

207

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AN EXPERTISE SYSTEM FOR THE MARINE RESOURCES INFORMATION CENTER

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University of Texas

Prepared by
Eugene B. Smith and Johnny H. Butler

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TEXAS A&M UNIVERSITY  SEA GRANT PROGRAM

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Sea Grant Depository

AN EXPERTISE SYSTEM
FOR THE
MARINE RESOURCES INFORMATION CENTER*

PELL MARINE SCIENCE LIBRARY
University of Rhode Island
Narragansett Bay Campus

By
Eugene B. Smith
Johnny H. Butler

Sea Grant Publication No. 207

January 1970

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INTRODUCTION

The Personnel Expertise System described by this paper is one of five systems developed to support the activities of the Marine Resources Information Center, which is an activity of the Texas A&M University Sea Grant Program. The major design and programming effort was performed by Johnny H. Butler, in conjunction with Mr. Eugene B. Smith, who is conducting the overall project.

THE SPECIALIZED INFORMATION CENTER CONCEPT

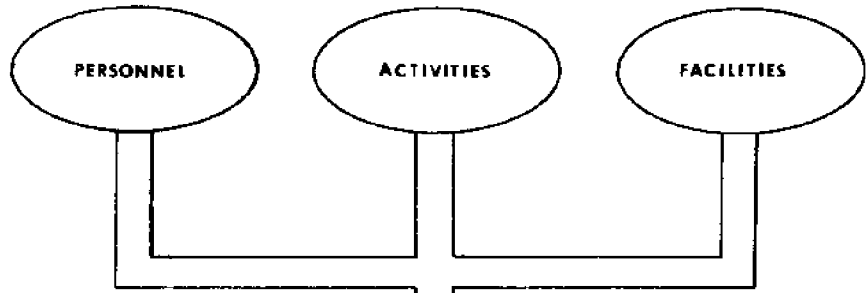
Recognition of the increasing flood of printed information, coupled with the need for dissemination of this material in an effective manner, has fostered the development of several large, general purpose information centers within the last decade. These centers may be categorized into the following groups: 1) depots and libraries, 2) abstracting and indexing services, 3) information analysis centers, and 4) data centers. Each center maintains a large reservoir of information relating to a particular interest area and is capable of serving a multitude of users.

While such centers are an essential link in the dissemination process, there is still a need for small, specialized information centers to serve local interests. Information activities constitute a major function of a diversified project such as the Sea Grant Program. Due to the interdisciplinary nature of all of the areas of expertise associated with the development of marine resources, the body of relevant information is not well defined as it is in other programs. The marine resources activities involve a variety of participants which extends from the commercial fisherman to the specialist devoted to basic research. There must be some vehicle which can serve as an information interface both within the program and to outside resources.

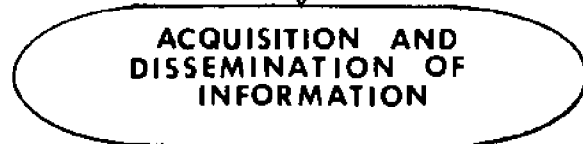
This then, is the area which the Marine Resources Information Center seeks to cover. An overview of the functional organization of such a center is shown in Figure 1. It may be noted that major resource

