North Carolina Seafood & You:
A Good Match for Your Health

Health Conscientious Consumers Take Note!

Increasing dietary intake of omega-3 fatty acids is fast becoming the single most important dietary recommendation being made to improve human health and prevent chronic disease. These beneficial nutrients can be found in a variety of foods or purchased in a supplement form. Fortunately for the North Carolina seafood industry omega-3 fatty acids, specifically EPA (eicosapentaenoic acid) and DPA (docosahexaenoic acid), are commonly found in fatty fish. In North Carolina, a person only needs to look as far as the coastal waters or inland rivers and lakes to find natural sources of omega-3s.

One challenge for the seafood industry is to make more North Carolinians aware of the human health benefits derived from eating seafood. Thousands of scientific papers on human disease unequivocally demonstrate the health benefits of consuming omega-3 fatty acids. Randomized clinical trials of patients with pre-existing coronary heart disease have shown significant reduction in cardiovascular events (deaths, non-fatal heart attacks, and non-fatal strokes) when given omega-3 fatty acid supplements. Omega-3 fatty acids reduce the risk for cardiovascular disease in a number of ways; by a reduction in heart beat irregularities called arrhythmia, by a decrease in blood clots which in turn can decrease the risk for heart attack and stroke, by a decrease in blood triglycerides, by slightly lowering blood pressure, by a decrease in the rate of plaque formation in arteries, and by reduction in overall inflammation which is now known to be an important factor causing atherosclerosis.

Regular consumption of seafood or supplemental omega-3 fatty acids has been shown to improve a number of other diseases and disorders including rheumatoid arthritis, inflammatory bowel disorders (Crohn's disease, ulcerative colitis), periodontal disease (gingivitis), mental disorders (autism, depression, postpartum depression, bi-polar disorder, borderline personality disorder, impaired cognitive development in infants and children), and the list goes on.

For the Industry

So what can the North Carolina seafood industry do to increase consumer awareness of the health benefits of eating seafood? One way is to identify the level of omega-3s on product packaging. As knowledge about the health benefits of seafood becomes more widespread, customers will demand information about the omega-3 content of the products they purchase.

Current Events

November 4-7, 2007
52nd Annual Atlantic Fisheries Technology Conference (AFTC)
“Enhancing Seafood Choices; Quality, Technology and Products”
Portland, Maine
www.aftc.ca/

November 5-9, 2007
31st Annual Seafood Science and Technology Society (SST)
Joint Meeting with 60th Annual Meeting of the Gulf and Caribbean Fisheries Institute
Punta Cana, Dominican Republic
http://sst.ifas.ufl.edu

January 17, 2008
Sensory Evaluation Workshop and Quality Index (QI) for Hybrid Striped Bass
2:30-4:00 pm • Call for information and registration
252.222.6334

Seafood Industry Roundtable
location TBA

February 12-14, 2008
Basic Seafood HACCP Workshop
Association of Food and Drug Officials (AFDO) Certified
Morehead City, NC
benefits of consuming omega-3 fatty acids continues to grow, many foods providing far less omega-3 fatty acids than fish are being competitively marketed with a Qualified Health Claim (QHC) statement on the label.

The first step towards including this nutritional claim on packages is to determine the level of omega-3 fatty acids in a seafood product (see chart at right “Omega-3 Fatty Acid Content in North Carolina Seafood”). A second step is to determine if a seafood product meets the minimum EPA and DHA levels (of at least 130 mg DHA and/or EPA per Reference Amount Customarily Consumed (RACC)) in order to support a content claim. According to the FDA the common RACCs for fish products are 55g fish and shellfish (uncooked), 85g cooked and 110g uncooked entrees without sauce (such as plain or fried fish or crab cakes), and 140g for entrees with sauce (e.g., fish with cream sauce or shrimp with lobster sauce). It is the responsibility of a supplier to ensure the eligibility of a fish product for use in a Qualified Health Claim on a label. It makes good business practice to have any health claim reviewed by state or federal agencies prior to making a product available to consumers. If the claim were false or unsubstantiated, the product would be removed from store shelves.

