S7 Figure

Human\_SelP 1 --------------------MWRS------------------------------LGLALALCLLPSG---------GTESQDQSSL-CKQ  
Rat\_SelP 1 --------------------MWRS------------------------------LGLALALCLLPYG---------GAESQGQSPA-CKQ  
Mouse\_SelP 1 --------------------MWRS------------------------------LGLALALCLLPYG---------GAESQGQSSA-CYK  
Platypus\_SelPa 1 --------------------MWQG------------------------------LGLALALCLLPGG---------GAESQSASSH-CKE  
Chicken\_SelPa 1 --------------------MWAG------------------------------LGLALVLCLLPGG---------GTESQR-----CQE  
Cocodile\_SelPa 1 --------------------MWAG------------------------------LGLALVLCLLPEG---------GTESQGSSAR-CKE  
Latimeria\_SelPa 1 --------------------MWTG------------------------------LGLLLALCVLSRG---------RAESQGKSTR-CKE  
Frog\_SelPa 1 --------------------MWKG------------------------------FALALALCLLPWG---------GAESQGHRSR-CKQ  
Pike\_SelPa 1 --------------------MWAG------------------------------LSLLLALCLLPGG---------GTESEGEGSR-CKP  
Trout\_SelPa1 1 -------------------MMWVG------------------------------LSLLLALCLLPGG---------GTESEGEGTR-CKQ  
Salmon\_SelPa1 1 --------------------MWAG------------------------------LSLLLALCLLPGG---------GTESEGEGTR-CKP  
Trout\_SelPa2 1 --------------------MKAG------------------------------LSLLLALCLLPGG---------GAESEGEGTR-CKP  
Salmon\_SelPa2 1 --------------------MKAG------------------------------LSLLLALCLLPGG---------GAESEGEGTR-CKP  
Stickleback\_Sel 1 --------------------MWAY------------------------------LSLLVALCLLRGG---------GAESVGDGPH-CQL  
Tilapia\_SelPa 1 --------------------MWAG------------------------------LSLLLTLCLLHGG---------GAESEGGGPR-CQL  
Medaka\_SelPa 1 --------------------MWAG------------------------------LTLLLALCLLHGG---------GAESEGGGPR-CQP  
Fugu\_SelPa 1 ------------------MLVFAGGVAAVASEQRTFLPISULGESGGTAEMRACLGLLLALCMLHGG---------GAESEGDGPR-CQL  
Zebrafish\_SelPa 1 --------------------MWKA------------------------------LSLTLALCLLVGC---------SAESETEGAR-CKL  
S-gar\_SelPa 1 --------------------MWTG------------------------------LSLVLAVALLPVG---------GAESEGGGGR-CKT  
Pike\_SelPb 1 ---------------------MQG------------------------------FYLTLWLCATLSGPLQAS--PLFVEGDRNASRICKP  
Trout\_SelPb1 1 --------------------MMQG------------------------------L-LTLWLCAALPGLLCAS--PLLVEGDNDASKICKP  
Salmon\_SelPb1 1 --------------------MMQG------------------------------L-LTLWLCAALPGLLCAS--PLLVEGDNDASKICKT  
Trout\_SelPb2 1 --------------------MMQG------------------------------L-FTLRLCAALPGLLWAS--PLLVEGDNDASKICKP  
Salmon\_SelPb2 1 --------------------MMQG------------------------------L-FTLRLCAALPGLLWAS--PLLVEGDTDASKICKP  
Stickleback\_Sel 1 ------------------------------------------------------MSAVSLLYAALPGLLWASHVSLLVEGDNDASRICKP  
Tilapia\_SelPb 1 ---------------------MSS------------------------------L-LTLWLFAALPGLLWASHSTLIVEGDNDASRICKP  
Fugu\_SelPb 1 --------------------MSSH--------------------------------SLLWLQATLIGLLWAS----HVQGFNHTTRICKP  
Medaka\_SelPb 1 ---------------------------------------------------------MLRLCSALPALLWASLSVLSAEGDSNASKICKP  
Zebrafish\_SelPb 1 -----------------MQALWPL--------------------------------LLSALPALLGA------SSLFVEKESNGSRICKP  
S-gar\_SelPb 1 -----------------MRGLWAL--------------------------------LLTALPALQGA-------AAVAAQERNSSRLCQP  
E-shark\_SelP 1 ----------MIIKLCCRVVEAVV------------------------------MELGVPLLTVLLGL------VLIVSGEKQESRICQA  
Whaleshark\_SelP 1 -----------------------M------------------------------MELEMPLLTIVLGL------TISVVAAESESRICKV  
Latimeria\_SelPb 1 -----------------MMGRWAP--------------------------------VFTLLAGLVTG-----------FSPGNGSQICQP  
