



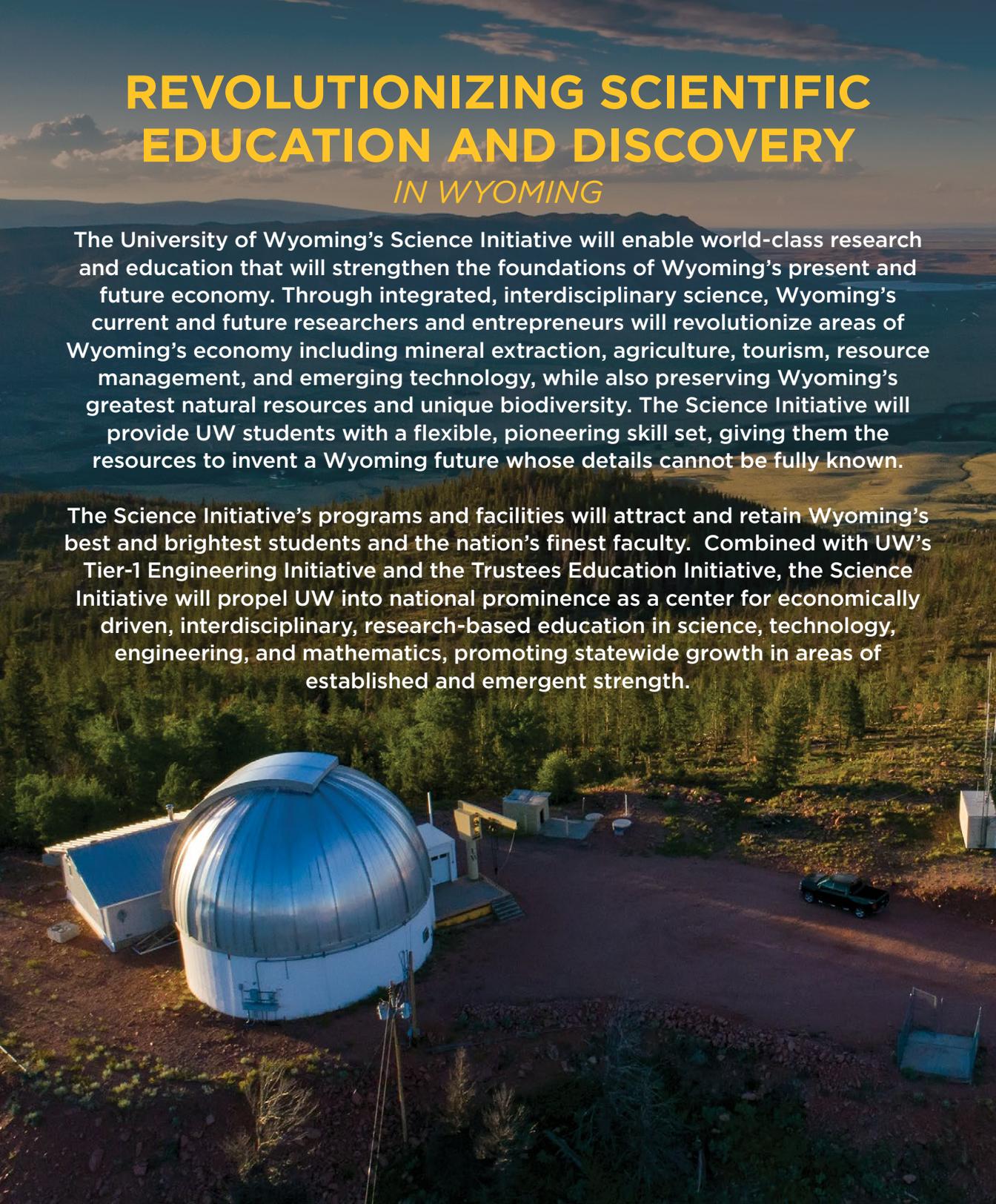
     **UW TOP-TIER
SCIENCE
INITIATIVE**
UNIVERSITY OF WYOMING

PROGRAMS AND FACILITIES UPDATE

REVOLUTIONIZING SCIENTIFIC EDUCATION AND DISCOVERY *IN WYOMING*

The University of Wyoming's Science Initiative will enable world-class research and education that will strengthen the foundations of Wyoming's present and future economy. Through integrated, interdisciplinary science, Wyoming's current and future researchers and entrepreneurs will revolutionize areas of Wyoming's economy including mineral extraction, agriculture, tourism, resource management, and emerging technology, while also preserving Wyoming's greatest natural resources and unique biodiversity. The Science Initiative will provide UW students with a flexible, pioneering skill set, giving them the resources to invent a Wyoming future whose details cannot be fully known.

The Science Initiative's programs and facilities will attract and retain Wyoming's best and brightest students and the nation's finest faculty. Combined with UW's Tier-1 Engineering Initiative and the Trustees Education Initiative, the Science Initiative will propel UW into national prominence as a center for economically driven, interdisciplinary, research-based education in science, technology, engineering, and mathematics, promoting statewide growth in areas of established and emergent strength.



PILLARS OF THE SCIENCE INITIATIVE



Advance Discovery

Elevate UW core science programs to national prominence with facilities and programming that will attract and retain national-level grant funding and high-quality undergraduate students, graduate students, and faculty. High-performing people, programming, and facilities will push UW to the frontiers of science and enable UW to tackle important interdisciplinary problems.



Improve Student Learning

Comprehensively transform UW science education by training college educators in innovative active learning techniques and providing students with transformative research experiences in top-tier laboratories.



Create Economic Vitality

Strengthen and diversify Wyoming's economy by providing a highly trained, creative workforce in frontier interdisciplinary sciences and technologies. UW will advance competitive scientific research that will directly support economic development through creation of new companies and support to Wyoming industries.