Benefits for Consumers
And what should consumers do? Add more fatty-type fish into their diet. The average American diet is deficient in omega-3 fatty acids, which has been found to contribute to the chronic health conditions mentioned before. The American Heart Association recommends eating a fatty-type fish at least twice a week, or 0.5-1.8 grams of omega-3 per day, whether coming from natural sources or supplements. Most of the beneficial effects of omega-3 fatty acids come from the consumption of EPA and DHA.

Another type of omega-3 is ALA (alpha-linolenic acid), which is found in walnuts, flaxseed oil, canola oil and other plant products. ALA can be effective in helping improve health, however ALA must be converted to EPA and DHA in the liver to be beneficial. This conversion however is inefficient, with little ALA actually being converted. The better benefit to a person’s health comes from the direct consumption of EPA and DHA omega-3s such as that found in seafood products. Consumers are encouraged to check with their primary health care provider about the proper amounts of omega-3s to be consumed. Too much per day (generally over 3 grams) can result in negative effects on the body such as nosebleeds.

A Good Match
Consumers and the seafood industry can benefit from each other when it comes to omega-3s. By the industry providing the proper nutritional information on the product being sold to the consumer, the consumer can then be assured they are purchasing a product with those nutrients found essential to good health.

To receive a more complete listing of NC seafood and omega-3s call 252-222-6334 or email jill_fournier@ncsu.edu and request a copy of “NC Seafood & You: A Good Match for Your Health.”

Omega-3 Fatty Acid Content of Select NC Seafood

<table>
<thead>
<tr>
<th>Top 5 Commercial Species</th>
<th>Total EPA+DHA (g)* per 3.5 oz (100g)</th>
<th>2006 Harvest (lbs)</th>
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<tr>
<td>Blue Crab</td>
<td>0.4</td>
<td>25,309,539</td>
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<tr>
<td>Croaker</td>
<td>0.2</td>
<td>10,383,561</td>
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<tr>
<td>Shrimp</td>
<td>0.3</td>
<td>5,736,305</td>
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<tr>
<td>Flounder</td>
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<td>3,966,148</td>
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<tr>
<td>Bluefish</td>
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<td>2,791,100</td>
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<table>
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<tr>
<th>Top 5 Recreational Species</th>
<th>Total EPA+DHA (g)* per 3.5 oz (100g)</th>
<th>2006 Harvest (lbs)</th>
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<tr>
<td>Tuna, yellowfin</td>
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<tr>
<td>Dolphinfish</td>
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<tr>
<td>Striped Bass</td>
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<tr>
<td>Bluefish</td>
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<td>1,207,241</td>
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<tr>
<td>Mackerel, King</td>
<td>2.2</td>
<td>1,114,458</td>
</tr>
</tbody>
</table>

*refers to the two types of omega-3 fatty acids found in fatty fish

REFERENCES
American Heart Association - http://www.americanheart.org

Consumers seek out local seafood despite global imports

Today’s seafood trade is global. Eighty percent of the seafood eaten in this country is imported. To compete in this new, international arena, seafood processors are diversifying into aquaculture and “value-added” seafood to meet dynamic consumer needs. Value-added refers to food that is processed to create a new form, texture or flavor profile that is uniquely different from its raw ingredients. Additionally, the shelf life of value-added food can be extended for months using specialized packaging and storage conditions. Consumer research repeatedly has shown that the public will pay a premium for food that is healthy, flavorful and easy to prepare. Because seafood is typically low in fat and high in protein, consumers - particularly baby boomers - are purchasing more marine products. The popularity of the health benefits of omega-3 fatty acids are also driving the sales of seafood.

