

Bulletin *of the*

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Defining Coastal Resilience and Its Ability to Define Connecticut

Since storms Irene (2011) and Sandy (2012), Connecticut residents have become more aware of the impact that storms like these can have on everyday life: extended power outages, lost economic viability and millions of dollars in property damage. The state was a mess.

These storms raised public awareness, but researchers have been studying coastal changes and their potential implications on residents for years. Coastal resilience is a hot topic and there is a lot to it.

Coastal resilience is typically defined as the ability of shoreline communities (including their ecosystems and infrastructure) to respond to natural coastal changes and weather-related disasters.

Reports on the subject are plentiful and have been prepared by organizations ranging from The Nature Conservancy to the National Oceanic and Atmospheric Administration (NOAA) and the US Geological Survey (USGS) to the United Nations. No matter the source, experts seem to agree that threats to the world's coasts include blizzards, flooding, hurricanes, tornadoes, lightning, drought, earthquakes, tsunamis and landslides. One of the biggest threats in Connecticut is flooding.

While inland floodplains exist in the state, shoreline communities are at greater risk. According to Brian Thompson, director of the Connecticut Department of Energy and Environmental Protection (DEEP) Office of Long Island Sound Programs, a tremendous amount of development, population and economy is based on the state's shoreline communities and the draw of tourism. "If the shoreline is at risk, then our entire state's economy is at risk and vulnerable," he said.

Rob Thieler, a research geologist at the USGS, agrees and takes the economic



These images show the erosion of the coast near Griswold Point in Old Lyme. The top image shows a map put together by the USGS in 1880 and the aerial photograph below it shows the same section of coast in 2012. The rock circled in each image (see arrows) has not moved, but the coast has eroded a significant amount in 132 years. Rising sea levels are one of the factors contributing to coastal erosion. [Graphic: UConn Cooperative Extension]

implications one step further. "The immediate impact is along the shoreline," he said, "but when the coastal environment is damaged, it can cause the re-direction of large amounts of state and federal money that could have been used in other parts of the state or country. That's why, directly or indirectly, coastal flooding affects everyone."

So what are some of the things being done to prepare and mitigate the threat?

A number of entities in the state are conducting research and raising public awareness of the issue. Earlier this year, the state legislature created the Connecticut Institute for Resilience and Climate Adaptation (CIRCA). The organization is a jointly funded and managed partnership between the

(See Coastal Resilience, page 2)

From the National Academies

The following is excerpted from press releases and other news reports from the National Academies (www.national-academies.org).

◆ Ebola: Research Priorities to Guide Public Health Practices

The recent epidemic of Ebola Virus Disease (EVD) has affected multiple countries in West Africa along with Spain and the United States, becoming the worst EVD outbreak since the disease was discovered in 1976. Until 2014, previous outbreaks were confined to smaller geographic areas and rarely affected more than a few hundred people. Confirmed and suspected cases of EVD have now occurred in the United States through human-to-human transmission, requiring the US medical and public health systems to prepare for and respond to domestic cases of the disease. The heightened awareness and attention to EVD have also led to questions on specific characteristics of the virus, how the virus behaves, and personal protective equipment and personal protective behaviors that can be used to prevent its spread and reduce exposure.

On November 3, 2014, the Institute of Medicine, in collaboration with the National Research Council, convened a workshop with key stakeholders and experts to discuss the research priorities that could guide medical and public health practice. Discussions included the degree of transmission and biopersistence of the virus under a range of conditions and on a variety of materials, as well as issues of handling potentially infected materials, decontamination, and the training and personal protective equipment usage of traditional and nontraditional workers involved in the

(See NAS, page 7)

*In Bristol, Imagine Nation ignites children's imaginations.
See page 7.*

UConn and DEEP designed to bring the University's research resources and international reach to bear on the issue. "UConn faculty have connections with national and international researchers," said CIRCA Executive Director James O'Donnell. "They bring a global perspective to the issues being faced in our state."

According to O'Donnell, who is a member of the Connecticut Academy of Science & Engineering, CIRCA's first order of business is to understand the needs of towns. "Then we'll work with them to prioritize their needs (technical, engineering, legal, economic, etc.) and perform technical analysis," he said. "There aren't necessarily easy answers, but it's important to find ways to mitigate and eliminate the potential impacts."

He noted that the organization also plans to provide seed money to towns that undertake research that has broad applications. "In many cases, towns face similar issues," O'Donnell said. "When one town develops a solution, it could work for others as well."

Climate Adaptation Academy seminars are being offered by UConn's Center for Land Use Education and Research (CLEAR) and Connecticut Sea Grant. The seminars are based on CLEAR's successful Land Use Academy workshops. Established as a UConn Center in 2002, CLEAR is built on a 25-year track record of research, outreach and training programs that address water management, land use planning, climate resiliency and geospatial (mapping) technology. "Coordinating with CIRCA is a natural extension of our programming and outreach activities to local municipalities," said Juliana Barrett, a

sea grant educator at CLEAR. "The implications of sea level rise and erosion are critical to our state and we have a successful outreach structure that brings together various entities to discuss and develop positive networking opportunities."

