

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

FIRST ANNUAL REPORT of UNOLS ADVISORY COUNCIL to FEDERAL FUNDING AGENCIES

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July 1, 1972

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of Institutions
for the coordination and support
of university oceanographic facilities

UNOLS Office
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

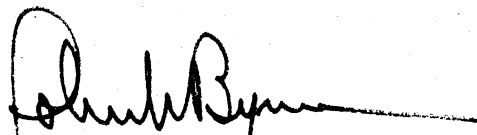
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LETTER OF TRANSMITTAL

Pursuant to the Charter of the University National Oceanographic Laboratory System (UNOLS), it is my pleasure to transmit this report via UNOLS Members to Federal Agencies which support academic oceanographic facilities.

The purpose of UNOLS is to provide for community-wide coordination and review of the utilization of available facilities, and for access to those facilities. UNOLS assesses the current match of facilities to the needs of academic oceanographic programs and makes appropriate recommendations of priorities for replacing, modifying or improving the numbers and mix of facilities for the community of users.

The task of the UNOLS Advisory Council is to monitor the activities of the System and to make an annual report dealing with the utilization and planning for those facilities. This document is the first such report.



John V. Byrne, Chairman
UNOLS Advisory Council

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM
(UNOLS)

ADVISORY COUNCIL REPORT
July, 1972

SUMMARY AND RECOMMENDATIONS

The University-National Oceanographic Laboratory System (UNOLS) provides for an annual report by its Advisory Council on the utilization and support of research vessels. This is the first of such reports which are intended for the use of Federal Agencies having responsibilities for funding oceanographic research and facility usage at academic institutions. This summary consolidates the conclusions and recommendations which are presented in the text of the report.

Ship Scheduling and Access

UNOLS ship schedule coordination meetings were held in November 1971 and May, 1972. Scientists from non-ship-operating institutions did not participate to the extent anticipated. In order to increase participation in this program the following recommendations are offered.

1. *In 1973 two ship schedule coordinating sessions should be held; one each on the east and west coasts. They should be as accessible as possible to working scientists. Wherever possible, other regional and consortia meetings should undertake to coordinate ship requirements and to keep UNOLS informed of their activities.*
2. *Broad and timely distribution of UNOLS tentative ship operating schedules should be made well in advance of scheduled meetings. Schedules should contain detailed scientific program information and cruise tracks.*
3. *There should be the closest possible coordination between the UNOLS Office and Federal ship operating activities for the purpose of information exchange and effective utilization of ship time.*

Federal Support for Ship Operations

Funding projected by Federal Agencies (ONR and NSF) for 1973 operations of the existing UNOLS academic research fleet appears to be adequate at about \$17.6M. It is estimated that costs will rise about 8% per year in the period 1974-1977. Apart from operating costs, shipboard equipment and marine technicians are critical areas which are not now adequately funded.

4. *The projected figure of \$17.6M should be continued as the operating funds in 1973 for the existing UNOLS academic research fleet. During the period 1974-1977 funding should be increased about 8% (about \$1.5M) annually.*
5. *The renewal and upgrading of shipboard equipment are key factors in effective ship operations. Lack of funds for equipment now constitutes one of the greatest deficiencies in ship support. In 1973 at least \$1.3M should be allocated specifically for ships equipment; thereafter an amount equivalent to about 10% of the total support for ship operations should be reserved for equipment.*
6. *The development of higher performance ship operations together with the use of shared equipment both within institutions and on an interinstitutional cooperative basis has accentuated the need for trained marine technicians funded separately. This concept should be established at major laboratories and separately funded. Pending further experience about \$0.9M per year should be allotted for this purpose.*
7. *Direct funding of research ship operations by ONR and NSF has resulted in a highly effective utilization of academic research ships as well as a means for cooperative use of ships by outside scientists. Present levels of support by NSF and ONR should be continued and, in addition, agencies such as NOAA, the Atomic Energy Commission, Environmental Protection Agency and others whose research programs are supported by the existence of these ships should consider participating in the "block funding" arrangement of university research vessels.*

Federal Support for Small Vessels and Boats

Whereas almost the entire academic research fleet of ships over 100-ft. in size receives direct Federal Support, only a small fraction of the smaller coastal vessels are so funded. In general, those which are Federally funded have proved to be capable, effective and well operated ships; and those which are not, are little or ineffectively used. The need for capable coastal research vessels has been identified as a priority item by UNOLS. Presently six boats in the 65-ft. range are funded in the amount of about \$0.5M.

8. *In order to provide for capable small coastal research vessels, the number of craft now receiving direct support should be about doubled, and \$0.5M of new funds supplied to meet this need. These funds, commencing in 1973, should come equally from NOAA and EPA who have clear responsibilities for funding research in the coastal zone.*

Ship Construction and Replacement

New construction of academic research vessels has been funded to the extent of \$2.8M in 1972 and 1973 by NSF. Navy which has built and owns eleven ships of the fleet has no present plans for academic ship replacement. At present, the replacement cycle for the UNOLS fleet is about sixty years. The coastal zone area has been identified as bearing the greatest need for new and replacement vessels. This need further extends to institutions which can gain access to ship use on a cooperative basis.

9. *Both NSF and Navy should continue plans for academic research ship replacement based on a 15-20 year amortization. This will require coordinated funding of about \$8M per year commencing in 1974.*
10. *Based on the coastal zone having been identified as the area most in need of additional ship facilities, NSF ship construction funds for 1973 should be allocated to construct at least two vessels according to the following priorities:*
 1. *Replacement of existing cooperative coastal research vessels.*
 2. *Replacement of institutional coastal research vessels.*
 3. *New construction of cooperative coastal research vessels.*
 4. *New construction of institutional coastal research vessels.*

("Cooperative" is defined as a vessel operated by an institution or consortia on behalf of the needs of all academic institutions in a given region.)

11. *In 1974, NSF ship construction funds should be applied to the replacement of one large academic research vessel; and, with funds remaining, to the construction of at least one coastal research vessel according to the foregoing priorities.*

Federal Support for Other Operations and Facilities

Through UNOLS there have been identified and will continue to be identified specialized facilities which contribute to the effectiveness of academic marine research. These are usually on a case by case basis. To date only a few selected areas have received any close scrutiny. The failure of UNOLS to include other facilities does not imply non-support so much as the analysis of the need for such specialized facilities has not yet been completed.

12. *It is recommended that the UNOLS concept of National Oceanographic Facilities be implemented (a) to broaden the cooperative use of facilities, and more important (b) to develop new applications of advanced technology for use by scientists.*
13. *Submersibles should be utilized more in university research than at present, both on an institutional basis and as National Oceanographic Facilities (including charter funding). Total support of about \$1.3M in 1973 and \$1.9M in 1974 should be about evenly divided between ONR, NSF, and NOAA (MUS&T Office). The two latter agencies should join in supporting at least two submersibles and a submersible "charter fund" as UNOLS National Oceanographic Facilities.*
14. *The bathythermograph facilities at Scripps Institution and Woods Hole should be supported through 1974 at a total level of about \$100,000 after which time those activities should be consolidated into the general data system of the respective institution.*
15. *The role of aircraft for university research has not been fully defined by UNOLS. Pending this, it is recommended that in 1973 support of the Scripps Institution aircraft be continued as an interim National Oceanographic Facility for one-half of its available flight time at a funding level of about \$60,000.*

16. For the improvement and replacement of ship support facilities and for new concepts of shore depots \$0.5M in 1973 and \$1.0M subsequently should be planned pending a realistic assessment of needs.
17. In identifying other specialized facilities involving the use of advanced technology in academic research the assistance of the National Academy of Sciences Ocean Affairs Board in cooperation with the National Academy of Engineering Marine Board should be solicited. Tentative funding of about 5 to 10% of total ship support should be planned for.
18. Recommended funding for selected areas of facility support in the short and near terms is summarized in the following table. In many cases the arrangements shown are tenuous and in need of further study, but it does serve as an open starting point and inclusion rather than not is considered the lesser error.

| SUMMARY OF RECOMMENDED FUNDING (Millions of Dollars) | | | | | | | | | | | | | | | | |
|---|-------------|------------|------------|-------------|-------------|------------|-------------|-------------|------------|-------------|-------------|------------|-------------|-------------|------------|-------------|
| | 1972 | | | | 1973 | | | | | | 1974 | | | | | |
| | NSF | ONR | OTH | TOT | NSF | ONR | NOAA | EPA | OTH | TOT | NSF | ONR | NOAA | EPA | OTH | TOT |
| Research Ships | | | | | | | | | | | | | | | | |
| Operations | 10.7 | 4.3 | 1.5 | 16.5 | 11.4 | 4.7 | 0.25 | 0.25 | 1.5 | 18.1 | 12.4 | 4.7 | 0.25 | 0.25 | 1.5 | 19.1 |
| Equipment | 1.2 | - | - | 1.2 | 1.2 | 0.1 | - | - | - | 1.3 | 1.5 | 0.4 | - | - | - | 1.9 |
| Marine technicians | 0.5 | - | - | 0.5 | 0.5 | - | 0.1 | - | - | 0.6 | 0.7 | - | 0.2 | - | - | 0.9 |
| Replacement & Construction | 2.8 | - | - | 2.8 | 2.8 | - | - | - | - | 2.8 | 8.0 | - | - | - | - | 8.0 |
| (Total) | (15.2) | (4.3) | (1.5) | (21.0) | (15.9) | (6.8) | (0.35) | (0.25) | (1.5) | (22.8) | (22.6) | (5.1) | (0.45) | (0.25) | (1.5) | (29.9) |
| Shore Facility | 0.9 | - | - | 0.9 | 0.5 | - | - | - | - | 0.5 | 1.0 | - | - | - | - | 1.0 |
| Specialized Facility Support | | | | | | | | | | | | | | | | |
| Submersibles | 0.2 | 0.5 | - | 0.7 | 0.4 | 0.5 | 0.4 | - | - | 1.3 | 0.6 | 0.5 | 0.6 | - | - | 1.7 |
| BT Facilities | 0.1 | - | - | 0.1 | 0.1 | - | - | - | - | 0.1 | 0.1 | - | - | - | - | 0.1 |
| Aircraft | 0.1 | - | - | 0.1 | 0.1 | - | - | - | - | 0.1 | 0.2 | - | - | - | - | 0.2 |
| Other Spec. Facil & Oper. | 0.1 | 1.0 | - | 1.1 | 0.5 | 0.9 | 0.3 | - | - | 1.7 | 1.0 | 1.0 | 0.3 | - | - | 2.3 |
| (Total) | (0.5) | (1.5) | - | (2.0) | (1.1) | (1.4) | (0.7) | - | - | (3.2) | (1.9) | (1.5) | (0.9) | - | - | (4.3) |
| TOTAL | 16.6 | 5.8 | 1.5 | 23.9 | 17.5 | 6.2 | 1.05 | 0.25 | 1.5 | 26.5 | 25.5 | 6.6 | 1.35 | 0.25 | 1.5 | 35.2 |

| | 1975 | 1976 | 1977 | 1978 |
|------------------------------|-------------|-------------|-------------|-------------|
| | TOTAL | TOTAL | TOTAL | TOTAL |
| Research Ships | | | | |
| Operations | 21.1 | 22.6 | 24.1 | 25.6 |
| Equipment | 2.1 | 2.2 | 2.4 | 2.5 |
| Marine Technicians | 0.9 | 1.0 | 1.0 | 1.0 |
| Replacement & Construction | 8.0 | 8.0 | 8.0 | 8.0 |
| (Total) | (32.1) | (33.8) | (35.5) | (37.1) |
| Shore Facility | 1.0 | 1.0 | 1.0 | 1.0 |
| Specialized Facility Support | | | | |
| Submersibles | 1.9 | 1.9 | 2.0 | 2.0 |
| B/T Facilities | - | - | - | - |
| Aircraft | 0.5 | 0.5 | 0.7 | 0.8 |
| Other Spec. Facil & Oper. | 2.5 | 3.0 | 3.0 | 3.0 |
| (Total) | (4.9) | (5.5) | (5.7) | (5.8) |
| TOTAL | 38.0 | 40.3 | 42.2 | 43.9 |

TEXT

INTRODUCTION

This report is the first annual report by the Advisory Council of the University-National Oceanographic Laboratory System (UNOLS). It is intended to provide Federal funding agencies with an assessment of the use, the need, and the adequacy of funding relative to oceanographic facilities at academic institutions.

