

Project Number 10

**Potential for Enhancement of Fisheries Habitat by Infilling
OCS Pipeline Canals**

Denise J. Reed
and
Lawrence P. **Rozas**
Louisiana Universities Marine **Consortium**
8124 Hwy. 56
Chauvin LA 70344
(504) 851-2800

Appendices

Appendix 1. LUMCON OCS Pipeline Questionnaire 140

ABSTRACT

The restoration of productive fisheries habitat by backfilling pipeline canals depends upon maximizing the area of shallow water in canals and restoring as much of the adjacent marsh habitat as possible by removing spoil banks. Our study will examine canals (both plugged and unplugged) in brackish and saline marshes, of various age and **bathymetry** to identify the relationship between nursery value and canal depth. **By** sampling canals of different types and depths, we will identify the degree to which canals must be filled to convert them to productive nursery habitat for fisheries species. The potential for restoring OCS pipeline canal to shallow productive areas using their own spoil as backfill will be estimated using surveys of the amount of material **required** and the amount of spoil available. Fisheries access to the adjacent marsh surface after spoil bank removal will be estimated using tide gauge data for the various types of **marsh/canal** environments included in **the** study.

PROJECT GOALS AND OBJECTIVES

The overall goal of this project is to assess the feasibility of **infilling** OCS pipeline canals with their original spoil material and evaluate the resulting **increase** in fisheries **habitat**. The specific objectives are:

1. Determine the relationship between pipeline canal depth and fisheries nursery use.
2. Determine the degree to which fisheries habitat can be restored by backfilling pipeline canals.
3. Estimate the potential increase in the area of marsh surface habitat accessible to **fisheries** species resulting from spoil bank removal.
4. Evaluate the effect of plugging on a) fisheries usage of canals, and b) maintaining the integrity of canal margins and spoil banks.

The objectives for the **first** year of the project were:

1. Select study area.
2. Develop a database containing information on OCS pipeline canals in the study area.
3. Develop the sampling design for the project.
4. Commence field survey of physical parameters.

ACCOMPLISHMENTS TO DATE

Objective 1: The study will be conducted in brackish and saline marshes between the **Atchafalaya** River and Bayou **Lafourche**. This is the Terrebonne hydrologic basin and it was selected because of accessibility to field sites from the **LUMCON** Marine Center in Cocodrie and because it contains a number of OCS pipeline canals which cross both saline and brackish marsh zones. This decision was made by the Principal Investigators based on their knowledge of the area and map evidence of pipeline canals.

Objective 2: Database development was the main accomplishment of Year 1. Initially, attempts were made to obtain information on canals **from** permit applications to the Coastal Management Division of Louisiana Department of Natural Resources. It became apparent that this source included information on only a few pipeline canals. **In** order to identify canals about which we needed to obtain information we used **Penwell** Map's "Pipelines of Louisiana." This map identifies individual pipelines and their operators in Louisiana. Using this information we approached individual operating companies and requested their assistance in filling out a **questionnaire** about their pipelines (Attachment A). Each company was sent a copy of the Penwell map with their pipelines highlighted to facilitate identification of different pipelines owned by the same company. Questionnaires were

mailed to ten companies in January 1991 and **all** replies were **received** by April 1991. We were very pleased with the response of the companies and several made special efforts to provide us with data in addition to that which we requested.

