| Year | Reference | BMAA Detected? | BMAA Detected in Cyano-bacteria[1]? | BMAA Detected in Bioaccumulated Sources[2]? | BMAA Detected in Phyto-plankton or Zoo-plankton[3]? | BMAA Detected in Human Tissues/Waste[4]? | Chroma-tography | Column ID | Elution Buffer(s) | Deri-vative | Detection Method | Detector |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | [100] | Yes | N/A | Yes | N/A | N/A | RPLC | Hypersil Gold C18 (2.1 x 150 mm; 1.9 µm) | 0.075% acetic acid in water/0.075 % acetic acid in acetonitrile | FLEC | MS/MS | Waters Xevo TQ-S |
| 2019 | [106] | Yes | Yes | N/A | N/A | N/A | RPLC | Phenomenex Kinetex (1.7 µm; 100 A pore size) | 0.1% formic acid in 45% water/0.1% formic acid in 55% methanol | PCF | MS/MS | Agilent 6490 Triple Quadrupole |



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## Supplementary Tables

**Table S1.** Comparison of chromatography methods used for detection of BMAA. [1]Includes cyanobacterial cultures grown *in-vitro,* and cyanobacterial samples collected from natural habitats. [2]Includes BMAA bioaccumulated in higher trophic level organisms such as traditional Chamorro dietary items such as cycad flour and flying foxes and seafoods such as mussels, lobster, fish and crab. [3]Phytoplankton include diatoms and dinoflagellates. [4]Includes human brain tissue and urine. Studies that did not analyze the specified sample type are labelled N/A. Derivatizing agents include 6-aminoquinoyl-*N*-hydroxysuccinimide (AQC), dansyl chloride (DC), ethyl chloroformate (ECF), (+)-1-(9-fluorenyl)-ethyl chloroformate (FLEC), fluorenylmethyloxycarbonyl (FMOC), isobaric tag for relative and absolute quantitation (iTRAQ), ninhydrin (post-column derivatization), and propyl chloroformate (PCF).

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | [35] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters C18 BEH (2.1 x 150 mm; 1.7 µm) | 20 mM ammonium formate with 0.2% formic acid/0.1% formic acid in acetonitrile | AQC | MS/MS | Waters Xevo TQ-S |
| 2019 | [35] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.7)/52% aqueous acetonitrile | AQC | FD | Waters 2475 Multi k-Fluorescence Detector |
| 2019 | [107] | Yes | Yes | No | N/A | N/A | RPLC | Phenomenex AAA-MS (250 x 2.0 mm; 4 µm) | 10 mM Ammonium Formate in water/10 mM ammonum formate in Methanol | PCF | MS/MS | Agilent 1200 Infinity Series |
| 2019 | [108] | Yes | N/A | Yes | N/A | N/A | RPLC | EclipseXDB C-18 (4.6 x 100 mm; 5 µm) | 28% acetonitrile/ 0.1% ammonium formate in water | AQC | MS/MS | Agilent Technologies 1290/6460 MS |
| 2018 | [25] | Yes | No | Yes | N/A | N/A | HILIC | Tosoh TSKgel amide-80 (2.0 x 250 mm; 5 µm) | 50 mM formic acid in water/50 mM formic acid in | none | DMS-MS/MS | AB Sciex SelexION (DMS)/AB Sciex Qtrap 5500 (MS) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | acetonitrile | | | |
| 2018 | [48] | No | N/A | No | N/A | N/A | HILIC | SeQuant ZIC-HILIC (dimensions unspecified) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | none | MS/MS | Thermo LTQ XL Linear Ion Trap MS |
| 2018 | [26] | Yes | Yes | No | N/A | No | HILIC | Tosoh TSKgel amide-80 (2.0 x 250 mm; 5 µm) | 50 mM formic acid/5% 50 mM formic acid in 95% acetonitrile | none | MS/MS | Waters Xevo TQ-S |
| 2018 | [47] | Yes | N/A | Yes | N/A | N/A | HILIC | Tosoh TSKgel amide-80 (2.0 x 250 mm; 5 µm) | 50 mM formic acid in water/50 mM formic acid in 95% acetonitrile | none | MS/MS | Agilent 6430 MS |
| 2018 | [109] | Yes | Yes | Yes | N/A | N/A | RPLC | Waters Acquity BEH C18 (2.1 x 150 mm; 1.7 µm) | 20 mM ammonium formate in water (pH 5.0)/methanol | AQC | MS/MS | Waters Xevo TQ-S/Thermo Scientific TSQ Quantiva |
