DOCTORAL PROGRAM IN AQUACULTURE/FISHERIES

University of Arkansas at Pine Bluff™

Proposal

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Fayetteville, were some of the first created. The Aquaculture/Fisheries Center has become a nationally and internationally-renowned source of research-based information in the areas of aquaculture and fisheries. The UAPB Aquaculture/Fisheries Center is charged with providing the teaching, research, and extension support to the aquaculture industry and to fisheries managers in the state. Academic programs in aquaculture/fisheries extend theory into practical applications and solutions to problems faced by stakeholders in the state and across the country.

The process of research is fundamentally a process of solving problems. Just as Ph.D. programs in engineering and agriculture train Ph.D. scientists to solve problems through applied science methods, Ph.D. students in aquaculture/fisheries will solve problems of aquaculture and fisheries stakeholders through applied and strategic research. Such a stakeholder-driven basis for developing research and extension programs is fundamental to the mission of land-grant universities. In Arkansas, there are two land-grant universities, the University of Arkansas at Fayetteville and the University of Arkansas at Pine Bluff. The USDA requires that NIFA funding and the state funds required as match be spent on projects developed through a defined stakeholder-input process. USDA defines stakeholders as those who use agricultural research, extension, and education programs. Stakeholders identified for the Aquaculture/Fisheries Center are the state's aquaculture industry and fisheries resource managers (See Appendix A for the Mission Statement of the Aquaculture/Fisheries Center).

Arkansas plays a unique role in aquaculture/fisheries in the United States. It is the birthplace of warmwater aquaculture in the country, is the second-leading aquaculture-producing state, and is home to many national leaders in aquaculture/fisheries. Aquaculture and fisheries have had significant impacts on the rural economies of the Delta, through the multiplier effects of expenditures in local communities by aquaculture businesses, and through expenditures by anglers who enjoy the excellent recreational fishing opportunities in the Natural State. Advancements in aquaculture production technologies and in understanding and managing the natural fisheries resources of the state have driven the growth and competitiveness of these sectors.

Arkansas is the second-leading aquaculture producing state in the U.S. Arkansas leads the nation in production of bait minnows, Chinese carps, hybrid striped bass fry and fingerlings, largemouth bass foodfish, and is third in catfish production. There are 4th generation fish farmers in Arkansas that include several national industry leaders. Much of the economic activity generated by aquaculture is in the Delta region that is characterized by high rates of poverty and unemployment. The recreational fishing industry creates expenditures of $425 million per year in Arkansas, powered by the 655,000 anglers who fish in Arkansas each year (U.S. Department of the Interior 2007). Appropriate science-based management of these resources will enhance benefits of the citizens of the state through direct access to the recreational benefits offered and also through the revenue generated through tourism.

The total impact of the UAPB Aquaculture/Fisheries Center has not been measured quantitatively. However, several components of its programs have. A 2002 IMPLAN-based analysis (using data from a survey of the catfish industry in that county) of the economic impact of the catfish industry on Chicot County, Arkansas, demonstrated that the catfish industry in that county alone generated $384 million in total economic output and 2,665 jobs in addition to $22

ecology, ecology of fishes, and management of small impoundments. A Memorandum of Agreement has been signed with the Graduate School of the University of Arkansas for Medical Sciences (See Appendix) to allow Ph.D. students from UAPB to enroll in graduate-level courses that add depth to the aquaculture/fisheries coursework offered at UAPB. Students will also take two hours of graduate seminar, at least one hour of a teaching/extension practicum, research and thesis credit hours, and additional advanced coursework in biological, chemical, and social sciences.

Students will be expected to spend a substantial amount of time involved in research and demonstrate the ability to design and conduct high-impact research studies. Students will be engaged in research throughout their tenure in the program, and will enroll in research and thesis credit hours after completing the coursework identified in their plan of study.

Specific courses to be taken by each student will be specified in a plan of study approved by the major professor and the committee. This plan of study will ensure that the student possesses the expected knowledge base prior to standing for the preliminary examination. We expect students who enroll in the program to bring varied backgrounds and levels of preparation in aquaculture and fisheries; thus the committee will assist the student to tailor an appropriate plan of study.

Each student must satisfactorily pass a series of milestones throughout their program of study leading to the Ph.D. degree. These milestones have been developed to ensure that students have a clearly-defined path to follow and understand the direction needed for steady progress towards their degree. However, the program also includes mechanisms that allow students to adapt to changing circumstances that arise throughout many research projects, to change research projects, and to change major professors.

The first milestone is to compose a dissertation committee. This must be accomplished prior to the end of the student's first semester. The graduate committee of the doctoral student should collectively determine the number of course credits needed. The committee must meet during the first semester to review and approve the student's plan of study (unanimous approval) and to discuss preliminary plans for the research to be undertaken. The student must complete a dissertation proposal within the first 200 days of enrolling in the Ph.D. program. Failure to defend the proposal within the specified time period will result in the student losing his/her assistantship. The proposal must first be approved by the major professor and the dissertation committee one week prior to scheduling an oral public defense. Following the oral defense of the proposal, the committee will meet to discuss any changes to the proposal (the proposal must have unanimous approval from the committee). The proposal must be defended prior to the student initiating his/her research. The next major milestone is successful completion of preliminary examinations. When the student completes his/her subject matter coursework, he/she will schedule his/her preliminary examinations. These examinations will have both written and oral components. The student must pass his/her preliminary examinations at least one year prior to graduating. One dissenting vote (other than that of the major professor) from the committee is allowed for the student to pass his/her preliminary examination. Students who fail the preliminary examination twice will be dismissed from the program. The final milestone for the student is the successful completion and defense of the dissertation. The dissertation must consist of original research developed and implemented by the student. The committee

initiatives to continue to develop productivity-enhancing solutions. These small-scale businesses do not have the research and development capability to address these challenges on their own. The growing volume of seafood imports, already the second largest commodity imported into the United States, requires expanded research for the U.S. industry to remain competitive and to support domestic job creation. The Delta region in Arkansas and Mississippi has benefited the most of any region from aquaculture. Security of food supplies and health are also at stake in keeping fish farming viable and growing.

The Aquaculture/Fisheries Center at UAPB is recognized as one of the top programs in aquaculture/fisheries, nationally and internationally. It is the only graduate program in the state specifically focused on aquaculture/fisheries and has responsibility for conducting research and extension in aquaculture/fisheries for the state. UAPB is one of the few aquaculture programs nationwide with an emphasis on production aquaculture. The Center enjoys strong support by the state and the industry. Graduates have been placed in major university doctoral programs, at state and federal levels, and in the private sector. The success of the masters program has demonstrated the need for additional trained professionals and qualified doctoral graduates with UAPB's stakeholder-driven focus. The unique perspective of the center and its accountability to stakeholders, confers a unique training opportunity and outlook to its graduates in fisheries as well as aquaculture. Many of these comments will be found in the letters of support to be found in the appendix. This focus is appreciated and well-known in the industry, government and academic community.