The UNOLS Charter, in regard to the Annual Report states

"The Advisory Council shall make an annual report to the funding agencies via UNOLS and shall include all matters pursuant to its Charter as:

- (1) Review and evaluation of the effectiveness of utilization and operation of Federally supported oceanographic facilities including the providing of access to facilities to all qualified scientists.
- (2) The need for replacement and additional facilities and their assignment, and an assessment of out-moded or excess facilities and their disposition.
- (3) The consideration of specialized facilities or new concepts in facilities
- (4) Recommendations as to the balance between facilities and funded research programs."

Because UNOLS has operated only since November, 1971 and the Advisory Council only since December, 1971, this report represents less than a full year's effort. The following sections include reviews and recommendations dealing with:

- . UNOLS development and activities
- . University ship scheduling and access by scientists
- . Operations and funding of academic facilities, particularly ships
- . New concepts in facilities
- . Replacement of facilities

Not contained in this first report is an evaluation of effective utilization of facilities and recommendations as to the balance between facilities and research programs. These two important and related subjects require a greater scope of effort and subjective treatment than time has permitted.

The following sections address selected elements of facility support for academic oceanographic research. It should be recognized that these are not the sum total of either the needs or the existing resources of the academic community. Instead the report represents only those matters which the UNOLS Advisory Council has had the opportunity and capability to deal with or even recognize. Moreover, those areas which are covered are done so with the recognition that current budgets are necessarily austere and presumably will remain so for the near future.

UNOLS DEVELOPMENT AND ACTIVITIES

In order to serve the broadest use possible, this report describes the development and activities of UNOLS during the past year. As it is now comprised, UNOLS is an adaptation of recommendations by the President's Commission on Marine Science, Engineering and Resources (1969) and the National Council on Marine Resources and Engineering Development (Berman Panel-1970). It was implemented in September, 1971 following a year of development jointly by Federal Agencies and the Academic Community.

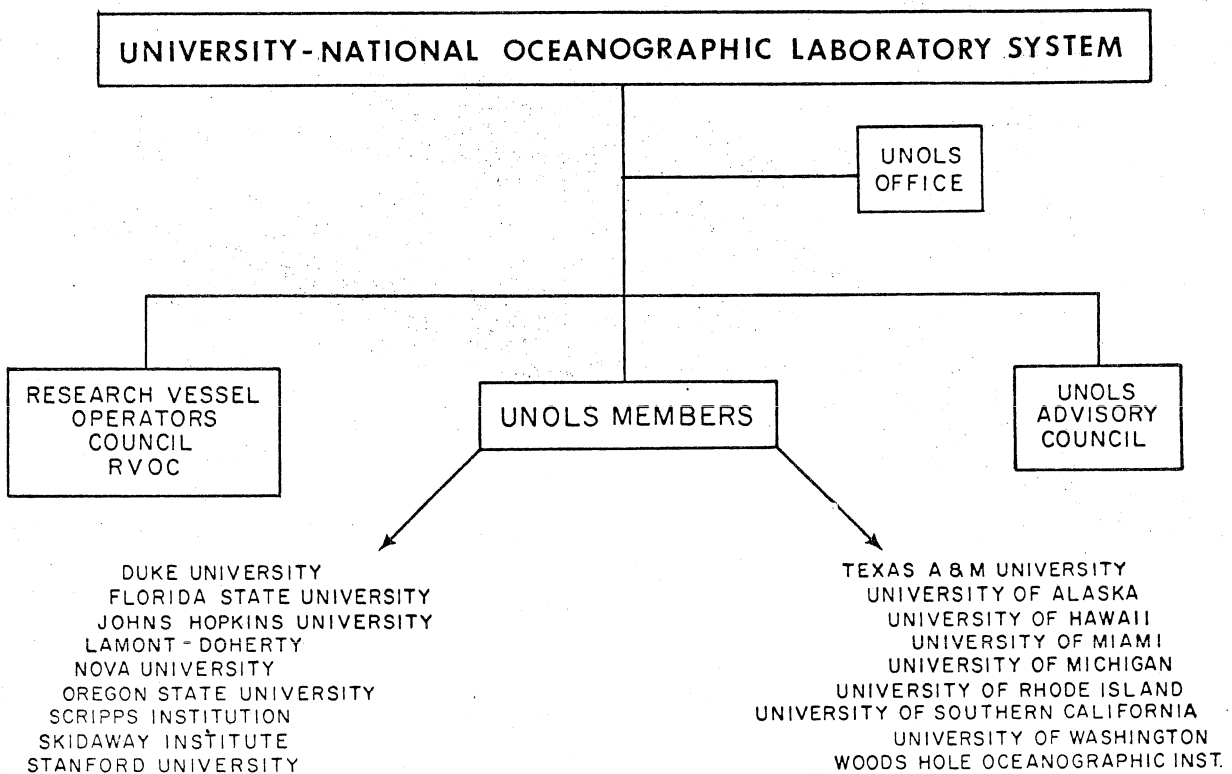
As stated in its charter UNOLS has as its objectives:

- To create a mechanism for coordinated utilization of and planning for oceanographic facilities through an association of academic institutions in a national system whereby institutions can work together and with funding agencies to assist in the effective use, assessment and planning for oceanographic facilities.
- To improve the level and stability of Federal support for academic oceanography, thereby continuing and enhancing the excellence of this nation's oceanographic program.

The functions of UNOLS are, to provide for community-wide coordination and review of the use of facilities, to increase the opportunity for access to those facilities, to assess the current match of facilities to the needs of academic oceanographic programs and to recommend priorities for replacing, modifying or improving the numbers and types of facilities. In turn, UNOLS is to assist Federal agencies in achieving effective ship and other facility utilization and in obtaining adequate and uniform financial

and cruise information. UNOLS further serves as a focus for new ideas and requirements for specialized facilities. Because of the need to develop ship utilization procedures for the Federal agencies and because of the outstanding needs for improving the academic oceanographic fleet and its funding, attention initially has been directed toward ships. Other facilities, particularly specialized facilities, are receiving increasing attention, however.

The organization of UNOLS is shown on the accompanying figure. The basic element is the Membership which is defined as those academic institutions which operate Federally funded and significant seagoing oceanographic facilities. At the present time eighteen institutions comprise the membership. These are listed below:



The Chairman of UNOLS is Dr. Arthur E. Maxwell, Provost of Woods Hole Oceanographic Institution, and the Vice-Chairman is Dr. J.M. Savage, Associate Director of the Allan Hancock Foundation, University of Southern California. The UNOLS Office which provides staff and secretarial services is operated on behalf of the members by the Woods Hole Oceanographic Institution and is funded during the current period jointly by the National Science Foundation and Office of Naval Research. Captain R.P. Dinsmore, USCG (Ret.), serves as head of the UNOLS Office and Executive Secretary of UNOLS.

Under the auspices of UNOLS research ship scheduling procedures have been developed which include open institutional meetings, preliminary schedule circulation and coordination meetings. Emphasis has been to assure the most effective use of, and to provide widespread access to, Federally funded ship time.

At its first Annual Meeting in November, 1971 at LaJolla, California the UNOLS members elected the Advisory Council and identified the areas of specialized facilities requiring early attention. At its recent meeting in May, 1972 at College Station, Texas, the new concept of National Oceanographic Facilities was adopted. The highlights of these meetings are described in Appendix III.

In addition to the Membership, the two main sub-bodies of UNOLS are the Research Vessel Operators Council and the UNOLS Advisory Council.

Research Vessel Operators Council (RVOC)

This group is an organization which has been in existence for about ten years and by mutual agreement has become part of UNOLS. It comprises the marine superintendents and naval engineering personnel of university operating institutions. Its role is to exchange ship operating and technical information between members and to serve as a forum for working with the Coast Guard on ship inspection and marine safety matters. The current chairman is Jonathan Leiby, Naval Architect, of Woods Hole. RVOC meets annually and sponsors working groups as required. A current effort is a forthcoming seminar with industry on oceanographic winches sponsored jointly with the Marine Technology Society. RVOC is a valuable adjunct to UNOLS and should serve an increasingly important role in achieving the overall goals of UNOLS.

UNOLS Advisory Council

The Advisory Council is a group of seven scientists elected by UNOLS Members. Four members of the Advisory Council are from member institutions and three from non-members. Election to the council is for three years. The purpose of the Advisory Council as set forth in the UNOLS Charter is:

"..... to monitor the activities of the System giving attention to the effective use of existing oceanographic facilities and to the performance of the member institutions in providing access to Federally supported University facilities for scientists from other institutions, especially from non-ship operating institutions. It will evaluate the need for replacement and additional facilities and assess whether some facilities are outmoded or in excess of current needs. In consideration of research needs recognized by the National Academy of Sciences, Federal agency advisory bodies, other groups of scientists and the UNOLS organization itself, the UNOLS Advisory Council will recommend to the funding agency and UNOLS the consideration of specialized facilities or new concepts in facilities. It will also make recommendations as to the balance between facilities and funded research programs. It will assist the funding agencies in efforts to obtain adequate and uniform financial and cruise reporting of ship operations."

The Advisory Council Members elected at the November, 1971

meeting are:

John V. Byrne, Oregon State Univ., 3-years
John P. Craven, Univ. Hawaii, 3-years
Charles L. Drake, Dartmouth College, 3-years (resigned 6-1-72)
David W. Menzel, Skidaway Institute, 2-years
Robert A. Ragotzkie, Univ. Wisconsin, 1-year
Henry M. Stommel, M.I.T., 2-years
Warren S. Wooster, Scripps Institution, 1-year

To date the Advisory Council has held three meetings:

December 6, 1971 at San Francisco, California
January 27-28, 1972 at Skidaway Institute, Savannah, Georgia
May 31-June 1, 1972 at Scripps Institution, La Jolla, California

At its first meeting the Advisory Council examined the charges conveyed to it at the November, 1971 UNOLS Meeting. These included focus on the problem of access to research ships and facilities by qualified investigators, and early attention to the need for certain specialized facilities.

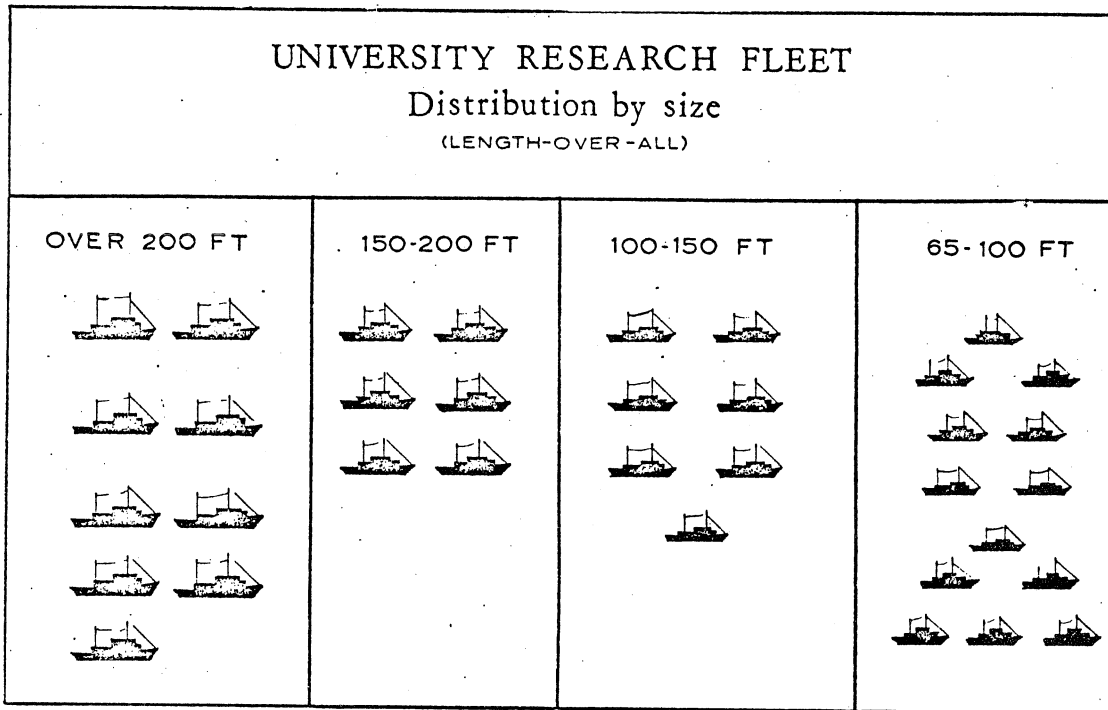
These charges along with the charter functions of the Advisory Council were developed into the following task schedule.

