SBIR

Small Business Innovation Research Program

ABSTRACTS OF PHASE II AWARDS FOR FISCAL YEAR 2021

U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

INTRODUCTION

The Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), through the Small Business Innovation Research (SBIR) program, awarded 16 NOAA SBIR Phase II contracts for FY 2021.

In Phase II, funding is provided for projects that are most promising after Phase I is completed from the previous year. These awards are up to $500,000 each, and totaling approximately $7.9M. The awards are for a two-year effort to continue the research and development of the innovative approach they proposed during the Phase I project. Abstracts of successful Phase II proposals and comments on their anticipated results are also provided in this publication.

FY 2021 Phase II List of Awardees

Award Number	Company Name	Subtopic Number
NA21OAR0210291	Creare, LLC.	9.2.02
NA21OAR0210292	Shellfish Solutions, INC.	9.1.01
NA21OAR0210293	Azavea, INC.	9.5.03
NA21OAR0210294	Aerodyne Research, INC.	9.5.02
NA21OAR0210295	CD3, General Benefit Corporation	9.1.02
NA21OAR0210296	Innovim, LLC.	9.5.03
NA21OAR0210297	Kraenion Labs, LLC.	9.5.03
NA21OAR0210298	DiveViz, LLC.	9.3.02
NA21OAR0210299	Lynntech, INC.	9.1.02
NA21OAR0210300	Hydronalix, INC.	9.4.01
NA21OAR0210301	Charles River Analytics, INC.	9.4.01
NA21OAR0210302	CVision AI, INC.	9.2.05
NA21OAR0210303	CFD Research Corporation	9.3.02
NA21OAR0210304	AAPlasma, LLC	9.1.02
NA21OAR0210305	SafetySpect, INC.	9.2.05
NA21OAR0210319	Cruyningen Izak van dba LineSpect	9.4.02

FY 2021 PHASE II AWARD WINNER

FIRM:	Creare, LLC. 16 Great Hollow Road Hanover, NH 03755
AWARD:	$499,917.00
PHONE:	603-640-2501
E-MAIL:	jcw@creare.com
PRINCIPAL INVESTIGATOR (PI):	Jed Wilbur
TITLE OF PROJECT:	Low Cost Ocean Temperature Profile Sensing
SUBTOPIC NUMBER:	9.2.02

TECHNICAL ABSTRACT:
Changes in ocean temperature profoundly impact the productivity of fisheries and aquaculture. Consistently sampling offshore ocean temperatures, particularly at depth, is challenging and expensive. However, opportunistic sampling from fishing gear can address the challenge. Existing programs, such as Environmental Monitoring on Lobster Traps, have capitalized on this on a small basis. Expanding these programs is hindered by the high cost of sensor nodes and the need for integrating with the host ship. A simpler and less expensive approach is needed. Creare is developing the Wireless Open Water Logger (WOWL, openwaterlogger.org), an open-source, inexpensive, and easy to use sensor for logging water temperature and depth. The WOWL is encapsulated in the waterproof casing that can be readily attached to commercial fishing gear. The system integrates with users' smartphones, eliminating the need for dedicated hardware to retrieve and upload data. Data are geo-tagged by the smartphone and then uploaded to an existing, cloud-based, and publicly-accessible data repository. In Phase I we fabricated proof-ofconcept WOWL sensors and demonstrated their performance in open water testing. In Phase II we will refine and improve the WOWL design, develop supporting hardware, fabricate at least 100 units, and demonstrate performance in large-scale, long-duration, scientific study.

SUMMARY OF ANTICIPATED RESULTS:
The Wireless Open Water Logger will enable opportunistic ocean monitoring studies at scales much larger than is currently possible. We see four markets for the system: (1) bulk purchase of a large number of units by large scale ocean monitoring studies; (2) purchases of batches of units by educational institutions organizations to equip students, staff, and volunteers; (3) purchase systems by individual fishermen concerned with the impact of temperature on catch; and (4) bulk purchases by large-scale commercial outfits and cooperatives looking for competitive advantages by leveraging the increasingly clear relationship between water temperature and catch/bycatch.

