

Global dataset for Macroalgae C:N:P

This is the accompanying dataset for “SEAWEED BIOGEOCHEMISTRY: GLOBAL ASSESSMENT OF C:N AND C:P RATIOS AND IMPLICATIONS FOR OCEAN AFFORESTATION” (Sheppard et al., in press). Methods for collection of the dataset are found therein.

For queries, please contact dataset creator and caretaker, Emily Sheppard.

emily.sheppard@utas.edu.au

References

AbouAisha, K. M., Shabana, E. F., ElAbyad, M. S., Kobbia, I. A., & Schanz, F. (1997). Seasonal changes in *Cystoseira myrica* and phosphorus input at two sites of the Red Sea Egyptian coast. *Water Air and Soil Pollution*, 93(1-4), 199-211.

Ahn, O., Petrell, R., & Harrison, P. (1998). Ammonium and nitrate uptake by *Laminaria saccharina* and *Nereocystis luetkeana* originating from a salmon sea cage farm. *J Appl Phycol*, 10, 333-340. <https://doi.org/10.1023/A:1008092521651>

Al-Hafedh, Y. S., Alam, A., Buschmann, A. H., & Fitzsimmons, K. M. (2012). Experiments on an integrated aquaculture system (seaweeds and marine fish) on the Red Sea coast of Saudi Arabia: efficiency comparison of two local seaweed species for nutrient biofiltration and production. *Reviews in Aquaculture*, 4(1), 21-31. <https://doi.org/10.1111/j.1753-5131.2012.01057.x>

Allen, E., Browne, J., Hynes, S., & Murphy, J. D. (2013). The potential of algae blooms to produce renewable gaseous fuel. *Waste Management*, 33(11), 2425-2433. <https://doi.org/10.1016/j.wasman.2013.06.017>

Amato, D. W., Bishop, J. M., Glenn, C. R., Dulai, H., & Smith, C. M. (2016). Impact of Submarine Groundwater Discharge on Marine Water Quality and Reef Biota of Maui. *Plos*

One, 11(11), 28, Article e0165825. <https://doi.org/10.1371/journal.pone.0165825>

Aquilino, K. M., Bracken, M. E. S., Faubel, M. N., & Stachowicz, J. J. (2009). Local-scale nutrient regeneration facilitates seaweed growth on wave-exposed rocky shores in an upwelling system. *Limnology and Oceanography*, 54(1), 309-317.

<https://doi.org/10.4319/lo.2009.54.1.0309>

Atkinson, M. J., & Smith, S. V. (1983). C:N:P ratios of benthic marine plants. *Limnology and Oceanography*, 28, 568–574

Baker, P., Minzlaff, U., Schoenle, A., Schwabe, E., Hohlfeld, M., Jeuck, A., Brenke, N., Prausse, D., Rothenbeck, M., Brix, S., Frutos, I., Jorger, K. M., Neusser, T. P., Koppelman, R., Devey, C., Brandt, A., & Arndt, H. (2018). Potential contribution of surface-dwelling Sargassum algae to deep-sea ecosystems in the southern North Atlantic. *Deep-Sea Research Part II-Topical Studies in Oceanography*, 148, 21-34.

<https://doi.org/10.1016/j.dsr2.2017.10.002>

Barile, P. J., Lapointe, B. E., & Capo, T. R. (2004). Dietary nitrogen availability in macroalgae enhances growth of the sea hare *Aplysia californica* (Opisthobranchia : Anaspidea). *Journal of Experimental Marine Biology and Ecology*, 303(1), 65-78.

<https://doi.org/10.1016/j.jembe.2003.11.004>

Bjornsater, B. R., & Wheeler, P. A. (1990). EFFECT OF NITROGEN AND PHOSPHORUS SUPPLY ON GROWTH AND TISSUE COMPOSITION OF *ULVA-FENESTRATA* AND *ENTEROMORPHA-INTESTINALIS* (ULVALES, CHLOROPHYTA). *Journal of Phycology*, 26(4), 603-611. <https://doi.org/10.1111/j.0022-3646.1990.00603.x>

Blanchette, C. A., Broitman, B. R., & Gaines, S. D. (2006). Intertidal community structure and oceanographic patterns around Santa Cruz Island, CA, USA. *Marine Biology*, 149(3), 689-701. <https://doi.org/10.1007/s00227-005-0239-3>

Borras-Chavez, R., Edwards, M. S., Arvizu-Higuera, D. L., Rodriguez-Montesinos, Y. E., Hernandez-Carmona, G., & Briceno-Dominguez, D. (2016). Repetitive harvesting of *Macrocystis pyrifera* (Phaeophyceae) and its effects on chemical constituents of economic value. *Botanica Marina*, 59(1), 63-71. <https://doi.org/10.1515/bot-2015-0028>

Britton, D., Cornwall, C. E., Revill, A. T., Hurd, C. L., & Johnson, C. R. (2016). Ocean acidification reverses the positive effects of seawater pH fluctuations on growth and photosynthesis of the habitat-forming kelp, *Ecklonia radiata*. *Scientific Reports*, 6(1), 26036. <https://doi.org/10.1038/srep26036>

Britton, D., Mundy, C. N., McGraw, C. M., Revill, A. T., & Hurd, C. L. (2019). Responses of seaweeds that use CO₂ as their sole inorganic carbon source to ocean acidification: differential effects of fluctuating pH but little benefit of CO₂ enrichment. *ICES Journal of Marine Science*, 76(6), 1860-1870. <https://doi.org/10.1093/icesjms/fsz070>

Britton, D., Schmid, M., Noisette, F., Havenhand, J. N., Paine, E. R., McGraw, C. M., Revill, A. T., Virtue, P., Nichols, P. D., Mundy, C. N., & Hurd, C. L. (2020). Adjustments in fatty acid composition is a mechanism that can explain resilience to marine heatwaves and future ocean conditions in the habitat-forming seaweed *Phyllospora comosa* (Labillardière) C.Agardh. *Global Change Biology*, 26(6), 3512-3524. <https://doi.org/https://doi.org/10.1111/gcb.15052>

Britton, D., Schmid, M., Revill, A., Virtue, P., Nichols, P., Hurd, C., & Mundy, C. (2021). Seasonal and site-specific variation in the nutritional quality of temperate seaweed assemblages: implications for grazing invertebrates and the commercial exploitation of seaweeds. *Journal of Applied Phycology*, 33. <https://doi.org/10.1007/s10811-020-02302-1>

Brouwer, P. E. M. (1996). Decomposition in situ of the sublittoral Antarctic macroalga *Desmarestia anceps* Montagne. *Polar Biology*, 16(2), 129-137.

Brzezinski, M. A., Reed, D. C., Harrer, S., Rassweiler, A., Melack, J. M., Goodridge, B. M., & Dugan, J. E. (2013). MULTIPLE SOURCES AND FORMS OF NITROGEN SUSTAIN YEAR-ROUND KELP GROWTH on the Inner Continental Shelf of the Santa Barbara Channel. *Oceanography*, 26(3), 114-123.
<https://doi.org/10.5670/oceanog.2013.53>

Buapet, P., Hiranpan, R., Ritchie, R. J., & Prathep, A. (2008). Effect of nutrient inputs on growth, chlorophyll, and tissue nutrient concentration of *Ova reticulata* from a tropical habitat. *Scienceasia*, 34(2), 245-252. <https://doi.org/10.2306/scienceasia1513-1874.2008.34.245>

Buchholz, C. M., Lebreton, B., Bartsch, I., & Wiencke, C. (2019). Variation of isotope composition in kelps from Kongsfjorden (Svalbard). *Marine Biology*, 166(6), 14, Article 71. <https://doi.org/10.1007/s00227-019-3513-5>

Buchholz, C. M., & Wiencke, C. (2016). Working on a baseline for the Kongsfjorden food web: production and properties of macroalgal particulate organic matter (POM). *Polar Biology*, 39(11), 2053-2064. <https://doi.org/10.1007/s00300-015-1828-3>

Carneiro, M. A. D., Resende, J. F. D., Oliveira, S. R., Fernandes, F. D., Borburema, H. D. D., Barbosa-Silva, M. S., Ferreira, A. B. G., & Marinho-Soriano, E. (2021). Performance of the agarophyte *Gracilariopsis tenuifrons* in a multi-trophic aquaculture system with *Litopenaeus vannamei* using water recirculation. *Journal of Applied Phycology*, 33(1), 481-490.
<https://doi.org/10.1007/s10811-020-02318-7>

Carreon-Palau, L., Parrish, C. C., Perez-Espana, H., & Aguiniga-Garcia, S. (2018). Elemental ratios and lipid classes in a coral reef food web under river influence. *Progress in Oceanography*, 164, 1-11. <https://doi.org/10.1016/j.pocean.2018.03.009>

Cerda, O., Karsten, U., Rothausler, E., Tala, F., & Thiel, M. (2009). Compensatory growth of

the kelp *Macrocystis integrifolia* (Phaeophyceae, Laminariales) against grazing of *Peramphithoe femorata* (Amphipoda, Ampithoidae) in northern-central Chile. *Journal of Experimental Marine Biology and Ecology*, 377(2), 61-67.