SIGNATURE PROGRAMS AND FACILITIES OF THE SCIENCE INITIATIVE

Learning Actively Mentoring Program



Wyoming Research Scholars Program



Science Initiative Roadshow



Faculty Innovation Grant Program

PhD Scholars Program



Student Collaborative Research, Outreach,
& Learning Laboratory



Center for Advanced Scientific
Instrumentation

LEARNING ACTIVELY MENTORING PROGRAM (LAMP)

 UWYO.EDU/LAMP

LAMP is a comprehensive, sustained mentoring and professional development program with an emphasis on how to best adopt active learning strategies in large-scale active learning classrooms at UW and in classrooms across the state's community colleges.

PROGRAM GOALS

1. Improve student retention, success, and engagement in STEM classrooms.
2. Enable all new and most existing STEM teaching faculty and teaching assistants at UW to become trained in active learning strategies by 2022.
3. Conduct research on active learning in STEM classrooms to investigate relationships between teaching practices and student success, literacy, engagement, and inclusion.
4. Establish professional development and collaboration opportunities for science instructors across the state, including community college instructors and K-12 teachers, to improve learning experiences for all Wyoming students.

The **LAMP Fellows Program** is an immersive, year-long educational development opportunity designed to facilitate instructors' incorporation of active learning techniques into the STEM courses they teach at UW and at community colleges across the state.

The **LAMP Learning Assistant Program** provides undergraduate and teaching certificate students with opportunities to assist teaching in large introductory science courses at UW taught in active learning classrooms.

NEW ACTIVE LEARNING CLASSROOM TO BE BUILT IN THE SCIENCE INITIATIVE BUILDING

A large-scale, state of the art, 200-seat active learning classroom, located in the Science Initiative building, will provide the setting for highly interactive instruction

for core science introductory courses in biology, chemistry, and physics.