FY 2021 PHASE II AWARD WINNER

FIRM:	Shellfish Solutions, INC. 91 Water Street Castine, ME, 04421
AWARD:	$500,000.00
PHONE:	781-570-9406
E-MAIL:	chip@oystertracker.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Wyllys Terry
TITLE OF PROJECT:	Tide to Table Traceability and Marketing System
SUBTOPIC NUMBER:	9.1.01

TECHNICAL ABSTRACT:

The Centers for Disease Control estimates Vibrio (parahaemolyticus & vulnificus) causes 80,000 illnesses and 100 deaths in the United States every year, most commonly from eating raw or undercooked seafood such as oysters. However, according to the co-chair of the Interstate Shellfish Sanitation Conference: “Our current [tracking] system…is inadequate.... More than half of all traceback investigations fail because the information in the value chain is lost.” In Phase I, Shellfish Solutions piloted a digital traceability and marketing system that is lower cost than the existing largely handwritten system and more powerful: Saving users significant amounts of time while improving compliance. The value extends beyond regulatory compliance. QR codes embedded on the regulatory tags gives farmers/harvesters the opportunity to tell their unique story directly to chefs and consumers--connecting the consumer with the producers of their food. The increasing toll on consumer health from unsafe food is leading companies and regulators to look for a high quality, easy to use, and cost-effective digital traceability system. Without such a system many companies will not be able to meet the increasing regulatory requirements. Phase II will add features necessary to make this system commercially ready for shellfish harvesters and Wholesalers in the US.

SUMMARY OF ANTICIPATED RESULTS:

In Phase I, we saved our beta clients 30%+ on their compliance costs, while increasing inventory accuracy and adding marketing benefits. With over 2,800 small to mid-size shellfish dealers in the US, we have a initial target market we understand well. Beyond shellfish the much larger seafood and fresh food industries offer numerous adjacent market opportunities. A digitized supply chain opens up opportunities to use Machine Learning and Artificial Intelligence to move from the current reactive approach to food safety to a proactive approach. Keeping consumers safe while making businesses more profitable is a great business.

FY 2021 PHASE II AWARD WINNER

FIRM:	Azavea, INC. 990 Spring Garden Street, 5th Floor Philadelphia, PA, 19123
AWARD:	$500,000.00
PHONE:	215-701-7713
E-MAIL:	cheetham@azavea.com
PRINCIPAL INVESTIGATOR (PI):	Robert Cheetham

TITLE OF PROJECT:	Advancing Flood Extent Delineation Modeling Using Synthetic Aperture Radar (SAR) Data
SUBTOPIC NUMBER:	9.5.03

TECHNICAL ABSTRACT:

The primary goal of this research is to advance flood extent delineation modeling by enhancing the ability of the modeling community to access and utilize the forecasts and reanalysis products of the National Water Model. One of the most difficult challenges facing stakeholders in the flood inundation domain is the lack of easily accessible tools to query and process the large and complex datasets needed to accelerate their work. Even when such tools are available, processing these datasets is time consuming and costly for many organizations, and is commonly cited as a barrier to more expedient research. This project seeks to address these challenges by combining cloud native data and data processing formats with the Python programming language to create valuable new tools for interactive and exploratory analysis. Such tools will not only make the rapid delivery of flood inundation maps possible, but will also provide the potential to inform future data infrastructure that improves communication between the National Water Center and regional River Forecast Centers. Further, because the structure of national Water Model outputs is common across the hydrological domain, the results of this research will also be applicable to a broad range of other hydrological projects.

SUMMARY OF ANTICIPATED RESULTS:

The commercial application for flood extent delineation modeling extends to public and private sector organizations with a shared need to process and analyze imagery data, to take advantage of high-quality flood inundation mapping products, and to leverage machine learning models to support decision-making. Broadly usable tools and libraries will be packaged as an implementation service and provided to engineering firms and prime government contractors working on flood inundation mapping and resilience planning, to multilateral organizations providing humanitarian relief, to satellite imagery providers as a value-added service, and to water utilities to support impervious surface studies for flood mitigation purposes.

