





Research & G r a d u at e P r o g r a m s

ANNUAL REPORT

2001

y any measure, the University of Florida is a research institution of national and international stature, but the first and most frequent beneficiaries of the thousands of research projects conducted annually at UF are the residents of Florida.

From the premature child in the neonatal intensive care unit at Shands Hospital to the cattle rancher who relies on the Institute of Food and Agricultural Sciences for advice on ways to protect his herd's health, UF research touches thousands of Floridians every day.

Much of the funding for this research that is applied throughout Florida countless times daily comes from outside Florida and represents a significant economic impact on our state economy. Through its research program, UF leverages hundreds of millions of dollars in federal and private funds to hire employees, support students, buy equipment and contract for services in Florida.

Research also drives the quality of the university's graduate education program, as top graduate students come to UF to work with our high-quality research faculty. These students represent our most effective vehicle for transferring knowledge as they graduate highly qualified to lead our state in the future.

The more than 3,300 research faculty at the University of Florida work tirelessly to educate our students and to transfer the results of their research to the citizens of Florida. The Office of Research and Graduate Programs facilitates that knowledge transfer for the benefit of all of Florida's people.

Sincerely,

Han Philips

Win Phillips Vice President for Research Dean of the Graduate School



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Research Overview

he State of Florida earns nearly a five-fold return on its generous investment in the University of Florida, which generates more than \$5 in funding from other sources for

every \$1 in state spending. Much of that additional funding is in the form of research grants from the federal government, private foundations and industry, which totalled a record \$379.5 million in 2000-2001.



But the impact of UF research on the state of Florida goes far beyond the ledger sheet. Thousands of UF research projects have a direct impact on Floridians' quality of life. From health care and the environment to technology and the arts, UF scientists and scholars use all the resources at their disposal to benefit the citizens of Florida and the nation.

The six colleges that comprise UF's Health Science Center accounted for 52 percent of the university's \$379.5 million total in 2000-2001, receiving a record \$197.8 million in contracts and grants, up nearly 14 percent from the previous year. Much of that increase can be attributed to a 34 percent increase in awards from the National Institutes of Health, which continues to be UF's largest source of research funding at \$93.5 million. represented a 36 percent increase over 1999-2000.

A \$3.9 million grant from the U.S. Department of Agriculture to establish a Center for Subtropical Agroforestry to promote environmentally friendly farming practices helped push UF's Institute of Food and



"The university's ability to address the whole spectrum of health issues makes us especially competitive for NIH funding," said Win Phillips, UF's vice president for research. "We are participating in the broad diversity of opportunities stemming from growth in the health-care field."

UF faculty also had great success in their pursuit of funding from the National Science Foundation.The record \$28.2 million in NSF awards Agricultural Sciences (IFAS) to a record \$66.9 million in funding in 2000-2001.

The College of Engineering accounted for 13 percent of the total with \$50.3 million.

Federal money still accounts for well over half of UF's total research funding, but the university continues to build its relationships with industry. Funding from industry was up more than 23 percent last year to \$59.2 million.

"While publicly funded research, particularly from the federal government, is vital to our research enterprise, we have tried to achieve a more balanced ratio of public and private funding," Phillips said. "Industrial sponsors have come to recognize the University of Florida as a high-quality research institution that can help them solve real-world problems."

UF faculty are becoming increasingly aggressive in their pursuit of major grants. Although the 4,195 proposals submitted was only a 3.3 percent increase from the previous year, the total amount requested rose 32 percent from \$471,998,565 to \$623,166,794.

"The significant number of major grants the university has received over the last decade has helped to inspire other faculty to aim higher in their pursuit of funding," Phillips said.

UF's technology transfer efforts continue to benefit the research enterprise. The record \$28.7 million UF received in royalty and licensing income for intellectual property it developed represented a 9 percent increase over 1999-00. The glaucoma drug Trusopt[®] and the sports drink Gatorade[®] accounted for 85 percent of that total.

