

Undergraduate Guide  
for the major in

Natural Resources



School of Natural Resources and the  
Environment

## Welcome to the School of Natural Resources

People are increasingly cognizant of the impacts human activity has on our plant, animal, and water resources at local and global scales, and aware of the need to mitigate those impacts. It is a great time to major in Natural Resources, where you can bring to bear your enthusiasm and talents to tackle challenging problems in science and management. You will interact with students, faculty, and staff who share your passion for understanding the world and affecting positive change. And you will learn how to integrate information about science, management, policy, economics, and planning to develop solutions to interdisciplinary challenges in natural resources conservation and management.

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### Important Contacts

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The University of Arizona is a big place. It qualifies as a small town. Navigating the bureaucracy and jumping through hoops can be challenging. Here are some good people to talk to if you have questions about what to do.

#### **General School Information**

Katie Hughes, Academic Advisor

621-7260, BSE 325D, khughes@email.arizona.edu

Katie is the go to person for academic advising, learning about internships, finishing your degree check, learning about research/academic opportunities, and discussing University policy.

Dr. William Matter, Assistant Director for Academic Programs

621-7280, BSE 319, wmatter@ag.arizona.edu

Dr. Matter can do all the stuff Katie can do, and more. If Katie can't help you, or she isn't around, see Dr. Matter. In addition, he's a good person to talk to if you need faculty guidance.

#### Faculty Advisors

Every student should have a faculty advisor. If you don't remember who your advisor is, email Katie.

#### **College of Agriculture and Life Sciences**

Nancy Rodriguez, Coordinator, Academic Advising

621-3613, Forbes 211, nancyr@email.arizona.edu

Nancy can help you with general education advising, and serves as a contact with the College if you are butting up against University policy. If it is a college-level question, see her first. Also, she can help with transferring of course work.

Mary Venezia, Academic Advisor

621-3616, Forbes 211, venezia@cals.arizona.edu

Mary can also help you with general education, transfer credit, and college policy.

Julie Adkins, Academic Advisor/Degree Certification

621-0975, Forbes 211D, jadkins@email.arizona.edu

When it's time to do your degree check (also called a degree or senior audit), Julie will be your new best friend. Also, she can help with transferring of course work.

## Options within the Natural Resources Major

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We have one major, but lots of options. You will earn a B.S. in Natural Resources, and choose an area of specialty. Each of our options provides the background required for entry-level positions with various agencies and organizations involved in natural resources conservation and management, and for admission to graduate programs. Work with your advisor to tailor your program so that you prepare yourself for the career you want.

### **Conservation Biology Option**

The Conservation Biology Option encourages students to study conservation across taxa (invertebrates, vertebrates, plants, fungi, microbes) and across scientific disciplines (ecology, genetics, evolution), supported by courses in policy, planning, and economics. It provides an option to pursue careers in education, law, policy, and other non-scientific approaches to conservation. Students will have the knowledge, skills, and experiences for careers as conservation biologists, conservation planners, ecologists, environmental educators, researchers, or resource managers. Graduates will be equipped to pursue graduate degrees, work for government agencies or non-profit organizations -- such as The Nature Conservancy and Land Trusts -- or become involved in environmental law or policy. Students completing this option could be qualified for Civil Service positions under the titles Ecologist, Fish and Wildlife Biologists, and Botanist.

### **Ecology and Management of Rangelands Option**

The Ecology and Management of Rangelands Option examines the biological and physical processes of ecosystems and application of this knowledge to sustainable use of range and open lands. This is a great opportunity for students with an interest in plant ecology, plant-animal interactions, and management of landscapes. Technical courses in range management and related natural resource subjects stress the application of basic concepts to management planning and practices. Selection of courses in wildlife or fisheries science, watershed hydrology and management, soil and water science, animal and plant science, or agricultural and resource economics can enhance qualification for certain types of employment. Many of these courses involve hands-on work in the rangelands of Arizona. Range management professionals may inventory soils, plants, and animals; develop resource management plans with agencies or private firms; help restore degraded lands; or manage a preserve or ranch. Because of their broad, interdisciplinary background, students are employed by the U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, Natural Resources Conservation Service, state land departments, and others.

