Table S1. Band math with band number and band wavelengths in nm for each algorithm used for BGA/PC relative fluorescence unit (BGA_PC_RFU) estimation at Harsha Lake using phycocyanin indices and nearest center band wavelengths in current and near-future satellite imaging systems. Float refers to floating point values of relative reflectance in the ENVI band math we used in this study at the specified wavelengths in nm from atmospherically corrected imagery. Float is not a variable, it is an IDL function used to prevent byte overflow errors during calculation. Band number and band wavelengths are listed for each algorithm sequentially. Asterisk after algorithm indicates design specifically for phycocyanin detection.

Phycocyanin Index Algorithms by Satellite/Sensor	Reference	Spatial Res. (m)	ENVI Band Math/Wavelengths (nm)
CASIAl10SABI	Alawadi et al. (2010) [41]	1	(float(b35) − float(b20))/(float(b7) + float(b12))
CASIAl10SABI	Alawadi et al. (2010) [41]	1	(float(857) − float(644))/(float(458) + float(529))
CASIAm092Bsub	Amin et al. (2009) [42]	1	(float(b23)) − (float(b21))
CASIAm092Bsub	Amin et al. (2009) [42]	1	(float(686)) − (float(658))
CASIAm09KBBI	Amin et al. (2009) [42]	1	(float(b23) − float(b21))/(float(b23) + float(b21))
CASIAm09KBBI	Amin et al. (2009) [42]	1	(float(686) − float(658))/(float(686) + float(658))
CASIBe16FLHblue	Beck et al. (2016) [6]	1	(float(b12)) − [float(b20) + (float(b7) − float(b20))]
CASIBe16FLHblue	Beck et al. (2016) [6]	1	(float(529)) − [float(644) + (float(458) − float(644))]
CASIBe16FLHviolet	Beck et al. (2016) [6]	1	(float(b12)) − [float(b20) + (float(b5) − float(b20))]
CASIBe16FLHviolet	Beck et al. (2016) [6]	1	(float(529)) − [float(644) + (float(429) − float(644))]
CASIBe162B700sub629 *	This paper	1	(float(b24)) − (float(b19))
CASIBe162B700sub629 *	This paper	1	(float(700)) − (float(629))
CASIBe162B643sub629 *	This paper	1	(float(b20)) − (float(b19))
CASIBe162B643sub629 *	This paper	1	(float(644)) − (float(629))
CASIBe162B700sub601	This paper	1	(float(b24)) − (float(b17))
CASIBe162B700sub601	This paper	1	(float(b700)) − (float(601))
CASIBe152BsubPhy(715sub615) *	This paper	1	(float(b25)) − (float(b18))
CASIBe152BsubPhy(715sub615) *	This paper	1	(float(715)) − (float(615))
CASIBe16MPI *	This paper	1	(((float(b18)) − (float(b17)) − ((float(b20)) − (float(b17)))))
CASIBe16MPI *	This paper	1	(((float(615)) − (float(601)) − ((float(644)) − (float(601)))))
CASIBe16NDPhyI *	This paper	1	(float(b24) − float(b17))/(float(b24) + float(b17))
CASIBe16NDPhyI *	This paper	1	(float(700) − float(601))/(float(700) + float(601))
CASIBe16NDPhyI644over615 *	This paper	1	(float(b20) − float(b18))/(float(b20) + float(b18))
CASIBe16NDPhyI644over615 *	This paper	1	(float(644) − float(615))/(float(644) + float(615))
CASIBe16NDPhyI644over629 *	This paper	1	(float(b20) − float(b19))/(float(b20) + float(b19))

CASIBe16NDPhyI644over629 *	This paper	1	(float(644) − float(629))/(float(644) + float(629))
CASIBe16Phy2BDA644over629 *	This paper	1	(float(b20)/float(b19))
CASIBe16Phy2BDA644over629 *	This paper	1	(float(644)/float(629))
CASIDa052BDA	Dall'Olmo et al. (2003) [54]	1	(float(b25))/(float(b22))
CASIDa052BDA	Dall'Olmo et al. (2003) [54]	1	(float(715))/(float(672))
CASIDE933BDA *	Dekker (1993) [26]	1	((float(b17)) − (float(b20))) − (float(b19))
CASIDE933BDA *	Dekker (1993) [26]	1	((float(601)) − (float(644))) − (float(629))
CASIGi033BDA	Gitelson et al. (2003) [43]	1	((1/float(b22)) − (1/float(b25))) × (float(b28))
CASIGi033BDA	Gitelson et al. (2003) [43]	1	((1/float(672)) − (1/float(715))) × (float(757))
CASIGo04MCI	Gower et al. (2004) [44]	1	(((float(b25)) − (float(b23)) − ((float(b28)) − (float(b23)))))
CASIGo04MCI	Gower et al. (2004) [44]	1	(((float(715)) − (float(686)) − ((float(757)) − (float(686)))))
CASIHU103BDA *	Hunter et al. (2008) [29]	1	((1/float(b18)) − (1/float(b17))) − (float(b26))
CASIHU103BDA *	Hunter et al. (2008) [29]	1	((1/float(615)) − (1/float(601))) − (float(729))
CASIKn07KIVU	Kneubuhler et al. (2007) [45]	1	(float(b7) − float(b20))/(float(b12))
CASIKn07KIVU	Kneubuhler et al. (2007) [45]	1	(float(458) − float(644))/(float(529))
CASIKu15PhyCI	Kudela et al. (2015) [17]	1	−1 × (((float(b23)) − (float(b21)) − ((float(b25)) − (float(b21)))))
CASIKu15PhyCI	Kudela et al. (2015) [17]	1	−1 × (((float(686)) − (float(658)) − ((float(715)) − (float(658)))))
CASIKu15SLH	Kudela et al. (2015) [17]	1	(float(b25)) − [float(b21) + (float(b28) − float(b21))]
CASIKu15SLH	Kudela et al. (2015) [17]	1	(float(715)) − [float(658) + (float(757) − float(658))]
CASIMI092BDA	Mishra et al. (2009) [11]	1	(float(b24))/(float(b17))
CASIMI092BDA	Mishra et al. (2009) [11]	1	(float(700))/(float(601))
CASIMM092BDA	Mishra et al. (2009) [11]	1	(float(b26))/(float(b17))
CASIMM092BDA	Mishra et al. (2009) [11]	1	(float(729))/(float(601))
CASIMM12NDCI	Mishra and Mishra (2012) [32]	1	(float(b25) − float(b23))/(float(b25) + float(b23))
CASIMM12NDCI	Mishra and Mishra (2012) [32]	1	(float(715) − float(686))/(float(715) + float(686))
CASIMM12NDCIalt	Mishra and Mishra (2012) [32]	1	(float(b24) − float(b21))/(float(b24) + float(b21))