UNOLS ADVISORY COUNCIL
TASK SCHEDULE

| Role of Advisory Council | | July 1972 | | July 1973 | Long Term |
|--|-------|--|---|---|---|
| Evaluate Effectiveness: Scheduling Utilization Access | | Develop Criteria Obtain Data Pilot Evaluations ATLANTIS II AGASSIZ CAYUSE CONRAD EASTWARD THOMPSON TRIDENT (DISCOVERER) | | Refine Criteria | |
| Facility Support | | | | | |
| Need for Replacement and Additional Facilities | Ships | Inventory | FY-73 Specifics FY-74 Totals | FY-74 Specifics FY-75 Totals Develop Long Range Needs | Establish and update long range needs |
| | Boats | Sample Regional Inventory | Develop Recommen- dations on Boats | Update Recommen- dations | |
| Specialized Facilities | | Broad Inven- tory of Facilities --- Identify Criti- cal Areas --- Establish Ad Hoc Groups: Submersibles Aircraft BT Facilities Cooperative Facilities | FY-73 Recommen- dations: Submersibles Aircraft BT Facilities Establish further Groups contingent on identification of critical areas & success of pilot efforts | FY-74 Recommendations Begin to develop new concepts for specialized facilities | |

PROFILE OF UNIVERSITY RESEARCH FLEET

The Academic research ships funded directly by the Federal Government comprises a fleet of about thirty-five ships. These are operated by eighteen institutions (UNOLS Members) under "block funding" grants by the Office of Naval Research and the National Science Foundation. Distribution by size is shown in the following figure.



UNIVERSITY OPERATED RESEARCH SHIPS WHICH ARE DIRECTLY FUNDED BY THE FEDERAL GOVERNMENT

An inventory of these ships is given in Table 1 of Appendix I.

Of the nine vessels over 200-ft. in length, five are relatively new (less than ten years old). Seven are owned by the Federal Government (Navy).

Two of six ships in the 150-200 ft. class are new and the remaining four are converted World War II cargo ships approaching thirty years of age. All are privately owned.

Of the seven ships 100-150 ft. long, three have existed for less than ten years. Three others are World War II conversions. One of these older ones is Navy owned.

The thirteen ships from 50-100 ft. include five over 65-ft. of which three are of recent construction. Six 65-ft. vessels include four old conversions. Two under 65-ft. are both relatively new. Two of the 50-100 ft. class are Navy owned.

The median age of the entire thirty-five vessel fleet is eleven years, but eleven of the ships are twenty-eight years or older. Of the eleven Navy owned ships, five are twenty or more years of age.

Geographically there is about an even distribution between the East and West Coasts for vessels over 75-ft. Below this size there is a preponderance of Atlantic and Gulf Coast based vessels.

In addition to the Federally funded university ships, additional academic research vessels are operated either from project, state or other forms of funding. These are generally smaller ships. One is 136-ft. LOA and eight others are between 75-100 ft. Thus the vast

majority of academic research vessels over 75-ft. are Federally block-funded. At 65-ft., however, the comparison shifts. In this size range there is a group of 24 boats operated by nineteen non-UNOLS laboratories contrasted to the eight boats of the same size operated by seven UNOLS Members. The relatively large number of 65-ft. boats results largely from the Federal motorboat laws and the availability of surplus Army "T-Boat" which accounts for ten of the 24 craft. An inventory of the 65-ft. class including both block funded vessels and others is included in Table 3 of Appendix I.

There are an estimated seventy-five vessels between 26-50 ft. mostly used for estuarine research and training.

SHIP SCHEDULING AND ACCESS

The coordination of research ship scheduling and access to ship use by all scientists is considered to be a primary role of UNOLS. The UNOLS Charter, (Appendix II) sets forth procedures for a timely, visible and coordinated development of university ship schedules. This effort presently is in its first annual cycle and a full review cannot be made until its completion. Nevertheless, tentative ship schedules for 1973 have been developed under the UNOLS "concept" and two ship schedule coordination sessions have been held. The first of these was at the November, 1971 UNOLS meeting at La Jolla. This was a pilot exercise aimed at the already fixed 1972 ship schedule. The second was at the May 4, 1972 annual meeting at College Station, Texas, and was in context with the UNOLS procedures. This latter effort was monitored closely by the UNOLS Advisory Council. A copy of the tentative 1973 ship schedule is attached as Appendix VI.

A survey made by the UNOLS Office showed that UNOLS Members ship requirements for their own Federally funded (or likely so) programs amounted to about 130% of available ship time even after the first cut. Variations ran from about even to 150%. Returns from member institutions showed the following statistics:

| Institution | Unaccommodated or significantly curtailed ship time programs * | |
|--------------------------------|--|---------------|
| | No. Scientists | Ship days |
| University of Alaska | 6 | 120 |
| Scripps Institution | 6 | 289 |
| University of Florida | 2 | 26 |
| Skidaway Institute | 3 | 60 |
| Lamont-Doherty | - | 1/2 ship year |
| University of Miami | - | 1/2 ship year |
| Nova University | 0 | 0 |
| Texas A&M | 3 | 68 |
| University of Rhode Island | 2 | 20 |
| University of Washington | 1 | 30 |
| Woods Hole Oceanographic Inst. | 12 | 1 ship year |

(*Defined as funded projects which received less than 2/3 ship time required)

Nevertheless most institutions demonstrated a high degree of cooperation in accommodating outside scientists. A sampling of 1971 figures shows the following statistics:

| Institution | No. Cruises | Total Scientific Participating | No. from Other Inst. |
|-----------------------|-------------|--------------------------------|----------------------|
| Scripps Institution | 46 | 450 | 67 |
| Lamont-Doherty | 16 | 99 | 10 |
| Univ. of Rhode Island | 16 | 156 | 45 |
| Woods Hole | 53 | 609 | 219 |
| Univ. of Washington | 11 | 173 | 32 |

Most UNOLS Members report that between 15% and 25% of scientific participants on cruises are from other institutions. As a comparison the 1969 Directory of Oceanographers shows:

- . 1,357 total
- . 855 from academic institutions
- . 227 from non-UNOLS institutions (26% of total)

At first glance it appears that the current balance of "outside"* participation is reasonable. It should be recognized, however, that much of the "other" participation comes from other UNOLS institutions and not from institutions which do not have their own ship. This is not unexpected because effective utilization of ships as well as good science should encourage exchange arrangements. In view of the average 30% ship deficiency at UNOLS institutions, the role of UNOLS in attempting to find ship time for qualified scientists should promote exchange of scientists within UNOLS as well as from non-ship operating laboratories.

Although the ship schedule coordination by UNOLS is a major step forward and undoubtedly is resulting in sounder ship utilization, it has thus far not produced the results intended. Following the distribution of tentative ship schedules to over 160 scientists at 109 different institutions, about 60 "outside"* requests were received by seventeen UNOLS Members (statistics from Duke University EASTWARD program are not included). Although this figure is significant, it falls short of what might have been expected. Furthermore, at the UNOLS ship schedule coordination meeting almost no requests were submitted to the assembled members who came fully prepared to deal with them. This can possibly be attributed to any or all of the following reasons:

* "Outside" refers to scientists not at UNOLS member institutions and not part of other systematic arrangements such as IDOE.

There is a newness and still general unawareness by working scientists of the role of UNOLS in this regard. UNOLS purposely has refrained from a massive publicity campaign in order not to start an unrealistic avalanche of ship-time seekers.

At the scheduling stage few investigators outside of UNOLS institutions seem to be prepared to seek "committed" ship time so far in advance (16-18 months). Most fall into a category of subsequently examining available ships and seeking shipboard accommodations.

The time frame between the development of tentative ship schedules, and the date of the ship schedule coordination meeting was insufficient to allow working scientists to react.

A schedule coordination meeting held nationally (at College Station, Texas) cannot expect to bring forth an adequate representation of working scientists who seek ship time.

The tentative ship schedule developed by UNOLS for 1973 (Appendix VI) reflects the information furnished by the institutional members. While this is useful where previously nothing had been available, it is inadequate to the needs envisioned. More information should be made available concerning program description and cruise tracks. Furthermore, when ship

time is not entirely committed or may be available to an outside scientist, it should be more clearly stated.

Although UNOLS functions for the university research ship fleet, the Federally operated ships also are an important resource to the working scientist. These include the research vessels of the Navy, NOAA (National Ocean Survey and Fisheries) and U. S. Coast Guard, all of whom have excellent records for carrying academic scientists. In many instances when a participating investigator does not require control over the ship's operations, Government ships are as good as, or better than, academic ships for a source of ship time. Wherever possible, information on the activities of Navy, NOAA and other Federal ships should be made available to the academic community.

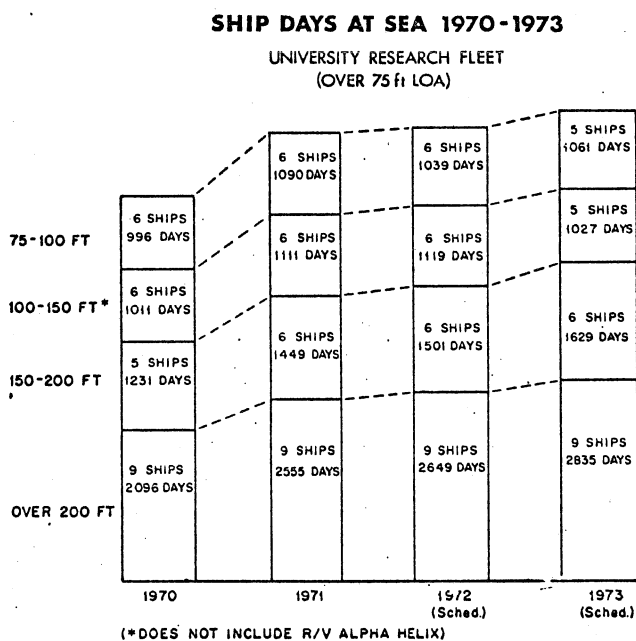
Advisory Council recommendations concerning research ships are as follows:

- . *In 1973 two ship schedule coordinating sessions should be held; one each on the east and west coasts. They should be as accessible as possible to working scientists. Wherever possible, other regional and consortia meetings should undertake to coordinate ship requirements and to keep UNOLS informed of their activities.*
- . *Broad and timely distribution of UNOLS tentative ship operating schedules should be made well in advance of scheduled meetings. Schedules should contain detailed scientific program information and cruise tracks.*
- . *There should be the closest possible coordination between the UNOLS Office and Federal ship operating activities for the purpose of information exchange and effective utilization of ship time.*

FEDERAL SUPPORT FOR SHIP OPERATIONS

A factor unique in the field of marine research is the high cost of operating its principal facility -- ships. Ship operations costs are about 22% of the UNOLS laboratories total budgets (individual fractions range from 12-35%).

