Marine Fisheries Initiative Program

(MARFIN)

REPORT

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PREFACE

The Marine Fisheries Initiative (MARFIN) promotes and endorses programs that seek to optimize economic and social benefits from marine fishery resources through cooperative efforts that evoke the best research and management talents of the Southeast Region. Preference is given to cooperative planning efforts with up to three-year time horizons. The intent is to focus projects funded by MARFIN into cooperative efforts that provide clear answers for fishery needs covered by the National Marine Fisheries Service (NMFS) 2001 Strategic Plan for Fisheries Research. Goals one, two, and four are particularly important. For example, a geographically restricted age and growth study of a local fishery resource is of limited value unless it is coordinated with, or verified by, similar studies that span the range of the resource. The value of such studies is also relatively limited unless the results can be combined with other studies to provide a regional assessment of the resource. MARFIN provides this necessary programmatic integration through cooperative planning, accomplishment of program activities, and an annual MARFIN Conference.

The MARFIN program was created to bring together scientific, technical, industry, resource conservation, and management talents to conduct cooperative programs to facilitate and enhance the management of the marine fishery resources of the Gulf of Mexico and South Atlantic. MARFIN requires the timely dissemination of the results of both successful and unsuccessful efforts; therefore, each recipient of funding under this program is obligated to attend a MARFIN conference to report project findings. The bycatch issue remains a focal point of research needs for the Southeast Region. Critical reef fish fisheries are also being addressed, from efforts to reduce catches associated with shrimp trawls, to life history studies, as well as fishery-dependent and -independent characterization work. Delineation of fishery stocks (king mackerel, Gulf red snapper, South Atlantic red porgy, wahoo, and dolphinfish) continues to be an area of important research toward enhancement management of these commercially and recreationally vital fisheries. Research on economic and sociological impacts of fisheries regulations, including the establishment of marine fishery reserves, illustrates the recognition by the MARFIN program that all aspects of a fishery, including essential fish habitat, must be understood to provide adequate fisheries management.

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[1]NMFS Strategic Plan Goals:
- Provide scientifically sound information and data to support fishery conservation and management.
- Through conservation engineering research, contribute to efforts to reduce bycatch and adverse effects on EFH, promote efficient harvest of target species, and to improve the data from fishery surveys.
- Through economic and ecological research on marine communities and ecosystems, provide scientific data and information to increase long-term economic and social benefits to the Nation from living marine resources.
- Improve the fishery information system.
- Improve the effectiveness of external partnerships with fishers, managers, scientists, conservationists, and other interested groups.

HISTORY OF THE MARFIN PROGRAM

The MARFIN Program received its initial impetus from a 1983 discussion paper entitled: "Research Needs For Information Leading To Full and Wise Use of Fishery Resources In The Gulf of Mexico," by Dr. Thomas D. McIlwain of the Gulf Coast Research Laboratory while he was in the office of then Representative Trent Lott.[2] This paper, sometimes referred to as the Lott-McIlwain paper, proposed an additional investment in fisheries research and development in the Gulf of Mexico to increase the economic contribution of marine fisheries, develop more valuable products from existing fisheries, develop export markets, forecast variation in yields, and conserve and maintain presently exploited resources.

The next step in the evolution of MARFIN was the preparation and publication of the Marine Fisheries Initiative - Gulf of Mexico Phase.[3] This publication, developed by a joint industry, federal, state, and academic task force, detailed the research and development efforts necessary to enhance, restore, and maintain fisheries in the Gulf of Mexico. The program focused on funding projects that had the greatest probability of maintaining and improving existing fisheries, increasing revenues for the domestic industry, increasing yields from fisheries, and generating increased recreational opportunity and harvest potential. Projects were to be selected for funding based on their likelihood of achieving these benefits through both short-term and long-term research with consideration of the magnitude of the eventual benefit that might be realized. Both short-term projects yielding immediate benefits and long-term projects were to receive high-priority emphasis. Planning emphasis was placed upon attaining priority goals either through a single project or a series of projects necessary to attain that goal.

In 1992, the MARFIN program was expanded to include a South Atlantic component (North Carolina, South Carolina, Georgia, and the Atlantic coast of Florida). The goals and objectives of the South Atlantic Phase of MARFIN are described in Special Report No. 13 of the Atlantic States Marine Fisheries Commission, Marine Fisheries Initiative (MARFIN) South Atlantic Phase.[4]

The Lott-McIlwain paper and the Marine Fisheries Initiative publication were instrumental in gaining public support for the MARFIN program. On December 4, 1985, the conference report of the House and Senate that appropriated funds for the Departments of Commerce, Justice, State, the judiciary, and related agencies for the fiscal year (FY) ending September 30, 1986, allocated $2,850,000 for the MARFIN Program.