Value-added can also refer to the area where seafood is harvested. Earlier this year the questionable safety of Asian seafood imports – especially from China – received a great deal of media visibility. This only heightened consumer awareness about the advantages of buying local food products. Carteret County, home to the largest number of commercial fishermen in North Carolina since the mid 1960s, began the “CarteretCatch™” program in 2006 to educate consumers about the seasonality and availability of coastal commodities. This year the NC Aquarium launched a “Local Catch” program to accomplish the same goal. Both efforts have been well-received by the public.

In coming issues, we will explore how the NC seafood industry is evolving to satisfy the market demand for local seafood and further-processed, value-added products.
Creating Waves of Change

Remembering Dr. Frank Bancroft Thomas

Recently the Seafood Laboratory suffered a loss, the passing of its founder and supporter, Dr. Frank Bancroft Thomas. There are those of you reading who may remember this expert and friend of the industry and others of you who have never heard his name at all. For those who are unenlightened to the astounding career of Dr. Thomas, please read the following - written by Julie Powers, former Public Information Officer at the Seafood Lab who interviewed Dr. Thomas in 2004 - about a man of small stature and his larger-than-life work that helped spawn an industry.

In the late 1950s and early 1960s, Professor Frank Bancroft Thomas was a busy food processing extension specialist at NCSU in Raleigh. His work stretched over a big territory and demanded a wide range of expertise. One day made that particularly clear.

“I was in Boone (in the NC mountains) working with a kraut manufacturer,” he said. “I got a phone call from Shallotte (across the state along the coast) about an oyster problem.” Thomas went back to NCSU and told his group, “There’s too much geography here,” he said. “It turned out to be a very stable industry.”

With no coastal office to work from, Dr. Thomas held many meetings from the trunk of his car as he traveled the NC coast seeking out seafood processors. This new constituency was a bit suspicious at first, asking him what he was selling. He told them an educational program.

“They looked at you with a funny-looking eye,” Thomas recalled. It wasn’t long before processors saw value in his ideas. By necessity, initial efforts were directed toward the basics of quality and freshness – on-board sanitation, handling and storage. In the day, boats coming in weren’t even using ice to keep the fish fresh. He helped introduce new technology - such things as mechanical shuckers for oysters and scallops. “A lot of these were not particularly new innovations, but were from other areas and had not been used in North Carolina,” he said.

Soon, however, Dr. Thomas was leading efforts to improve and enhance the quality, safety and appeal of seafood as it passed through the hands not only of processors, but fishermen, wholesalers, dealers, and consumers.

Dr. Thomas was always looking for new ways to advance North Carolina’s seafood industry, often while doing the same for other regions. He spent six months on sabbatical from NCSU in 1968 at the Department of Food Science and Technology, University of Hawaii. A living definition of the word, “extension,” Dr. Thomas kept in touch with his North Carolina constituents on pertinent issues even when he was on the other side of the world.

While in Hawaii, he continued his semi-monthly newspaper column, “Cap’n & Doc” distributed to weekly newspapers in coastal North Carolina. Written as if they were letters from Dr. Thomas to a fishing boat captain, the articles delivered scientific information in an engaging, conversational style.

Largely through his efforts, NCSU established the “Coastal Seafood Laboratory” in Morehead City, with funding from another relatively new organization, Sea Grant. Thomas put scientific expertise and resources of North Carolina State University within reach of even the tiniest fishing village of coastal North Carolina. His own innovative thinking and energizing enthusiasm were essential in keeping one of North Carolina’s oldest and most important industries competitive and productive in changing times.

Now named the “NCSU Seafood Laboratory,” the new operation under Dr. Thomas’s direction successfully pursued its missions: to work closely with campus researchers on applied seafood research, and to provide advisory services to people involved with the state’s fisheries. In addition to bacteriology and analytical capabilities, this new lab had a seafood pilot plant equipped with the first fish deboner in seafood research in the United States.