Bruce Hyde, CLEAR land use educator, agreed. "Climate Adaptation Academy programs focus on identifying issues and bringing together resources to brainstorm solutions," he said. "For example, after Hurricane Sandy, Connecticut Sea Grant and CLEAR hosted an event that brought together experts from the state and federal government to help address the issue of dune blowouts," he said. "And we have established opportunities to work beyond municipal structures and address things that have broad appeal."

CLEAR and Connecticut Sea Grant are in the planning stages of offering seminars about the issues surrounding elevation of homes, impacts of climate change on real estate, living shorelines, legal issues, flooding, and general climate adaptation outreach to communities. "There are so many variables and perspectives to consider," Hyde said. "Audiences include not only municipal leaders like zoning and building officials, but also builders, engineers, surveyors, lawyers, property owners and insurance agents as well as organizations like Shore Up Connecticut, a low-interest loan program offered in Connecticut designed to help homeowners with storm- and disaster-preparedness. We're looking forward to working with the people at CIRCA to help them achieve their goals."

DEEP is working with the USGS to map the Connecticut coast and provide towns with information to plan for the future. Established in 1879, the USGS provides impartial science information on the health of the country's ecosystems and environment, natural hazards and resources. The USGS's Thielier has been working with Connecticut Sea Grant's Barrett and Hyde; Joel Stocker, UConn assistant extension educator and geospatial expert; and Kevin O'Brien, environmental analyst at DEEP's Office of Long Island Sound Programs, to create a database that puts important shoreline change data, spanning more than 100 years, into a user-friendly format. This effort was funded by a grant from NOAA and National Sea Grant to Connecticut Sea Grant.

"The database provides numerical information about net shoreline movement and speed of change," O'Brien said. "We have the data to quantify things that we suspected anecdotally were true. An interesting next step would be to explore what is driving the changes."

Stocker agrees. "What we don't yet understand is why these changes occurred," he said, noting that variables such as the presence of glacial deposits, bedrock and seawalls can impact coastal change. "The shoreline is a dynamic system, so rather than fixate on what it is today or what it was yesterday, we need to realize that it's going to change and will for a long time to come. In addition, when humans intervene and stop the movement of the shoreline by erecting things like seawalls, there are additional consequences to the system."

According to Thielier, such databases provide towns with instant access to information that would take years to compile. "It provides a great wealth of information in an accessible way that can help municipalities make data-driven decisions about their approach to coastal resilience," he said.

One of the biggest challenges is that sea level rise doesn't need to be huge to have dramatic effects.

For a community like Old Saybrook, which is bordered by Long Island Sound to the south and the Connecticut River to the east, the prospects are daunting. An all-volunteer Sea Level Rise/Climate Adaptation Committee appointed by the town's Board of Selectmen is using an online tool from the US Army Corps of Engineers to forecast sea level rise and study its impacts on the town's environment,

(See Coastal Resilience, page 8)

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IN BRIEF

Science and Engineering Notes from Around Connecticut



Biomedical Research

3D FACIAL IMPLANT GAINS FDA APPROVAL. South Windsor's **Oxford Performance Materials (OPM)** has received approval from the US Food and Drug Administration to market its 3D-printed facial implant. The polymer implant can be individually created for each transplant patient using MRI or CT scans that digitize the skin's topography. That file can then be sent to a 3D printer to manufacture a new polymer face, which surgeons would implant into the patient. OPM received similar approval early last year for a cranial implant. Biomet Inc., currently distributing OPM's cranial implants, will be the exclusive global distributor for the new implant.

JACKSON LAB OFFICIALLY OPENS. On October 7, Governor **Dannel Malloy** joined CASE member **Edison Liu**, The Jackson Laboratory (JAX) President and CEO, Lt. Governor **Nancy Wyman**, UConn President **Susan Herbst** and national scientific leaders to celebrate the official opening of JAX's new nonprofit research institute for genomic medicine. **The Jackson Laboratory for Genomic Medicine** was built in response to the "Bioscience Connecticut" initiative. In collaboration with state government, universities, hospitals and insurance companies, JAX is recruiting scientists and researchers, generating public and private investment and conducting scientific research in the field of personalized medicine.

UCONN'S LAURENCIN WINS \$4M PIONEER AWARD. CASE member **Cato T. Laurencin**, a UConn Health Center surgeon-scientist known for his research in the field of musculoskeletal injuries, has won a \$4 million National Institutes of Health (NIH) Pioneer Award for his work in regenerative engineering. The grant, part of NIH's program for high-risk research with potentially high rewards, supports "individual scientists of exceptional creativity" who propose "transforming approaches to major challenges in biomedical and behavioral research." Last year, a bioengineered matrix that Laurencin created to regenerate ligament tissue inside the knee began clinical trials in Europe.

MOUNT SINAI OPENS GENETIC TESTING LAB IN BRANFORD. In October, officials of the Icahn School of Medicine at Mount Sinai in New York announced the opening of the **Mount Sinai Genetic Testing Lab** in Branford. "The Greater New Haven area has an incredible talent pool for biomedical research," said Icahn spokesman **Glenn Farrell**, explaining why Mount Sinai sought to open the new facility in Connecticut. "We also have ongoing collaborations with **Yale University, Jackson Laboratories** and **UConn**." The state is providing a \$9.5 million loan to support the new facility, forgiving up to \$7 million of that loan if the facility reaches its jobs goal.