<https://doi.org/10.1016/j.jembe.2009.06.011>

Chen, B. B., Lin, L. D., Ma, Z. L., Zhang, T. T., Chen, W. Z., & Zou, D. H. (2019). Carbon and nitrogen accumulation and interspecific competition in two algae species, *Pyropia haitanensis* and *Ulva lactuca*, under ocean acidification conditions. *Aquaculture International*, 27(3), 721-733. <https://doi.org/10.1007/s10499-019-00360-y>

Chen, B. B., Zou, D. H., Du, H., & Ji, Z. W. (2018). Carbon and nitrogen accumulation in the economic seaweed *Gracilaria lemaneiformis* affected by ocean acidification and increasing temperature. *Aquaculture*, 482, 176-182. <https://doi.org/10.1016/j.aquaculture.2017.09.042>

Chen, S. W., Xu, K., Ji, D. H., Wang, W. L., Xu, Y., Chen, C. S., & Xie, C. T. (2020). Release of dissolved and particulate organic matter by marine macroalgae and its biogeochemical implications. *Algal Research-Biomass Biofuels and Bioproducts*, 52, 10, Article 102096. <https://doi.org/10.1016/j.algal.2020.102096>

Cherbadgy, I. I., Sabitova, L. I., & Parensky, V. A. (2010). The influence of environmental factors and nutrient concentrations in tissues of the seaweed *Ahnfeltia tobuchiensis* (Rhodophyta: Ahnfeltiales) on the primary production and dark respiration of its population. *Russian Journal of Marine Biology*, 36(4), 282-292. <https://doi.org/10.1134/s1063074010040061>

Cherbadgy, I. I., & Propp, L. N. (2019). Content of Organic Carbon, Nitrogen, and Phosphorus in Deep-Water Coralline Algae Biocenoses, South China Sea. *Oceanology*, 59(4), 9. <https://doi.org/10.1134/s0001437019040015>

Cherbadgy, I. I., & Sabitova, L. I. (2011). Influence of the Environmental Factors on the Intensity of the Oxygen, Ammonium, and Phosphate Metabolism in the Agar Containing

Seaweed *Ahnfeltia tobuchiensis* (Ahnfeltiales, Rhodophyta). *Oceanology*, 51(1), 49-59.
<https://doi.org/10.1134/s0001437011010024>

Clausing, R. J., & Fong, P. (2016). Environmental variability drives rapid and dramatic changes in nutrient limitation of tropical macroalgae with different ecological strategies. *Coral Reefs*, 35(2), 669-680. <https://doi.org/10.1007/s00338-016-1403-6>

Cole, A. J., Roberts, D. A., Garside, A. L., de Nys, R., & Paul, N. A. (2016). Seaweed compost for agricultural crop production. *Journal of Applied Phycology*, 28(1), 629- 642.
<https://doi.org/10.1007/s10811-015-0544-2>

Corey, P., Kim, J. K., Duston, J., Garbary, D. J., & Prithiviraj, B. (2013). Bioremediation potential of *Palmaria palmata* and *Chondrus crispus* (Basin Head): effect of nitrate and ammonium ratio as nitrogen source on nutrient removal. *Journal of Applied Phycology*, 25(5), 1349-1358. <https://doi.org/10.1007/s10811-013-9977-7>

Corey, P., Kim, J. K., Garbary, D. J., Prithiviraj, B., & Duston, J. (2012). Bioremediation potential of *Chondrus crispus* (Basin Head) and *Palmaria palmata*: effect of temperature and high nitrate on nutrient removal. *Journal of Applied Phycology*, 24(3), 441-448.
<https://doi.org/10.1007/s10811-011-9734-8>

Cornwall, C. E., Boyd, P. W., McGraw, C. M., Hepburn, C. D., Pilditch, C. A., Morris, J. N., Smith, A. M., & Hurd, C. L. (2014). Diffusion Boundary Layers Ameliorate the Negative Effects of Ocean Acidification on the Temperate Coralline Macroalga *Arthrocardia corymbosa*. *Plos One*, 9(5), 9, Article e97235. <https://doi.org/10.1371/journal.pone.0097235>

Dalsgaard, T., & Krause-Jensen, D. (2006). Monitoring nutrient release from fish farms with macroalgal and phytoplankton bioassays. *Aquaculture*, 256(1-4), 302-310.
<https://doi.org/10.1016/j.aquaculture.2006.02.047>

de Bettignies, F., Dauby, P., Thomas, F., Gobet, A., Delage, L., Bohner, O., Loisel, S., &

Davoult, D. (2020). Degradation dynamics and processes associated with the accumulation of *Laminaria hyperborea* (Phaeophyceae) kelp fragments: an in situ experimental approach. *Journal of Phycology*, 56(6), 1481-1492.

<https://doi.org/https://doi.org/10.1111/jpy.13041>

Dean, P. R., & Hurd, C. L. (2007). Seasonal growth, erosion rates, and nitrogen and photosynthetic ecophysiology of *Undaria pinnatifida* (heterokontophyta) in southern New Zealand. *Journal of Phycology*, 43(6), 1138-1148.

<https://doi.org/10.1111/j.1529-8817.2007.00416.x>

Derse, E., Knee, K. L., Wankel, S. D., Kendall, C., Berg, C. J., & Paytan, A. (2007). Identifying sources of nitrogen to Hanalei Bay, Kauai, utilizing the nitrogen isotope signature of macroalgae. *Environmental Science & Technology*, 41(15), 5217-5223.

<https://doi.org/10.1021/es0700449>

Dethier, M. N., Brown, A. S., Burgess, S., Eisenlord, M. E., Galloway, A. W. E., Kimber, J., Lowe, A. T., O'Neil, C. M., Raymond, W. W., Sosik, E. A., & Duggins, D. O. (2014). Degrading detritus: Changes in food quality of aging kelp tissue varies with species. *Journal of Experimental Marine Biology and Ecology*, 460, 72-79.

<https://doi.org/10.1016/j.jembe.2014.06.010>

Dunton, K. H. (2001). delta N-15 and delta C-13 measurements of Antarctic peninsula fauna: Trophic relationships and assimilation of benthic seaweeds. *American Zoologist*, 41(1), 99-112. [https://doi.org/10.1668/0003-1569\(2001\)041\[0099:Nacmoa\]2.0.Co;2](https://doi.org/10.1668/0003-1569(2001)041[0099:Nacmoa]2.0.Co;2)

Endo, H., Inomata, E., Gao, X., Kinoshita, J., Sato, Y., & Agatsuma, Y. (2020). Heat Stress Promotes Nitrogen Accumulation in Meristems via Apical Blade Erosion in a Brown Macroalga With Intercalary Growth. *Frontiers in Marine Science*, 7, 10, Article 575721.