CASIMM12NDCIalt	Mishra and Mishra (2012) [32]	1	(float(700) − float(658))/(float(700) + float(658))
CASIMM143BDAopt14*	Mishra and Mishra (2014) [16]	1	((1/float(b19)) − (1/float(b21))) × (float(b26))
CASIMM143BDAopt14 *	Mishra and Mishra (2014) [16]	1	((1/float(629)) − (1/float(658))) × (float(729))
CASIMM143BDAopt	Mishra and Mishra (2014) [16]	1	((1/float(b19)) − (1/float(b21))) × (float(b29))
CASIMM143BDAopt	Mishra and Mishra (2014) [16]	1	((1/float(629)) − (1/float(658))) × (float(772))
CASISI052BDA *	Simis et al. (2005) [7]	1	(float(b25))/(float(b19))
CASISI052BDA *	Simis et al. (2005) [7]	1	(float(715))/(float(629))
CASISM122BDA	S. Mishra (2012) [46]	1	(float(b25))/(float(b17))
CASISM122BDA	S. Mishra (2012) [46]	1	(float(715))/(float(601))
CASISY002BDA *	Schalles and Yacobi (2000) [47]	1	(float(b21))/(float(b19))
CASISY002BDA *	Schalles and Yacobi (2000) [47]	1	(float(658))/(float(629))
CASIStu16Phy *	Stumpf et al. (2016) [24]	1	(float(b22) − float(b18)) + ((float(b18) − float(b23)) × 0.74)
CASIStu16Phy *	Stumpf et al. (2016) [24]	1	(float(665) − float(620)) + ((float(620) − float(681)) × 0.74)
CASIStu16PhyFLH *	Stumpf et al. (2016) [24]	1	(float(b22)) − (float(b23) + (float(b18) − float(b23)))
CASIStu16PhyFLH *	Stumpf et al. (2016) [24]	1	(float(665)) − (float(681) + (float(620) − float(681)))
CASIWy08CI	Wynne et al. (2008) [19]	1	−1 × (((float(b23)) − (float(b22)) − ((float(b25)) − (float(b22)))))
CASIWy08CI	Wynne et al. (2008) [19]	1	−1 × (((float(686)) − (float(672)) − ((float(715)) − (float(672)))))
CASIZh10FLH	Zhao et al. (2010) [48]	1	(float(b23)) − [float(b25) + (float(b22) − float(b25))]
CASIZh10FLH	Zhao et al. (2010) [48]	1	(float(686)) − [float(715) + (float(672) − float(715))]
WV2Al10SABI	Alawadi et al. (2010) [41]	1.8	(float(b7) − float(b5))/(float(b1) + float(b3))
WV2Al10SABI	Alawadi et al. (2010) [41]	1.8	(float(850) − float(640))/(float(450) + float(530))
WV2Am092Bsub	Amin et al. (2009) [42]	1.8	(float(b6)) − (float(b5))
WV2Am092Bsub	Amin et al. (2009) [42]	1.8	(float(730)) − (float(659))

WV2Be16FLHviolet	Beck et al. (2016) [6]	1.8	(float(b3)) − [float(b5) + (float(b1) − float(b5))]
WV2Be16FLHviolet	Beck et al. (2016) [6]	1.8	(float(548)) − [float(659) + (float(429) − float(659))]
WV2Be162Bsub *	This paper	1.8	(float(b6)) − (float(b4))
WV2Be162Bsub *	This paper	1.8	(float(730)) − (float(608))
WV2Be16NDPhyI *	This paper	1.8	(float(b6) − float(b4))/(float(b6) + float(b4))
WV2Be16NDPhyI *	This paper	1.8	(float(730) − float(608))/(float(730) + float(608))
WV2Hu103BDA *	Hunter et al. (2008) [29]	1.8	((1/float(b4)) − (1/float(b3))) − (float(b6))
WV2Hu103BDA *	Hunter et al. (2008) [29]	1.8	((1/float(608)) − (1/float(548))) − (float(730))
WV2Kn07KIVU	Kneubuhler et al. (2007) [45]	1.8	(float(b1) − float(b5))/(float(b3))
WV2Kn07KIVU	Kneubuhler et al. (2007) [45]	1.8	(float(429) − float(659))/(float(548))
WV2Mi092BDA	Mishra et al. (2009) [11]	1.8	(float(b6))/(float(b5))
WV2Mi092BDA	Mishra et al. (2009) [11]	1.8	(float(730))/(float(659))
WV2MM12NDCI	Mishra and Mishra (2012) [32]	1.8	(float(b6) − float(b5))/(float(b6) + float(b5))
WV2MM12NDCI	Mishra and Mishra (2012) [32]	1.8	(float(730) − float(659))/(float(730) + float(659))
WV2MM143BDAopt *	Mishra and Mishra (2014) [16]	1.8	((1/float(b4)) − (1/float(b5)))*(float(b6))
WV2MM143BDAopt *	Mishra and Mishra (2014) [16]	1.8	((1/float(608)) − (1/float(659)))*(float(730))
WV2MM143BDAver3merisver *	Mishra and Mishra (2014) [16]	1.8	((1/float(b4)) − (1/float(b5)))*(float(b7))
WV2MM143BDAver3merisver *	Mishra and Mishra (2014) [16]	1.8	((1/float(608)) − (1/float(659)))*(float(840))
WV2SI052BDA *	Simis et al. (2005) [7]	1.8	(float(b6))/(float(b4))
WV2SI052BDA *	Simis et al. (2005) [7]	1.8	(float(730))/(float(608))
WV2SY002BDA *	Schalles and Yacobi (2000) [47]	1.8	(float(b5))/(float(b4))
WV2SY002BDA *	Schalles and Yacobi (2000) [47]	1.8	(float(659))/(float(608))
S2Al10SABI	Alawadi et al. (2010) [41]	20	(float(b8b) − float(b4))/(float(b2) + float(b3))
S2Al10SABI	Alawadi et al. (2010) [41]	20	(float(864) − float(665))/(float(486) + float(558))