For the University research fleet the amount of time at sea has increased during the past four years as shown below:



The number of academic ship days per year has increased by about 1200 days or 23% from 1970 to 1973. During this same period total funding for the fleet has increased about 35% comparing favorably with inflationary trends over this period. Furthermore, because the increased time at sea has been accomplished mostly by the larger and newer ships which can carry more

scientists, the net cost per scientist-day has remained about even or has decreased.

Average days at sea per year for each of the above categories is as follows:

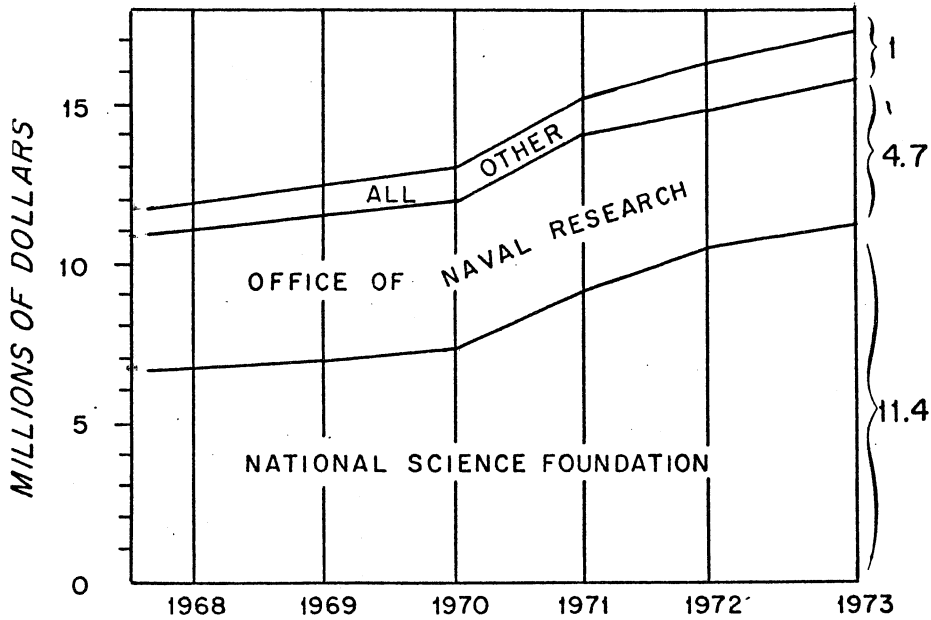
| | 1970 | 1971 | Sched 1972 | Sched 1973 |
|------------------|------|------|---------------|---------------|
| Over 200 ft. LOA | 288 | 312 | 294 | 315 |
| 150-200 ft. LOA | 246 | 258 | 266 | 272 |
| 100-150 ft. LOA | 170 | 156 | 187 | 204 |
| 75-100 ft. LOA | 167 | 182 | 208 | 212 |

(These data are based on ships actually in service for the entire year whose numbers usually differ from that given in total ship -days.)

The increase in days at sea for the more current years can be attributed to the increased performance of new ships and, in some cases, the upgrading of some older ships.

Funding for the operations of the 35 vessels of the UNOLS Fleet amounted to about \$16.6M in 1972. This compares to \$14.9M in 1971 and a projected \$17.6M in 1973. The five year trend in funding is shown below and a detailed profile by institution is given in Table 4 of Appendix I.

FROM
1972
REPORT



RESEARCH SHIP OPERATIONS SUPPORT -
FIVE YEAR TREND

Based on a survey by the UNOLS Office the funding for ship operations in 1972 has been about adequate with several exceptions. Original institutional proposals totaled \$17.4M and the 1972 operating deficiency appears to about 8.0M or 5%. This has been partially offset by extra funding for shipboard equipment which originally was included in proposed operations. In other cases shortage of funds has required at least three institutions to curtail operations and one other to operate at a deficit. Because the operating year is far from complete and because of inherent accounting lags, further operating deficiencies can be expected.

UNOLS review of 1973 operating outlook is based on NSF and ONR projections contained in Table 5 of Appendix I, and totals about \$17.6M. The most recent estimates by UNOLS Members are contained in the following list and total about \$17.2M.

Summary of Projected Funding Needs
(Ship Operations Only)

| | | | | | |
|--------------|-----------|----------------|-----------|------------|---------------|
| Alaska | 254,474 | Washington | 1,070,876 | Nova | 56,000 |
| Scripps | 3,469,937 | Lamont-Doherty | 1,558,400 | URI | 826,160 |
| Hawaii | 1,236,000 | Duke | 544,014 | Texas A&M | 750,000 |
| Oregon State | 906,939 | Florida State | 105,291 | Woods Hole | 3,716,000 |
| So. Calif. | 357,671 | Skidaway | 103,000 | Michigan | 302,906 |
| Miami | 1,601,283 | Johns Hopkins | 375,255 | TOTAL | \$ 17,234,176 |

This falls within the projected figure although deficiencies most likely will occur.

Ship equipment, however, is a different matter. This major category which includes new and replacement shipboard machinery, habitability and installed scientific gear has been identified by most operators as their major and growing deficiency. Estimated needs here total about \$1.7M for 1973 or about 10% of operating costs.

Compared with projected support, there is a continuing deficiency of \$0.5M or 40% of projected funding.

In other categories related to ship operations the lack of support for shipboard technicians emerges as a serious problem. However, the matter of shipboard (and other) technicians for university operations has not as yet been clearly defined but will be examined by a UNOLS working group during the forthcoming year. Based on a cursory sampling, it appears that 5% of ship operating costs is a tentative reasonable estimate which ought to be assigned to support of shipboard technicians and should

be included in 1973 and subsequent budgets.

The effect of "big-science" on ship utilization has become of increasing interest and concern. Programs such as the International Decade of Ocean Exploration (IDOE) have come to represent a sizeable fraction of ship time in the 1973 schedule. A cursory and perhaps non-inclusive examination of the schedule shows that about 10% of all ship time is devoted to IDOE projects. In terms of dollar value this represents about \$3.2M of total ship funding* for which IDOE has contributed \$2.8M or 11% of its total budget. Because IDOE cruises may accommodate other scientists and programs, no significant discrepancy currently appears to exist between IDOE ship funds and ship time allotted. A more pronounced effect is the long-term block commitment of ship time involved which has the effect of making ships less available to smaller programs. The three largest university research vessels all have major portions of the 1973 utilization dedicated to IDOE projects. These major global programs are being undertaken in a coordinated fashion which has resulted in participation by a great number of scientists. The impact on the general welfare of the individual institutions must be closely watched however.

* based on analysis that the following fractions of 1973 ship years are given to IDOE:

| | | | | | |
|-------------|---|-----|------------|---|-----|
| TRIDENT | - | 15% | YAQUINA | - | 14% |
| ATLANTIS II | - | 60% | CAYUSE | - | 10% |
| CHAIN | - | 37% | MELVILLE | - | 72% |
| KNORR | - | 57% | KANA KEOKI | - | 35% |

The outlook for operations costs for 1974 and beyond must include not only the usual inflationary price increases but also heavier operating loads due to expanding scientific programs. It is not unreasonable to expect that requirements for operating funds will increase at the rate of about 8% per year over the next five years or about \$1.5M per year. This estimate is based on information furnished the UNOLS Office by member institutions. Projecting this level of increase for those ships currently funded by ONR and NSF (including planned replacements) indicates that the following annual levels of support will be needed for the existing fleet.

| | <u>FY-74</u> | <u>FY-75</u> | <u>FY-76</u> | <u>FY-77</u> |
|-----------------------|--------------|--------------|--------------|--------------|
| Ship operations | 19.1 | 20.6 | 22.1 | 23.6 |
| Shipboard equipment | 1.9 | 2.1 | 2.2 | 2.4 |
| Shipboard technicians | 0.9 | 1.0 | 1.1 | 1.2 |

It should be noted that this projection does not include any increase in the size of the UNOLS Fleet which, nevertheless, is proposed in the next section. Consequently the final recommendations for vessel operations and associated funding becomes even greater.

The apportionment of operational support between Federal Agencies is a subject which UNOLS has not considered in any depth but which is planned over the forthcoming year -- hopefully in cooperation with the new Interagency Committee for Marine Science and Engineering (ICMSE). Presently direct support is provided by the Office of Naval Research and the National Science Foundation. This is the so-called "block-funding" which

has been in effect for about five years. It has proved more successful than the earlier vagaries of project funding and has resulted in a greater utilization of existing ships. The source of current funding by agency is indicated by the graph on page 19.

Block funding currently accounts for about 90% of UNOLS Fleet support. The remaining 10% comes from State and private sources and from other Federal Agencies (AEC, NOAA, USCG, EPA) and from additional Navy project funding.

A survey of past ship use indicates that 10% or more of ship time is devoted to accomplishing research projects of agencies other than ONR and NSF. UNOLS looks forward to greater participation in ship support by those agencies which now or in the future may benefit from the operations of academic research ships. In particular the operating costs of the smaller coastal research ships (considered in the next section) should at least in part, be block funded by agencies having responsibilities and obligations for funding research in the coastal zone. As a start it is recommended that NOAA and EPA commence in 1973 and/or 1974 to fund operations of the additional smaller vessels which the following section suggests be brought into the block funding system.

Advisory Council recommendations concerning Federal support for ship operations are:

- . *The projected figure of \$17.6M should be continued as the operating funds in 1973 for the existing UNOLS academic research fleet. During the period 1974-1977 funding should be increased about 8% (about \$1.5M) annually.*
- . *The renewal and upgrading of shipboard equipment are key factors in effective ship operations. Lack of funds for equipment now constitutes one of the greatest deficiencies in ship support. In 1973 at least \$1.3M should be allocated specifically for ships equipment; thereafter an amount equivalent to about 10% of the total support for ship operations should be reserved for equipment.*
- . *The development of higher performance ship operations together with the use of shared equipment both within institutions and on an interinstitutional cooperative basis has accentuated the need for trained marine technicians funded separately. This concept should be established at major laboratories and separately funded. Pending further experience about \$0.9M per year should be allotted for this purpose.*
- . *Direct funding of research ship operations by ONR and NSF has resulted in a highly effective utilization of academic research ships as well as a means for cooperative use of ships by outside scientists. Present levels of support by NSF and ONR should be continued and, in addition, agencies such as NOAA, the Atomic Energy Commission, Environmental Protection Agency and others whose research programs are supported by the existence of these ships should consider participating in the "block funding" arrangement of university research vessels.*

FEDERAL SUPPORT FOR SMALL VESSELS AND BOATS

Whereas almost all of the larger academic research vessels (100-ft. LOA or greater) are included within the UNOLS Membership, only a small portion of the smaller vessels are so included. This is understandable in that the UNOLS fleet was intended to comprise only "significant" facilities capable of interinstitutional cooperation and that many of the smaller boats are largely given over to undergraduate training programs which is beyond the specific scope of UNOLS.

Nevertheless, a current and critical issue is the many requests by small and new vessel operators (or potential operators) for needed support. The mandate of UNOLS properly includes an awareness of this problem, and of the role that these vessels play in the nation's oceanographic program.

There are about nine vessels between 75-100 ft. long not currently block funded. About two-thirds of these are specifically and fully project funded. An inventory is given in Table 2 of Appendix I.

In the 55-75 ft. range a large number exist, particularly at the 65-ft. size, probably owing to the Federal motorboat laws and the availability of surplus Army T-Boats. This group, which is the smallest research vessel generally requiring a regularly assigned crew, numbers about 32 vessels. An inventory comprises Table 3 of Appendix I.