The following list represents ESTAIMTED funding for each year from the start of the MARFIN program until the current year:

Fiscal Year 1986 - $2,850,000

Fiscal Year 1987 - $3,500,000

[2]Office of Representative Trent Lott, Washington, DC; Dr. Thomas D. McIlwain; May 1983
[3]Gulf States Marine Fisheries Commission, P.O. Box 426, Ocean Springs, MS 39564; J.Y. Christmas, D.J. Etzold, T.D. McIlwain,
L.B.Simpson (eds.) January 1985
[4]Special Report No, 13 of the Atlantic States Marine Fisheries Commission; E.J. Joseph, V.G. Burrell, D.M. Cupka, P.J. Eldridge,
August 1988

Fiscal Year 1988 - $3,500,000

Fiscal Year 1989 - $3,000,000

Fiscal Year 1990 - $3,000,000

Fiscal Year 1991 - $2,986,000

Fiscal Year 1992 - $4,000,000 (This includes $500,000 of the South Atlantic MARFIN and $1,300,000 for shrimp trawl bycatch studies.)

Fiscal Year 1993 - $3,540,000

Fiscal Year 1994 - $3,542,000

Fiscal Year 1995 - $3,540,000

Fiscal Year 1996 - $2,760,000 (No new projects were accepted due to a congressional allocation reduction and active multi-year projects selected during previous funding cycles.)

Fiscal Year 1997 - $3,000,000

Fiscal Year 1998 - $3,000,000

Fiscal Year 1999 - $3,000,000 (This includes $500,000 for the Northeast Region.)

Fiscal Year 2000 - $2,750,000 (No new projects were accepted during FY 2000 due to a reduction in congressional allocation, and because of the large number of active multi-year projects selected during previous funding cycles.)

Fiscal Year 2001 - $3,500,000 (This includes $250,000 for the Northeast Region and $750,000 for red snapper research.)

Fiscal Year 2002 - $3,500,000 (This includes $250,000 for the Northeast Region and $750,000 for red snapper research.)

Fiscal Year 2003 - $3,250,000 (This includes $250,000 for the Northeast Region and $500,000 for red snapper research. No new projects were accepted during FY 2003 because of the large number of active multi-year projects selected during previous funding cycles.)

Fiscal Year 2004 - $2,500,000

Fiscal Year 2005 - $3,400,000 (This includes $250,000 for the Northeast Region and $750,000 for red snapper research.)

Fiscal Year 2006 - $2,400,000

Fiscal Year 2007 - $2,898,000 (This includes $750,000 for red snapper research)

Fiscal Year 2008 - $2,898,000 (This includes $750,000 for red snapper research)

Fiscal Year 2009 - $3,000.000 (This includes $750,000 for red snapper research)

Fiscal Year 2010 - $3,000.000 (This includes $750,000 for red snapper research)

Fiscal Year 2011 - $3,000.000 (This includes $750,000 for red snapper research)

Fiscal Year 2012 - $3,000.000 (This includes $750,000 for red snapper research)

Fiscal Year 2013 - $3,000.000 (This includes $750,000 for red snapper research)

Fiscal Year 2013 - $3,000.000 (This includes $750,000 for red snapper research)

Fiscal Year 2014 - $3,000.000 (This includes $750,000 for red snapper research)

MARFIN promotes and endorses programs that seek to optimize economic and social benefits from marine fishery resources through cooperative efforts that evoke the best research and management talents of the Southeast Region. The intent of the MARFIN program is to focus projects on key fisheries' issues in the southeast United States.

MARFIN PROGRAM ORGANIZATION AND ADMINISTRATION

The NMFS Southeast Regional Administrator (RA) re-formed the MARFIN Panel in FY 1992 when the program was expanded to cover the South Atlantic (Appendix 1). Each member of the MARFIN Panel provides individual recommendations to the RA on MARFIN priorities and financial assistance applications. The MARFIN Panel membership is as follows:

- One state marine conservation agency representative each from the Gulf of Mexico and the South Atlantic areas.
- One representative each from the Gulf of Mexico and the South Atlantic commercial fishing industries.
- The Executive Directors of the Gulf of Mexico and South Atlantic Fishery Management Councils.
- The Executive Directors of the Gulf and Atlantic States Marine Fisheries Commissions.
- One representative each from the Gulf of Mexico and the South Atlantic recreational fishing industries.
- One representative each from the Gulf of Mexico and the South Atlantic Sea Grant Universities.
- A NMFS Southeast Fisheries Science Center representative.
- The NMFS Southeast Region Program Officer acts as an advisor to the RA and MARFIN Panel members concerning federal, Department of Commerce, and NOAA financial assistance administration requirements.