### **Watershed Management and Ecohydrology Option**

Watershed Hydrology and Management is the art and science of managing the natural resources of wild land drainage basins, with special consideration given to the quantity and quality of the water resource. Watershed managers are concerned with sustained productivity of such products as water, wood, forage, wildlife, and recreational opportunities. Watershed management graduates are qualified for careers in organizations and businesses concerned with integrated land management, the environment, or water resources. Many are employed as hydrologists. Employers include federal or state agencies, municipal water districts, private consulting firms, and conservation organizations. The study of watershed management emphasizes the combined physical, biological, and management aspects of natural resources, with special attention to water. Students receive specialized course work in subjects

specific to the management of surface water resources. The curriculum also emphasizes social science, communication skills, and procedures for analyzing policy, as these tools are becoming increasingly important components of successful resource management activities.

### **Wildlife and Fisheries Conservation and Management**

Undergraduates may pursue an option in either Wildlife Conservation and Management or Fisheries Conservation and Management. Wildlife science and fisheries science are the study of wild animals, fish, and other aquatic organisms. This involves the study of their biology and the interrelationships with each other, with humans, and with the physical and biological environment that makes up their habitat. Managers and biologists are concerned with maintaining species diversity, improving conditions for declining and endangered species, managing populations that are hunted or fished, conducting law enforcement, and coordinating other resource management activities to maintain environmental quality. Some professionals may be active in surveys of plants and animals, operation and management of refuges and hatcheries, pollution monitoring and testing, design and conduct of research, habitat improvement, pest management, environmental education, or computer modeling. Professionals in wildlife and fisheries are employed by federal agencies-the Fish and Wildlife Service, National Park Service, Bureau of Indian Affairs, Bureau of Land Management, and Forest Service, for example-and by state game and fish departments or departments of natural resources.

## UNDERGRADUATE ADVISING IN SNRE

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Every student is assigned to a faculty advisor. You can see Dr. Bill Matter or Katie Hughes for general advising. Talk to your faculty advisor about major course substitutions, choosing technical electives, career exploration, and opportunities for practical experience in your field. If you DON'T have an advisor, see Dr. Matter or Katie Hughes to have one assigned from the list below.

\* Indicates program chair.

### General Advising

Dr. William Matter		Katie Hughes – Academic Advisor
621-7280		621-7260
BSE 319		BSE 323
<a href="mailto:wmatter@ag.arizona.edu">wmatter@ag.arizona.edu</a>		<a href="mailto:khughes@email.arizona.edu">khughes@email.arizona.edu</a>

### Conservation Biology Option (any SNRE faculty member can advise)

Dr. Steve Archer	626-8791	BSE 316	<a href="mailto:sarcher@ag.arizona.edu">sarcher@ag.arizona.edu</a>
Dr. Kevin Bonine	626-0092	BSE 113	<a href="mailto:kebonine@email.arizona.edu">kebonine@email.arizona.edu</a>
Dr. John Koprowski	626-5895	BSE 306	<a href="mailto:squirrel@ag.arizona.edu">squirrel@ag.arizona.edu</a>
Dr. Bill Shaw	621- 7265	BSE 216	<a href="mailto:wshaw@ag.arizona.edu">wshaw@ag.arizona.edu</a>
Dr. Bob Steidl	626-3164	BSE 305	<a href="mailto:steidl@ag.arizona.edu">steidl@ag.arizona.edu</a>

### Rangeland Ecology & Management Option

Dr. Steve Archer	626-8791	BSE 316	<a href="mailto:sarcher@ag.arizona.edu">sarcher@ag.arizona.edu</a>
Dr. Jeff Fehmi	621-7268	BSE 115A	<a href="mailto:jfehmi@u.arizona.edu">jfehmi@u.arizona.edu</a>
Dr. Larry Howery	621-7277	BSE 301D-1	<a href="mailto:lhowery@ag.arizona.edu">lhowery@ag.arizona.edu</a>
*Dr. Mitch McClaran	621-1673	BSE 112	<a href="mailto:mccclaran@u.arizona.edu">mccclaran@u.arizona.edu</a>
Dr. George Ruyle	621-1384	BSE 302	<a href="mailto:gruyle@ag.arizona.edu">gruyle@ag.arizona.edu</a>
Dr. Steve Smith	621-5325	BSE 211	<a href="mailto:azalfalf@ag.arizona.edu">azalfalf@ag.arizona.edu</a>