FY 2021 PHASE II AWARD WINNER

FIRM:	Aerodyne Research, INC. 45 Manning Road Billerica, MA, 01821
AWARD:	$499,998.00
PHONE:	978-663-9500
E-MAIL:	krechmer@aerodyne.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Jordan Krechmer

TITLE OF PROJECT:	Automated Monitoring of VOCs with a Compact Gas Chromatography-Proton Transfer Reaction Mass Spectrometer (GC -Vocus)
SUBTOPIC NUMBER:	9.5.02

TECHNICAL ABSTRACT:

Volatile organic compounds (VOCs) are emitted from a wide variety of biogenic and anthropogenic sources. VOCs transform in the atmosphere, forming ozone and oxygenated VOCs (OVOCs), which in turn can form fine particulates or condense onto preexisting particulate matter (PM). Both ozone and fine PM are deleterious to human health and alter the Earth's climate. Measurements of VOCs and OVOCs are necessary to model the sources and sinks of harmful atmospheric chemicals. Progress in this area is limited, however, by the lack of field-deployable instrumentation capable of providing detailed molecular information. The goal of the proposed work is to develop a hybrid gas chromatograph and a lower resolution proton transfer reaction Vocus mass spectrometer (GC-Vocus) instrument capable of real-time molecular-level chemical characterization of VOCs and OVOCs. Phase I resulted in a prototype instrument and software capable of measuring VOCs and OVOCs. The result of Phase II will be a GCVocus instrument that is capable of fully autonomous, real-time, robust, and sensitive measurements of VOCs and OVOCs.

SUMMARY OF ANTICIPATED RESULTS:

We expect that the GC-Vocus will be ideally suited to monitoring sites and to academic and government research laboratories. China, India, and the European Union represent large potential markets as they increase their focus and funding for solving major air quality issues. For example, the European Aerosols, Clouds, and Trace gases Research Infrastructure (ACTRIS) Network has a nascent effort to characterize VOC emissions across the continent. We also intend the GC-Vocus to be a useful tool for monitoring in industrial applications such as at oil refineries in which specificity is needed to detect toxic chemicals such as ethylene oxide.

FY 2021 PHASE II AWARD WINNER

FIRM:	CD3, General Benefit Corporation 1865 Ashland Ave Saint Paul, MN, 55104
AWARD:	$500,000.00
PHONE:	952-212-6576
E-MAIL:	ed@cd3systems.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Edgar Rudberg

TITLE OF PROJECT:	SBIR Phase II: Continuous eDNA Monitoring for Early Detection of Aquaculture Diseases
SUBTOPIC NUMBER:	9.1.02

TECHNICAL ABSTRACT:

As aquaculture increases productivity to meet worldwide demand, it faces an increasing threat from the spread of disease, aquatic organisms, and pathogens. However, biosensor technologies have not kept pace with the need to monitor these ever-increasing threats. In particular, biomonitoring has been limited by the need for continuous human presence, whether at the point of collection or in the laboratory. What is needed are biosensors that function as robustly and easily as a smoke-alarm, i.e., autonomous, reliable, in-field monitoring technologies capable of disseminating data straightforwardly and in real-time to a broad range of personnel and decision-makers. CD3 will seek to overcome these barriers. By completing the assembly of a benchtop instrument and piloting it to detect customers' target aquatic pathogens, we will validate and develop the technology. Simultaneously, we will be using the engineering and application data gathered from the benchtop instrument to inform an Alpha Product unit's professional industrial engineering design suitable for production and sales.

SUMMARY OF ANTICIPATED RESULTS:

The commercial potential of the DNA-Tracker is $1b+ in aquaculture. Additional markets include fisheries, resource management, water quality monitoring, defense, and biosecurity. The DNA-Tracker enables improved protein production, better food quality and reduces the risk for aquaculture farmers by monitoring eDNA in their ponds and pens for diseases, aquatic organisms, and pathogens. The DNA Tracker will enter a growing field of the U.S. biotechnology industry, a $112.4bn/year industry of which 16.4% of the market is agriculture and aquaculture technologies.