Chicken\_SelPb 1 --------------------MGP-------------------------------LLLALASCLGLAV---------ASEGATNGSRLCHE  
Crocodile\_SelPb 1 ------------------------------------------------------MGPPALAAAALLGLV-------AAALADVADRICQP  
Frog\_SelPb 1 --------------------MHKS------------------------------VLMISALMGLLGL---------VSSSEQTNSSICKP  
Platypus\_SelPb 1 ---------------------------------------------------------TLATLLAAAG---------ALPDLENGTRICQP  
Whaleshark\_SelP 1 --------------------MRKG------------------------------LGVALTLCLLLVG---------WVEGQEH----CNK  
E-shark\_SelP 1 -----------------------------------------------------------------------------------MSNDCQD  
Amphioxus\_SelPa 1 MSMGDEPLLFAATNSLSNMIHHRG------------------------------NLLAAALCLVVSG----------LDALAAPNRLCTQ  
Amphioxus\_SelPb 1 ---------------------MSG------------------------------LLQTAALCLVVS----------WLGSLTCAQEMCGP  
  
  
Human\_SelP 31 PPAWSIRDQ-DPMLNSNGSVTVVALLQASUYLCIIEASK----------------LEDLRVKLKKEGYSNISYIVVNHQGISSRLKYTHL  
Rat\_SelP 31 APPWNIGDQ-NPMLNSEGTVTVVALLQASUYLCLLQASR----------------LEDLRIKLENQGYFNISYIVVNHQGSPSQLKHAHL  
Mouse\_SelP 31 APEWYIGDQ-NPMLNSEGKVTVVALLQASUYLCLLQASR----------------LEDLRIKLESQGYFNISYIVVNHQGSPSQLKHSHL  
Platypus\_SelPa 31 APRWQIRDQ-DPMLNSLGTVTVVALLQASUYLCILQASR----------------LEDLRVKLENEGYSNISYIIVNHQGMPSQLNHKTL  
Chicken\_SelPa 27 PPEWHIGEE-SPMLNARGSVAVVALLQASUYLCLLQASR----------------LEDLRVKLENEGLVNISYVVVNHQSPHSQKKFHLL  
Cocodile\_SelPa 31 PPEWYIAGQ-DPMLNSRGSVTVVALLQASUHLCLLQASS----------------LEDLRVKLENDGLVNISYVVVNHQGITSQEKIHLL  
Latimeria\_SelPa 31 PPTWYIGEE-NPMLESRGKVTVVALLQASUHFCLMQASR----------------MDDLHLKLENEGLVNISYMIVNHQGEYSQHKHNLL  
Frog\_SelPa 31 PPDWSIGDQ-NPMIQSAGKVTVVALLQASUYLCLLQASR----------------LEDLRLKLEKEKLVGISYVVVNHQGRHSRAKYDLL  
Pike\_SelPa 31 PPIWSIGEV-EPMKEAMGQVTVVALLQASULFCLVQASL----------------LDGLRLKLEGQGLKNVHYMVVNHQGEKAQRLHKLL  
Trout\_SelPa1 32 PPGWSIGEV-EPMKEVMGQVTVVALLQASULFCLVQASL----------------LDGLRLKLEGQGLENVTYMVVNHQGEQAQRLHTLL  
Salmon\_SelPa1 31 PPGWSIGEV-EPMKEVMGQVTVVALLQASULFCLVQASL----------------LDGLRLKLEGQGLENVTYMVVNHQGEQAQRLHTLL  
Trout\_SelPa2 31 PPGWSIGEV-EPMKGVMGQVTVVALLQASUSFCLVQASL----------------LDELRLKLEGQGLDNVTYMVVNHQGEQAQHLHTLL  
Salmon\_SelPa2 31 PAGWSIGEV-EPMKGVMGQVTVVALLQASULFCLVQASL----------------LDELRLKLEGQGLDNVTYMVVNHQGDQAQHLHTLL  
Stickleback\_Sel 31 PSPWRIGEV-EPMQGTMGRVTVVALLQASULFCLVQASR----------------MDGLRQKLESQGLKDVAYMVVNQQGEQARRLHPML  
Tilapia\_SelPa 31 PSDWRIGDV-EPMKGSVGRVTVVALLQASULFCLVQASR----------------LDGLQQKLERQGLKNVVYMVVNHQGEQSRHLHPLL  
Medaka\_SelPa 31 PPAWKIGEV-DPMKESMGRVTVVALLKASULYCLVQASR----------------LDGLHKKLEGQGLKDVVYMVVNHHEAQAQRLHPLL  
Fugu\_SelPa 63 PPVWKIGDL-EPMKEAMGRVTVVALLESSULFCVVQASR----------------MDSLRQRLENQGLRDVVYMVVSHQGAHAPGLHAML  
Zebrafish\_SelPa 31 PPEWKVGDV-EPMKNALGQVTVVAYLQASULFCLEQASK----------------LNDLLLKLENQGYPNIAYMVVNNREERSQRLHHLL  
S-gar\_SelPa 31 PPEWAVGNE-QPMTDSAGRVTVVALLQASULFCLVQASR----------------LDVLRLRLEQQGLVNISYVVVNHQGEQSHRLYPVL  
Pike\_SelPb 38 APAWEIKGQGAPMKELLGNVVVLALLKASUHFCLTQASK----------------LQGLREKLLRGNLTDVSFLIVNEREAQSRAMYWEL  
Trout\_SelPb1 38 APHWEIKGHGAPMKELLGNVVVLALLKASUHFCRTQASK----------------LGGLRDKLLRSNLTDVSFLIVNEREAQSRAMYWEL  
Salmon\_SelPb1 38 APHWEIKGHGAPMKELLGNVVVLALLKASUHFCRTQASK----------------LGGLRDKLLHSNLTDVSFLIVNEREAQSRAMYWEL  
Trout\_SelPb2 38 APRCEIKGHGAPMKGLLGNLVVLALLKACUHFCLTQASK----------------LEGLHDKLLRSNLTDMSFLIVNEREVQSUAMYWEL  
Salmon\_SelPb2 38 APRWEIKGHGAPMKGLLGNVVVLALLKASUHFCLTQASK----------------------------RSSPEPCIVNURGAPPP------  