| 2018 | [26] | Yes | Yes | Yes | N/A | No | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in water/10 mM ammonium formate in methanol | PCF | MS/MS | Waters Xevo TQ-S |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | [26] | Yes | Yes | Yes | N/A | No | RPLC | Waters Acquity BEH (2.1 x 150 mm; 1.7 µm) | 20 mM ammonium formate in water (pH 5.0)/methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2018 | [47] | Yes | N/A | Yes | N/A | N/A | RPLC | Phenomenex Kinetex (2.1 x 100 mm; 1.7 µm) | 20 mM ammonium formate in water (pH 5.0)/methanol | AQC | MS/MS | Agilent 6430 MS |
| 2018 | [44] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Acquity BEH C18 (2.1 x 100 mm; 1.7 µm) | 20 mM ammonium formate in water (pH 5.0)/methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2018 | [81] | Yes | N/A | N/A | N/A | Yes | RPLC | Waters UltraTag C18 (2.1 x 100 mm; 1.7 µm) | 5% acetonitrile in water with 0.3% acetic acid/acetonitrile with 0.3% acetic acid | AQC | MS/MS | Thermo Fisher TQS Vantage Triple Quad |
| 2018 | [110] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters UltraTag C18 (2.1 x 100 mm; 1.7 µm) | 0.1% (v/v) formic acid/0.1% (v/v) formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |
| 2018 | [111] | Yes | Yes | No | N/A | N/A | RPLC | Phenomenex Kinetex C18, 100A (2.1 x 100 mm; 1.7 µm) | 20 mM ammonium acetate (pH 5.0)/methanol | AQC | MS | Waters EMD 1000 Single Quad MS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | [79] | No | N/A | N/A | N/A | No | RPLC | Mac-Mod Analytical ACE Excel SuperC18 (2.1 x 100 mm; 2 µm) | 0.1% (v/v) heptaflurobutyric acid/0.1% (v/v) heptafluoro butyric acid in methanol | none | MS/MS | Sciex 5500 Triple Quad MS |
| 2018 | [112] | Yes | Yes | N/A | N/A | N/A | RPLC | Phenomenex Kinetex C18 (2.1 x 150 mm; 1.7 µm) | 0.1% (v/v) formic acid/0.1% (v/v) formic acid in methanol | PCF | MS/MS | Agilent Technologies 6490 Triple Quad MS |
| 2018 | [113] | Yes | N/A | Yes | Yes | N/A | RPLC | Phenomonex EZ:FaastTM AAA-MS (2 x 250 mm) | 10 mM ammonium formate in water/10 mM ammonium formate in methanol | PCF | MS | Shimadzu 2010EV |
| 2017 | [80] | Yes | N/A | N/A | N/A | Yes | HILIC | Waters Atlantis HILIC SILICA (2.1 x 100 mm; 3 µm) | 50 mM formic acid in water/50 mM formic acid in 95% acetonitrile | none | MS/MS | Waters Xevo TQ-S |
| 2017 | [90] | Yes | Yes | N/A | N/A | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 100 mm; 5 µm); SeQuant (1 x 14 mm; 5 µm) guard column | 0.1% formic acid in acetonitrile/ 0.1% formic acid in water | none | MS | Thermo LCQ Fleet Ion Trap |
| 2017 | [114] | No | No | N/A | N/A | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 150 mm; 5 µm) | 0.1% formic acid in acetonitrile/ 0.1% formic acid in water | none | MS | Agilent Technologies 6490 Triple Quad MS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | [115] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters UltraTag C18 (2.1 mm x 100 mm; 1.7 µm) | 0.01% formic acid in 0.05% ammonia in water/0.01 % formic acid in methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2017 | [116] | Yes | N/A | N/A | N/A | N/A | RPLC | Phenomene x Chirex 3126 chiral column (4.6 x 250mm); Waters AccQ Tag Ultra (2.1 x 100 mm) | 2 mM copper sulfate in water/2 mM copper sulfate in 15% aq. acetonitrile; 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |
| 2017 | [117] | Yes | Yes | N/A | N/A | N/A | RPLC | Thermo Hypesil GOLD C18 (2.1 x 100 mm, 1.9 µm); Thermo guard column (2.1 x 5 mm; 3 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | DC[7] | HRMS | Thermo Fisher Q-Exactive MS |