State of the Environment



ozens of University of Florida faculty, students and alumni from the Institute of Food and Agricultural Sciences (IFAS) are helping to ensure that the \$7.8 billion, 30-year restoration of the Florida Everglades achieves its ambitious goals.

This research falls into several general categories:water quality assessment, plant and animal population studies and public policy issues. In each of these areas, IFAS researchers are engaged in research to determine the potential impacts, positive and negative, of the proposed restoration project.

Ramesh Reddy, graduate research professor and chair of the Department of Soil and Water Sciences, likens his team's research in the Everglades to a doctor diagnosing an illness and suggesting a treatment.

"When you get sick, the first thing the doctor does is take your temperature, then he might do a blood test and then a CAT scan," Reddy says."That's a lot like what we're doing with the Everglades. We're looking at the soil and water at progressively more detailed levels."

Specifically they're looking at phosphorous, the nutrient many believe is responsible for cattails driving out sawgrass and algae clogging once open water in the Everglades, particularly in areas just south of the agricultural areas around Lake Okeechobee.

"If you compare the water coming in from the agricultural areas with water quality just about anywhere else in the world, it's pretty clean," Reddy says."But the Everglades ecosystem is so pristine that just a small spike in phosphorous can cause changes in biological communities."

Getting data about alligators requires an affinity for top-heavy skiffs with airplane propellers on the back and waste-deep muck

where gators are one of the lesser threats. Out in this hot, humid natural laboratory, UF wildlife ecology scientists and graduate students carry out a precision campaign to capture alligators, surgically implant tracking devices and thermometers and release them back into their "home ranges."

This research provides restoration planners with the real data they need about alligators for the simulation models being used to test different water management strategies.

Over the last 15 years, wildlife ecology Assistant Professor Peter Frederick and his colleagues have logged thou-

> sands of hours in a small plane skimming at 800 feet over a 1,300-squaremile area of the central Everglades where virtually all of the wading birds congregate, spotting and photographing the colonies.

They also have spent thousands more hours airboating and wading through shallow, alligator-infested waters to verify their aerial estimates.

The result, Frederick says, is one of the most comprehensive surveys ever done for any animal living in the Everglades, and one of the most revealing.

"The movement of birds from the southwest coastal region around what is now Naples to the inland water conservation areas provides some of the most obvious evidence of coastal degradation," Frederick says, noting that surveys conducted by the Audubon Society in the 1930s showed virtually all of the wading birds living along the southwest coast."Today, almost all of the wading birds are in the water conservation areas because the coastal areas have been almost totally dewatered."

Since 1994, in a study sponsored by the Florida Department of Environmental Protection, Frederick and several graduate students have monitored mercury levels in great egret chicks in the Everglades.

As predators at the top of the food chain, great egrets are good barometers for the herons, ibises, storks and spoonbills that also live in the Everglades, Frederick says. The results surprised



and pleased the researchers.The most significant: Between 1994 and this year, average mercury levels in the chicks' feathers dropped 73 percent.

UF's role in Everglades research is impressive both for the sheer number of faculty and students involved and for the breadth of their expertise.

"The University of Florida is definitely a player," says H. Franklin Percival, leader of the Florida Cooperative Fish and Wildlife Research Unit headquartered at UF. "Beyond the obvious associations of the faculty and graduate students currently conducting research are many more indirect ones, like people who have gotten their Ph.D.s at UF then gone on to positions of influence with state and federal agencies."

Space



he University of Florida has conducted research for NASA for half a century. Now, through a lead role in the Florida Space Research Initiative, the university is helping the Kennedy Space Center evolve from primarily a launch facility into a center for space-related academic research and technology transfer.

UF is developing a space biotechnology research program at the Space Experiment,Research & Processing Laboratory now under con struction in the 400-acre Space Station Commerce Park at the Kennedy Space Center. The lab, which will serve as NASA's core facility for processing and packaging experiments slated for trips aboard the space shuttle and International Space Station, is expected to be completed in 2003.