Stickleback\_Sel 37 APHWTIKER-APMQELLGNVVVVALLKASUQFCLTQASK----------------IGGLRDKLNRSNLTDVSFMIVNEREPHSRAMYWEL  
Tilapia\_SelPb 39 APQWDIKGY-APMQDLLGNVAVVALLKATUQFCLKQASK----------------IGGLRDRLNRSNMTEVSFIIVNERDAHSRAMYWEL  
Fugu\_SelPb 35 APHWEINGE-APMQRLLGRVAVVALLKATUHFCLVQASR----------------IGGLRKKLIQSNMTEVSYMIVNEQDPHSRALFWEL  
Medaka\_SelPb 34 APYWDIEGH-VPMQEHLGNVVVVALLKATUEFCLTQASK----------------IGNLRDKLNRNNITEVSFMIVNELEALSQTMHWKL  
Zebrafish\_SelPb 36 APQWEIDGK-TPMKELLGNVVVVALLKASUHFCLTQAAR----------------LGDLRDKLANGGLTNISFMVVNEQDSQSRAMYWEL  
S-gar\_SelPb 35 PPRWEVSGR-APMEELRGRVAVVALLKASUQFCLTQASR----------------LGDLRTRLSRSGMTDVGFLIVNEREPVSRAMFWEL  
E-shark\_SelP 45 APLWEIANQ-NPMEQQLGSVVVVALLKASUQFCLTQAAK----------------LGSLQDKLARQGLKDVHYMIVNEKAPESRAMLWEL  
Whaleshark\_SelP 32 APHWEIADR-KPMEEQIGHVVVVALLKASCGFCLTQATK----------------LGSLRDKLKHQGLKDIHYMIVNEKSPQSRAMLWEL  
Latimeria\_SelPb 31 APVWEINGE-RPMEETLGRVTVVGLLEASUHFCLMQAAR----------------LGSLHEKFARKGMEDIRYLIVNNKSPSSRAMFWEL  
Chicken\_SelPb 31 APAWRINGS-SPMEGAAGQVTVVALLKASUHFCLLQARS----------------LGALRERLGQQGVSDVRYVIVNEQAPLSRAMFGEL  
Crocodile\_SelPb 30 APLWRVNGT-VPMDEALGQVTLVALLKASUQFCLKQASS----------------LGGLREKLSRRGMADVSYMIVNEKAPLSRAMYWEL  
Frog\_SelPb 32 SPKWSIDGE-VPMAEALGNVTVVALLQASCGFCLIQAAR----------------MGPLRDKLYLQGMTDIKYLIVNDQSKTSTDMFPEL  
Platypus\_SelPb 25 APRWTVNGV-APMEGTEGQVIVVALLKASUHFCLKQAARRRGCPFLGPLPVEGGGLAGLRERLAGHGAGNVSFLIVNQRDPTAQLLHTEL  
Whaleshark\_SelP 28 PPAWTIGGK-EPMTDSLGKVTVVALLQASUHFCLTQAAS----------------LTVLQQKLHENGFVNVSFIVVNHQGKSSREKYQHL  
E-shark\_SelP 8 ------GGR----------------------------------------------LDSLRKNLTNAGLVNISYLIVNHQEKLSRDLYQNF  
Amphioxus\_SelPa 51 PPSWELDGI-DFMEESRGNVVVLQMSIAIUSFCRTQAER----------------LERLRLKLQRDGVTDISFGVINGMGFMSRVSLRQL  
Amphioxus\_SelPb 30 PAYWEAEGR-SPMADNKGKVIVMKFPIGSUPFCQGEVSS----------------LEALRQKLYSEGKSDIFFGAVNHWGWASWWYRGEL

S7 Figure, continued

Human\_SelP 104 KNKVSEHIPVYQQEENQTDVWTLLNGSKDDFLIYDRCGRLVYHLGLPFSFLTFPYVEEAIKIAYCEKKCGNCSLTTLKD--------EDF  
Rat\_SelP 104 KKQVSDHIAVYRQDEHQTDVWTLLNGNKDDFLIYDRCGRLVYHLGLPYSFLTFPYVEEAIKIAYCEKRCGNCSFTSLED--------EAF  
Mouse\_SelP 104 KKQVSEHIAVYRQEEDGIDVWTLLNGNKDDFLIYDRCGRLVYHLGLPYSFLTFPYVEEAIKIAYCEERCGNCNLTSLED--------EDF  
Platypus\_SelPa 104 KEKVSEHIPVYQQDEKQTDVWSTLKGNKDDFLIYDRCGRLVYHLSLPYTFLSFSYVEDSIKTTYCEQNCGNCSYTMPEA--------EEF  
Chicken\_SelPa 100 QESVSDHITVYQQDDHQADVWTTLNGNKDDFLIYDRCGRLVYHLGLPYSFLSFQYVEEAIKIAYCENNCGNCSYTEPDI--------DNI  
Cocodile\_SelPa 104 RKEVSEHIVVYQQDENQPDVWTTLNGNKDDFLIYDRCGRLVYHLGLPYSFLSFLYVEESIKIAYCEQNCGNCSYMTPDV--------EKV  
Latimeria\_SelPa 104 KQRVSEFIPVYKQDMEKPNVWNLLNGNKDDFLIYDRCGRLVYHLGLPYSVLHFPYMEEAIRIAFCETRCGNCSFTPEDI--------NEI  
Frog\_SelPa 104 KSKVSEHIPVYQQEENQPDVWSLLKGDKDDFFIYDRCGRLVQHLELPYSLLHFPYVEEAVRIAYCGDKCGECEHKIPDA---------DV  
Pike\_SelPa 104 KQKLSEKITLYKQEPEQVDVWQSLAGQKDDFLIYDRCGRLTYHISLPYSIMSIPYVENAIKETYCARICGNCKHESVEI--------PAE  
Trout\_SelPa1 105 RQKLSENITLYKQQPKQEDVWQTLAGEKDDFLIYDRCGRLTYHISLPYSILGTPYVENAIKETYCTRVCGDCTYESKEI--------PAE  
Salmon\_SelPa1 104 RQKLSENITLYKQQPKQDDVWQTLAGEKDDFLVYDRCGRLTYHISLPYSILGTPYVENAIKKTYCTRICGDCSYESQEI--------PAE  
Trout\_SelPa2 104 SQKLSENIILYKQVPKQDDVWQALAGKKDDFLIYDRCGRLTHHIFLPFSILGTPYVENAIKETYCQRICGDCTYENTEI--------PAE  
Salmon\_SelPa2 104 SQKLSENIILYKQEPKRADVWQALAGKKDDFLIYDRCGRLTHHIFLPFSILGTPYVENAIKETYCQSICGDCTYESTEI--------PAE  
Stickleback\_Sel 104 AQRLSVNIDLYKQDEQQPDVWKTLGGDKDDFLVYDRCGRLTHHIALPYSIIGQGHVESAIKDAYCKRTCGDCVHESATT--------PEE  
Tilapia\_SelPa 104 EAKLSKNIILYKQDGHQPDVWQTLAGEKDDFFIYDRCGRLTYRISLPYSIIGEGHIEKAIKDTYCKRLCGDCTHESAEI--------PEE  