9TH ROUND OF BIOMED RESEARCH FUNDING ANNOUNCED. On October 24, State Senator **Joseph J. Crisco, Jr.** and the **Connecticut Department of Public Health** announced that eight research projects totaling \$2.3 million have been selected to receive state funding from the **Connecticut Biomedical Research Trust Fund**. Recipients of the funding include researchers at the **UConn Health Center, Yale University, Wesleyan University,** and **Western Connecticut Health Network**. In 2000, the **Connecticut General Assembly** established the Biomedical Research Trust Fund to fund biomedical research into tobacco-related illnesses such as heart disease and cancer; the scope of the research subsequently was

expanded to include Alzheimer's disease, stroke and diabetes. This is the ninth round of proposals funded through the Research Trust Fund, with state funding totaling more than \$16.7 million to date.



Business & Industry

BERLIN FIRM GETS STATE LOAN TO BOOST PRODUCTION, JOBS. In August, Governor **Dannel Malloy** announced a 10-year, \$711,533 loan to **TOMZ Corp.**, a Berlin machining company manufacturing parts for medical devices and health care, laboratory diagnostic and aerospace companies. The state loan, provided through the **Connecticut Department of Economic and Community Development's Manufacturing Assistance Act**, will help TOMZ expand and build a training center. As part of the \$2.3 million project, TOMZ will increase its production and add 30 jobs. If the goals are met, TOMZ will be eligible for \$350,000 in loan forgiveness.

SIKORSKY UNVEILS NEW S-97 RAIDER HELICOPTER. **United Technologies** subsidiary **Sikorsky Aircraft** this fall unveiled a prototype of its S-97 Raider helicopter to replace the US Army's OH-58D Kiowa Warrior fleet. The Raider can carry two pilots, six troops and external weapons with a cruising speed up to 253 mph—twice the speed of conventional helicopters. Sikorsky funded development of the prototype without any federal funding. Sikorsky covered 75% of the costs, with industry partners contributing the remainder. **UTC Aerospace Systems** supplied parts for the Raider's flight control system as well as actuation, air management and sensing systems.

UK'S BAE SYSTEMS ACQUIRES SILVERSKY. This fall, Milford cloud security provider **SilverSky** announced British defense and security giant BAE Systems will pay \$232.5 million to acquire the company, which received \$4 million in funding from **Connecticut Innovations** in 2000. BAE acquired SilverSky for its cybersecurity business; SilverSky claims to have more than 5,500 customers across financial, healthcare, retail and other industries.

FUELCELL ENERGY SELLS BRIDGEPORT SITE, PLANS EXPANSION. Danbury-based **FuelCell Energy** (FuelCell) announced this fall that it will sell its 1.4 megawatt fuel cell installation at the **University of Bridgeport** to NRG Energy of New Jersey. NRG will assume ownership once the facility is completed in early 2015, with FuelCell operating and maintaining the project and NRG selling the electricity. In August, NRG invested \$75 million in FuelCell, buying up \$35 million worth of stock and providing a \$40 million revolving loan fund for FuelCell's project development. In addition, FuelCell Energy announced plans in October to expand its Torrington manufacturing facility in two stages with the help of a financial package through the **Connecticut Department of Economic and Community Development**.



Communication

AT&T SETTLEMENT TO FUND RESTITUTION PROGRAM. AT&T announced in early October that it will pay \$268,252 to the state as part of a \$105 million nationwide settlement to resolve allegations that AT&T placed charges on consumers' cell phone bills without their knowledge or consent. The charges amounted to approximately \$10 a month for text message subscription services. AT&T will pay \$80 million to the Federal Trade Commission to fund a

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IN BRIEF

Science and Engineering Notes from Around Connecticut

consumer restitution program. States will receive \$20 million, with notices sent to all customers who incurred the charges from 2009 onward, informing them about the refund process.

UCONN, COMCAST SPONSOR CYBERSECURITY CONFERENCE.

On October 20-21, **UConn** and the **Comcast Center of Excellence for Security Innovation (CSI)** sponsored a first-ever Cybersecurity, Education & Diversity Challenge (CyberSEED) Conference, where security professionals and business leaders gathered to discuss cybersecurity trends and strategies. As part of the conference, over 40 universities and high schools competed in three cybersecurity challenges for \$100,000 in prizes.



Education & Cognition

WESLEYAN RESEARCHERS, SCIENCE CENTER TO COLLABORATE.

Researchers from **Wesleyan's Cognitive Development Lab** received \$3,000 from the National Living Laboratory® Initiative to support collaboration between Wesleyan and the **Connecticut Science Center**. The stipend, announced in September, supports museum staff, student coordination and museum visit time for the students, travel costs, signage and materials for the lab's child development demonstrations. In the Living Laboratory's educational model, scientists in disciplines including developmental psychology, cognitive science, educational psychology, cognitive neuroscience, social psychology and related fields, recruit participants and conduct studies within local museum exhibits.

FAIRFIELD STUDENT WINS DAVIDSON FELLOWS AWARD.

