Dr. Wade L. Griffin

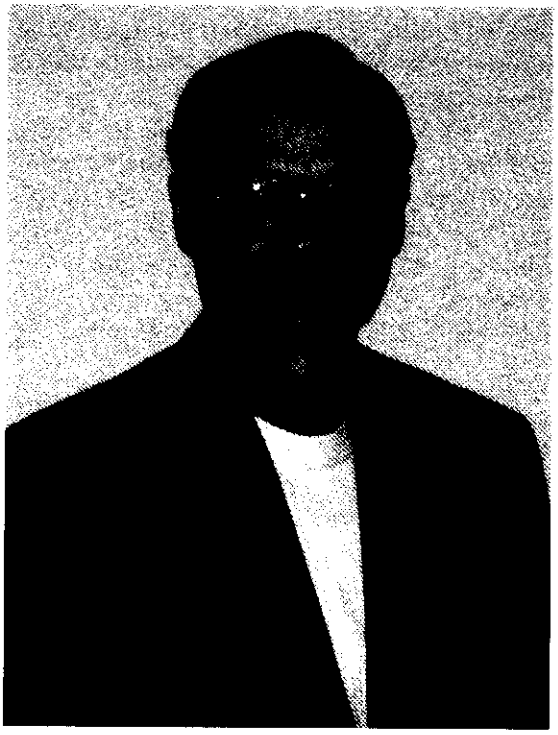
Lifetime Achievement Award

Dr. Wade L. Griffin, professor of agriculture economics, Texas A&M University, has maintained a national and international reputation in policy analysis of fisheries and aquaculture economics for the past 33 years. Dr. Griffin obtained more than $4.1 million in competitive research funds to support his research program in fisheries and aquaculture. He has written or coauthored 78 referred journal articles, 23 Experiment Station Bulletins, 12 Sea Grant publications, 6 chapters in books, 31 contributed papers, and 35 invited papers. He has also released 10 different computer programs to assist fishermen and researchers to better evaluate the economics of shrimping and fishing.

Dr. Griffin's research has focused on fisheries in the Gulf of Mexico and aquaculture species important to the South. He began his career at Texas A&M University in 1972, where he estimated effort and cost of shrimp harvesting by trawlers in the Gulf of Mexico. This early work set the stage for his life-long work in fisheries economics.

Because of Dr. Griffin's work and reputation in shrimp fisheries in 1976, and again in 1978, he was asked by the Gulf of Mexico Fisheries Management Council to help develop the first regional management plan for the shrimp fishery of the Gulf of Mexico, U.S. waters. He provided both data and analysis and wrote much of the economic section of this plan.

Because of the complicated nature of the Gulf shrimp fishery, Dr. Griffin developed the General Bioeconomic Fisheries Simulations Model (GBFSM) in 1976 for the purpose of evaluating management policies proposed by management agencies. GBFSM has become



an internationally recognized model for analyzing policy questions related to shrimping and fishing in both the Gulf of Mexico and Atlantic fisheries.

Over the past 28 years, Dr. Griffin continued to develop GBFSM in conjunction with faculty, research associates, graduate students, and personnel in state and federal agencies. Dr. Griffin has applied the GBFSM to policies such as seasonal area closures, turtle excluder devices, bycatch reduction devices, fractional license, fractional gear, license buyback, total allowable catch, bag limits, size limits, and trip limits.

Because of Dr. Griffin's expertise and reputation, he has served on the Gulf States Marine Fishery Commission task force to develop a shrimp fishery management plan (1976–1977). For the Gulf of Mexico Fisheries Management Council, he has served on the Gulf Council task force to develop a management plan for Gulf of Mexico's Shrimp Fishery (1977–1978), the Gulf Council task force to develop management plans for Gulf of Mexico's Ground Fish (1977–1978), the Shrimp Stock Assessment Panel (1991–present), the Special Shrimp Scientific and Statistical Committee (1998–present), and the Socioeconomic Panel (2000–present).

