

A History
and general description

of
The University of Mississippi
Biological Field Station

by
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Director Emeritus of the Biological Field Station
of The University of Mississippi

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Note About the Author

Dr. Luther A. Knight, Jr. is the important driving force behind all of the accomplishments enjoyed by The University of Mississippi at its Biological Field Station (BFS). My first association with Dr. Knight and the BFS occurred about nine years ago when we visited what was mostly an overgrown area of a few ponds and lots of weeds. Most of Dr. Knight's efforts were directed at trying to keep up with the weeds and in supporting a few research projects. However, I recognized from previous experiences what an unbelievable resource the BFS would be to the University. It didn't take much coaxing of Dr. Knight to begin to hear his vision about the future. Our partnership has been an enduring one for these many years, and I am pleased to continue to have Dr. Knight's sage advice as we continue the evolving program at the BFS.

Michael R. Dingerson
Associate Vice Chancellor for Research and
Dean of the Graduate School

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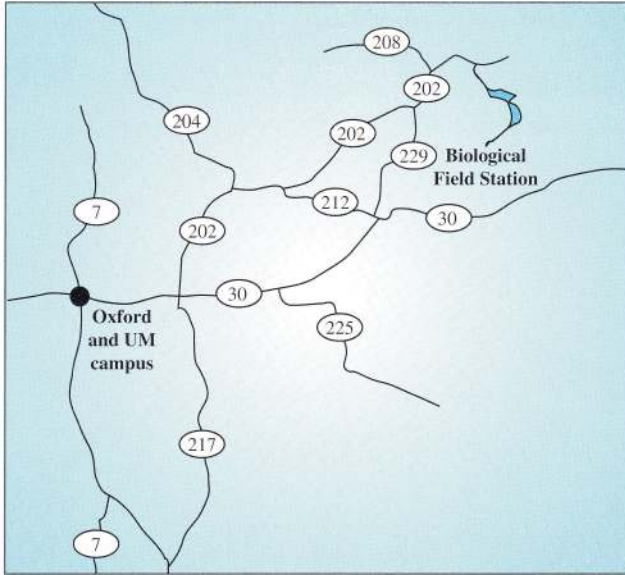


Fig. 1. The University of Mississippi Biological Field Station in relation to Oxford and The University of Mississippi campus.

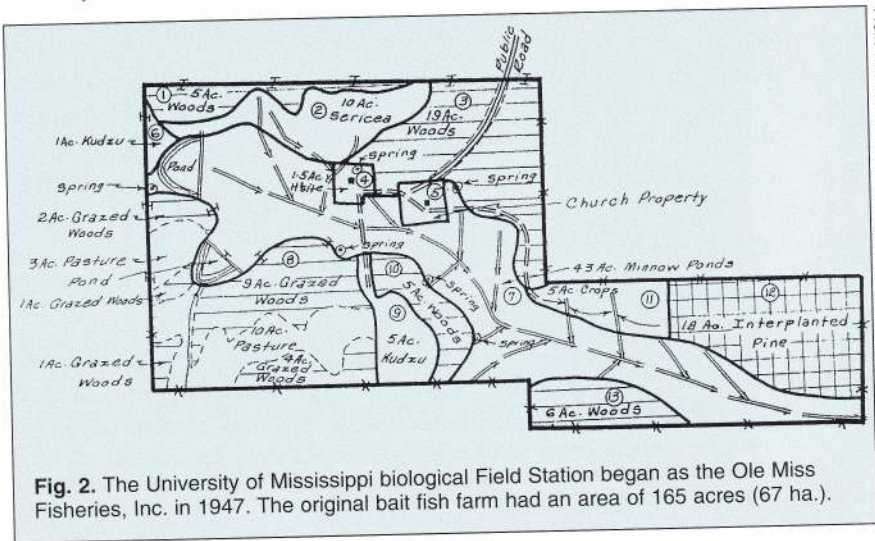
Introduction

Located in northern Mississippi approximately 11 miles (18 km) from the Oxford campus in Lafayette County, the University of Mississippi Biological Field Station offers exceptional opportunities for research and studies in aquatic and terrestrial ecology (Fig. 1). The station lies in an uncommonly scenic three mile long V-shaped valley surrounded by wooded hills from which springs and seeps flow year-round. The facility is unique because of an unusual combination of terrain, vegetation, water resources and engineering.