S2Am092Bsub	Amin et al. (2009) [42]	20	(float(b5)) − (float(b4))
S2Am092Bsub	Amin et al. (2009) [42]	20	(float(707)) − (float(665))
S2Be162Bdiv	This paper	20	(float(b6))/(float(b5))
S2Be162Bdiv	This paper	20	(float(736))/(float(707))
S2Be16FLHblue	Beck et al. (2016) [6]	20	(float(b3)) − [float(b4) + (float(b2) − float(b4))]
S2Be16FLHblue	Beck et al. (2016) [6]	20	(float(558)) − [float(665) + (float(486) − float(665))]
S2Be162Bsub	This paper	20	(float(b6)) − (float(b4))
S2Be162Bsub	This paper	20	(float(736)) − (float(665))
S2Be162Bsubedge	This paper	20	(float(b6)) − (float(b5))
S2Be162Bsubedge	This paper	20	(float(736)) − (float(707))
S2Be16NDPhyI	This paper	20	(float(b6) − float(b4))/(float(b6) + float(b4))
S2Be16NDPhyI	This paper	20	(float(736) − float(665))/(float(736) + float(665))
S2Be16NDPhyIedge	This paper	20	(float(b6) − float(b5))/(float(b6) + float(b5))
S2Be16NDPhyIedge	This paper	20	(float(736) − float(707))/(float(736) + float(707))
S2Hu103BDA	Hunter et al. (2008) [29]	20	((1/float(b5)) − (1/float(b4))) − (float(b6))
S2Hu103BDA	Hunter et al. (2008) [29]	20	((1/float(707)) − (1/float(665))) − (float(736))
S2Kn07KIVU	Kneubuhler et al. (2007) [45]	20	(float(b2) − float(b4))/(float(b3))
S2Kn07KIVU	Kneubuhler et al. (2007) [45]	20	(float(486) − float(665))/(float(558))
S2Mi092BDA	Mishra et al. (2009) [11]	20	(float(b6))/(float(b4))
S2Mi092BDA	Mishra et al. (2009) [11]	20	(float(736))/(float(665))
S2MM12NDCI	Mishra and Mishra (2012) [32]	20	(float(b5) − float(b4))/(float(b5) + float(b4))
S2MM12NDCI	Mishra and Mishra (2012) [32]	20	(float(707) − float(665))/(float(707) + float(665))
S2SI052BDA	Simis et al. (2005) [7]	20	(float(b5))/(float(b4))
S2SI052BDA	Simis et al. (2005) [7]	20	(float(707))/(float(665))
L8Al10SABI	Alawadi et al. (2010) [41]	30	(float(b5) − float(b4))/(float(b2) + float(b3))
L8Al10SABI	Alawadi et al. (2010) [41]	30	(float(850) − float(640))/(float(450) + float(530))
L8Be162Bsub	This paper	30	(float(b5)) − (float(b4))
L8Be162Bsub	This paper	30	(float(850)) − (float(640))
L8Be16FLHblue	Beck et al. (2016) [6]	30	(float(b3)) − [float(b4) + (float(b2) − float(b4))]
L8Be16FLHblue	Beck et al. (2016) [6]	30	(float(530)) − [float(640) + (float(450) − float(640))]

L8Be15Flhviolet	Beck et al. (2016) [6]	30	(float(b3)) − [float(b4) + (float(b1) − float(b4))]
L8Be15Flhviolet	Beck et al. (2016) [6]	30	(float(530)) − [float(640) + (float(430) − float(640))]
L8Da032BDA	Dall'Olmo et al. (2003) [54]	30	(float(b5))/(float(b4))
L8Da032BDA	Dall'Olmo et al. (2003) [54]	30	(float(850))/(float(640))
L8Gi033BDA	Gitelson et al. (2003) [43]	30	((1/float(b2)) − (1/float(b4)))*(float(b3))
L8Gi033BDA	Gitelson et al. (2003) [43]	30	((1/float(450)) − (1/float(640)))*(float(530))
L8Kn07KIVU	Kneubuhler et al. (2007) [45]	30	(float(b2) − float(b4))/(float(b3))
L8Kn07KIVU	Kneubuhler et al. (2007) [45]	30	(float(450) − float(640))/(float(530))
L8MM12NDCI	Mishra and Mishra (2012) [32]	30	(float(b5) − float(b4))/(float(b5) + float(b4))
L8MM12NDCI	Mishra and Mishra (2012) [32]	30	(float(850) − float(640))/(float(b850) + float(640))
L8MM143BDA	Mishra and Mishra (2014) [16]	30	((1/float(b3)) − (1/float(b4)))*(float(b5))
L8MM143BDA	Mishra and Mishra (2014) [16]	30	((1/float(530)) − (1/float(640)))*(float(850))
L8SM122BDA	S. Mishra (2012) [46]	30	(float(b5))/(float(b3))
L8SM122BDA	S. Mishra (2012) [46]	30	(float(850))/(float(530))
MODISAm2Bsub08	Amin et al. (2009) [42]	250	(float(b2)) − (float(b1))
MODISAm2Bsub08	Amin et al. (2009) [42]	250	(float(857)) − (float(644))
MODISMMndci12	Mishra and Mishra (2012) [32]	250	(float(b2) − float(b1))/(float(b2) + float(b1))
MODISMMndci12	Mishra and Mishra (2012) [32]	250	(float(857) − float(644))/(float(857) + float(644))
MODISSY00	Schalles and Yacobi (2000) [47]	250	(float(b2))/(float(b1))
MODISSY00	Schalles and Yacobi (2000) [47]	250	(float(857))/(float(644))
MERISAl10SABI	Alawadi et al. (2010) [41]	300	(float(b13) − float(b7))/(float(b2) + float(b4))
MERISAl10SABI	Alawadi et al. (2010) [41]	300	(float(864) − float(665))/(float(443) + float(508))
MERISAm092Bsub *	Amin et al. (2009) [42]	300	(float(b8)) − (float(b6))
MERISAm092Bsub *	Amin et al. (2009) [42]	300	(float(679)) − (float(622))