Alternate representatives to the MARFIN Panel serve when necessary. Individual Panel members are appointed by the NMFS Southeast Regional Administrator for staggered terms.

The RA of the NMFS Southeast Regional Office relies on recommendations from individual members of the MARFIN Panel in selecting each year's projects. Each year the RA and NMFS administrators and scientists identify areas of emphasis for the next year's competition.

The NMFS Southeast Regional State/Federal Liaison Branch staff (Appendix 2) is responsible for the overall administration of all NMFS Southeast grants and cooperative

agreement programs, including MARFIN. Their responsibilities include planning, application and selection, negotiation, performance monitoring, and close-out of all assigned competitive and noncompetitive financial assistance programs. A NMFS Southeast Regional scientific or technical expert is assigned as the technical monitor for each MARFIN award. The technical monitor is responsible to the State/Federal Liaison Branch Program Officer for all technical and cooperative aspects of assigned awards. The NOAA Grants Officer is responsible for the overall administration of each NMFS financial assistance award issued to recipients outside of the federal Government and cooperates with the NMFS Southeast Region State/Federal Liaison Branch in administering each financial assistance award.

Overview of Research Awards

AWARDS COMPLETED OR ONGOING IN FY2014

"Development and Assessment of Bycatch Reduction Devices within the Southeastern Shrimp Trawl Fishery" Gulf and South Atlantic Fisheries Foundation, Inc. MARFIN A**ward NA08NMF4330406**

"Evaluating the effect of barotrauma on regulatory discards in the red snapper fishery using advanced acoustic telemetry and hyperbaric experimentation" Texas A&M University Corpus Christi MARFIN A**ward NA10NMF4330126**

"Digital Archiving of the Surviving SEAMAP Plankton Samples" –Louisiana State University MARFIN A**ward NA08NMF4330408**

"Genetic evaluation of population bottlenecks in gag (*Mycteroperca microlepis*)" - South Carolina Department of Natural Resources MARFIN A**ward NA09NMF4330154**

"Release mortality of Gulf of Mexico greater amberjack from commercial and recreational hand-line fisheries: Integration of fishing practices, environmental parameters, and fish physiological attributes" – University of Florida MARFIN A**ward NA09NMF4330147**

"Ecological and Fisheries Implications of Red Snapper (*Lutjanus campechanus*) and Gag (*Mycteroperca microlepis*) Interactions" – University of South Alabama MARFIN A**ward NA10NMF4330105**

"The recovering goliath grouper population of the southeastern U.S.; non-consumptive investigations of reproduction for stock assessment" – Florida State University MARFIN A**ward NA10NMF4330123**

"Development of an algorithm to estimate age structures in landings precluding the routine use of age-length-keys for applications in data-poor fisheries and with species that cannot be aged directly" – University of Miami MARFIN A**ward NA10NMF4330116**

"Integrated assessment modeling of natural mortality: a framework and simulation study" –Virginia Polytechnic Institute & State University MARFIN A**ward NA10NMF4330119**

"Evaluation of Approaches for Reef-Fish Stock Assessment under Data-Poor to Data-Rich Conditions" - University of Miami MARFIN A**ward NA11NMF4330129**

"Larval dispersion from the spawn of large, highly fecund red snapper found in offshore waters of the northern Gulf of Mexico" – University of Southern Mississippi MARFIN A**ward NA10NMF4330118**

"Spatial and temporal abundance and distribution of red snapper (Lutjanus campechanus) eggs across the northern Gulf of Mexico based on historic SEAMAP plankton surveys" Dauphin Island Sea Lab/Marine Environmental Sciences Consortium MARFIN A**ward NA09NMF4330153**

"Population Structure And Genetic Demography Of Red Snapper (*Lutjanus campechanus*) In The U.S. South Atlantic and Connectivity with Red Snapper In the Gulf of Mexico" – Texas A & M University – College Station **MARFIN Award NA10NMF4330114**

