Sharing Culture: Skills and Services in Support of the Maine Algal Industry

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Collaborators:
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Tim Pinkhim, Seawater Facilities Technician

Maine Algal Cluster Initiative – MAC Steering Committee

Outline:

3 Bigelow Laboratory Core Facilities:

- National Center for Marine Algae and Microbiota (NCMA)
- Bigelow Analytical Services (BAS)
- Bigelow Seawater Facility

Maine Algal Cluster Initiative

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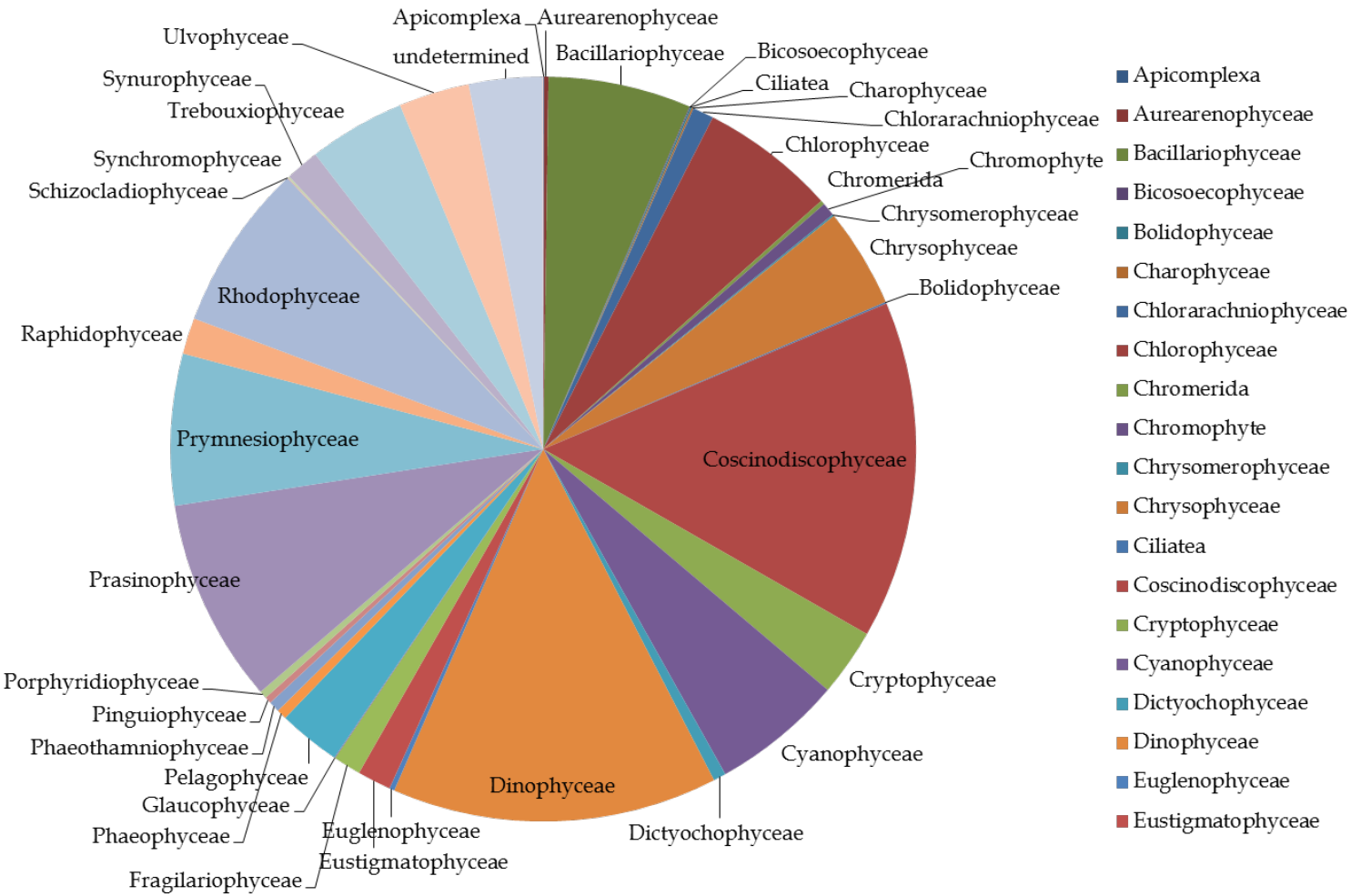
NCMA: the largest and most diverse collection of microalgae in the world.



got algae? bigelow.org

~3000 Microalgal strains from every ocean.