<https://doi.org/10.3389/fmars.2020.575721>

Endo, H., Suehiro, K., Gao, X., & Agatsuma, Y. (2017). Interactive effects of elevated summer temperature, nutrient availability, and irradiance on growth and chemical compositions of juvenile kelp, *Eisenia bicyclis*. *Phycological Research*, 65(2), 118- 126. <https://doi.org/10.1111/pre.12170>

Engdahl, S., Mamboya, F., Mtolera, M., Semesi, A., & Bjork, M. (1998). The brown macroalgae *Padina boergesenii* as an indicator of heavy metal contamination in the zanzibar channel. *Ambio*, 27(8), 694-700. <Go to ISI>://WOS:000078071500016

Enriquez, S., Duarte, C. M., & Sandjensen, K. (1995). PATTERNS IN THE PHOTOSYNTHETIC METABOLISM OF MEDITERRANEAN MACROPHYTES. *Marine Ecology Progress Series*, 119(1-3), 243-252. <https://doi.org/10.3354/meps119243>

Falkenberg, L. J., Russell, B. D., & Connell, S. D. (2013). Contrasting resource limitations of marine primary producers: implications for competitive interactions under enriched CO₂ and nutrient regimes. *Oecologia*, 172(2), 575-583. <https://doi.org/10.1007/s00442-012-2507-5>

Figuerola, F., Bonomi, B. J., Malta, E., Conde-Álvarez, R., Nitschke, U., Arenas, F., Mata, M., Connan, S., Abreu, M., Marquardt, R., Vaz-Pinto, F., Konotchick, T., Celis-Plá, P., Hermoso, M., Ordoñez, G., Ruiz, E., Flores, P., Mérida, J., Kirke, D., & Stengel, D. (2014). Short-term effects of increasing CO₂, nitrate and temperature on three Mediterranean macroalgae: biochemical composition. *Aquatic Biology*, 22, 177-193. <https://doi.org/10.3354/ab00610>

Figuerola, F. L., Israel, A., Neori, A., Martinez, B., Malta, E. J., Put, A., Inken, S., Marquardt, R., Abdala, R., & Korbee, N. (2010). Effect of nutrient supply on photosynthesis and pigmentation to short-term stress (UV radiation) in *Gracilaria conferta* (Rhodophyta). *Marine Pollution Bulletin*, 60(10), 1768-1778. <https://doi.org/10.1016/j.marpolbul.2010.06.009>

Flukes, E. B., Wright, J. T., & Johnson, C. R. (2015). PHENOTYPIC PLASTICITY AND

BIOGEOGRAPHIC VARIATION IN PHYSIOLOGY OF HABITAT-FORMING SEAWEED: RESPONSE TO TEMPERATURE AND NITRATE. *Journal of Phycology*, 51(5), 896-909. <https://doi.org/10.1111/jpy.12330>

Fong, P., Boyer, K. E., Kamer, K., & Boyle, K. A. (2003). Influence of initial tissue nutrient status of tropical marine algae on response to nitrogen and phosphorus additions. *Marine Ecology Progress Series*, 262, 111-123. <https://doi.org/10.3354/meps262111>

Garcia-Sanchez, M., Korbee, N., Perez-Ruzafa, I. M., Marcos, C., Figueroa, F. L., & Perez Ruzafa, A. (2014). Living in a coastal lagoon environment: Photosynthetic and biochemical mechanisms of key marine macroalgae. *Marine Environmental Research*, 101, 8-21. <https://doi.org/10.1016/j.marenvres.2014.07.012>

Gennaro, P., Piazzzi, L., Persia, E., & Porrello, S. (2015). Nutrient exploitation and competition strategies of the invasive seaweed *Caulerpa cylindracea*. *European Journal of Phycology*, 50(4), 384-394. <https://doi.org/10.1080/09670262.2015.1055591>

Gennaro, P., Piazzzi, L., Persia, E., & Porrello, S. (2019). Responses of macroalgal assemblages dominated by three Mediterranean brown macroalgae with different life strategies to nutrient enrichment. *European Journal of Phycology*, 54(3), 432-446. <https://doi.org/10.1080/09670262.2019.1590861>

Gevaert, F., Davoult, D., Creach, A., Kling, R., Janquin, M. A., Seuront, L., & Lemoine, Y. (2001). Carbon and nitrogen content of *Laminaria saccharina* in the eastern English Channel: biometrics and seasonal variations. *Journal of the Marine Biological Association of the United Kingdom*, 81(5), 727-734. <https://doi.org/10.1017/s0025315401004532>

Gomez, I., Weykam, G., & Wiencke, C. (1998). Photosynthetic metabolism and major organic compounds in the marine brown alga *Desmarestia menziesii* from King George Island (Antarctica). *Aquatic Botany*, 60(2), 105-118. [https://doi.org/10.1016/s0304-3770\(97\)00097-1](https://doi.org/10.1016/s0304-3770(97)00097-1)

Gomez, I., & Wiencke, C. (1998). Seasonal changes in C, N and major organic compounds and their significance to morpho-functional processes in the endemic Antarctic brown alga *Ascoseira mirabilis*. *Polar Biology*, 19(2), 115-124. <https://doi.org/10.1007/s003000050222>

Gomez, I., Wiencke, C., & Weykam, G. (1995). SEASONAL PHOTOSYNTHETIC CHARACTERISTICS OF ASCOSEIRA-MIRABILIS (ASCOSEIRALES, PHAEOPHYCEAE) FROM KING-GEORGE-ISLAND, ANTARCTICA. *Marine Biology*, 123(1), 167-172. <https://doi.org/10.1007/bf00350336>

Gonzalez-De Zayas, R., Rossi, S., Hernandez-Fernandez, L., Velazquez-Ochoa, R., Soares, M., Merino-Ibarra, M., Castillo-Sandoval, F. S., & Soto-Jimenez, M. F. (2020). Stable isotopes used to assess pollution impacts on coastal and marine ecosystems of Cuba and Mexico. *Regional Studies in Marine Science*, 39, 13, Article 101413. <https://doi.org/10.1016/j.rsma.2020.101413>

Gordillo, F. J. L., Carmona, R., Vinegla, B., Wiencke, C., & Jimenez, C. (2016). Effects of simultaneous increase in temperature and ocean acidification on biochemical composition and photosynthetic performance of common macroalgae from Kongsfjorden (Svalbard). *Polar Biology*, 39(11), 1993-2007. <https://doi.org/10.1007/s00300-016-1897-y>

Gordillo, F. J. L., Niell, F. X., & Figueroa, F. L. (2001). Non-photosynthetic enhancement of growth by high CO₂ level in the nitrophilic seaweed *Ulva rigida* C. Agardh (Chlorophyta). *Planta*, 213(1), 64-70. <https://doi.org/10.1007/s004250000468>

Gubelit, Y., Polyak, Y., Dembska, G., Pazikowska-Sapota, G., Zegarowski, L., Kochura, D., Krivorotov, D., Podgornaya, E., Burova, O., & Maazouzi, C. (2016). Nutrient and metal pollution of the eastern Gulf of Finland coastline: Sediments, macroalgae, microbiota. *Science of the Total Environment*, 550, 806-819. <https://doi.org/10.1016/j.scitotenv.2016.01.122>

Gubelit, Y. I., Makhutova, O. N., Sushchik, N. N., Kolmakova, A. A., Kalachova, G. S., & Gladyshev, M. I. (2015). Fatty acid and elemental composition of littoral "green tide" algae from the Gulf of Finland, the Baltic Sea. *Journal of Applied Phycology*, 27(1), 375-386. <https://doi.org/10.1007/s10811-014-0349-8>

Henley, W. J., & Dunton, K. H. (1995). A SEASONAL COMPARISON OF CARBON, NITROGEN, AND PIGMENT CONTENT IN LAMINARIA-SOLIDUNGULA AND L-SACCHARINA (PHAEOPHYTA) IN THE ALASKAN ARCTIC. *Journal of Phycology*, 31(3), 325-331. <https://doi.org/10.1111/j.0022-3646.1995.00325.x>

Hernandez, I., Christmas, M., Yelloly, J. M., & Whitton, B. A. (1997). Factors affecting surface alkaline phosphatase activity in the brown alga *Fucus spiralis* at a North Sea intertidal site (Tyne sands, Scotland). *Journal of Phycology*, 33(4), 569-575. <https://doi.org/10.1111/j.0022-3646.1997.00569.x>

Hernandez, I., Martinez-Aragon, J. F., Tovar, A., Perez-Llorens, J. L., & Vergara, J. J. (2002). Biofiltering efficiency in removal of dissolved nutrients by three species of estuarine macroalgae cultivated with sea bass (*Dicentrarchus labrax*) waste waters 2. Ammonium. *Journal of Applied Phycology*, 14(5), 375-384. <https://doi.org/10.1023/a:1022178417203>

Hernandez, I., Peralta, G., PerezLlorens, J. L., Vergara, J. J., & Niell, F. X. (1997). Biomass and dynamics of growth of *Ulva* species in Palmones river estuary. *Journal of Phycology*, 33(5), 764-772. <https://doi.org/10.1111/j.0022-3646.1997.00764.x>

Hernandez, I., Perez-Pastor, A., Mateo, J. J., Megina, C., & Vergara, J. J. (2008). Growth dynamics of *Ulva rotundata* (chlorophyta) in a fish farm: Implications for biomitigation at a large scale. *Journal of Phycology*, 44(4), 1080-1089. <https://doi.org/10.1111/j.1529-8817.2008.00550.x>