Sofia Bramante, a 2014 graduate of **Fairfield Warde High School** in Fairfield, received a 2014 Davidson Fellows Award, earning a \$10,000 scholarship for her engineering project entitled, "Fabrication of a Flexible, Tunable Color Changing Skin using Magnetically Responsive Fe_3O_4 Photonic Crystal Structures." The grant is awarded by the Davidson Fellows Scholarship Foundation, a Nevada-based nonprofit, to recognize "profoundly gifted youth." The only recipient from New England, Bramante was honored for her engineering research on a color-changing coating that could be used for stealth purposes on military vehicles or to provide color-changing capability for consumer products.

MARITIME AQUARIUM PLANS 'GIRLS IN SCIENCE.' The **Maritime Aquarium** in Norwalk announced this fall that it has received \$10,000 funding from Dominion Resources to create a "Girls in Science" after-school program for more than 100 girls in grades 4-8 in three Bridgeport schools. The schools are **Beardsley**, **John Winthrop** and **Park City Magnet** schools. Maritime Aquarium educators will meet the girls after school once a week for 12 weeks, and will lead them through topics such as fish and squid anatomy, marine habitats, water pollution and animal adaptations.

TUNXIS TO PARTNER WITH CHESHIRE FIRM. On October 22, **Tunxis Community College** announced a partnership with **EDAC Technologies** of Cheshire to offer an Advanced Manufacturing Machine Technology Certificate, preparing students to be machine operators in response to Connecticut manufacturers' demand for a skilled workforce. The program is accredited by the National Institute of Metalworking Skills. Instruction will focus on Computer Numeric Control machining, tool making, programming inspection, and other areas at an accelerated pace, allowing students to complete the program in six months.

GRANT FUNDS PROGRAM TO TRAIN STEM TEACHERS IN URBAN SCHOOLS. The National Science Foundation awarded

the **University of Bridgeport (UB)** \$200,000 to recruit and train physical science teachers in high-need urban schools throughout Southwestern Connecticut with the aim of increasing student performance and interest in the physical sciences. The project launched in January. It also will expand UB's outreach in area schools.



Energy

TOWN, UTILITY PARTNER ON NATURAL GAS DISTRIBUTION.

Working with **Yankee Gas**, Wilton became the first Connecticut town to partner with a gas utility under the state's recently enacted Comprehensive Energy Strategy, an initiative that calls for expanding the state's natural gas distribution system. The Wilton project involved construction of a 3.5-mile natural gas expansion pipeline, which was completed this fall. The state extended loan payoffs for capital expenses to 25 years from 15 years, considered by Wilton First Selectman **William F. Brennan** to be a "key element in the success of the program." Brennan noted that "After new boiler installations are finished, we expect to save an estimated \$450,000 to \$500,000 per year in future energy costs."

BRIDGEPORT DISTRICT ENERGY SYSTEM PROPOSED.

Easton-based **NuPower Thermal** announced plans this fall to install a district energy system in Bridgeport to heat and cool public buildings. The work will involve installing pipes for a low-temperature water loop, which could lead to an 80% reduction in greenhouse gas emissions. One of the sources of heat for the new system will be Wheelabrator, the city's waste-to-energy plant. Potential customers include **People's United Bank**, municipal buildings downtown, the federal and state courthouses, **Housatonic Community College** and the **University of Bridgeport**, with potential to include some city schools, the **Webster Bank Arena**, the ballpark and police and fire stations. The project is expected to cost \$45 million.

OIL DEALERS SUE OVER NATURAL GAS EXPANSION PLANS.

The **Connecticut Energy Marketers Association**, a group representing some 600 oil dealers, filed suit October 10 in Hartford Superior Court against Governor **Dannel Malloy**, the **Connecticut Department of Energy and Environmental Protection** and the **Connecticut Public Utilities Regulatory Authority**, claiming the state's energy plan to expand natural gas service in Connecticut violates state environmental laws. The dealers contend that state law requires officials to conduct an environmental impact study or determine that a study is necessary before implementing the plan, and believe the state favors utilities over family-owned businesses.

UNIVERSITY OF BRIDGEPORT TO GET MICROGRID PROJECT.

The **University of Bridgeport (UB)** has been chosen as one of two funded microgrid projects as part of the **Connecticut Department of Energy and Environmental Protection Microgrid Program**. The \$2.2 million grant will help to fund the design, engineering, and interconnection infrastructure costs for UB's new 1.4MW fuel cell-powered microgrid. The facility will provide electrical power and heat for UB buildings, and will be capable of serving up to 2,700 campus and city residents during a power outage or emergency. Microgrids are an essential part of the state's strategy to better withstand catastrophic storms in the future.



Environment

STUDY FINDS NET COOLING EFFECT FROM FOREST LOSS.

Nadine Unger of the **Yale School of Forestry & Environmental Studies** reported in the August 24 online edition of the journal *Nature*

IN BRIEF

Science and Engineering Notes from Around Connecticut

Climate Change that converting forests into cropland worldwide has triggered a net cooling effect on global temperatures. Unger calculated that a 30% decline in biogenic volatile organic compounds (BVOC) emissions between 1850 and 2000, largely due to the conversion of forests to cropland, produced a net global cooling of about 0.1°C. During the same period, the global climate warmed by about 0.6°C., mostly due to increases in fossil fuel carbon dioxide emissions. Unger said the findings do not suggest increased forest loss provides climate change benefits, but rather point to the complexity of climate change and the importance of better assessing which parts of the world would benefit from greater forest conservation.