Enter Location to narrow down your search:

Radius 200 mi

Submit Reset

Filter Map by Tag: Show all | Algae Cyanophyceae Prasinophyceae Trebouxiophyceae Fragilariophyceae Coscinodiscophyceae Bacteria **Reset locations**

- CCMP100 - Achnanthes brevipes Falmouth Great Pond; Falmouth; Massachusetts USA
- CCMP1000 - Thalassiosira oceanica continental slope
- CCMP1001 - Thalassiosira oceanica continental slope
- CCMP1002 - Thalassiosira oceanica continental slope
- CCMP1003 - Thalassiosira oceanica Sargasso Sea
- CCMP1004 - Thalassiosira oceanica Gulf Stream Warm Core Ring 81D
- CCMP1005 - Thalassiosira oceanica Sargasso Sea
- CCMP1006 - Thalassiosira

Maintained by 3 curators, Julie Sexton, Tracey Riggens, Jeff Brown, who have >50 yrs experience culturing algae collectively.

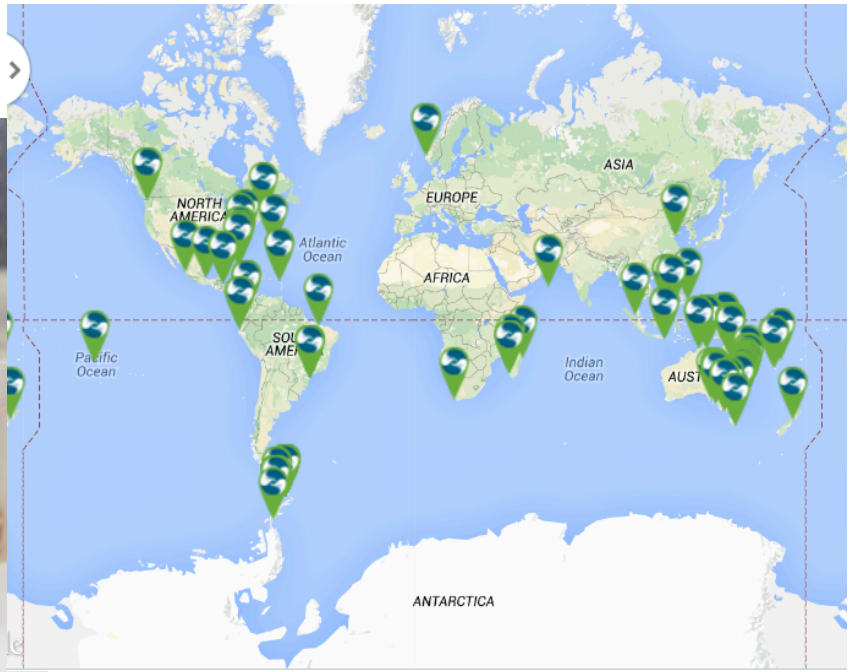
NCMA also has 159 macroalgal strains

5 classes:

- Bangiophyceae
- Florideophyceae
- Rhodophyceae
- Ulvophyceae
- Phaeophyceae

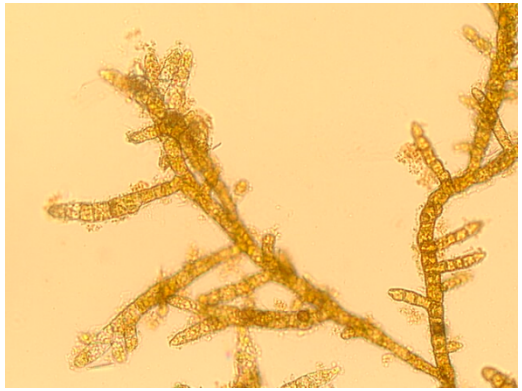
>30 genera:

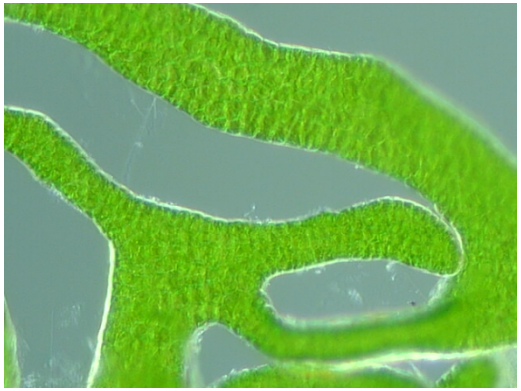
- *Palmaria decipiens*
- *Porphyra plocamiestris*



Products and Services

- Strains provided as starter cultures
- Clean seawater and a wide range of growth media kits
- Culturing Techniques Courses and consulting on growth optimization
- New isolations/strain clean up/taxonomic ID
- Cryopreservation and perpetual culture maintenance
- Private collections and International Depository Authority (patent depository)
- Research services (e.g., Nucleic acids from algae, mass culture, macroalgal culture, growth/compound optimization, etc.)