Objective 3: The sampling design described in our **project** proposal called for the selection of ten study sites in each of four types of canal: saline-plugged, saline-unplugged, brackish-plugged and brackish-unplugged. Eight canals were identified in the database which carried OCS materials and which crossed both saline and brackish marsh types (as **determined from** local knowledge of the area and the **Chabreck and Linscombe (1978)** map of Louisiana coastal marshes). One additional canal, which only crosses saline marshes, was included in initial site selection. Each pipeline canal was divided into 1 km section using quad maps. These sections **were** designated as saline/brackish and plugged/unplugged. Frequently, the canal was actually divided into **plugged/unplugged** sections of less than 1 km in length and the character of the canal within each 1 km **section** was **recorded**. Random numbers were used to select three sections of canal of each of the four types. Although only one will be included in the field study, three were chosen to allow for a second and third choice in the event that designations are found to be incorrect during field inspections. For example, it is difficult to determine **from** air photos how complete the plugs across canals are. If field inspection shows that a section selected as a plugged site is actually open to tidal exchange (i.e. unplugged) then the next plugged **selected** section will be inspected. In this manner, 32 sections of canal were selected for study with two "back-ups" for each section.

Objective 4: Field survey was begun in May 1991. The **first** canal **section** examined was a saline plugged site. Both ground and bathymetric survey techniques proved appropriate for the study and **research** assistants have been trained in the techniques to be used in surveying sections of canal.

SIGNIFICANT FINDINGS

The Penwell map allowed us to **identify** which canals were used for more than one pipeline. Thus, we were able to request information on modifications made to the canal after its initial construction where appropriate. As each completed questionnaire was **received**, the location of the canal and ownership was marked on USGS 7.5 minute quad maps of the study **area**. Air photos, available for inspection at the Coastal Management Division, Louisiana Department of Natural Resources, were used to provide an updated view of the present status of the canals. Information on spoil banks, plugged-status and canal width were also recorded on the quad maps. Data was also entered into a dBase **III** database (transferable to FoxBase on Macintosh) designed for the project. In all, data on 24 pipelines are included in the database. Some operating companies informed us that the pipeline canals had been constructed over 30 years ago and detailed records were unavailable. Consequently, information on the original dimensions of the canals was not available. However, **sufficient** information was available to design field sampling protocol using the procedures outlined above.

The database allows us to examine the character of **OCS** pipeline canals in the study area in terms of their age and original depth. These are two indices which may be **useful** in eventually determining the feasibility of recreating valuable fisheries habitat. The older the pipeline, the more time there has been for degradation of the spoil bank and loss of material for **infilling**. In addition, the deeper the original canal, the less likely that presently degraded spoil banks will contain enough material to restore habitat. Figure 1 shows a frequency distribution for the age of 19 of the 24 canals included in the database for which age data are available. Clearly, there is a wide distribution in the age of the canals with the modal class of the distribution occurring between 1965 and 1970. The frequency distribution of the canals selected for the study is also shown in Figure 1 and this illustrates

that the canals selected for analysis are representative of the total population of OCS canals in the study area. Figure 2 shows a similar frequency distribution based on original canal depth data for the 15 canals for which this information is available. Although canals can be up to 4.5 m (15 feet deep), the modal depth is between 1.8 and 2.4 m (6 and 8 feet). Canals selected for study are also representative of canals in our study area relative to canal depth (Figure 2).

PROBLEMS OR DELAYS ENCOUNTERED AND PROPOSED SOLUTIONS

The only problems which have been encountered on the project were concerned with database development. The sources of information which we originally planned to use could not provide the data we required. Consequently, a questionnaire to pipeline companies was developed and distributed. We had planned for database development to be complete by February/March 1991. Because we were relying on the response of the companies, the database was not completed until April 1991. This also delayed sampling design development and surveying of physical parameters. However, progress on sampling design was faster than anticipated and field survey work was begun in May 1991. It is anticipated that this component of the work can still be completed with the originally planned schedule (by September/October 1991). Other components are on schedule.

REVISED SCHEDULE FOR REMAINDER OF PROJECT

For the reasons described in the previous section, no revisions to the schedule for the remainder of the project are necessary at this stage.