The Original Bait Fish Farm, Ole Miss Fisheries, Inc.

The University of Mississippi Biological Field Station was begun in July 1947 as a bait fish farm, Ole Miss Fisheries, Inc., later to be known as Minnows Incorporated, by the Herbert Kohn Corporation of Memphis, Tennessee. Thad B. Poe was named its first overseer. After Poe left the position as overseer, Henry Hickey became manager and remained in that capacity during the remainder of the time that the farm was in operation into the early 1980's.

The original bait fish farm, with the exception of two acres where the small Bay Springs Baptist Church is presently located, consisted of 165 acres (67 ha.) purchased from the Hickey family (Fig. 2). Hickey and his mother continued to live in the old family home on the fish farm until it closed in the early 1980' s. This fertile bottom-land lay in the floodplain along the headwaters of the Bay Springs Branch



From Tallahatchie River Soil Conservation District, MS, 1947.

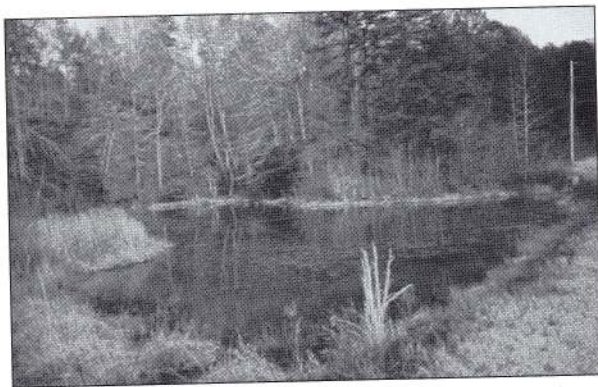


Fig. 3. One of six major springs that are found on the station.

of Puskus Creek. Bay Springs Branch and an unnamed creek which flows from the southwest converge at the eastern boundary of the fish farm to form Puskus Creek. Puskus Creek is a tributary of the Little Tallahatchie River drainage and receives runoff from the many

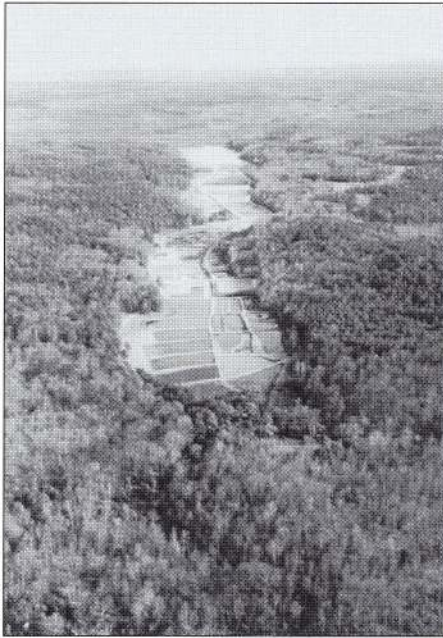


Fig. 4. The original fish farm was an irregular arrangement of ponds. Those downgrade were filled via pipes through the levees of those upgrade.

boards which formed a space 16 inches (40 cm) by 4 inches (10 cm) by 5 feet (150 cm). The space was packed with sawdust obtained from a local sawmill to form a watertight seal. Water level could be maintained, or draining accomplished as required, by removal or addition of boards. Both filling and draining relied on gravity. At the present time a majority of the old concrete outlet structures have been removed and replaced by modern polyvinylchloride standpipes.

When the fish farm was constructed each of the spawning/rearing ponds was re-enforced by board fences built to expected water levels, creating vertical-sided erosion prevention struc-

seeps and springs found throughout the area (Fig. 3).