Hill, J. M., & McQuaid, C. D. (2009). Variability in the fractionation of stable isotopes during degradation of two intertidal red algae. *Estuarine Coastal and Shelf Science*, 82(3), 397-405. <https://doi.org/10.1016/j.ecss.2009.02.001>

Horrocks, J. L., Stewart, G. R., & Dennison, W. C. (1995). Tissue nutrient content of *Gracilaria* spp (Rhodophyta) and water quality along an estuarine gradient. *Marine and Freshwater Research*, 46(6), 975-983. <https://doi.org/10.1071/mf9950975>

Howarth, L. M., Filgueira, R., Jiang, D., Koepke, H., Frame, M. K., Buchwald, C., Finnis, S., Chopin, T., Costanzo, S. D., & Grant, J. (2019). Using macroalgal bioindicators to map nutrient plumes from fish farms and other sources at a bay-wide scale. *Aquaculture Environment Interactions*, 11, 671-684. <https://doi.org/10.3354/aei00340>

Human, L. R. D., Adams, J. B., & Allanson, B. R. (2016). Insights into the cause of an *Ulva lactuca* Linnaeus bloom in the Knysna Estuary. *South African Journal of Botany*, 107, 55-62. <https://doi.org/10.1016/j.sajb.2016.05.016>

Hurd, C. L., Durante, K. M., Chia, F. S., & Harrison, P. J. (1994). EFFECT OF BRYOZOAN COLONIZATION ON INORGANIC NITROGEN ACQUISITION BY THE KELPS *AGARUM-FIMBRIATUM* AND *MACROCYSTIS-INTEGRIFOLIA*. *Marine Biology*, 121(1), 167-173. <https://doi.org/10.1007/bf00349486>

Kamer, K., Boyle, K. A., & Fong, P. (2001). Macroalgal bloom dynamics in a highly eutrophic southern California estuary. *Estuaries*, 24(4), 623-635. <https://doi.org/10.2307/1353262>

Kamer, K., Fong, P., Kennison, R., & Schiff, K. (2004). Nutrient limitation of the macroalga *Enteromorpha intestinalis* collected along a resource gradient in a highly eutrophic estuary. *Estuaries*, 27(2), 201-208. <https://doi.org/10.1007/bf02803377>

Kang, J. W., & Chung, I. K. (2017). The effects of eutrophication and acidification on the ecophysiology of *Ulva pertusa* Kjellman. *Journal of Applied Phycology*, 29(5), 2675- 2683. <https://doi.org/10.1007/s10811-017-1087-5>

Kang, J. W., & Chung, I. K. (2018). The Interactive Effects of Elevated CO₂ and Ammonium Enrichment on the Physiological Performances of *Saccharina japonica* (Laminariales, Phaeophyta). *Ocean Science Journal*, 53(3), 487-497. <https://doi.org/10.1007/s12601-018-0014-2>

Kang, Y. H., Kim, S., Choi, S. K., Lee, H. J., Chung, I. K., & Park, S. R. (2021). A comparison of the bioremediation potential of five seaweed species in an integrated fish-seaweed aquaculture system: implication for a multi-species seaweed culture. *Reviews in Aquaculture*, 13(1), 353-364. <https://doi.org/10.1111/raq.12478>

Kelly, B. J. (1997). *Aspects of the Chemistry and Biology of Durvillaea antarctica and Durvillaea willana* University of Otago]. Dunedin, New Zealand.

Khoi, L. V., & Fotedar, R. (2011). Integration of western king prawn (*Penaeus latisulcatus* Kishinouye, 1896) and green seaweed (*Ulva lactuca* Linnaeus, 1753) in a closed recirculating aquaculture system. *Aquaculture*, 322, 201-209. <https://doi.org/10.1016/j.aquaculture.2011.09.030>

Kim, J. K., Kraemer, G. P., & Yarish, C. (2008). Physiological activity of *Porphyra* in relation to eulittoral zonation. *Journal of Experimental Marine Biology and Ecology*, 365(2), 75-85. <https://doi.org/10.1016/j.jembe.2008.07.040>

Kim, S., Yoon, S. C., Yoo, M. H., Park, K. W., Park, S. R., & Youn, S. H. (2019). Physiological Responses of Cultured Seaweed *Pyropia yezoensis* to Phosphorous Limitation in the Nakdong River Estuary, Korea. *Ocean Science Journal*, 54(1), 129- 139. <https://doi.org/10.1007/s12601-018-0065-4>

Kristensen, E. (1990). Characterization of biogenic organic matter by stepwise thermogravimetry (STG). *Biogeochemistry*, 9(2), 135-159.
<https://doi.org/10.1007/BF00692169>

Kristensen, E. (1994). DECOMPOSITION OF MACROALGAE, VASCULAR PLANTS AND SEDIMENT DETRITUS IN SEAWATER - USE OF STEPWISE THERMOGRAVIMETRY. *Biogeochemistry*, 26(1), 1-24.
<https://doi.org/10.1007/bf02180401>

Kristensen, E., Quintana, C. O., & Valdemarsen, T. (2019). Stable C and N Isotope Composition of Primary Producers and Consumers Along an Estuarine Salinity Gradient: Tracing Mixing Patterns and Trophic Discrimination. *Estuaries and Coasts*, 42(1), 144-156.
<https://doi.org/10.1007/s12237-018-0460-1>

Krumhansl, K. A., & Scheibling, R. E. (2012). Detrital subsidy from subtidal kelp beds is altered by the invasive green alga *Codium fragile* ssp *fragile*. *Marine Ecology Progress Series*, 456, 73-85. <https://doi.org/10.3354/meps09671>

Kubler, J. E., & Raven, J. A. (1994). CONSEQUENCES OF LIGHT LIMITATION FOR CARBON ACQUISITION IN 3 RHODOPHYTES. *Marine Ecology Progress Series*, 110(2-3), 203-209. <https://doi.org/10.3354/meps110203>

Lapointe, B. E. (1997). Nutrient thresholds for bottom-up control of macroalgal blooms on coral reefs in Jamaica and southeast Florida. *Limnology and Oceanography*, 42(5), 1119-1131. https://doi.org/10.4319/lo.1997.42.5_part_2.1119

Lapointe, B. E., Barile, P. J., Littler, M. M., Littler, D. S., Bedford, B. J., & Gasque, C. (2005). Macroalgal blooms on southeast Florida coral reefs I. Nutrient stoichiometry of the invasive green alga *Codium isthmocladum* in the wider Caribbean indicates nutrient enrichment. *Harmful Algae*, 4(6), 1092-1105. <https://doi.org/10.1016/j.hal.2005.06.004>

Lapointe, B. E., Barile, P. J., Yentsch, C. S., Littler, M. M., Littler, D. S., & Kakuk, B. (2004). The relative importance of nutrient enrichment and herbivory on macroalgal communities near Norman's Pond Cay, Exumas Cays, Bahamas: a "natural" enrichment experiment. *Journal of Experimental Marine Biology and Ecology*, 298(2), 275-301. [https://doi.org/10.1016/s0022-0981\(03\)00363-0](https://doi.org/10.1016/s0022-0981(03)00363-0)

Lapointe, B. E., & Bedford, B. J. (2010). Ecology and nutrition of invasive *Caulerpa brachypus* f. *parvifolia* blooms on coral reefs off southeast Florida, USA. *Harmful Algae*, 9(1), 1-12. <https://doi.org/10.1016/j.hal.2009.06.001>

Lapointe, B. E., & Bedford, B. J. (2011). Stormwater nutrient inputs favor growth of non native macroalgae (Rhodophyta) on O'ahu, Hawaiian Islands. *Harmful Algae*, 10(3), 310-318. <https://doi.org/10.1016/j.hal.2010.11.004>

Lapointe, B. E., Brewton, R. A., Herren, L. W., Porter, J. W., & Hu, C. M. (2019). Nitrogen enrichment, altered stoichiometry, and coral reef decline at Looe Key, Florida Keys, USA: a 3-decade study. *Marine Biology*, 166(8), 31, Article 108. <https://doi.org/10.1007/s00227-019-3538-9>

Lapointe, B. E., Brewton, R. A., Herren, L. W., Wang, M., Hu, C., McGillicuddy, D. J., Lindell, S., Hernandez, F. J., & Morton, P. L. (2021). Nutrient content and stoichiometry of pelagic *Sargassum* reflects increasing nitrogen availability in the Atlantic Basin. *Nature Communications*, 12(1), 3060. <https://doi.org/10.1038/s41467-021-23135-7>

Lapointe, B. E., Littler, M. M., & Littler, D. S. (1992). NUTRIENT AVAILABILITY TO MARINE MACROALGAE IN SILICICLASTIC VERSUS CARBONATE-RICH COASTAL WATERS. *Estuaries*, 15(1), 75-82. <https://doi.org/10.2307/1352712>

Lapointe, B. E., Thacker, K., Hanson, C., & Getten, L. (2011). Sewage pollution in Negril, Jamaica: effects on nutrition and ecology of coral reef macroalgae. *Chinese Journal of*

Oceanology and Limnology, 29(4), 775-789. <https://doi.org/10.1007/s00343-011-0506-8>

Larned, S. T. (1998). Nitrogen- versus phosphorus-limited growth and sources of nutrients for coral reef macroalgae. *Marine Biology*, 132(3), 409-421.