A survey of the use of smaller vessels shows a wide range in capabilities and costs. Eight are Federally block funded at an average annual level of about \$79K per boat. This cost is considerably higher, generally by a factor of 2:1, than the available figures for non-block funded boats. However, a similar comparison of usage ranges between 2:1 and 3:1 and indicates clearly that fully funded boats are operated more effectively. Crew costs, overtime, installed shipboard equipment make the difference between an effective and an ineffective facility. The availability of these assets is generally related to block funding. The absence of them contributes to an underutilized facility which further compounds the problem.

A survey of 65-ft. vessel operators indicates that the majority are desirous of Federal block funding. However, a surprising number indicate a continued preference for project funding but with direct Federal funding for capital improvements and equipment. This concept is interesting and might be a realistic method of upgrading small university research boats into more effective facilities. The idea, however, needs further exploration.

Vessels less than 50-ft. long are relatively numerous. An inventory of these smaller boats is underway and, although incomplete, an emerging fact is that smaller boats are clearly institutional facilities and there is little evidence existing which would call for them to be block funded by

Federal Agencies.

Sufficient evidence does exist to demonstrate the effectiveness of block funding of vessels in the 65-ft. range and to support the recommendation that the number of boats so funded should be increased. New funds amounting to \$0.5M would support about six such vessels. Because NOAA and EPA, as well as NSF, have responsibilities to promote basic research it is not unreasonable for those Agencies to join with ONR and NSF in the direct Federal funding of this added effort. This is especially relevant in view of the current awareness of the needs for Coastal Zone research. Small university research vessels are major partners along with their Federal and State supported counterparts in coastal zone research. It seems especially appropriate that additional funding be identified for ship funding in this area.

In a similar vein, Coastal Zone research vessels were identified at the first UNOLS meeting as a matter for early attention. This charge was undertaken by a UNOLS Working Group whose report is attached as Appendix V. The Group concerned itself not with the smaller institutional vessels but with larger more capable coastal ships which would be operated on a cooperative regional basis. The UNOLS Advisory Council approves this report in principle but does not necessarily agree with specific recommendations dealing with the definition of regions or size and

characteristics of ships. UNOLS does agree with the concept of cooperative regional vessels as a means of furthering coastal research and ship access by scientists from institutions not operating this size ship.

Here again the matter of funding the operation of such vessels accents the responsibilities of other agencies to support vessel operations. The Working Group noted that the use of cooperative regional vessels be divided between basic science and "regional needs" of an applied nature. This latter can be interpreted as applied research serving the Coastal Zone missions of various Federal, Regional, and State Agencies, and it seems appropriate that such Agencies support this activity.

Recommended support for small coastal research vessels in addition to those presently funded by ONR and NSF is tentatively proposed as follows:

| Agency | 1973 | 1974 | 1975 et seq. |
|---|---------|---------|--------------|
| National Oceanic and Atmospheric Administration | \$0.25M | \$0.25M | \$0.3M |
| Environmental Protection Agency | \$0.25M | \$0.25M | \$0.3M |
| Total | \$0.50M | \$0.50M | \$0.6M |

The Advisory Council recommends that:

- In order to provide for capable small coastal research vessels, the number of craft now receiving direct support should be about doubled, and \$0.5M of new funds supplied to meet this need. These funds, commencing in 1973, should come equally from NOAA and EPA who have clear responsibilities for funding research in the coastal zone.*

SHIP CONSTRUCTION AND REPLACEMENT

A goal of UNOLS is the determination of the optimum number and size of ships to comprise the University Fleet, and of a replacement/construction program to achieve that goal. Such a determination is necessarily dependent first on an evaluation of the substance of science at sea. UNOLS hopes to derive this latter input from such bodies as the Ocean Science Committee of the National Academy of Sciences Ocean Affairs Board and the National Advisory Committee on the Oceans and Atmosphere. A UNOLS report on requirements for academic research ships is presently scheduled for July, 1973. In the meantime it is sufficient to state that a tentative goal is the replacement of the existing fleet and the fulfillment of existing needs.

The currently operating university research fleet which is block funded by the Federal Government comprises about thirty-five ships, at least 50-ft. in length. A summary by numbers and age is given in the following table and a more detailed inventory is given in Table 1 of Appendix I.

| Age | Size (LOA) | | | | |
|----------|-------------|------------|------------|-----------|----|
| | Over 200-ft | 150-200 ft | 100-150 ft | 50-100 ft | |
| Under 10 | 5 | 2 | 3 | 5 | 15 |
| 10-20 | 2 | 0 | 0 | 2 | 4 |
| 20-30 | 1 | 4 | 4 | 5 | 14 |
| Over 30 | 1 | 0 | 0 | 1 | 2 |
| Total | 9 | 6 | 7 | 13 | 35 |

Not included in the above table are three new ships in the 150-200 ft. range now in early stages of construction and which will enter service in 1974.

The present ship construction rate averages about one ship per year. However, in terms of current funding the fleet replacement cycle is closer to 60 years. By any reckoning there now appears to be inadequate provision to replace the existing fleet. Although the NSF long term ship construction plan does provide for increases in the current rate, the Navy, which has been the major provider of ships to the academic fleet in the past, has no plans for future ship construction in this category.

Any funding for replacement must agree with the amortization period of the ship. Whereas the service of older ships has been dragged out to 30 years and beyond, the useful life of a research vessel is now generally considered to be between 15 and 20 years. Assuming the replacement value of the present fleet to be \$160M and that this should be amortized over 20 years, a straight line annual figure of \$8M per year is obtained. Although this is an obvious oversimplification, it infers that commencing in 1974 the average annual university ship replacement funding by the Federal Government should be \$8M.

UNOLS can offer no well ordered replacement and construction program priorities at this time. Priorities should be set on the basis

of the total national program vis-a-vis institutional programs and needs. Replacement priorities also should include the material condition of the ship. This is the only factor which is reasonably well established by virtue of the inspection program of the NSF/Navy Panel for Ship Operation, Construction and Conversion.

About one-third of the academic ships are conversions of World War II vessels and are approaching thirty years of age. Recent construction has concentrated on replacing this category and particularly the 180-ft. FS class of which four remain.* These and the other older ships which cannot remain in service for many more years should bear the closest scrutiny as candidates for early replacement.

Priorities other than replacement cannot be ignored, however. At the first Annual UNOLS Meeting and under the subject of priority needs for academic research, there emerged a wide demand for coastal research vessels. In response to this the UNOLS Advisory Council appointed a Working Group whose report is appended. This report agreed with the need for coastal vessels but noted that about twenty of the existing UNOLS ships, or 60% of the fleet, could be so defined.

* ALAMINOS - Texas A&M (now being replaced)
TRIDENT - University of Rhode Island
YAQUINA - Oregon State University
AGASSIZ - Scripps Institution

The real need, according to the UNOLS Working Group, was for "cooperative" ships which could capably meet the needs of the institutions having little likelihood of acquiring their own vessel. The Report has two main thrusts:

1. That institutions within a coastal region act together to develop a joint plan for the justification, acquisition funding and operation of a cooperative ship and/or facility.
2. That FY-73 ship construction funds go into coastal ships based upon the needs and scientific merit demonstrated by the above plan/proposal.

The UNOLS Advisory Council agreed with these viewpoints and approved the Report in principle. The specific recommendations concerning delineation or regions and vessel characteristics are, however, considered premature and should be developed along with specific needs of the "regions in question".

It is, therefore, recommended that the FY-1973 Federal funds for research ship construction be applied to coastal research ships according to the following priorities:

1. Replacement of regional coastal vessels
2. Replacement of institutional coastal vessels
3. New Construction of regional coastal vessels
4. New Construction of institutional coastal vessels

On the assumption that FY-1973 ship construction funds will continue at \$2.8M, from two to four ships, according to size and equipage, should be funded. Actual awards should be on the basis of proposal reviews identifying the maximum benefits to coastal research contained therein.

As earlier set forth, FY-1974 et seq, new construction should be funded at a rate of \$8.0M annually for at least five years. Tentative 1974 funding should consider the replacement of one large (over 150-ft.) ship and, if funds remain, one additional coastal vessel according to the principles outlined in the foregoing, if the 1973 effort proves successful. A fuller program of ship construction pursuant to a long range plan will be presented in the 1973 Annual Report.

Recommendations by the Advisory Council on research ship construction are that:

- *Both NSF and Navy should continue plans for academic research ship replacement based on a 15-20 year amortization. This will require coordinated funding of about \$8M per year commencing in 1974.*
 - *Based on the coastal zone having been identified as the area most in need of additional ship facilities, NSF ship construction funds for 1973 should be allocated to construct at least two vessels according to the following priorities:*
 1. *Replacement of existing cooperative coastal research vessels.*
 2. *Replacement of institutional coastal research vessels.*
 3. *New construction of cooperative coastal research vessels.*
 4. *New construction of institutional coastal research vessels.*
- ("Cooperative" is defined as a vessel operated by an institution or consortia on behalf of the needs of all academic institutions in a given region.)*
- *In 1974, NSF ship construction funds should be applied to the replacement of one large academic research vessel; and, with funds remaining, to the construction of at least one coastal research vessel according to the foregoing priorities.*

FEDERAL SUPPORT FOR OTHER OPERATIONS AND FACILITIES

While the early attention of UNOLS is clearly directed toward research ships, other more specialized facilities are, and should, share an increasing role in academic research. The UNOLS Charter provides that:

"Coordination of other facilities will develop as the need becomes apparent. As oceanography has become more mature and sophisticated, requirements for facilities have become more varied and, in particular, specialized facilities, e. g., deep sea drilling ship, submersible and tender, aircraft, communication stations, automatic data processing and other highly specialized equipment (both shipboard and shore). Some of these facilities are so expensive that a single research project or institution cannot justify their acquisition, and often the facilities should be available to the academic oceanographic community as a whole. Requirements for specialized facilities are often identified by scientists themselves. It is likely that in the course of coordinating meetings or meetings of the UNOLS Advisory Council, these specialized requirements and ideas for new facilities will be aired and catalyzed. Recommendations so generated by the scientific community can then be made to the funding agencies via the Advisory Council. Likewise, the availability of specialized facilities can be communicated to the academic oceanographic community through the efforts of the UNOLS."

The first UNOLS Meeting in November, 1971 identified certain priority areas and specialized facilities for early attention by the Advisory Council. These included:

- | | |
|-----------------------------------|---------------------------------|
| (1) Cooperative use of facilities | (6) Technicians Pools |
| (2) Coastal Research Vessels | (7) Stable Platforms |
| (3) Submersibles | (8) Standardized Depots & Bases |
| (4) Bathythermograph Facilities | (9) Radio Stations |
| (5) Aircraft | |

At its first meeting the Advisory Council reviewed these categories and singled out the first five listed above for immediate action. These were selected either through community wide direction or by exigencies in current funding. The approach tentatively adopted by the Advisory Council has been to establish ad hoc Working Groups from among the entire UNOLS community with the request that each Working Group conduct its business promptly and produce a succinct set of recommendations. To date recommendations on the first four items have been received. The Working Group on Aircraft continues and its report is not yet available. Each of these facilities is discussed below.

1. Cooperative Use of Facilities

In regard to ships, this subject has been addressed in the sections dealing with Ship Scheduling and Access and Operations. There has emerged, however, a new concept of "National Oceanographic Facilities" which has been adopted by UNOLS and whose purpose is:

- . To provide oceanographic vessel and other facility support to scientists who do not operate or have available the required facilities.
- . To provide for the support and use in academic research of specialized and unique facilities.

This concept and the method of achieving it are described in Annex II to the UNOLS Charter which is appended. Such facilities are envisioned to be operated much the same as the present national facilities R/V EASTWARD and R/V ALPHA HELIX. Indeed, the operation of those ships has served as a pattern for this concept and UNOLS proposes

that they be designated as the first of the National Oceanographic Facilities. In certain cases another innovation is available; that of designating a fraction of total operating time as a National Oceanographic Facility. Such a split would then permit a facility to be otherwise assigned to institutional, mission oriented or other applied efforts.