The first series of ponds was more or less haphazardly arranged (Fig. 4) and filled from the larger springs in the valley from pond to pond via a network of pipes through the levees. These ponds were emptied through standpipes in the lower corners of the ponds. Ponds that were built later, however, were designed for more efficient filling, and could be both filled and drained independently of each other. The newer ponds were equipped with concrete discharge structures (Fig. 5) open on one side and with 6 inch (15 cm) drain pipes through the levee at the bottom of the structure. The edges of the open side had built-in parallel grooves to receive 2 inch (5 cm) thick by 16 inch (40 cm) long

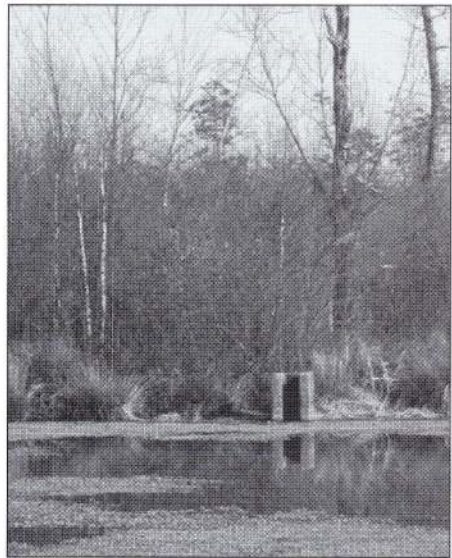


Fig. 5. Concrete outlet structures facilitated drainage in newer ponds. Most of these structures have now been replaced with modern polyvinylchloride standpipes.

tures. Corners were enclosed with chicken wire to form triangles into which water hyacinths from Louisiana were placed. The roots of these floating plants provided a substrate onto which the fish's eggs were deposited. This procedure, as is often the case where caution is not exercised, resulted in the establishment of the nonindigenous golden topminnow, *Fundulus chrysotus* in the creek system.

The fledgling industry employed four men in addition to Hickey to handle the labor intensive chores of spawning, rearing, feeding, harvesting, selling, and farm maintenance. Among others, long-time workers were George White, Troy Ivy, and Jake Gardner. While the farm was at its peak, between three and four million fish were produced annually, 80% of which were golden shiners, *Notemigonus crysoleucas*, and the remainder goldfish, *Crassius auratus*. Most were sold in Mississippi because of the expensive \$500 license required for transporting the fish out of state. Individuals from outside of Mississippi could, however, come to Minnows Incorporated, to buy and transport their own fish.

Following the construction of the initial series of ponds, a marshy area about a mile downstream to the southwest of Bay Springs branch was drained by dynamiting channels to facilitate dewatering. From this area, 65 more ponds forming a double row were built. These could be filled from lateral pipes branching off from a larger pipe buried beneath the road between the two rows of ponds. The ponds were emptied through drains in the deep ends of the ponds. Even though the area had been drained it was necessary for the contractor, Charles McGonagill, to have the timber felled and to leave it and the stumps in place. He then was able to walk his dragline and bulldozer in on the downed timber. Beginning at the far end as the ponds were completed, stumps and other debris were removed as the dragline walked back out.

The original minnow farm represented innovative engineering. For example, in addition to the difficulty of draining the swamp in order to provide room for more ponds, the Bay Springs Branch had its course altered. It originally flowed along the base of the hills on the north side of the valley east of the church. To facilitate construction of larger ponds in that area, and to assure their proper and most efficient drainage, it was feasible to change the creek's course to the base of the hills on the other side of the flood plain. In this arrangement, it was easier to fill the newly built ponds and, because of the altered grade easier to empty them as well.

Attempts at Rearing Other Aquatic Organisms

Although the main emphasis was on the propagation of bait fishes, attempts were also made to produce freshwater trout and bullfrogs. Dr. Y. J. McGaha, a member of the Department of Biology faculty, was retained as a consultant in the early development of the farm. He surmised that trout could thrive because the springs contained waters that seldom rose above 60 to 65° F. Trout, however, are marginal even in Tishomingo County in the extreme northeastern corner of Mississippi because of their critical temperature requirements. The waters of the springs at the station are also very low in the many dissolved substances needed for fish production. As a matter of fact, during the production of bait fish, it was necessary to add basic slag to the ponds to raise total hardness to the proper level for maximum production. Both of these factors probably prevented the success of the trout project.

Several attempts were also made to rear bullfrogs for the commercial market, but this project failed as well. It was never clearly demonstrated, but was strongly suspected that there were either too many predators destroying the larval tadpoles or that disease depleted the frogs confined in a relatively closed space.