MERISAM09KBBI	Amin et al. (2009) [42]	300	(float(b8) − float(b7))/(float(b8) + float(b7))
MERISAM09KBBI	Amin et al. (2009) [42]	300	(float(679) − float(665))/(float(679) + float(665))
MERISBe16FLHblue	Beck et al. (2016) [6]	300	(float(b5)) − [float(b7) + (float(b2) − float(b7))]
MERISBe16FLHblue	Beck et al. (2016) [6]	300	(float(565)) − [float(665) + (float(443) − float(665))]
MERISBe16FLHPhy *	This paper	300	(float(b6)) − [float(b9) + (float(b5) − float(b9))]
MERISBe16FLHPhy *	This paper	300	(float(622)) − [float(707) + (float(565) − float(707))]
MERISBe162Bsub *	This paper	300	(float(b9)) − (float(b6))
MERISBe162Bsub *	This paper	300	(float(707)) − (float(622))
MERISGo04MCI	Gower et al. (2004) [44]	300	(((float(b5)) − (float(b8)) − ((float(b10)) − (float(b8)))))
MERISGo04MCI	Gower et al. (2004) [44]	300	(((float(565)) − (float(679)) − ((float(750)) − (float(679)))))
MERISHu103BDA *	Hunter et al. (2008) [29]	300	((1/float(b6)) − (1/float(b5))) − (float(b9))
MERISHu103BDA *	Hunter et al. (2008) [29]	300	((1/float(622)) − (1/float(565))) − (float(707))
MERISKn07KIVU	Kneubuhler et al. (2007) [45]	300	(float(b2) − float(b7))/(float(b4))
MERISKn07KIVU	Kneubuhler et al. (2007) [45]	300	(float(443) − float(665))/(float(508))
MERISMM092BDA	Mishra et al. (2009) [11]	300	(float(b9))/(float(b8))
MERISMM092BDA	Mishra et al. (2009) [11]	300	(float(707))/(float(679))
MERISMM12NDCI	Mishra and Mishra (2012) [32]	300	(float(b9) − float(b7))/(float(b9) + float(b7))
MERISMM12NDCI	Mishra and Mishra (2012) [32]	300	(float(707) − float(665))/(float(707) + float(665))
MERISBe16NDPhyI *	This paper	300	(float(b9) − float(b6))/(float(b9) + float(b6))
MERISBe16NDPhyI *	This paper	300	(float(707) − float(622))/(float(707) + float(622))
MERISMM143BDAopt *	Mishra and Mishra (2014) [16]	300	((1/float(b6)) − (1/float(b7)))*(float(b9))
MERISMM143BDAopt *	Mishra and Mishra (2014) [16]	300	((1/float(622)) − (1/float(665)))*(float(707))
MERISSI052BDA *	Simis et al. (2005) [7]	300	(float(b9))/(float(b6))
MERISSI052BDA *	Simis et al. (2005) [7]	300	(float(707))/(float(622))
MERISSY002BDA *	Schalles and Yacobi (2000) [47]	300	(float(b7))/(float(b6))
MERISSY002BDA *	Schalles and Yacobi (2000) [47]	300	(float(665))/(float(622))

MERISStu16Phy *	Stumpf et al. (2016) [24]	300	(float(b7) − float(b6)) + ((float(b6) − float(b8)) × 0.74)
MERISStu16Phy *	Stumpf et al. (2016) [24]	300	(float(665) − float(620)) + ((float(620) − float(681)) × 0.74)
MERISStu16PhyFLH *	Stumpf et al. (2016) [24]	300	(float(b7)) − (float(b8) + (float(b6) − float(b8)))
MERISStu16PhyFLH *	Stumpf et al. (2016) [24]	300	(float(665)) − (float(681) + (float(620) − float(681)))
MERISWy08CI / MERISKu15PhyCI*	Wynne et al. (2008) [19]	300	−1 × (((float(b8)) − (float(b6)) − ((float(b9)) − (float(b6)))))
MERISWy08CI / MERISKu15PhyCI*	Wynne et al. (2008) [19]	300	−1 × (((float(679)) − (float(622)) − ((float(707)) − (float(622)))))

Table S2. Performance of algorithms for BGA estimation at Harsha Lake using image derived phycocyanin indices according to Pearson's r test (Type 1) linear regressions. Satellite/Algorithm combinations with asterisk measure the 620 nm phycocyanin absorption feature directly. *Y*-axis (dependent variable) and intercept have units of BGA_PC_RFU. *X*-axis is a unit less numerical index, Slope has units of BGA_PC_RFU.