"Social Impacts of the Allocation/Reallocation of Marine Fisheries Resources on Communities in the Gulf of Mexico and South Atlantic: Development of an Empirical Predictive Model" – Gulf and South Atlantic Fisheries Foundation, Inc., MARFIN A**ward NA09NMF4330149**

"An Expanded Outreach Program and Technology Transfer of Updated Bycatch Reduction Devices and Turtle Excluder Devices to the Southeastern U.S. Shrimp Industry" – Gulf and South Atlantic Fisheries Foundation, Inc. MARFIN A**ward NA11NMF4330127**

"To Vent or Descend? Evaluating seasonal release mortality of gag and red grouper in recreational fisheries of the eastern Gulf of Mexico" – University of Florida MARFIN A**ward NA12NMF4330089**

"Continuation of an Expanded Outreach Program and Technology Transfer of Updated Turtle Excluder Devices and Bycatch Reduction Devices to the Southeastern U.S. Shrimp Industry" - Gulf and South Atlantic Fisheries Foundation, Inc. MARFIN A**ward NA12NMF4330088**

"A Survey to Characterize Harvest and Regulatory Discards in the Offshore Recreational Charter Fishery off the Atlantic Coast of Florida" - Florida Fish and Wildlife Conservation Commission MARFIN A**ward NA12NMF4330093**

"Assessment of genetic stock structure of gray triggerfish (Balistes capriscus) in U.S. waters of the Gulf of Mexico and south Atlantic regions" –University of Southern Mississippi MARFIN A**ward NA09NMF4330150**

"Length and age sampling of the commercial snapper/grouper fishery and age and growth comparison of black sea bass caught along the North Carolina coastline" –

North Carolina Department of Environment and Natural Resources MARFIN A**ward**

"Continue Development of Fisheries Independent, Habitat-Based Indices of Abundance for Pre-Reproductive Gag Grouper in the Northeastern Gulf of Mexico" – University of Florida MARFIN A**ward NA10NMF4330106**

"An evaluation of the effects of catch and release angling on survival and behavior of goliath grouper (*Epinephelus itajara*) with additional investigation into long-term residence and movement patterns" – Florida Fish and Wildlife Conservation Commission MARFIN A**ward NA10NMF4330115**

"Use of otolith microchemistry to improve fisheries-independent indices of recruitment for gag (*Mycteroperca microlepis*): Linking estuarine nurseries to nearshore reefs in the eastern Gulf of Mexico" – University of South Florida MARFIN A**ward NA10NMF4330113**

"The use of Ultrasonic Telemetry to Estimate Natural and Fishing Mortality of Red Snapper (Lutjanus campechanus)" – Auburn University MARFIN A**ward NA11NMF4330126**

"Exploring the utility of side-scan sonar and experimental Z-traps in improving the efficiency of fisheries-independent surveys of reef fishes on the West Florida Shelf" - Florida Fish and Wildlife Conservation Commission MARFIN A**ward NA11NMF4330122**

"Regional age structure, reproductive biology and trophic patterns of adult goliath grouper" - Florida State University MARFIN A**ward NA11NMF4330123**

"Gray triggerfish (Balistes capriscus) life history in the South Atlantic Bight: The extensive collection and analysis of new data for age, growth, and reproduction and the comparison with data from 1992" - South Carolina Research Foundation MARFIN A**ward NA11NMF4330130**

"Efficient Mapping of Hard-Bottom Habitats at Reef Morphology Scales to Improve Sampling Designs and Analyses of Spatial Dynamics for Reef Fishes in the Gulf of Mexico" –University of Florida MARFIN A**ward NA12NMF4330090**

"A molecular approach to assess future fertility in black sea bass (Centropristis striata)" –South Carolina Department of Natural Resources MARFIN A**ward NA12NMF4330091**

"Do juvenile gag have a habitat-mediated bottleneck in the NE Gulf of Mexico? Spatial evaluation of fishery-independent indices of abundance, growth and mortality" **University of Florida** MARFIN A**WARD NA13NMF4330170**

“Identifying and defining management areas for queen triggerfish and mutton snapper spawning aggregation sites in the US Virgin Islands and assessing effectiveness of area closures on mutton snapper” - University of the Virgin Islands MARFIN A**WARD NA13NMF4330167**

“Evaluation of the effects of recreational catch-and-release angling on the survival of gag grouper (Mycteroperca microlepis), additional investigation into gear/strategies to reduce fishing trauma” - Florida Fish and Wildlife Conservation Commission **MARFIN AWARD NA13NMF4330168**