This fish deboner, brought from Japan, was another of his successes. Dr. Thomas had procured the deboner...
for the Lab after seeing one in action during one of his many visits to Japan. One of the laboratory’s goals was to find uses for the many “trash” fish, too small to fillet, that were netted with commercial catches. The machine could strip the flesh from fish too small to process otherwise. “It was to make saleable a lot of the underutilized fish,” he said. “When they went through the deboner, you retrieved this valuable fish product.” The machine was central to successful efforts to utilize these species for minced fish products, thereby broadening the income potential for commercial fishermen and providing a new source of low-cost, high-quality protein.

Under Thomas’ direction, the lab also was charged with seafood education and training through workshops and county extension programs. In 1973, representatives from each Carteret County home extension club began to gather regularly at the seafood laboratory to work with researchers, test recipes and brainstorm on new presentations.

The tradition continues today. In 2003, their experience was compiled into Mariner’s Menu: 30 Years of Fresh Seafood Ideas. The popular volume is a combination of a seafood cookbook, a cook’s resource manual and a rich portrayal of North Carolina’s coastal traditions.

Dr. Thomas was not only a friend to the industry, but made his mark in many ways during his 30-plus years of service to North Carolina. He was prolific in his scientific writings, with nearly 100 publications bearing his name. He served on the governor’s Farm Economy and Aquaculture Task Force from 1987 until 1992. In 1982 Dr. Thomas was chosen for the Earl P. McFee Award, an international honor for outstanding work in fisheries technology. In 1984, NCSU CALS presented him with the Outstanding Extension Service Award.

In recognition of his productive career and his participation in many community and professional organizations, Gov. James Martin appointed Dr. Thomas to the Order of the Long Leaf Pine, the highest civilian honor in North Carolina, upon his retirement in 1988. The state Division of Industrial Development also expressed its gratitude for his service with a certificate of appreciation, and the NC Fisheries Association recognized him with a plaque of appreciation.

Years after his official retirement, Dr. Thomas’s contributions to NCSU and the state persisted. He chaired the NC Sea Grant Outreach Advisory Board for several years and was active in his support of the Seafood Lab.

The NCSU Seafood Laboratory he helped establish continues to be a strong force in constantly improving the quality and the marketability of North Carolina seafood. Thomas was instrumental in the creation of NCSU’s Center for Marine Sciences and Technology (CMAST). The marine laboratory in Morehead City, opened in 2000, now houses the Seafood Laboratory and NC Sea Grant’s Carteret County offices.

Coming generations of young scientists also will benefit from Dr. Thomas and his distinguished work. The NCSU Food Science Department in 2000 established an endowment in honor of Dr. Thomas and his wife Rachel, who also spent her career in the NC Cooperative Extension Service. the Frank and Rachel Thomas Food Science and Family and Consumer Sciences Scholarship is a tribute to the more than 75 years of combined public service the Thomas’s had given to NCSU. A second endowment, the Rachel Kirby Thomas and Dr. Frank Bancroft Thomas 4-H Foods & Nutrition Endowment, was also created in 2005.

These undergraduate student scholarships and independent study stipends honor their dedication as extension specialists, counselors and friends and their devotion to helping students, citizens and industry with personal, professional and academic development.

On October 28, 2007, the Thomas’s received yet another NCSU honor, The Joe and Ginger Taylor Outstanding Philanthropist Award, recognizing them for their continued support for undergraduates through the two endowments they established.

Dr. Thomas’s imprint on the seafood industry as a whole was indelible, albeit often invisible, as the procedures and processes he introduced have become industry standards. He said in his interview, “There was nothing. I was number one. When I started working with the seafood industry, even the state of NC did not know who was involved in the seafood industry or even if they had one really because there was no agency or central point of data collection and gathering with the exception of the Division of Marine Fisheries.”

Dr. Thomas passed away on July 31, 2007 at the age of 85. He is survived not only by his wife Rachel, but by the thousands of people whose lives he impacted by stepping up to be the first to support and mold North Carolina’s seafood industry. Many thanks from all of us, Dr. Thomas, for making those waves of change.
When East Meets North West

Representing areas of the United States that couldn’t be more geographically separated, staff from two university seafood research programs connect, compare notes and find common ground about the seafood and fishing industries they are committed to helping.