Phycocyanin Index Algorithms by Satellite/Sensor	No. of Water Truth Sites BGA_PC_RFU	Pearson's r	Pearson's r2	*p* Value	Slope BGA_PC_RFU	Intercept BGA_PC_RFU
CASI						
CASIAl10SABI	29	0.404	0.163	0.030	18.857	15.818
CASIAm092Bsub	29	−0.175	0.031	0.364	−0.052	7.367
CASIAm09KBBI	29	0.040	0.002	0.837	7.921	11.375
CASIBe152BsubPhy715sub615 *	29	0.881	0.776	<0.001	0.049	9.977
CASIBe16FLHblue	29	0.629	0.396	<0.001	0.088	−6.392
CASIBe16FLHPhy	29	0.713	0.508	<0.001	0.146	−1.678
CASIBe16FLHviolet	29	0.675	0.456	<0.001	0.068	−7.479
CASIBe162B700sub601	29	0.852	0.726	<0.001	0.081	11.711
CASIBe16MPI	29	−0.467	0.218	0.011	−0.161	13.278
CASIBe16NDPhyI	29	0.852	0.726	<0.001	69.299	11.935
CASIBe16NDPhyI644over615 *	29	0.537	0.288	0.003	146.060	13.659
CASIBe16NDPhyI644over629 *	29	−0.548	0.300	0.002	−136.485	11.940
CASIBe16Phy2BDA644over629 *	29	0.382	0.146	0.041	54.556	−44.543
CASIBe16Phy2BDA686over658	29	0.047	0.002	0.801	5.507	6.061
CASIDa052BDA	29	0.838	0.702	<0.001	17.282	−10.808
CASIDE933BDA*	29	0.387	0.150	0.038	112.013	10.020
CASIGi033BDA	29	0.844	0.712	<0.001	30.263	6.448
CASIGo04MCI	29	0.731	0.534	<0.001	0.056	1.281
CASIHU103BDA*	29	−0.707	0.500	<0.001	−0.036	0.001
CASIKn07KIVU	29	0.485	0.235	0.008	49.033	31.255
CASIKu15PhyCI	29	0.792	0.627	<0.001	0.047	6.485
CASIKu15SLH	29	0.731	0.534	<0.001	0.056	1.281
CASIMI092BDA	29	−0.781	0.610	<0.001	−0.045	6.688
CASIMM092BDA	29	0.791	0.626	<0.001	23.433	−4.962

CASIMM12NDCI	29	0.780	0.608	<0.001	41.052	6.188
CASIMM12NDCIalt	29	0.772	0.596	<0.001	75.289	7.452
CASIMM143BDAopt14 *	29	0.662	0.438	<0.001	74.525	9.074
CASIMM143BDAopt	29	0.645	0.416	<0.001	94.692	9.181
CASISI052BDA *	29	0.853	0.728	<0.001	18.099	−8.955
CASISM122BDA	29	0.833	0.694	<0.001	20.570	−8.555
CASISY002BDA *	29	0.558	0.311	0.002	47.863	−38.509
CASIStu16Phy *	29	−0.050	0.003	0.798	−0.017	10.418
CASIStu16PhyFLH *	29	0.349	0.122	0.064	0.08	16.196
CASIWy08CI	29	0.781	0.610	<0.001	0.045	6.688
CASIZh10FLH	29	0.781	0.610	<0.001	0.045	6.688
WorldView-2						
WV2Al10SABI	29	0.480	0.230	0.008	20.295	15.812
WV2Am092Bsub	29	0.866	0.750	<0.001	0.080	11.789
WV2Be16FLHviolet	29	0.623	0.388	<0.001	0.081	−18.412
WV2Be162Bsub *	29	0.889	0.790	<0.001	0.074	17.520
WV2Be16NDPhyI *	29	0.864	0.746	<0.001	47.364	16.659
WV2Hu103BDA *	29	−0.714	0.510	<0.001	−0.039	−2.688
WV2Kn07KIVU	29	0.035	0.001	0.855	2.484	12.246
WV2Mi092BDA	29	0.853	0.728	<0.001	27.383	−15.432
WV2MM12NDCI	29	0.848	0.719	<0.001	52.969	12.148
WV2MM143BDAopt *	29	−0.133	0.018	0.491	−27.919	5.912
WV2MM143BDAver3merisver *	29	0.024	0.001	0.900	4.869	11.215
WV2SI052BDA *	29	0.867	0.752	<0.001	29.027	−12.058
WV2SY002BDA *	29	0.669	0.448	<0.001	111.776	−80.932
Sentinel-2						
S2Al10SABI	29	0.269	0.072	0.159	15.628	13.637
S2Am092Bsub	29	0.823	0.677	<0.001	0.064	6.382
S2Be162Bdiv	29	0.396	0.157	0.033	35.834	−11.965
S2Be16FLHblue	29	0.392	0.154	0.036	0.079	−3.332
S2Be162Bsub	29	0.839	0.704	<0.001	0.094	18.699
S2Be162Bsubedge	29	−0.529	0.280	0.003	−0.088	−2.806

S2Be16NDPhyI	29	0.795	0.632	<0.001	42.506	16.944
S2Be16NDPhyIedge	29	0.393	0.154	0.035	46.674	21.248
S2Hu103BDA	29	−0.702	0.493	<0.001	−0.045	−1.327
S2Kn07KIVU	29	−0.096	0.009	0.619	−18.749	8.349
S2Mi092BDA	29	0.806	0.650	<0.001	28.086	−10.394
S2MM12NDCI	29	0.823	0.677	<0.001	58.416	5.934
S2SI052BDA	29	0.832	0.692	<0.001	24.869	−18.784
Landsat-8						
L8Al10SABI	29	0.323	0.104	0.088	17.628	14.894
L8Be162Bsub	29	0.231	0.053	0.228	0.023	14.274
L8Be16FLHblue	29	0.471	0.222	0.010	0.071	−6.249
L8Be15Flhviolet	29	0.582	0.339	<0.001	0.080	−11.805
L8Da032BDA	29	0.326	0.106	0.084	9.817	5.200
L8Gi033BDA	29	0.290	0.084	0.127	22.885	−8.833
L8Kn07KIVU	29	−0.161	0.026	0.403	−32.668	0.125
L8MM12NDCI	29	0.306	0.094	0.106	10.518	13.761
L8SM122BDA	29	0.332	0.110	0.078	12.496	5.119
MODIS						
MODISAm092Bsub	9	0.342	0.117	0.368	0.017	12.900
MODISMM12NDCI4	9	0.428	0.183	0.251	10.082	13.363
MODISSY002BDA	9	0.413	0.171	0.269	6.957	6.466
MERIS						
MERISAl10SABI	9	0.723	0.523	0.028	16.576	14.948
MERISAm092Bsub *	9	0.165	0.027	0.672	0.059	13.984
MERISAM09KBBI	9	−0.196	0.038	0.613	−46.016	7.918
MERISBe16FLHblue	9	0.759	0.576	0.018	0.143	−32.353
MERISBe16FLHPhy *	9	−0.532	0.283	0.140	−0.149	−2.253
MERISBe16NDPhyI *	9	0.923	0.852	<0.001	43.290	9.650
MERISBe162Bsub *	9	0.910	0.828	<0.001	0.051	9.466
MERISGo04MCI	9	−0.920	0.846	<0.001	−0.028	6.807
MERISHu103BDA*	9	−0.869	0.755	0.002	−0.037	−4.161
MERISKn07KIVU	9	−0.053	0.003	0.892	−3.686	8.109

