

## Appendix S1

### GeneBank numbers for sequences used in the analysis.

The following are the sequences used for the within-genome genetic distance calculations: 1 *Amyloodinium ocellatum* Brown - DC1 isolate AF352359-AF352362; 2 *Cryptoperidiniopsis brodyi* Steidinger, Landsberg, P. L. Mason, Vogelbein, Tester et Litaker – CellH isolate AF352349- AF352350; 3 *Cryptoperidiniopsis* species CspA5 isolate - AF352355-AF352358 (also referenced as isolate as PLO21, Steidinger et al. 2006); 4 *Cryptoperidiniopsis brodyi* V14 isolate - AF352352-AF352354; 5 *Heterocapsa triquetra* (Ehrenberg) Stein AF352363- AF352364 (Note: the same SSU sequence has been assigned to both *H. triquetra* and *H. pygmaea* Lobelich III, R.J. Schmidt & Sherley, indicating the above sequence may belong to either species (see Table 2); 6 *Karenia brevis* (Davis) Hansen et Moestrup (= *Gymnodinium breve* and *Ptychodiscus brevis*) - Wilson isolate AF352368-AF352369; 7 *Karenia mikimotoi* (Miyake & Kominami ex Oda) G. Hansen & Ø. Moestrup GA87TIN isolate (= *Gymnodinium mikimotoi*)- AF318223-AF318224; 8 *Karlodinium veneficum* (B. Leadbeater & J.D. Dodge) J. Larsen (= *Gymnodinium micrum*, = *Karlodinium micrum*, recently reclassified as *Karlodinium veneficum*)- AF352365-AF352367 isolate Gga; 9 Lucy sp. Florida isolate- AF352346-AF352348; 10 *Pfiesteria piscicida* K.A. Steidinger & J.M. Burkholder CCMP1834 sequences identical to AF352333 and AF352337 (Note: For some of the *P. piscicida* isolates sequences were obtained multiple times from either the same isolate or from different isolates as indicated in Fig. 2. Identical sequences were not deposited multiple times in GenBank. Consequently, the same GenBank number may apply to

different *Pfiesteria* isolates for the purposes of this analysis, which included all the copies sequenced for each isolate.); 11 *Pfiesteria piscicida* CCMP1921 AF352336 and sequences identical to AF352333 and AF352337; 12 *Pfiesteria piscicida* – Cell M (equivalent to CCMP1834) AF352333, AF352337; 13 *Pfiesteria piscicida* Cell N (=Noga P) AF352334-AF352335; 14. *Pfiesteria piscicida* VIMS10/11 AF352333; 15 *Pseudopfiesteria shumwayae* (Glasgow & Burkholder) Litaker, Steidinger, Mason, Shields & Tester 1049 - AF352341-AF352345; 16 *Pseudopfiesteria shumwayae* Noga S - AF352338-AF352340; 17 *Prorocentrum minimum* (Pavillard) J. Schiller - AF208244, AF352370-AF352371; 18 *Scrippsiella trochoidea* (Stein) Balech ex Loeblich III SZN33 - AF527069-AF527070; 19 *Scrippsiella trochoidea* SZN61 - AF527074-AF527076; 20 *Scrippsiella trochoidea* SZN64 - AF527079-AF527081; 21 *Scrippsiella trochoidea* SZN69 - AF527082-AF527084; 22 *Scrippsiella trochoidea* SZN70 - AF527085-AF527089; 23 *Scrippsiella trochoidea* SZN72 - AF527090-AF527092; 24 *Scrippsiella trochoidea* SZN76 - AF527093-AF527094; 25 *Scrippsiella trochoidea* SZN77 - AF527097-AF527100; 26 *Scrippsiella trochoidea* SZN89 - AF527102-AF527108; 27 *Scrippsiella trochoidea* SZN91 - AF527116-AF527119; 28 *Scrippsiella trochoidea* SZN93 - AF527120-AF527121; 29 *Scrippsiella trochoidea* var *aciculifera* M. Montresor SZN60 - AF527071-AF527073; 30 *Scrippsiella trochoidea* var *aciculifera* SZN63 - AF527077-AF527078.