In late September, the NCSU Seafood Laboratory hosted Dr. Chuck Crapo (pronounced kray-po), a Professor and Seafood Extension Specialist with Alaska Sea Grant and the Fishery Industrial Technology Center of the University of Alaska in Kodiak. Staff of the Seafood Lab met with Dr. Crapo and provided him with tours to several area seafood producers and fishing areas along the NC coast.

Dr. Crapo also presented a seminar to CMAST staff and guests from Carteret County marine labs on Alaska Fisheries. Below are a few of the amazing Alaskan statistics he shared:

- 32,000+ miles of coastline (compared to NC’s 4,000+)
- Seafood/fishing is Alaska’s largest employer
- Dozens of communities are dependent on fisheries and seafood processing
- Alaska is responsible for 60% of the US fisheries (2.65 million MT/5.6 billion pounds)
- Maintains the largest single fishery in the world, Alaska Pollock in the Bering Sea (1.54 million MT/ 3.4 billion pounds)
- Boasta the healthiest salmon fishery in the Pacific (510,000 MT/1.3 billion pounds)
- Alaska products include pollock/cod, salmon, halibut, sablefish, rockfish, crab, and smaller fisheries of sea urchins, sea cucumbers, scallops and octopus

Although North Carolina’s fishing industry catch does not compare in numbers to the Alaskan industry, there are similarities shared between the two states. Dr. Crapo and his staff conduct research to assist the processors in his state, as does Dr. David Green and the staff of the Seafood Laboratory. Some of the concerns of Alaskan processors are not unlike those of North Carolina processors: fishermen want to add value and direct market; buyers want consistent quality; and industry and markets are becoming more technical.

The Alaska Fisheries Industrial Technology Center (FITC) started in 1981 to assist the Alaska seafood industry. The NCSU Seafood Laboratory started in 1970 with the late Dr. Frank Thomas as the first Extension Seafood Specialist. Dr. Crapo says the focus recently has been on applied research in food science and harvesting technology, as is the work of the Seafood Lab. Much work done at the Seafood Lab is initiated by the industry, as in Alaska. Below are some of the areas and projects with which the FITC is currently involved:

Seafood Quality – slurry ice, exploring salmon uses, evaluating quality and costs, omega-3 fatty acids
Seafood Safety – Pellicle study and survival of Listeria, micro-environment evaluation
Process Improvement – machine vision systems, grading salmon, grading pearls, electronic nose for spoilage detection
Product Development – salmon jerky – developing easier methods, fish oil and microencapsulation, edible protein coatings, oyster industry development

Where will my fish come from?

That is the topic given to Kayla Norman, senior at West Carteret High School in Morehead City, for her senior mentoring project. Ms. Norman is volunteering at the NCSU Seafood Laboratory to learn more about the future of North Carolina’s seafood industry. Coming from a commercial fishing family in Salter Path, Ms. Norman has shown great enthusiasm to learn about the issues and the needs in the industry.

Health benefits of seafood and world demand for fish far exceeds current wild harvest numbers. So, where will our fish come from in the future? Our hands-on exposure to wild and aquaculture production and quality evaluation techniques are designed to make students think, become engaged and inspire them to achieve goals beyond their current expectations. We anticipate a final project report to be written by Kayla and hope that her brief time with us at was enjoyable and enlightening and motivate her to become an “achiever.”
Seafood Tips*

Fish and shellfish are highly perishable and must be properly handled from catch to cook. Mishandling results in poor quality and loss of flavor and nutrients. Be sure that the seafood you buy is fresh. A fresh fish has:

- eyes that are bright, clear, full and protruding (as a fish deteriorates, the eyes become cloudy, discolored and sunken)
- gills are bright red or pink and free from slime
- flesh that is firm and elastic and springs back when pressed gently with the finger and shouldn’t separate from the bone
- skin that is shiny and not faded (characteristic colors and markings fade as fresh fish gets older)
- scales that adhere tightly
- an intestinal cavity (if gutted) that is pink with a bright red blood streak along the backbone
- an odor that is ocean-fresh and mild (fish fresh from the water do not have a “fishy” smell)

* from “Mariner’s Menu – 30 Years of Fresh Seafood Ideas” by Joyce Taylor

Herb-Broiled Mackerel Fillets

Try this moist and herb-flavored entrée utilizing a North Carolina fish high in omega-3s. Spanish mackerel is available in summer through mid to late fall. If not available, substitute King mackerel steaks or other fresh fish of your liking.

4 small Spanish mackerel fillets
1/4 cup margarine or butter, softened
1 tablespoon chopped fresh parsley
1 tablespoon thinly sliced green onion, including tops
1/2 teaspoon chopped fresh tarragon (or 1/4 dried)
1/2 teaspoon chopped fresh thyme (or 1/4 dried)
1 teaspoon salt
1/8 teaspoon freshly ground black pepper
1/8 teaspoon paprika

Place fillets in a greased, broiler-safe pan, without rack, skin side down. In small bowl, blend together margarine, parsley, green onion, tarragon, thyme, salt, pepper and paprika. Spread over fillets. Broil about 4 inches from heat until fish flakes with a fork, about 8 to 10 minutes. Baste once or twice with pan juices during cooking. Serves 4.

Basic Seafood HACCP Workshop February 12-14, 2008

The NCSU Seafood Laboratory is offering the Basic Seafood HACCP Workshop, essential to members of the seafood industry – retailers, fishermen, distributors, processors and others needing to meet FDA-required standards for the handling of fresh seafood and seafood products.

HACCP stands for Hazard Analysis and Critical Control Point, a science-based system for assuring that many types of food remain safe from chemical, physical and biological hazards at critical points along the journey from production to consumption. Basic Seafood HACCP covers the most current FDA-required information needed by seafood processors and others to comply with government standards and be able to complete a written HACCP plan for their business.

Registrations are now being accepted. Please call the Laboratory at 252.222.6334 or email jill_fournier@ncsu.edu to request a registration form. Cost is $150 for the two-and-a-half-day workshop. Deadline for registration is February 8, 2008 and space is limited to 30 people. Teacher or Continuing Education Credits (CEUs) are available.

Seafood Science Meetings Top Agenda in November

NCSU Seafood Lab staff will present research results at two regional fish technology conferences in November. Dr. David Green, Professor and Extension Seafood Specialist at the Laboratory, is serving as co-chair of the scientific program committee for the 52nd Atlantic Fisheries Technology Conference in Portland, Maine. Barry Nash, Seafood Technology and Marketing Specialist, is chair of a special industry forum on seafood product commercialization. Greg Bolton and David Green will present a scientific paper entitled “Effects of high hydrostatic pressures on microbiological, chemical and sensory quality of yellowfin tuna and mahi-mahi” based on a recent USDA grant.

The Seafood Lab is also participating in the 31st Seafood Science and Technology Society of the Americas conference in Punta Cana, Dominican Republic. A paper by undergraduate student Matt Stallsworth will be presented entitled “Isolation and identification of histamine-producing bacteria in yellowfin tuna and mahi-mahi from North Carolina and Hawaii” based on his CMAST summer internship.

Seafood Laboratory Plans Joint SST / AFTC Meeting for 2008

The NCSU Seafood Laboratory and North Carolina Sea Grant are hosting the 8th Joint Meeting of the Seafood Science and Technology Society (SST) and Atlantic Fisheries Technology Conference (AFTC) in Wrightsville Beach, NC on October 19-21, 2008. Additionally, the first NC Marine Biotechnology Symposium will be held in conjunction with the conference on October 22. More details on the 2008 conference and symposium will be provided in future newsletters.