FY 2021 PHASE II AWARD WINNER

FIRM:	Innovim, LLC. 6401 Golden Triangle Dr. STE 200 Greenbelt, MD, 20770
AWARD:	$450,564.04
PHONE:	301-785-6026
E-MAIL:	pardanuy@innovim.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Philip Ardanuy
TITLE OF PROJECT:	A New Machine Learning Technique for Accurately Forecasting Extreme Precipitation from Landfalling Atmospheric Rivers
SUBTOPIC NUMBER:	9.5.03

TECHNICAL ABSTRACT:

Atmospheric Rivers (AR) transport large volumes of water vapor outside the tropics and, when making landfall, produce large quantities of rain that replenish aquifers, contribute to beneficial increases in snowpack, yet can cause flooding and significant damage to property and lives. Accurate forecasts of precipitation during landfalling ARs are critical because of their large role in water supply and flooding along the US west coast. The intensity, location, and duration of atmospheric rivers are poorly forecast in all currently operational numerical weather prediction models beyond forecast Day 7, resulting in a significant decision support services gap. During Phase-I we used Machine Learning (ML) technologies to develop and demonstrate a robust decision support approach—with a viable path from research to operations. The resultant near real-time LEARN2 tool integrates Numerical Weather Prediction (NWP) forecast guidance products, remotely sensed satellite observations, and Sub-seasonal-to Seasonal (S2S) teleconnection indices to demonstrate the theoretical basis for a family of decision-support products. Our Phase-II SBIR project goals are to remove remaining biases, systematically refine and operationally validate the ML technique across a decade of observations and extend the state of science to deliver skillful landfalling ARs forecasts beyond Week 1 under realistic operational conditions.

SUMMARY OF ANTICIPATED RESULTS:

INNOVIM will seek to apply our SBIR Phase-II research results in accordance with our commitment as NOAA Weather Ready Nation (WRN) Ambassador. We will plan the first deployment of the near real-time Landfalling Event Atmospheric River Neural Network (LEARN2) tool to the National Weather Service (NWS) for operational use in western US Weather Forecast Offices (WFO) at no cost to the government. We will perform any requested improvements and site-specific tailoring under our discounted GSA labor schedules. Additional deployments will target the Department of the Interior, the US Army Corps of Engineers, and western state, county, and local emergency/infrastructure managers.

FY 2021 PHASE II AWARD WINNER

FIRM:	Kraenion Labs, LLC. 17094 Lon Rd Los Gatos, CA 95033
AWARD:	$500,000.00
PHONE:	650-283-9142
E-MAIL:	binu@kraenion.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Binu Mathew
TITLE OF PROJECT:	Machine Learning for Risk Assessment using Satellite and Aerial Imagery
SUBTOPIC NUMBER:	9.5.03

TECHNICAL ABSTRACT:

Kraenion is an AI company developing Machine Learning and Active Learning technology to analyze large 2D and 3D multi-spectral datasets of importance to public safety and national security. Our deep learning models and statistical vision algorithms process planet-scale satellite image datasets and security critical CT and X-ray imagery. Kraenion's Vision Engine platform includes active learning based neural network training technology where the training software is aware of the cost of labeling data. Unlike traditional neural network training that assumes a large labeled dataset, our system carefully picks samples that maximize the learning opportunity and presents it for labeling to a human annotator. This provides much higher return on dollars invested for data annotation in areas like satellite imagery where unlabeled data is abundant, but labeled data is scarce.

SUMMARY OF ANTICIPATED RESULTS:

We propose to extend our innovations in deep learning and active learning to a) Risk assessment based on a combination of satellite/airborne imagery and ancillary GIS data such as maps of the electric grid and municipal building permits. b) Active learning based secure image annotation and ML technologies for federal agencies involved in satellite image analysis. Potential federal customers include NASA, NOAA, NGA, USGS, USDA and DHS.

