286	126	126	211	211
Y733J	222	222	183	183	153	153	148	151	294	302	126	134	205	209
Y734J	216	216			153	153	145	148	294	294	134	134		
Y735J	222	222			153	153	145	145	262	274				
Y736J	216	225	171	180	151	153	166	169	254	306	130	142	205	221
Y737J	222	222	192	192	151	151	154	157	262	274	130	142	179	209
Y738J					153	153	145	145	262	262			179	211

Y739J	222	231	165	174	153	155	145	151	254	286	126	130	209	215
Y740J	219	228	180	189	151	155	145	145	270	294	130	130	179	211
Y741J	216	225	171	180	139	151	160	175	262	262	130	130	179	211
Y742J	216	228	174	177	139	155	151	169	274	294	126	130	209	209
Y743J	222	234	171	180	153	155	148	169	286	302	126	130	179	213
Y744J	216	222	171	171	153	153	145	145	274	290	134	134	179	209
Y745J	222	222	168	168	151	155	151	160	254	294	130	130	211	211
Y746J	222	225	168	174	151	153	145	172	290	298	130	130	179	179
Y747J	216	225	168	171	153	153	145	160	294	310	134	134	209	211
Y748J	222	225	171	186	153	155	145	157	298	302	134	138	209	211
Y749J	222	225	168	171	151	153	145	148	286	290	130	134	209	209
Y750J	225	228	171	171	151	155	145	184	270	286	126	138	209	213
Y767Y	219	222	171	171	141	153	166	181	282	286	130	138	179	213
Y768Y	216	222	174	174	139	151	145	148	286	290	126	134		
Y769Y	222	228	171	177	153	153	145	154	278	290	126	130	211	211
Y770Y	225	228	171	174	151	153	148	172	262	290	142	142	209	209
Y771Y	222	222	168	174	151	155	145	175	254	254	130	130	209	209
Y772Y	222	228	171	171	153	153	151	169	290	302	130	134	209	209
Y773Y	216	225	174	177	139	153	145	160	278	278	130	138	203	211
Y774Y	222	222	171	177	139	153	148	154	294	302	122	134	209	213
Y775Y	222	222	183	189	143	155	151	166	254	270	130	130	211	211
Y776Y	222	225	168	177	139	153	148	163	290	294	130	134	179	211
gun10	216	216	177	177	141	153	130	139	266	274			203	207
gun11	216	216	165	168	153	153	139	139	242	246	150	154		
gun12	216	216	171	174	153	153			278	290			213	213
gun13	216	216	180	180	153	153	130	130	266	270	134	150	207	207
gun14	216	216	171	177	153	153	130	130	254	290	146	150	203	203
gun15	216	216	171	177	145	155	127	130	286	290	138	158	203	203
gun16	216	216	168	171	145	153	130	130	250	270	146	150	213	213
gun17	216	216	171	171	153	153	136	136	258	274			203	217
gun18	216	216	168	168	141	153	130	139	262	262			213	213
gun19	216	216	174	180	153	153	130	130	262	270			203	207

gun1	216	216	171	177	153	153	130	139	254	262			189	189
gun20	216	216	168	171	153	153	130	130	242	266			221	221
gun21	216	216	168	168	151	153	130	130	254	270	142	150	215	215
gun22	216	216	168	171	145	155	130	139	258	262	134	134	205	205
gun23	216	216	165	171	135	153	130	130	254	278	138	150		
gun24	216	216	168	168	153	153	130	139	258	266			203	203
gun25	216	216	171	177	145	153	130	130	254	262			203	205
gun2	216	216	216	216			130	139	254	270				
gun3	216	216	168	168	153	153	130	130	270	286			209	219
gun4	216	216	168	168	153	153	130	130	270	274			203	205
gun5	216	216	171	177	145	153	130	139	266	282	142	150	203	213
gun6	216	216	168	171	153	153	130	139	266	274	134	150	207	207
gun7	216	216			145	155	130	139	258	278	134	142	209	217
gun8	216	216	168	174	145	153	130	139	266	274				
gun9	216	216	165	165	153	155	130	130	262	270			203	203
smi10	213	213	168	171	141	153			278	278			203	203
smi11	213	213	168	171	141	153	130	130	274	274			189	203
smi12	213	213	168	168	153	153	130	130	238	278	150	150	203	205
smi13	213	213	168	171	153	153	130	130	266	274	150	150	203	203
smi14	213	213	171	177	153	157	130	130	270	286	142	142		
smi15	213	213	168	171	151	153	130	130	238	282	150	158	203	203
smi16	213	213	168	168	153	153	130	130	262	278	150	150	203	203
smi17	213	213	171	171	153	153	130	130	274	278			203	203
smi18	213	213	171	177	153	153	130	130	266	270			203	203
smi19	213	213			141	153	130	130	262	262	150	150	193	203
smi1	213	213	171	171	153	153	130	130	274	282	150	150	203	203
smi20	213	216	159	171	153	153	130	130	282	294	150	150	197	203
smi21	213	213	168	168	153	153	130	130	270	274	150	158	203	213
smi22	213	213	171	177	153	153	130	130	254	282			203	205
smi23	213	213	171	177	153	153	130	130	270	270	150	158	197	203
smi24	213	213	168	168	153	153	130	130	262	270	134	150	203	203
smi25			174	177	153	153	130	130			134	150	203	203

smi2	213	213	171	171	141	153	130	130	270	286	134	150	203	221
smi3	213	216	168	168	141	153	130	130	266	278			203	203
smi4	213	216	171	177	141	153	130	130	266	278	134	158	203	203
smi5	213	213	168	168	153	153	130	130	270	282			203	203
smi6	213	213	168	168			130	130	250	274	134	154	203	203
smi7	213	213	168	168	153	153	130	130	238	282	150	150	203	203
smi8	213	213	168	168	153	153	130	130	274	278	146	150	203	203
smi9	213	213	168	171	141	153			270	278			203	203
missing	15		24		9		14		39		35		37	