Medaka\_SelPa 104 EERLSQNIALYKQYEHQPDVWRTLNGEKDDFFIYDRCGRLTHHLSLPYNIIGHGHVEQAIKEAYCNRVCGECSFESADT--------PAE  
Fugu\_SelPa 136 AQKLTEHISLYKQDEALPDVWQTLGGNNNDFFIYDRCGRLTHRISLPYSIIGHGHVERAVKDTYCNSLCGECTHETTET--------LQE  
Zebrafish\_SelPa 104 QERLL-NITLYAQDLSQPDAWQAVNAEKDDILVYDRCGRLTYHLSLPYTILSHPHVEEAIKHTYCDRICGECSLESSAQ--------LEE  
S-gar\_SelPa 104 KKKMSQKIRVYDQDPLQEDVWKILSGEKDDFLIYDRCGSLTHHLGLPYSMLTMSYVEDAIRDTYCKDICGNCSLESSSL--------PVT  
Pike\_SelPb 112 RRRASPAIPVYQQAPLQDDVWEALDGDKDDFLVYDRCGRLTFHIVLPYSFLHYPYIEAAIRATYHKDICGNCTLDFNST-----------  
Trout\_SelPb1 112 KRRAPPGIPVYQQAPLQDDVWEALDGDKDDFLVYDRCGRLTFHIVLPYSFLHYPYIEAAVRATYHKDICGNCTVDSNTT--------SSA  
Salmon\_SelPb1 112 KRRAPPGIPVYQQAPLQDDVWEALDGDKDDFLVYDRCGRLTFHIVLPYSFLHYPYIEAAVRATYHKDICGNCTVDSNTT--------SSA  
Trout\_SelPb2 112 KRRATPDIPVYQQAQLQDDVWEALYGNKDDFLVYDRNPNGVTQLG------GTADSETSLU----------AAQEWLLT------RQTLQ  
Salmon\_SelPb2 94 ----PPGIPVYQQAQLY--------GNKDDFLVYDR------------------------------DLRNWCD--------------TSF  
Stickleback\_Sel 110 KRRAPPGVPVYQQAALQSDVWEALDGDKDDFLVYDRCGLLTFHIVLPYSFLHNVYVEAAIRATYLKNIC-NCTVDSVVSSLNNSVMNNET  
Tilapia\_SelPb 112 KRSAPTGVPVFQQQPFQNDVWEALDGDKDDFLVYDRCGLLTFHIVMPYSFLHHPFVEAAIRATYQKNIC-NCTQNFTSS--------VGG  
Fugu\_SelPb 108 ERRAPPDVPVYQQSAFQSDVWETLDGDKDDFLIYDRCGQLTFHVGLPYSFLNYVYVEAAIRATYQGNIC-NCSANSTSL-------HDTG  
Medaka\_SelPb 107 KKKAPTGVPVYQQSSLQKDVWEILDGDKDDFLIYDRCGLLTFHIVLPNSFLQNADVENAITATYTQDIC-NCSGNSTLS---------GG  
Zebrafish\_SelPb 109 KRRTAQDIPVYQQSPLQNDVWEILEGDKDDFLVYDRCGYLTFHIVLPFSFLHYPYIEAAIRATYHKNMC-NCSLNANFS--------ISE  
S-gar\_SelPb 108 KRRAPEGIPVYQQGLFQSDVWEILEGEKDDFLIYDRCGLLTFHIVLPYSFLHYPYVEAAIRATYLRDICGNCTLDSSDNQGLNASQIPER  
E-shark\_SelP 118 KRHVPNNVSVYQQSPIQPDVWHSLQGGKDDFLIYDRCGRLTFHVVLPYSSLQYPYIEAAIRATHKRDICGECTITKSSL----------E  
Whaleshark\_SelP 105 KRHTPEDIPVYQQSPFQRDVWSILQGNKDDFLIYDRCGKLTFHIVLPYSYLQFRYTEAAIRATYNKDICGNCGIGNISL----------E  
Latimeria\_SelPb 104 KRHAPANITVYQQAPLQKNVWQILEGKKDDFFIYDRCGKLTFQISLPFSFLNNSYVEAAIMSTYHSDKCGNCSAANFNQ--------TVQ  
Chicken\_SelPb 104 QRHAPPGVPVLQQQPHEPDVWQLLGGDKDDFLVYDRCGRLAFHIQLPYSFLHLPYVESAIRFTHRKDFCGNCSLYPNST---------QE  
Crocodile\_SelPb 103 KRQAPAGVPVYQQGVLDPDVWQILDGDKDDFLIYDKCGRLVFHISLPYSFLHFPYVESAVHFVYHKDYCGNCFHYSNST--------QQE  
Frog\_SelPb 105 KRWAPKGIPVYQQTPGQEDVWDLLNGNKDDFLIYDRCGRLTFHIRLPLSFLHFPYVEAAIKFTYNESFCGNCSFTSNST--------LMP  
Platypus\_SelPb 114 ERHAPPGVPVYAQDGPDPDVWSVLGGDKDDFFVYDRCGRLTFHIQLPFSFLHFPYVEAAVRFTHRRDFCGNCSYYFPQV-----------  
Whaleshark\_SelP 101 NSKVENQIPVYQQDVNQPDVWTLLRGIKDDFLIYDSCGHLTYHLELPYTILSQPFVAHAIVKTYCQRICSNCSFVQDNS--------PAC  
E-shark\_SelP 46 TDLVSRDIPVYQQNVHQPNIWKLLQGVTDDFLIYDRCGHLTYHLGLPYTLLTLPYVETAIRMTYCQNICSGCSVMQY----------VEA  
Amphioxus\_SelPa 124 EGVV--NFGVYQDTP-RADVWGLLDGRKDDFIIYDRCGRLARHIRMPEAWLVRPDVEDAIREVYAESPCGNCAFYPDTT--------PTP  
Amphioxus\_SelPb 103 ERRA--NFPVY-QDSWSQDIWGKLHAAKDDILVYDRCGRLAYHLRLPRAYLGNTHTEEAIRAAYRQSPCGPCGT----------------  
  
  
Human\_SelP 186 CKRVSLATVDKTVETPS----------PHYHHEHHHN------------HGHQHLGSSELSENQQPGAPNAPTHPAPPGLH---------  
Rat\_SelP 186 CKNVSSATASKTTEPSE----------EHNHHKHHDK------------HGHEHLGSSKPSENQQPGALDVETSLPPSGLHHHH------  
Mouse\_SelP 186 CKTVTSATANKTAEPSE----------AHSHHKHHNK------------HGQEHLGSSKPSENQQPGP--SETTLPPSGL---H------  
Platypus\_SelPa 186 CTNTSSAAKEKATEAPL-------PHNDRPHHHHHHH------------HHHGHKPHPSGTEQAPADPDGPLRSPAPQGLH---------  
Chicken\_SelPa 182 CENITKKEDENLAGIEP-------EPEPSGQHSHHHH--------QLHRHRHHHHHREGGRHSKTQNHQAPSESQRRHPHNG--------  
Cocodile\_SelPa 186 CNNIDKSTDEEPAEITP------EQHNHHSHQPNQHR-----------HHGHGHHHREEDQLSEDQNQQAHAQRHHSPGNNR--------  
Latimeria\_SelPa 186 CNRTENTDEPVEEPPPT------SVPDPPQQNPQHHG----------AHRHHRQHGHQEQSHHHRHDQFSSGQNGQVHV-----------  