In 2001, shrimp prices began to tumble, and the Gulf of Mexico shrimp fishery became severely depressed financially. A Summit for the Sustainability of the Gulf of Mexico Shrimp Industry was held, and options were identified by industry and government to aid the shrimp industry. Dr. Griffin consulted with the National Marine Fisheries Service (NMFS) to develop a Shrimp Business Plan to evaluate options for the shrimp harvesting industry to reduce financial pressure on their operations and improve their long-term financial condition in an economically sustainable fishery.

His former students are highly sought after, and several hold important positions in academia in the South and in federal and state agencies charged with managing the Gulf fisheries. Dr. Ward of NMFS writes that, "All of Wade's graduate students I have known over the years have been professional and knowledgeable." Dr. Keithly of Louisiana State University writes that "I have met a number of Wade's graduate students and they are, indeed, professional in character." Dr. Ward continues by writing "while Wade may not have solved all the problems facing fishermen in the Gulf shrimp fishery, he certainly has trained many of its managers over the years."

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Use of Economics in Fisheries: Some Observations

Dr. Wade L. Griffin

I am honored to be a recipient of the Lifetime Achievement Award. Don Ethridge, who received this award in 2002, said, "Whatever any of us accomplish is attributable in large part to many other people ...." I heartily agree with this statement. All of my research has been in cooperation with many different colleagues and students, and I am very grateful to them. I am also grateful to God because looking back, I can see that he has guided and directed my life both professionally and personally.

When Dr. Myers informed me that I would receive this award, he said that this presentation is an opportunity to talk about the highlights of my career and offer comments on opportunities and challenges for the profession. What I want to do in this paper is tell you about how economics has played a role in fisheries management in the Gulf of Mexico.

The Gulf of Mexico Shrimp Fishery

Upon completing my Ph.D. in 1972 at Oregon State University, I had three job offers: Hawaii; Washington, D.C.; and Texas A&M University. The job at Texas A&M was to work on a grant from the National Marine Fisheries Service (NMFS). I would like to say that I came to Texas A&M because I had been inspired by the pioneers in fisheries economics like Crutchfield, Gordon, Schaefer, Scott, and others, but the fact is, my wife said that she had been in a foreign country long enough (we are both from Texas), so we came to Texas A&M. That began my career in fisheries, which I am still in today. Most of this work has been related to the Gulf of Mexico (Gulf) shrimp fishery. To give you some idea of the importance of the Gulf shrimp fishery, in 1972 it was valued at $163 million (ex vessel), whereas tuna was $89 million and salmon was valued at $62 million. In 2003, the Gulf shrimp fishery was valued at $362 million, whereas salmon was $201 million and tuna was valued at $87 million. Crabs from the Atlantic, Pacific, and Gulf together were valued at $483 million in 2003.

The grant I worked on was titled "An Economic Appraisal of the Gulf Shrimp Fishery." The study was to estimate fishing effort for the industry and to examine the cost and returns for shrimping. The data for the project consisted of landings and revenue on a trip-by-trip basis collected by NMFS port agents. A subset of these trips had been interviewed by NMFS port agents to determine the days fished (fishing effort). A regression model was developed on the basis of the interviewed trips to estimate effort for the noninterviewed trips. The cost and return data for the shrimp fishery consisted of 13 offshore shrimp trawlers—not exactly what you would call a representative of the thousands of shrimp vessels in the Gulf, but it was all that was available. I learned two important lessons from this study. First, an economist cannot publish in a journal controlled by biologists when the research is viewed as their territory. Second, fisheries economic data was nonexistent except for revenue data.

Special thanks to Dr. Tony Lamberte, NMFS, St. Petersburg, Florida for reviewing the manuscript and making many helpful suggestions. Dr. Lamberte was the economist for the Gulf of Mexico Fisheries Management Council for many years.