"After participating in [the LAMP Fellows Program] I learned how to plan coherent curriculum with appropriate assessment... When I implemented active learning strategies in my physics course I saw an increase in test scores between the years... The impact that LAMP has had on me is pretty much immeasurable."

- Michelle Mason

(Physics and Astronomy PhD student, 2016-2017 LAMP Fellow)



LAMP HAS
TRAINED
97 INSTRUCTORS
FROM **5 WYOMING**
INSTITUTIONS IN
ACTIVE LEARNING
TECHNIQUES

"Being part of the [LAMP Fellows Program] has changed my outlook on being an educator. Although I have formal training in education, it wasn't until I joined the LAMP program that I saw how educational research could be used to better educate and inspire our students."

- Michele Larson (LIFE Program Faculty, 2016-2017 LAMP Fellow)

WYOMING RESEARCH SCHOLARS PROGRAM (WRSP)

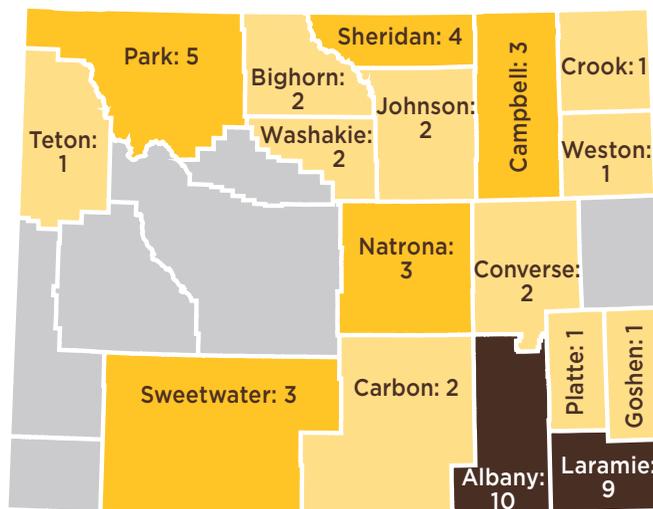
 UWYO.EDU/WRSP

WRSP pairs undergraduate students with faculty mentors to participate in their own cutting-edge research project starting as early as their freshman year. Research experiences through WRSP build confidence and competence in young scholars at a formative stage in their training.

PROGRAM GOALS

1. Attract high-achieving high school graduates and community college transfer students to UW.
2. Retain promising students in the sciences at UW through early involvement in hands-on science research, department seminars, and public outreach events.
3. Pair talented students with a faculty mentor who can model the scholarship, teaching, service, and outreach activities of a professional scientist.
4. Develop transferable professional skills such as science writing, data analysis, and oral communication through participation in research and public outreach events.

Where are the research scholars from?

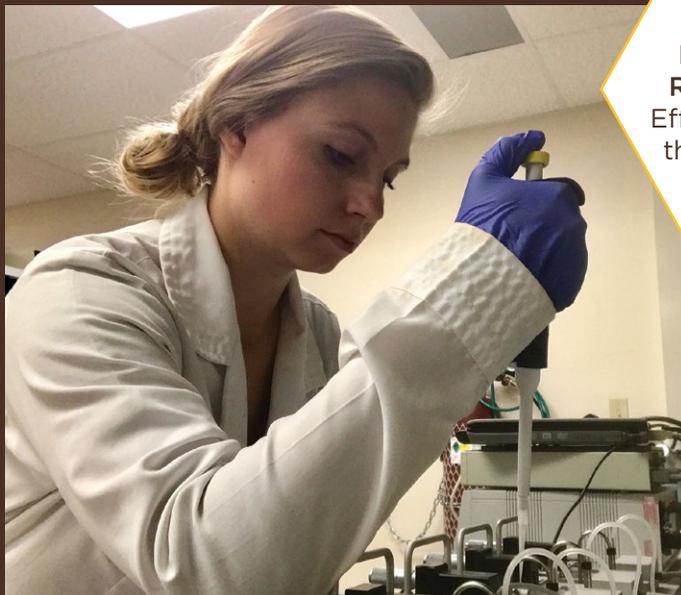


WRSP HAS PROVIDED
UNDERGRADUATE
STUDENTS FROM
**17 WYOMING
COUNTIES**



WITH **TRANSFORMATIVE,
CUTTING-EDGE**
RESEARCH EXPERIENCES

WRSP SCHOLAR PROFILES



Olivia Glassock
Buffalo, WY
B.S. Kinesiology
Research Project:
Effects of obesity on
the cardiovascular
system