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Bigelow Analytical Services

- Fee-for-service analytical facility
- Serving research, industry and State
- Open to new ideas and challenges

Analytical capabilities:

Elementary	• Colorimetric analysis • UV/Vis spectrometry and fluorometry • Elemental analyzer
Compound composition	• Liquid chromatography (HPLC) • Gas chromatograph - mass spectrometry • Liquid- chromatography - mass spectrometry
Production Rates	• Radioisotope approaches • Stable isotope approaches (compounds and bulk isotope ratios)

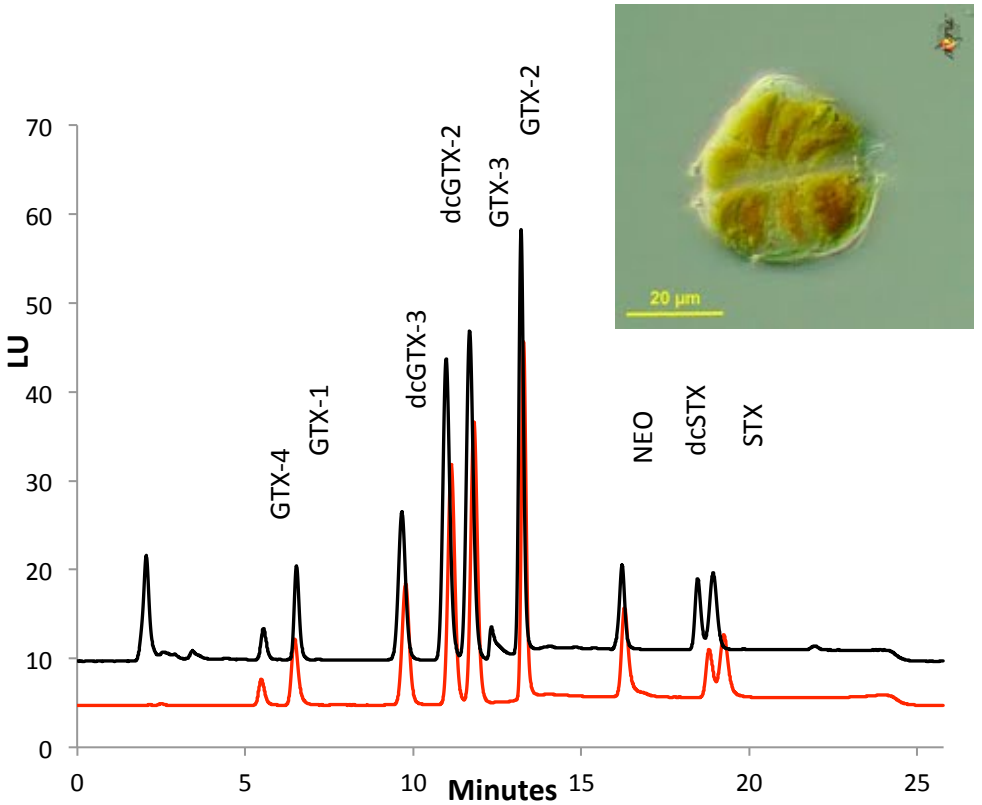
Example: Toxin Testing

Microalgal toxins:
Paralytic and Amnesic Shellfish Toxins (PSPs and ASPs)

Approach:
- HPLC-PCOX method
- Maine 1st in US to adopt chemical analysis

Conducting PSP and ASP analysis for MEDMR shellfish monitoring program (2013-2014 season).

Funding: Sewall and Ingalls Foundations



Comparison of primary standards and mussel matrix-matched standards of saxitoxins, gonyautoxins and neosaxitoxins.