Given the lack of economic data in fisheries, and particularly in the shrimp industry, I obtained funding from Sea Grant to collect economic cost and return data from shrimp fishermen. About the same time, Fred Prochaska and others at the University of Florida began to do marketing studies of the Gulf shrimp fishery.

200-Mile Extended Jurisdiction

During the period 1975–1978, countries with coastal waters began to extend their jurisdiction to 200 miles. The U.S. Congress passed the Fishery Conservation and Management Act in 1976 (now called the Magnuson-Stevens Fishery Conservation and Management Act). The Act gave management authority to the United States over the fishery resource within a fishery conservation zone (FCZ), now called the Exclusive Economic Zone (EEZ), extending seaward from the state's territorial waters to 200 miles (Gulf of Mexico Fishery Management Council). The Gulf of Mexico Fishery Management Council (Council) is one of eight regional Fishery Management Councils established by the Act who are responsible for developing plans to manage fishery resources in the EEZ.

Shrimp was first on the agenda for establishing a management plan. Shrimp spawn in the Gulf and move into the bays and estuaries as postmyses. They grow to juvenile shrimp in the bays and then move into the Gulf where they mature as adults, completing the annual cycle. Thus, shrimp fishing occurred on both state and federal waters. The states have management authority in their respective state waters, and now the federal government has management authority in the EEZ. In 1976, in anticipation of the United States going to a 200-mile extended jurisdiction, a Gulf Shrimp Management Plan Task Force was established to develop a regional management plan for Gulf shrimp that described the resource, the fishery, the management system with associated problems, and a proposed a system for managing the fishery (Christmas and Etzold). In this proposed management system, the need for modeling the shrimp fishery was identified. As a member of this Task Force, I saw an opportunity and linked up with William Grant, a system ecologist in the Wildlife and Fisheries Science Department at Texas A&M University, to develop a model that would incorporate both the biological and economic aspects of the shrimp fishery. We called our model the general bioeconomic fisheries simulation model (GBFSM).

Once the Council was established, it formed a Task Force in 1977 to develop the management plan for the Gulf of Mexico shrimp fishery. The goal of the management plan was: "To manage the shrimp fishery of the United States waters of the Gulf of Mexico in order to attain the greatest overall benefit to the nation with particular reference to food production and recreational opportunities on the bases of the maximum sustainable yield as modified by relevant economic, social, or ecological factors" (Gulf of Mexico Fishery Management Council). Management Measure 1, which was considered and adopted, established a cooperative agreement with the State of Florida for permanent closure of an area to protect small pink shrimp until they were a larger and more valuable size. Historically, Florida had established a Tortugas Shrimp Sanctuary for the protection of small shrimp. However, it was discovered during public meetings that Florida was closing waters beyond its jurisdiction. When the shrimpers learned this, they moved in and began to harvest the smaller shrimp. This brought them in conflict with stone crabbers. Management Measure 2, which was considered and adopted, established a cooperative closure with Texas to protect small brown shrimp as they migrated to deeper waters offshore. Texas had been closing its territorial waters 45 to 60 days starting in May and ending in July.

We evaluated both measures with the GBFSM and found that each had a slight negative effect (Blomo; Griffin et al. 1981). It is interesting that the analysis of Measure 1 was included in the discussion of the rationale for adopting the measure, whereas the analysis of Measure 2 was ignored. NMFS analysts determined that the proposed cooperative Texas closure would net 4 million pounds of shrimp