The UAPB program is the only major aquaculture/fisheries program in the U. S. that has experienced growth in recent years. In the last 15 years, faculty numbers have doubled, a masters program with 15-20 students was added, and the availability of full scholarships has attracted interest nationwide in the undergraduate program. Yet UAPB, along with other aquaculture and fisheries programs around the country, has struggled to find qualified Ph.D. candidates to fill faculty positions. Trained experts to supply research positions being vacated by retiring professionals and leadership roles will have to come from Ph.D. programs. While fisheries programs are more numerous nationwide, none in the state offer a Ph.D. explicitly in aquaculture/fisheries. There is a clear need to increase the pool of aquaculture/fisheries scientists at the Ph.D. level. There is growing concern over the impending retirement of many fisheries professionals over the next 5-10 years. These individuals were hired during an expansion phase of the Fisheries professionals in the 1960s (Kohler 2006).

The addition of a Ph.D. program to the Aquaculture/Fisheries Center would benefit the department by attracting top-quality students from around the country with an established set of research skills. These would enable the faculty in Aquaculture and Fisheries to conduct more in-depth and longer-term research. This would be expected to increase the number of research studies conducted each year, increase the output of refereed publications, but more importantly produce solutions to more stakeholder problems each year. The program is also expected to benefit the state by supplying trained professionals and applied research and would benefit the country by an enhanced pool of qualified doctoral graduates with the UAPB focus.

The 5-year strategic plan for the Center includes development of the Ph.D. program as well as maintaining its high-quality master's program (Appendix B includes the current strategic plan of

articles, extension and trade publications, government documents). Offered spring semester of every year.

GAQF 5405 Statistics in Research 4 Credits (3hrs. Lecture, 3 hrs. Lab)
This course will cover the fundamentals of basic statistics and analytical techniques that are needed for scientific research data analysis. The statistics taught in this class will range from descriptive statistics, simple t-test, ANOVAs, to linear regression. Theories and applications of statistics will be demonstrated and taught through use of real-world examples. Offered fall semester of every year.

GAQF 5406 Univariate and Multivariate Models in Fisheries Science 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
This course will cover models that are developed to deal with univariate and multivariate data analysis. The statistical modeling techniques taught in this class include multiple regressions, model selection methods, logistic regressions, multivariate ANOVAs, ordinations, and classification analyses. Theories and application to real-world examples will be used to understand the statistical methods. The laboratory session will focus on the application of the models for specific uses. Offered spring semester of even years.

GAQF 5407 Experimental Design and Analysis 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
The success of research studies starts from good planning of research design. This course addresses the needs of graduate students preparing for a career in agricultural and aquaculture research as professional scientists in the subjects of design, plot layout, analysis and interpretation of laboratory and field experiments. Many numerical examples and problems will be presented, and the recitation through homework assignments will allow students to explore analysis. Laboratories will be devoted to practical applications and exercises. Offered spring semester of odd years.

GAQF 5208 Nonparametric Methods in Data Analysis 2 Credits (2 hrs. Lecture)
Parametric statistics, such as t-test and F-tests, require very rigorous parametric assumptions about the underlying distribution of populations. However, we often deal with data that do not satisfy the restrictive parametric assumptions of sufficient sample size that are crucial for accurate and unbiased statistical inferences. This course will introduce alternative nonparametric statistical methods that can be used in the analysis of data that do not meet parametric statistical assumptions. Offered summer session II of even years.

GAQF 5311 Advanced Aquaculture 3 Credits (3 hrs Lecture)
Students will learn the biological, chemical, and physical bases, determinants and limitations of production systems and major species. Climatic influences will be discussed. Special consideration will be given to species of regional importance and elements of hatchery management and fish genetics. This course is needed by all aquaculturists. Offered spring semester of odd years.

GAQF 5310 Program Evaluation and Survey Methods 3 Credits (3 hrs. Lecture)
This course will cover the fundamentals of program evaluation and survey methodologies. Evaluation models such as systems analysis, behavioral objectives, and goal-free will be studied.

The construction, design, and implementation of questionnaires using a sound scientific approach will be covered in depth. Offered spring semester of odd years.

GAQF 5414 Ecology of Fishes 4 Credits (3 hrs Lecture, 3 hrs. Lab)
Students will learn the fundamental concepts of ecology. Students will learn specific life history requisites of native Arkansas fishes and how they interrelate with habitat parameters. Students will also be introduced to simplistic habitat modeling techniques. This course is recommended for students with the goal of working in natural resource management or research. Students should have taken a course in ichthyology that emphasized taxonomy of fishes. Offered spring semester of even years.

GAQF 5315 Extension Methodology 3 Credits (3 hrs. Lecture)
This course will cover the history and mission of the land-grant system with particular emphasis on Extension. Extension community needs assessment, program development, implementation, and evaluation will be covered. Extension methodologies for technology transfer will be covered in depth. Strongly recommended for all aquaculture/fisheries students. Offered summer of even years.

GAQF 5420 Fish Physiology 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
This course will impart an understanding of the organization of diverse physiological systems that enable fish to flourish in diverse aqueous and marine environments. The course begins with an examination of energy mobilization and a thorough overview of the systems responsible for the maintenance of homeostasis. In the second part of the course sensory biology and the neuroendocrine system are presented to illustrate how environmental signals are integrated and responded to. Finally, examinations of examples of applications of fish physiology to fisheries management and aquaculture will be presented.

GAQF 5220 Engineering and Construction of Aquaculture Facilities I 2 Credits (3 hrs. Lecture, 3 hrs. Lab)
This course will cover site selection and construction of levee and watershed ponds, repairing levees and ponds, cage construction and placement, in-pond raceways, aeration, and pond effluents. Strongly recommended for all aquaculture students. Offered summer semester I of odd years.

GAQF 5221 Engineering and Construction of Aquaculture Facilities II 2 Credits (3 hrs. Lecture, 3 hrs. Lab)
This course will cover degassing mats, pumps, open channel and piping systems, transportation, and management, and components of recirculating aquaculture systems with fish only and with fish integrated with plant production. Offered summer semester II of odd years.

GAQF 5322 Aquaculture Economics 3 Credits (3 hrs Lecture)
Aquaculturists need to be able to develop, interpret, and use results of economic analyses to improve economic and financial performance of aquaculture businesses. The course will cover the application of economics and financial analysis techniques in aquaculture. Enterprise budgets, balance sheets, income statements, cash flow budgets, loan management, risk analysis,

and business plan development are included. No prior background in economics and marketing is required. Offered fall semester of odd years.