MARINE RESOURCES INFORMATION CENTER

MARINE
RESOURCE



AVAILABLE
KNOWLEDGE



USER
GROUPS

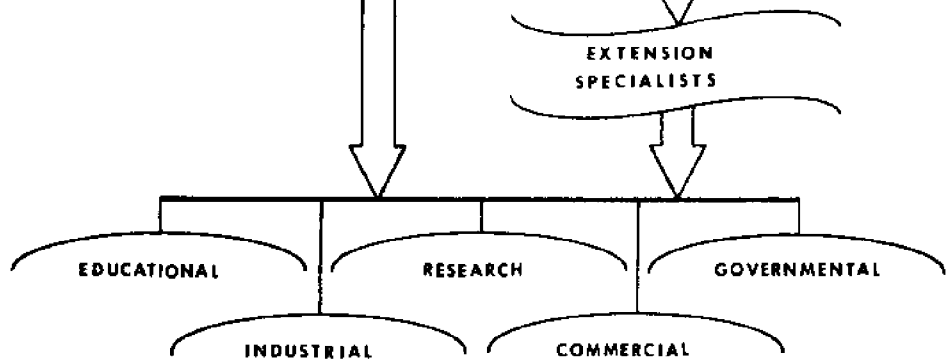


FIGURE 1

areas which may be identified as desirable data files include personnel, activities, and facilities. The available knowledge area is represented within the center by the technical data which is maintained in the form of microfiche files. The process of acquisition, selection, storage and retrieval of information for the diverse group of disciplines represented by marine resource activities is indeed a difficult one. The broad spectrum of potential user groups serves to provide additional complications in the dissemination of relevant information.

THE EXPERTISE FILE

Of the many resources which may be utilized in conjunction with marine related activities, one of the most important is the individual who is knowledgeable in a particular area of interest. In organizations, the personnel departments maintain files on all employees. In professional societies and trade associations, membership lists are established to identify the members according to primary training or experience. The so called "invisible colleges" are characterized by individuals having a personal knowledge of the detailed abilities and activities of a limited number of associates who are active in their field of endeavor. Little is being done however, to make information available on the expertise of a large group of individuals. The President's latest report to congress on marine science affairs indicates that "Progress in marine sciences in the 1970's depends in large measure on an expanded base of manpower. . ."¹ The specialized interests and capabilities of our available manpower are not being utilized to the extent that they could be if they were known.

Is this information of value if it were available? Possibly not if one considers a small, closely knit organization where each individual has knowledge of the capabilities and interests of the others in the group. However, in a large, interdisciplinary undertaking such

¹The Third Report of the President to Congress on Marine Resources and Engineering Development, Marine Science Affairs - A Year of Broadened Participation. (Washington: U.S. Government Printing Office, January, 1968), P. 135.

as the Sea Grant Program such detailed knowledge of other individuals is not possible to any great degree. It would seem that some mechanism which would assist in making information available on the skills of all interested individuals would be most desirable. Such a capability, in the form of a useable data base, would assist in a more optimum utilization of existing manpower.

Specific examples of potential use within the Sea Grant Program might include the following:

1. Use of the file by the program director for the establishment of a project team to work in a particular problem area.
2. Use of the file by an industrial firm to identify an individual who has knowledge and experience in a specific technical area for the purpose of consulting on a problem.
3. Use of the file by a researcher to identify individuals who are currently working in an area of interest to the person making the query.

Given the availability of a good expertise file one can project many additional uses of this nature.

Assuming that files of this nature are valuable, it should be recognized that the problems of making this type of information available are considerable. The major problem areas may be identified as 1) the acquisition of adequate, valid information and 2) the maintenance of this information on a current basis.

The acquisition problem includes the selection and identification of those individuals who will be requested to participate and the

identification of those items of information which seem to be of most value in such a file. Once a questionnaire has been developed the actual collection of the information is most difficult. People are currently deluged with a variety of paperwork and it is natural to take care of only those items which seem to be of greatest importance. In many cases, another questionnaire does not rate very high and consequently the response rate for questionnaires is generally quite low.

The individuals who are asked to complete the questionnaire and be listed in the file must understand the utility and value of the file. They must be able to see how such a file may be used and why it is better than currently available information.

Once a good data base has been established its value will rapidly decrease with time unless adequate update procedures are used. It is imperative that such information be updated on at least an annual basis to insure current, valid data. If the participant does not feel that the system is worthwhile he will not respond to a questionnaire designed to update this information.

DATA ACQUISITION

The population considered for initial development of this expertise file was limited to employees of Texas A&M University. A letter and initial questionnaire, as shown on pages I-1 and I-2 of the appendix, was sent to 987 faculty and staff members. To date a response has been received from 182 or 18.4 percent of those contacted.

Some five months later a machine generated letter and detailed listing of existing data, as shown on pages I-3 and I-4, was distributed to each individual now in the file. The purpose was twofold, 1) to provide a validity check on the information now in the file and 2) to obtain two additional items of information which seem essential for better file utilization. The response to this query was good and many corrections were made to the data.

Based on the data obtained from the first two contacts with participants, a new questionnaire was designed to combine the previous ones and to be used as new names are added to the file. This questionnaire, as shown by Figure II, may be used for direct keypunching of the data for the file. A limited amount of editing and additional coding by the staff of the information center is required.