### Watershed Management & Ecohydrology Option

Dr. Dave Breshears	621-7259	BSE 226E	<a href="mailto:daveb@ag.arizona.edu">daveb@ag.arizona.edu</a>
Dr. Don Falk	626-7201	BSE 207	<a href="mailto:dafalk@email.arizona.edu">dafalk@email.arizona.edu</a>
*Dr. Phil Guertin	621-1723	BSE 204C	<a href="mailto:phil@snr.arizona.edu">phil@snr.arizona.edu</a>
Dr. Shirley Papuga	621-3803	BSE 209	<a href="mailto:kurc@cals.arizona.edu">kurc@cals.arizona.edu</a>

### Wildlife & Fisheries Conservation & Management Options

Dr. Dave Christianson	626-7621	BSE 202	<a href="mailto:dchristianson@email.arizona.edu">dchristianson@email.arizona.edu</a>
Dr. John Koprowski	626-5895	BSE 306	<a href="mailto:squirrel@ag.arizona.edu">squirrel@ag.arizona.edu</a>
*Dr. Bill Mannan	621-7283	BSE 201	<a href="mailto:mannan@ag.arizona.edu">mannan@ag.arizona.edu</a>
Dr. Bill Matter	621-7280	BSE 319	<a href="mailto:wmatter@ag.arizona.edu">wmatter@ag.arizona.edu</a>
Dr. Bill Shaw	621- 7265	BSE 216	<a href="mailto:wshaw@ag.arizona.edu">wshaw@ag.arizona.edu</a>
Dr. Bob Steidl	626-3164	BSE 305	<a href="mailto:steidl@ag.arizona.edu">steidl@ag.arizona.edu</a>

### Cooperative Fish & Wildlife Research Unit - USGS (Not advisors: info. only)

Dr. Scott Bonar	621-1193	BSE 210	<a href="mailto:sbonar@ag.arizona.edu">sbonar@ag.arizona.edu</a>
Dr. Melanie Culver	6263775	BSE 213	<a href="mailto:culver@ag.arizona.edu">culver@ag.arizona.edu</a>

## Faculty Interests

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- Steve Archer** Terrestrial ecosystem science and plant ecology  
**Scott Bonar** Aquatic ecology, fisheries and endangered species management  
**David Breshears** Global change ecohydrology, die-off & erosion  
**David Christianson** population biology, predator-prey ecology, behavioral ecology  
**Melanie Culver** Conservation genetics  
**J. Edward deSteiguer** Public lands policy, resource economics, renewable energy  
**Don Falk** Fire and ecology, dendroecology, restoration ecology  
**Jeffrey Fehmi** Land reclamation, restoration, invasive species  
**Larry Fisher** Ecosystem management, environmental conflict resolution, international conservation  
**Rachel Gallery** Plant-microbe community ecology, diversity, and function  
**Gregg Garfin** Drought, climate change, adaptation, policy  
**H. Randy Gimblett** Patterns of visitor use and impacts  
**D. Phillip Guertin** GIS, watershed hydrology and management  
**Leslie Gunatilaka** Natural products chemistry, metabolite synthesis  
**Larry Howery** Foraging behavior of large ungulates, noxious weeds  
**Charles Hutchinson**, Geography, remote sensing  
**John Koprowski** Small mammal ecology, conservation biology  
**Laura Lopez-Hoffman** Transboundary conservation, ecosystem services & policy  
**R. William Mannan** Avian ecology and urbanization  
**Stuart Marsh, Interim Director** Land use and cover change  
**William J. Matter, Associate Director** Stream & fish ecology, population regulation  
**Mitch P. McClaran** Rangeland ecology, rangeland policy  
**Russell Monson** Forest carbon budgets  
**David Moore** Global change biology, ecosystem modeling, plant ecophysiology  
**Istvan Molnar** Microbial biosynthetic engineering  
**Barron Orr** Geospatial technology  
**Shirley Papuga** Surface water, land-atmosphere interactions, ecohydrology  
**David Quanrud** Water quality, reclamation, wastewater treatment  
**George B. Ruyle** Range livestock production, grazing management, livestock-wildlife interactions  
**Cecil Schwalbe** Amphibian and reptile ecology and management  
**William W. Shaw** Socio-political aspects natural resources  
**Steve Smith** Rangeland plant ecology and genetics  
**Robert J. Steidl** Quantitative ecology, conservation biology  
**Willem JD van Leeuwan** Remote sensing, phenology, biogeography, multi-scale  
**Charles Van Riper** Ornithology, wildlife diseases, conservation, ecology  
**Craig Wissler** Geographic Information Science

## Research & Internship Opportunities/Financial Assistance

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There are many ways to become involved in research as an undergraduate, something you should seriously consider. Work with an advisor to discuss what's best for you. If you aren't on our listserv, email Katie Hughes to be subscribed to learn about research and internship opportunities.