GAQF 5323 Aquaculture Marketing 3 Credits (3 hrs. Lecture)
Aquaculturists need to understand how to develop a marketing plan and interpret results from marketing research. This course will cover key marketing concepts, functions, channels, and strategies. Examples will be focused on the aquaculture industry. No prior background in economics and marketing required. Offered fall semester of even years.

GAQF 5324 Quantitative Methods in Fisheries and Aquaculture Economics 3 Credits (3 hrs. Lecture)
This course will introduce students to quantitative methods used to: 1) identify consumer preferences; 2) estimate demand for either an aquaculture product or a non-market good or service; 3) willingness-to-pay techniques; 4) contingent valuation; 5) logit analysis; and hedonic analyses. Offered spring semester of even years.

GAQF 5325 Fish Population Dynamics 3 Credits (3 hrs. Lecture)
Students will learn theoretical aspects of population dynamics. The course focuses on the use of standard mathematical models in estimating fish population size, recruitment, production, and yield. Some modeling applications are explored through standard computer software and programming for model derivation and applications. Offered fall semester of even years.

GAQF 5430 Fish Health Protection 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
Fish diseases are a major factor governing the management of natural fisheries and diseases also have a significant impact on commercial aquaculture. In this class, students will learn disease diagnostic techniques from microscopy to PCR, survey the major diseases of wild and cultured fish, and learn about the relationships between fish disease and regulatory actions. Additional lectures will cover shrimp and shellfish diseases. The laboratory portion of the course is conducted in the UAPB Fish Disease Diagnostic Laboratory and requires students to diagnose, document, and report on fish disease cases. Offered spring semester of even years.

GAQF 5435 Management of Small Impoundments 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
Students will learn the principles that govern the management of small impoundments for recreational fishing. Students will learn about species balance, population balance, field techniques to assess balance, and methods to correct unbalanced populations. Labs will be field trips to ponds in Jefferson and adjacent counties to assess the balance of farm ponds; to make recommendations about their balance; and to formulate solutions to unbalanced populations. This course is needed by extension biologists, aquaculturists, and research biologists. Offered spring semester of even years.

GAQF 5336 Aquatic Animal Nutrition 3 Credits (3 hrs. Lecture)
This course covers metabolism and nutritional requirements of fishes and other aquatic animals. Biochemical concepts of nutrient utilization will be discussed. Emphasis is on the differences between nutrient use and requirements of aquatic animals versus terrestrial ones. This course is needed by aquaculture students. Offered fall semester every year.

GAQF 5136 Aquatic Animal Nutrition 1 Credit (3 hrs. Lab)
This course covers laboratory analytical procedures relevant to fish nutrition studies (protein, lipid, dry matter, ash, etc.). Students will also initiate and maintain a group project (usually a feeding trial) to gain practical experience in methods used to determine nutrient requirements or optimal feeding strategies for different fish species. Offered fall semester every year.

GAQF 5441 Aquatic Chemistry and Analysis 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
This course will provide students with an understanding of (a) the fundamental chemical principles affecting water quality in aquatic environments, (b) the biological, chemical and physical processes that affect water quality, (c) skills required to evaluate water quality problems with basic analytical and laboratory skills. Offered fall semester of even years.

GAQF 5445 Stream Ecology 4 Credits (3 hrs. Lecture, 3 hrs. Lab)
Students will learn about the chemical, physical and biotic factors that affect stream organisms and will also learn how aquatic ecosystems function. Stream organisms have developed adaptations to cope with such systems. Stream habitat management, impact assessment, and habitat modeling will be emphasized. Hydrologic data interpretation will be integrated into field exercises. This course is recommended to acquire an understanding of stream hydrology and dynamics and is necessary for students who embark on careers with regulatory or management functions. Offered fall semester of odd years.

GAQF 5371 Fisheries Management 3 Credits (3 hrs. Lecture)
Students will learn about fish population in streams, reservoirs, lakes and oceans and will also learn techniques and methods to assess and manage these populations. This course is needed by all fisheries biologists. Offered spring semester of odd years.

GAQF 5341 Water Quality Management 3 Credits (3 hrs Lecture)
This course covers the management of water quality in commercial fish ponds, farm ponds, impoundments, and streams. Students will apply water chemistry to management goals for various water bodies. This course is needed by all aquaculture and fisheries scientists.

GAQF 5390-5391 Special Topics 3 Credits
This course is offered as a forum to cover timely and topical issues that affect aquaculture and fisheries as they arise. Examples of such issues include aquatic vegetation, aquatic toxicology, and mathematical programming.

GAQF 5195-5196 Graduate Seminar 1 Credit
Seminars will be presented each week by faculty, staff, students, and guest lecturers. Approaches will include recent perspective and historical overviews as well as critiques of recent research in applied and natural fisheries. Offered spring and fall semesters of every year.

GAQF 5198-5398 Graduate Research Problems 1-3 Credits
This project-oriented course offers advanced studies in aquaculture and fisheries. The course provides the opportunity for students to obtain specialized skills or undertake research in areas outside the scope of the student's thesis research. Class activities are arranged in advance with instructors amenable to supervising this course. The amount of credit offered for this course will

vary from 1-3 credit hours and depend upon the scope of the project. Credit offered for the course and scope of the project would be determined prior to registration. A research problems outline approved by the course supervisor, graduate committee, and graduate coordinator must be submitted with the program of study.

GAQF 5129-5999 Research and Thesis 1-9 Credits

New Content Areas and Courses Proposed to be Offered in the Department of Aquaculture and Fisheries.

For the Ph.D. program, several additional new courses will be added to the curriculum to strengthen the overall core of courses that are already available. These new courses will include: population modeling, reservoir fisheries and ecology, reproductive physiology and hatchery applications, genetic principles and applications in fisheries, and a teaching practicum. Descriptions of the new courses to be offered are included below (Table 4).

GAQF 5340 Integrative Fish Hatchery Science 3 Credits (2 hrs Lecture, 3 hrs Lab)
An integration of the concepts of basic biology of aquaculture species and hatchery techniques will be presented. Current finfish hatchery practices will be presented in a physiological context and in a quantitative fashion. Students are expected to develop a skill set that can be applied to the development of new hatchery protocols adapted from active areas of aquaculture research. Offered every other year.

GAQF 5345 Genetic Principles and Applications in Fisheries and Aquaculture 3 Credits (3 hrs Lecture)
The goal of this course is to provide students the tools to understand and evaluate the use of genetic approaches for fisheries management and aquaculture. Chromosomal, biochemical, quantitative and ecological aspects of fish genetics will be presented with emphasis on their application to aquaculture and fish management. This course is needed by all fisheries and aquaculture biologists. Offered every other year.