Frog\_SelPa 185 CKKPEEQPEQEKPVEEK-----VERPRPHRNHHRHHR-------PKHSGHRHRHHNNEGGQAAEVDAFQTNNRAGSHNG-----------  
Pike\_SelPa 186 CNGTAEATSEGEDKPTT---TVEPTHDGHQHHRHHHH-----------HHHHDDKHGDHGDREVGRGHGAEQQRHHKHVGEGHRHV----  
Trout\_SelPa1 187 CNRTVEAKPEGEEKPVT---GRETTHGGHGHHHHGHGHNGNRHGHNGNRHGHDHHGERGMGRGHGRDHGAER--QHQHDTEGLQHGQA--  
Salmon\_SelPa1 186 CNRTVEAKPEGEEKPVT---GRETTHGGHGHHHHGHGHNDNRHGHNGNRHGHDHHGERGMGRGHGRDHGAERQQQHQHDTEGLQHGQA--  
Trout\_SelPa2 186 CNRMVEVKPEGEEKPVT---GGDTPHGGRGHHHHGNG-----HGHHGKSHGHGHHGESDVGREHGRGHGVEQ-QQHQNGAERLHHGQA--  
Salmon\_SelPa2 186 CNRMVEVKPEGEEKPVT---GGDTPHGGRGHHHHGNG-----HGHHSKSHGHGHHGESEVGRDHGRGHGVEQ-QQHQHGAEGLHHGQA--  
Stickleback\_Sel 186 CVEKAVAQPDADAPPVVEDNGGGGGHHGHHHNGHGHH----RGHHHGHHHGHHHGGDHGVGQQAVVHQEHERDGGASHGQHNSALDQM--  
Tilapia\_SelPa 186 CKDNAGVQPDVPAEQDD---TRHDHHHGHGHGHHHGH---GH--HHG--HGHGHHGDNQDVHPH--GHGSDHNNGHHHRNHDGADQTQHG  
Medaka\_SelPa 186 CQGKDNAQPETDGAQPA--------GEEHQHQHPHHG------------HHGHNHGDNHGLHPRGFGHGHDHRHGHHHRHHHGRA-----  
Fugu\_SelPa 218 CTPKTSALPDNGVAPGA-------EETGHECHHHGRQ-----------HHGDGHRDHGDSQCTHTRGSGRGHGHHHGHGGQGQH------  
Zebrafish\_SelPa 185 CKKATEEVNKPVEEEPR----------------QDHG-----------HHEHGHHEHQGEAERHRHGHHHPHHHHHHH------------  
S-gar\_SelPa 186 CNSTVKPEGKPEDKPEE--------SPESHGHPHAHG------------HGHHHSEEGRQSHRRHSSHGHHHGHGRHHHGSQQEFNNG--  
Pike\_SelPb 191 TWNSTQHKSLSGVGVIV---------------NETDG------------TAASALTVTENSSPAPNEGGVTQTHHHGPG-----------  
Trout\_SelPb1 194 GWNSTRRNETLSSSEMRVNETDSTVRSIDVDTVSNPV----------PSDGPQMSAEGGGNMSHIHHQHHQYPHH---------------  
Salmon\_SelPb1 194 GWNSSQRNETLSSSEMRVNETDSTVVDTVRSTDVDTV------SNPVASDGRQMSSEGGGNMSHIPHQHHQYPHHQHHQYPH--------  
Trout\_SelPb2 180 CQIEVATVSNPVPDVVU-------------------------------------------------------------------------  
Salmon\_SelPb2 128 MWPWISLLSLIDV-----------------------------------------------------------------------------  
Stickleback\_Sel 199 DFNVSQTNATPRIQPDTNDPEGAGTPPPPTHHHSHHH------------HHHHQHHHPHHPHLNQPLHDTSHPLSVHH------------  
Tilapia\_SelPb 193 NNITNNGTAQLVDEGSEVPDTASGRTHHHHHHHHHHD------DPPSHHHHHDQHSSHQNQSLHQQDQGDSTSHHHHHS-----------  
Fugu\_SelPb 190 RNETAQALTQLGADDPQVTPAPVRLHHHHHHHHHHHH------------HRHDHPHQDGSSKPSTPTP----------------------  
Medaka\_SelPb 187 GNNFTRNSSQSHSGVQRPADEPENVTTTLEASPNDSR----------HEHAHHHHPHHQHLHHHHPHHQHLHHHHPHHQHLH--------  
Zebrafish\_SelPb 190 SPDSTKNEPAGENNQRP----NSTEPVTAAHHHHHQQ-------HEPHHHHHNPYPNSHKKSGDSDVTGKPKEPTHH-------------  
S-gar\_SelPb 198 KENVTDAECLDDHEQHQGEQSNGPQPSRHSQAHHSGH--------RLVHGPCRDKGRKRPPSPQNSTLSARQHAHSPHTI----------  
E-shark\_SelP 198 MDRNVTTTPSRHLSPNT-------------------------------------------------------------------------  
Whaleshark\_SelP 185 TKRNITSYKANIFQFNTTSFVASLTFENITTQPVQQH----------------------VANKPDPDPKLSSSPIHPH------------  
Latimeria\_SelPb 186 VGSNTSVSAWEESGK----------------------------------EGLGQNKQSVEDYIQHPLARLDPLPSLPP------------  
Chicken\_SelPb 185 ANSTMEVPATLTPLPKQ--------EEKESETPAHHQ------------PNHLHPHHRAVGNGTAPEPSGDHRPAHAHH-----------  
Crocodile\_SelPb 185 ANGTAEAQANPSLAPRQ-------------------------------------EKEEEPPPRVHPTPRHEADGSEASVLHG--------  
Frog\_SelPb 187 MNETALLSLSDNSSSPL--------------------------------------PNKDGPVNKEPSKTLEKNKDHKKLDSDR-------  
Platypus\_SelPb 193 -NDTTTQESELEKSPGA------------------------------------PGEEPEGSPVREPDRPQSQDPTGPF------------  
Whaleshark\_SelP 183 IARNITQTLKIDLRKHH-----------RGHHHAHRN------------HNPNVHEEDQLQQNRTDPVQLGHNTHKHHQ-----------  
E-shark\_SelP 126 CNSTSATEENTADKTVQNHRRGVVKSVNKADAQPDSG---------LNTHTQLLLNMTGPGEEQDPHRRRQHRHHQRHHK----------  