"The state of Wyoming has done an amazing job supporting us. Keep promoting undergraduates doing research. It opens our minds to a whole new world we never would have gotten to see otherwise."



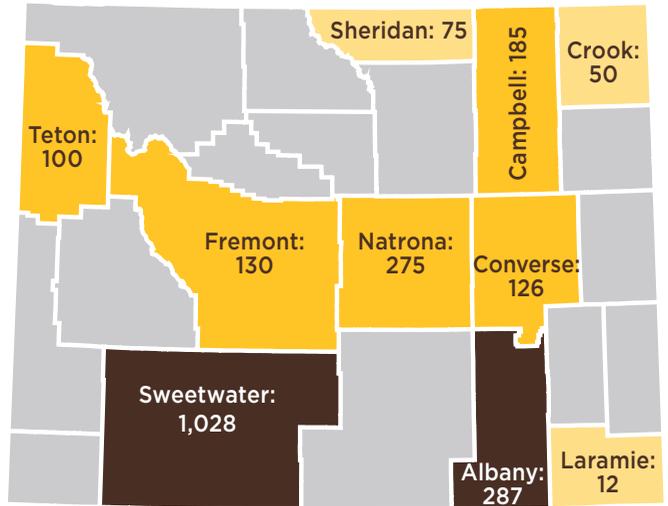
Logan Fairbourn
Cheyenne, WY
B.S. Microbiology
Research Project:
"Bacterial cellulose:
determining fiber
properties and surmising
application potentials
as they relate to the
textile industry"

"Doing research through the Science Initiative helped me advance my understanding of applied microbiology; even better, it pushed me to become a better scientist in the process."

SCIENCE INITIATIVE ROADSHOW

Teams of undergraduate and graduate students from UW, including WRSP Scholars and LAMP Learning Assistants, travel throughout the state facilitating hands-on learning in K-12 STEM classrooms using active learning techniques through the Science Initiative Roadshow. The Roadshow exposes students and teachers from around the state to innovative active learning techniques and creates links between UW and schools across the state to improve STEM teaching statewide.

Wyoming counties and number of K-12 students served, 2018-2019



THE SCIENCE INITIATIVE ROADSHOW
HAS REACHED **2,300 K-12 STUDENTS**
IN **12** WYOMING COMMUNITIES
SINCE 2018

2018-2019 ROADSHOW HIGHLIGHTS



Douglas rural school districts (grades K-8) - November 9, 2018

The Science Initiative Roadshow brought active learning to 66 students in grades K-8 from rural school districts near Douglas. Students learned about the chemistry of ocean acidification, the ecosystems of plant rhizospheres (communities of roots), and adaptations of the Asian Longhorn beetle.

"The sessions with our students were enriching. Teachers, just like students, learned so much from your visit that we can apply within our daily lessons. This program helps to strengthen science in our schools and also gives students models (of your UW students) to look at in order to help our students frame and plan their own futures!"

— Mrs. McGuire, teacher from Dry Creek Elementary School in Bill, WY

Rock Springs High School - April 23, 2019

Three teams of student researchers from UW facilitated hands-on learning with physics, biology, environmental science, and mathematics classes, reaching 450 students. One team helped students create enclosed ecosystems called Winogradsky columns. The high school students used microscopes to observe microbial life in the column and drew the biogeochemical cycling occurring in different layers.