MERISKu15PhyCI *	9	0.916	0.839	<0.001	0.053	6.077
MERISMM092BDA	9	0.929	0.863	<0.001	18.850	−13.270
MERISMM12NDCI	9	0.923	0.852	<0.001	43.290	9.650
MERISMM143BDAopt *	9	0.834	0.696	0.005	92.824	0.143
MERISSI052BDA *	9	0.911	0.830	<0.001	19.746	−10.214
MERISSY002BDA *	9	0.688	0.473	0.040	97.763	−79.493
MERISStu16Phy *	9	0.503	0.253	0.168	0.213	6.765
MERISStu16PhyFLH *	9	0.641	0.410	0.063	0.269	18.367
MERISWy08CI/MERISKu15PhyCI *	9	0.916	0.839	<0.001	0.053	6.077

Table S3. Performance of Algorithms for BGA Estimation at Harsha (East Fork) Lake with all results normalized to calculated BGA/PC values. Satellite/Algorithm combinations with asterisk measure the 620 nm phycocyanin absorption feature directly. *Y*-axis (dependent variable) and intercept have units of BGA_PC_RFU. *X*-axis also has units of BGA_PC_RFU. Slope is unit less.

Phycocyanin Index Algorithms by Satellite/Sensor	**No. of Water Truth Sites BGA_PC_RFU**	**Pearson's r**	**Pearson's r2**	***p* Value**	**Slope**	**Intercept BGA_PC_RFU**
CASI						
CASIAl10SABI	29	0.404	0.163	0.030	1.000	0.000
CASIAm092Bsub	29	0.175	0.031	0.364	0.299	3.809
CASIAm09KBBI	29	0.040	0.002	0.837	1.000	0.000
CASIBe152BsubPhy715sub615 *	29	0.881	0.776	<0.001	1.006	−0.055
CASIBe16FLHblue	29	0.629	0.396	<0.001	1.001	0.007
CASIBe16FLHPhy	29	0.713	0.508	<0.001	1.000	−0.001
CASIBe16FLHviolet	29	0.675	0.456	<0.001	0.994	−0.045
CASIBe162B700sub601	29	0.852	0.726	<0.001	1.005	−0.060
CASIBe16MPI	29	0.467	0.218	0.011	1.002	−0.025
CASIBe16NDPhyI	29	0.852	0.726	<0.001	1.000	0.000
CASIBe16NDPhyI644over615 *	29	0.537	0.288	0.094	1.000	0.000
CASIBe16NDPhyI644over629 *	29	0.548	0.300	0.002	1.000	0.000

CASIBe16Phy2BDA644over629 *	29	0.382	0.146	0.041	1.000	0.000
CASIBe16Phy2BDA686over658	29	0.047	0.002	0.801	1.000	0.000
CASIDa052BDA	29	0.838	0.702	<0.001	1.000	0.000
CASIDE933BDA*	29	0.263	0.069	0.168	1.000	0.000
CASIGi033BDA	29	0.844	0.712	<0.001	1.000	0.000
CASIGo04MCI	29	0.731	0.534	<0.001	0.994	0.008
CASIHU103BDA*	29	0.707	0.500	<0.001	1.007	0.000
CASIKn07KIVU	29	0.485	0.235	0.008	1.000	0.000
CASIKu15PhyCI	29	0.792	0.627	<0.001	0.995	0.032
CASIKu15SLH	29	0.731	0.534	<0.001	0.994	0.008
CASIMI092BDA	29	0.781	0.610	<0.001	1.003	−0.021
CASIMM092BDA	29	0.791	0.626	<0.001	1.000	0.000
CASIMM12NDCI	29	0.780	0.608	<0.001	1.000	0.000
CASIMM12NDCIalt	29	0.772	0.596	<0.001	1.000	0.000
CASIMM143BDAopt14 *	29	0.662	0.438	<0.001	1.000	0.000
CASIMM143BDAopt	29	0.645	0.416	<0.001	1.000	0.000
CASISI052BDA	29	0.853	0.728	<0.001	1.000	0.000
CASISM122BDA	29	0.833	0.694	<0.001	1.000	0.000
CASISY002BDA	29	0.558	0.311	0.002	1.000	0.000
CASIStu16Phy *	29	−0.050	0.003	0.798	0.991	0.092
CASIStu16PhyFLH *	29	0.349	0.122	0.064	0.996	0.070
CASIWy08CI	29	0.781	0.610	<0.001	1.003	−0.021
CASIZh10FLH	29	0.781	0.610	<0.001	1.003	−0.021
WorldView-2						
WV2Al10SABI	29	0.480	0.230	0.008	1.000	0.000
WV2Am092Bsub	29	0.866	0.750	<0.001	1.001	−0.012
WV2Be16FLHviolet	29	0.623	0.388	<0.001	1.004	0.070
WV2Be162Bsub *	29	0.889	0.790	<0.001	1.002	−0.036
WV2Be16NDPhyI *	29	0.864	0.746	<0.001	1.000	0.000