worth $6.8 million to $12.7 million and add $13.6 million to $25.4 million to the GNP. In 1981, the first year of the Texas closure, there was a large increase in Texas production, and proponents of the closure were calling it a huge success, ignoring the fact that there was a large increase in brown shrimp all across the Gulf due to favorable water temperature and salinity conditions. In 2003 I evaluated the Texas closure again. This analysis differed from the first analysis in that it considered the effect to the rest of the Gulf as a result of the Texas closure. Results were that during the time of the Texas closure offshore, Texas vessels were fishing off the coast of Louisiana, which caused substantial growth over fishing of shrimp. The Texas closure was estimated to cost shrimpers Gulf-wide $25 million a year. When the results were presented to the Council, the representative from Texas Parks and Wildlife Department (TPWD) disputed the analysis and rallied some Texas shrimpers to oppose doing away with the Texas closure. The Council chose to keep the closure in place not because they did not believe the economic analysis but mainly because of enforcement at the state and federal levels. If the Council had done away with closure in federal waters, then Texas would be responsible for enforcing the state territorial sea closure. This, as in earlier years, would put a strain on state resources, with hundreds of shrimpers fishing just outside the state's territorial waters during the day and coming inside at night to fish for brown shrimp. By maintaining the federal closure, NMFS and the Coast Guard, in cooperation with Texas, would enforce the closures. Also, the Coast Guard reasoned that a federal closure has helped them catch other law violations, such as drug and people trafficking, because they could monitor vessel traffic better when thousands of shrimp vessels are not around.

Sea Turtles

In 1978, sea turtles were listed as threatened or endangered. The most endangered sea turtle is the Kemp's ridley, which inhabit the coastal waters of the Gulf of Mexico and nest at the Rancho Nuevo beach in Mexico. In 1947, the number of Kemp's ridley nests was estimated to be 92,000. This was reduced to 6,000 by 1966 because of intense exploitation by man for the eggs, juveniles, and adult turtles (Hildebrand; National Research Council; Turtle Expert Working Group). In 1966, the Mexican government began protecting the nesting beach at Rancho Nuevo from poachers, although not very successfully until, in 1978, the United States joined in providing cooperative assistance in the management and protection of nests. Nests continued to decline and reached a low of 702 in 1985 (Thompson).

Commercial shrimp trawls were identified to be a major source of sea turtle mortality at sea (Henwood, Stuntz, and Thompson; National Research Council; Pritchard; Witzell). This brought shrimpers in the Gulf into sharp conflict with the proponents of sea turtle conservation. The environmental community compelled Congress to mandate the use of turtle excluder devices (TEDs) to reduce sea turtle bycatch. The environmental community then forced the regulations to be published in the *National Register* in 1987, and in 1988, TEDs began to be used in the Gulf. The main problem shrimpers had with using TEDs (besides cost, learning to use them, and clogging) is that it also excluded some of the shrimp. Whenever regulations are imposed on individuals, as with TEDs, a Regulatory Impact Review (RIR) and a Regulatory Flexibility Act Analysis have to be conducted. These analytical requirements necessitate the determination, in quantitative terms as much as possible, of economic impacts. We have used GBFSM to determine the economic impact to shrimpers of the use of TEDs in the Gulf (Griffin, Tolman, and Oliver). Then in 2002, when the size of TEDs was recommended to be increased to ensure the escape of large Loggerheads and Leatherback sea turtles from shrimp trawls, we used GBFSM to determine the economic impact to shrimpers (Department of Commerce).

We also did an analysis for the TPWD to determine the effect on shrimpers of the closing of the lower nearshore coastal waters of

Texas to shrimping from December 1 to July 15, which would reduce the catch of small shrimp and reduce bycatch, including sea turtles. The results of the analysis showed that the closure would have little effect on the shrimpers (which was disputed by shrimpers). Texas Parks and Wildlife Commission passed additional regulations, which included gear restriction, and closures that were implemented beginning in September 2000. With or without our economic analysis, however, the Commission would have passed the gear restriction and closure regulations.