| 2016 | [94] | Yes | No | Yes | N/A | No | HILIC | SeQuant ZIC-HILIC (2.1 x 150 mm; 5 µm) | 0.1% formic acid in acetonitrile/ 0.1% formic acid in water | none | MS | Agilent Technologies 6490 Triple Quad MS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2016 | [105] | Yes | N/A | Yes | N/A | N/A | HILIC | Waters Acquity BEH amide (2.1 x 100 mm; 1.7 µm); Waters Acquity BEH amide (2.1 x 5 mm) pre-column | acetonitrile/ 0.1% formic acid in water | none | MS/MS | Waters Xevo TQ-S |
| 2016 | [118] | Yes | N/A | Yes | N/A | N/A | HILIC | Waters Acquity BEH amide (2.1 x 100 mm; 1.7 µm); pre-column Waters Acquity BEH amide (2.1 x 5 mm) | acetonitrile/ 0.1% formic acid in water | none | MS/MS | Waters Xevo TQ-S |
| 2016 | [49] | Yes | No | Yes | Yes | N/A | HILIC | Merck SeQuant ZIC-HILIC (2.1 x 150 mm; 5 µm); TSKgel amide-80 guard column (2 x 10 mm; 5 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | none | MS/MS | AB Sciex AP 5500 Qtrap Triple Quad MS |
| 2016 | [5] | Yes | N/A | N/A | Yes | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 150 mm; 5 µm); TSKgel amide-80 guard column (2 x 10 mm; 5 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | none | MS/MS | Sciex Qtrap 5500 AB |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2016 | [119] | Yes | N/A | Yes | N/A | N/A | HILIC | Tosoh TSKgel Amide-80 (2.0 x 250 mm; 5 µm) | 50 mM formic acid in water/50 mM formic acid in 95% acetonitrile | none | MS/MS | Agilent 6430 MS |
| 2016 | [120] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/52% acetonitrile in water | AQC | FD | Waters 2475 Multi ʎ-Fluorescence Detector |
| 2016 | [120] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Acquity BEH C18 (2.1 x 150 mm; 1.7 µm) | 20 mM ammonium formate in 0.2% formic acid/0.1% formic acid in acetonitrile | AQC | MS/MS | Waters Xevo TQ-S |
| 2016 | [7] | Yes | Yes | N/A | Yes | N/A | RPLC | Waters AccQ-Tag Ultra C18 (2.1 x 100 mm; 1.7 µm) | 0.01% formic acid in 0.05% ammonia in water/0.01 % formic acid in methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2016 | [121] | No | N/A | N/A | N/A | N/A | RPLC | Waters UltraTag C18 (2.1 mm x 100 mm; 1.7 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |
| 2016 | [105] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Acquity BEH, 1.7 µm (2.1 x 100 mm); Waters C18 guard | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | DC | MS/MS | Waters Xevo MS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | column | | | | |
| 2016 | [85] | No | N/A | N/A | N/A | No | RPLC | Waters Acquity BEH C18 (2.1 x 50 mm; 1.7 µm) | 0.1% formic acid in water / 0.1% formic acid in methanol | DC | MS/MS | Waters Xevo TQ-S |
| 2015 | [45] | Yes | No | Yes | Yes | N/A | HILIC | Tosoh TSKgel amide-80 (2 x 250 mm; 5 µm) | 50 mM formic acid in water/50 mM formic acid in acetonitrile | none | DMS-MS/MS | AB Sciex Qtrap 5500 |
| 2015 | [6] | Yes | Yes | Yes | Yes | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 150 mm; 5µm); TSKgel amide-80 guard column (2 x 10 mm; 5 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | none | MS/MS | AB Sciex Qtrap 5500 |
| 2015 | [122] | No | No | N/A | Yes | N/A | HILIC | Tosoh TSKgel amide-80 (2 x 250 mm; 5 µm) | 50 mM ammonium formate in water/50 mM ammonium formate in acetonitrile | none | MS/MS | AB Sciex API 4000 Qtrap/Agilent 6430 |
| 2015 | [123] | Yes | N/A | Yes | N/A | N/A | RPLC | Phenomenex Kinetex C18 (2.1 x 100 mm; 1.7 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | [71] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Acquity BEH C18 (2.1 x 150 mm; 1.7 µm) | 20 mM ammonium formate in water (pH 5.0)/methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2015 | [124] | No | N/A | N/A | N/A | N/A | RPLC | Waters AccQ-Tag Ultra C18 (2.1 x 100 mm; 1.7 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |
| 2015 | [7] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQ-Tag Ultra C18 (2.1 x 100 mm; 1.7 µm) | 0.01% formic acid and 0.05% ammonia in water/0.01 % formic acid in methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2015 | [125] | Yes | N/A | Yes | N/A | N/A | RPLC | Thermo Scientific Hypersil GOLD C18 (2.1 x 100 mm; 3 µm) | 0.3% formic acid in water/0.3% formic acid in acetonitrile | AQC | MS/MS | Agilent G6410B Triple Quad |
| 2015 | [78] | Yes | N/A | N/A | N/A | Yes | RPLC | Waters Acquity BEH C18 (2.1 x 100 mm; 1.7µm) | 0.01% formic acid and 0.05% ammonia in water/0.01 % formic acid in methanol | AQC | MS/MS | Waters Xevo TQ-S |
| 2015 | [126] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Acquity BEH (2.1 x 100 mm; 1.7 µm); Waters C18 guard column | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | DC | MS/MS | Waters Xevo MS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | [127] | Yes | Yes | N/A | N/A | N/A | RPLC | Thermo Hypesil GOLD C18 (2.1 x 100 mm; 1.9 µm); Thermo guard column (2.1 x 5 mm; 3 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | DC | HRMS | Thermo Fisher Q-Exactive MS |
| 2015 | [128] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQ-Tag Ultra C18 (2.1 x 100 mm; 1.7 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |
| 2014 | [101] | Yes | No | Yes | N/A | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 150 mm; 5 µm); TSKgel amide-80 guard column (2 x 10 mm; 5 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | none | MS/MS | Sciex Qtrap 5500 AB |
| 2014 | [129] | No | No | N/A | N/A | N/A | HILIC | Tosoh TSKgel Amide-80 (2.0 x 250 mm; 5 µm) | 50 mM formic acid in water/50 mM formic acid in acetonitrile: water (95:5) | none | MS/MS | AB Sciex API4000 Qtrap |
| 2014 | [130] | No | N/A | N/A | N/A | No | HILIC | Merck Sequant ZIC-HILIC (2.1 x 150 mm; 3.5 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | None | MS | Thermo TSQ Quantum Discovery Max |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | [131] | Yes | Yes | Yes | N/A | N/A | RPLC | Kromasil-Thermohypersil C8 (4.6 x 250 mm) | not specified | AQC | FD | Waters 2475 Multi ʎ-Fluorescence Detector |
| 2014 | [131] | Yes | Yes | Yes | N/A | N/A | RPLC | Thermo Hypurity C18 (2.5 x 250 mm; 5 µm) | 0.5 g/L ammonium formate in water/0.5 g/L ammonium formate in methanol | AQC | MS/MS | Finnigan LCQ Classic Ion Trap MS |
| 2014 | [132] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQ Tag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientic Finnigan TSQ Quantum UltraAM |
| 2014 | [133] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQTag Ultra column (2.1 x 100 mm) | 0.01% formic acid in 0.05% ammonia / 0.01% formic acid in methanol | AQC | MS/MS | Waters Xevo TQ-MS |
| 2014 | [76] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.7)/52% acetonitrile in water | AQC | FD | Waters 2475 Multi ʎ-Fluorescence Detector |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | [76] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters BEH C18 (2.1 x 150 mm; 1.7 µm) | 20 mM ammonium formate with 0.2% formic acid/0.1% formic acid in acetonitrile | AQC | MS/MS | Waters Xevo TQ-S |
| 2014 | [93] | Yes | Yes | Yes | N/A | N/A | RPLC | Agilent Eclipse XDB-C18 (4.6 × 100 mm; 5 µm) | 28% acetonitrile in water with 0.1% ammonium acetate | AQC | MS/MS | Agilent |
| 2014 | [24] | Yes | Yes | N/A | Yes | N/A | RPLC | Waters AccQ-Tag Ultra C18 (2.1 x 100 mm; 1.7 µm) | acetonitrile /formic acid | AQC | MS/MS | Thermo TSQ Vantage |
| 2014 | [134] | Yes | Yes | N/A | N/A | N/A | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in water/10 mM ammonium formate in methanol | PCF | MS/MS | Waters Micromass Quattro Micro |
| 2014 | [135] | Yes | N/A | Yes | N/A | N/A | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in methanol | PCF | MS/MS | Waters Micromass Quattro Micro |