Under UNOLS a National Oceanographic Facility can be so designated subject to:

- . concurrence of the owner and operator, and
- . reasonable assurance of support, and
- . review by the Advisory Council, and
- . approval by UNOLS

Designation of National Oceanographic Facilities should be subjected to the closest scrutiny. Such designation should advance new concepts and to provide for new high cost technology in university research. It should not be used to "rescue" old or bankrupt facilities.

Proposed funding for specific facilities is contained in other sections of this report and amounts to about \$1.5M or 6% of the total funding support for academic facilities.

- . *It is recommended that the UNOLS concept of National Oceanographic Facilities be implemented (a) to broaden the cooperative use of facilities, and more important (b) to develop new applications of advanced technology for use by scientists.*

2. Coastal Research Vessels

Coastal research vessels are discussed in the sections on Small Vessels and Boats. and on Ship Construction. A copy of the Working Group Report is contained in Appendix IV.

3. Submersibles

The Report of the Working Group for a University Submersible Facility is appended. In this report the Working Group has recommended that there be made available for university research at least one deep and one shallow submersible on each coast the use of which shall be allocated by an interdisciplinary review committee based on scientific merit of proposed use. In addition the Working Group recommended that a fund be allocated to provide submersible support through lease, charter or other short-term arrangements.

The Advisory Council concurs with this report in principle. The Advisory Council proposes to include an implementation scheme in future recommendations and for the time being recommends that the only operational university submersible, ALVIN, be operated, in part as a national cooperative facility, if all parties are agreeable. The submersible "Charter Fund" appears to be an excellent means of implementing submersibles to short term academic use and a test period of 1973-1974 is recommended wherein such funds would be apportioned by a review committee.

Although these and other specialized facilities ordinarily are intended to support university basic research to be funded by the National Science Foundation, the case for submersibles has clear interests in common with the Manned Undersea Science and Technology Office (MUS&T) of NOAA. That agency has goals for the development and use of submersibles and other subsurface facilities which include university research. It appears to be appropriate that NOAA MUS&T Program and NSF join in a coordinated effort directed toward the utilization of submersibles for academic research. It is therefore recommended that each agency support one or more submersible as a National Oceanographic Facility in 1973 and 1974 and further contribute to the "Charter Fund" for individual projects. Under the terms of the UNOLS Charter a Review Committee of individual experts would review and recommend university projects to be undertaken.

Proposed funding here for 1973 and tentative 1974 and subsequent years is:

| | 1973 | | | 1974 et seq. | | |
|---|-------|-----|------|--------------|-----|------|
| | ONR | NSF | NOAA | ONR | NSF | NOAA |
| Institutional Submersibles | \$0.5 | - | - | \$0.5 | - | - |
| Submersibles as National Oceanographic Facilities | - | 0.3 | - | - | 0.6 | 0.6 |
| Charter Fund | - | 0.1 | 0.1 | - | 0.1 | 0.1 |

- Submersibles should be utilized more in university research than at present, both on an institutional basis and as National Oceanographic Facilities (including charter funding). Total support of about \$1.3M in 1973 and \$1.9M in 1974 should be about evenly divided between ONR, NSF, and NOAA (MUS&T Office). The two latter agencies should join in supporting at least two submersibles and a submersible "charter fund" as UNOLS National Oceanographic Facilities.*

4. Bathythermograph Facilities

The matter of BT facility support was presented to the Advisory Council by the institutions at which they are located. Navy funding of long standing for these BT facilities is being terminated. Should such facilities be continued; if so, what role would they serve and how should they be supported? The Advisory Council itself acted as a Working Group on this matter. Information was obtained by means of a general questionnaire and by statements provided from personnel at the existing bathythermograph facilities at the Scripps and Woods Hole Institutions and at the Environmental Data Service of NOAA.

The general agreement derived from the questionnaires and statements was that there is little utilization today for a general BT facility as such but that such facilities are a segment of the larger national data problem. The Advisory Council considers that University bathythermograph facilities should not be designated as National Oceanographic Facilities; but that the data and services of the existing facilities (Scripps Institution and Woods Hole Oceanographic Institution) are national resources and that specific Federal support should be continued for those facilities for about two years beyond the current year. During this period bathythermograph facilities along with other data depositories should be integrated as fundamental parts of Woods Hole and Scripps. In the specific case of Scripps Institution, the Federal

support should also be used to reduce the current backlog of unprocessed bathythermograph data.

- The bathythermograph facilities at Scripps Institution and Woods Hole should be supported through 1974 at a total level of about \$100,000 after which time those activities should be consolidated into the general data system of the respective institution.*

5. Aircraft

The UNOLS Working Group for Aircraft Utilization has not completed its work. A full treatment of aircraft in university research will be included in the 1973 Annual Report. However, the UNOLS Advisory Council considers that aircraft must play a significant role in oceanographic research. Presently one aircraft is owned and operated within the community (a DC-3 at Scripps Institution). This has been funded in part, by NSF as a cooperative facility. Smaller charter aircraft have been well employed during the current year by Nova University, University of Wisconsin, Woods Hole and others. The National Center for Atmospheric Research at Boulder, Colorado has offered to explore cooperative arrangements. Pending future recommendations by the Working Group in this area, the Scripps Aircraft should be continued in support as an interim "National Oceanographic Facility" for about one-half of its operating time and at a 1973 funding level of about \$60,000. Looking ahead, tentative planning for university aircraft might include \$200,000 for 1974 and \$0.5 thereafter.

- The role of aircraft for university research has not been fully defined by UNOLS. Pending this, it is recommended that in 1973 support of the Scripps Institution aircraft be continued as an interim National Oceanographic Facility for approximately one-half of its available flight time at a funding level of about \$60,000.*

6. Technicians Pools

Support of shipboard technicians has been discussed in the section on ship operations and has been identified as a critical matter by many UNOLS members. Because technicians bridge a gap between ship operations and other activities, the role might be considered separately. The general **concept** of technicians should be analyzed during the coming year by a Working Group addressing such matters as specific roles, career patterns, training, technicians pools and their support.

Tied to shipboard operations, technician costs have been identified by a dollar value of about 5% of ship operating costs. This value, or about \$0.9K should be included in 1974 and subsequent funding. In 1973, pending better definition, about \$600,000 should be so assigned on a case by case basis. The following recommendation is repeated from an earlier section:

- The development of higher performance ship operations together with the use of shared equipment both within institutions and on an interinstitutional cooperative basis has accentuated the need for trained marine technicians funded separately. This concept should be established at major laboratories and separately funded. Pending further experience about \$0.9M per year should be allotted for this purpose.*

7. Shore Facilities

Under this category there are two concepts:

- . routine replacement and improvement of laboratory base facilities
- . new concepts of standardized depots for interinstitutional support

The development, replacement and improvement of ships must be accompanied by similar improvements to ship base facilities both to serve the particular needs of institutions and in a new sense to serve in cooperative support arrangements. The precise needs of the former are not as yet defined and the latter concept needs to be developed, although the planning by the University of Hawaii in this regard is most progressive.

- . *For the improvement and replacement of ship support facilities and for new concepts of shore depots \$0.5M in 1973 and \$1.0M subsequently should be planned pending a realistic assessment of needs.*

8. Other Specialized Facilities

The UNOLS Advisory Council is not prepared to identify and develop other areas of specialized facilities at this time. The UNOLS Advisory Council proposes that the need for specialized National Facilities is

a priority which should be investigated during the coming year with the assistance of the National Academy of Sciences Ocean Affairs Board in cooperation with the National Academy of Engineering Marine Board. ONR traditionally has supported the development and operation of specialized platforms and more recently NOAA has commenced similar development support. This should be continued in about equal amounts together with similar support by NSF at a total level of about 5-10% of ship facility support.

- . In identifying other specialized facilities involving the use of advanced technology in academic research the assistance of the National Academy of Sciences Ocean Affairs Board in cooperation with the National Academy of Engineering Marine Board should be solicited. Tentative funding of about 5 to 10% of total ship support should be planned for.*

APPENDIX I

TABLES OF STATISTICS

PROFILE OF FEDERAL FUNDED ACADEMIC RESEARCH FLEET

| OPERATOR | NAME | LENGTH FT. | OWNER | BUILT/CONV. | 1972 OPER. COST | 1972 DAYS AT SEA |
|---|----------------|------------|-----------|-------------|--------------------|---------------------|
| University of Alaska | ACONA | 85 | NAVY | 1961 | 635,864 | 200 |
| Scripps Institution | AGASSIZ | 150 | -- | 1944/1961 | 658,130 | 214 |
| | MELVILLE | 245 | NAVY | 1969 | 1,303,702 | 238 |
| | OCONOSTOTA | 100 | NAVY | 1944/1962 | 153,088 | 101 |
| | SCRIPPS | 95 | -- | 1965 | 213,075 | 227 |
| | T. WASHINGTON | 209 | NAVY | 1965 | 1,060,008 | 308 |
| | ALPHA HELIX | 133 | -- | 1966 | 600,000 | |
| University of Hawaii | KANA KEOKI | 156 | CHARTERED | 1967 | 895,787 | 303 |
| | TERITU | 90 | -- | 1953/1964 | 268,644 | 200 |
| Oregon State University | YAQUINA | 180 | -- | 1944/1964 | 681,699 | 284 |
| | CAYUSE | 80 | -- | 1968 | 226,960 | 190 |
| Univ. of Southern California | VELERO IV | 110 | -- | 1948 | 389,890 | 220 |
| Univ. of Washington | T. G. THOMPSON | 209 | NAVY | 1965 | 952,205 | 281 |
| | HOH | 65 | NAVY | 1943/1962 | 151,946 | 439 |
| | ONAR | 65 | NAVY | 1954/1963 | | |
| Stanford University | PROTEUS | 100 | -- | 1946/1969 | | |
| Lamont-Doherty | CONRAD | 209 | NAVY | 1962 | 869,400 | 333 |
| | VEMA | 202 | NAVY | 1923/1953 | 610,900 | 340 |
| Duke University | EASTWARD | 118 | -- | 1964 | 577,953 | 220 |
| Florida State University | TURSIOPS | 65 | NAVY | 1953/1955 | 95,118 | |
| Skidaway Institute | KIT JONES | 64 | NAVY | 1938/1958 | 100,322 | 200 |
| Johns Hopkins | R. WARFIELD | 106 | -- | 1967 | 249,500 | 210 |
| | MAURY | 65 | -- | 1950 | 69,754 | 120 |
| University of Miami | GILLIS | 209 | -- | 1962 | 851,573 | 318 |
| | ISELIN | 170 | -- | 1972 | 388,412 | 172 |
| | CALANUS | 64 | -- | 1970 | 91,840 | 223 |
| Nova | GULF STREAM | 55 | -- | 1963 | 54,590 | |
| University of Rhode Island | TRIDENT | 180 | -- | 1944/1962 | 774,069 | 301 |
| Texas A&M | ALAMINOS | 180 | -- | 1945/1963 | 644,749 | 245 |
| Woods Hole Oceanographic Institution | ATLANTIS II | 210 | -- | 1963 | 1,167,000 | 269 |
| | CHAIN | 213 | NAVY | 1944/1958 | 1,182,000 | 291 |
| | GOSNOLD | 99 | -- | 1944/1961 | 301,000 | |
| | KNORR | 245 | NAVY | 1970 | 1,040,000 | 271 |
| University of Michigan | INLAND SEAS | 114 | -- | 1943/1962 | 214,941 | 158 |
| | MYSIS | 50 | -- | 1963 | 65,221 | 166 |

Table 1

UNIVERSITY RESEARCH VESSELS (over 65-ft)