Texas Bay and Bait License Buyback

To harvest shrimp commercially in Texas, a fishermen must have at least one of three licenses: a bay, bait, and/or gulf license. Texas has always managed their shrimp fishery to protect the smaller shrimp so that they could grow to larger and more valuable sizes. This particularly benefited the larger offshore shrimpers because more shrimp would escape the bays and move into the offshore area. Over time, however, the inshore bay and bait shrimp fishery increased substantially, which led to a decrease in the number of shrimp that could be harvested by the gulf shrimp fleet. This resulted in a decrease in the overall net returns to the shrimp fishing industry (Robinson, Campbell, and Butler). In 1995, to offset these effects, the Texas Legislature passed legislation expanding the authority of the TPWD to include a license limitation and voluntary license buyback program of the bay and bait shrimp fishery (Vernon Statutes). Funding for the buyback program was originally through license surcharge fees to accrue annually on the basis of shrimp handling and harvesting licenses sold and were estimated to be $170,000 per year. We evaluated the buyback program with GBFSM and estimated that it would take 15 years to buy back the excess licenses from the bay[1] fishery (Funk et al.). The TPWD wanted to know how quickly they could reduce the number of licenses if additional funds were found. We found that if additional funds of $500,000/year for 5 years were made available, the time could be reduced to about 5 years. Additional funds were obtained from a 3-year federal grant, private donations, and a $3.00 addition to a Saltwater Fishing Stamp. The first rounds of buybacks occurred in 1996, and by 2003, 1,005 licenses were purchased at a cost of $5.8 million (Riechers, Griffin, and Woodward).

Red Snapper and Shrimp Trawl Bycatch

Red snapper stocks experienced serious decline in the Gulf from overfishing of adult fish by commercial and recreational fishermen and from the incidental discarded catch of juveniles by shrimpers. To rebuild the stocks, the Council and the NMFS instituted over time a multitude of regulations: total allowable catch (TAC) for the entire fishery, quota and quota closures for both commercial and recreational fishermen, trip limits and license limitation for the commercial red snapper sector, size and bag limits for recreational red snapper fishermen, and the use of bycatch reduction devices in shrimp trawls. When the bycatch issue first arose in the early 1990s, it was proposed that shrimp bycatch be controlled by time/area closures. We used GBFSM to analyze these options, which showed that closures would mainly result in negative economic impacts on the shrimp fishery. This issue touched off a heated controversy around the Gulf, prompting Congress to step in and prohibit the Council and NMFS from implementing any bycatch reduction regulations in the shrimp fishery for a period of 3 years. In the meantime, studies were conducted to find other means of reducing bycatch in the shrimp fishery. One of these methods is the so-called bycatch reduction device (BRD). Again we used GBFSM to analyze the effects of BRDs and time/area closures. Our results showed that BRDs were far less costly to shrimpers than time/area closures. Basically, the closures only postponed the catching of juvenile red snapper in shrimp trawls until the season was open. The decision was made to forget closures and go with BRDs, although it took several more years of

[1] The bait shrimp fishery was not included in the analysis because no data existed on that fishery.

deliberations and lawsuits before BRDs were implemented in 1998.

In the late 1990s, we comprehensively analyzed with GBFSM the biological and economic impacts of rebuilding red snapper stocks, this time integrating biological and economic models of the shrimp and red snapper fisheries. We were able to show the tradeoffs between rebuilding the red snapper stock, and the producer and consumer surplus for commercial shrimp and red snapper fisheries, and consumer surplus for the recreational red snapper fisheries under various combinations of TAC, bag limits, size limits, and bycatch reductions through BRDs. The results of this research were later used in the RIR for a fishery management plan amendment to rebuild the red snapper stock. GBFSM results that were used in the RIR unintentionally revived the highly contentious issue regarding the 51%/49% allocation of red snapper TAC between the commercial and recreational sectors. Despite almost equal allocation, the recreational sector appeared to be worth more than the commercial fishery, prompting some Council members to put on the table the issue of reallocating more fish to the recreational sector. They resolved the hot potato by tossing it back for further research. The one thing, however, that was locked into the Council's memory was that a recreational red snapper fishing trip was worth $213 (Griffin, Gillig, and Ozuna). In fact, this number has been used in many other RIRs and economic analyses done to support Council decisions in the red snapper and other reef fish fisheries.