Amphioxus\_SelPa 203 ILTTTPGSPTDGPDVTTASDIGSGDLDEGFIRDTGTSMDDVDESNAPLHTSTSHQNRTSVNNRTERIMFTEHNTESPQRNSKRHHRR---  
Amphioxus\_SelPb ------------------------------------------------------------------------------------------  
S7 Figure, continued

Human\_SelP 245 ---HHHKHKGQHRQGHPENRDMPASEDLQD------------LQKKLCRKRCINQLLCKLPTDSELAP---RSUCCHCRHLIFEKTGS--  
Rat\_SelP 248 ---HHHKHKGQHRQGHLESUDMGASEGLQLSL----------AQRKLURRGCINQLLCKLSEESGAAT---SSCCCHCRHLIFEKSGS--  
Mouse\_SelP 243 ---HHHRHRGQHRQGHLESUDTTASEGLHLSL----------AQRKLURRGCINQLLCKLSKESEAAP---SSCCCHCRHLIFEKSGS--  
Platypus\_SelPa 248 ---KRLRPAGQPRQGQGGSREAAEGRGEELPSPRK-------KAURKGNASCQNQLLUDWHKRSGPAP---SSUCUHCRHLLFGSKATA-  
Chicken\_SelPa 249 ---RRHRVFNHNRHDQIGSHEQVETLPPGEGVENLPRVT---KLUKKGKTICKNQLTUNWQTASDSTT---SSUCCHCRHLLFEELGN--  
Cocodile\_SelPa 251 ---RHNRVLGRNRQDQAGSQERVEAVPQREVLEIPLQSK---RLUKKGNASCKNQLTUNFLKASESTS---SSUCUHURHLLFEEVGK--  
Latimeria\_SelPa 249 ---EVQRPIAHDHHGNEQGQVDSLLIRQVR------------RPUKKKAASUSQSVEUNWQEMSGLIS---SKUCUHURQLYSNQAIDN-  
Frog\_SelPa 252 ---QGQSVVPQSEVVFVPQREADVPVLA--------------LQPUKKAKSUKKQYLUEWREDAGKAF---NSUCUHURQLSFEIAQN--  
Pike\_SelPa 258 ---QDQLHVSQDHVGQTAVQL---GQETNEGQVMQ-------RPUAKEGVRCSGQHDUQWKEGSVLSPSSKASUCUHURHLLDDGVSGQP  
Trout\_SelPa1 270 ---HGQLHVGQEHMGQQAVQLGQMPQEGQRGHIMQ-------NPUVKGKSRUKAEHSUQWKEGSDLSPSSKASUCUHURRLFGDGVSNEP  
Salmon\_SelPa1 271 ---QGQLHVGQEHMGQQAVQLGQMPQEGQRGHIMQ-------NPUVKGMSRUKAEHSUQWKEGSDLSPSSKASUCUHURRLFGDGESNEP  
Trout\_SelPa2 265 ---HGQVHVGQEHMGQQ-------PKEVQEGHIMQ-------RPUVKGRARUKAELSUHLKEGSDISPSSKVSUCUHURGLFGNGVRNEP  
Salmon\_SelPa2 265 ---HGQLHVGQEHMGQQ-------PKEAQEGHIMQ-------RPUVKGRARUKAELSUHLKEGSDISPSSKVSUCUHURGLFGNGVSNEP  
Stickleback\_Sel 270 ---QQQAHIPQMPHGAQAAPV---------------------RPUVEENAKUKSKHSUKLTAGSDNEASLKLSUCCHURRLFGEVGSEQP  
Tilapia\_SelPa 264 VRPHGHFHEGDMPQTQHHFDLGQIPQEVHNQQVAQEAHAVIERPULSRKNRUKLKYNUQGLTGSDNEI--KSSUCUHURRLFGEAGSEQP  
Medaka\_SelPa 251 ---ETRLQEHQHHASSDQMQHAVQLEQIGQEVVGAPV-----RPUVQETARUKTKFTUHMVAGSENE----ASUCUHURRLFGHAGSEQP  
Fugu\_SelPa 284 ---EGRVHMGDIPQRPDHLDLGQAQQALNLHHLPQHDAA---ATRPUESKRUKAQFSUQWAEASDTGAFPKASUCUHURRLFGDVVGEEP  
Zebrafish\_SelPa 236 ---RGQQQVDVDQQVLSQVDFGQVAAETP-------------MMKRPUAKHSRUKVQYSUQQGADSPV---ASUCUHURQLFGGEGNGRV  
S-gar\_SelPa 254 ---QTQRHSQTHQQQQLIKNPSLLSQQEVVDFPLRIE-----WPUKKGAAKUKHQYSUEWKEGSSDLLS--SSUCUHCRQLFGGEGUDQ-  
Pike\_SelPb 243 ---QHHQNKHYQRPHTHGSDI---------------------------------------------------------------------  
Trout\_SelPb1 259 ---HQQQHQHHHNHGSDA------------------------------------------------------------------------  
Salmon\_SelPb1 270 ---HHHYHQHHUNHGSDA------------------------------------------------------------------------  
Trout\_SelPb2 197 ------------------------------------------------------------------------------------------  
Salmon\_SelPb2 141 ------------------------------------------------------------------------------------------  
Stickleback\_Sel 265 ---HHHPHHHHHQQQQPGNHS---------------------------------------------------------------------  
Tilapia\_SelPb 266 ---PHQQHQHDH------------------------------------------------------------------------------  
Fugu\_SelPb 246 ------------------------------------------------------------------------------------------  
Medaka\_SelPb 259 ---HHHPHLQQHSKHQNDDSY---------------------------------------------------------------------  
Zebrafish\_SelPb 256 ---SHQEHVHNHR-----------------------------------------------------------------------------  
S-gar\_SelPb 270 ---HSHHDLHQHUAGCDR------------------------PPRAELQRQCTFT----------------ATACSLCALL---------  