| 2013 | [136] | Yes | Yes | N/A | N/A | N/A | HILIC | Merck Sequant ZIC-HILIC (2.1 x 150 mm; 3.5 µm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | None | MS | Thermo TSQ Quantum Discovery Max |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2013 | [137] | Yes | Yes | Yes | N/A | N/A | RPLC | Kromasil-Thermohyperisil C8 (4.6 x 250 mm) | 140 mM ammonium acetate, 5.6 mM triethylamine (pH 5.7) in water/52% acetonitrile in water | AQC | FD | Waters 2475 Muli λ-Fluorescence Detector |
| 2013 | [137] | Yes | Yes | Yes | N/A | N/A | RPLC | Thermo Hypurity C18 (2.5 x 250 mm; 5 µm) | 0.5 g/L ammonium formate in water/0.5 g/L ammonium formate in methanol | AQC | MS/MS | Finnigan LCQ Classic Ion Trap MS |
| 2013 | [138] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQTag Ultra column (2.1 x 100 mm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientific Finnigan TSQ Quantum UltraAM |
| 2013 | [139] | Yes | N/A | N/A | N/A | N/A | RPLC | Waters C18 AccQ-Tag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Finnigan TSQ Quantum Ultra AM |
| 2013 | [140] | Yes | Yes | N/A | N/A | N/A | RPLC | Agilent Bonus RP Rapid Resolution High Throughput (2.1 x 100 mm, 1.8 µm) | acetonitrile/ formic acid | AQC | MS/MS | Thermo TSQ Vantage |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2013 | [53] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Acquity BEH (2.1 x 100 mm; 1.7 µm); Waters C18 guard column | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | DC | MS/MS | Waters Xevo MS |
| 2013 | [141] | Yes | N/A | Yes | N/A | N/A | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in methanol | PCF | MS/MS | Thermo Scientific Finnigan TSQ Quantum UltraAM |
| 2012 | [60] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters NovaPak C18 (3.9 x 300 mm; 4 µm) | 140 mM sodium acetate and 5.6 mM triethylamine in water (pH 5.2)/acetonitrile/water | AQC | FLD | Agilent 1100 |
| 2012 | [60] | No | No | N/A | N/A | N/A | RPLC | Agilent Zorbax Eclipse AAA (4.6 x 75 mm; 3.5 µm) | 0.1% formic acid in acetonitrile/ 0.1% formic acid in water | AQC | MS/MS | Agilent 6401A QQQ |
| 2012 | [60] | No | No | N/A | N/A | N/A | HILIC | Sequant ZIC-HILIC (2.1 x 150 mm; 5 µm) | 0.1% formic acid in acetonitrile/ 0.1% formic acid in water | none | MS/MS | Agilent 6401A QQQ |
| 2012 | [95] | No | No | N/A | N/A | N/A | HILIC | Tosoh TSK-gel Amide-80 (2.0 x 250 mm; 5 µm) | acetonitrile /formic acid | None | MS/MS | API 4000 Qtrap MS |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2012 | [142] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 × 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD |
| 2012 | [142] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water / 0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Scientific Finnigan TSQ Quantum UltraAM |
| 2012 | [143] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Merck Hitachi L-7480 FLD |
| 2012 | [46] | Yes | Yes | Yes | N/A | N/A | RPLC | Agilent Bonus RP Rapid Resolution High Throughput (2.1 x 100 mm; 1.8 µm) | acetonitrile/ formic acid | AQC | MS/MS | Thermo TSQ Vantage |
| 2012 | [144] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine/65% methanol in water | AQC | FLD | Merck Hitachi L-7480 FLD |
| 2012 | [145] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Xbridge C18 (4.6 x 150 mm; 3.5 µm) | Waters AccQ-Tag Ultra Eluents A& B | AQC | MS/MS | Agilent G410A Triple Quad |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | [146] | No | N/A | N/A | N/A | N/A | ESI | NA | 0.1% formic acid/acetonitrile | none | MS/MS | Sciex API 5000 Triple Quad |
| 2011 | [146] | No | N/A | N/A | N/A | N/A | GC | Fused silica (0.25 x 300 mm; 0.25mm) coated with DB-5 | Helium Gas | ECF | MS | Shimadzu CLASS17A-QP5000 |