WV2Hu103BDA *	29	0.714	0.510	<0.001	0.999	−0.002
WV2Kn07KIVU	29	0.035	0.001	0.855	1.000	−0.002
WV2Mi092BDA	29	0.853	0.728	<0.001	1.000	0.000
WV2MM12NDCI	29	0.824	0.679	<0.001	1.333	−3.805
WV2MM143BDAopt *	29	0.133	0.018	0.491	1.000	0.000
WV2MM143BDAver3merisver *	29	0.024	0.001	0.900	1.000	0.000
WV2SI052BDA *	29	0.867	0.752	<0.001	1.000	0.000
WV2SY002BDA *	29	0.669	0.448	<0.001	1.000	0.000
Sentinel-2						
S2Al10SABI	29	0.269	0.072	0.159	1.000	0.000
S2Am092Bsub	29	0.823	0.677	<0.001	0.993	0.043
S2Be162Bdiv	29	0.396	0.157	0.033	1.000	0.000
S2Be16FLHblue	29	0.392	0.154	0.036	0.996	−0.012
S2Be162Bsub	29	0.839	0.704	<0.001	1.002	−0.037
S2Be162Bsubedge	29	0.529	0.280	0.003	1.003	0.007
S2Be16NDPhyI	29	0.795	0.632	<0.001	1.000	0.000
S2Be16NDPhyIedge	29	0.393	0.154	0.035	1.000	0.000
S2Hu103BDA	29	0.702	0.493	<0.001	1.000	0.001
S2Kn07KIVU	29	0.096	0.009	0.619	1.000	0.000
S2Mi092BDA	29	0.806	0.650	<0.001	1.000	−0.001
S2MM12NDCI	29	0.823	0.677	<0.001	1.000	0.000
S2SI052BDA	29	0.832	0.692	<0.001	1.000	0.000
Landsat-8						
L8Al10SABI	29	0.323	0.104	0.088	1.000	0.000
L8Be162Bsub	29	0.231	0.053	0.228	0.997	0.048
L8Be16FLHblue	29	0.471	0.222	0.010	1.001	0.008
L8Be15Flhviolet	29	0.582	0.339	<0.001	0.994	−0.069
L8Da032BDA	29	0.326	0.106	0.084	1.000	0.000
L8Gi033BDA	29	0.290	0.084	0.127	1.000	0.000

L8Kn07KIVU	29	0.161	0.026	0.403	1.000	0.000
L8MM12NDCI	29	0.346	0.120	0.066	1.000	0.000
L8SM122BDA	29	0.332	0.110	0.078	1.000	0.000
MODIS						
MODISAm092Bsub	9	0.342	0.117	0.368	0.979	0.267
MODISMMNDCI12	9	0.428	0.183	0.251	1.000	−0.001
MODISSY002BDA	9	0.413	0.171	0.269	1.000	−0.001
MERIS						
MERISAl10SABI	9	0.723	0.523	0.028	1.000	0.000
MERISAm092Bsub *	9	0.165	0.027	0.672	1.007	−0.101
MERISAM09KBBI	9	0.196	0.038	0.613	1.000	0.000
MERISBe16FLHblue	9	0.759	0.576	0.018	0.999	−0.041
MERISBe16FLHPhy *	9	−0.532	0.283	0.140	0.998	−0.005
MERISBe16NDPhyI *	9	0.923	0.852	<0.001	1.000	0.000
MERISBe162Bsub *	9	0.910	0.828	<0.001	1.002	−0.019
MERISGo04MCI	9	0.920	0.846	<0.001	0.994	0.041
MERISHu103BDA *	9	0.869	0.755	0.002	1.010	0.040
MERISKn07KIVU	9	0.053	0.003	0.892	1.000	0.001
MERISMM092BDA	9	0.929	0.863	<0.001	1.000	0.000
MERISMM12NDCI	9	0.923	0.852	<0.001	1.000	0.000
MERISMM143BDAopt *	9	0.834	0.696	0.005	1.000	0.000
MERISSI052BDA *	9	0.911	0.830	<0.001	1.000	0.001
MERISSY002BDA *	9	0.688	0.473	0.040	1.000	0.000
MERISStu16Phy *	9	0.503	0.253	0.168	0.999	0.010
MERISStu16PhyFLH *	9	0.641	0.410	0.063	1.001	−0.012
MERISWy08CI / MERISKu15PhyCI *	9	0.916	0.839	<0.001	1.007	−0.041

Table S4. Direct and Indirect BGA Indices Ranked by Performance (Pearson's r^2). Satellite/Algorithm combinations with asterisk measure the 620 nm phycocyanin absorption feature directly. *Y*-axis (dependent variable) and intercept have units of BGA_PC_RFU. *X*-axis also has units of BGA_PC_RFU. Slope is unit less.

Phycocyanin Index Algorithms by Satellite/Sensor	No. of Water Truth Sites BGA_PC_RFU	Pearson's r	Pearson's r2	*p* Value	Slope	Intercept BGA_PC_RFU
CASI						
CASIBe152BsubPhy715sub615 *	29	0.881	0.776	<0.001	1.006	−0.055
CASISI052BDA *	29	0.853	0.728	<0.001	1.000	0.000
CASIBe162B700sub601 *	29	0.852	0.726	<0.001	1.005	−0.060
CASIBe16NDPhyI *	29	0.852	0.726	<0.001	1.000	0.000
CASIGi033BDA	29	0.844	0.712	<0.001	1.000	0.000
CASIDa052BDA	29	0.838	0.702	<0.001	1.000	0.000
CASISM122BDA	29	0.833	0.694	<0.001	1.000	0.000
CASIKu15PhyCI	29	0.792	0.627	<0.001	0.995	0.032
CASIMM092BDA	29	0.791	0.626	<0.001	1.000	0.000
CASIMI092BDA	29	0.781	0.610	<0.001	1.003	−0.021
CASIWy08CI	29	0.781	0.610	<0.001	1.003	−0.021
CASIZh10FLH	29	0.781	0.610	<0.001	1.003	−0.021
CASIMM12NDCI	29	0.780	0.608	<0.001	1.000	0.000
CASIMM12NDCIalt	29	0.772	0.596	<0.001	1.000	0.000
CASIGo04MCI	29	0.731	0.534	<0.001	0.994	0.008
CASIKu15SLH	29	0.731	0.534	<0.001	0.994	0.008
CASIBe16FLHPhy	29	0.713	0.508	<0.001	1.000	−0.001
CASIHU103BDA*	29	0.707	0.500	<0.001	1.007	0.000
CASIBe16FLHviolet	29	0.675	0.456	<0.001	0.994	−0.045
CASIMM143BDAopt14*	29	0.662	0.438	<0.001	1.000	0.000
CASIMM143BDAopt	29	0.645	0.416	<0.001	1.000	0.000
CASIStu16PhyFLH*	29	0.349	0.122	0.064	0.996	0.070
CASIBe16FLHblue	29	0.629	0.396	<0.001	1.001	0.007
CASISY002BDA	29	0.558	0.311	0.002	1.000	0.000
CASIBe16NDPhyI644over629*	29	0.548	0.300	0.002	1.000	0.000
CASIBe16NDPhyI644over615*	29	0.537	0.288	0.094	1.000	0.000