‘WHERE BIRDS THRIVE, PEOPLE PROSPER.’ The **Connecticut Department of Energy and Environmental Protection (DEEP)** declared September 21, 2014 as “Important Bird Area Day” in Connecticut. Governor **Dannel Malloy** announced he will form a panel of experts, chaired by **Stewart Hudson**, executive director of **Audubon Connecticut**, to serve as an advisory committee to DEEP for developing an Important Bird Area Program that will include identification and recognition of critical bird habitats and the promotion of bird conservation in the state. Hudson commented, “The good news is that protecting important places for birds also protects important places for people. Where birds thrive, people prosper.”

IMPACT OF MILLSTONE DISCHARGE WATER PROBED. During the summer of 2014, environmental officials began studying the impact of more than 2 billion gallons of water discharged into Long Island Sound after being used to cool the nuclear reactors at the **Millstone Power Station**. The water, typically 20 degrees warmer than the water in the Sound, creates a warm current that some fishermen claim attracts flounder and other species. The **Connecticut Department of Energy and Environmental Protection** is questioning whether oxygen levels in the plume of heated water can support aquatic life, as well as investigating the impact the plume has on the marine environment near the shore.



Food & Agriculture

PIG FARMER URGES PROACTIVE EFFORTS TO COMBAT VIRUS. Third-generation Connecticut pig farmer **Ray Damiani** is concerned about the potential spread of Porcine Epidemic Diarrhea Virus (PEDV) to Connecticut, which is currently one of 16 states not yet reporting a confirmed case of PEDV, according to the American Association of Swine Veterinarians. The illness is responsible for the death of millions of piglets in the United States and abroad. The National Pork Board has allocated close to \$1 million for research into the disease, which infects a pig’s intestine and causes severe diarrhea and vomiting. “The state needs to be proactive to help prevent the spread of this disease,” said Damiani.

LONG ISLAND SOUND LOBSTER FISHERY CLOSED. On September 9, the state closed the Long Island Sound lobster fishery because of catch declines. The state’s lobstermen blame the declining catch on pollution from sewage plants, pesticide and rising temperatures of the Sound that interferes with lobsters’ metabolism. At its peak in 1998, 3.7 million pounds of lobsters were caught by Connecticut’s commercial lobstermen. In 2013, it was less than 120,000 pounds, down 97%.

RUDD CENTER TO JOIN UCONN, RELOCATE TO HARTFORD. On September 12, **UConn** announced a new partnership with the **Rudd Center for Food Policy and Obesity**. The collaboration will see the center’s faculty and staff move from **Yale** to UConn, with the center itself relocating to Hartford’s Constitution Plaza in January,

providing easier access to state policymakers. The alliance is part of UConn’s vision to make health and wellness research a top priority. The move will allow Rudd Center researchers to expand their work and build new collaborations with UConn experts on nutrition, public policy, psychology, agriculture, economics, and obesity—many located within **UConn’s Center for Health, Intervention and Prevention**, where the Rudd Center will be situated.

STUDY FINDS GREATER SOIL-TO-CROP TRANSFER OF METALS IN NANOPARTICLE FORM. In a paper published in *Environmental Science and Technology*, **Connecticut Agricultural Experiment Station** scientists reported on the movement and bio-accumulation of engineered nanoparticles from soil into the food chain. The team showed that zucchini plants accumulated cerium dioxide, a nanoparticle commonly used in consumer products, from soil to a much greater extent than the non-nanoparticle form of the metal. This greater metal content in the plant led to higher cerium levels in crickets that consumed zucchini and in spiders that consumed the crickets. **Jason C. White**, lead investigator on the USDA-funded study, noted that “Our most significant finding was that although transfer of the metal from soil to the food chain was modest, the values were significantly higher for the nanoparticle as compared to the non-nanoparticle form, a result that has not been previously observed and was unexpected.”

UCONN TEAM GETS GRANT FOR SEAWEED AQUACULTURE STUDY. **UConn** researchers **Jang K. Kim** of the Department of Marine Sciences and CASE member **Charles Yarish** of the Department of Ecology and Evolutionary Biology have received a two-year grant for \$314,000 from the USDA’s National Institute of Food and Agriculture. Their proposal, entitled “Developing an environmentally and economically sustainable sugar kelp aquaculture industry in southern New England: from seed to market,” was the top ranked entry in a national competition. In this new project, Kim and Yarish will help provide necessary technologies to overcome hurdles that kelp aquaculturists currently face, including sustainable kelp seedstock, open water cultivation technology, processing facilities for fresh and fresh frozen kelp products and market analyses.