Sequences used for calculating the within-species variation ITS1, 5.8S, and ITS2 region among dinoflagellates belonging to the same species were: 1 *Alexandrium affine* (H. Inoue & Y. Fukuyo) E. Balech - AB006995 plus strains CU-1 and H2 entered manually from Adachi et al. 1996 but not in GenBank; 2 *Alexandrium catenella*

(Whedon & Kofoid) E. Balech - AJ005048 (labeled *Alexandrium tamarensense* (Lebour) E. Balech in GenBank but matches 100% with *A. catanella* sequence), AY347308, AJ298900, AB006990; 3 *Alexandrium lusitanicum* E. Balech/*minutum* Halim - AJ005050, AY455825-AY455826, AJ318460; 4 *Alexandrium pseudogonyaulax* (Biecheler) Horiguchi ex Kita & Fukuyo / sp. AS-1 - AB006997, AF208243; 5 *Alexandrium tamarensense* (Lebour) E. Balech/*fundyense* Balech gene A - AB006993, AF374224-AF374228; 6 *Alexandrium tamarensense*/*fundyense* gene B - AJ005049, AB006994; 7 *Alexandrium tamarensense* WKS-1 type - AB006991, AJ005047; 8 *Alexandrium taylori* Balech - AJ251653-AJ251654, AJ291785, AJ300451, AJ416856; 9 *Amphidinium carterae* Hulbert - AJ534380-AJ534381; 10 *Amphidinium eilantiensis* J. J. LEE - AJ417899-AJ417900; 11 *Coolia malayense* - AF244943-AF244950; 12 *Coolia monotis* Meunier - AJ279032, AJ308524; 13 *Dinophysis acuminata* Claparède & Lachmann/*acuta* Ehrenberg/*dens* Pavillard/*pavillardii* Schröder/*sacculus* Stein - AJ012007, AJ272119, AJ304807, AJ404000, AY040569-AY040583; 14 *Dinophysis norvegica* Claparède & Lachmann - AJ506980, AJ506982, AJ506985; 15 *Gymnodinium catenatum* L.W. Graham - AF208247, AY506575-AY506592, AY506574; 16 *Gymnodinium corii* Schiller/*simplex* (Lohmann) Kofoid & Swezy - AF318226, AY686651; 17 *Gymnodinium linucheae* R. V. Trench & L. -V. Thinh - AF333509, equivalent sequence to *Symbiodinium* Freudenthal clade A species AF427465, and isolates 47-5iii AY074985 and 47-5i AY074984; 18 *Gymnodinium* Stein sp. zhao01/zhao08 - AJ534384, AJ534385 both 100% identical to *Symbiodinium* sp. G15 AY160123; 19 *Gyrodinium instriatum* Freudenthal & Lee - AJ534386-AJ534388, AJ534383; 20 *Heterocapsa circularisquma* Horiguchi - AB049711, AB084089-

AB084091; 21 *Heterocapsa pygmaea* Lobelich III, R.J. Schmidt & Sherley/*triquetra* - AB084094, AF352363; 22 *Heterocapsa triquetra* - AB084101, AF208249, AF527816; 23 *Heterocapsa* Stein FK6-D47/NIES614 - AB084097, AB084099; 24 *Karenia brevis* (= *Gymnodinium breve*)- AF352368-AF352369; 25 *Karenia mikimotoi* (= *Gymnodinium mikimotoi*) - AF318223-AF318224; 26 *Ostreopsis ovata* Fukuyo Malacca Straights - AF218455-AF218456; 27 *Ostreopsis ovata* South China Sea - AF218457-AF218464; 28 *Ostreopsis* J. Schmidt sp. D5/cf. *siamensis* - AJ301643, AJ312944; 29 *Pfiesteria piscicida* - AY245693, AF330600-AF330620, AF352333-AF352337, AY112746, DQ344039- DQ344043, AM231028-AM231033; 30 *Pseudopfiesteria shumwayae* - AF352340-AF352341; 31 *Prorocentrum micans* Ehrenberg - M14649, AF208245, AF370878-AF370879; 32 *Prorocentrum minimum* (Pavillard) J. Schiller - AF208244, AF352370; 33 *Scrippsiella trochoidea* SZN33,89,90 - AF527069-AF527070, AF527102-AF527115; 34 *Scrippsiella trochoidea* SZN60,63 - AF527071-AF527073, AF527077-AF527078; 34 *Scrippsiella trochoidea* SZN64,69,70,72,91.93 - AF527079-AF527092, AF527116-AF527121; 35. *Symbiodinium microadriaticum* Freudenthal - AF180119-AF180120.