FY 2021 PHASE II AWARD WINNER

FIRM:	DiveViz, LLC. 4828 Orchard Avenue, STE. A San Diego, CA, 92107
AWARD:	$499,713.00
PHONE:	727-698-5756
E-MAIL:	chris@diveviz.com
PRINCIPAL INVESTIGATOR (PI):	Bryan Cheezem
TITLE OF PROJECT:	Developing a Visibility Predictive Model using Crowdsourced Data
SUBTOPIC NUMBER:	9.3.02

TECHNICAL ABSTRACT:

Increased ocean advocacy and exploration begins with knowledge and exposure to the underwater environment and is furthered by technological and scientific advancements to increase the frequency and time spent underwater. Positive underwater experiences that promote increased participation are contingent on safe and optimal water conditions. To facilitate increased engagement, awareness, understanding, and participation with coastal environments, the DiveViz platform has developed a predictive forecasting tool of ocean visibility conditions via reports from the local diving community, measurements of water turbidity, and water quality data accessibility. During Phase II of this project, DiveViz intends to expand and refine many of their existing ocean visibility forecasting features, as well as expand citizen science contributions and local diver incentives through popular sharing, liking, and promoting features.

SUMMARY OF ANTICIPATED RESULTS:

Significant to this Phase, a primary innovation will be the development of wearable turbidity sensors for the diving community to wear during dives. This citizen science derived data, in addition to continuous measurements from stationary commercial turbidity sensors, will feed directly into DiveViz's algorithm, thus increasing the ability to forecast water visibility and the frequency with which the global diving community explores the ocean.

FY 2021 PHASE II AWARD WINNER

FIRM:	Lynntech, INC. 2501 Earl Rudder Freeway South College Station, TX, 77845
AWARD:	$499,337.00
PHONE:	979-764-2312
E-MAIL:	john.muller@lynntech.com
PRINCIPAL INVESTIGATOR (PI):	Dr. John E. Mueller
TITLE OF PROJECT:	Rapid, Simple Diagnostic for Pathogens in Marine Aquaculture
SUBTOPIC NUMBER:	9.1.02

TECHNICAL ABSTRACT:

Aquaculture is the farming of aquatic organisms for human consumption, and includes finfish, shellfish, crustaceans and plants. Aquaculture accounts for approximately 50% of the world's fish food and is one of the fastest growing food-producing sectors. A major challenge facing commercial fisheries is the presence of infectious diseases. Once a disease outbreak occurs, effective management requires three basic approaches: (1) identification of the problem, (2) diagnosis of the pathogen and (3) corrective management. All must be performed quickly to avoid disease spread and further loss.

SUMMARY OF ANTICIPATED RESULTS:

Lynntech is developing a rapid, user-friendly, detection assay to identify, distinguish, and quantify pathogens that infect aquaculture waters. This will be a multiplex assay that will detect six different aquaculture pathogens. Our diagnostic combines molecular genetic methods with a power-free, semiquantitative technology for detection. Due to low power requirements, Lynntech's Aquaculture Diagnostic will be ideal for field-use at aquaculture facilities. Our proposed diagnostic system will also include an innovative technology that will concentrate aquaculture water, eliminating the need to enrich pathogen concentrations, which can be exceptionally time-consuming and costly.

FY 2021 PHASE II AWARD WINNER

FIRM:	Hydronalix, INC. 1691 W. Duval Commerce Court Road, Ste 141 Green Valley, AZ, 85614
AWARD:	$500,000.00
PHONE:	520-360-3486
E-MAIL:	tony.mulligan@hydronalix.com
PRINCIPAL INVESTIGATOR (PI):	Anthony Mulligan
TITLE OF PROJECT:	NOAA Aerielle SONAR UAS
SUBTOPIC NUMBER:	9.4.01

TECHNICAL ABSTRACT:

The Aerielle SONAR UAS Phase II proposal is in response to Topic 9.4.01, “Unmanned Aircraft System: Rapid Response for Natural Disaster” and proposes to improve and further develop the “Aerielle” with a Humminbird underwater sonar imaging commonly used by emergency responders. The goal of the Aerielle SONAR UAS was to perform SONAR scanning of underwater structures for hazardous debris identification, automatic victim recognition in challenging landscapes, and near-real time collaboration utilizing cloud storage and mobile app development, which was accomplished successfully. The Aerielle integrated cutting edge SONAR technology in a buoyant UAS platform, allowing it to land in water and perform real-time analysis of underwater structures and debris.