### **Undergraduate Biology Research Program (UBRP)**

UBRP involves students in science through biological research. Students are paid for their research efforts, develop an understanding of scientific method, and acquire skills necessary to be successful in post-graduate studies.

<http://ubrp.arizona.edu>

### **NASA Space Grant**

The UA/NASA Space Grant Program hires undergraduate (sophomores-seniors) research interns for a mentored research experience. Fields of inquiry include exploration, earth observations and our changing environment, information sciences, biological and physical research, science education, journalism, and policy. Successful applicants work alongside upper-level graduate students, faculty, and practicing scientists, mathematicians, engineers and even professional journalists.

<http://spacegrant.arizona.edu>.

### **Paid Research**

Faculty may have funding to pay students to work on a research project. Don't expect to conduct cutting edge research right away. You may have to pay your dues by cleaning glassware, entering data, or cleaning cages. But doing grunt work is important, and gets your foot in the door. Talk to your professors!

### **Honors Grant**

Students may seek their own funding through the Undergraduate Research Grants program. Undergraduates can apply for a stipend or other expenses needed for research. Student proposals must have the support of a faculty member, who cosigns the proposal and commits to serve as a research mentor and advisor. Applications are available each January from The Honors Center in Slonaker House. The proposal deadline is in early March.

### **Internships**

Students can gain pre-professional experience by working as interns with resource management agencies or conservation organizations over the summer or during the school year. Arizona Game and Fish Department offers internships every summer, and internships with other organizations are posted on the listserv. Sign up to receive credit to count as a technical elective with a Faculty Advisor (RNR 293, 393, 493)

### **Other Opportunities**

Student Opportunities for Undergraduate Research and Creative Expression

<http://source.arizona.edu>

## Potential Internship Opportunities

American Museum of Natural History  
P.O. Box 16553  
Portal, AZ 85632

Apache-Sitgraves National Forest  
Lakeside Ranger District, 2022 W.  
Lakeside, AZ 85929

Appleton-Whittell Research Ranch  
HC 1 Boc 44  
Elgin, AZ 85611

Arizona Department of Transportation  
1444 W. Grant Rd.  
Tucson, AZ 85745-1406

Arizona Game and Fish, Region 5  
555 N. Greasewood Road  
Tucson, AZ 85745

Arizona-Sonora Desert Museum  
2021 N. Kinney Road  
Tucson, AZ 85743-8918

Buenos Aires National Wildlife Refuge  
P.O. Box 85633  
Sasabe, AZ 85633

Bureau of Land Management  
12661 East Broadway  
Tucson, AZ 85748-7208

Center for Biological Diversity  
P.O. Box 710  
Tucson, AZ 85702

Chiricahua National Monument  
Dos Cabezas Route, Box 6500  
Willcox, AZ 85643

Fort Huachuca Wildlife Office  
US Army Garrison, ATZS-ISB  
Sierra Vista, AZ 85613-6000

Intercultural Center for the Study of Deserts  
and Oceans  
P.O. Box 249  
Lukeville, AZ 85341

Mason Audubon Center  
8751 N. Thornydale  
Tucson, AZ 85742

Native Seeds-SEARCH  
526 N. 4th Ave.  
Tucson, AZ 85705

Organ Pipe Cactus National  
10 Organ Pipe Drive  
Ajo, AZ 85321-9626

Saguaro National Park, Rincon  
3693 South Old Spanish Trail  
Tucson, AZ 85730

Sky Island Alliance  
738 N. 5th Ave. Suite 201  
Tucson, AZ 85705

Society for Ecological Restoration  
1955 W. Grant Road #150  
Tucson, AZ 85745

The Nature Conservancy of Arizona  
1500 East Fort Lowell  
Tucson, AZ 85719

The Nature Conservancy--Flagstaff  
2601 N. Fort Valley Rd., Suite 1  
Flagstaff, AZ 86001

Water Department  
310 West Alameda St.  
Tucson, AZ 85701

SCA (Student Conservation Association)  
<http://www.thesca.org/serve/internships>



The National Wildlife Federation  
<http://www.nwf.org/About/Jobs-at-NWF/Internships/Requirements.aspx>

Jobs Listing - American Fisheries Society  
<http://fisheries.org/jobs>

The Society for Conservation Biology  
SCB Job Database  
<http://www.conbio.org/jobs/>