GAQF 5326 Fisheries Modeling 3 Credits (3 hrs Lecture)
Students will learn to use a variety of statistical models commonly employed in fisheries science and ecology. Both deterministic and stochastic models will be employed that pertain to mainstream concepts in fish population dynamics and ecology. Examples of topics include virtual population analysis, fish bioenergetics, modeling fish-environment relationships, and models used for fish community analyses. Offered fall of odd years. Prerequisites: GAQF 5325, GAQF 5405 (or equivalent statistics course)

GAQF 5335 Reservoir Fisheries and Ecology 3 Credits (3 hrs Lecture)
This course will provide an in-depth look at the limnology, ecology, and management of reservoir systems. Students will learn reservoir physical/chemical properties, processes, and dynamics; trophic aspects; and specialized management issues. Students will be able to compare and contrast reservoir systems with lakes and rivers, and will be expected to present seminar topics to their peers. This course will be needed by all fisheries biologists and will be offered spring of odd years.

GAQF 5336 Ecology of Caribbean Reef Fishes 3 Credits (2 hrs Lecture, 3 hrs Lab)
This course will introduce students to the biology and ecology of Caribbean reef fishes. The course will be needed by fisheries biologists interested in working in marine environments and will be offered every other summer. It will involve three weeks of intensive work in Pine Bluff and two weeks of field work. Students will be required to pay their own expenses for the field work (transportation, room, board, dive fees, and equipment rental) in addition to tuition. Prerequisite: Students must be SCUBA certified prior to the class.

GAQF 5v71-75 and 5v81-85 Teaching/Extension Practicum
Each Ph.D. student is required to take at least 1 hour of this course to gain experience in teaching and/or extension. Students who intend to pursue a career in either a university teaching or extension specialist position may choose to take more hours or take it twice (with a second number). The number of hours taken will be specified in the student's plan of study.

Students in the Ph.D. program in Aquaculture/Fisheries may also take courses outside of the areas of aquaculture and fisheries, to provide additional overall depth. Table 5 lists graduate courses currently offered by other departments at UAPB, and Table 6 lists relevant graduate courses available at the University of Arkansas at Little Rock, the University of Arkansas at Monticello, and the University of Arkansas for Medical Sciences. These campuses are located within 1 hour's drive of UAPB. In addition, the existing Special Topics class provides a mechanism to cover specific study areas of particular interest to students, but not offered as full courses on campus. These may include topics such as population or conservation genetics, bioinformatics, behavioral or stress physiology, physiology of disease, epidemiology, bioenergetics, fatty acid signatures, otolith microchemistry, or isotope analysis.

List of Program Faculty (Names and Credentials):

The Center is recognized for both its scientific contributions and its impacts on the aquaculture industry. In 2005, the Center was selected for the 1890 AEA/ARD System-Wide Integrated Award for the level and scope of its research and extension activities. Individual scientists in the Center have received the highest awards from aquaculture industry associations in the state and nationally for their contributions (Table 6). The following prestigious awards have been made to Center faculty: 1) Researcher of the Year, Catfish Farmers of America, 2) McCraren Awards (4) from the National Aquaculture Association, three different scientists 3) Outstanding Service Awards from the Catfish Farmers of Arkansas and the Arkansas Bait and Ornamental Fish Growers Association, and the Harvey McGeorge Distinguished Award of Service to Agriculture (other recipients include Sen. Dale Bumpers, Rep. Marion Berry, and others).

Over the past 5 years, three different faculty in Aquaculture/Fisheries had papers selected for Best Paper of the Year by two different journals, Journal of Aquatic Animal Health and the North American Journal of Aquaculture. Moreover, UAPB Aquaculture/Fisheries Center faculty won first place in two of the five categories at the 2005 joint meeting of the Association of 1890 Extension Administrators and the 1890 Association of Research Directors. At that same meeting, the UAPB Aquaculture/Fisheries Center was awarded the 1890 System-Wide Integration Award.

Graduate and undergraduate students and faculty have also received a variety of awards at professional association meetings over the years (Tables 7, 8). Receipt of these awards has generated a positive reputation for the quality of graduates of the Masters of Science in Aquaculture/Fisheries and the B.S. degree in Fisheries Biology. As a result, many employers actively recruit UAPB Aquaculture/Fisheries graduates for positions that will be opening, often in advance of the opening itself.

Center personnel collaborate with a large number of other universities and agencies throughout the United States and overseas and serve on a number of federal task forces that address policy issues of national importance (Appendix D). Of great recent importance is the Center's role in assembling and interpreting scientific data for federal regulators making decisions in areas with the potential to have devastating economic impacts on the aquaculture industry (e.g. Environmental Protection Agency on effluents, U.S. Fish & Wildlife Service/U.S. Geological Survey on exotic species, Animal Plant and Health Inspection Service on fish pathogens).

Table 9 lists faculty currently hired in the department, along with one position vacancy. There are a total of 14 Ph.D.-level faculty positions in the Aquaculture/Fisheries Center. Scientists lead research programs in fish health, fish nutrition, pond and hatchery management, water quality, fish physiology, economics and marketing, engineering, small impoundments (farm ponds and reservoirs), fisheries management, and larval fish ecology. The Center is known for its many dedicated and talented faculty members. Research faculty in the Center are the primary sources of fish diagnostic services in Arkansas, fish nutrition, aquaculture economics and marketing research information in the U.S., and the principal source of information on baitfish production technologies. The following lists faculty and areas of expertise and general program areas:

Dr. Carole Engle – Director/Professor, Auburn University
General Program Area: Aquaculture economics, aquaculture marketing, aquaculture, policy issues affecting aquaculture, catfish production, Asian Carps

Dr. Andrew Goodwin – Associate Director/Professor, Auburn University
General Program Area: Fish diseases, parasites, virology, water quality, diagnostics, animal identification, therapeutants

Dr. Nathan Stone – Extension Fisheries Specialist / Section Leader, Auburn University
General Program Area: Aquaculture, water quality, effluents, farm pond management, baitfish production, alternative & small scale production

Dr. Madan Dey – Professor, University of the Philippines
General Program Area: Aquaculture marketing, international trade

Dr. Michael Eggleton – Associate Professor, Mississippi State University
General Program Area: Quantitative fisheries science, population dynamics

Dr. Alf Haukenes – Assistant Professor, University of South Dakota
General Program Area: Fish physiology, reproductive physiology, stress physiology

Dr. Anita Kelly – Extension Aquaculture Specialist, Southern Illinois University
General Program Area: Fish health, pathology

Dr. Rebecca Lochmann – Professor, Texas A&M University
General Program Area: Fish nutrition, lipids, nutrition, immunity