"There are a large number of resident scientists at KSC that do work in the biotechnology business," said Robert Ferl,a UF professor of horticultural sciences and specialist in plant growth in space who heads the UF-NASA biotechnology program. "We're a natural fit because we are leaders of biotechnology efforts in the state."

NASA also recently awarded UF \$2.5 million for a new center that will develop effective ways to recycle air, water and waste on extended space missions such as a manned mission to Mars. But that's only half the picture: The center also must actively seek and promote a "terrestrial" commercial application for each new technology, such as removing pollutants from air or water.

"What's unique about this center is that it's simultaneously dealing with two issues," said John Warwick, professor and chair of UF's Department of Environmental Engineering Sciences, where the center will be based."One is the technical needs of NASA to support extended human space flight.The second is to support development of technology that has a high commercial potential."

NASA officials expect that it will be extremely difficult to regularly resupply astronauts on the extended missions anticipated in coming years, such as a prolonged visit to the moon or a Mars mission.As a result, the agency is looking for technologies that can sustain life for months or years in a so-called "closed loop" system, where oxygen, water and other essentials are recycled and reused repeatedly.

Warwick said the UF center will focus its efforts in three areas: air revitalization, solid waste recovery and water recovery. The goals with all of the systems, he said, are to reduce size and weight and to function on low power with a minimum of crew oversight. The systems also must be extremely reliable, he said. "This equipment has to be bulletproof," he said. "It has to work as well on the last day of the mission as on the first day." F rom the Institute for Child Health Policy to the Institute on Aging, the University of Florida contributes to the health of our state's residents through all stages of life.

For 15 years, the Institute for Child Health Policy has been committed to promoting the health and wellbeing of children and youth in Florida and nationally.

The institute has built on its initial early success developing a system which uses local school districts as a grouping mechanism, much like traditional employer-based insurance pools, to secure health insurance at greatly reduced cost.The Florida Healthy Kids Corp. program, administered by the state, now serves more than 1 million children.

Given the continual changes in both the financing and organization of child health care, the institute focuses its attention on issues of access, utilization, cost, quality and family involvement in both its policy and program development and health services research. The institute's goal is to research, evaluate,formulate, and advance health policies, programs, and systems that promote the health and well-being of children and youth in the state of Florida and nationally.

2001 marked the 50th anniversary of aging research, education and service at the University of Florida. Although it has had several names over the years, beginning with the establishment of the Institute on Gerontology in 1951 and progressing to the current Institute on Aging, the research has always been committed to improving quality of life for residents of Florida and beyond.

Older Americans represent the fastest growing segment of the population. It is estimated that by 2010, there will be 40 million people age 65 and older, with the "oldest-old" segment, adults age 85 and older, growing most rapidly.

Nowhere is this truer than in Florida, which has one of the highest proportions of older adults in the U.S. More than 15 percent of Florida's residents are age 65 and older.

The faculty of the University of Florida Institute on Aging conduct and

facilitate aging-related research, education and service. The institute is supported by affiliations with major health-care centers, research programs and colleges across the UF campus.

Much of the important science currently being conducted on aging at UF and nationally is about the small, everyday strategies that reduce discomfort and disability in later life; strate gies that contribute to physical and mental health and emotional well-being into advanced old age.

Among the specific initiatives the institute is pursuing are the implementation of a care manager certification program for professionals working with older adults and expansion of aging programs in UF's Institute of Food and Agricultural Sciences.

"We want to provide greater opportunities for older adults to help shape aging policy and participate in research that leads to the discovery of new treatments," says institute Director Jeffrey Dwyer.