The sequences used to calculate divergence rates between species belonging to the 14 genera investigated were as follows: 1. *Alexandrium* - *affine* Halim AB006995, *catenella* AY347308, *cohorticula* (Balech) Balech AF145224, *fraterculus* (Balech) Balech AF208242, *fundyense* AJ005049, *insuetum* E. Balech AB006996, *margalefi* E. Balech AJ251208, *lusitanicum* E. Balech AJ005050, *pseudogonyaulax* strain H1 AB006997, *tamarensis* isolate AT-10 AF374226, *tamarensis* strain CU-15 AB006992, *tamarensis* strain WKS-1 AB006991 and *taylori* AJ251653. 2. *Amphidinium* - *carterae* 2

AJ534380 and *eilatiensis* J. J. LEE, AJ417899. 3. *Coolia* Meunier - *malayense* AF244943 and *monotis* AJ279032. 4. *Cryptoperidiniopsis* Steidinger, Landsberg, Mason, P.L., Vogelbein, Tester & Litaker - *brodyi* AF352349, V14 AF352352, A5 AF352355 and sp. PLO21 AY245691. 5. *Dinophysis* Ehrenberg - *acuminata* AJ272119, *caudata* Saville-Kent AY040584, *norvegica* AJ506980, *rotundata* Claparède & Lachmann AJ506990 and *tripos* Gourret AJ304806. 6. *Gonyaulax* Diesing - *polyedra* F. Stein AF377944 and *spinifera* (Claparède & Lachmann) Diesing AF051832. 7. *Gymnodinium* Stein - *catenatum* AY506575, *corii* AF318226, *impudicum* (S. Fraga & I. Bravo) G. Hansen & Ø. Moestrup AF131074, *linucheae* R. V. Trench & L. -V. Thinh AF333509, *maguelonnense* Biecheler AF318225, *sanguineum* K. Hirasaka AF131075, sp. 7-15 AJ534382, sp. zhao01 AJ534385. 8. *Heterocapsa* Stein - *arctica* Horiguchi AB084095, *circularisquama* Horiguchi AB084089, *illdefina* (Herman & Sweeney) Morrill & Loeblich III AB084092, sp. FK6-D47 AB084097, sp. NIES472 AB084098, sp. NIES473 AB084100, *pygmaea* AB084093-AB084094, sp. TK6-D57 AB084096 and *triquetra* AB084101. 9. *Karenia* G. Hansen & Moestrup - *brevis* AF352368, identical to sequence from *K. mikimotoi* AF318223 (Listed as *Gymnodinium mikimotoi* in GenBank). 10. *Ostreopsis* J. Schmidt - *lenticularis* Fukuyo AF218465, *ovata* Fukuyo Malacca Straights Group AF218455, *ovata* South China Sea Group AF218458, cf. *ovata* strain A1 AJ311520, cf. *siamensis* AJ301643. 11. *Pentapharsodinium* Indelicato & Loeblich III - *dalei* Indelicato et Loeblich AF527817 and *tyrrhenicum* (Balech) Montessor, Zingone & Marino AF527818. 12. *Prorocentrum* Ehrenberg - *donghaiense* Lu AY465116, *micans* AF208245, *minimum* AF208244 and *triestinum* J. Schiller AF208246. 13. *Scrippsiella* Balech ex A.R. Loeblich III - *inulfa* (Deflandre) Montessor AF527812, *lachrymosa* Gao

& Dodge AF527819, *operosa* (Deflandre) Montresor AF527813, *ramonii* M. Montresor AF527820, *rotunda* J. Lewis AF527821, sp. SSD1 AY685008, *trochoidea* China strain AY685009, *trochoidea* strain SZN64 AF527080, *trochoidea* strain SZN76 AF527093, *trochoidea* strain SZN77 AF527098, *trochoidea* strain SZN89 AF527108, *trochoidea* var. *aciculifera* strain SZN60 AF527071, *trochoidea* var. *aciculifera* strain SCCAP499 AF527068. 14. *Symbiodinium* Freudenthal - *cariborum* R. K. Trench AF333504, *californium* AF334659, *goreaui* R.K. Trench & R.J. Blank AF333515, *kawagutii* R.K. Trench & R. J. Blank AF333517, *muscatinei* LaJeunesse and Trench AF333510, *pilosum* R. K. Trench & R. J. Blank AF333506 and *pulchrorum* R. K. Trench AF333511.