PROJECT PARTICIPANTS

The numbers of individuals involved in the project are

PI's and co-investigators	2
Research assistants	3

Dr. Denise Reed is the PI responsible for database development and surveying of physical parameters. Dr. Lawrence Rozas is the PI responsible for fisheries aspects of the project. Together, these PI's have made decisions concerning site selection, sampling design and field protocols. Research assistants involved in the project are: James Donovan, Derral Dupre and Scott Longman. These research assistants have been involved in database development, recording of information on maps, ordering supplies, preparation for field work, and have assisted with field survey work.

RELATED PUBLICATIONS AND PRESENTATIONS

No presentations or publications have specifically resulted from this project during the first year.

PROPOSALS SUBMITTED

The following proposal has been submitted not as a direct result of this project but on a related topic. It aims to examine an alternative to spoil bank construction for dredging drilling access canals through coastal wetlands especially with regard to the impact on marsh ecology and fisheries habitat.

A Field Evaluation of the Environmental Impacts of Spray Dredging: An Alternative Technology for Accessing Drilling Sites in Coastal Wetlands.

U.S. Department of Energy. October 1991- September 1994

Dr. Denise J. Reed, Principal Investigator. Dr. Lawrence Rozas, Co-Investigator.

\$460,000. Status: Pending.

Appendix 1

**Louisiana Universities Marine Consortium
OCS Pipeline Questionnaire for**

Our data indicates that this canal is used for two pipelines. Please include data for both pipeline emplacements.

Reference on accompanying map: _____

Do these pipelines carry OCS material? Pipeline 1: Yes/No
Pipeline 2: Yes/No

Canal Construction Dates: _____ Modified for Pipeline 2:
Beginning Date: _____ Beginning Date: _____
completion Date: _____ Completion Date: _____

Canal constructed in which direction: _____
(e.g. north to south)

Pipeline Emplacement Dates:
Pipeline 1: Start: _____ Finish: _____
Pipeline 2: Start: _____ Finish: _____

Canal Dimensions:(original) _____ If Modified for Pipeline 2
Width: _____ Width: _____
Depth: _____ Depth: _____
Length: _____ Length: _____

Canal Construction Technique Pipeline 1: _____
(e.g. flotation canal, push-pull) Pipeline 2: _____

Spoil Bank Type Pipeline 1: _____
Pipeline 2: _____

Were there any special permit requirements? Yes/No

If Yes, please provide details:

Pipeline 1: _____

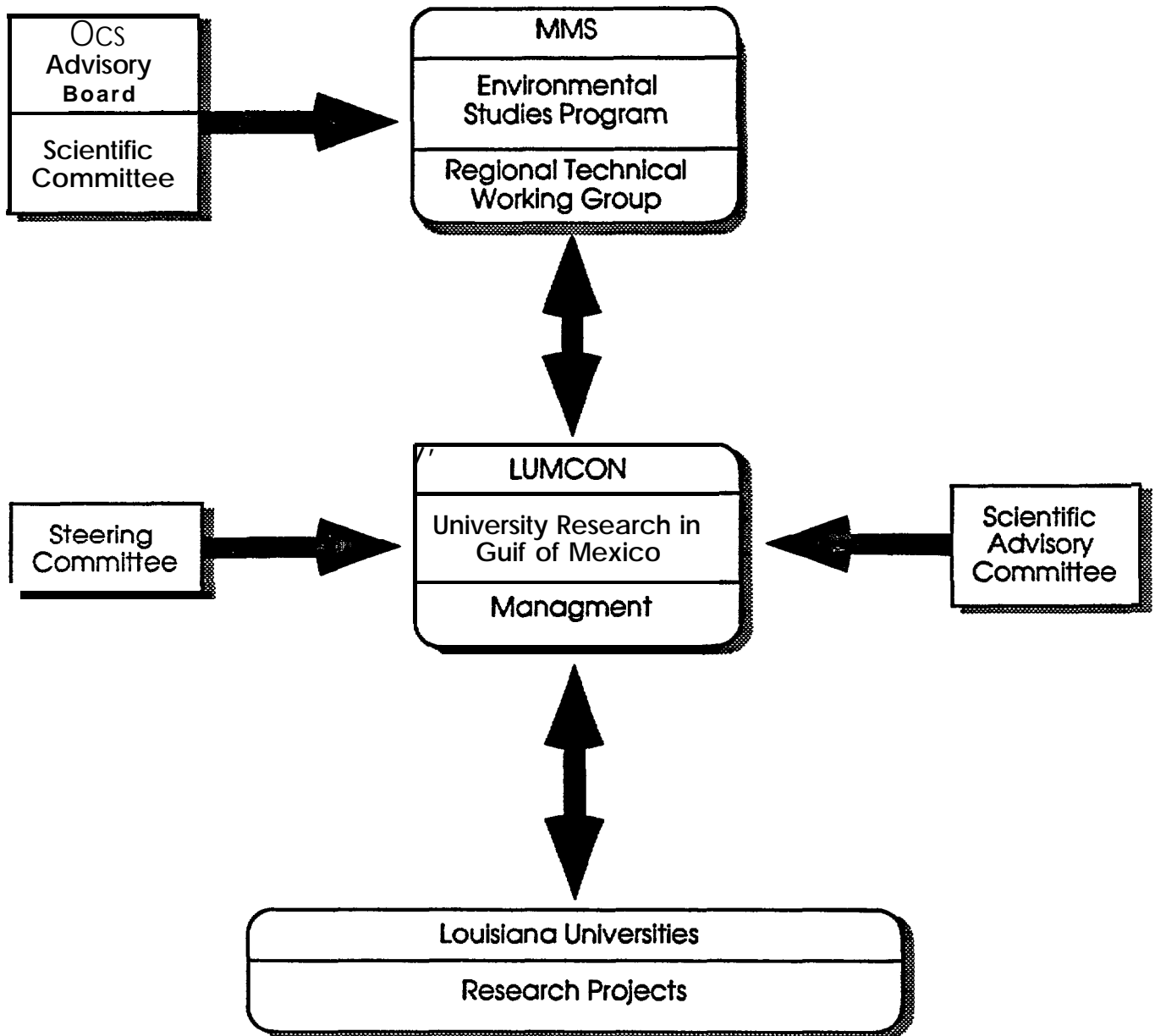
Pipeline 2: _____

Is the canal plugged? Yes/No

APPENDIX 1

Organizational Structure

Organizational Structure



*Number of Research Projects Proposed and Funded by Framework Issue for the
LUMCON-MMS Cooperative Program in University Research on the Effects of Petroleum Development in
the Gulf of Mexico 1990-91*

Framework Issue	Proposals Submitted	Proposals Forwarded	Projects Funded
1. Long-term fate and chronic biological effects of medium-high molecular weight aromatic and heterocyclic hydrocarbons and their degradation products in sediments resulting from oil spills and operational discharges.	7	2	1
2. Residual effects of oil spills and recovery from oiling in coastal wetlands.	4	2	2
3. Effects of channelization of wetlands for pipeline emplacement and navigation.	15	3	3
4. Effects on endangered and threatened birds, mammals and sea turtles.	0	0	0
5. Long-term effects of operational discharges (drilling fluids, cuttings and produced water) on the shelf environment Extensive field assessment and monitoring efforts will not be supported.	11	1	0
6. Fate and effects of coastal produced water discharges; especially experiments elucidating biological effects and chemical transformation processes which complement ongoing field studies.	7	2	1
7. Factors influencing the interpretation of offshore environmental assessment and monitoring.	4	2	2
8. Effects of oil and gas structures on offshore populations. Studies addressing questions of how offshore platforms have affected populations of fishes and invertebrates on the shelf will be emphasized as opposed to rigs-to-reefs siting and sport and commercial fishing utilization questions.	4	1	0
9. Social, economic and cultural effects of offshore oil and gas development,	7	3	2
Total	59	16	11

Number of Research Projects Submitted and Funded by Framework Issue

APPENDIX 2

Annual Report 1990-91

APPENDIX 3

Research Presentations

Seydlitz, Ruth, Shirley **Laska**, Elizabeth **Triche** and Karen Bishop. The Impact of Offshore Oil Activity on the Distribution of Employment in Involved Communities". Paper to be presented at the annual meetings of the Mid-South Sociological Association, October 1991.

