Image Credit: Johns Hopkins APL

INSPIRED DISCOVERIES

2020 RESEARCH REPORT

University of Idaho

A MESSAGE FROM THE VICE PRESIDENT

From my first day as VPRED at the University of Idaho, I have witnessed our students, faculty, staff and community members engage in top-tier research, scholarship and creative activities. Every day I see us taking bold steps, building on our accomplishments and growing a robust, externally-funded program that is consistent with top peer research universities.

As you read my fourth annual report, you will see that we continue on this positive trajectory. Our record-breaking annual research expenditures, as reported to the National Science Foundation's Higher Education Research and Development (HERD) Survey, now exceed $113 million. University of Idaho faculty are receiving national recognition for their notable achievements. We continue to train and award degrees to students, building a robust workforce for our state and region. In addition, we continue to find ways to save time and reduce the costs of administering research by exploring and adopting best practices.

It is a privilege to lead our research enterprise, but research is so much more than simply institutional progress; it is how we broaden society's understanding of the world and improve our quality of life. I have been involved in leading a national effort for the Association of Public and Land-grant Universities (APLU) known as Public Impact Research: Engaged Universities Making the Difference. In this effort, we call on our colleagues to adopt "Public Impact Research."

In reading our 2020 Research Report, Inspired Discoveries, a snapshot of this year's achievements and innovations, I invite you to join me in celebrating our journey toward excellence. As we move into 2020, we will continue to elevate the University of Idaho's research profile and provide solutions to problems faced by our state, the nation and the world.

Go Vandals!

Janet E. Nelson, Ph.D.
Vice President for Research and Economic Developement

U of I Dramatically Increases Genomic Sequencing Capacity

In June 2019, U of I was one of the first sites in the world to install the new PacBio Sequel II Genome Sequencer. The Sequel II is the latest development in third generation long read sequencing technology and represents a quantum leap in the quality and quantity of genomic data. PacBio's new instrument can generate sequencing read lengths of up to 170 kilobases and up to 160 gigabases of information per run. This is roughly equivalent to sequencing over 50 human genomes. This new capacity allows U of I researchers to produce much higher quality and larger scale genome assemblies at a dramatically reduced cost.

The research applications of the PacBio Sequel II are numerous and diverse, including preparing DNA libraries from many different organisms, including bacterial pathogens, pipefishes and snails from the Galapagos Islands. The sequence data from these organisms will be used to address research questions in agriculture, evolutionary biology and biomedical research.

The Sequel II is housed in and operated by the Institute for Bioinformatics and Evolutionary Studies Genomics Resources Core and was purchased by a consortium organized by the Center for Modeling Complex Interactions.

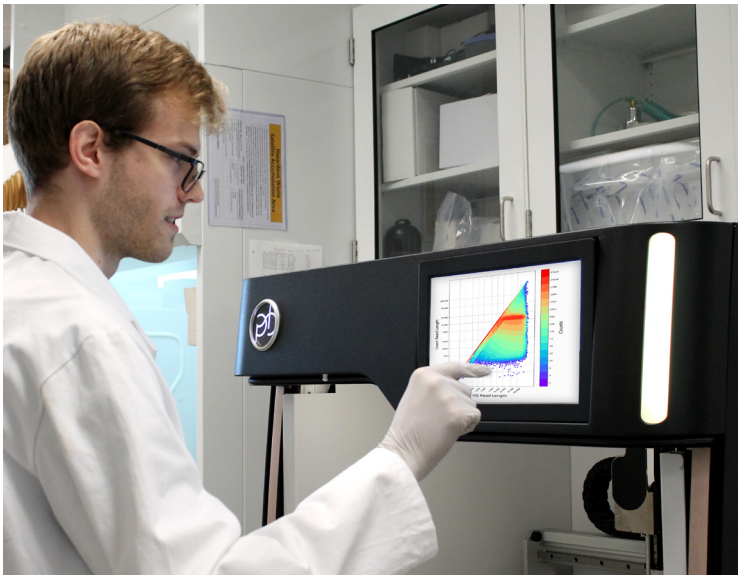


Image Credit: Katy Riendeau

CAFE

Building the nation's largest research dairy has long been a goal for the University of Idaho and industry partners. Together with the Idaho Dairymen's Association (IDA) and members of allied industry, we are moving forward toward building the nation's largest and most advanced research dairy.