| 2011 | [51] | Yes | Yes | N/A | N/A | N/A | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in water/10 mM ammonium formate in methanol | PCF | MS | Shimadzu 2010EV |
| 2011 | [68] | Yes | N/A | N/A | N/A | N/A | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in water/10 mM ammonium formate in methanol | PCF | MS | Shimadzu 2010EV |
| 2011 | [147] | Yes | Yes | N/A | N/A | N/A | RPLC | Phenomenex AAA-MS (2.0 x 250 mm; 4 µm) | 10 mM ammonium formate in methanol | PCF | MS/MS | Thermo Scientific Finnigan TSQ Quantum UltraAM |
| 2010 | [148] | No | N/A | N/A | N/A | No | GCxGC | Restek RTX- 5MS (60 m × 0.25 mm; 0.25 µm) | helium gas | ECF | MS | HP 5971A GC/MS |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | [149] | No | No | N/A | N/A | N/A | HILIC | Phenomenex Luna C18(2) (4.60 x 250 mm; 5 mm) | 2 mM ammonium formate (pH 3) in water/2 mM ammonium formate (pH 3) in acetonitrile/ water (90/10; v/v) | None | MS/MS | AB API 365 |
| 2010 | [150] | No | No | N/A | N/A | N/A | HILIC | SeQuant ZIC-HILIC, 5 um (2.1 x 150 mm; 5 µm) | acetonitrile and 60 mM formic acid 60/40 (v/v), isocratic flow | None | MS/MS | Thermo Finnigan HPLC, Finnigan LCQ Deca XP Plus |
| 2010 | [150] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters C18 AccQ-Tag Ultra (2.1 x 100 mm) | acetonitrile and 0.05% TFA; 70/30 (v/v), isocratic flow | AQC | MS/MS | Finnigan TSQ Quantum Ultra AM |
| 2010 | [150] | No | No | N/A | N/A | N/A | HILIC | Tosoh TSKgel amide-80 (2.0 x 250 mm; 5 µm) | acetonitrile and 0.05% TFA; 70/30 (v/v), isocratic flow | none | MS/MS | Micromass Quattro Ultima Pt |
| 2010 | [66] | Yes | Yes | Yes | N/A | N/A | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 µm) | acetonitrile/ formic acid | AQC | MS/MS | AB API 2000 Triple Quadrupole |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2010 | [74] | Yes | Yes | Yes | Yes | N/A | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 µm) | acetonitrile/ formic acid | AQC | MS/MS | AB API 2000 Triple Quadrupole |
| 2010 | [27] | Yes | Yes | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 × 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD |
| 2010 | [27] | Yes | Yes | Yes | N/A | N/A | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 µm) | acetonitrile/ formic acid | AQC | MS/MS | Thermo TSQ Quantum Discovery Max |
| 2009 | [151] | No | N/A | N/A | N/A | No | GC | Restek film RTX-5MS (60 m x 0.25 mm) | helium gas | ECF | MS | HP 5971A GC/MS |
| 2009 | [152] | Yes | Yes | N/A | N/A | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 150 mm; 5 µm) | acetonitrile/ formic acid | None | MS/MS | Agilent G6410A |
| 2009 | [59] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo TSQ Quantum Discovery Max |
| 2009 | [59] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | Waters AccQ-Tag Ultra Eluents A& B | AQC | MS | Waters EMD 1000 Single Quad |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009 | [59] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 column (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, |
| 2009 | [59] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | Waters AccQ-Tag Ultra Eluents A&B | AQC | UV | Acquity UV Detector |
| 2009 | [153] | Yes | Yes | N/A | N/A | N/A | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 µm) | 0.1% formic acid in water/0.1% rormic acid in acetonitrile | AQC | MS/MS | Thermo TSQ Quantum Discovery Max |
| 2009 | [154] | Yes | Yes | N/A | N/A | N/A | RPLC | 2 serially coupled Chromolith Perform RP-18e (3 mm) | 20 mM sodium acetate (pH 5.5)/50/50 acetonitrile/ water | AQC | FLD | Hitachi LaChrom FLD L-7485 |
| 2009 | [67] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS | Waters EMD 1000 Single Quad |