SUMMARY OF ANTICIPATED RESULTS:

Based on these results, Hydronalix will: (1) Design and establish a manufacturing process to produce a production prototype generation Aerielle (in volume) with improved aerodynamics that is waterproof, (2) Improve with introduction of multi-functional capabilities including Cloud-based data transfer, weather data collection, side-scan and 360º Sonar imaging and improved motion in water, EO/IR cameras, and (3) Implement new algorithms and machine learning to manage advanced disaster response. The goal is to develop a UAS that could assist ships, boats and emergency managers in disaster prevention and response and provide localized weather information.

FY 2021 PHASE II AWARD WINNER

FIRM:	Charles River Analytics, INC. 625 Mount Auburn Street Cambridge, MA, 02138
AWARD:	$499,973.00
PHONE:	617-234-5093
E-MAIL:	dstouch@cra.com
PRINCIPAL INVESTIGATOR (PI):	Daniel Stouch

TITLE OF PROJECT:	Semi-autonomous Capabilities for the Operation of Uncrewed Teams (SCOUT)
SUBTOPIC NUMBER:	9.4.01

TECHNICAL ABSTRACT:

Natural disasters and other severe weather events have the potential to create loss of life and damage property on large scales. Preparing for and responding to these incidents is a complex, multi-phase process. NOAA's 2019-2022 Strategic Plan to achieve the vision of a Weather Ready Nation will reduce the impacts of weather, water, and climate events, and harness cutting-edge science, technology, and engineering to provide the best observations, forecasts, and warnings possible. Uncrewed aircraft systems (UAS) provide new sensing capabilities, keep humans out of harm's way, and collect precise and actionable data when effectively supported by autonomy. We propose to implement and demonstrate Semi-autonomous Capabilities for the Operation of Uncrewed Teams (SCOUT), beginning by analyzing requirements and developing scenarios, integrating with existing commercial UAS and their ground control stations, and adding user interfaces to plan, monitor, and analyze survey missions. We will then fully implement and validate the dynamic routing and scene characterization algorithms prototyped during Phase I. Finally, we will validate airframe effectiveness and overall system concept viability to enable disaster management teams to leverage small, semi-autonomous UAS to execute rapid site survey missions to mitigate severe weather effects and vertically profile critical meteorological data for localized weather forecasting.

SUMMARY OF ANTICIPATED RESULTS:

The derived product has the potential to support other rapid site survey operations, such as IED search and detection, wildlife surveys, radiological surveys. shark or rip current monitoring at public beaches, residential community alerting of approaching deadly weather (e.g., tornadoes), humanitarian relief refugee camp assessment, avalanche danger assessment and warning, marine regatta safety and performance monitoring, and remote youth sports viewing (to reduce crowd size during pandemics) and analytics. SCOUT technology will be marketable as an appliqué kit with sensors and software, and also enhance our commercial VisionKit® product. SCOUT will also benefit federal and local emergency management agencies.

FY 2021 PHASE II AWARD WINNER

FIRM:	CVision AI, INC. 81 West Street Medford, MA, 02155
AWARD:	$449,418.00
PHONE:	603-546-5246
E-MAIL:	benjamin.woodward@cvisionai.com
PRINCIPAL INVESTIGATOR (PI):	Benjamin Woodward
TITLE OF PROJECT:	Automated Filet Identification
SUBTOPIC NUMBER:	9.2.05

TECHNICAL ABSTRACT:

In the United States and other countries where seafood is often sold in the filet form there is an incredible amount of illegal mislabeling of market species for economic gain. This is made possible because the average consumer cannot identify fish species in the marketplace, especially in filet form. One seafood fraud study by Oceana reported the mislabeling of seafood at 33% in the United States. To solve this problem, we will develop a species identification methodology based on visible imagery that relies on commodity hardware such as tablets and smartphones. The algorithm, deployed in a user-friendly mobile application, will use efficient deep neural networks trained on a large amount of filet imagery started during phase I and expanded in phase II in collaboration with two New England seafood companies: Blue Harvest Fisheries and Gulf of Maine Sashimi. Our expanded dataset will include more fish species and more images per species. Building off encouraging performance achieved in phase I, the algorithm will continue to be improved both in terms of classification accuracy and model calibration which will give users of the application an understanding of how confident the algorithm is in any decision that is made.