<https://doi.org/10.1007/s002270050407>

Leal, P. P., Ojeda, J., Sotomayor, C., & Buschmann, A. H. (2020). Physiological stress modulates epiphyte (Rhizoclonium sp.)-basiphyte (Agarophyton chilense) interaction in co-culture under different light regimes. *Journal of Applied Phycology*, 32(5), 3219-3232.

<https://doi.org/10.1007/s10811-020-02153-w>

Lee, J. E., & Kang, J. W. (2020). The interactive effects of elevated temperature and nutrient concentrations on the physiological responses of *Ulva linza* Linnaeus (Ulvales, Chlorophyta). *Journal of Applied Phycology*, 32(4), 2459-2467.

<https://doi.org/10.1007/s10811-019-02031-0>

Legarda, E. C., da Silva, D., Miranda, C. S., Pereira, P. K. M., Martins, M. A., Machado, C., de Lorenzo, M. A., Hayashi, L., & Vieira, F. D. (2021). Sea lettuce integrated with Pacific white shrimp and mullet cultivation in biofloc impact system performance and the sea lettuce nutritional composition. *Aquaculture*, 534, 8, Article 736265.

<https://doi.org/10.1016/j.aquaculture.2020.736265>

Leichter, J. J., Stewart, H. L., & Miller, S. L. (2003). Episodic nutrient transport to Florida coral reefs. *Limnology and Oceanography*, 48(4), 1394-1407.

<https://doi.org/10.4319/lo.2003.48.4.1394>

Lenzi, M., Gennaro, P., Renzi, M., Persia, E., & Porrello, S. (2012). Spread of *Alsidium corallinum* C. Ag. in a Tyrrhenian eutrophic lagoon dominated by opportunistic macroalgae. *Marine Pollution Bulletin*, 64(12), 2699-2707.

<https://doi.org/10.1016/j.marpolbul.2012.10.004>

Lenzi, M., Salvaterra, G., Gennaro, P., Mercatali, I., Persia, E., Porrello, S., & Sorce, C. (2015). A new approach to macroalgal bloom control in eutrophic, shallow-water, coastal areas. *Journal of Environmental Management*, *150*, 456-465.

<https://doi.org/10.1016/j.jenvman.2014.12.031>

Li, J. Y., Agatsuma, Y., Nagai, T., Sato, Y., & Taniguchi, K. (2009). Differences in resource storage pattern between *Laminaria longissima* and *Laminaria diabolica* (Laminariaceae; Phaeophyta) reflecting their morphological characteristics [Article]. *Journal of Applied Phycology*, *21*(2), 215-224. <https://doi.org/10.1007/s10811-008-9352-2>

Li, J. Y., Liu, Y. C., Liu, Y., Wang, Q. H., Gao, X., & Gong, Q. L. (2019). Effects of temperature and salinity on the growth and biochemical composition of the brown alga *Sargassum fusiforme* (Fucales, Phaeophyceae). *Journal of Applied Phycology*, *31*(5), 3061-3068. <https://doi.org/10.1007/s10811-019-01795-9>

Lin, H. J., Wu, C. Y., Kao, S. J., Kao, W. Y., & Meng, P. J. (2007). Mapping anthropogenic nitrogen through point sources in coral reefs using delta N-15 in macroalgae. *Marine Ecology Progress Series*, *335*, 95-109. <https://doi.org/10.3354/meps335095>

Littler, M. M., Littler, D. S., & Brooks, B. L. (2010). The effects of nitrogen and phosphorus enrichment on algal community development: Artificial mini-reefs on the Belize Barrier Reef sedimentary lagoon. *Harmful Algae*, *9*(3), 255-263.

<https://doi.org/10.1016/j.hal.2009.11.002>

Lourenco, S. O., Barbarino, E., Nascimento, A., Freitas, J. N. P., & Diniz, G. S. (2006). Tissue nitrogen and phosphorus in seaweeds in a tropical eutrophic environment: What a long-term study tells us. *Journal of Applied Phycology*, *18*(3-5), 389-398.

<https://doi.org/10.1007/s10811-006-9035-9>

Lourenco, S. O., Barbarino, E., Nascimento, A., & Paranhos, R. (2005). Seasonal variations

in tissue nitrogen and phosphorus of eight macroalgae from a tropical hypersaline coastal environment. *Cryptogamie Algologie*, 26(4), 355-371.

MacArthur, L. D., Phillips, D. L., Hyndes, G. A., Hanson, C. E., & Vanderklift, M. A. (2011). Habitat surrounding patch reefs influences the diet and nutrition of the western rock lobster. *Marine Ecology Progress Series*, 436, 191-205. <https://doi.org/10.3354/meps09256>

Mawi, S., Krishnan, S., Din, M. F. M., Arumugam, N., & Chelliapan, S. (2020). Bioremediation potential of macroalgae *Gracilaria edulis* and *Gracilaria changii* co cultured with shrimp wastewater in an outdoor water recirculation system. *Environmental Technology & Innovation*, 17, 8, Article 100571. <https://doi.org/10.1016/j.eti.2019.100571>

Mayakun, J., Kim, J. H., Lapointe, B. E., & Prathep, A. (2012). The effects of herbivore exclusion and nutrient enrichment on growth and reproduction of *Halimeda macroloba*. *Scienceasia*, 38(3), 227-234. <https://doi.org/10.2306/scienceasia1513-1874.2012.38.227>

Mayakun, J., Kim, J. H., Lapointe, B. E., & Prathep, A. (2013). Effects of nutrient enrichment and herbivory on morphology, reproduction and chemical content of *Turbinaria conoides* (Phaeophyceae). *Phycological Research*, 61(4), 270-276. <https://doi.org/10.1111/pre.12023>

Mayr, C. C., Forsterra, G., Haussermann, V., Wunderlich, A., Grau, J., Zieringer, M., & Altenbach, A. V. (2011). Stable isotope variability in a Chilean fjord food web: implications for N- and C-cycles. *Marine Ecology Progress Series*, 428, 89-104. <https://doi.org/10.3354/meps09015>

Mendo, T., & B.J., G. (2006). Utilization of seaweed *Ulva* sp. in Paracas Bay (Peru): Experimenting with compost. *Journal of Applied Phycology - J APPL PHYCOL*, 18, 27-31. <https://doi.org/10.1007/s10811-005-9010-x>

Menendez, M., Herrera, J., & Comin, F. A. (2002). Effect of nitrogen and phosphorus supply

on growth, chlorophyll content and tissue composition of the macroalga *Chaetomorpha linum* (OF Mull.) Kütz in a Mediterranean coastal lagoon. *Scientia Marina*, 66(4), 355-364. <https://doi.org/10.3989/scimar.2002.66n4355>

Mercado, J. M., Javier, F., Gordillo, L., Niell, F. X., & Figueroa, F. L. (1999). Effects of different levels of CO₂ on photosynthesis and cell components of the red alga *Porphyra leucosticta*. *Journal of Applied Phycology*, 11(5), 455-461. <https://doi.org/10.1023/a:1008194223558>

Milledge, J., Staple, A., & Harvey, P. (2015). Slow Pyrolysis as a Method for the Destruction of Japanese Wireweed, *Sargassum muticum*. *Environment and Natural Resources Research*, 5. <https://doi.org/10.5539/enrr.v5n1p28>

Milledge, J. J., & Harvey, P. J. (2016). Ensilage and anaerobic digestion of *Sargassum muticum*. *Journal of Applied Phycology*, 28(5), 3021-3030. <https://doi.org/10.1007/s10811-016-0804-9>

Miller, S. M. (2003). *Ecophysiology of Ecklonia radiata (Alariaceae: Laminariales) in Doubtful Sound, Fjordland University of Otago*. Dunedin, New Zealand.