State of Health





| Summary of Sponsored Research Activity FY 2000-2001 | | | | | | |
|--|---------------|--|---------------|--|--|--|
| Proposals Submitted | 4,195 | Total Sponsored Research Funding | \$379,509,635 | | | |
| Grant and Contract Dollars Requested | \$623,166,794 | Grant and Contract Direct Expenditures | \$306,679,404 | | | |
| Awards Received | 5,285 | Recovered Indirect Cost Expenditures | \$42,227,803 | | | |
| New Awards Received | 1,908 | Grant and Contract Dollars Expended | \$348,907,207 | | | |
| Continuations or Supplementals | 3,089 | Projects Active During the Fiscal Year | 6,841 | | | |
| Grant and Contract Dollars Awarded | \$363,495,414 | Faculty Receiving Awards | 1,742 | | | |
| Gifts for Research | \$16,014,221 | Sponsors | 788 | | | |



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Sponsored Research Awards Federal/Non-Federal FY 1983–2001

Much of the 11.8 percent increase in total sponsored research awards can be attributed to a 29 percent increase in federal funding,particularly from the National Institutes of Health and the National Science Foundation. Total sponsored research awards have grown nearly 150 percent in the last decade.





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Research Awards by Sponsor Type FY 1992–2001

A 29.7 percent increase in federal awards to a record \$227.1 million and a 23.3 percent increase in funding from industry were responsible for much of UF's overall gain of 11.8 percent. Much of the federal increase can be attributed to a 34 percent increase in awards from the National Institutes of Health, from \$69.7 million to \$93.5 million.Awards from the National Science Foundation rose 36.2 percent, while several large grants from the U.S. Department of Agriculture resulted in a 130 percent increase,from \$13.3 million in 1999-2000 to \$30.6 million in 2000-2001.

Research Awards by Major Academic Unit — FY 1992–2001

Awards to the Health Science Center increased \$24 million to a record \$197.8 million,up nearly 14 percent, while the Institute of Food and Agricultural Sciences and the College of Liberal Arts and Sciences were up 31 percent and 12 percent, respectively.

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Technology Transfer and Licensing — 1989-2001

Royalty and licensing income reached a record \$28.7 million in 2000-2001,a 9 percent increase over the previous year. The glaucoma drug Trusopt[®] and the sports drink Gatorade[®] accounted for 85 percent of that total.



UF's technology transfer efforts continue to benefit the research enterprise.



Patents & Licensing Activity FY 1991–2000

| Final Very | Invention Disclosures | U.S. Patent Applications | U.S. Patents | Licenses Generating |
|-------------|--------------------------|-----------------------------|--------------|------------------------|
| FISCAL YEAR | Received | Filed | Issued | Royatties |
| 2000/01 | 196 | 116 | 68 | 84 |
| 1999/00 | 166 | 122 | 52 | 63 |
| 1998/99 | 134 | 106 | 51 | 49 |
| 1997/98 | 139 | 68 | 51 | 58 |
| 1996/97 | 103 | 101 | 47 | 61 |
| 1995/96 | 90 | 61 | 34 | 69 |
| 1994/95 | 84 | 100 | 24 | 64 |
| 1993/94 | 75 | 66 | 45 | 20 |
| 1992/93 | 90 | 41 | 45 | 46 |
| 1991/92 | 74 | 34 | 50 | 35 |
| | | | | |

Graduate Education Overview



he more than 8,700 graduate students attending the University of Florida are the human capital that will carry the state to a higher level of prosperity in the 21st century.

While the economy of the 20th century relied on physical capital — steel, oil and chemicals — the economy of the 21st century will be largely dependent on human capital.The industries that will dominate — microelectronics, biotechnology, telecommunications and many others — require the intellectual capital graduate education provides. For Florida to compete with other states for the high-tech businesses of the 21st century, those businesses must be able to access a welleducated workforce.

By delivering a diversified, high-quality graduate education, the University of Florida helps guard against a "brain drain," the loss of our best and

> brightest students to other states, where they go to continue their education, probably never to return.

> The university owes much of its reputation to the quality of its many nationally ranked graduate programs. This reputation is an important component of Florida's attractiveness

as a location for clean, high-tech industries seeking to relocate.

In addition, there is an important economic impact resulting from intellectual property developed by these highly educated individuals. One





needs only to look at the successes of Silicon Valley in California and Research Triangle Park in North Carolina to understand the value of university-derived technology to the state and national economy.