"I loved all the hands-on work they let us take part in. They didn't only show and teach us about these things, they let us use microscopes and look at interesting things ourselves. It was a great experience!"

— Student

THE SCIENCE
INITIATIVE
AWARDED
\$1 MILLION
IN SEED GRANTS TO
13 INTERDISCIPLINARY
UW FACULTY TEAMS
IN 2019



FACULTY INNOVATION GRANT PROGRAM

In March of 2019, the Science Initiative launched a pilot version of the Faculty Innovation Grant Program, designed to stimulate and bolster submission of competitive interdisciplinary grant proposals to federal agencies.

These seed grants are expected to encourage 30+ competitive grant proposals over the next 2 years to federal agencies including the National Science Foundation (NSF), Department of Energy (DOE), Department of Defense (DOD), United States Department of Agriculture (USDA), National Institutes of Health (NIH), and United States Geographical Survey (USGS). Similar programs at other universities typically yield a 20 to 1 return on investment.

When fully funded, the program will award \$600,000 annually.

PHD SCHOLARS PROGRAM

The PhD Scholars Program will train the next generation of scientists by providing access to the newest and most advanced scientific facilities in the region with mentorship by some of the top faculty scientists in the world. The PhD Scholars Program will do the following:

1. Attract high-quality graduate students to the University of Wyoming.
2. Increase the number and quality of PhD students graduating from UW to bring Science Initiative academic programs to top-quartile status.
3. Train the next generation of leading scientists with skills: 1) to address challenging and relevant interdisciplinary problems, 2) to pursue successful careers in business and industry, governmental, and non-governmental organizations, and academia, and 3) to conduct effective outreach to citizens of the state and nation.
4. Stimulate an increase in successful research grant proposals from interdisciplinary researchers.
5. Provide hands-on mentorship for WRSP scholars.
6. Reduce average time-to-degree for a UW PhD.

The PhD Scholars Program will continually provide funding for 20 prestigious PhD awards within the core five Science Initiative departments. Each PhD student will undergo training and demonstrate competency in outreach and will perform one semester of active learning classroom teaching (through LAMP) and/or undergraduate research mentorship (through WRSP), in addition to performing doctoral research.

STUDENT COLLABORATIVE RESEARCH, OUTREACH, & LEARNING LABORATORY (SCROLL)

SCROLL, a component of the new Science Initiative building, will include:

1. Interdisciplinary laboratory space and computational labs that can be used by undergraduate students to conduct individual and course-based research.
2. A 30-seat active learning classroom that will serve as a training space to instruct LAMP Fellows, LAMP Learning Assistants, and Science Initiative Roadshow student researchers in active learning techniques.
3. Space to facilitate in-reach visits from Wyoming K-12 schools.
4. A collision space where students can study and interact more informally with peers across disciplines, fostering the creation of new ideas and enhancing student life and learning outcomes.

Course-Based Undergraduate Research Experiences (CUREs)

SCROLL will also provide space for Course-Based Undergraduate Research Experiences (CUREs), allowing hundreds of UW undergraduates to participate in hands-on research through their classes. Individual research fellowships are competitive and limited in number, but CUREs will enable students of all experience levels to engage in research as a part of their degree requirements. Each CURE will be taught as a multi-course, sequential series, designed to enable problem-based active learning through research. Student research will occur in the laboratory, field, and community and will incorporate both facilitated and independent projects, with instructors and subject matter experts coaching student researchers.