The form is intended to be short, as well as easy to complete and return in a minimum amount of time. Data is requested in six major categories.

1. IDENTIFICATION - Basic information required for identification of the individual and some indication of where he may be contacted is requested.

MARINE RESOURCES INFORMATION CENTER
PERSONNEL EXPERTISE FORM

IDENTIFICATION:

NAME _____

TITLE _____

BUSINESS ADDRESS _____

Department _____

Organization _____

City State Zip _____

Phone: (xxx-xxx-xxx) _____

EXPERTISE: (indicate up to 5 areas of expertise - not necessarily relating to marine activities)

1. _____ 4. _____

2. _____ 5. _____

3. _____

BROAD EXPERTISE CATEGORIES: In order to provide a broad categorization of personnel, please identify the area(s) which best describes your expertise by checking up to 3 of the categories shown below. Use numbers 1, 2, or 3 to signify them in order of decreasing importance.

- | | | |
|---|---|---|
| <input type="checkbox"/> Resource Management | <input type="checkbox"/> Mineral Exploration & Recovery | <input type="checkbox"/> Personnel & Training |
| <input type="checkbox"/> Engineering Design | <input type="checkbox"/> Chemical Processes | <input type="checkbox"/> Physical Oceanography & Meteorology |
| <input type="checkbox"/> Marine Engineering | <input type="checkbox"/> Food Technology & Processing | <input type="checkbox"/> Product Development, Marketing & Finance |
| <input type="checkbox"/> Marine Biology & Fisheries | | |

<u>EDUCATION:</u>	DEGREE	MAJOR
	_____	_____
	_____	_____
	_____	_____

WORK EXPERIENCE: Briefly indicate type and number of years.

Current Position: _____

MARINE RELATED ACTIVITIES: Please indicate your current involvement in marine activities.

WHEN COMPLETED,
PLEASE RETURN THIS FORM TO:

Marine Resources Information Center
Office of the Sea Grant Program
Texas A&M University
College Station, Texas 77843

2. EXPERTISE - The individual is asked to specify up to five areas of expertise, which do not necessarily relate to marine activities. These areas of expertise, expressed in the person's own words, serve as the basis for a sort in the processing of the data and provide one major entry to the file.
3. BROAD EXPERTISE CATEGORIES - In this section the individual is asked to specify categories describing up to three areas of expertise, in order of decreasing importance. The latitude of this categorization is recognized as being limited and may be expanded slightly at some future date. The previous section was intended to give almost unlimited freedom in the description of one's expertise and this section is designed to give a more restricted grouping of the individuals included in the file.
4. EDUCATION - Here the person is requested to provide information which indicates the degree received and major area of study. This will give the user of the file a quick summary of the formal training of the individual.
5. WORK EXPERIENCE - The person is asked to briefly summarize his previous work experience in terms of type and number of years. He is also requested to provide information regarding his current position.
6. MARINE RELATED ACTIVITIES - This question was included to provide an indication of current involvement, if any, in marine activities.

It should be noted that only a minimal amount of information is requested under each category. As previously stated, the questionnaire must be short and concise if those individuals contacted are to be expected to provide the requested information. The file is not designed to provide a complete vita sheet on all participants, but is intended as a quick reference to individual expertise information.

The data sheet is edited by the Information Center staff to insure completeness of the data. During this editing process a departmental code is assigned, numerical codes are assigned to represent the broad expertise categories, and general occupational codes are assigned based on the information regarding current position.

In order to simplify the file maintenance procedures, special computer programs have been written which will automatically generate a designated form letter. These letters, as shown by appendix I-4, are personalized to the degree that the individual's name and address is printed in the upper left-hand part of the letter. Mailing labels are also printed at the same time to assist in the distribution of the printed material.

DATA PRESENTATION

Once the data has been converted to machinable form, it is then processed into a format designed for easy access by the potential user. This information is made available in the form of a variety of computer listings, which are supplemented in many cases by biographical data sheets on the individual participants.

Typical copies of each type of listing are shown in appendix II. A brief discussion of each list is given below.