Graduate students provide critical help in the university's research activities. The dynamic partnership between experienced faculty researchers and enthusiastic and curious graduate students generates creativity, excitement and innovation. This partnership enables our scientists to leverage their talents, to diversify their research and to reach their goals faster - critical factors in today's fast-paced technology- and knowledgedriven environment.

Graduate students are ambassadors who expand and strengthen our ties with other countries. Florida's economy is intimately tied to the international economy, and many international students who earn graduate degrees remain in the United States to contribute to the nation's economy. Others return to their native countries with a better appreciation for American culture, institutions and values.

Graduate students also help the university to perform its teaching mission. They provide a high level of teaching assistance to the university's faculty at relatively low cost. Teaching assistants do not substitute for faculty. They serve different and important roles, helping the professor do his or her job better.

The teaching assistantship is an apprenticeship for future university faculty. Just as tomorrow's doctors learn their craft in residency and tomorrow's lawyers serve as clerks, tomorrow's university professors learn their craft under the watchful eyes of their faculty mentors.



Graduate Applicants — 1992-2001



Graduate Enrollment — Fall 1991-2000



Matthew Chopp may be the ultimate Florida Gator. Few UF students know the Gator

mascot's namesake quite like Chopp, who spends the better part of each year in the Everglades studying alligator nests.

Chopp, a master's student in UF's Department of Wildlife Ecology and Conservation,works in the Arthur R. Marshall Loxahatchee National Wildlife Refuge in the Everglades, researching and comparing nests in the marsh interior and canal systems.

Chopp and his colleagues use global positioning satellite (GPS) units to find the nests, which are often buried under mounds of swamp muck. Being careful not to incur the wrath of the mother, the researchers examine the eggs for health and viability, then leave them to incubate.

Excellence In Graduate Education 2001

When the babies hatch, they are tagged and released.

"I've never once been bitten," says Chopp, who is attached to the U.S. Geological Survey's (USGS) Florida Cooperative Fish and Wildlife Research Unit based at UF. The unit works with the Florida Fish and Wildlife Conservation Commission, the Wildlife Management Institute and others to study nest success and hatchling survival rates among Everglades alligators.Chopp is the third master's student to participate in the project since its inception in 1998.

After the alligators hatch, Chopp tracks their survival and growth, comparing those born in canal nests with those born in marsh nests. Everglades alligators usually lay about 40 eggs in a nest, compared to 60 in a more northern area like Gainesville. Chopp hypothesizes that this differ ence is due to stressful conditions in the Everglades. Last year, he said, almost all the sampled "canal" nests failed due to flooding.

"Alligators have evolved to reproduce in certain natural conditions, which are very unpredictable," he says, citing the need to determine the conditions in which the reptiles will thrive.

Chopp's research is part of a comprehensive study for the South Florida Ecosystem Restoration Taskforce, a subgroup of the Department of the Interior's South Florida Ecosystem Restoration Program, in preparation for a planned restoration of the Everglades. The plans, which include removal of some of the canal systems, are aimed at water and habitat management.

"The water level in the canals can change drastically in a few days," Chopp says. "We're asking what effects canal removal might have on alligator population ecology."

Chopp works under joint advisors H. Franklin Percival, unit leader at the Florida Co-op Unit, and Kenneth G. Rice of the USGS in Homestead. Their data will be gathered with that of other researchers into a computer model that will help predict how different species will be impacted by various Everglades restoration alternatives.



Enrollment of Women — Fall 1991-2000



Total Minority Enrollment — Fall 1991-2000

page 16 UNIVERSITY OF FLORIDA

Patricia Campbell, English department teaching assistant, proved her ability to adapt as a teacher when she revamped her entire Survey of American Literature course to take advantage of the opportunities offered by teaching the class in a Networked Writing Environment classroom with networked computer terminals for every student. Campbell added web-based and computerized materials to supplement her traditional lecture and reading.

"She is a gifted teacher — a natural, as one might say — though one who's highly prepared," says English department Chair John Leavey. "The department is fortunate to have such a strong teaching assistant."