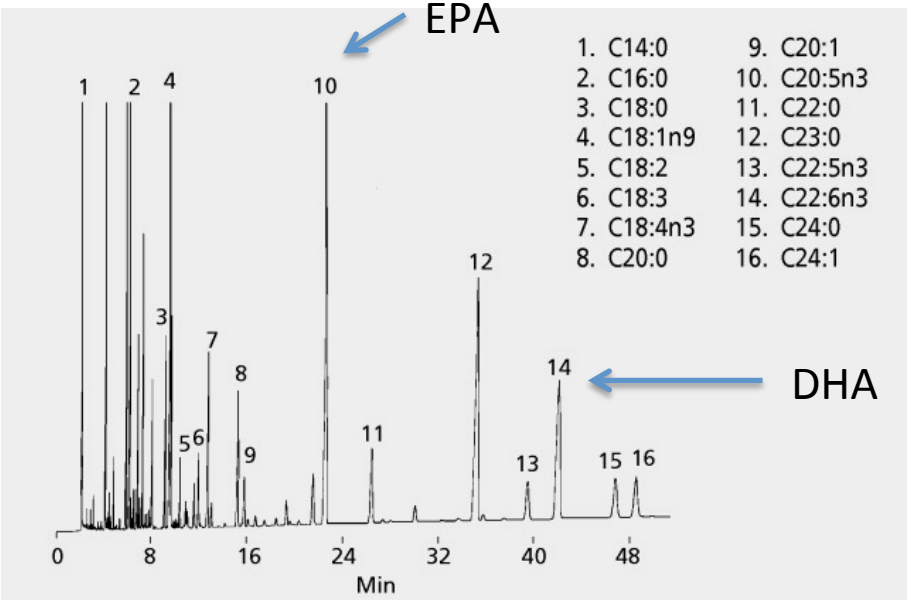
Example: Nutritional analyses

e.g. Ω-3 and Ω-6 PUFAs

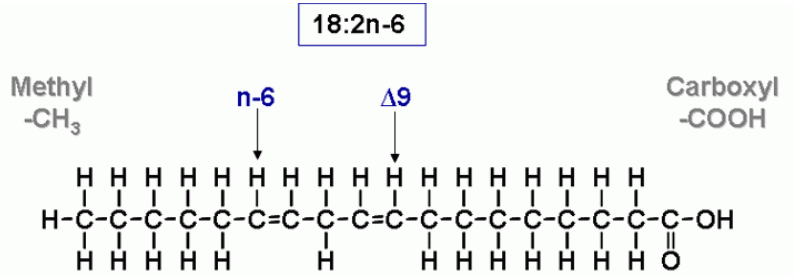
key components for:

- Growth/development
- health
- taste

- elemental analysis
- antioxidants
- vitamins
- pigments
- toxins



Polyunsaturated Fatty Acids (PUFAs)



Current project: Gordon and Betty Moore Foundation

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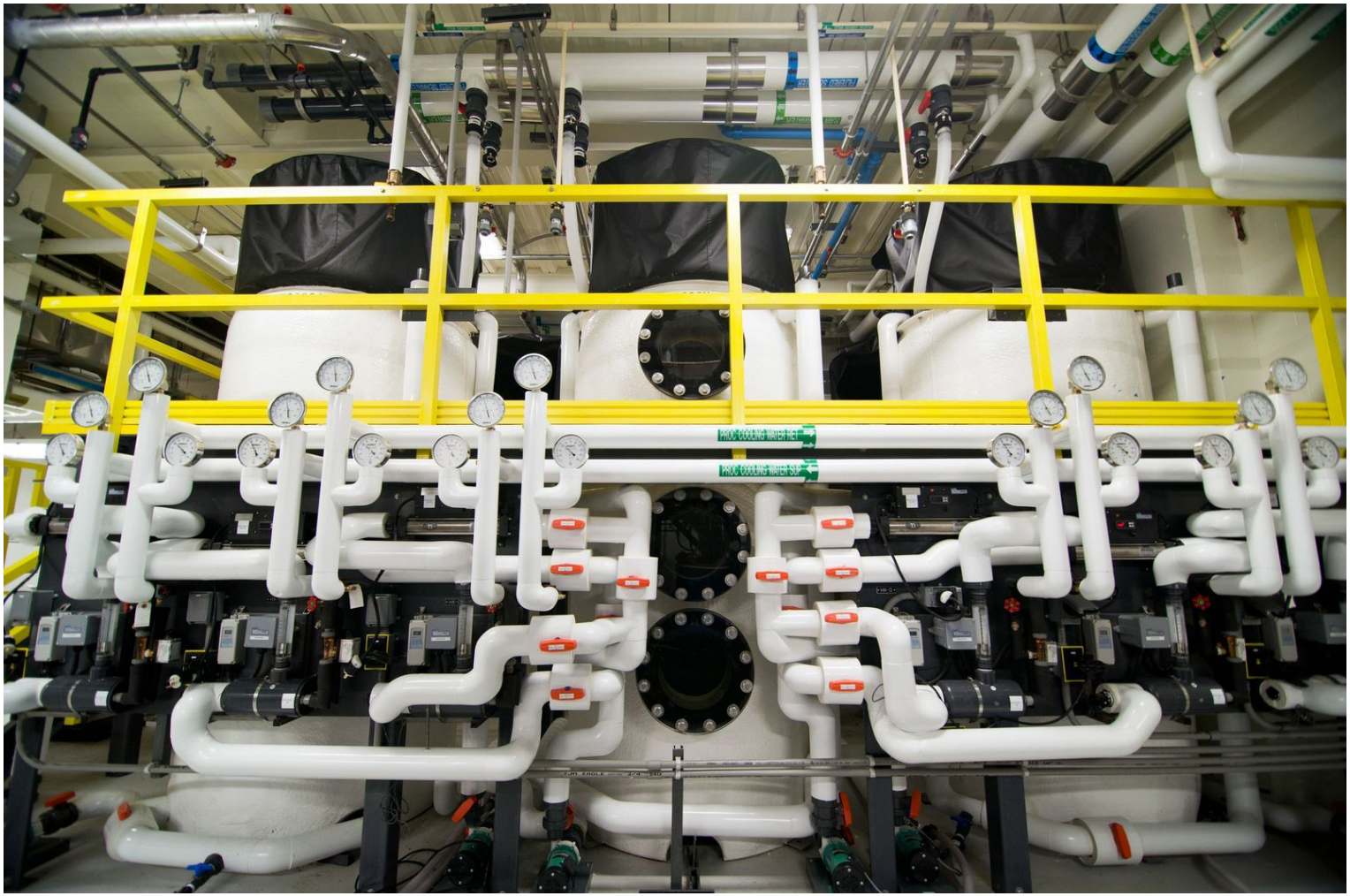