Baxter, Vein. Political Economy of **Oil** and Oil Exploitation of Offshore Oil. Paper to be presented at the annual meeting of the American **Sociological** Association, August 1991.

Laska, Shirley. Impact of offshore oil exploration and production on the social institutions of coastal Louisiana MMS Scientific Advisory Committee Meeting, New Orleans, LA, March 1991.

Rabalais, N.N. and **R.E.** Turner. Louisiana shelf sediments: **Benthic-pelagic** coupling. Marine **Benthic** Ecology Meetings, Williamsburg, VA, March 1991.

Wiseman, W.J., Jr., **N.N. Rabalais** and **R.E.** Turner. **Interannual** and **intra-annual** variability of hypoxia on the Louisiana inner shelf. The Oceanography Society, St. Petersburg, Florida, March 1991.

Rabalais, N.N. Hypoxia on the Louisiana **shelf**: Biological aspects. Seminar at Louisiana State University, Dept. of Oceanography and Coastal Sciences, February 1991.

Rabalais, N.N. **Northern Gulf** of Mexico hypoxia: **Effects** on **benthic** communities. Seminar at University of Rhode **Island**, Graduate School of Oceanography, **January** 1991.

Felder, D.L., J. Staton, and **R.B. Griffis**. Relationship of burrow morphology to population structure in the **estuarine** ghost shrimp *Lepidophthalmus louisianensis* (*Decapoda, Thalassinoidea*). *The Crustacean Society* and The American Society of Zoologists Annual Meeting, San Antonio, TX, December 1990.

Zimmerman, T.L., and **D.L. Felder**. Reproductive cycling **in** a newly recognized Gulf coast species, *Sesarma* (*Decapoda, Brachyura*). Contributed **paper**: The Crustacean Society and The American Society of Zoologists Annual Meeting, San Antonio, TX, December 1990.

Laska, Shirley. **Impact** of offshore oil exploration and production on the social institutions of coastal Louisiana. MMS Technology Transfer Meeting, New Orleans, LA, November 1990.

Rabalais, N.N. **Invited** participant in EPA Workshop on Derivation of a National Saltwater Dissolved **Oxygen** Water Quality Criterion, November 1990.

Baxter, **Vern**. Political Economy of **Oil** and **Oil** Exploitation of Offshore Oil. Annual Meeting of the American Sociological Association, August 1990.

Laska, Shirley, Daphne Spain, Ruth **Seydlitz** and Elizabeth **Triche**. Resource extraction communities: Comparative ecological analysis of "**boom/bust**" dynamics. Annual Meeting of the American Sociological Association, Washington, D. C., August 1990.

Thayer, Ralph E. and Charles D. **Hadley**. The impact of the decline in the outer continental shelf activity on the provision of public services by state and local government in the coastal zone of Louisiana. Paper presented at the annual meetings of the Urban Affairs Association, Charlotte, NC, April 1990.

Mendelssohn, I. A. Oil effects on wetlands. Louisiana Environmental Health Association, 1990 Annual Education Conference, **Alexandria**, LA, January 31, 1990.

St. Pe', K. M., **J.C. Means**, **C. Milan**, **M. Schenkler** and S. Courtney. An assessment of produced water impacts to low-energy, brackish water systems in southeast Louisiana: A project summary. Proceedings **1st International Symposium**, Oil and Gas Waste Management, New Orleans, LA, 1990.