Scientific and Statistical Committee

The Scientific and Statistical Committee (SSC) of the Council is the main scientific advisory body of the Council and is composed of professional biologists, economists, anthropologists, statisticians, oceanographers, and lawyers. I have served in the special shrimp SSC since 1991. Through my years of membership in this committee, I have reviewed several scientific research studies, mostly in the biological field. Very little has come in the form of economic or social research studies, so it has almost become a routine to ask the Council for more studies in the socioeconomic arena. One function of this group is to review the report of the socioeconomic panel, of which I am also a member.

Socioeconomic Panel

Although the Council was formed in about 1977, it was not until about 1990 that the Socioeconomic Panel (SEP) of the Council was established. The Council intended the SEP to serve as a working group that provides the Council advice on economic and social matters in fishery management. In the early years, panel members spent considerable time attempting to define its role in the management process and determining the information needs so that it could function effectively as an adviser to the Council. The requests to the SEP from the Council were typically of the following form:

> **Tampa, Florida—February 27, 1998—** The Gulf of Mexico Fishery Management Council will convene its Socioeconomic Assessment Panel (SEP) to review available social and economic information on the Gulf migratory group of king and Spanish mackerels and to determine the social and economic implications of the levels of acceptable biological catches recommended by the Council's Mackerel Stock Assessment Panel (MSAP). The SEP may recommend to the Council total allowable catch levels for the 1998–1999 fishing year. In addition, the SEP will address certain issues related to the assessment of regulatory impacts on fishing communities (Source: http://www.gulfcouncil.org/prrel/pr1998-05.htm).

There were two problems with this request. First, for most fisheries, there was no economic information other then revenue from commercial sales. Second, the time allowed for the economic analysis was usually very short. These two problems made it difficult to provide any meaningful economic implications to the Council for the different management plans. Despite these obstacles, the SEP has provided advice that the Council and the public considered in the discussions regarding the

adoption or rejection of certain fishery management measures.

In 2000, Walter Keithly from Louisiana State University and I joined the SEP, and we, along with John Ward from the NMFS and Lee Anderson from the University of Delaware, began to push for better economic input, particularly in the area of bioeconomic modeling, for consideration by the SEP. We thought it was one of the best avenues for the SEP to provide good, solid economic advice to the Council. Lee Anderson had recently developed a bioeconomic model in Excel, which he named LEM,[2] after the authors. This model used the calibrated biological model developed by NMFS stock assessment biologists, to which he added an economic component. A modeling subgroup of the SEP, which included Walter Keithly, John Ward, Lee Anderson, and me, met at the University of Delaware on September 5–9, 2000, and calibrated the economic coefficients for the red snapper fishery. With this bioeconomic model, the SEP was able to determine the economic implications of the levels of acceptable biological catches recommended by the Council's Red Snapper Assessment Panel, a group consisting entirely of biologists.

Two years ago, the Council faced hard choices regarding the rebuilding of the overfished red grouper, a species fished mostly off the west coast of Florida. One measure they seriously considered, and for which they sought guidance from the SEP, was the movement of the longline fishery from outside the 20-fathom depth zone to outside the 50-fathom depth zone. LEM was then calibrated to the red grouper fishery, and to provide more reasonable estimates of model parameters, the SEP's modeling subgroup conducted a workshop with industry participants. LEM was able to quantify the large cost to the longline fishery and the potential large benefits to the other sectors of the fishery. Although in the end, this particular management measure was abandoned, the Council and the public were made aware of the type of highly useful economic information that a bioeconomic model can provide.

[2] LEM after the authors, Lee Anderson, and his graduate students Emiko Maaruyama and Maryjane Middelkoop.

Conclusion

Economic analysis in 1972 in the Gulf fisheries was nonexistent because of a lack of economic data (other then revenue), relative absence of fishery economists, and any real need for the economic analysis. With the advent of the 200-mile extended jurisdiction and the requirement for RIR and Regulatory Flexibility Act Analysis, economic analysis has become mandatory. Although there is still a large gap in economic data needed to do economic analyses, the development of bioeconomic models has made economic analysis a very relevant part of the fisheries management process.

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