Recent Pond Construction and Renovation

After the University acquired the property, seven of the original larger ponds east of the church were converted into 45 uniform, one-tenth acre (0.04 ha.) ponds or



Fig. 6. The need for a number of small, 0.1 acre (0.04 ha.) ponds (mesocosms) for replicate experiments was recognized. During the last five years, about 90 of these have been built.

mesocosms (Fig. 6). These have better plumbing design and are more uniform in size and depth. Ten of the original ponds at the southwestern end of the Station were likewise rebuilt to provide forty small shallow uniform ponds. As a result of the new construction, there are now about 220 ponds representing about 90 surface acres (37 ha.) of water (Fig. 7). These include eight modern efficiently designed constructed wetland cells which were partially funded and built by the United States Department of Agriculture Natural Resources Conservation Service.

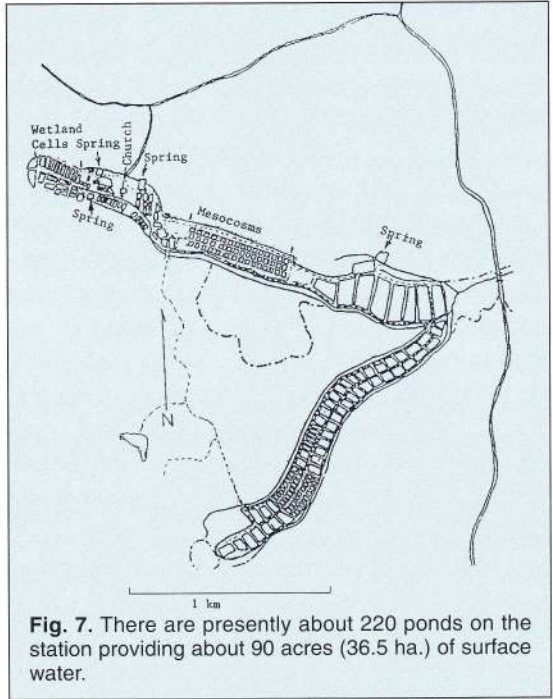
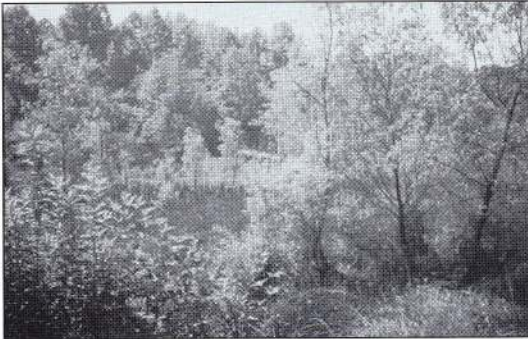


Fig. 7. There are presently about 220 ponds on the station providing about 90 acres (36.5 ha.) of surface water.



Lush vegetative growth was curtailed during the time the facility was a fish farm. The manager and his crew, aided by a small number of cows, kept the entire acreage clear of underbrush. Grazing cattle made mowing minimal and mowing was further facilitat-

Fig. 8. (Top) There was rapid encroachment and growth of vegetation on the facility between the time Minnows Incorporated ceased operation and the property was acquired by the University. This view is looking southwest along the far arm of the station.



Fig. 9. (Bottom) This view shows the same area of the station as seen in Fig. 8 two years after clearing of brush, weeds, and other vegetation.



Fig. 10. The Mississippi National Guard selected the Field Station as one of their public service projects in 1990 and 1991. One of the guardsmen is constructing the roof on the station manager's home.

ty back into shape for teaching and research required the concerted efforts of a number of individuals and organizations, especially the USDA-ARS National Sedimentation Laboratory; Mississippi Department of Wildlife, Fisheries and Parks; personnel of the Department of Biology of the University of Mississippi; Davis and Klepzig Machine Shop; Dr. Charles M. Cooper; Mr. Duane Shaw and Mr. Jack Herring of the Mississippi Department of Wildlife, Fisheries and Parks; and Mr. Clark Littlejohn, County Supervisor, Lafayette County, Mississippi.

Special contributions to the Station's development have been made by the Mississippi National Guard. The Mississippi National Guard Engineering Company C of Charleston selected the Station as one of their domestic assistance projects in both 1990 and 1991. During the two summer camps, the Guard undertook construc-

ed by the uneroded levees. A minimum of labor was required to keep the few small willows and alders pulled from the ponds. For the most part these woody plants were pulled up by hand.