1. DETAILED LISTING - This list is the basic reference portion of the expertise data file. It is the only section which contains all of the data which is located in the file on each individual. All other listings refer back to this basic sheet in order to eliminate a gross duplication of material in the user file. The reference code, which is found as the first item of data on the detailed listing provides a vehicle for all references in the file. In addition to this reference code, all lists also show the name of the reference individual for the convenience of the file user.
2. ALPHA LISTING - This list provides a means of accessing the file alphabetically according to last name.
3. DEPARTMENTAL LISTING - This list provides access to the file by department. This listing could be changed to reflect organization rather than department as the file is expanded and the scope of the population is enlarged.

4. SPECIALTY LISTING - The organization of this listing is according to the broad expertise categories which were designated by the participant on the revised questionnaire. As previously mentioned the number of areas in this group may be expanded as circumstances warrant.
5. OCCUPATION LISTING - Categorization by occupation is accomplished by the Information Center staff and is based on the information provided under the section which shows the current occupation of the individual. The categories shown below are currently in use and these may be changed or expanded as necessary.
 - a. Teaching
 - b. Research
 - c. Extension
 - d. Program Planning
 - e. Administration
 - f. Technician
 - g. Other

The processing procedures currently allow for the assignment of up to three categories for each individual in the file. One person could therefore be listed under the TEACHING, RESEARCH and ADMINISTRATION categories if his work involved all three of these areas. Expansion of the file beyond the university setting would necessitate expansion of the number of areas accordingly.

6. EXPERTISE LISTING - This breakdown should prove to be one of the most useful entries into the file. It is derived from the listing of up to five areas of expertise which do not necessarily relate to marine activities. From the data collected to date, it is obvious that these items will be very specific. That is, as a rule, not many people will be listed under each category.

It is recognized that there will be limitations to the various categories and classifications which have been chosen to serve as entry points to the file. Normal usage of the file should provide feedback which will assist in modifications to improve file access.

SUMMARY

As stated in the 1968 report of the President to Congress on Marine Science Affairs, one of the main objectives of the Sea Grant Program Registration was "to disseminate knowledge and information about marine resource development to all interested and concerned sectors of the nation."² The expertise file of the Marine Resources Information Center is one attempt to make information available on the people resource associated with marine resource development.

While the population from which the file was assembled is relatively small, it is felt that the experience obtained in the usage of the information will be of value in later expansion and modifications of the system. The expertise file should prove to be of considerable value in providing the potential for a better utilization of existing manpower and skills in the area of marine resource development.

²The Second Report of the President to the Congress on Marine Resources and Engineering Development. Marine Science Affairs - A Year of Plans and Progress. (Washington: U.S. Government Printing Office, February, 1968), p. 146.

REFERENCES

1. Elliott, R. W., E. B. Smith (ed.). Micrographics in Modern Information Systems. Proceedings of a Conference Sponsored by Texas A&M University, June 5-6, 1969.
2. Marine Science Affairs - A Year of Plans and Progress. The Second Report of the President to the Congress on Marine Resources and Engineering Development. Washington: U. S. Government Printing Office, February, 1968.
3. Marine Science Affairs - A Year of Transition. The First Report of the President to the Congress on Marine Resources and Engineering Development. Washington: U. S. Government Printing Office, February, 1967.
4. Marine Science Affairs - A Year of Broadened Participation. The Third Report of the President to the Congress on Marine Resources and Engineering Development. Washington: U. S. Government Printing Office, January, 1969.
5. O'Connor, Joel S. The Development of an Information Retrieval Center for the Aquatic Sciences. Unpublished Doctoral dissertation, the University of Rhode Island, 1965.
6. Swanson, Rowena W. Move the Information A Kind of Missionary Spirit. Air Force Office of Scientific Research, AFOSR 67-1247. Arlington: Office of Aerospace Research, June, 1967.

NAME: _____

TITLE: _____

ADDRESS: (Please show correct address if it is different
from that shown on the back of this sheet.)

OFFICE PHONE: _____

Major Fields of Expertise Which May Be Related to Marine Resources (List
Up to 5):

1.* Education (Degrees and Major Fields):

2.* Work Experience (Type and Number of Years):

I (wish) (do not wish) to be included in your active files related
to marine resources.