“Economic Analysis and Management Implications of IFQ Trading Behavior in the Gulf of Mexico Commercial Red Snapper Fishery” – University of Florida MARFIN A**ward NA12NMF4330086**

“Genetic Risk Assessment Modeling for Offshore Marine Aquaculture Operations: Cobia” –South Carolina Department of Natural Resources MARFIN A**ward NA11NMF4330125**

“Monitoring, Predicting, and Managing the Environmental Impacts of Offshore Aquaculture in the United States” – University of Miami MARFIN A**ward NA12NMF4330087**

“Ecosystem-Based Fisheries Assessment of Reef Fishes in the Northcentral Gulf of Mexico” - University of South Alabama MARFIN A**WARD** NA13NMF4330169

“Fisheries Diet Data Compilation and Research: Toward an Integrated Ecosystem Assessment in the Gulf of Mexico: - Texas A&M University Corpus Christi MARFIN A**WARD NA13NMF4330171**

FY2014 AWARDS

"The Effect of Changing Climate Regimes on Ephemeral Nursery Habitats: Influence on Selected Reef Fish Populations in National Marine Sanctuaries and Habitat Areas of Particular Concern in the Northern" University of Southern Mississippi **MARFIN AWARD NA14NMF4330222**

"Pilot Study for Developing Fisheries-Independent Indices of Abundance for Juvenile Red Snapper in the U.S. South Atlantic" Florida Fish & Wildlife Conservation Commission **MARFIN AWARD NA14NMF4330221**

"Investigation of the relative habitat value of oil/gas platforms and natural banks in enhancing stock building of reef fish in the western Gulf of Mexico" Texas A&M University - Corpus Christi **MARFIN AWARD NA14NMF4330219**

"Joint Estimation of Revealed and Stated Preference Recreational Data for Evaluation of the Economic Effects of the Allocation of Harvests" East Carolina University **MARFIN AWARD NA14NMF4330220**

Appendix 1: MARFIN PANEL MEMBERS Revised: May 2015

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Appendix 3: MARFIN PUBLICATIONS

Ball, A.O., M.G. Beal, R.W. Chapman, G.R. Sedberry

2006. Population structure of red porgy, *Pagrus pagrus*, in the Atlantic Ocean. Accepted with revisions by Marine Biology.

Ball, A.O., G.R. Sedberry, M.S. Zatcoff, R.W. Chapman and J.L. Carlin

2000. Population structure of the wreckfish *Polyprion americanus* determined with microsatellite genetic markers. Mar. Biol. 137:1077-1090.

Ball, A.O., G.R. Sedberry, J.H. Wessel III, and R. W. Chapman

2003. Large-scale genetic differentiation of *Pagrus pagrus* in the Atlantic. J. Fish Biol. 62:1232-1237.

Bertelsen, R.D. and C. Cox

2001. Sanctuary roles in population and reproductive dynamics of Caribbean spiny lobster. Spatial Processes and Management of Marine Populations Alaska Sea Grant College Program. AK-SG-01-02:591-605.

Bertelsen, R.D. and T.R. Mathews

2001. Fecundity dynamics of female spiny lobster (*Panulirus argus*) in a south Florida fishery and Dry Tortugas National Park lobster sanctuary. Mar. Freshwater Res. 52:1559-1565.

Broughton, R.E., L.B. Stewart and J.R. Gold

2002. Microsatellite loci reveal substantial gene flow between king mackerel (*Scomberomorus cavalla*) in the western Atlantic Ocean and Gulf of Mexico. Fisheries Research 54:305-316.

Brown-Peterson, N. J., R.M. Overstreet, J.M. Lotz, J.S. Franks and K.M. Burns

2001. Reproductive biology of cobia, *Rachycentron canadum*, from coastal waters of the southern United States. Fish. Bull. 99:15-28.

Chapman, R.W., G.R. Sedberry, C.C. Koenig and B.M. Eleby

1999. Stock identification of gag, *Mycteroperca microlepis*, along the southeast coast of the United States. Mar. Biotechnol. 1:137-146.

Chapman, R.W., G.R. Sedberry, J.C. McGovern and B.A. Wiley

1999. The genetic consequences of reproductive variance: studies of species with different longevities, In Musick, J.A. (ed.) Life in the slow lane: Ecology and conservation of long-
lived marine animals. Am. Fish. Soc. Symposium 23:169-181.