Dr. Steve Lochmann – Associate Professor, Texas A&M University
General Program Area: Larval fish ecology, recruitment of largemouth bass in Arkansas River

Dr. Peter Perschbacher – Associate Professor, Texas A&M University
General Program Area: Aquaculture, phytoplankton analyses

Dr. Hugh Thomforde – Extension Aquaculture Specialist, Auburn University
General Program Area: Aquaculture, water quality

Dr. Lin Xie – Assistant Professor, Kansas State University
General Program Area: Biostatistics of aquaculture and fisheries

Dr. Yushun Chen – Assistant Professor, West Virginia University
General Program Area: Water quality

Vacant – Assistant/Associate/Full Professor,
General Program Area: Management and ecology of farm ponds, irrigation reservoirs, and other impoundments

There currently are two post-doctoral scientists employed in research positions in the Center. These are:

Dr. Todd Sink – Postdoctoral Scientist, University of Tennessee
General Program Area: Aquatic animal nutrition and physiology

Dr. Kehar Singh – Postdoctoral Scientist, Punjab Agricultural University, Ludhiana, India
General Program Area: Aquaculture marketing, demand and trade analysis

Appendix E includes the curriculum vitae of current faculty.

Faculty hold terminal degrees (Ph.D.) in their respective areas of expertise. Several faculty members are recognized nationally and internationally for their discoveries and scientific achievements. Others have studied with nationally and internationally-renowned aquaculture and fisheries scientists and did their Ph.D. work at the top aquaculture and fisheries universities in the U.S. These include Auburn University, Texas A&M University, Mississippi State University, Kansas State University, Southern Illinois University, and the University of South Dakota.

such as the bi-annual Field Day and the annual Aquatic Sciences Education Day. Another strength of the Center's faculty is their strong ties to the aquaculture industry, to national aquaculture associations, and to national and international agencies involved in aquaculture regulation. The credibility of the Center with its stakeholders has resulted in strong aquaculture industry support.

The UAPB Aquaculture/Fisheries Center provides a unique opportunity to train scientists for the position of extension aquaculture specialist. These positions require a Ph.D. degree in most states, but few recent Ph.D. graduates have training and experience in extension methodologies. The seamless level of integration of research and extension in the Center provides such an opportunity. The 7.9 FTE (faculty) in aquaculture extension in the Center provide ample mentoring opportunities for Ph.D. students. The annual workshops and educational meetings held in the state in cooperation with the Catfish Farmers of Arkansas and the Arkansas Bait and Ornamental Fish Growers Association, the field demonstrations, the Arkansas Aquaculture Field Day, and ongoing extension educational programs provide many opportunities for training for these positions.

Majority Extension faculty are listed in Table 8 along with general program areas, and current priority programs. Additional faculty support for Extension is included in three individuals with partial extension appointments (< 50%) in specialized areas that include: fish health (Dr. Andrew Goodwin), farm pond and reservoir management, and aquaculture economics and marketing (Dr. Carole Engle). Four specialists are located off-campus in Lake Village, Lonoke, and Newport, Arkansas. Lake Village is central to commercial catfish production in the state, with the majority of acreage located within a radius of 50 miles. The majority of baitfish and sportfish production is near Lonoke. Based on the results of a producer survey conducted as part of a NE Arkansas aquaculture plan, a specialist was located in NE Arkansas to support area producers. Through a cooperative agreement, the specialist is housed on the campus of Arkansas State University at Newport (an example of cooperation between the UA and ASU systems.). One UAPB-based specialist is devoted primarily to the catfish and baitfish research verification program, and another works in the area of aquaculture equipment development.

Aquaculture/Fisheries Center faculty have mentored and graduated over 85 M.S. graduate students since 1997, when the first graduate student enrolled in the M.S. degree program in Aquaculture/Fisheries. Appendix H includes experience of faculty in supervising and mentoring graduate students as thesis advisor. Each student has at least two other members on his/her thesis advisory committee. Figure 2 shows that UAPB has graduated, on average, 4.4 M.S. students per year over the past five years. Of these, 32% have pursued Ph.D. degrees and 71% of the rest are working in positions directly related to their training in aquaculture/fisheries (Appendix H). Graduation rate is approximately 89%.

Appendices I and J list recent productivity of both M.S. and B.S. students including student publications, abstracts, and presentations for 2000-2010. M.S. graduate students have published 1.45 refereed journal articles/graduate student, 3.45 total publications per graduate student. Ninety-two percent of graduate students have at least one publication, 85% publish at least 1 refereed publication, and 74% publish at least 1 refereed journal article.

Description of Program Resources (Library, Instructional Equipment and Facilities, Technology Support):

Library Resources

Library resources available to faculty and students in the Aquaculture/Fisheries Center at UAPB include all the major scientific journals in the areas of aquaculture and fisheries and the majority of the relevant books. The journals are available through online subscriptions that allow faculty, staff, and students to access full-text scientific literature from their desk and laptop computers. Access includes a good collection of journals and books in related areas of biology (including bacteriology, parasitology, and immunology), chemistry, nutrition, economics, marketing, and ecology, among others.

Existing aquaculture and fisheries literature collections at UAPB are comprised of holdings at Watson Memorial Library and departmental holdings. John Brown Watson Memorial Library, the main library, hosts 30 online databases with access to over 100,000 full-text journals and newspaper articles, many peer-reviewed, from any computer on campus and for distance access, where applicable, with an ID and password. The main library houses a volume equivalence of 361,502 holdings: 185,955 print volumes and 175,547 microform. 730 print journals with retrospective journals in bound volumes an don microfilm are also available to patrons. The Online Public Access Catalog (OPAC) accesses all print holdings in the mail library and AFREL and is accessible through UAPB's and AFREL's web sites. A keyword search of Aquaculture and Fisheries in OPAC will yield 11,080 titles under the following subject headings: Agriculture 491, Aquaculture/Fisheries 281, Aquatic Animal Nutrition 641, Biology 631, Chemistry 631, Ecology/Environmental Sciences 1631, Economics/Marketing 1581, Fisheries Management 2,441, Medical Sciences 1,931, and Water Quality 821.

The department's combined collection of 955 books, 159 aquaculture/fisheries and 622 science periodicals, are housed in the newly-formed and operational satellite library resource center located in Woodard Hall. This center was funded originally through a USDA Capacity Building Grant, but expenses, including staffing are now included in the Watson Memorial Library's budget. The next largest collection of aquaculture and fisheries materials is at the nearby USDA/ARS Southern National Aquaculture Research Center (SNARC) laboratory library, located 45 miles from Pine Bluff in Stuttgart, AR. It contains 579 books, 211 monographs and 98 periodicals/databases and indexes.