Campbell views her classroom role as that of a negotiator who must create a forum where multiple voices and views can exist, rather than one where all must agree on a final point.

"Teaching in a classroom of diverse experiences and utilizing multiple approaches to learning is fulfilling," she says. "The reward of teaching lies in sharing the polyphony and witnessing the students' growing respect for diverse



opinions as they develop lifelong analytical, imaginative and communicative skills."

Terrance Weik, a doctoral candidate in anthropology, is leading the firstever excavation of a black Seminole town.The research is under way in central Florida and may reveal how the runaway slaves actually lived within the embattled Seminole Indian nation.

Called "Maroons," a term derived from the Spanish word "cimarrones," meaning fugitive, they fled from Georgia and South Carolina to Florida,where some of them escaped pursuing authorities to befriend and live with the Seminole Indians.

"No one has actually identified one of their towns on the ground until now," said Jerald Milanich, a UF archaeologist and member of the excavation team. "Although we know something about the black Seminoles from documents, here is an opportunity to physically learn whether their lives were similar to what they were like earlier in the slave quarters of Southern plantations or if they developed a unique lifestyle that emerged with their new status as free people in Florida."

They established "Abraham's Old Town," or Peliklikaha, about 10 miles east of Sumter County's Dade Battlefield.That's where blacks and Seminoles annihilated a U.S.Army force in one of the most decisive battles of the Second Seminole War of 1835-42, said Weik.

A powerful black Seminole leader, Abraham served as an interpreter for Seminole Indian chief Micanopy during the critical war years, eventually surrendering and helping the





Master's Degrees Awarded — 1992-2001

U.S. military to negotiate an end to the war. That paved the way for Florida to enter the union,he said.

The UF team hopes to find out if the black Indians were subservient to the Seminole Indians or if the blacks' military and interpreting skills made them "masters of the Seminole" as some military docu-

ments of the 1830s suggest, Weik said. Or they may learn that neither of these scenarios is correct, he added.

"This is, in a sense, the next chapter after Fort Mose in the story of African-American



resistance to slavery in Florida," he said. "The project will bring to light details of life, the everyday struggles and the cultural heritage of this under-recognized group, and help us better understand the early interactions between Africans, Seminoles and Europeans on the Florida frontier."

The researchers also want to learn about the people's housing, what they ate and if their pottery more closely resembled that of the Seminole Indians or what they once made on slave plantations, Milanich said.

"Recently, there's been a lot of interest in Florida's black Seminoles," he said. "Historians and anthropologists have studied them, but they haven't been looked at by archaeologists."

Like Seminole Indian sites, black Seminole sites are hard to find because they weren't occupied long, he said.

Black Seminoles left no written records, and while historical documents describe things such as laws against Maroons and the military forces used to hunt them, little attention has been paid to who these people were or what shaped their material culture, Weik said.

Archaeologists plan to pass on what they learn to public school children.With grant funding from the Florida Department of State Division of Historical Resources,the research team plans to hold public lectures and prepare a brochure about the site that will be distributed to Florida schools, museums and tourist agencies, Weik said.

Lara Foley, a doctoral student in sociology, says keeping up with current issues in teaching and in sociology is important to her. Foley has taught courses ranging from Principles of Sociology to Development of Sociological Thought. She can often be found in teaching workshops or updating her lessons with the latest research in the field. "This takes extra work on my part, but is truly worth it because it keeps me excited about the material. If I am



excited about the topics, the students will tend to be as well," she says.

"I have been very impressed with the climate of Lara's classroom. She has a very effective rapport with her students and she demonstrates considerable knowledge of her subject matter. She is one of the finest graduate student instructors I have observed in recent years," says Connie Shehan, professor of sociology and director of the University Center for Excellence in Teaching.

Foley strives to create an environment where different viewpoints can be actively discussed. To that end, she encourages the use of e-mail and an electronic message board for those students who may be uncomfortable speaking out in class.

"I want to be certain that students know that they can speak in my classroom. Not only must students have a voice, they must be taken seriously," she says.

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