Coleman, F.C., C.C. Koenig, G.R. Huntsman, J.A. Music, A.M. Eklund, J.C. McGovern, R. W. Chapman, G.R. Sedberry and C.B. Grimes

2000. American Fisheries Society Position Statement: Long-lived reef fishes: The grouper-snapper complex. Fisheries. 25(3):14-21.

Diamond, S. L.

2003. Estimation of shrimp trawl bycatch: comparing methods using field and simulated data. Fish. Bull. 101:484-500.

Fischer, A.J., C.A. Wilson and D. L. Nieland

2001. Age and growth of red snapper *Lutjanus campechanus* in the northwestern Gulf of Mexico: Implications to the unit stock hypothesis. Proc. of the Gulf and Caribbean Fisheries Institute 53:496-506.

Gillig, D., R. T. Woodward, T. Ozuna, Jr. and W. L. Griffin

2003. Joint estimation of revealed and stated preference data: An application to recreational red snapper valuation. Agricultural and Resources Economics Review: 32:209-221.

Gold, J.R. and L.R. Richardson

1999. Population structure of two species targeted for marine stock enhancement in the Gulf of Mexico. Bull. of National Research Institute of Aquaculture, Supplement 1:75-83.

Gold, J.R., E. Pak and L.R. Richardson

2001. Microsatellite variation among red snapper (*Lutjanus campechanus*) from the

Gulf of Mexico. Marine Biotechnology 3:293-304.

Gold, J.R. E. Pak and D.A. DeVries

2002. Population structure of king mackerel (*Scomberomorus cavalla*) around peninsular Florida, as revealed by microsatellite DNA. Fish. Bull 100:491-509.

Gold, J.R. and C.P. Burridge

2004. Historical population dynamics of red snapper (*Lutjanus campechanus*) in the northern Gulf of Mexico. Texas Journal of Science 56:157-170.

Heist, E. J. and J. R. Gold

1999. Microsatellite DNA variation in sandbar sharks (*Carcharhinus plumbeus*) from the Gulf of Mexico and mid-Atlantic Bight. Copeia: 182-186.

Heist, E.J. and J.R. Gold

2000. DNA microsatellite loci and genetic structure of red snapper (*Lutjanus campechanus*) in the Gulf of Mexico. Trans. Am. Fish. Soc. 129:469 - 475.

Hoffmayer, E.R. and G.R. Parsons

2001. The physiological response to capture and handling stress in the Atlantic sharpnose shark, *Rhizoprionodon terraenovae*: description of the secondary stress response. Fish Physiology and Biochemistry 25(4):277-285.

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2003. Food habits of three shark species from the northern Gulf of Mexico. Southeastern Naturalist 2(2):271-280.

Jacob, S., F. Farmer, M. Jepson, and C. Adams

2001. Landing a Definition of Fishing Dependent Communities: Potential Social Science Contributions to Meeting National Standard 8. Fisheries 2001; 26: 16-22

Koenig, C., F. Coleman, C. Grimes, G. Fitzhugh, K. Scanlon, C. Gledhill and M. Grace

2000. Protection of fish spawning habitat for the conservation of warm temperate reef fish fisheries of shelf-edge reefs of Florida. Bull. Marine Science 66(3):593-616.

Matthews, T.R., and M.F. Larkin

2002. Fishing effort and resource allocation in the Florida stone crab (*Menippe*) fishery. Proc. Gulf & Caribbean Fisheries Institute 53:83-99.

McBride, R., M. Johnson, L. Bullock and F. Stengard

2001. Preliminary observations on the sexual development of hogfish, *Lachnolaimus maximus* (Pisces: Labridae). Proc. Gulf & Caribbean Fisheries Institute 52:98-102.

McBride, R. S. and J.R. Styer

2002. Species composition, catch rates, and size structure of fishes captured in the south Florida lampara net fishery. Mar. Fish. Rev. 64(1):21-27.

McBride, R.S. and M.D. Murphy

2003. Current and potential yield per recruit of hogfish, *Lachnolaimus maximus,* in Florida. Proc. Gulf & Caribbean Fisheries Institute 54:513-525.

McBride, R.S, J.R. Styer and R. Hudson

2003. Spawning cycles and habitats for ballyhoo (*Hemiramphus brasiliensis*) and balao
(*H. balao*) in south Florida. Fish. Bull. 101:583-589.

McDonough, C.J. and C.A. Wenner

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