Monteiro, C., Li, H. R., Diehl, N., Collen, J., Heinrich, S., Bischof, K., & Bartsch, I. (2021). Modulation of physiological performance by temperature and salinity in the sugar kelp *Saccharina latissima*. *Phycological Research*, 69(1), 48-57. <https://doi.org/10.1111/pre.12443>

Mortensen, L. M. (2017). Remediation of nutrient-rich, brackish fjord water through production of protein-rich kelp *S. latissima* and *L. digitata*. *Journal of Applied Phycology*, 29(6), 3089-3096. <https://doi.org/10.1007/s10811-017-1184-5>

Narvarte, B. C. V., Nelson, W. A., & Roleda, M. Y. (2020). Inorganic carbon utilization of tropical calcifying macroalgae and the impacts of intensive mariculture-derived coastal

acidification on the physiological performance of the rhodolith *Sporolithon* sp.

Environmental Pollution, 266, 11, Article 115344.

<https://doi.org/10.1016/j.envpol.2020.115344>

Navarro, N. P., Figueroa, F. L., Korbee, N., Mansilla, A., Matsuhira, B., Barahona, T., & Plastino, E. M. (2014). The Effects of NO₃- Supply on *Mazzaella laminarioides* (Rhodophyta, Gigartinales) from Southern Chile. *Photochemistry and Photobiology*, 90(6), 1299-1307. <https://doi.org/10.1111/php.12344>

Neori, A., Cohen, I., & Gordin, H. (1991). ULVA-LACTUCA BIOFILTERS FOR MARINE FISHPOND EFFLUENTS .2. GROWTH-RATE, YIELD AND C-N RATIO. *Botanica Marina*, 34(6), 483-489. <https://doi.org/10.1515/botm.1991.34.6.483>

Nielsen, M. M., Bruhn, A., Rasmussen, M. B., Olesen, B., Larsen, M. M., & Moller, H. B. (2012). Cultivation of *Ulva lactuca* with manure for simultaneous bioremediation and biomass production. *Journal of Applied Phycology*, 24(3), 449-458. <https://doi.org/10.1007/s10811-011-9767-z>

Norderhaug, K. M., Nygaard, K., & Fredriksen, S. (2006). Importance of phlorotannin content and C : N ratio of *Laminaria hyperborea* in determining its palatability as food for consumers. *Marine Biology Research*, 2(6), 367-371. <https://doi.org/10.1080/17451000600962789>

Ober, G. T., & Thornber, C. S. (2017). Divergent responses in growth and nutritional quality of coastal macroalgae to the combination of increased pCO₂ and nutrients. *Marine Environmental Research*, 131, 69-79. <https://doi.org/10.1016/j.marenvres.2017.09.003>

Olischlager, M., Iniguez, C., Gordillo, F. J. L., & Wiencke, C. (2014). Biochemical composition of temperate and Arctic populations of *Saccharina latissima* after exposure to increased pCO₂ and temperature reveals ecotypic variation. *Planta*, 240(6), 1213-1224. <https://doi.org/10.1007/s00425-014-2143-x>

Paine, E., Schmid, M., Reville, A., & Hurd, C. (2020). Light regulates inorganic nitrogen uptake and storage, but not nitrate assimilation, by the red macroalga *Hemineura frondosa* (Rhodophyta). *European Journal of Phycology*, 56.

<https://doi.org/10.1080/09670262.2020.1786858>

Peckol, P., & Ramus, J. (1992). PHOTOSYNTHETIC PERFORMANCE OF DEEP-WATER MACROALGAE (PHAEOPHYTA, DICTYOTALES) OFF BERMUDA. *Hydrobiologia*, 231(2), 93-98. <https://doi.org/10.1007/bf00006501>

Pelletreau, K. N., & Muller-Parker, G. (2002). Sulfuric acid in the phaeophyte alga *Desmarestia munda* deters feeding by the sea urchin *Strongylocentrotus droebachiensis*. *Marine Biology*, 141(1), 1-9. <https://doi.org/10.1007/s00227-002-0809-6>

Perini, V., & Bracken, M. E. S. (2014). Nitrogen availability limits phosphorus uptake in an intertidal macroalga. *Oecologia*, 175(2), 667-676. <https://doi.org/10.1007/s00442-014-2914-x>

Peters, K. J., Amsler, C. D., Amsler, M. O., McClintock, J. B., Dunbar, R. B., & Baker, B. J. (2005). A comparative analysis of the nutritional and elemental composition of macroalgae from the western Antarctic Peninsula. *Phycologia*, 44(4), 453-463. [https://doi.org/10.2216/0031-8884\(2005\)44\[453:Acaotn\]2.0.Co;2](https://doi.org/10.2216/0031-8884(2005)44[453:Acaotn]2.0.Co;2)

Pfister, C. A. (1992). COSTS OF REPRODUCTION IN AN INTERTIDAL KELP - PATTERNS OF ALLOCATION AND LIFE-HISTORY CONSEQUENCES. *Ecology*, 73(5), 1586-1596. <https://doi.org/10.2307/1940012>

Phelps, C. M., Boyce, M. C., & Huggett, M. J. (2017). Future climate change scenarios differentially affect three abundant algal species in southwestern Australia. *Marine Environmental Research*, 126, 69-80. <https://doi.org/10.1016/j.marenvres.2017.02.008>

Phillips, J. C., & Hurd, C. L. (2003). Nitrogen ecophysiology of intertidal seaweeds from New Zealand: N uptake, storage and utilisation in relation to shore position and season. *Marine Ecology Progress Series*, 264, 31-48.

<https://doi.org/10.3354/meps264031>

Polo, L. K., Felix, M. R. L., Kreuzsch, M., Pereira, D. T., Costa, G. B., Simioni, C., Martins, R. D., Latini, A., Floh, E. S. I., Chow, F., Ramlov, F., Maraschin, M., Bouzon, Z. L., & Schmidt, E. C. (2015). Metabolic profile of the brown macroalga *Sargassum cymosum* (Phaeophyceae, Fucales) under laboratory UV radiation and salinity conditions. *Journal of Applied Phycology*, 27(2), 887-899.

<https://doi.org/10.1007/s10811-014-0381-8>

Pritchard, D. W., Hurd, C. L., Beardall, J., & Hepburn, C. D. (2013). SURVIVAL IN LOW LIGHT: PHOTOSYNTHESIS AND GROWTH OF A RED ALGA IN RELATION TO MEASURED IN SITU IRRADIANCE. *Journal of Phycology*, 49(5), 867-879.
<https://doi.org/10.1111/jpy.12093>

Quintano, E., Celis-Pla, P. S. M., Martinez, B., Diez, I., Muguerza, N., Figueroa, F. L., & Gorostiaga, J. M. (2019). Ecophysiological responses of a threatened red alga to increased irradiance in an in situ transplant experiment. *Marine Environmental Research*, 144, 166-177. <https://doi.org/10.1016/j.marenvres.2019.01.008>

Quintano, E., Diez, I., Muguerza, N., Figueroa, F. L., & Gorostiaga, J. M. (2018). Depth influence on biochemical performance and thallus size of the red alga *Gelidium comeum*. *Marine Ecology-an Evolutionary Perspective*, 39(1), 10, Article e12478.
<https://doi.org/10.1111/maec.12478>

Rautenberger, R., Fernandez, P. A., Strittmatter, M., Heesch, S., Cornwall, C. E., Hurd, C. L., & Roleda, M. Y. (2015). Saturating light and not increased carbon dioxide under ocean acidification drives photosynthesis and growth in *Ulva rigida* (Chlorophyta). *Ecology and*

Evolution, 5(4), 874-888. <https://doi.org/10.1002/ece3.1382>

Reef, R., Pandolfi, J. M., & Lovelock, C. E. (2012). The effect of nutrient enrichment on the growth, nucleic acid concentrations, and elemental stoichiometry of coral reef macroalgae. *Ecology and Evolution*, 2(8), 1985-1995.