The Idaho Center for Agriculture, Food and the Environment, known as **CAFE**, will include a herd of 2,000 cattle and will be located in the heart of the state's dairy producing region. The $45 million project is a public-private partnership between U of I, members of industry and the state of Idaho.

U of I and IDA jointly purchased 640 acres for the research dairy in February 2019. The final project will span three counties in Idaho. The research dairy is located near Rupert, while a complementary discovery complex is located near Jerome and a collaborative food science program will be developed with the College of Southern Idaho in Twin Falls.

CAFE's location, herd size and research scope make it uniquely positioned to address real-world issues facing the dairy and food processing industries. Research at CAFE will explore long-term sustainability in the region by addressing water usage constraints and environmental quality while also supporting the dairy, livestock, cropland and food processing industries.

Plans for CAFE include a research dairy and water and soil health demonstration farm, a discovery complex featuring a public outreach and education center and a food processing pilot plant. The site for the dairy also includes 1,200 additional acres for complementary agronomic research, feed production and nutrient management which will provide engagement with stakeholders who want to better understand the interactions between dairy production and water and soil health.

Leading the Way to a Sustainable Food Processing Industry in Idaho

The State Board of Education Higher Education Research Council (HERC) funded a three-year, $2.1M IGEM award led by Karen Humes. An interdisciplinary team from four colleges including Erik Coats, Armando McDonald and Jae Ryu, spearheaded the proposal, "Sustaining Idaho's Food Industry with an Integrated Approach to Food, Energy, Water and Waste." This project involves supporting Idaho dairies and food processors with management of waste streams, including the recovery of nutrients and valuable byproducts, assisting producers with "just right" applications of water and nutrients on crops, quantifying the connections between water and energy use in our food system and a variety of workforce development initiatives.

Image credit: U of I sharepoint

Uof I found its place in the Innovation Den

The Innovation Collective thinks big about their vision for the future, and it's no secret that the University of Idaho plays a big role. The group converted an abandoned 34,000 square-foot building into a high-tech business incubator in downtown Coeur d'Alene, and the University of Idaho Computer Science (CS) department was one of the first tenants. The U of I CS faculty and staff occupy a 4,500 square-foot unit in the Innovation Den, teaching CS students how to apply artificial intelligence and robotics to the world's toughest problems. The Idaho Technology Council hosted a Technology and Innovation Summit in the Innovation Den that brought together employers of all sizes and entrepreneurs of all ages.

Image Credit: Katie Marshall

Aquaculture Research Institute Makes Leap Forward with new Moscow Facility

The U of I campus was honored to host the ribbon cutting for the newest addition to the Aquaculture Research Institute's (ARI) fish research capacity, the Aquatic Animal Research Facility. The new building contains fish-rearing systems that can be used to study both freshwater and marine species, addressing challenges facing Idaho's aquaculture industry, state agencies and tribal fisheries enhancement activities. It will also provide undergraduate and graduate students with new opportunities to conduct research and develop fish-rearing skills through experiential learning.

With the ever-growing worldwide demand for seafood, aquaculture will play a critical role in providing safe and healthful products for consumers. The facility will utilize recirculating aquaculture systems, presenting the prospect of producing both freshwater fish species without straining water resources, and even producing marine species in land-based farming systems. Research activities will include projects in genetics, nutrition, selective breeding, physiology and health involving many species of marine and freshwater fish.