CASIKn07KIVU	29	0.485	0.235	0.008	1.000	0.000
CASIBe16MPI	29	0.467	0.218	0.011	1.002	−0.025
CASIAl10SABI	29	0.404	0.163	0.030	1.000	0.000
CASIBe16Phy2BDA644over629 *	29	0.382	0.146	0.041	1.000	0.000
CASIDE933BDA *	29	0.263	0.069	0.168	1.000	0.000
CASIAm092Bsub	29	0.175	0.031	0.364	0.299	3.809
CASIStu16Phy *	29	−0.050	0.003	0.798	0.991	0.092
CASIAm09KBBI	29	0.040	0.002	0.837	1.000	0.000
CASIBe16Phy2BDA686over658	29	0.047	0.002	0.801	1.000	0.000
WorldView-2						
WV2Be162Bsub *	29	0.889	0.790	<0.001	1.002	−0.036
WV2SI052BDA *	29	0.867	0.752	<0.001	1.000	0.000
WV2Am092Bsub	29	0.866	0.750	<0.001	1.001	−0.012
WV2Be16NDPhyI *	29	0.864	0.746	<0.001	1.000	0.000
WV2Mi092BDA	29	0.853	0.728	<0.001	1.000	0.000
WV2MM12NDCI	29	0.824	0.679	<0.001	1.333	−3.805
WV2Hu103BDA *	29	0.714	0.510	<0.001	0.999	−0.002
WV2SY002BDA *	29	0.669	0.448	<0.001	1.000	0.000
WV2Be16FLHviolet	29	0.623	0.388	<0.001	1.004	0.070
WV2Al10SABI	29	0.480	0.230	0.008	1.000	0.000
WV2MM143BDAopt *	29	0.133	0.018	0.491	1.000	0.000
WV2Kn07KIVU	29	0.035	0.001	0.855	1.000	−0.002
WV2MM143BDAver3merisver *	29	0.024	0.001	0.900	1.000	0.000
Sentinel-2						
S2Be162Bsub	29	0.839	0.704	<0.001	1.002	−0.037
S2SI052BDA	29	0.832	0.692	<0.001	1.000	0.000
S2Am092Bsub	29	0.823	0.677	<0.001	0.993	0.043
S2MM12NDCI	29	0.823	0.677	<0.001	1.000	0.000
S2Mi092BDA	29	0.806	0.650	<0.001	1.000	−0.001
S2Be16NDPhyI	29	0.795	0.632	<0.001	1.000	0.000
S2Hu103BDA	29	0.702	0.493	<0.001	1.000	0.001
S2Be162Bsubedge	29	0.529	0.280	0.003	1.003	0.007

S2Be162Bdiv	29	0.396	0.157	0.033	1.000	0.000
S2Be16FLHblue	29	0.392	0.154	0.036	0.996	−0.012
S2Be16NDPhyIedge	29	0.393	0.154	0.035	1.000	0.000
S2Al10SABI	29	0.269	0.072	0.159	1.000	0.000
S2Kn07KIVU	29	0.096	0.009	0.619	1.000	0.000
Landsat-8						
L8Be15Flhviolet	29	0.582	0.339	<0.001	0.994	−0.069
L8Be16FLHblue	29	0.471	0.222	0.010	1.001	0.008
L8MM12NDCI	29	0.346	0.120	0.066	1.000	0.000
L8SM122BDA	29	0.332	0.110	0.078	1.000	0.000
L8Da032BDA	29	0.326	0.106	0.084	1.000	0.000
L8Al10SABI	29	0.323	0.104	0.088	1.000	0.000
L8Gi033BDA	29	0.290	0.084	0.127	1.000	0.000
L8Be162Bsub	29	0.231	0.053	0.228	0.997	0.048
L8Kn07KIVU	29	0.161	0.026	0.403	1.000	0.000
MODIS						
MODISMMNDCI12	9	0.428	0.183	0.251	1.000	−0.001
MODISSY002BDA	9	0.413	0.171	0.269	1.000	−0.001
MODISAm092Bsub	9	0.342	0.117	0.368	0.979	0.267
MERIS						
MERISMM092BDA	9	0.929	0.863	<0.001	1.000	0.000
MERISBe16NDPhyI *	9	0.923	0.852	<0.001	1.000	0.000
MERISMM12NDCI	9	0.923	0.852	<0.001	1.000	0.000
MERISGo04MCI	9	0.920	0.846	<0.001	0.994	0.041
MERISWy08CI / MERISKu15PhyCI *	9	0.916	0.839	<0.001	1.007	−0.041
MERISSI052BDA *	9	0.911	0.830	<0.001	1.000	0.001
MERISBe162Bsub *	9	0.910	0.828	<0.001	1.002	−0.019
MERISHu103BDA *	9	0.869	0.755	0.002	1.010	0.040
MERISMM143BDAopt *	9	0.834	0.696	0.005	1.000	0.000
MERISBe16FLHblue	9	0.759	0.576	0.018	0.999	−0.041
MERISAl10SABI	9	0.723	0.523	0.028	1.000	0.000
MERISSY002BDA *	9	0.688	0.473	0.040	1.000	0.000

MERISStu16PhyFLH*	9	0.641	0.410	0.063	1.001	−0.012
MERISBe16FLHPhy*	9	−0.532	0.283	0.140	0.998	−0.005
MERISStu16Phy*	9	0.503	0.253	0.168	0.999	0.010
MERISAM09KBBI	9	0.196	0.038	0.613	1.000	0.000
MERISAm092Bsub*	9	0.165	0.027	0.672	1.007	−0.101
MERISKn07KIVU	9	0.053	0.003	0.892	1.000	0.001

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