In addition, the libraries at the National Center for Toxicology Research (NCTR) (Food and Drug Administration), University of Arkansas Medical Sciences (UAMS), and the University of Arkansas at Little Rock (UALR) are available to UAPB faculty and students. Total holdings of these libraries include:

NCTR: 12,000 monographs, 600 databases, and 250 current titles in microbiology, genetics, reproductive and developmental biology, chemistry, neurotoxicology, biochemical toxicology, molecular epidemiology, biometry and risk assessment.

E. Maintenance Building

This location provides storage for tools, hardware, and chemicals and provides resources for tractor and vehicle maintenance.

F. Storage Facility

This building provides seven 10x10 ft storage rooms for secure storage of property for researchers and projects at the station.

G. Value-Added Product Development and Demonstration Building

Built in 2000, the Value Added Product Development and Demonstration building is a multi-purpose structure with both research and extension objectives. The laboratory portion of the building is a food processing/kitchen lab where catfish, shrimp and crayfish are developed into new edibles by altering protein structure or simply utilizing innovative recipes with the normal state of the product. A second portion of the building provides an extension conference room that doubles as a break room for research station personnel on a daily basis. The building also provides shower facilities and the station's main office.

H. Water Chemistry Laboratory

This building houses state-of-the-art chemical analysis machinery. Geared to perform a variety of tests of water chemistry parameters, the laboratory houses computers, spectrophotometers, and fume hoods for chemical analysis of water.

I. Truck Shed

In addition to vehicles available from the UAPB Motor Pool, the Department maintains five trucks for field research and several trucks, tractors, ATVs, and golf carts for Station use. These vehicles are stored at the Aquaculture Research Station.

2. The S.J. Parker Agricultural Research Complex

This complex houses facilities and personnel from both the departments of Agriculture and Aquaculture/Fisheries and a conference room. Aquaculture/Fisheries facilities in the S.J. Parker main building include offices for professors, researchers, and graduate students. A wet and a dry nutrition laboratory is located in the main building; and, at the far end of the complex, the Fish Shop and Boat Barn house natural fisheries research space and equipment (described below).

Fish nutrition research at UAPB addresses the development of diets and feeding strategies for baitfish, channel catfish, hybrid striped bass, pacu, largemouth bass and tilapia. Special interests include lipid nutrition, broodstock nutrition, nutritional immunology, nutritional aspects of stress physiology and the effects of fish consumption on human health. The nutrition dry laboratory (1,000 square foot) contains a walk-in cooler, freezer and ultra-cold freezer for sample storage,

equipment for diet preparation, and instrumentation for feed and tissue analysis including protein, lipid, dry matter, ash, fiber analysis, and fatty acid analysis. The wet lab (1,000 square foot) is equipped with a variety of aquaria that may be operated in either flow-through or recirculation fashion.

Support facilities for natural fisheries research include a 2,256 square foot laboratory and a 2,400 square foot boat storage facility. The Fish Shop includes a wet lab with five independent recirculation systems (8 20-gallon aquaria per system) and 20 170-liter flow-through polytanks in a light-controlled environment. There is a large equipment storage area that includes backpack electrofishing equipment, state-of-the-art tagging equipment, and ploidy manipulation equipment; and a processing laboratory that includes wet sample areas, standard microscopy, and an image analysis station. The Boat Barn contains two boom-mounted electrofishing boats and seven all-purpose aluminum boats of various sizes. Collection gears of many types are available, including gill, trap, and hoop nets, trawls, seines, purse seines, and ichthyoplankton tow nets. The Boat Barn is enclosed by a gated fence and has ample parking for vehicles and boats.

3. The S. J. Parker Extension Complex

The office of the Dean of the School of Agriculture, Fisheries, and Human Sciences is located in the complex along with various personnel in each of the component departments and the S. A. Haley Auditorium. Offices of Aquaculture and Fisheries Extension personnel stationed in Pine Bluff and the Fish Health laboratory are also located in the Extension Complex.

The Fish Health Laboratory is one of four disease diagnostic laboratories operated by UAPB that provide a variety of services to the aquaculture industry (the other three are described in items 7-9 below). The lab on the UAPB campus in Pine Bluff provides advanced diagnostic services (histology, quantitative polymerase chain reaction, pathogen identification) to the other laboratories, assists with research related fish health problems from the labs and ponds of the Aquaculture/Fisheries Center and handles a significant number of cases from out of state. The UAPB laboratory is APHIS approved to inspect fish for export and is one of the most active labs in the APHIS Farm Certification Program. Together these four laboratories handle more than 2,000 disease cases per year submitted by more than 300 farms in 27 states.

The S.A. Haley auditorium is used for presentations, keynote speeches, and safety meetings. This auditorium provides seating for up to 150 people with wired network connections for all stations. This allows for easy access to the internet or school network.

4. Woodard Hall

The second floor of Woodard Hall is home to classrooms, computer labs, teaching and graduate student offices, and administration offices for the Department of Aquaculture/Fisheries and the Aquaculture and Fisheries Center for Excellence. The Aquaculture/Fisheries Library (AFREL) is also housed in Woodard Hall, with significant paper volume holdings and rapidly increasing access to on-line resources (see Library Materials).

5. O.R. Holiday Applied Sciences Building

Opened in 2001 and adjacent to Woodard Hall, the Applied Sciences building is home to both Aquaculture and Agriculture facilities. Aquaculture laboratories for dissection and analytical exercises are available in addition to wet laboratories for fish experiments in aquaria and the Aquaculture/Fisheries Ichthyology Teaching Collection is housed on the first floor, and currently contains more than 5,000 specimens and more than 400 species.

6. UAPB Lonoke Farm

The UAPB Lonoke farm is an additional aquaculture resource located about 1 hour from campus. The farm is home to agricultural research projects, and has 13 ponds with nearly 200 acres of water. The ponds are leased to Arkansas Game & Fish Commission who manages the ponds and uses several for game fish production. Other ponds on the property are available for research projects.

7. Lonoke Diagnostics Laboratory

The Diagnostic Lab in Lonoke specializes in the diseases of baitfish, ornamental fishes, and water quality. The lab is in the Lonoke Agricultural Center Building on the south side of Highway 70, one mile east of downtown Lonoke. The building is located next to the Arkansas National Guard armory.

8. Lake Village Diagnostics Laboratory

This laboratory is located in the heart of the catfish industry in Southeast Arkansas. The lab is the second oldest in the UAPB Fish Disease Diagnostic system, and specializes in catfish disease and water quality as related to catfish production.

9. Newport Diagnostics Laboratory

The Newport Laboratory is located in North East Arkansas, an area with a diversity of culture species. It specializes in catfish disease and water quality. The lab is located on the campus of Arkansas State University-Newport.

