Beyond Sushi....

A review of current seaweed markets and products
Sarah Redmond, Maine Sea Grant/UMaine Cooperative Extension
Brown Seaweed Production

FAO, 2010
Cultured seaweeds
**Brown Seaweed Production**

FAO, 2010

**Cultured species**

- **Sea Vegetables**
  - *Laminaria japonica* (kombu)
  - *Sargassum* (Hijiki)
  - *Undaria* (Wakame)
  - *Saccharina latissima* (Atlantic Kombu)
  - *Laminaria digitata* (Atlantic Kombu)
  - *Alaria esculenta* (Atlantic Wakame)

- **Phycocolloids (alginate)**
  - *Macrocystis*
  - *Laminaria japonica*
Red Seaweed Production

**Sea Vegetables**
- Porphyra (nori)
- Gelidium (salads)
- Gracilaria (salads)
- Palmaria (dulse)

**Phycocolloids**
- Eucheuma & Kappaphycus (carrageenan)
- Gelidium & Gracilaria (agar)
Production (t) of the Top Three

Large Scale, Established Seaweed Companies

China

Japan

Republic of Korea

FAO, 2010
per capita seaweed consumption (kg yr\(^{-1}\))

Established Traditional Markets,
High per capita consumption

FAO, 2010
per capita seaweed consumption (kg yr\(^{-1}\))

Established Traditional Markets, High per capita consumption

FABULOUS AND FLAVORFUL GIM

A collection of Korean seaweed recipes developed by faculty chefs from The Culinary Institute of America

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Traditional Uses, Wild Harvest

Small Cottage Industries Worldwide
Many different traditional uses of seaweeds on coasts
Atlantic Ocean’s Turn!
Irish seaweed has been called the "gold dust" of the west coast by MEP Jim Higgins.

The North West MEP says Ireland's seaweed is an untapped natural resource.

He's urging the Ministers for the Environment and Enterprise to look at expanding the seaweed industry to meet international market demands and provide business and jobs growth across the country.

NUI Galway says there are 580 different types of seaweed in the country which can be used in various industries including food, health and beauty.

China, Japan and Korea are world leaders in the supply of seaweed internationally and MEP Higgins believes Ireland has the capacity to compete within this market.
Total World Aquacultured Seaweed Value, 2010 (FAO): $5,430,102,000

Seaweed Markets by Type

**Edibles**
- Sea Vegetables
  - Fresh
  - Salted
  - Frozen
  - Dried
  - Snacks

**Extracts**
- Phycocolloids
- Fertilizer
- Constituents
Fresh Markets

Opportunities exist in local markets
- Consumer
- Restaurants

Trend towards healthy, fresh, local ingredients

Fresh Salad, sushi, ingredients for traditional dishes

Challenges:
- Processing
- Handling
- Food safety
- Regulatory concerns
- Short shelf life, Requires constant low temperature refrigeration
“Fresh” Prepared Foods

Cooked Fresh: Prepared, packaged, ‘ready to eat’

Sushi bars in grocery stores, deli counters, restaurants

Photo credit Jang Kim
Ready-to-eat Lunchboxes

Macro Vegetarian From New York
Maine Bento Box
Fresh Maine Smoked Mussels & Local Sea Vegetables
Jellies, Pastes
- As condiment
- For replacement in cooking, healthy additive
Salted

• Fresh, Salted Seaweed draws water out of fronds
• Shelf Stable
• “Raw” food—Requires no heat
• Rinse & Ready to eat or cook

Challenges:
• Processing
• Marketing
• Development of Products
• Education of Consumers
Rolls
Knots
Blades
Stipes
Squares
Shredded
And more....
Salted mixed salad

Also........
Fermented
Pickled
Frozen

- Fresh, Frozen Seaweed
- Mild flavor, less ‘salty’
- Long Shelf Life in Freezer
- Thaw & Ready to eat or cook
- “Easy Food”—Appeal to American consumers

Challenges:
- Processing
- Marketing
- Development of Products
Value Added Frozen

Seaweed Salads

Ingredient List:
Wakame, Disodium inosinate, citric acid, sorbitolum, vinegar, salt, sesame oil, sugar, a capsicum, sesame, Brilliant Blue, Lemon Yellow, Agar, Potassium sorbate
Salad Types:

- Hijiki Salad (Black Seaweed Salad)
- Sesame seaweed salad
- ‘natural’ versions salads
- Wasabi Wakame
- Ginger Wakame
- Spicy Wakame

Restaurant and Home Packs
Coloring Issues with Value Added
Undaria & Laminaria
Kelp Rolls

Rolled kelp with fish

http://img.21food.com/thumb/userimages/enshiyoux/enshiyoux$917103829.jpg

Frozen Salted Shredded

Frozen Prepared Salad

http://img.diytrade.com/cdimg/90097/22374290/0/1310435498Frozen_salted_kelp_shredded.jpg
• Kelp Beef Roll
• Kelp Fish Roll

Frozen prepared soups
Dried

- Fresh Dried Seaweed
- Traditional method of preservation
- Long Shelf Life
- Reconstitute & Ready to eat or cook
- “Raw” Food, requires no high heat processing
- Versatile—Whole leaf, flakes, powders, mixed, etc.