*If you wish to provide a vita sheet we will extract the information
for items 1 and 2.

OFFICE OF THE SEA GRANT PROGRAM
TEXAS A&M UNIVERSITY

OCTOBER 11, 1969

COMPUTER GENERATED
NAME AND ADDRESS
ARE PRINTED HERE

DEAR SIR:

YOU RECENTLY COMPLETED AND RETURNED AN INFORMATION QUESTIONNAIRE WHICH WAS DESIGNED TO ESTABLISH AN EXPERTISE FILE IN THE FIELD OF MARINE RESOURCES. THIS INFORMATION HAS BEEN CONDENSED, CONVERTED TO MACHINABLE FORM AND A LISTING OF YOUR DATA IS SHOWN ON THE ATTACHED SHEET. IN ORDER TO ELIMINATE ALL POSSIBLE ERRORS, WOULD YOU PLEASE REVIEW THE DATA AND MAKE ANY CORRECTIONS WHICH SEEM NECESSARY.

WE WOULD ALSO LIKE TO COLLECT TWO ADDITIONAL TYPES OF INFORMATION TO COMPLETE THE FILE:

1. PLEASE LIST YOUR CURRENT INVOLVEMENT IN MARINE RELATED ACTIVITIES IN THE SPACE BELOW.

2. IN ORDER TO PROVIDE A CATEGORIZATION OF PERSONNEL BY BROAD EXPERTISE CATEGORIES, PLEASE IDENTIFY THE AREA OR AREAS WHICH YOU FEEL BEST DESCRIBES YOUR EXPERTISE BY CHECKING UP TO 3 OF THE AREAS SHOWN BELOW. USE THE NUMBERS 1, 2, OR 3 TO SIGNIFY THEM IN ORDER OF DECREASING IMPORTANCE.

- | | |
|---|---|
| <input type="checkbox"/> RESOURCE MANAGEMENT | <input type="checkbox"/> CHEMICAL PROCESSES |
| <input type="checkbox"/> ENGINEERING DESIGN | <input type="checkbox"/> FOOD TECHNOLOGY & PROCESSING |
| <input type="checkbox"/> MARINE ENGINEERING | <input type="checkbox"/> PERSONNEL & TRAINING |
| <input type="checkbox"/> MARINE BIOLOGY & FISHERIES | <input type="checkbox"/> PHYSICAL OCEANOGRAPHY & METEOROLOGY |
| <input type="checkbox"/> MINERAL EXPLORATION & RECOVERY | <input type="checkbox"/> PRODUCT DEVELOPMENT, MARKETING & FINANCE |

PLEASE RETURN THIS LETTER WITH THE DESIGNATED INFORMATION AND THE CORRECTED DATA FORM AT YOUR EARLIEST CONVIENCE TO:

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
OLD CUSHING LIBRARY
CAMPUS

EUGENE B. SMITH

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
PERSONNEL LISTING

DATE= 11/17/69

PAGE 78

REFERENCE CODE= P-05-HARH001 HARH001

ORGANIZATION= TEXAS A&M UNIVERSITY

NAME= DR. H. G. HARTLEY

ADDRESS= INSTITUTE OF STATISTICS
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77843
PHONE 713-845-3341

EXPERTISE= STATISTICAL METHODOLOGY
MATHEMATICAL PROGRAMMING
SAMPLE SURVEY METHODOLOGY
COMPUTER SIMULATION
NUMERICAL ANALYSIS

EDUCATION= PH.D. MATHEMATICS
PH.D. STATISTICS
D.S.C. MATHEMATICAL STATISTICS

WORK EXPERIENCE= INDUSTRIAL - WAR WORK AS SCIENTIFIC OFFICER IN CHARGE HARH001
OF PLANNING AND SUPERVISION OF COMPUTATIONAL
WORK - 8 YRS.
RESEARCH - 4 YRS.
ACADEMIC - TEACHING AND RESEARCH - 36 YRS.
CURRENT - PROFESSOR AND DIRECTOR, INSTITUTE OF STATIS