The fish rearing operations stopped in the early 1980's and the facility was sold to the Weyerhaeuser Company. The farm lay fallow for two or three years until The University of Mississippi began negotiations to purchase the land. During that interval, much of the open land area and a majority of the ponds became overgrown with alders, willows, other shrubs, blackberry vines and honeysuckle (Fig. 8).

Figure 9 shows the Station after a majority of the ponds were reclaimed. Efforts to bring the facility

tion work valued in excess of one million dollars which resulted in 45 tenth acre ponds and a house for the Station manager (Fig. 10).

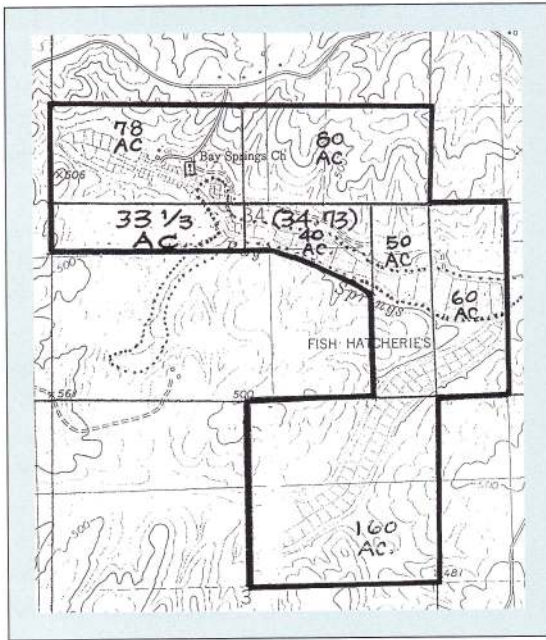


Fig. 11. The Biological Field Station boundaries as they were in 1986.

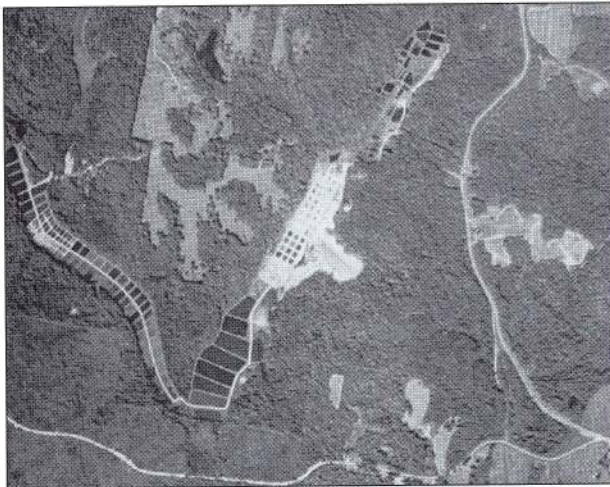


Fig. 12. Aerial view of the Biological Field Station as it appeared in 1996.

Dedication of the University of Mississippi Biological Field Station

Minnows Incorporated was acquired from Weyerhaeuser Company in a land trade and dedicated as the University of Mississippi Biological field Station in May 1986 (Fig. 11). The original land exchange was approximately 500 acres (202 ha.). In 1989 an additional 220 acres (90 ha.), known as the old Bramlett farm, were purchased. More recently, in

April 1996, about 15 more acres (6 ha.) were bought to provide access to the new Center for Water and Wetland Resources complex. The total acreage (Fig.12) is about 740 acres (nearly 300 ha).

Re-organization of the Biological Field Station

When the Station was begun in 1985 it was a part of the Department of Biology at the University of Mississippi. In August 1994, then Vice Chancellor for Academic Affairs Gerald Walton appointed a review committee chaired by Associate Vice Chancellor for Research, Michael R. Dingson. The committee consisted of Dr. H. Dale Abadie, Dean of the College of Liberal Arts; Mr. Robert W. Dowdy, University Comptroller; Dr. Jo Ann O'Quin, Director of Research; and Dr. James G. Vaughan, Associate Dean, School of Engineering. The committee was formed to study the status of the Station and to recommend what, if any, action should be taken to assure future successful development. One of the recommendations was to place the Station in the Office of Research under the direct supervision of Dr. Dingson. It further recommended that the Director at that time, Dr. John H. Rodgers, Jr. be allowed to return to the development of his research program, and a new Director be hired. Another recommendation was to promote a programmatic