| 2009 | [153] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Nova-Pak C18 ( 3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l Fluorescence Detector, Waters 2488 UV detector |
| 2009 | [29] | Yes | N/A | N/A | N/A | Yes | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 | 0.1% formic acid in water/0.1% formic acid | AQC | MS/MS | Thermo TSQ Quantum Discovery |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | μm) | in acetonitrile | | | Max |
| 2009 | [29] | Yes | N/A | N/A | N/A | Yes | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, Waters 2488 UV Detector |
| 2009 | [155] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Finnigan Ultra AM |
| 2009 | [83] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo Finnigan Triple Quadrupole MS (model unspecified) |
| 2009 | [156] | No | No | N/A | N/A | N/A | RPLC | Supelco LC-18 (4.6 x 150 mm; 5 μm) with Zorbax C18 guard (4.6 x 12.5 mm; 5μm) | 0.1 M ammonium formate (pH 4.0)/acetonitrile | FMOC | FD | Agilent 1100 LC-FLD |
| 2009 | [157] | Yes | N/A | Yes | N/A | No | RPLC | Agilent XDB C18 (2.1 x 50 mm; 1.8 μm) | 10 mM formic acid/10 mM formic acid in acetonitrile | iTRAQ | MS/MS | Sciex API4000 |
| 2009 | [158] | Yes | N/A | N/A | N/A | N/A | RPLC | Waters Spherisorb ODS2 (4.6 x 250 mm; 5 μm) | acetonitrile /formic acid | None | MS | Thermo LCQ DecaXP Plus Ion Trap |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | [75] | Yes | Yes | N/A | N/A | N/A | GC | ZB-AAA GC (10 m x 0.25 mm) | helium gas | ECF | EI-MS | Thermo Finnigan Trace MS Plus |
| 2008 | [65] | No | No | N/A | N/A | N/A | HILIC | Tosoh TSK-gel Amide-80 (2.0 x 250; 5 µm) | acetonitrile/ water | None | MS | Shimadzu LCMS 2010A |
| 2008 | [54] | No | No | N/A | N/A | N/A | HILIC | SeQuant ZIC-HILIC (2.1 x 50; 5 µm/2.1 x 150; 5 µm) | acetonitrile/ 60 mM formic acid | None | MS/MS | Micromass Quattro Ultima or API 4000 QTRAP |
| 2008 | [58] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS | Waters EMD 1000 Single Quad |
| 2008 | [58] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | Waters AccQ-Tag Ultra Eluents A& B | AQC | UV | Acquity UV Detector |
| 2008 | [58] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamin e (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD |
| 2008 | [58] | Yes | Yes | N/A | N/A | N/A | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo TSQ Quantum Discovery Max |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | [159] | Yes | Yes | N/A | N/A | N/A | RPLC | Thermo Hypersil GOLD (2.1 x 100 mm; 3 µm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo TSQ Quantum Discovery Max |
| 2008 | [159] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, Waters 2488 UV Detector |
| 2007 | [52] | Yes | Yes | N/A | N/A | N/A | IEX | Hitachi Reaction with Li-form resin & Ion Exchange ammonia filter | proprietary eluents (Hitachi) | Nin-hydrin | FLD | Hitachi Amino Acid Analyzer |
| 2007 | [52] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | 0.1% formic acid in water/0.1% formic acid in acetonitrile | AQC | MS/MS | Thermo TSQ Quantum Discovery Max |
| 2007 | [52] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | Waters AccQ-Tag Ultra Eluents A& B | AQC | MS | Waters EMD 1000 Single Quad |
| 2007 | [52] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | [52] | Yes | Yes | N/A | N/A | N/A | RPLC | Waters AccQTag Ultra (2.1 x 100 mm) | Waters AccQ-Tag Ultra Eluents A& B | AQC | UV | Acquity UV Detector |
| 2006 | [23] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | MS | Agilent SL Single Quad, DAD |
| 2006 | [23] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, Waters 2488 UV Detector |
| 2005 | [22] | Yes | Yes | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | MS | Agilent SL Single Quad, DAD |