Image Credit: Johns Hopkins APL

Dragonfly: NASA Rotorcraft Lander Mission to Saturn's Moon Titan

The University of Idaho is part of a team that won the competition to design NASA's latest planetary probe. Professor of Physics Jason W. Barnes is the deputy principal investigator of the mission. U of I alumna Shannon M. MacKenzie (Physics PhD 2017) helped draft the winning proposal and is on the science team as one of the mission's co-investigators.

The spacecraft, named Dragonfly, will visit Titan, a giant ice moon orbiting Saturn. Titan is the only moon with a thick atmosphere. Within that atmosphere, sunlight drives carbon chemistry to produce complex hydrocarbon molecules. When those hydrocarbons mix with liquid water from Titan's vast interior ocean or in impact melt pools on the moon's surface, the resulting primordial soup resembles the shallow pools in which life formed on Earth four billion years ago. Because geologic activity has erased evidence of how life formed here, Dragonfly will explore Titan to search for chemical evidence that life may have formed there, and, if it hasn't, how far prebiotic chemistry has progressed toward becoming biology.

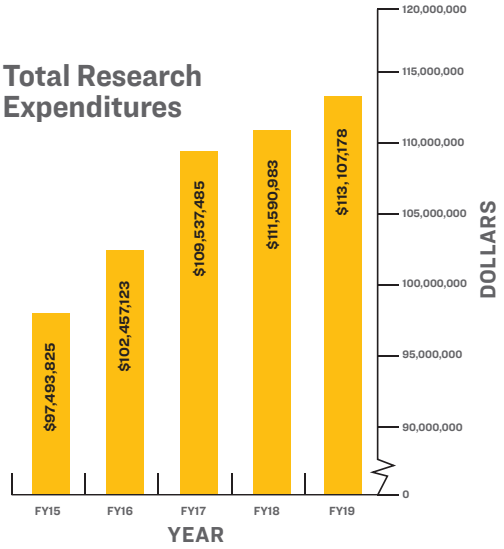
With a budget of around $1 billion, NASA's New Frontiers program represents the largest single competed scientific opportunity offered by the U.S. Government. Dragonfly now proceeds to its final design phase, followed by fabrication and launch on a rocket from Florida in April 2026. After cruising through space for over eight years, it will arrive at Titan in December 2034, landing on sand dunes near the moon's equator.

Instead of driving on wheels like a Mars rover, Dragonfly uses eight propellers arranged in an over-under dual-quadcopter configuration to fly through Titan's thick atmosphere and under its low gravity (1/7th Earth's). After landing, it will embark on one of the most epic adventures in human history, flying between interesting sites on the surface of this alien moon for just under three Earth years.

RESEARCH ACTIVITY AND EXPENDITURES

Expenditures as reported to the National Science Foundation's Higher Education Research and Development (HERD) Survey. FY19 figures have been submitted but not approved.

Total Research Expenditures



Summary of Sponsored Project Activity

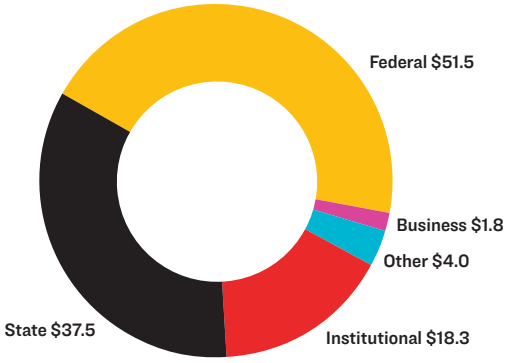
SPONSORED PROJECTS	NUMBER	AMOUNT
Proposals Submitted	960	$252,216,539

AWARDS RECEIVED	NUMBER	AMOUNT
New Awards	476	$57,604,547
Other Actions	239	$29,491,562
TOTAL AWARDS	**715**	**$87,096,109**

Total Research Expenditures by Funding Source

(Dollars in Millions)