Carney, R.C. The value of process oriented studies in the OCS. Plenary Address. **10th Annual Minerals Management Service Information Transfer Meeting**, New Orleans, LA, December 1989.

Felgenhauer, B.E., and **D.L. Felder**. Morphological studies of the *thalassinidean digestive tract*. **Invited Paper: Biology of the *Thalassinoidea***, Special Symposium, **American Society of Zoologists Annual Meeting**, Boston, MA, December 1989.

Manning, R.B., and **D.L. Felder**. Re-evaluation of *callianassid genera*. **Invited Paper: Biology of the *Thalassinoidea***, Special Symposium, **American Society of Zoologists Annual Meeting**, Boston, MA, December 1989.

Mendelssohn, I. A., J. Hill, and **M.W. Hester**. Long-term recovery of a brackish marsh from an oil spill in coastal Louisiana. **Minerals Management Service Information Transfer Meeting**, Gulf of Mexico **OCS Region**, New Orleans, LA, December 1989.

Staton, J., and **D.L. Felder**. Genetic differentiation in coastal *callianassid* populations of the Gulf of Mexico and the Carolinian Atlantic. **Invited Paper: Biology of the *Thalassinoidea***, Special Symposium, **American Society of Zoologists Annual Meeting**, Boston, MA, December 1989.

Thayer, Ralph E. and Charles D. **Hadley**. The politics of legislative-gubernatorial interaction in Louisiana Fiscal paralysis as a catalyst to meaningful legislative independence. Paper presented at the annual meetings of the Southern **Political Science Association**, Memphis, TN, November 1989.

APPENDIX 4

Publications

- Forsyth, Craig and DeAnn K. **Gauthier**. 1991. "Families of Offshore Oil Workers: Adaptations to Cyclical Father **Absence/Presence**". *Sociological Spectrum* 11(2): 177-201.
- Garcia-Martinez, P., **A.K.D. Hajos**, **D.R. Livingstone** and **G.W. Winston**. 1991. Metabolism and mutagenicity of 4-nitroquinoline N-oxide by **microsomes** and **cytosol** of digestive gland of the mussel *Mytilus edulis* L., *Marine Environmental Research*. (In press).
- Gauthier**, DeArm K. 1991. Toward Understanding the Structural Responses of the Families of Offshore **Oilworkers**. **M.A.** Thesis. Baton Rouge: Louisiana State University.
- Griffis**, R.B., and **T.H. Suchanek**. (In press) A model of relationship between burrow architecture and trophic mode in thalassinidean shrimp (Decapoda: Thalassinidea). Marine Ecology Progress Series, 24 ms. pages.
- Manning, R. B., and **D.L. Felder**. (In press). "Revision of the American *Callianassidae* (Crustacean, Decapoda, Thalassinidea)". Proceedings of the Biological Society of Washington, 56 ms. pages.
- Means**, J. C., C. Milan and **D.J. McMillin**. 1991. Bioaccumulation of produced water associated aromatic hydrocarbons by **estuarine** invertebrates. *Marine Environmental Research* (in press).
- Daniels**, C.B. and **J.C. Means**. 1990. Assessment of the genotoxicity of produced water discharges associated with oil and gas production using a fish egg and larval test. *Marine Environmental Research*. 28:303-307.
- Daniels**, C.B., C.B. Henry and **J.C. Means**. 1990. Coastal oil drilling produced waters Chemical characterization and assessment of the **genotoxicity** using **chromosomal aberrations** in *Cyprinodon variegates*. pp 356-371 in Aquatic Toxicology and Risk Assessment. Landis and Van **Der Schalle**, eds. ASTM, Philadelphia, PA.
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- Sigleo**, A.C. and **J.C. Means**. 1990. Organic and inorganic components of **estuarine colloids**: implications for transport of pollutants. *Rev. Environ. Toxicol. Contam.* 112:123-147.
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APPENDIX 5

Related Proposals Submitted

Funded

Carney, Robert. Ecosystem Studies of the Gulf of Mexico **Chemosynthetic** Communities, U.S. Minerals Management Service, proposed start: July 1, 1991, 36 months, \$100,000, verbal **notification** of funding.