The University of Mississippi Biological Field Station Organization Chart

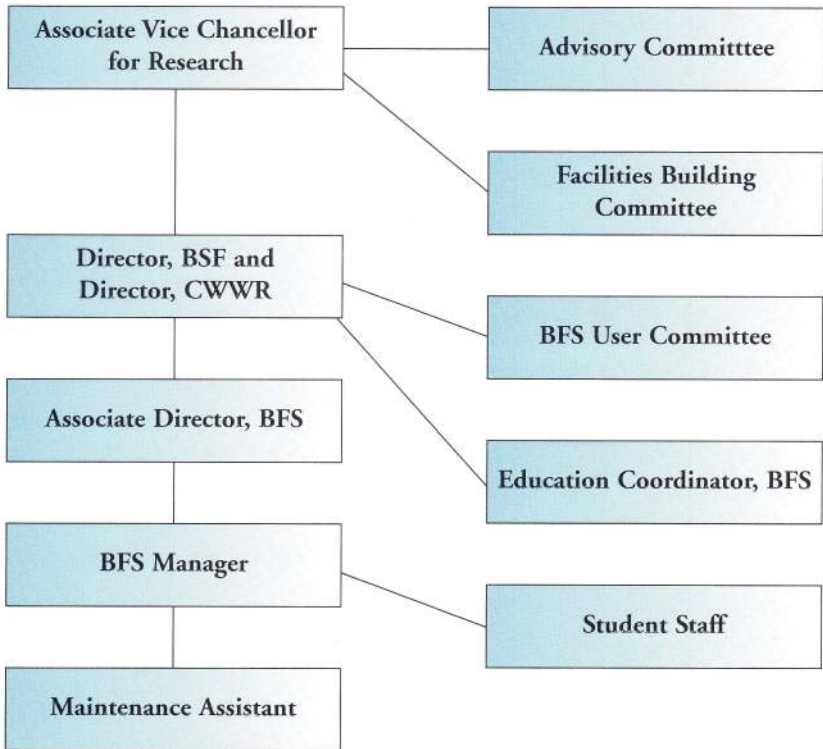


Fig. 13. The University of Mississippi Biological Field Station Organizational Chart.

educational plan to best use the assets of the Station to the greatest extent to reach as broad a spectrum of users as possible. Following those actions an organizational chart outlining responsibilities of the Biological Field Station Staff was developed (Fig. 13).

When the Biological Field Station was dedicated in May 1985, Dr. Luther A. Knight, Jr. was appointed as Director, and served until January 1, 1991. At that time, Dr. John H. Rodgers, Jr., who came to the University of Mississippi from The University of North Texas in 1990 as Professor of Biology and Associate Director of the Field Station was promoted to Director; his tenure ended December 31, 1994, and Dr. Knight was asked to serve as Interim Director. On August 15, 1995, Dr. Marjorie M. Holland, formerly of the US Environmental Protection Agency, Research Triangle Park, North Carolina, was appointed as Director of the Station and Director of the Center for and Water and Wetland Resources. Dr. Knight remained as Acting Associate Director. On January 1, 1996 Dr. Lucile McCook was employed as Education Coordinator. For purposes of maintaining the physical

infrastructure, a Station Manager and Maintenance Assistant were employed. Additionally, two to three part-time student employees work at the station. The Field Station office is located in Shoemaker Hall on the Oxford campus, and employs a student secretary one-half time (Fig. 14).



Fig. 14. The University of Mississippi Biological Field Station staff. (from left to right: former Director Dr. John Rodgers Jr., Field Station Manager Mark Baker, Assistant Grounds Keeper David Mathis, Education Coordinator Dr. Lucile McCook, Director Dr. Marjorie Holland, Acting Associate Director Luther Knight, Student Secretary Amanda Knight-Ellis).

Cooperating Agencies

Several cooperating agencies and private sector interests have supported long-term development of the Field Station through collaborative research and aquaculture projects. The Mississippi Department of Wildlife, Fisheries and Parks has a long-term program of aquaculture and fisheries research at the Station. The USDA-ARS National Sedimentation Laboratory has supported long-term collaborative studies of sedimentation processes and water quality. The Natural Resources Conservation Service has funded construction of a series of artificial wetland cells. The Peace Corps, through CHP International, Inc., funded construction of aquaculture ponds and used the station for training Peace Corps volunteers. Shell Development Corporation funded construction of an artificial stream facility and sponsored research on the impact of detergent-additives on aquatic stream systems. Zoecon and ABC Laboratories provided for the construction of an experimental tank facility. The Mississippi Mineral Resources Institute has collaborated in building a workshop. The Research Institute of Pharmaceutical Sciences remains a supportive collaborator. In 1994 the USDA Forest Service added a tank facility for studying native fish population dynamics.