Seawater system Description:

- Located on the Damariscotta River Estuary, Shore facility and floating dock w/ overboard pumps
- Raw and Filtered Seawater Available
  - Pasteurized upon request
- Partially powered by 20 kW solar system
- Able to test Artic to Equatorial Species (can control light and temperature)
- Systems can be set as flow-through or batch mode

Seawater system capabilities:

Type	Capicity (L)	Low Temp C°	High Temp C°	Temp Variation C°	# of Units
Mesocosm	2460	4	37	1.5	6
Water Table	300	7.5	30	1.5	3
Kalwall tubes	94.5	7	25	1	8
Bag Vessels	400	7	25	1	6

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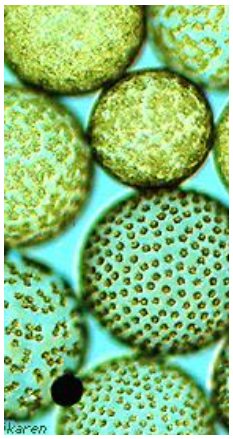
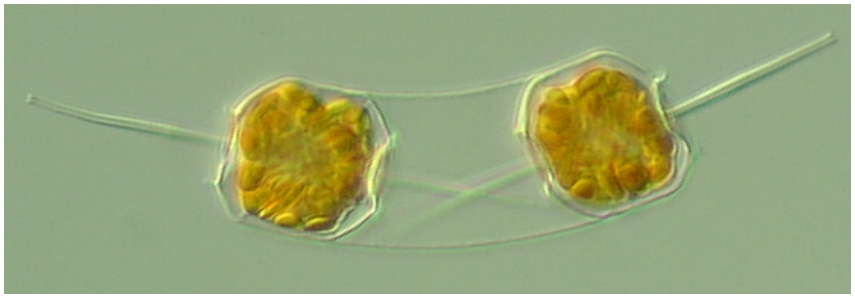
Proposal for a Maine Algal Cluster (MAC) Initiative