| 2005 | [22] | Yes | Yes | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, Waters 2488 UV Detector |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2005 | [77] | No | N/A | N/A | N/A | No | RPLC | Unspecified | Unspecified | FMOC | FLD | Unspecified |
| 2004 | [28] | Yes | N/A | N/A | N/A | Yes | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | MS | Agilent SL Single Quad, DAD |
| 2004 | [160] | Yes | Yes | Yes | N/A | Yes | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, Waters 2488 UV Detector |
| 2004 | [160] | Yes | Yes | Yes | N/A | Yes | RPLC | Waters Symmetry | acetonitrile/ water | AQC | MS, DAD | Agilent SL Single Quad, DAD |
| 2003 | [20] | Yes | Yes | Yes | N/A | Yes | RPLC | Waters SymetryShield RP-18 | acetonitrile/ water | AQC | MS / UV | Agilent SL Single Quad, DAD |
| 2003 | [161] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | [21] | Yes | N/A | Yes | N/A | N/A | RPLC | Waters Nova-Pak C18 (3.9 x 300 mm) | 140 mM sodium acetate, 5.6 mM triethylamine (pH 5.2)/60% acetonitrile | AQC | FLD | Waters 2487 Dual-l FLD, | |

**Table S2.** Comparison of non-chromatography methods used for detection of BMAA. [1]Includes cyanobacterial cultures grown *in-vitro,* and cyanobacterial samples collected from natural habitats. [2]Includes BMAA bioaccumulated in higher trophic level organisms such as traditional Chamorro dietary items such as cycad flour and flying foxes and seafoods such as mussels, lobster, fish and crab. [3]Phytoplankton include diatoms and dinoflagellates. [4]Includes human brain tissue and urine. Studies that did not analyze the specified sample type are labelled N/A.

| **Year** | **Reference** | **BMAA Detected?** | **BMAA Detected in Cyano-bacteria[1] ?** | **BMAA Detected in Bioaccumulated Sources[2]?** | **BMAA Detected in Phyto-plankton or Zoo-plankton[3] ?** | **BMAA Detected in Human Tissues/Waste[4]?** | **Separation** | **Separation Device** | **Elution Buffer(s)/ BGE** | **Derivative** | **Detection Method** | **Detector** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | [104] | Yes | Yes | N/A | N/A | N/A | ELISA | Abraxis BMAA ELISA kit (PN 520040) | N/A | none | Spectro-photometer | Sunrise Absorbance Reader |
| 2018 | [103] | Yes | N/A | Yes | N/A | N/A | Chip-based CZE | 908 Devices ZipChip HS Chip | 2% formic acid in 50% methanol in water | none | MS/MS | Q Exactive HF MS (Thermo Fisher) |
| 2018 | [162] | Yes | N/A | N/A | N/A | N/A | ELISA | Abraxis BMAA ELISA kit (PN 520040) | N/A | none | Spectro-photometer | BioTek ELx800 Absorbance Microplate Reader |
| 2017 | [80] | Yes | N/A | N/A | N/A | Yes | ELISA | Abraxis BMAA ELISA kit (PN 520040) | N/A | none | Spectro-photometer | BioTek Power Wave Spectrometer |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | [163] | Yes | No | Yes | N/A | N/A | CE | Agilent G1600A CE System with custom interface | 5 M formic acid with 10% acetonitrile | none | MS/MS | Sciex API-4000 MS |
| 2016 | [97] | No | N/A | No | N/A | N/A | ELISA | Abraxis BMAA ELISA kit (PN 520040) | N/A | none | Spectro-photometer | Microplate ELISA Photometer |
| 2016 | [92] | Yes | Yes | N/A | N/A | N/A | ELISA | Abraxis BMAA ELISA kit (PN 520040) | N/A | none | Spectro-photometer | Biotek Synergy HT |
| 2013 | [57] | Yes | N/A | N/A | N/A | N/A | ELISA | Abraxis BMAA ELISA kit (PN 520040) | N/A | none | MTP Reader | Biotek Synergy HT |
| 2011 | [56] | Yes | Yes | N/A | N/A | N/A | CE | fused-silica (50 cm x 75 μm) | 5 mM sodium tetraborate (pH 9) | none | UV | Beckman Coulter P/ACE MDQ system |
| 2009 | [55] | Yes | Yes | N/A | N/A | N/A | N/A | N/A | N/A | none | $^1$H NMR | Bruker DPX 300 |

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