After the Field Station was placed under the administration of the Office of Research, a User Committee was appointed by Vice Chancellor for Research, Dr. Michael Dingerson, to advise the Director on policy and to recommend protocols to insure the efficient operation and development of the station. This committee has recommended several changes. Among these have been regulations for the use of the facility. Because of the emphasis on toxicology, a sub-committee was selected from the User Committee to review proposed projects involving potentially hazardous materials, and to review proposals involving exotic organisms. Recently, the committee approved a land use plan covering current and projected uses of the station.

Research and educational efforts are varied at the Biological Field Station. These range from amphibian, reptile, and avian population dynamics, to sport fish genetics, to plankton ecology, to toxicological investigations dealing with agrichemicals and agricultural runoff, to wastewater remediation using constructed wetlands. Because of its aquatic, terrestrial and aquatic-terrestrial interface, the station is poised to develop into a multifaceted facility with national recognition.

Center for Water and Wetland Resources

Currently under development at the Biological Field Station is the Center for Water and Wetland Resources (CWWR) which will ensure the infrastructure that will address issues concerned with American agriculture. This multimillion dollar addition to the Biological Field Station, funded jointly by the Cooperative State Research Service of the USDA and the State of Mississippi, focuses on research and educational activities dealing with a variety of subjects designed to reach a diverse constituency. The physical structure of the Center will consist of an Education/Demonstration Building, Toxicology Laboratory, General Laboratory, and a Plant/Invertebrate Culture Facility. Unique to the overall complex will be the use of innovative waste water and sewage treatment using aquatic and semi-aquatic plants and constructed wetlands. Groundbreaking ceremonies for the building complex were held June 1, 1996 (Fig. 15). All CWWR buildings are scheduled for completion in 1998.

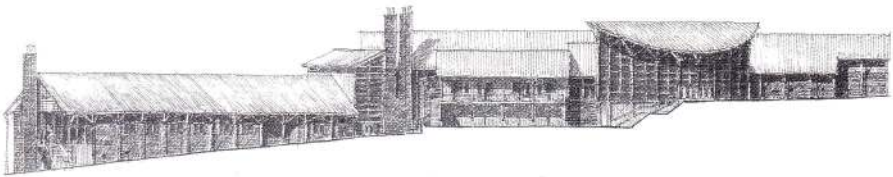


Fig. 15. Architect's rendition of the Center for Water and Wetland Resources. (courtesy Foil and Wyatt, Architects and Planners, P.A.)

Since its inception the Field Station has provided a facility for obtaining field-tested environmental information dealing with such diverse topics as runoff and sedimentation, sports fisheries development, stream and wetland ecology, and aquatic vertebrates and invertebrates. Complementing activities dealing with economically important aquatic species is research directed at the toxicological effects of various chemical substances on the environment. To answer questions raised by the introduction of such substances, and to provide information needed for product development, research involving evaluation of pesticides, herbicides and various other commonly used products is a prominent part of the ongoing activities of the station. The Biological Field Station greatly increases the research and educational capabilities of The University of Mississippi, and has allowed continued collaboration and research affiliation with State, Federal and private agencies. The need for understanding and conservation of natural resources underscores the important role of The University of Mississippi Biological Field Station in providing excellent in educational and research opportunities in basic and applied freshwater and terrestrial ecology.

May 1996 • The University of Mississippi

Chancellor, Robert C. Khayat

Provost, Gerald W. Walton

Associate Vice Chancellor for Research, and

Dean of the Graduate School, Michael R. Dingerson

Field Station Staff

Director, Marjorie M. Holland

Acting Associate Director, Luther A. Knight, Jr.

Education Coordinator, Lucile M. McCook

Field Station Manager, John Mark Baker

Assistant Grounds Keeper, David Mathis

Student Secretary, Amanda L. Ellis



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