Health

INVENTION CONVENTION WINNER PURSUES PATENT, PROTOTYPE. **Connecticut 2014 Invention Convention** winner **Kylie Simonds** of Naugatuck has submitted her design for a pediatric IV backpack that offers an alternative to poles and wires usually used for administering chemotherapy to the US Patent and Trademark Office. Kylie, 11, underwent 46 weeks of chemotherapy and is in remission from rhabdomyosarcoma, a cancer that affects the soft tissues and connective tissues or bones. “I used to have to use the IV poles and I always tripped over all the wires,” she said. “It was hard to walk around and I always had to have someone push it for me because I was kind of weak when I was in chemo.” She is currently raising money on GoFundMe to make a working prototype of the backpack.

CT HEALTH EXCHANGE FOCUS OF HARVARD STUDY. **Access Health CT (AHCT)**, Connecticut’s health exchange, was the focus of a Harvard Business School and Harvard School of Public Health case study authored by John Quelch, Charles Edward Wilson Professor of Business Administration at Harvard Business School and a professor of health policy and management at the Harvard School of Public Health. Key to Connecticut’s success, said Quelch, was that AHCT, a quasi-state agency, put marketing at the forefront early—including hiring **Kevin Counihan**, the chief marketing officer

IN BRIEF

Science and Engineering Notes from Around Connecticut

of Massachusetts' successful health connector, to run Connecticut's program.

CT FIRM CLOSE TO EBOLA VACCINE. On October 30, **Protein Sciences** announced it is a month away from developing a vaccine to fight Ebola. Although it will not be the first vaccine to hit clinical trials, Protein Sciences hopes to be a frontrunner in the race to develop a vaccine to fight Ebola. Shipments will be sent to the National Institutes of Health, with human clinical testing expected by the end of the year. The vaccine being developed is protein-based, comprised of a protein found on the outer coat of the virus, instead of the actual virus. The protein triggers antibodies in primates, said Protein Sciences executive chairman and global head of business development **Daniel Adams**.

LAWMAKERS PRESS FOR REGULATIONS ON E-CIGARETTE DEVICES. On August 19, two Connecticut lawmakers, **US Senator Richard Blumenthal** and **US Representative Elizabeth Esty**, announced an initiative to require child-proof bottles for liquid nicotine used for e-cigarettes. The move is the latest effort to regulate battery-powered devices used to inhale vapor from a heated liquid nicotine solution and related accessories. According to the American Association of Poison Control Centers, potentially toxic exposures from e-cigarette devices and liquid nicotine have risen from 271 in 2011 to 2,313 so far this year. Blumenthal and Esty said they are responding to a rising number of poisonings.



High Technology

UConn, FEI, TO DEVELOP NEW MICROSCOPY CENTER. **UConn** and scientific instrument maker **FEI** signed an agreement this fall to develop a center for microscopy and materials science research to be located in the new Innovation Partnership Building at UConn's Tech Park. The center will open in mid-2015 and feature three microscopes from FEI. "The new Center at the UConn Tech Park will be the foremost microscopy facility in the world," said UConn Provost and CASE member **Mun Choi**. Upon completion in 2017, the center will include seven instruments from FEI, including the flagship microscope, Titan Themis TEM, capable of more than one-hundred million times magnification, allowing scientists to see individual atoms, determine their arrangement, and measure the electrical and magnetic forces they exert on one another.

READY TO WORK PARTNERSHIP GRANT. On October 17, **The Workforce Alliance** and the **Eastern CT Workforce Investment Board** announced the availability of a \$5.5 million, 4-year federal grant that is part of the federal Ready to Work Partnership. The grant will help find jobs for 567 long-term unemployed workers in high-tech fields. The **Connecticut Department of Labor** engages the Workforce Alliance and the Workforce Investment Board to provide job training and support services in collaboration with local employers. Local participating companies include **Protein Sciences** and **Accel Corp.** in Meriden, and **Rowland Technologies, Ulbrich Steel** and **BYK Corp.** in Wallingford.

GRANT TO FUND EXPANDED MANUFACTURING EDUCATION. **Manchester Community College** (MCC) will lead a federally funded effort to expand manufacturing education in Connecticut with receipt of \$6 million of a total \$15 million grant from the US Department of Labor. The funding will support expansion of the **Connecticut Advanced Manufacturing Initiative**, which trains students for jobs. MCC will work with the other 11 state community colleges, **Charter Oak State College** and the **Connecticut State Colleges and Universities System** office. The grant pays for hands-

on training, new teachers and educational assistants and the development of registered apprenticeship programs for high-demand manufacturing occupations.

CCAT, USAF SIGN \$6M METALS MANUFACTURING DEAL. On October 29, the United States Air Force and the **Connecticut Center for Advanced Technology, Inc.** (CCAT) signed a five-year, \$6 million contract, "Manufacturing Technology Innovation for Cost Reduction." The contract will fund development and use of tools for metal and composite materials manufacturing for Air Force supply chain companies, with many of those companies based in Connecticut. The intended outcome of this collaboration is for Air Force manufacturers to meet their target cost objectives and improve global competitiveness.