APPENDIX II
Data Output Formats

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
PERSONNEL LISTING

DATE= 01/12/70

PAGE 8

REFERENCE CODE= P-69-BELRR01 BELRR01

ORGANIZATION= TEXAS A&M UNIVERSITY SPECIALTY = 04 07 00

NAME= DR. R. R. BELL

ADDRESS= DEPT. OF VETERINARY PARASITOLOGY
TEXAS A&M UNIVERSITY
COLLEGE STATION, TEXAS 77843
PHONE 713-845-2851

EXPERTISE= HELMINTHS PARASITES

EDUCATION= D.V.M. VETERINARY MEDICINE
M.S. VETERINARY PARASITOLOGY
PH.D. VETERINARY PARASITOLOGY

WORK EXPERIENCE= TEACHING AND RESEARCH 17YRS. BELRR01
(PARASITES OF DOMESTIC ANIMALS)
CURRENT - HEAD, DEPT. OF VETERINARY PARASITOLOGY
MARINE ACTIVITY - OCCURRENCE AND SIGNIFICANCE OF
PARASITES IN COMMERCIAL OCEAN FISH,
MICROSPORIDIA IN SHRIMP.

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
ALPHABETICAL LISTING

DATE= 01/09/70

PAGE 2

P-69-DOWEJ01	DR. E. J. DOWDY
P-69-DREDD01	DR. DAN D. DREW
P-69-DULNM01	DR. NELSON M. DULLER
P-69-ELLRW01	DR. ROGER W. ELLIOTT
P-69-EPPJA01	DR. JUN A. EPPS
P-69-FAHDA01	DR. DAVIS A. FAHLQUIST
P-69-FARFC01	DR. F. C. FARIES, JR.
P-69-FITL01	DR. LLOYD E. FITE
P-69-FLOAI01	DR. A. I. FLOWERS
P-69-FOXMJ01	DR. M. J. FOX JR.
P-69-FRERJ01	DR. R. J. FREUND
P-69-GALBM01	MR. B. M. GALLAWAY
P-69-GANAF01	DR. ANTHONY F. GANGI
P-69-GARCJ01	DR. C. J. GARRISON
P-69-GIAAJ01	DR. A. J. GIAROLA
P-69-GIACH01	DR. CHOU-SENG GIAM
P-69-GILSM01	MR. SAMUEL M. GILLESPIE
P-69-GODCL01	DR. CURTIS L. GODFREY
P-69-GOLIS01	DR. IRVING S. GOLDSTEIN
P-69-GOUFW01	DR. FRANK W. GOULD
P-69-GRIRD01	DR. RONALD D. GRIGSBY
P-69-GRULC01	DR. L. C. GRUMBLES
P-69-GUNRH01	DR. RICHARD H. GUNDERSON
P-69-GUSLF01	DR. LAWRENCE F. GUSEMAN, JR.
P-69-HADCR01	DR. C. R. HADEN
P-69-HANRW01	DR. RUY W. HANN JR.
P-69-HARHO01	DR. H. D. HARTLEY
P-69-HARHW01	DR. HAROLD W. HARRY
P-69-HARJB01	DR. JOE B. HARRIS
P-69-HENJK01	MR. JAMES K. HENNIGAN
P-69-HENWK01	MR. WALTER K. HENRY
P-69-HOCRR01	DR. RONALD R. HOCKING
P-69-HODL 01	MR. LOUIS HODGES
P-69-HOLCD01	DR. C. D. HOLLAND
P-69-HOPSH01	DR. SEWELL H. HOPKINS
P-69-HORK 01	DR. KALMAN HORVATH
P-69-HOSLR01	DR. L. R. HOSSNER
P-69-HOWJR01	DR. J. R. HOWES
P-69-HURJT01	DR. JOHN TOM HURT
P-69-ICHT 01	DR. TAKASHI ICHIYE
P-69-IRBHD01	DR. HAROLD D. IRBY
P-69-IRGKJ01	DR. KURT J. IRGOLIC
P-69-IRVRL01	DR. ROBERT L. IRVINE
P-69-JORWK01	DR. WAYNE R. JORDAN
P-69-KENHT01	DR. HARVEY T. KENNEDY
P-69-KIEWH01	MR. WILLIAM H. KIEL, JR.
P-69-KOEKJ01	DR. KARL J. KOENIG
P-69-KRIKV01	DR. KOTRA V. KRISHNAMURTY
P-69-KUYWE01	MR. W. E. KUYKENDALL, JR.
P-69-LAAJ 01	DR. J. LAANE
P-69-LARCF01	DR. CURTIS F. LARD

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
DEPARTMENT LISTING

DATE= 01/09/70

PAGE 1

AEROSPACE ENGINEERING

KAUBM01 DR. BALUSU M. KAD
RODCA01 DR. CHARLES A. RODENBERGER

AGRICULTURAL ECONOMICS & SOCIO.