Instructional Support and Technology

The Center currently has a large-scale Peer-to-Peer network with 125 networked computers using a fiber (ST/multi-mode) and copper based (Cat5e) 10Mbps backbone with a Full T-1 (1.544Mb) Internet connection. The network consists of underground fiber optic lines between four different facilities (Woodard Hall, S.J. Parker, 1890 Extension, and the Aquaculture Research Station), terminated with ST style connectors, connected to Fiber-to-Ethernet 10Mbps transceivers, feeding an installed base of 10BaseT network hubs. Most faculty and staff members are furnished with Dell or Gateway Pentium-4 (Windows XP) based computers running at 2Ghz or faster (Table 10). All faculty and staff members are furnished with their own personal printer in their offices (Table 11). Our graduate students are equipped with either Dell or Gateway

Pentium-4 (Windows XP) or Pentium-III (Windows 2000) based computers, with most students having a printer in their office.

Our web site hosting, email services and computer hardware purchase support are all provided off-site through written agreement with University of Arkansas Extension Services in Little Rock.

The teaching classroom/computer lab is equipped with 17 networked Pentium-4 (Windows XP) based computers, 16 for our students and one for the instructor's use. The instructors' podium is also wired with a network connection for laptop use and a shared network printer. Two separately controlled displays are provided for instructional use, a 60 inch (diagonal) plasma television and a ceiling mounted LCD video projector. These displays allow simultaneous viewing of programs (documents, spreadsheets, presentations, statistical analysis) running on any selected computer in the classroom, DVD and videocassette presentations. There is also a document camera on the instructor's podium, allowing non-digital based materials (pages from a book, documents, and small objects) to be displayed for all to see. Our undergraduate computer lab/study room is equipped with two Pentium-III (Windows 2000) and three Pentium-4 (Windows XP) based computers and a shared network printer. Our Research and Extension laboratories (Fish Health, Nutrition, Water Quality, and teaching labs) are equipped with an assortment of Pentium-4 (Windows XP) and Pentium-III (Windows 2000) networked computers. Pending available funding, all computers will be upgraded to Pentium-4 class hardware.

The Aquaculture/Fisheries satellite library resource room is equipped with four Pentium-4 (windows XP) based computers, one for the Librarian and three networked computer stations for student research, with a networked high-capacity printer and a flat-bed scanner available. The satellite library resource room is also equipped with a high-capacity photocopier.

The off-campus facility at Lonoke is run on a small Peer-to-Peer network shared with other University of Arkansas Division of Agriculture, Cooperative Extension Service personnel, using copper-based (Cat5e) 10/100Mbps backbone with Digital Subscriber Line (DSL) Internet connections. All Aquaculture/Fisheries Center personnel at these sites are furnished with Dell or Gateway Pentium-4 (Windows XP) based computers running at 2Ghz or faster and are furnished with their own personal printer in their offices.

The off-campus facility at Lake Village runs a small Peer-to-Peer network connected through an individually contracted digital subscriber line (DSL) Internet connection, using a copper-based (cat5e) 100 Mbps backbone. All Aquaculture/Fisheries Center personnel at this site are furnished with Dell or Gateway Pentium-4 (Windows XP) based computers running at 2 Ghz or faster and are furnished with their own personal printer in their offices. There are also wireless (WiFi) capabilities available for our visitors while they attend meetings and conferences in the conference room. Full-time audio/visual capabilities had been added at this location by installing a public address system, an LCD projector and a wall mounted projector screen.

The off-campus facility at Newport is provided Internet access through written agreement with Arkansas State University's campus computer network using fiber optics and copper-based (Cat5e) 100Mbps backbone for an Internet connection. There are no wireless (WiFi) capabilities

in place at this time. The Extension specialist at this site is furnished with Dell and Gateway Pentium-4 (Windows XP) based computers running at 2Ghz or faster and is furnished with their a personal printer and scanner in the office.

Distance Education Laboratory, School of Agriculture, Fisheries, and Human Sciences

The Distance Learning Classroom and open computer lab of the School of Agriculture, Fisheries, and Human Sciences is located on the first floor of Woodard Hall, and features the following equipment and capabilities. The IP protocol based (H323 standard) system allowing distance learning classes or video conferencing with any other H323 standards based location in the world by way of the Internet. The equipment of this classroom is instructor coordinated by using the "Symposium" multimedia controller, running PC Presenter software. This hardware controller allows display of any selected digital computer display, video camera output, DVD video, or videotape source to the distant location and to the classroom's three wall mounted 42" plasma display screens. These sources include instructor's view and students' view video cameras, with the specialized sound system which allow visual and audio interaction between ALL classroom participants and distant participants of the conference. What is currently being displayed on any of the 21 networked Pentium-4 student computers, the instructor's desktop computer/laptop computer, the fixed document camera, the DVD player, or the videotape player may also be chosen for display on the wall mounted LCD monitors. To facilitate students' projects and work, a high capacity laser printer and a 42" wide format printer are available to print out their assigned work and projects. A full-time support technician is assigned to keep the classroom/lab fully operational and functional.

INTEL Computer Laboratory Technology Grant

This grant has vastly upgraded the computing capabilities of the Aquaculture/Fisheries program's teaching classroom and undergraduate computer lab. The 20 new Pentium-4 based computers, upgraded operating systems and current versions of nine different data analysis software programs will allow each of our students to become familiar with operation and use of a broad range of software analysis tools. The teaching classroom is set up in a (serverless) Peer-to-Peer network using classroom management software that allows viewing any selected classroom computer display, videotape, CD, DVD, or by using the video document camera viewing of a document, page of a book, or a small physical object – on either the wall mounted 60" Plasma screen monitor or the ceiling mounted LCD projector onto a projection screen. Ten Hewlett Packard personal data assistants (PDA's) will provide students with training on the capability of performing on-site data entry and retrieval through assigned class projects.

A faster T-1 communications line with fiber (ST/multi-mode) and copper based (Cat5e) 100Mbps backbone upgraded our Internet connection in 2008. The Center's network consists of existing underground fiber optic lines between three different facilities (Woodard Hall, S.J. Parker Agricultural Research Complex, S.J. Parker Extension Complex), and the newly added "fourth" fiber optic line to the Value-Added Product Development facility at the Aquaculture Research Station. All fiber optic lines connect to a Fiber-to-Ethernet 100Mbps transceivers, feeding an upgraded installed base of 10/100BaseT network switches. New fiber optic lines now connect the Value-Added Product Development (VAPD) Building to the Center's fiber

backbone. The other buildings at the Aquaculture Research Station are connected with the VAPD building by a wireless (WiFi) bridge network allowing for full IP- Phone and Internet capability in all station work areas.