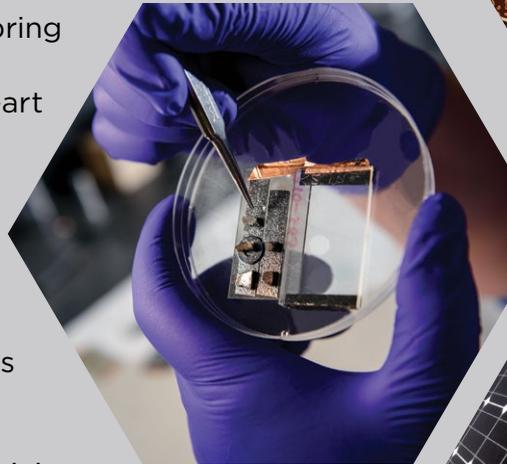
CENTER FOR ADVANCED SCIENTIFIC INSTRUMENTATION (CASI)

Located in the Science Initiative building, CASI will bring together UW's elite imaging scientists, their student teams, and unique instrumentation in a state-of-the-art staffed laboratory, allowing researchers to achieve unprecedented sensitivities and efficiencies in probing the fundamental interactions among atoms, molecules, and cells that underlie all next-generation technologies.

CASI's research capabilities and training opportunities will attract high-achieving students from across the globe. Expert imaging staff will train these student researchers in cutting-edge microscopy techniques, giving them the skills to succeed in their future careers.

CASI's instrumentation will allow researchers to design, control, and exploit nanoscale materials and devices, giving researchers the tools to advance critical technologies related to fossil fuel conversion/upgrade, fuel cell design, and photovoltaics (solar energy). Instrumentation for biological imaging will also provide cutting-edge capabilities to researchers across several departments at UW involved in biological and health-related research.

CASI will employ a sustainable operational model and will be a locus for private and corporate investment in imaging science, enabling collaborations with researchers from other institutions and attracting outside contract-based users.



SCIENCE INITIATIVE BUILDING UPDATE

Construction has begun on the Science Initiative building with an anticipated opening in Fall of 2021. In addition to CASI, the large-scale active learning classroom, and SCROLL, the building will include state-of-the-art plant growth and laboratory animal research facilities. These facilities, along with cutting-edge cell, organismal, and earth systems biology laboratories, will bring together UW's world-recognized scientists and students into a single collaborative space to foster innovation and convergent research activities.

"The advanced facilities and laboratories planned for the Science Initiative Building will place UW near the top among regional and peer institutions for capability in life sciences and imaging research. The building will be a hub for fundamental discovery and student-centered research that will ripple across campus for years, and serve as a model for future research and teaching innovation at UW."

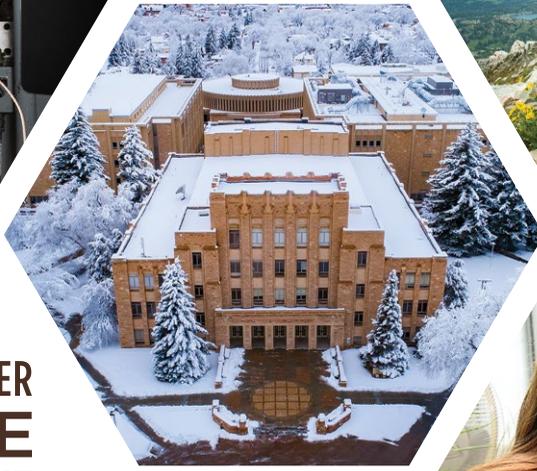
— David Williams, UW Botany Department Head





WHAT'S NEXT? PLANS FOR PHASE II OF THE SCIENCE INITIATIVE

- Renovation of vacated undergraduate teaching labs and teaching support rooms in the Biological Sciences building and Physical Sciences building.
- Full renovation of the Aven Nelson building to accommodate collection growth for UW's nationally prominent herbaria.
- Renovation of the vacated molecular biology wing of the Animal Science-Molecular Biology building to accommodate needed expansion for the Animal Science department.
- Replacement of the Wyoming Infrared Observatory (WIRO) on the summit of Jelm Mountain with the Wyoming Astronomical Observatory (WAO). WAO will host a 4.3-meter telescope, which would rank as the 4th largest in the country and among the 20 largest in the world.




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 University of Wyoming Science Initiative