Transportation

HYBRID DIESEL-ELECTRIC BUSES FOR NEW BUSWAY. It was announced August 22, that the state's new commuter busway, **CTfastrak**, will be outfitted with 48 new hybrid diesel-electric coach buses, with various manufacturers producing four sizes of buses. Nova, based in Plattsburgh, New York, is providing the 60-footers that will be the backbone of the service. Twelve Nova LFX models will run between **New Britain** and **Hartford** along the 9.4-mile busway. The Novas cost about \$900,000 each, with frames similar to the articulated buses that **CTTransit** introduced in the Hartford region two years ago. CTfastrak is also acquiring six 45-footers from MCI of North Dakota for about \$561,500 each, and twelve 30-foot buses from California-based Gillig for approximately \$625,000 each. Federal grants will pay for approximately 80% of the cost, with Connecticut covering the rest. The busway is scheduled to start service in early March 2015.

FEDERAL GRANTS TO FUND FREIGHT RAIL, WATERFRONT UPGRADES. In September, Connecticut was awarded nearly \$23 million in federal grants to upgrade freight rail from New London to Massachusetts and to rebuild **Waterbury's** riverfront, with about \$14.4 million going toward Waterbury's waterfront and transit center project. The funds will also support installation of more than 15,000 ties in towns along the **New London to Stafford Springs** route. Funds are part of the TIGER grants—transportation investments generating economic recovery. The rail line will meet new freight standards, including increased weight capacity. Elected officials, along with regional business owners and Genesee & Wyoming Inc., owner of New England Central Railroad, lobbied federal transportation officials for the money. New England Central is contributing \$2 million to the work. The rail corridor extends from the port of New London to the Vermont-Canadian border.

CONSTRUCTION OF NEW TRAIN STATIONS BEGINS. On October 24, the **Connecticut Department of Transportation** and Governor **Dannel Malloy** announced the start of construction for new train stations in **Wallingford, Meriden** and **Berlin** as part of the **New Haven-Hartford-Springfield Rail Program**; the project is expected to be completed in late 2016. Improvements include high-level platforms on both sides of the track; overhead pedestrian bridges with new elevators and stair towers on both sides of the track to connect the two platforms; platform snow melt systems; electric vehicle charging stations; ticket vending machines and passenger information display systems; PA and high-resolution video surveillance systems; increased parking capacity and roadway access improvements; improved accessibility for the mobility impaired/ADA compliant; and bicycle racks.

—Compiled and edited by Wendy Swift

Imagine Nation: A Museum Early Learning Center Ignites Children's Imaginations

Imagine Nation, A Museum Early Learning Center for children ages 2 to 8 in Bristol, draws inspiration from the renowned schools of Reggio Emilia, Italy. The Reggio Emilia philosophy centers on the belief that curriculum is child-initiated and teacher framed, open-ended and play focused.

With an emphasis on the STEAM subject areas (science, technology, engineering, arts, and math), Imagine Nation features an outdoor learning park and 10 indoor studios with the following themes: Wildlife; Science & Energy; Farm To Table; Design & Engineering; Multicultural Experience; Water; Art; Wellness; Light, Reflection, Technology; and Air & Space. Designed with a conscious use of space, color, natural light, each studio contains attractive and appropriate learning materials and display boards for the documentation of children's work. Educational objectives align with Connecticut's early learning standards and exhibits are designed to support a child's learning across eight domains of development: cognitive, social-emotional, physical, literacy, creative arts, mathematics, science and social studies. The museum supports learning experiences that reflect recommendations and policies of The National Association for the Education of Young Children and the Association of Children's Museums.

With over three floors to explore, visitors are invited to participate in informal studio workshops. These hands-on interactions are led by an early childhood educator and presented at different times throughout the day. The Museum also offers field trips and outreach programs including, Roots to Shoots (PreK-2), Tower of Power (Grades 1-4) and Bubble-ology (PreK-4). Coming in 2015, the museum will feature WGBH's Emmy award-winning science program "Peep and the Big Wide World." Parents and children will learn alongside Peep, Chirp and Quack that science, and science learning, can be found anywhere.

Through a partnership between staff and families, Imagine Nation's goal is to support children's intellectual, social, emotional and physical development in a positive, joyful environment that fosters a love of learning. To learn more visit www.imagemuseum.org. Museum hours are Wednesday through Saturday from 9:30 am to 5:00 pm and Sunday from 11 am to 5 pm.

NAS *(from page 1)*

full spectrum of this response. A new report, *Research Priorities to Inform Public Health and Medical Practice for Ebola Virus Disease*, summarizes the presentations and discussion of the workshop.

http://www.nap.edu/openbook.php?record_id=19004

◆ Engineering Education Still Key to US Innovation

Technological innovation has long been the key to US growth and prosperity, and engineering has been an important driver of this innovation, according to the author of a new article in Fall issue of *The Bridge* from the National Academy of Engineering. The author argues that the development and subsequent institutionalization of the engineering disciplines in US universities provided much of the talent behind US domination of world markets during the 20th century. Because engineering disciplines integrate scientific principles with practically oriented research, they provide systems and processes that themselves create ways of acquiring new knowledge. It is this integration, according to the author, that makes engineering critical to successful industrial innovation. Yet only 4.4% of the undergraduate degrees awarded in the United States are in engineering, compared with 13% in European countries and 23% in key Asian countries. Are too few engineering degrees being sought and awarded in the United States? What are the trends in the United States? What are the occupations and employment opportunities for US-trained engineers? The challenge for universities is "to design programs that retain the rigor of engineering while broadening the curriculum to address communication across cultures, management within and across organizations, intellectual property and technology transfer issues, financing innovation, knowledge of regulatory environments" the author argues, noting that "many US universities have stepped up to the challenge." At the undergraduate level, some have created "four plus one" programs that introduce cross-disciplinary