Harper, D. E., Jr. Supplemental Ship Funding for Studies of the Impacts of Hypoxia on **Benthic** Populations. Submitted: June 1990, duration: **July** 1990- Aug 1991, Texas Institute of Oceanography, **funded**.

Rabalais, N.N. and **D.E. Harper, Jr.** "Supplemental Ship Funding for Studies of the Impacts of Hypoxia on **Benthic Populations**," July 1990- Sept. 1990, Louisiana Sea Grant College Program and LUMCON, **funded**.

Rabalais, N.N. and **D.E. Harper, Jr.** "The Impacts of Hypoxia on **Benthic** Populations and Fisheries Resources," Aug. 1990- July 1992, NOAA **NECOP**, **funded**.

Rozas, Lawrence. Potential for Enhancement of Fisheries Habitat by **Infilling** OCS Pipeline Canals, Minerals Management Service, June 1990, three years, **funded**.

Winston, Gary. "Design of a local biomonitoring monitoring program for oil refinery effluents in the San Francisco Bay-Delta **System**," Western States **Petroleum** Association, June 1991, **funded**.

Pending

Carney, Robert. A Joint Industry-University Initiative on Deep Hydrocarbon Seeps in the Gulf of Mexico, Louisiana Board of Regents, proposed start **July** 1, 1991, \$180,000, 24 months, **pending**.

Carney, Robert. Spatial Patterns of Deep-Sea Fauna on Scales of 10,000 m², Office of Naval Research, proposed start: October 1, 1991, 24 months, \$50,000, **pending**.

Felder, D.L. (PI/PD) and **R.G. Griffis** (Collaborating Investigator). Burrowing **Thalassinoid** Shrimp as Determinants of Tropic Production and **Microbially** Mediated Nutrient Cycling in **Estuarine Benthic** Communities, Louisiana Sea Grant College Program, \$77,100, **pending**.

Murray, S. et al. Physical Oceanography of the Louisiana-Texas Shelf, U.S. Minerals Management Service, submitted: June 1990, Dec. 1990, May 1991, duration: 56 months, **pending**.

Patrick, W., R. DeLaune, N. **Rabalais**, E. **Overton**, R. Adams, J. **Suhayda**, A. **Pulsipher**, and M. Reams. Produced Waters in Louisiana Wetlands, U.S. Dept. of Energy, submitted: Jan. 1990, 30 months, **pending**.

Reed, Denise, and Lawrence **Rozas.** A Field Evaluation of the Environmental Impacts of Spray **Dredging:** An Alternative Technology for Accessing Drilling Sites in Coastal Wetlands, U.S. Department of Energy, October 1991- September 1994, \$460,000, pending.

Winston, Gary. Gulf of Mexico Offshore Operations Monitoring Experiment, Phase I Sublethal Responses to Contaminant Exposure. **U.S** Minerals Management Service, June 1991, pending.

APPENDIX 6

**“Effects of Offshore Oil and Gas Development: A Current Awareness
Bibliography”**

LUMCON — MMS University Research Initiative
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Databases were searched through the end of February for inclusion in the April issue. For further information contact:

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8124 Hwy. 66
Chauvin, LA 70944

Abraham, K. S. Wytch Farm development stresses environmental responsibility. *World Oil*. 2104: April 1990.

Abreu, C. J. (Petrobras, Rio de Janeiro, Brazil), Potter, P. E. (U. of Cincinnati, OH) Predicting reservoir quality in the Cretaceous Macelo Member of the Sergipe - Alagoas Basin, northeast Brazil. Annual convention and exposition of the American Association of Petroleum Geologists. *AAPG Bulletin*. 74:5; May 1990.

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