Challenges:
- Processing
- Marketing
- Development of Products, Education of American consumers
salted kelp roll/knot/strip
Place of Origin: Shandong China
salted kelp knot/roll/strip salted kelp knot/roll/strip Product Type: ...
Shredded Dried

DRY..................................RECONSTITUTED

Absorbs up to 10 times its weigh in water, reconstitutes almost to original size
Convenience Foods

Seaweed Salad

ON THE GO

Japanese Delight

Net Wt. 0.9 oz (26g)

Directions:

1. Add water over the seaweed and let it soak for 5 minutes.*
2. Place the sheet on top of the lid and carefully drain the water.
3. Add the dressing. Mix well and Enjoy!

* After 15 minutes, it will triple in volume with softer texture!!

Natural Vegetarian

Medium Kombu Seaweed and various seaweeds with a flavorful sesame soy dressing. Seaweeds are rich in vitamins, minerals and fibers yet low in calories. Enjoy this healthy salad anytime anywhere.

Serving Suggestions:

Eat the salad cold or warm. Serve as a side dish or as part of a meal. You can also use it as a topping for your favorite foods.
Dried fronds, flakes, powders
Huge interest in a Maine produced Nori Sheet
Bladderwrack Powder
Fucus vesiculosus  Origin- Canada
Contemporary Info  Folklore Info  Photo
Qty: 1  4oz Bladderwrack Powder organic $3.00

Bladderwrack
Fucus vesiculosus  Origin- Canada
Contemporary Info  Folklore Info  Photo
Qty: 1  4oz Bladderwrack organic $3.00

Kelp Powder
Ascophyllum nodosum  Origin- Iceland
Contemporary Info  Photo
Qty: 1  4oz Kelp powder organic $2.00

Wakame Flakes
Alaria esculenta  Origin- Canada
Contemporary Info  Photo
Qty: 1  4oz Wakame Flakes organic $0.00--OUT!

Sea Lettuce
Ulva lactuca  Origin- Canada
Contemporary Info  Photo
Qty: 1  4oz Sea Lettuce Flakes organic $6.75
Dried Seasoning Mixtures
Snacks

“Easy Food”
Healthy
Accessible
High Value
Added Healthy Ingredients
Nori Crisps
Vegan, Gluten Free, All Natural, Low in Fat/Fat Free, Low- Calorie, Mineral-Rich, Convenient, Versatile

Flavors: Classic Olive, Wasabi, Spicy Chipotle, Toasty Onion, Brown Sugar & Sea Salt, Cracked Pepper & Herbs, Sesame
Other Products

For Animals

For Plants

For Skin

For Health
Pet/Livestock Feed Supplements

pet kelp
Kelp-based supplement for Dogs and Cats
Joint & Bone Formula
70 minerals and vitamins from ocean kelp
plus Glucosamine and Chondroitin
8 oz. (227 g) pack
Veterinarian Formulated

Friskies Sensations
Ocean Fish, Tuna, Salmon, and Crab Flavors
Welcome to Paradise
8 oz. (227 g) pack
100% Complete & Balanced Nutrition
Live Market for Aquaria/Fish Food

- Natural Food Source for Herbivorous Fish
- Live algae for aquariums

Approximate Purchase Size: 4 cups for $17.99

www.liveaquaria.com
Fertilizers
Liquid, Dried, Soil Amendments
Skin/Beauty

• Sea Kelp Crème
  - Biofermented
  - La Mer
  - moisturizing, anti-aging, protection from environmental toxins, “feeds” skin with minerals & vitamins, softer, firmer, creaseless skin

• Facials
  • Lotions
  • Baths

• Red Algal natural Ingredients in Sunscreens

$150/oz
Thalassotherapy
“Sea Therapy”
Health

Supplements for:
• Iodine
• Thyroid Support
• Radiation Protection
• Weight Loss
• Bioavailable marine trace minerals
• Calcium, magnesium, sodium, phosphorous, potassium, iron, iodine, zinc, manganese, vitamins A, B’s, C, D, E, K, etc
• Fucoidan Extract
• Fucoxanthin Extract
Other Extracts

- Phycocolloids: Alginate, Agar, Carrageenan
- Alginate—Non digestible, highly absorptive fiber. Detoxifies the body by binding with toxins and radioactive elements and passing them out of the body.
- Mannitol
- Phlorotannins (UV protection, heavy metal chelators, herbivory defense)
- Chlorophyll, phycobiliproteins, carotenoids, Fucoxanthin
- Essential fatty acids, essential amino acids
- Antioxidant, anti-viral, anti-parasitic, antiflammable, antibacterial substances
Maine products from Maine