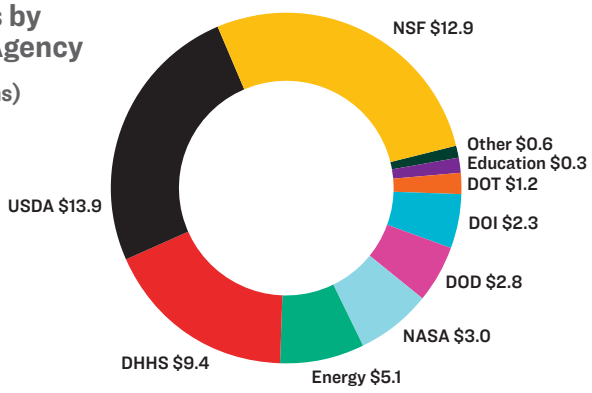
TOTAL $113.1



Federal Research Expenditures by Sponsoring Agency

(Dollars in Millions)

TOTAL $51.5



Technology Commercialization

ACTIVITY	NUMBER
Invention Disclosures	26
Licenses	4
Patent Applications	4
Issued Patents	0

Sponsored Project Activity by College and Unit (Dollars in Thousands)

SPONSORED PROJECTS	# OF AWARDS	AWARDED AMOUNT	EXPENDITURES	# OF PROPOSALS	PROPOSED AMOUNT
College of Agricultural and Life Sciences	245	$17,402	$15,704	340	$68,156
College of Letters, Arts and Social Sciences	15	$103	$274	31	$3,052
College of Art and Architecture	17	$991	$1,786	28	$6,325
College of Business and Economics	7	$22	$869	15	$28
College of Education, Health and Human Sciences	50	$13,957	$12,610	39	$18,886
College of Engineering	84	$12,327	$9,577	137	$42,576
College of Graduate Studies	2	$136	$120	2	$1,489
College of Law	3	$183	$268	4	$252
College of Natural Resources	103	$9,978	$11,283	119	$23,564
College of Science	64	$15,127	$13,014	78	$41,374
General Library	2	$99	$81	1	$100
Academic and Student Affairs	24	$1,029	$1,051	12	$1,349
Facilities Management	0	$0	$0	2	$281
University Outreach	35	$4,798	$3,941	69	$13,745
Office of Research and Economic Development	1	$165	$0	3	$519
Research Centers and Institutes	54	$10,181	$7,818	63	$27,328
WWAMI Med Educ/WI Reg Vet Medicine	9	$598	$576	17	$3,193
TOTAL AWARDS	**715**	**$87,096**	**$78,972**	**960**	**$252,217**

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FACULTY AND STUDENT HIGHLIGHTS

Presidential Early Career Award for Scientists and Engineers

Tara Hudiburg, associate professor in the department of Forest, Rangeland and Fire Sciences, was recognized for her excellence as a leader and early career scientist by the National Science Foundation (NSF). The PECASE award is the highest honor for early career scientists and engineers awarded by the U.S. Government, and is conferred at the White House each year.

American Association for the Advancement of Science Fellow

Janet Nelson, vice president for research and economic development, was recognized for her significant contributions to the field of organic chemistry and for her decades of national leadership across academic, government, not-for-profit organization and industry communities.

Goldwater Scholarship

Samuel Meyers, a mathematics and physics undergraduate student in the College of Science, was a 2019 recipient of this most prestigious scholarship for undergraduate students majoring in natural sciences, engineering or mathematics, for his research examining exoplanets and investigating planetary formation. He will receive up to $7,500 per year for up to two years. This scholarship is made possible by the Barry Goldwater Scholarship and Excellence in Education Program.

National Science Foundation Faculty Early Career Development (CAREER) Awardees

Elizabeth Cassel, in the College of Science, received $729,932 to develop a new method for more accurately measuring the timing and magnitude of elevation and terrain changes in the North American Cordillera, while recruiting low-income and underrepresented high school students to participate in this research.

Michael Strickland, in the College of Agricultural and Life Sciences, received $651,698 to determine the effects of agricultural antibiotics on soil food webs and the ecosystem, and to reach out to local Idaho middle schools for students to participate in this project.