E-shark\_SelP 215 ------------------------------------------------------------------------------------------  
Whaleshark\_SelP 241 -------HFNNSQDGSLET-----------------------------------------------------------------------  
Latimeria\_SelPb 230 ---PPHRHLHKRHQRFPE------------------------------------------------------------------------  
Chicken\_SelPb 244 ---HHGAHGKLHPKGQT-------------------------------------------------------------------------  
Crocodile\_SelPb 230 ---KAGPAHGRHREG---------------------------------------------------------------------------  
Frog\_SelPb 232 ---RPHDHSQHQPLNSHTPQE---------------------------------------------------NQNYHPRNLIKTG-----  
Platypus\_SelPb 234 ---SGVLLQGKENK----------------------------------------------------------------------------  
Whaleshark\_SelP 239 ---NHHHPHHQYDQSNSESETPDMVAGNGS------------PQPUINKSNCKRKFKUKPEGMSELAG---IRUUUYCRQLFSDKSSNNE  
E-shark\_SelP 197 ---NHHNNSGHREESMAGTSDGPTANSPRVQRNQHSLQI---RPURVMKFKCIPEVRSEVAP---------VSUAUHURQLFGSDLSHNV  
Amphioxus\_SelPa 290 ---HHHRRHGDHRQEAHSESH---------------------------------------------------------------------  
Amphioxus\_SelPb ------------------------------------------------------------------------------------------  
  
  
Human\_SelP 315 AITUQCKENLPSLCSUQGLRAEEN--ITESCQURLP----PAAUQISQQLIPTEASASURUKNQAKK-----UEUPSN-----  
Rat\_SelP 320 AITUQCAENLPSLCSUQGLFAEEK--VIESCQCRSP----PAAUH-SQHVSPTEASPNUSUNNKTKK-----UKUNLN-----  
Mouse\_SelP 315 AIAUQCAENLPSLCSUQGLFAEEK--VTESCQCRSP----PAAUQ-NQPMNPMEANPNUSUDNQTRK-----UKUHSN-----  
Platypus\_SelPa 324 TALUQCRDALPALCSUQGRQSGED--VIESUQURSPLPAUPPAAQLPSPSPTDPNAAUKUENTAGM------UKUPTR-----  
Chicken\_SelPa 328 SITUQCRGALPNSCRUHGQLLAED--ITESUQURLL----TAAUESAAGGGSETSDTUQUQERAGN------UAUKTN-----  
Cocodile\_SelPa 330 TATUHCRGTLPDTCRUQGQLLAEN--ITESUQURLL----PAAUQSLAEREHETSDNUQUQGKTGN------UAUKTN-----  
Latimeria\_SelPa 320 AAAUQCKRMLPSAUQUQGQLNGIN--VFESUQURSP----RATUQPLSDRPSQQEAADSVAUKUSQNLEIUEUQHQEQ-----  
Frog\_SelPa 320 EVAURCQEALPASUQUQELLSDS---LSESUQURLS----AAAUHSHSTGLPELDTESETNAPUAUPQEAENUQUKELURFLM  
Pike\_SelPa 335 IRLUHCNEALPASCQUHGLKGL----LRETUQURSP----QTDUQQPRPV---MUAUSPGVES--------------------  
Trout\_SelPa1 350 IGLUHCDEALPASUQUQGLIG-----LRETUQURSS----LADUQQPQPV---MUAUPLGVES---------UGUGLL-----  
Salmon\_SelPa1 351 IGLUHCDEALPASUQUQGLMG-----LRETUQURSS----PADUQQPQPV---MUAUPLGVES---------UGUGQL-----  
Trout\_SelPa2 338 IGLUHCDEALPASUQUQGLMGDSNNHIRETUQURLP----PTDUQQPLPV---MSAUSPGVET---------USUEQL-----  
Salmon\_SelPa2 338 VGLUHCDEALPASUQUQGLMGDSTNHIRETUQURSP----PADUQQPPPV---MSAUSPGVET---------UGUEQL-----  
Stickleback\_Sel 336 LGLUHCDEALPASUQUHGLTDGVANNVRETUQCRSP----PAAUQQPEPAPUAUAAGVS-------------UGUEQL-----  
Tilapia\_SelPa 352 VGLUHCDEALPTSURUHGLIGDAVNDVRETUQURLP----HAAUQEPQPA---QUAUPPGVVS---------UGUEQL-----  
Medaka\_SelPa 329 LGLUHCQEELPASUQCRGLTGELANTVIESUQURSP----PAAUQQPQPA---QUAUAPGAAS---------UAUEQL-----  
Fugu\_SelPa 368 VGLUHCSEALPASUQURGPTGDAVNAVRETUQURSP----LAVUQQPQPAQUAUPQGVN-------------UGUEQV-----  
Zebrafish\_SelPa 307 AGLUHCDEPLPASUPUQGLKEQDNH-IKETUQURPA---PPAEUELSQPTUVUPAGDAT-------------UGURKK-----  
S-gar\_SelPa 333 AAFUHCEEKPPASCQUQGLQGGNH--VRETUQURSS----SKAURLPSAAGQPEQSUTUPQGNER-------UIUQEQ-----  
Pike\_SelPb 261 ------------------------------------------------------------------------RGLGSN-----  
Trout\_SelPb1 274 ------------------------------------------------------------------------DKQDSN-----  
Salmon\_SelPb1 285 ------------------------------------------------------------------------DKQDSN-----  