ADAJW01 MR. JOHN W. ADAMS
BILR 01 DR. RAY BILLINGSLEY
BLAWE01 DR. WILLIAM E. BLACK
BOYCC01 MR. CALVIN C. BOYKIN
DAVDR01 MR. DAN R. DAVIS
HARJBO1 DR. JOE B. HARRIS
LARCF01 DR. CURTIS F. LARD
MCLEL01 DR. EDWARD L. MCLEAN
TROWL01 DR. WARREN L. TROCK
WOOAB01 DR. ALVIN B. WOJTEN

ACCOUNTING

BENED01 DR. EARL D. BENNETT
DANTE01 DR. TROY E. DANIEL
POILG01 DR. LARRY G. POINTER

ANIMAL SCIENCE

BRELH01 DR. L. H. BREUER
CARZL01 DR. Z. L. CARPENTER
CUBBF01 DR. BRYANT F. COBB III
POTGD01 DR. GARY D. POTTER
SCHLM01 DR. L. M. SCHAKE
VANC 01 DR. CARL VANDERZANT

ARCHITECTURE

CLACD01 MR. D. C. CLAYCAMP
NICR 01 MR. ROBERT NICHOLS

BIOCHEMISTRY & BIOPHYSICS

BOTNR01 DR. NESTOR R. BOTTINO
DUNGA01 DR. GERALD A. DUNOVAN
GRIRD01 DR. RONALD D. GRIGSBY
PREJM01 DR. J. M. PRESCOTT

BIOLOGY

HOPSH01 DR. SEWELL H. HOPKINS
HORK 01 DR. KALMAN HORVATH
KDEKJ01 DR. KARL J. KOENIG
MACJG01 DR. JOHN G. MACKIN
MCLDD01 DR. DONALD D. MCLAIN
SPEJJ01 DR. JOHN J. SPERRY

BUSINESS ADMINISTRATION

ZENHE01 MR. HARRY E. ZENNER JR.

CHEMICAL ENGINEERING

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
SPECIALTY LISTING

DATE= 01/12/70

PAGE 1

RESOURCE MANAGEMENT

ADABJ01 MR. B. J. ADAMS
ADAJW01 MR. JOHN W. ADAMS
ADKPLO1 DR. P. L. ADKISSON
BENED01 DR. EARL D. BENNETT
BENFJ01 MR. FRED J. BENSON
BILR 01 DR. RAY BILLINGSLEY
BLAWE01 DR. WILLIAM E. BLACK
BOWEV01 DR. ELBERT V. BOWDEN
BOYCC01 MR. CALVIN C. BOYKIN
BRAJR01 MR. JAMES R. BRADLEY
BURRLO1 DR. RICHARD L. BURY
CLACD01 MR. D. C. CLAYCAMP
CLARA01 DR. ROBERT A. CLARK
COURE01 MR. ROBERT EDWARD COUCH
DANTE01 DR. TROY E. DANIEL

ENGINEERING DESIGN

ALWCW01 DR. C. W. ALWORTH
BASDR01 DR. DAVID REED BASCO
BENFJ01 MR. FRED J. BENSON
BILR 01 DR. RAY BILLINGSLEY
CARJW01 DR. JERALD W. CARUTHERS
CHERD01 DR. ROBERT D. CHENOWETH
CLACD01 MR. D. C. CLAYCAMP
CLAWH01 DR. W. H. CLAYTON
COYHM01 DR. HARRY M. COYLE