SUMMARY OF ANTICIPATED RESULTS:

Our mobile application will be targeted toward three markets: seafood industry supply chain, consumers, and government. The primary competition for this product utilizes DNA or spectroscopy for fish identification, both of which are comparatively slow, expensive, and logistically challenging. During this effort we will achieve a minimal viable product (MVP) which we will use to raise significant funding to more fully develop and market the product to meet the business opportunity. Our project team includes New England Marine Monitoring which has significant relationships to viable funding groups, potential users, and experts in marketing and sales strategies in this domain.

FY 2021 PHASE II AWARD WINNER

FIRM:	CFD Research Corporation 6820 Moquin Drive Huntsville, AL, 35806
AWARD:	$499,996.00
PHONE:	256-361-0796
E-MAIL:	elise.schultz@cfdrc.com
PRINCIPAL INVESTIGATOR (PI):	Elise Schultz
TITLE OF PROJECT:	Weather Risk Information and Impacts for Schools Systems Kit
SUBTOPIC NUMBER:	9.3.02

TECHNICAL ABSTRACT:

The vision of a Weather-Ready Nation is achieved through the synthesis of the large number of NOAA products and services into meaningful and actionable information for community stakeholders and individual populations. Many community stakeholders such as school administrators find themselves in high-stakes weather-related decision-making situations where they are left to their self-interpretation of forecast information or model output. This non-specialist self-interpretation can be dangerous and may be influenced by source bias, hype, or other situational-dependent factors and lead to decisions that impact hundreds to thousands of members in our communities. This Phase II effort seeks to address improving the communication of probabilistic and deterministic forecast information used in school system closure decision-making with the prototype development of the Weather Risk Information and Impacts for School Systems Kit (WxRISK) software application. WxRISK provides spatial weather hazard risk information customized to a school district and includes features to use pre-existing school communication channels to relay critical weather forecast information to parents ahead of impactful weather events. This software system will address the Weather Enterprise's goal of public-private partnerships to increase awareness of NOAA products and services and build a more Weather Ready and resilient nation.

SUMMARY OF ANTICIPATED RESULTS:

Commercialization of the Weather Risk Information and Impacts for School Systems Kit (WxRISK) software systems will provide school systems the ability to use location-specific weather information and probabilistic forecast confidence to make more informed decisions as to school closing or delays. Using weather-based decision making will prioritize safety both while proactively closing in advance of impactful weather and by limiting closures or delays; thus, increasing time in the classroom and increasing savings to local economies. The WxRISK model can be expanded to businesses and municipalities for future commercialization potential.

FY 2021 PHASE II AWARD WINNER

FIRM:	AAPlasma, LLC. 1325 S 33rd St., Suite 101 Philadelphia, PA, 19146
AWARD:	$499,919.00
PHONE:	949-838-4311
E-MAIL:	charles@aaplasma.com
PRINCIPAL INVESTIGATOR (PI):	Charles Bailey
TITLE OF PROJECT:	Non-Equilibrium Short-Pulsed Discharge for Removal of Antibiotics and Pathogens from Water used in Aquacultural Facilities
SUBTOPIC NUMBER:	9.1.02

TECHNICAL ABSTRACT:

Seafood consumption in the United States has reached over 50% per capita over the last 25 years with over 75% of total U.S. seafood consumption coming from import. Many of the U.S. seafood import sources are located in tropical areas where bacteria and toxin hazards thrive. This concern is exacerbated by the increasing trade deficit. In 2001, the United States imported $6.8 billion more than exported. Rising levels of worldwide aquacultural activity have led to intensified antimicrobial action, leading to some prophylactic antibiotic use, increasing the proliferation of antibiotic resistant bacteria in aquacultural environments. Additionally, higher stresses on aquacultural facilities has amplified the number of pathogens and organic toxins that threaten fish, bivalves, and other aquatic organisms of interest. Many water treatment processes can lyse bacteria, yet intact remnants of pathogenic genes are often released into the environment, eventually being taken up by other cells through natural transformation.