(Non-Block Funded)

| <u>Operator</u> | <u>Name</u> | <u>LOA</u> | <u>Year Built</u> | <u>Type</u> |
|-------------------------------------|---------------------|------------|-------------------|----------------|
| CCNY | Atlantic Twin | 90 | | Catamaran |
| Lamont | * { Sir Horace Lamb | 136 | 1942 | Ex-YMS |
| | * { Erline | 100 | 1965 | Ex-Crew Boat |
| Texas A&M | { Kasidah II | 110 | 1924 | Ex-Yacht |
| | { Orca | 98 | 1925 | Ex-CG Cutter |
| | { Leprechaun | 77 | | Ex-PT Boat |
| Univ. of Texas | Longhorn | 80 | 1972 | R/V |
| Humboldt State | Catalyst | 100 | 1922 | Ex-Buoy Tender |
| Virginia Inst. of Marine Science | Langley | 80 | (old) | Ex-Ferryboat |

(Funded from Navy Appropriations)

Table 2

UNIVERSITY RESEARCH VESSEL INVENTORY

65-ft Class (+ 10 ft.)

| Operator | Name | LOA | Type | Current Oper. Cost |
|---|-----------------|-----|--------------------|--------------------|
| Marine Biology Laboratory Woods Hole | VERRILL | 65 | R/V | \$355/day |
| S. E. Massachusetts Univ. | CORSAIR | 65 | Survey Boat | |
| Univ. Connecticut | T-441 | 65 | T-Boat | 10,000 (less crew) |
| Univ. Connecticut | UCONN | 65 | T-Boat | 6,000 (less crew) |
| New York Univ. | KYMA | 65 | T-Boat | 50,000 |
| Columbia Univ. | MANNING | 65 | T-Boat | |
| Adelphi Univ. | ZOSTERA II | 54 | Yacht | \$150/day |
| Long Island Univ. | LUCAYO | 56 | Yacht | |
| Bermuda Biological Sta. | PANULIRUS | 64 | R/V | 21,942 |
| Johns Hopkins Univ. | *MAURY | 65 | R/V | 69,700 |
| Univ. of Maryland | AQUARIUS | 65 | Crewboat | 40-50,000 |
| Virginia Institute | PATHFINDER | 55 | R/V | |
| Old Dominion | LIN WOOD | 65 | T-Boat | |
| | HOLTON | | | |
| Duke Univ. | BEVERIDGE | 55 | Trawler | |
| Skidaway Inst. | *KIT JONES | 65 | Tug | 100,300 |
| Florida Inst Tech | SEA HUNTER | 65 | Shrimper/ Yacht | |
| Nova University | *GULF STREAM | 55 | Yacht | 54,600 |
| Miami Univ. | *CALANUS | 63 | R/V | 91,100 |
| Fla. State Univ. System | SUSIO | 65 | Houseboat | |
| Florida State Univ. | *TURSIOPS | 65 | T-Boat | 95,100 |
| Lerner Labs | DAN BRAMAN | 73 | | |
| Dauphin Island Sea Lab -Ala | AQUARIUS | 65 | Army Lighter | |
| Gulf Coast Research Lab. | GULF RESEARCHER | 65 | T-Boat | |
| Texas A&M | LEPRACHAUN | 77 | P-T Boat | |
| Texas A&M | EXCELLENCE | 56 | Yacht | |
| Texas A&M | DUET | 62 | Yacht | |
| Univ. Wisconsin (Mil.) | NEESKAY | 65 | T-Boat | 41,000 |
| Univ. Buffalo | DAMBACH | 65 | T-Boat | 31,000 |
| Univ. Michigan | *MYSIS | 50 | R/V | 65,200 |
| Moss Landing Mar. Lab. | | 55 | R/V | |
| Univ. Washington | *HOH | 65 | Tug | 151,946 |
| Univ. Washington | *ONAR | 65 | T-Boat | |
| Univ. Washington | KESTRAL | 55 | Traw/Yacht | |

(*indicates those currently direct Federally funded)

PROFILE OF RESEARCH VESSEL SUPPORT

| Institution | 1971 Actual | 1972 Proposed | 1972 Actual | | | Total |
|---------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------|
| | | | NSF | ONR | Other | |
| Alaska | 241,700 | 276,214 | 132,900 | 36,600 | 50,560 | 220,060 |
| Scripps | 2,774,500 | 3,810,577 | 2,075,000 | 1,000,000 | 695,700 | 3,870,700 |
| Lamont | 1,296,200 | 1,480,300 | 797,734 | 695,912 | -0- | 1,493,646 |
| Duke | 440,000 | 577,953 | 434,900 | -0- | -0- | 434,900 |
| Florida State | 106,040 | 82,900 | 68,200 | -0- | 23,500 | 91,700 |
| Georgia | 130,158 | 127,652 | 102,900 | -0- | 17,400 | 120,300 |
| Hawaii | 1,215,300 | 1,184,236 | 639,700 | 258,100 | 286,300 | 1,184,100 |
| Johns Hopkins | 303,511 | 345,781 | 124,400 | 45,800 | 139,600 | 309,800 |
| Miami | 1,050,000 | 1,415,023 | 1,220,800 | 194,900 | 4,500 | 1,420,200 |
| Michigan | 309,061 | 280,162 | 250,000 | -0- | 30,200 | 280,200 |
| Nova | 42,150 | 54,590 | 18,200 | 28,600 | -0- | 46,800 |
| Oregon State | 814,900 | 929,513 | 510,700 | 252,500 | 141,000 | 904,200 |
| Rhode Island | 633,082 | 774,069 | 453,800 | 189,400 | -0- | 643,200 |
| Southern California | 298,800 | 389,890 | 315,700 | -0- | -0- | 315,700 |
| Stanford | 218,600 | 234,000 | 176,300 | -0- | -0- | 176,300 |
| Texas A&M | 563,170 | 644,749 | 488,200 | 79,000 | 78,900 | 646,100 |
| Washington | 1,002,600 | 1,115,131 | 731,000 | 252,642 | 33,300 | 1,016,942 |
| Woods Hole | 3,471,400 | 3,686,634 | 2,234,700 | 1,126,448 | 73,621 | 3,434,769 |
| TOTAL | 14,911,172 | 17,409,374 | 10,875,134 | 4,159,902 | 1,574,581 | 16,609,617 |

Table 4

PROJECTED
1972 AND 1973 UNOLS FUNDING
(millions of dollars)

| | 1972 | | | | 1973 | | | |
|-------------------------|-------|-----|-------|-------|--------|--------|-------|-------|
| | NSF | ONR | Other | Total | NSF | ONR | Other | Total |
| <u>Operations</u> | | | | | | | | |
| SHIP OPERATIONS SUPPORT | 10.7* | 4.3 | 1.5 | 16.5 | 11.4** | 4.7 | 1.5 | 17.6 |
| OTHER OPERATIONS | 1.2 | 1.5 | - | 2.7 | 0.9 | 1.5*** | - | 2.4 |
| <u>Acquisitions</u> | | | | | | | | |
| SHIP ACQUISITION | 2.8 | - | - | 2.8 | 2.8 | - | - | 2.8 |
| SHIP EQUIPMENT | 1.2 | - | - | 1.2 | 1.2 | - | - | 1.2 |
| OTHER FACILITIES | 0.7 | - | - | 0.7 | - | - | - | - |
| Total | 16.6 | 5.8 | 1.5 | 23.9 | 16.3 | 6.2 | 1.5 | 24.0 |

*Includes 2.3 IDOE Support

Table 5

**Includes 2.8 IDOE Support

***Includes Code 466 Special Platform Support

APPENDIX II

UNOLS CHARTER

UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Charter

Recognizing the need for improved coordinated use of Federally supported oceanographic facilities, the community of academic oceanographic institutions which operate those facilities, by virtue of this Charter, do hereby establish such a system.

1. Objectives

- (a) To create a mechanism for coordinated utilization of and planning for oceanographic facilities through an association of academic institutions in a national system whereby institutions can work together and with funding agencies to assist in the effective use, assessment and planning for oceanographic facilities.
- (b) To improve the level and stability of Federal support for academic oceanography, thereby continuing and enhancing the excellence of this nation's oceanographic program.

2. Organization

- (a) The purpose of the organization is to provide for community-wide coordination and review of the utilization of available facilities, opportunity for access to those facilities, assessment of the current match of facilities to the needs of academic oceanographic programs and appropriate recommendations of priorities for replacing, modifying or improving the numbers and mix of facilities for the community of users.
- (b) The organization shall be named the University-National Oceanographic Laboratory System (UNOLS).
- (c) The organization shall be comprised of the UNOLS Membership, the Advisory Council, a UNOLS Office, and other sub-bodies which may be added.
- (d) Membership in UNOLS is open to academic institutions operating Federally funded significant seagoing oceanographic facilities. This generally shall be defined as

those institutions operating Federal Agency block-funded ships.¹ Membership shall be on an institutional basis. Each member institution shall designate a representative to UNOLS who normally will speak and act for his institution. In his absence he will be represented by an authorized alternate. Membership shall become effective upon application by an institution and a majority concurrence of the existing membership. Membership may be voluntarily terminated by any member on written notice to the UNOLS Chairman, and involuntarily terminated by a two-thirds vote of the membership when that member is no longer considered qualified.

- (e) A Chairman and Vice Chairman of UNOLS will be elected by simple majority from the designated representatives of the membership. Each will serve for a term of one year and will not serve more than three successive terms. The Vice Chairman will serve in the absence of the Chairman. If neither the Chairman nor Vice Chairman are present at a meeting, the members present shall elect an Acting Chairman for the duration of the meeting.

3. UNOLS Advisory Council

- (a) The purpose of the Advisory Council will be to monitor the activities of the System giving attention to the effective use of existing oceanographic facilities and to the performance of the member institutions in providing access to Federally supported University facilities for scientists from other institutions, especially from non-ship operating institutions. It will evaluate the need for replacement and additional facilities and assess whether some facilities are outmoded or in excess of current needs. In consideration of research

¹As of July 1, 1971, such institutions considered eligible for Charter membership are:

| | |
|---------------------------------------|--------------------------------------|
| University of Alaska | The University of Michigan |
| University of California, San Diego | Nova University |
| Lamont-Doherty Geological Observatory | Oregon State University |
| Duke Marine Laboratory | University of Rhode Island |
| Florida State University | University of Southern California |
| Skidaway Institute of Oceanography | Stanford University |
| University of Hawaii | Texas A&M University |
| The Johns Hopkins University | University of Washington |
| University of Miami | Woods Hole Oceanographic Institution |

needs recognized by the National Academy of Sciences, Federal agency advisory bodies, other groups of scientists and the UNOLS organization itself, the UNOLS Advisory Council will recommend to the funding agency and UNOLS the consideration of specialized facilities or new concepts in facilities. It will also make recommendations as to the balance between facilities and funded research programs. It will assist the funding agencies in efforts to obtain adequate and uniform financial and cruise reporting of ship operations.

- (b) The Advisory Council shall be comprised of seven members, three of whom will be derived from non-member institutions and four from member institutions. Committee members shall be nominated at the open session of the annual UNOLS meeting by any attendee at the meeting, and elected by UNOLS members in executive session giving due consideration to balance with respect to geographic distribution, scientific discipline and institutional size. No more than one member will serve from any one institution. Members will be elected for three-year terms with successive yearly rotations of two members the first year, two the second year and three the third. Each member will serve one term and will be eligible for reappointment only after three years have elapsed from the expiration of the last term served. Vacancies occurring during the year shall be filled at the next open meeting.
- (c) The Chairman of the Advisory Council shall be elected or re-elected annually from and by its members present or by proxy.

4. UNOLS Office

- (a) A UNOLS Office will be established initially at an existing member laboratory.
- (b) The purpose of the UNOLS Office will be to provide secretariat services for UNOLS and the Advisory Council. It will serve as the focal point for UNOLS correspondence and for central files on facilities, schedules, user requirements and related information.
- (c) The Executive Secretary of UNOLS will head the UNOLS Office.