<https://doi.org/10.1002/ece3.330>

Reidenbach, L. B., Fernandez, P. A., Leal, P. P., Noisette, F., McGraw, C. M., Revill, A. T., Hurd, C. L., & Kubler, J. E. (2017). Growth, ammonium metabolism, and photosynthetic properties of *Ulva australis* (Chlorophyta) under decreasing pH and ammonium enrichment. *Plos One*, 12(11), 20, Article e0188389. <https://doi.org/10.1371/journal.pone.0188389>

Ribeiro, A., Chiozzini, V. G., Braga, E. S., & Yokoya, N. S. (2017). Physiological responses and biofilter potential of *Hypnea aspera* (Rhodophyta, Gigartinales) cultivated in different availabilities of nitrate, ammonium, and phosphate. *Journal of Applied Phycology*, 29(2), 683-694. <https://doi.org/10.1007/s10811-016-0970-9>

Ricevuto, E., Vizzini, S., & Gambi, M. C. (2015). Ocean acidification effects on stable isotope signatures and trophic interactions of polychaete consumers and organic matter sources at a CO₂ shallow vent system. *Journal of Experimental Marine Biology and Ecology*, 468, 105-117. <https://doi.org/10.1016/j.jembe.2015.03.016>

Rico, J. M., & Fernandez, C. (1996). Seasonal nitrogen metabolism in an intertidal population of *Gelidium latifolium* (Gelidiaceae, Rhodophyta). *European Journal of Phycology*, 31(2), 149-155. <https://doi.org/10.1080/09670269600651321>

Rogers, K. M. (1999). Effects of sewage contamination on macro-algae and shellfish at Moa Point, New Zealand using stable carbon and nitrogen isotopes. *New Zealand Journal of Marine and Freshwater Research*, 33(2), 181-188.

<https://doi.org/10.1080/00288330.1999.9516868>

Roleda, M. Y., Lage, S., Aluwini, D. F., Rebours, C., Brurberg, M. B., Nitschke, U., & Gentili, F. G. (2021). Chemical profiling of the Arctic sea lettuce *Ulva lactuca* (Chlorophyta) mass-cultivated on land under controlled conditions for food applications. *Food Chemistry*, *341*, 10, Article 127999.
<https://doi.org/10.1016/j.foodchem.2020.127999>

Rubenstein, D. R., & Wikelski, M. (2003). Seasonal changes in food quality: A proximate cue for reproductive timing in marine iguanas. *Ecology*, *84*(11), 3013-3023.
<https://doi.org/10.1890/02-0354>

Samanta, P., Shin, S., Jang, S., Song, Y. C., Oh, S., & Kim, J. K. (2019). Stable carbon and nitrogen isotopic characterization and tracing nutrient sources of *Ulva* blooms around Jeju coastal areas. *Environmental Pollution*, *254*, 10, Article 113033.
<https://doi.org/10.1016/j.envpol.2019.113033>

Samocha, T. M., Fricker, J., Ali, A. M., Shpigel, M., & Neori, A. (2015). Growth and nutrient uptake of the macroalga *Gracilaria tikvahiae* cultured with the shrimp *Litopenaeus vannamei* in an Integrated Multi-Trophic Aquaculture (IMTA) system. *Aquaculture*, *446*, 263-271.
<https://doi.org/10.1016/j.aquaculture.2015.05.008>

Sato, Y., Hirano, T., Ichida, H., Murakami, M., Fukunishi, N., Abe, T., & Kawano, S. (2017). Morphological and physiological differences among cultivation lines of *Undaria pinnatifida* in a common garden experiment using a tank culture system. *Journal of Applied Phycology*, *29*(5), 2287-2295. <https://doi.org/10.1007/s10811-017-1170-y>

Sato, Y., Hirano, T., Niwa, K., Suzuki, T., Fukunishi, N., Abe, T., & Kawano, S. (2016). Phenotypic differentiation in the morphology and nutrient uptake kinetics among *Undaria pinnatifida* cultivated at six sites in Japan. *Journal of Applied Phycology*, *28*(6), 3447-3458. <https://doi.org/10.1007/s10811-016-0857-9>

Schaffelke, B. (2001). Surface alkaline phosphatase activities of macroalgae on coral reefs of the central Great Barrier Reef, Australia. *Coral Reefs*, 19(4), 310-317.

<https://doi.org/10.1007/s003380000128>

Sfriso, A., Marcomini, A., & Pavoni, B. (1994). GRACILARIA DISTRIBUTION, PRODUCTION AND COMPOSITION IN THE LAGOON OF VENICE.

Bioresource Technology, 50(2), 165-173. [https://doi.org/10.1016/0960-8524\(94\)90069-8](https://doi.org/10.1016/0960-8524(94)90069-8)

Shantz, A. A., Ladd, M. C., & Burkepile, D. E. (2017). Algal nitrogen and phosphorus content drive inter- and intraspecific differences in herbivore grazing on a Caribbean reef. *Journal of Experimental Marine Biology and Ecology*, 497, 164-171.

<https://doi.org/10.1016/j.jembe.2017.09.020>

Sharma, S. H. S., Lyons, G., McRoberts, C., McCall, D., Carmichael, E., Andrews, F., Swan, R., McCormack, R., & Mellon, R. (2012). Biostimulant activity of brown seaweed species from Strangford Lough: compositional analyses of polysaccharides and bioassay of extracts using mung bean (*Vigna mungo* L.) and pak choi (*Brassica rapa chinensis* L.). *Journal of Applied Phycology*, 24(5), 1081-1091. <https://doi.org/10.1007/s10811-011-9737-5>

Silva, P. H. D., Paul, N. A., de Nys, R., & Mata, L. (2013). Enhanced Production of Green Tide Algal Biomass through Additional Carbon Supply. *Plos One*, 8(12), 7, Article e81164. <https://doi.org/10.1371/journal.pone.0081164>

Smart, J. N., Schmid, M., Paine, E. R., Britton, D., Revill, A., & Hurd, C. L. (2022). Seasonal ammonium uptake kinetics of four brown macroalgae: Implications for use in integrated multi-trophic aquaculture. *Journal of Applied Phycology*, 34(3), 1693- 1708.

<https://doi.org/10.1007/s10811-022-02743-w>

Staehr, P., & Wernberg, T. (2009). Physiological responses of *Ecklonia radiata*

(Laminariales) to a latitudinal gradient in ocean temperature. *Journal of Phycology*, 45.
<https://doi.org/10.1111/j.1529-8817.2008.00635.x>

Stephens, T. A., & Hepburn, C. D. (2014). Mass-transfer gradients across kelp beds influence *Macrocystis pyrifera* growth over small spatial scales. *Marine Ecology Progress Series*, 515, 97-109. <https://doi.org/10.3354/meps10974>

Subandar, A., Petrell, R. J., & Harrison, P. J. (1993). LAMINARIA CULTURE FOR REDUCTION OF DISSOLVED INORGANIC NITROGEN IN SALMON FARM EFFLUENT. *Journal of Applied Phycology*, 5(4), 455-463.
<https://doi.org/10.1007/bf02182738>

Tabassum, M. R., Xia, A., & Murphy, J. D. (2016). The effect of seasonal variation on biomethane production from seaweed and on application as a gaseous transport biofuel. *Bioresource Technology*, 209, 213-219.
<https://doi.org/10.1016/j.biortech.2016.02.120>

Tabassum, M. R., Xia, A., & Murphy, J. D. (2017). Comparison of pre-treatments to reduce salinity and enhance biomethane yields of *Laminaria digitata* harvested in different seasons. *Energy*, 140, 546-551. <https://doi.org/10.1016/j.energy.2017.08.070>

Tedesco, S., & Daniels, S. (2018). Optimisation of biogas generation from brown seaweed residues: Compositional and geographical parameters affecting the viability of a biorefinery concept. *Applied Energy*, 228, 712-723.
<https://doi.org/10.1016/j.apenergy.2018.06.120>

Teichberg, M., Fox, S. E., Aguila, C., Olsen, Y. S., & Valiela, I. (2008). Macroalgal responses to experimental nutrient enrichment in shallow coastal waters: growth, internal nutrient pools, and isotopic signatures. *Marine Ecology Progress Series*, 368, 117-126.
<https://doi.org/10.3354/meps07564>

Teichberg, M., Fricke, A., & Bischof, K. (2013). Increased physiological performance of the calcifying green macroalga *Halimeda opuntia* in response to experimental nutrient enrichment on a Caribbean coral reef. *Aquatic Botany*, *104*, 25-33.

<https://doi.org/10.1016/j.aquabot.2012.09.010>

Tremblay-Gratton, A., Boussin, J. C., Tamigneaux, E., Vandenberg, G. W., & Le Francois, N. R. (2018). Bioremediation efficiency of *Palmaria palmata* and *Ulva lactuca* for use in a fully recirculated cold-seawater naturalistic exhibit: effect of high NO₃ and PO₄ concentrations and temperature on growth and nutrient uptake. *Journal of Applied Phycology*, *30*(2), 1295-1304. <https://doi.org/10.1007/s10811-017-1333-x>

Tsai, C. C., Chang, J. S., Sheu, F., Shyu, Y. T., Yu, A. Y. C., Wong, S. L., Dai, C. F., & Lee, T. M. (2005). Seasonal growth dynamics of *Laurencia papillosa* and *Gracilaria coronopifolia* from a highly eutrophic reef in southern Taiwan: temperature limitation and nutrient availability. *Journal of Experimental Marine Biology and Ecology*, *315*(1), 49-69.