VISION

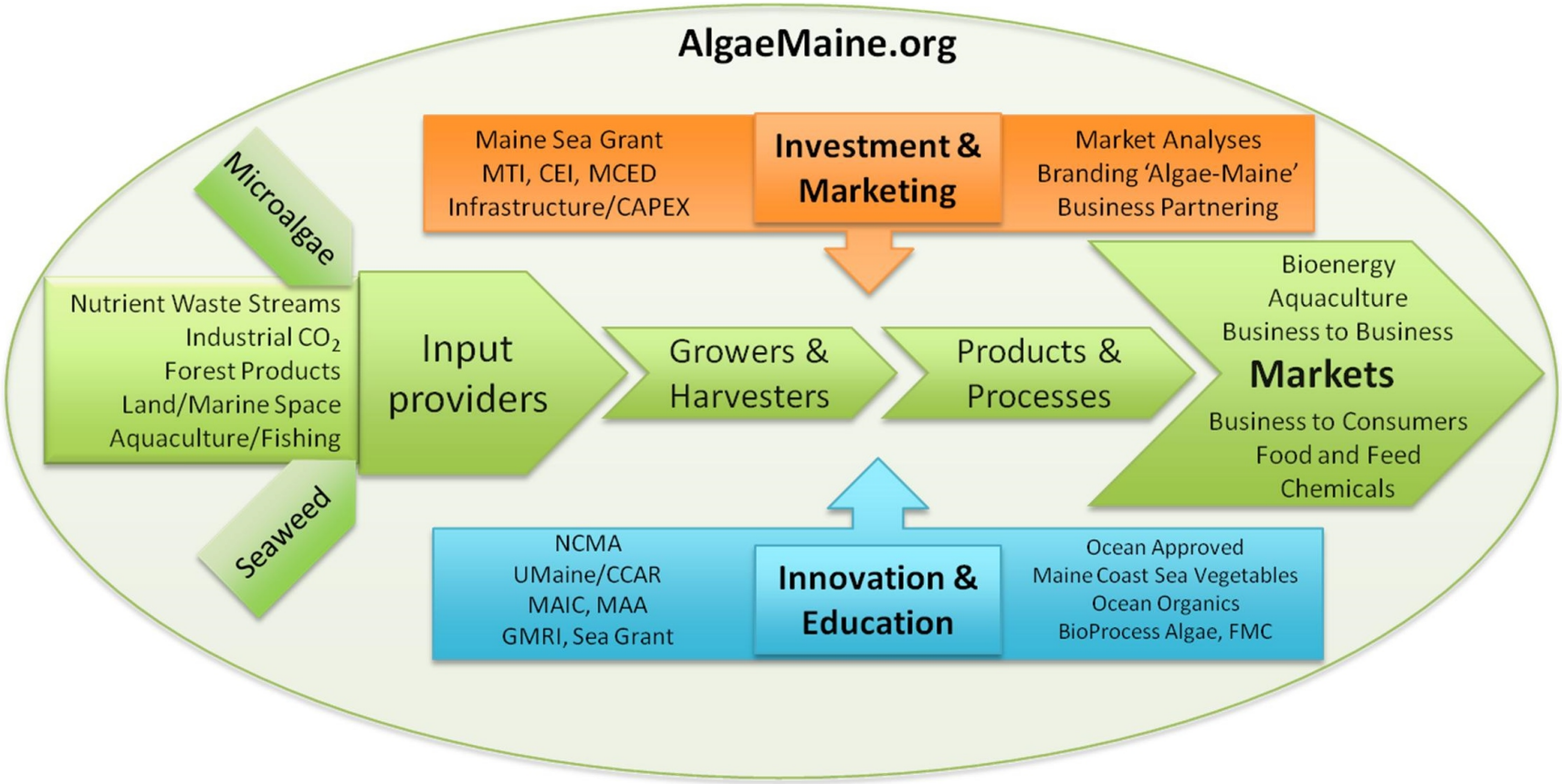
To create an operational environment through academic, private and educational collaboration that encourages innovation and fosters the vibrant growth of a sustainable, ecologically sound, and profitable macroalgae and microalgae industry sector in Maine.

Credit: Maine Algal Cluster Initiative proposal

What is the Maine algal industry missing?

Wordle© input – survey summary conducted by Chris Davis, MAIC

What are the perceived bottlenecks for a more vibrant Maine algae industry?



Credit: Maine Algal Cluster Initiative Steering Committee

What are the objectives of the Maine Algal Cluster Initiative?

1) Solve the discontinuities of a combined macro and micro Algal Cluster
2) Determine, and implement, the Cluster organization, governance, and administration
3) Identify further R & D needs that tighten the efficiencies of producers/businesses, create new products and processes
4) Identify profitable markets
5) Plan for production scaled to market demand
6) Structure investment to fuel expansion
7) Select and promote education and outreach methods in support of commercial production

Thank you for your attention.

https://ncma.bigelow.org

https://www. bigelow.org/bas

https://www.bigelow.org/seawater

Stay tuned to:
http://www.mainealgae.org