The following Connecticut scientists were elected to the National Academies in 2014:

NATIONAL ACADEMY OF SCIENCES

Marcia K. Johnson, PhD

Sterling Professor of Psychology
Yale University

Mark A. Johnson, PhD

Arthur T. Kemp Professor of Chemistry
Yale University

Alanna Schepartz, PhD

Milton Harris '29 PhD
Professor of Chemistry
Yale University

INSTITUTE OF MEDICINE

Martín-José Sepulveda, MD, MPH, FACP, FAAP

IBM Fellow and Vice President,
Health Systems and Policy Research
IBM

plinary courses or certificate programs in the fifth year. Others have introduced minors in entrepreneurship or management of technology, and a number of joint degree programs combine engineering with law and/or business. "Engineering holds great potential for continued US innovation in the future. But to realize this potential, it will be necessary for US universities to extend the "integrative" expertise of engineers into areas well beyond the technical core," the author concludes.

<http://www.nae.edu/Publications/Bridge/119585/119587.aspx>

◆ Report Urges Greater Focus on Young Adults

A new report from the Institute of Medicine and the National Research Council recommends that young adults between ages 18-26 be viewed as a separate subpopulation for purposes of policy and research, because they are in a critical period of development when successes or failures could strongly affect the trajectories of their lives. The report's authors found that young adults' brains and behaviors continue maturing into their 20s, and they face greater challenges achieving independence than their predecessors did, have lengthened pathways into adulthood, and are surprisingly unhealthy. The report calls for an improved understanding and response to the circumstances and needs of today's young adults, and urges the public and private sectors to improve policies and programs that address the needs of this group. Recommendations include raising completion rates for those in high school and post-secondary institutions, and ensuring that they obtain the skills and credentials in demand by the labor market. To accomplish these goals, better integration among secondary and higher education with workforce agencies is needed.

<http://www.nap.edu/openbook.php?recordid=18869>

Visit our web site at www.ctcase.org

Coastal Resilience *(from page 2)*

economy and quality of life. "The committee is using predicted sea level rise of one foot by 2035 and four feet by 2085," said Sandy Prisløe, the town's environmental planner. "Those dates and numbers are hard to get our heads around today, but even if those levels don't happen by 2035 or 2085, they will happen eventually."

Noting that about one quarter of the properties in town lie within the 100-year flood zone, Prisløe explained that even a sea level rise of one foot, combined with a storm surge of four feet, would have devastating consequences. "Storms like Sandy and Irene would produce greater flooding and affect more people in the future when they occur on top of a higher sea level," he said.

Old Saybrook is conducting mitigation studies, similar to other shoreline towns, and using Geographic Information Systems (GIS) to help understand the area and magnitude of potential impact. "The 2,000 or so properties in the 100-year flood zone have a total assessed value of more than \$700 million," Prisløe said.

According to Prisløe, the town looked at Sea, Lake and Overland Surges from Hurricane (or SLOSH) data from the US Army Corps of Engineers and the potential damage from a hurricane would be astounding. "In a Category One Hurricane, up to \$130 million of real estate could be affected," he said. "If, God forbid, we had a Category Four storm, \$1.1 billion worth of property could flood. That's a big number for a small town with 10,000 residents." The town has asked CIRCA for help producing new SLOSH data with sea level increases of one and four feet.

Old Saybrook also has put in place requirements for improvements to structures in the 100-year flood zone. If during a 10-year period, an owner makes improvements worth at least 50% of the total value of the structure, then they must elevate the structure to one foot

above the base flood elevation established by the Federal Emergency Management Agency (FEMA).

According to Prisløe, even that is subject to change and poses safety risks. "FEMA periodically updates the base flood elevation based on new data, so it's a moving target," he said. "In addition, property owners may get a false sense of security and decide to stay in their homes during a storm. Even if their structure is as storm-resistant as they think, they still run the risk of isolation from flooding. During Sandy, two homes completely burned because the roads were covered with a sand and water slurry that made it impossible for our emergency services people to get to them."

"Flooding in Connecticut will continue to be an issue due to sea level rise in the next 20-50 years and beyond," O'Donnell said. "The rules we've developed over the past 100 years might not make sense going forward. Maybe we need building/zoning code changes to balance houses and infrastructure needs with sensitive areas like marshes and ecosystems. The cost of repairs and ownership are going up ... should they be covered by insurance companies; the property owner; the town, state or federal government? Those are policy decisions and the people making those decisions need to be informed." Prisløe says shoreline towns have important decisions to make about priorities. "Do we raise roads or buy amphibious vehicles at significant costs? Do we mandate evacuations? Do we get to the point where the only action is to retreat from the shoreline? At what point is it no longer feasible to maintain the existing infrastructure? We don't know the answers," he said.

"These storms are not going away," Hyde said. "It's important for citizens to educate themselves now about the risks, support the ongoing efforts to mitigate those risks and help develop the plans we make for the future." —**Karen Cohen, freelance science writer**