USAJOBS - The Federal Government's Official  
Jobs Site  
<https://www.usajobs.gov/>

Conservation and Land Management Internship  
Program  
<http://www.clminternship.org/>

Marine Conservation Biology Institute  
[http://www.mcbi.org/who/jobs\\_internship.htm](http://www.mcbi.org/who/jobs_internship.htm)

Alaska Conservation Foundation  
<http://alaskaconservation.org/internships/>

Hawk Mountain Sanctuary  
[http://hawkmountain.org/index.php?pr=Conservation\\_Science\\_Internships](http://hawkmountain.org/index.php?pr=Conservation_Science_Internships)

Point Reyes Bird Observatory  
<http://www.prbo.org/cms/405>

Missouri Botanical Garden  
<http://www.mobot.org/hort/edu/opps.shtml>

Society for Range Management  
[http://www.rangelands.org/jobfair\\_rangelandcareers.shtml](http://www.rangelands.org/jobfair_rangelandcareers.shtml)

The Wildlife Society Job board  
[http://careers.wildlife.org/home/index.cfm?site\\_id=8764](http://careers.wildlife.org/home/index.cfm?site_id=8764)

Ornithological Jobs  
<http://www.osnabirds.org/jobs.aspx>

**Independent Study**

If you have a great idea for gaining experience or conducting a project and you know a faculty member who would be interested in guiding you through the process, you can conduct independent study for credit (see course numbers 299, 399, 499). See your advisor for more information and how to use Independent Study as a technical elective.

**Volunteer**

Chances are you won't be able to find a paid internship, research experience, or part-time natural resources job right away. Scan through faculty websites and talk to teaching assistants and advisors to find out who is doing the kind of work that interests you. Then talk to those professors or graduate students to find out if they could use a volunteer on their research projects. Again, it gets your foot in the door and is valuable experience.

Get to know faculty, graduate students, and staff. Go to office hours. Ask questions. Don't be afraid to be interested and enthusiastic. If you are intimidated by face-to-face contact with a total stranger, give them a call or send an email first.

***College of Agriculture and Life Sciences Scholarships***

Applications for various CALS scholarships can be obtained online at <http://cals.arizona.edu> or by contacting:

College of Agriculture and Life Sciences  
Office of Academic Programs  
Room 201, Forbes Bldg.  
University of Arizona  
Tucson, AZ 85721

**Office of Student Financial Aid (203 Administration Building)**

Students interested in any financial program administered by the Office of Student Financial Aid must complete a SAFE (Student Assistance Financial Evaluation) application, which requires a small fee.

## Student Clubs

### Ambassadors for Agriculture and Life Sciences

Club mailing address:

Office of Academic Programs, 1140 E. South Campus Drive, Room 211, Tucson, AZ 85721

Club advisor:

[Mr. Frank Santiago](#)

The College of Agriculture and Life Sciences Ambassadors are students who represent the future of agriculture and life sciences, as well as the human and natural resources in Arizona and beyond. Ambassadors serve as peer recruiters and liaisons for promotion of programs in the College of Agriculture and Life Sciences to campuses and statewide audiences.

The College of Agriculture and Life Sciences offers undergraduate and graduate degrees in fields of agriculture, renewable natural resources, and in family and consumer sciences. The Ambassadors represent the diversity of degree programs available in the College.

Website:

<http://cals.arizona.edu/oap/ambassadors>

### Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)

Club mailing address:

Office of Academic Programs, Forbes Bldg, Room 211, Tucson, AZ 85721

Club advisor:

[Mr. Frank Santiago](#)

MANRRS is a national society that welcomes membership of people of all racial and ethnic group participation in agricultural and related sciences careers. MANRRS promotes academic and professional advancement by empowering minorities in agriculture, natural resources, and related sciences.

Website:

<http://cals.arizona.edu/clubs/manrrs>

### Wildlife Society and American Fisheries Society

Club mailing address:

School of Natural Resources and the Environment, P. O. Box 210043, Tucson, AZ 85721-0043

Club advisor:

[Dr. Bill Shaw](#)

Website:

[http://cals.arizona.edu/clubs/wildlife\\_society](http://cals.arizona.edu/clubs/wildlife_society)

### Tierra Seca

Club mailing address:

School of Natural Resources and the Environment, P. O. Box 210043, Tucson, AZ 85721-0043

Club advisor:

[Dr. Mitch McClaran](#)

Student Chapter of the Society for Range Management