Trout\_SelPb2 197 ------------------------------------------------------------------------GGR--------  
Salmon\_SelPb2 141 ------------------------------------------------------------------------GDURAT-----  
Stickleback\_Sel 283 ------------------------------------------------------------------------GTAVDH-----  
Tilapia\_SelPb -----------------------------------------------------------------------------------  
Fugu\_SelPb 246 ------------------------------------------------------------------------EPKMAA-----  
Medaka\_SelPb -----------------------------------------------------------------------------------  
Zebrafish\_SelPb -----------------------------------------------------------------------------------  
S-gar\_SelPb 308 -------------CIYRGYC---------------------------------------------------------------  
E-shark\_SelP 215 ------------------------------------------------------------------------SD---------  
Whaleshark\_SelP 253 ------------------------------------------------------------------------DDTERL-----  
Latimeria\_SelPb 245 ------------------------------------------------------------------------AELVLG-----  
Chicken\_SelPb 258 ------------------------------------------------------------------------PEGRDP-----  
Crocodile\_SelPb 242 ------------------------------HQRRAPA-----------------------------------ARDEAR-----  
Frog\_SelPb 263 ------------------------------------------------------------------------AQRPEN-----  
Platypus\_SelPb 245 -----------------------------IIPWKTPLQAAPRKPSHP-------------------------PGAHD------  
Whaleshark\_SelP 311 VTUHCRTQSSSUQUQEQGRV--DS--LIESUQURLIPALUPQDQMSQRHUGPUQGVKSRE------------URDGLK-----  
E-shark\_ SelP 272 VTUQCRKTHLPSSUWUQQPKSEGN--VPEVUQURSL----SAASU---------------------------PENSQS-----  
Amphioxus\_SelPa 308 ------------------------------HHQRSQ------------------------------------DGHTDE-----  
Amphioxus\_SelPb -----------------------------------------------------------------------------------

**S7 Figure:** **Protein alignment of all selenoprotein P sequences used in the phylogenetic analysis.** All sequences were obtained from public databases and hand curated except the salmonid SelPa2 and SelPb2 sequences that were cloned in this work. Shading illustrates conserved regions in the alignment. The species accession numbers are Human SelP (CAA77836), Rat SelP (NP\_062065), Mouse SelP (NP\_033181), Trout SelPa1 (CCX35038), Salmon SelPa1 (XP\_014026610), Trout SelPb1 (CCX35039), Salmon SelPb1 (XP\_013995921), Trout SelPa2 (MH085053), Salmon SelPa2 (MH085055), Trout SelPb2 (MH085056), Salmon SelPb2 (MH085057), Pike SelPa (XP\_012992107), Pike SelPb (XP\_010889663), Zebrafish SelPa (AAH63960), Zebrafish SelPb (AAH86844), Stickleback SelPa (ENSGACG00000006838), Stickleback SelPb (DW037066), Tilapia SelPa (XP\_013127321), Tilapia SelPb (XP\_005475970), Medaka SelPa (XP\_004072267), Medaka SelPb (XP\_004079176), Fugu SelPa (XP\_003974909), Fugu SelPb (XP\_011614676), Chicken\_SelPa (NP\_001026780), Chicken\_SelPb (NP\_001335698), Crocodile\_SelPa (XM\_019532012), Crocodile\_SelPb (XM\_019531330), Clawed frog (Frog) SelPa (NP\_001186825), Frog SelPb (NP\_001335928) Coelacanth SelPa (XP\_006014647), Coelacanth SelPb (XP\_006012455), Spotted gar (S-gar) SelPa (XM\_015368034), S-gar SelPb XM (006634737), Elephant shark (E-shark) SelPa (XM\_007901591), E-shark\_SelPa (XM\_007899837), Whaleshark\_SelPa (XM\_020519442), Whaleshark SelPb (XP\_020374664), Platypus SelPa (XP (007654576), Platypus SelPb (XP\_007664551). The Amphioxus SelPa and SelPb were translated from XM\_002598433 and XM\_002604219 and reported by Jiang et al. (2012).