MARINE ENGINEERING

BASDR01 DR. DAVID REED BASCO
BOUAH01 DR. ARNOLD H. BOUMA
CAPLR01 DR. LUIS R. A. CAPURRO
COYHM01 DR. HARRY M. COYLE

MARINE BIOLOGY & FISHERIES

ADKPLO1 DR. P. L. ADKISSON
ALDDV01 DR. DAVID V. ALDRICH
ATKRLO1 DR. ROBERT L. ATKINSON
BELRR01 DR. R. R. BELL
BOTNR01 DR. NESTOR R. BOTTINO
BOYR 01 MRS. ROSEMARY BOYKIN
CHIAB01 DR. A. B. CHILDERS
COBBF01 DR. BRYANT F. COBB III

MINERAL EXPLORATION & RECOVERY

BOUAH01 DR. ARNOLD H. BOUMA

CHEMICAL PROCESSES

ATKRLO1 DR. ROBERT L. ATKINSON
BOTNR01 DR. NESTOR R. BOTTINO

MARINE RESOURCES INFORMATION CENTER
OFFICE OF THE SEA GRANT PROGRAM
OCCUPATION LISTING

DATE= 01/12/70

PAGE 2

RESEARCH

BOWE01	DR. ELBERT V. BOWDEN
BOYCC01	MR. CALVIN C. BOYKIN
BOYR 01	MRS. ROSEMARY BOYKIN
BRAJR01	MR. JAMES R. BRADLEY
BRELH01	DR. L. H. BREUER
BUREE01	DR. EDWARD E. BURNS
BURRL01	DR. RICHARD L. BURY
BUTEL01	DR. EDGAR L. BUTLER
CAPLR01	DR. LUIS R. A. CAPURRO
CARJW01	DR. JERALD W. CARUTHERS
CARZL01	DR. Z. L. CARPENTER
CATCM01	DR. CARL M. CATER
CAVRK01	DR. RALPH K. CAVIN III
CHERD01	DR. ROBERT D. CHENOWETH
CHIAB01	DR. A. B. CHILDERS
CLARA01	DR. ROBERT A. CLARK
CLAWH01	DR. W. H. CLAYTON
COBBF01	DR. BRYANT F. COBB III
COYHM01	DR. HARRY M. COYLE

EXTENSION

BENFJ01	MR. FRED J. BENSON
BLAWE01	DR. WILLIAM E. BLACK
BRAJR01	MR. JAMES R. BRADLEY
COBBF01	DR. BRYANT F. COBB III

PROGRAM PLANNING

BERRJ01	DR. R. J. BERRY
BLAWE01	DR. WILLIAM E. BLACK
BOWE01	DR. ELBERT V. BOWDEN
BRAJR01	MR. JAMES R. BRADLEY
DANTE01	DR. TROY E. DANIEL

ADMINISTRATION

BENFJ01	MR. FRED J. BENSON
BERRJ01	DR. R. J. BERRY
DANTE01	DR. TROY E. DANIEL

TECHNICIAN

BOYR 01	MRS. ROSEMARY BOYKIN
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FISH PROTEIN CONCENTRATE

DR. JAMES O. MCNEAL

P-69-MCNJU01

FISHERIES

MR. CARL W. LASHER JR.

P-69-LASCW01

FISHERIES DEVELOPMENT IN DEVELOPING NATIONS

DR. ALAN R. WATERS

P-69-WATAK01

FISHES

DR. F. C. FARIES, JR.

P-69-FARFC01

FLUID FLOW IN POROUS MEDIA

MR. ROBERT L. WHITING

P-69-WHIRL01

FLOWER PLANTS ECOLOGY

DR. FRANK W. GOULD

P-69-GOUFW01

FLOWER PLANTS TAXONOMY

DR. FRANK W. GOULD

P-69-GOUFW01

FLUID DYNAMICS

DR. W. H. CLAYTON

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FLUID MECHANICS

DR. BALUSU M. RAO

P-69-RAOBM01

FLUID MECHANICS-TWO-PHASE

DR. RON DARBY

P-69-DARR 01

FLUID MOTION

DR. JOHN TOM HUKI

P-69-HUKJTO1

FOOD BAKING & FORMULATION

DR. LLOYD W. RUDNEY

P-69-RUULW01

FOOD HANDLING

DR. Z. L. CARPENTER

P-69-CARZLO1

FOOD HYGIENE

DR. A. B. CHILDERS

P-69-CHIAB01