SUMMARY OF ANTICIPATED RESULTS:

With proof-of-concept validated in Phase I of this project, nonthermal plasma has emerged as a potential solution to this problem with its ability to reduce these residual genetic remnants. In Phase II of this SBIR project, AAPlasma will construct, optimize, and field-test a pilot-scale plasma system capable of treating industrial aquacultural volume.

FY 2021 PHASE II AWARD WINNER

FIRM:	SafetySpect, INC. 10100 Santa Monica Blvd., Suite 300 Los Angeles, CA, 90067
AWARD:	$499,826.00
PHONE:	310-691-3532
E-MAIL:	fvasefi@safetyspect.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Fartash Vasef

TITLE OF PROJECT:	Rapid detection of fish species and quality in the marketplace
SUBTOPIC NUMBER:	9.2.05

TECHNICAL ABSTRACT:

A goal of the “Illegal, Unreported, and Unregulated Fishing Enforcement Act” is to prevent illegally harvested fish from entering our ports and market and to combat illegal, unreported, and unregulated (IUU) fishing. Seafood is highly vulnerable to fraud due to factors such as the similar appearance of many species, variation in prices, complex supply chains, and challenges with supply and demand. Instances of seafood fraud are frequently reported; however, many incidents go undetected and the full extent of seafood fraud is difficult to determine. Existing rapid DNA testing can only detect a single species with each assay. There is a need for technology to rapidly detect mislabeling. The SafetySpect Quality, Adulteration and Traceability (QAT) system delivers innovation in the management of seafood supply chains. QAT provides rapid species identification, ability to incorporate many species (unlike rapid DNA analysis), bypasses sample preparation, and reduces the time and cost of species identification. QAT uses multimode spectroscopy, combining reflectance and fluorescence-based spectral analysis and a fusion AI classification algorithm. During Phase II, we will design and build handheld multimode spectroscopy systems, test them at several nodes in the seafood supply chain and expand the spectral dataset up to 200 fish and shellfish species.

SUMMARY OF ANTICIPATED RESULTS:

The US seafood industry faces unprecedented challenges as consumer preferences change while access to markets is threatened. Growing domestic and export demand by strengthening the US seafood brand is vital to preserve the industry. This project provides new commercial tools for seafood supply chain management that can track seafood species from harvest to market, add quality and freshness assessment with the same hardware platform, and has potential to incorporate the software with current modern cloud-based or blockchain supply management systems. IUU fishing robs nations of up to $23.5 billion annually, undermining fisheries management and cheating legal fishers.

FY 2021 PHASE II AWARD WINNER

FIRM:	Cruyningen Izak van dba LineSpect 20830 Boyce Ln Saratoga, CA, 95070
AWARD:	$499,955.00
PHONE:	408-647-4751
E-MAIL:	ikevc@linespect.com
PRINCIPAL INVESTIGATOR (PI):	Dr. Ike van Cruyningen
TITLE OF PROJECT:	Aircraft Detection 360 Camera and Microphone Array
SUBTOPIC NUMBER:	9.4.02

TECHNICAL ABSTRACT:

Unmanned aerial systems efficiently collect meteorological data for weather forecasting. The FAA currently limits flights to 400 feet altitude but could grant a waiver if the applicant can demonstrate safe equipment and operations. By defining a protected area of operations, the applicant can switch the requirement from visually observing the UAV to detecting crewed aircraft that enter this protected area of operations. The proposed embedded system with six cameras and a microphone array will match human visual and audio capabilities in detecting crewed aircraft to 3200 meters. Building it from commercial off-the-shelf components keeps the mass to less than a kilogram and the price reasonable. The detector will communicate aircraft range and bearing to the autopilot and the remote pilot in command for avoidance maneuvers.

SUMMARY OF ANTICIPATED RESULTS:

The proposed solution will eliminate blind spots of current products and be about one-third the weight and cost. It will find application in linear infrastructure industries such as utility lines, pipelines, roads, and railways; on large farms, mines, and construction projects; for forestry; in scientific wildlife census, environmental monitoring, or remote sensing; and eventually in package delivery. Phase III will support commercialization and initial sales to customers.