Program Budget:

Program Costs

The proposed program will be implemented via existing facilities, faculty and base funding. The Department of Aquaculture and Fisheries currently has the research facilities to accommodate Ph.D. students. Moreover, all the faculty and most of the courses are also in place. The five proposed new courses will be taught with existing teaching capacity in the department. This level of teaching capacity is available because the Department has worked towards developing a Ph.D. program for many years and has slowly added tenure-track faculty positions.

The Department has also obtained external grant funds to upgrade the computer laboratories in the department, the classroom with computer equipment and LCD projectors, and to expand library holdings in content areas relevant to the Ph.D. in aquaculture/fisheries.

Table 12 details the current budget of the Aquaculture/Fisheries Center. The overall budget for 2010 was $3.861 million. Of this, 67% is for salaries and fringe benefits of faculty, staff, and graduate students.

The additional costs needed for the program consist of the cost of additional assistantships for Ph.D. students. While some students are expected to be self-funded (through multilateral funding mechanisms and competitive fellowship grant programs available to students in this field), others will require assistantship support. Following consultation with the Dean of the Graduate School of the University of Arkansas at Fayetteville, we have budgeted assistantships for 10 Ph.D. students, $250,000. The additional assistantship costs required to initiate the program are expected to represent an increase of 6% of the Center's total annual budget.

Sources of Funding

The primary source of funding to support the Ph.D. program is the existing base funding from USDA. This funding includes formula funds from the Evans-Allen line item appropriated for 1890 land-grant universities, state matching funds, and ARS pass-through funding. This is supplemented by external grant awards. The budget projects external grant awards of $200,000 to $300,000 a year (16% - 24% of the average amount of external grant awards for the Center over the past 5 years) in direct support of Ph.D. assistantships (Table 13).

Permanent on-going funding is available for 10 assistantships for Ph.D. students. At an annual cost of $25,000 per Ph.D. student, the total on-going cost of these assistantships is $250,000. There will be two major sources of these permanent, on-going funds: The Evans-Allen account of USDA-CSREES and funds used currently to support temporary instructors in the Departments of Biology, Chemistry, and Mathematics. The Evans-Allen funds are formula funds received by UAPB to carry out its land-grant mission as an 1890 land-grant university. Five assistantships,

funded from Evans-Allen funds will be assigned to on-going projects planned as part of UAPB's overall Plan of Work with USDA. Five additional assistantships will be funded from accounts used to hire temporary instructors in biology, chemistry, and mathematics. These five Ph.D. students will be expected to teach lower level courses in the Departments of Biology, Chemistry, or Mathematical Sciences and Technology.

At least one proposal a year will be submitted from the Department of Aquaculture and Fisheries and the Center of Excellence in Aquaculture/Fisheries to seek funding explicitly for the Ph.D. program. This proposal will include funding for Ph.D. student assistantships. The first such proposal was approved in 2007 for $199,547 from the USDA Capacity-Building Grants Program. USDA staff who work with the Capacity-Building Grants Program have expressed a keen interest in the Ph.D. program, and we are confident that the probability of continued success in acquiring these funds is high.

Other possible sources of support and programs include the National Science Foundation that provides funding to develop teaching capacities for which UAPB will be eligible and the Multi-Cultural Scholars Program (USDA) that provides fellowships for Ph.D. students.

Table 14 lists new external grant funds received in 2010 ($1.395 million) for each faculty member in the Aquaculture/Fisheries Center. Research funding has flowed from 26 different sources in support of a wide variety of research topics over the last 5 years (Table 14). Moreover, the Center has averaged $1.13 million/year for the past 5 years. The success and stability of acquiring extramural funding indicates a strong capability to support students throughout their studies. Also, the wide variety of topics covered by extramurally-funded grants provide diverse opportunities for students to develop strong, comprehensive research skills with mentors active in a variety of research areas.

Enrollment and revenue projections

New student tuition and fees are expected to increase from $17,540 to $37,216 during the first three years of the program (Table 15). Anticipated enrollment is presented in Table 15. This program is not expected to yield a high enrollment. However, the enrollment levels projected are conservative, feasible, and adequate to meet state graduation standards for Ph.D. programs. With a conservative enrollment estimate of 10 Ph.D. students by year three, who will take from 3-4 years to complete the Ph.D. degree, a graduation rate of 2.5-3 Ph.D. students a year is projected.

Program Duplication (similar programs in Arkansas):

The proposed doctoral program at UAPB will be the only degree program in the state of Arkansas that provides focused and applied doctoral training for research scientists and future university educators in the disciplines of aquaculture and fisheries. The Aquaculture/Fisheries Center at UAPB is uniquely positioned to assume this role. At present UAPB provides the only undergraduate degree in Aquaculture and Fisheries in the state, has as its primary stakeholders aquaculture producers, aquaculture support industries, farm pond owners, natural resource managers (particularly state and federal agencies), and UAPB is the only state-supported institution of higher education in Arkansas that has the statewide responsibility for both research

The University of Arkansas undergoes an institutional accreditation process periodically conducted by the Higher Learning Commission: NCA. The University prepares and submits a comprehensive Self-Study Report. Site visits provide evidence that UAPB satisfies criteria for continued accreditation and identifies areas where the institution can improve. Accreditation reviews are conducted on a campus-wide basis every 10 years. The previous review took place in 1996, followed by the November 2006 accreditation review. The University received continued accreditation.

Desegregation

UAPB has contributed substantially to the diversity and talent of the leadership of the United States Fish and Wildlife Service (USFWS) and other agencies. In addition, the UAPB strategic plan includes providing superior educational experience for minority students. This would be the only Ph.D. program in aquaculture/fisheries at a Historically Black College and University (HBCU) that is located in the major fish farming region of the country. The top aquaculture program officer in the research branch of USDA (ARS) has emphasized the need for Ph.D. graduates from UAPB. Lack of minority Ph.D. candidates for the Agricultural Research Service (USDA) and other positions is severe and long-standing.

Organizational Chart

Figure 4 presents an organizational chart for the School of Agriculture, Fisheries, and Human Sciences at the University of Arkansas at Pine Bluff. The Ph.D. Program in Aquaculture/Fisheries will be administered by the Department of Aquaculture and Fisheries. The Department of Aquaculture and Fisheries is one of three departments in the School of Agriculture, Fisheries, and Human Sciences. Courses taught and mentoring of Ph.D. students will be the responsibility of the faculty in the Department of Aquaculture and Fisheries. These faculty have appointments in the Aquaculture/Fisheries Center of Excellence, through which research and extension activities are conducted.

Institutional and Board of Trustees Approval of Proposed Program

The proposed program was approved through all committees and signed by the Chancellor of the University of Arkansas at Pine Bluff on May 11, 2007 (see approval tab). The University of Arkansas Board of Trustees approved the program on September 4, 2009 (see resolution in signatures tab).

References

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