<https://doi.org/10.1016/j.jembe.2004.08.025>

Van Alstyne, K. L., Pelletreau, K. N., & Kirby, A. (2009). Nutritional preferences override chemical defenses in determining food choice by a generalist herbivore, *Littorina sitkana*. *Journal of Experimental Marine Biology and Ecology*, *379*(1-2), 85-91.

<https://doi.org/10.1016/j.jembe.2009.08.002>

van der Loos, L. M., Schmid, M., Leal, P. P., McGraw, C. M., Britton, D., Revill, A. T., Virtue, P., Nichols, P. D., & Hurd, C. L. (2019). Responses of macroalgae to CO₂ enrichment cannot be inferred solely from their inorganic carbon uptake strategy.

Ecology and Evolution, *9*(1), 125-140. <https://doi.org/https://doi.org/10.1002/ece3.4679>

Vega, J., Alvarez-Gomez, F., Guenaga, L., Figueroa, F. L., & Gomez-Pinchetti, J. L. (2020). Antioxidant activity of extracts from marine macroalgae, wild-collected and cultivated, in an integrated multi-trophic aquaculture system [Article]. *Aquaculture*, *522*, 10, Article

735088. <https://doi.org/10.1016/j.aquaculture.2020.735088>

Vergara, J. J., Garcia-Sanchez, M. P., Olive, I., Garcia-Marin, P., Brun, F. G., Perez-Llorens, J. L., & Hernandez, I. (2012). Seasonal functioning and dynamics of *Caulerpa prolifera* meadows in shallow areas: An integrated approach in Cadiz Bay Natural Park. *Estuarine Coastal and Shelf Science*, *112*, 255-264. <https://doi.org/10.1016/j.ecss.2012.07.031>

Viaroli, P., Bartoli, M., Azzoni, R., Giordani, G., Mucchino, C., Naldi, M., Nizzoli, D., & Taje, L. (2005). Nutrient and iron limitation to *Ulva* blooms in a eutrophic coastal lagoon (Sacca di Goro, Italy). *Hydrobiologia*, *550*, 57-71.

<https://doi.org/10.1007/s10750-005-4363-3>

Viaroli, P., Naldi, M., Bondavalli, C., & Bencivelli, S. (1996). Growth of the seaweed *Ulva rigida* C. Agardh in relation to biomass densities, internal nutrient pools and external nutrient supply in the Sacca di Goro lagoon (Northern Italy). *Hydrobiologia*, *329*(1- 3), 93-103. <https://doi.org/10.1007/bf00034550>

Villares, R., & Carballeira, A. (2003). Seasonal variation in the concentrations of nutrients in two green macroalgae and nutrient levels in sediments in the Rias Baixas (NW Spain). *Estuarine Coastal and Shelf Science*, *58*(4), 887-900.

<https://doi.org/10.1016/j.ecss.2003.07.004>

Visch, W. (2019). *Sustainable Kelp Aquaculture in Sweden [Thesis]*. Göteborgs Universitet.

Visch, W., Kononets, M., Hall, P., Nylund, G., & Pavia, H. (2020). Environmental impact of kelp (*Saccharina latissima*) aquaculture. *Marine Pollution Bulletin*, *155*.

<https://doi.org/10.1016/j.marpolbul.2020.110962>

Visch, W., Nylund, G. M., & Pavia, H. (2020). Growth and biofouling in kelp aquaculture (*Saccharina latissima*): the effect of location and wave exposure. *Journal of Applied Phycology*, *32*(5), 3199-3209. <https://doi.org/10.1007/s10811-020-02201-5>

Wakefield, R. L., & Murray, S. N. (1998). Factors influencing food choice by the seaweed eating marine snail *Norrisia norrisi* (Trochidae). *Marine Biology*, 130(4), 631-642.
<https://doi.org/10.1007/s002270050285>

Wang, X. X., Broch, O. J., Forbord, S., Handa, A., Skjermo, J., Reitan, K. I., Vadstein, O., & Olsen, Y. (2014). Assimilation of inorganic nutrients from salmon (*Salmo salar*) farming by the macroalgae (*Saccharina latissima*) in an exposed coastal environment: implications for integrated multi-trophic aquaculture. *Journal of Applied Phycology*, 26(4), 1869-1878.
<https://doi.org/10.1007/s10811-013-0230-1>

Wang, Y., Feng, Y. Q., Liu, X. J., Zhong, M. Q., Chen, W. Z., Wang, F., & Du, H. (2018). Response of *Gracilaria lemaneiformis* to nitrogen deprivation. *Algal Research Biomass Biofuels and Bioproducts*, 34, 82-96. <https://doi.org/10.1016/j.algal.2018.07.005>

Weigel, B. L., & Pfister, C. A. (2021). The dynamics and stoichiometry of dissolved organic carbon release by kelp. *Ecology*, 102(2), 17, Article e03221.
<https://doi.org/10.1002/ecy.3221>

Wernberg, T., Thomsen, M. S., Staehr, P. A., & Pedersen, M. F. (2001). Comparative phenology of *Sargassum muticum* and *Halidrys siliquosa* (Phaeophyceae : Fucales) in Limfjorden, Denmark. *Botanica Marina*, 44(1), 31-39. <https://doi.org/10.1515/bot.2001.005>

Weykam, G., Gomez, I., Wiencke, C., Iken, K., & Kloser, H. (1996). Photosynthetic characteristics and C:N ratios of macroalgae from King George Island (Antarctica). *Journal of Experimental Marine Biology and Ecology*, 204(1-2), 1-22.
[https://doi.org/10.1016/0022-0981\(96\)02576-2](https://doi.org/10.1016/0022-0981(96)02576-2)

Wheeler, P. A., & Bjornsater, B. R. (1992). SEASONAL FLUCTUATIONS IN TISSUE NITROGEN, PHOSPHORUS, AND N-P FOR 5 MACROALGAL SPECIES COMMON TO THE PACIFIC-NORTHWEST COAST. *Journal of Phycology*, 28(1), 1-6.

<https://doi.org/10.1111/j.0022-3646.1992.00001.x>

Wu, H. L., Zhang, J. H., Yarish, C., He, P., & Kim, J. K. (2018). Bioremediation and nutrient migration during blooms of *Ulva* in the Yellow Sea, China. *Phycologia*, *57*(2), 223- 231.

<https://doi.org/10.2216/17-32.1>

Yamamuro, M., & Kamiya, H. (2014). Elemental (C, N, P) and isotopic ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) signature of primary producers and their contribution to the organic matter in coastal lagoon sediment. *Landscape and Ecological Engineering*, *10*(1), 65-75.

<https://doi.org/10.1007/s11355-013-0219-6>

Young, E. B., Dring, M. J., Savidge, G., Birkett, D. A., & Berges, J. A. (2007). Seasonal variations in nitrate reductase activity and internal N pools in intertidal brown algae are correlated with ambient nitrate concentrations. *Plant Cell and Environment*, *30*(6), 764-774.

<https://doi.org/10.1111/j.1365-3040.2007.01666.x>

Yu, Z. H., Robinson, S. M. C., Xia, J. J., Sun, H. Y., & Hu, C. Q. (2016). Growth, bioaccumulation and fodder potentials of the seaweed *Sargassum hemiphyllum* grown in oyster and fish farms of South China. *Aquaculture*, *464*, 459-468.

<https://doi.org/10.1016/j.aquaculture.2016.07.031>

Yu, Z. H., Sun, H. Y., Huang, W., Hu, C. Q., & Zhou, Y. (2019). *Sargassum henslowianum* as a potential biofilter in mariculture farms of a subtropical eutrophic bay. *Marine Pollution Bulletin*, *149*, 10, Article 110615. <https://doi.org/10.1016/j.marpolbul.2019.110615>

Zhang, X. W., Xu, D., Han, W. T., Wang, Y. T., Fan, X., Loladze, I., Gao, G., Zhang, Y., Tong, S. Y., & Ye, N. H. (2021). Elevated CO₂ affects kelp nutrient quality: A case study of *Saccharina japonica* from CO₂-enriched coastal mesocosm systems. *Journal of Phycology*, *57*(1), 379-391. <https://doi.org/10.1111/jpy.13097>