- (d) The cost of operating the UNOLS Office will be Federally funded and should be prorated among the funding agencies in accordance with their participation in contract and grant programs with the institutions, or by such other arrangements as may be agreed to.
- (e) Contractual obligations between the institution hosting the UNOLS Office and the funding agencies will be the responsibility of those organizations.

5. Other Sub-bodies

- (a) Sub-bodies, usually ad hoc in nature, may be established or added by the membership or the Advisory Council in order to achieve particular purposes pursuant to the goals of the organization.

6. Coordination of Facilities

- (a) An underlying principle of the UNOLS is that control of facility operations and scheduling remain the responsibility of the operating institution with the understanding that reasonable efforts will be made to provide services to the scheduled users.
- (b) Coordination of ship schedules will be in accordance with procedures set forth in an Annex to this Charter. In general, UNOLS ship schedule meetings for broad operating areas will be held annually to coordinate tentative ship schedules developed by members. The objective of the meetings is to compare the various schedules, to recommend modification of them as desirable in order to achieve more effective use of ships, and to incorporate as many as possible of the requirements that could not be integrated in earlier schedules.
- (c) Coordination of other facilities will develop as the need becomes apparent. As oceanography has become more mature and sophisticated, requirements for facilities have become more varied and, in particular, specialized facilities, e.g., deep sea drilling ship, submersible and tender, aircraft, communication stations, automatic data processing and other highly specialized equipment (both shipboard and shore). Some of these facilities are so expensive that a single research

project or institution cannot justify their acquisition, and often the facilities should be available to the academic oceanographic community as a whole. Requirements for specialized facilities are often identified by scientists themselves. It is likely that in the course of coordinating meetings or meetings of the UNOLS Advisory Council, these specialized requirements and ideas for new facilities will be aired and catalyzed. Recommendations so generated by the scientific community can then be made to the funding agencies via the Advisory Council. Likewise, the availability of specialized facilities can be communicated to the academic oceanographic community through the efforts of the UNOLS.

7. Meetings

- (a) The Chairman of UNOLS, in accordance with the following, shall be responsible for the convening of all meetings of UNOLS and the Agenda:
- (1) At least once a year UNOLS members will convene to coordinate their facility schedules. Schedule coordination may involve more than one meeting each based on, but not limited to, a broad operating area and spaced sufficiently in time to permit attendance at all if desired. Other scientists and laboratories not members of UNOLS but who have indicated their requirements for work also may attend.
 - (2) In addition to the scheduling meetings, the UNOLS membership and Advisory Council will hold a joint annual open session which may be attended by any interested party. The open session will provide an input to UNOLS assessment, planning and organizational activities by the community at large.
 - (3) Notification of the UNOLS annual meeting and schedule coordinating meetings will be given broad distribution at least thirty days in advance.
 - (4) Special meetings of UNOLS may be called at the discretion of the UNOLS Chairman on the request of three or more members.

- (b) The Advisory Council will meet at least four times per year, in addition to or in conjunction with the meetings listed above, in observance of the purposes of the Council. The Advisory Council will attend all UNOLS meetings convened for the purpose of coordinating schedules to observe and review the results of such scheduling. Meetings of the Advisory Council shall be at the call of the Council Chairman.
- (c) Minutes shall be maintained of the proceedings of all UNOLS and Advisory Council meetings and shall be distributed to all UNOLS and Council members and participants.

8. Voting

- (a) Voting at all UNOLS meetings and on matters submitted by the Chairman through correspondence shall be on the basis of member institutions, each being entitled to one vote.
- (b) All recommendations and decisions except as herein set forth shall be on the basis of a simple majority of members present except that significant matters shall be decided by an absolute majority of all members. A significant matter shall be determined by the Chairman, any member, or any item not on the circulated agenda.
- (c) Voting will normally be by voice, but on request of any member present, by secret ballot.

9. Reports

- (a) Reports of the UNOLS schedule coordination meetings and annual meeting shall be prepared and distributed to funding agencies, members and participants.
- (b) The Advisory Council shall make an annual report to the funding agencies via UNOLS and shall include such matters pursuant to its Charter as:
 - (1) Review and evaluation of the effectiveness of utilization and operation of Federally supported oceanographic facilities including the providing of access to facilities to all qualified scientists.

- (2) The need for replacement and additional facilities and their assignment, and an assessment of out-moded or excess facilities and their disposition.
 - (3) The consideration of specialized facilities or new concepts in facilities.
 - (4) Recommendations as to the balance between facilities and funded research programs.
- (c) Minority Reports may be submitted by UNOLS or the Advisory Council but must be signed by at least two respective members.

10. Authority and Powers

- (a) Recommendations and decisions by UNOLS or any sub-organization thereof are not binding on any member or interested participant thereof.
- (b) No legal, fiscal or contractual authority is intended, granted, or implied under the terms of this Charter.

11. Implementation, Amendments and Termination

- (a) This Charter shall become effective when approved and signed by the heads of at least ten academic institutions or laboratories qualified for membership or their delegated representatives.
- (b) This Charter may be amended or Operative Annexes added if and when approved by two-thirds vote of the members, the matter having been submitted to the membership at least thirty days in advance.
- (c) This Charter shall remain in effect for a period of three years after which time it shall be dissolved unless modified or re-adopted by vote of the membership.

Approved and adopted;
Palisades, New York;
September 22, 1971

ANNEX I

to the

Charter

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

A PROCEDURE FOR COORDINATING SHIP SCHEDULES

1. An important facet of the UNOLS activities is the provision of a mechanism to coordinate the use of available facilities. The coordination of ship schedules is the most obvious area where immediate benefit might be gained. An underlying principle of the UNOLS is that control of facility operations and scheduling remain the responsibility of the operating institution with the understanding that reasonable efforts will be made to provide services to scheduled users. It will be a responsibility of the UNOLS Advisory Council to assess and report on the effectiveness of facility utilization. Within this framework, the following procedure shall apply for the coordination of ship schedules.
2. Three operating areas, each having a separate schedule coordination meeting, are designated to simplify the procedures. These are for the convenience of reducing the number of ship schedules to consider at one time, and in no way are they meant to restrict the area of operation of any ship, institution, scientist or group. In many cases, representatives of member institutions or individual scientists will attend more than one of the scheduling meetings. The operating areas are defined as:
 - (a) OPEN OCEAN - 500 miles or more offshore or when the ship makes calls at non-continental U. S. ports (including Hawaii and other U. S. oceanic islands);
 - (b) EAST COAST - less than 500 miles off the east coast of the U. S. , including the Gulf of Mexico and the Great Lakes; in general, when ships operate from U. S. ports;
 - (c) WEST COAST - less than 500 miles off the west coast of the U. S. , including the Gulf of Alaska (but not Hawaii); in general, when ships operate from U. S. ports.
3. As an initial step each laboratory responsible for the operation of one or more ships will develop a tentative schedule for its ships. This

tentative schedule should incorporate as broad an input as possible, both from within and without the operating institution. Further, the schedule at this stage must be considered as tentative; it is recognized that factors such as funding, logistics, weather, geography and research programs will provide many constraints. This tentative schedule should be formulated in January and February and should include operations proposed for the next calendar year and for as much of the subsequent year as possible. A copy of this tentative schedule should be forwarded to the UNOLS Office no later than 1 March.

4. The UNOLS Office will collate the various tentative schedules and distribute these to members of UNOLS and widely to other interested institutions and scientists having Federally funded oceanographic research programs. After these schedules have had appropriate distribution and sufficient time has elapsed for interested parties to submit to the UNOLS Office requests for time on specific cruises, a meeting of representatives of UNOLS members will be convened by the UNOLS Chairman for the purpose of coordinating ship schedules and accommodating as many additional requests as possible. One meeting will be held for each of the operating areas mentioned above. In general, one representative from each member institution will attend, with a provision for adequate direct communications to his home laboratory. Other scientists and laboratories not members of UNOLS but who have indicated their requirements for work at sea in the area under discussion may also attend and discuss their interests at the meeting if they so elect. This meeting should be convened no later than mid-May. The objective of the meeting is to compare the various schedules, to modify them as desirable in order to achieve more effective use of ships, and to incorporate as many as possible of the requirements that could not be integrated in earlier schedules.
5. To the extent that all requirements will not be accommodated. Records of these carry-over requirements will be kept by the UNOLS Office and communicated to the ship-operating institutions for consideration during the formulation of tentative schedules the following year and, if necessary, to the subsequent ship scheduling conference.

Subsequent to the coordination meeting, each operating laboratory will develop a ship schedule for the following year. (Again, it must be recognized that this schedule will have to be revised continually to accommodate vagaries in ship's operating problems as well as changes in scientific programs. These changes will be the responsibility of the operating laboratory, but will be

made in context with the previously agreed upon schedule). The planned schedules should be forwarded to the UNOLS Office by 1 July. The UNOLS Office will furnish funding agencies with copies; the agencies can then review all schedules prior to consideration of funding for the next year. These schedules, along with the research programs, should be the basis for the laboratory proposals to the funding agencies. Further, the UNOLS Office will circulate the final schedules to all interested parties. Schedule revisions will be submitted promptly to the UNOLS Office, which will develop an appropriate calendar for revision and distribution of fleet schedules based on the advice of the UNOLS Advisory Council, membership and the principal funding agencies.

6. The procedures set forth in this Annex shall terminate at the end of one year at which time they shall be reviewed, modified or readopted as necessary.

Approved and adopted at the UNOLS organization meeting on September 22, 1971.

ANNEX II TO UNOLS CHARTER

National Oceanographic Facilities

1. In addition to regular institutional UNOLS facilities there may be identified National Oceanographic Facilities, defined as those facilities, specialized and otherwise, that are made available for the use of qualified scientists from any institution and the use of which shall be determined by a UNOLS Review Committee.
2. A research vessel or other research facility may be designated as a National Oceanographic Facility upon the approval of the UNOLS Membership after review by the UNOLS Advisory Council, with the concurrence of the owner and operator of the facility and with reasonable assurance of support. National Oceanographic Facilities may be multi-or special purpose facilities and may be designated for the entire annual operating period or any significant period thereof.
3. The purpose of National Oceanographic Facilities is:
 - To provide oceanographic vessel and other facility support to scientists who do not operate or have available the required facilities.
 - To provide for the support and use in academic research of specialized and unique facilities.
4. A Review Committee for each facility shall be established for the purpose of considering proposals for facility use and for recommending programs to be scheduled. Members of the Committee shall be nominated by the UNOLS Advisory Council and shall be appointed by UNOLS. Members shall serve for terms of three years on a rotating basis. Each institution operating a National Oceanographic Facility may designate an ex-officio member in addition to those members appointed by UNOLS. The Review Committee shall elect its own Chairman from among the members appointed by UNOLS.

5. In recommending the allocation of facility time the Review Committee shall act primarily on the scientific merit of the proposed research and its compatibility with the individual facility.
6. Operational scheduling of the facility will be the function of the operating institution. The time frame for scheduling generally shall be in accordance with Annex I of the UNOLS Charter.
7. Information and announcements advertising the availability of a National Oceanographic Facility will be a joint function of the operating institution and the UNOLS Office.
8. Receipt, acknowledgement, collating and structuring of requests for facility use will be the function of the operating institution in consultation with the UNOLS Office.
9. An annual report to UNOLS on the use of each National Oceanographic Facility will be prepared by the appropriate operating institution in cooperation with the Review Committee and UNOLS Office.
10. Requests for funding the operation of the facility will be the responsibility of the operating institution.

Approved and adopted at the UNOLS Meeting at College Station, Texas, on May 5, 1972.

APPENDIX III

REPORTS OF UNOLS MEETINGS

UNOLS 1971 ANNUAL MEETING

UNOLS 1972 ANNUAL MEETING

Highlights of the UNOLS Meeting, November 16-17, 1971
Scripps Institution of Oceanography
La Jolla, California

- i. The meeting was attended by sixty-eight participants representing thirty-six academic institutions and seven Federal agencies.
- ii. The UNOLS Advisory Council was selected from a list of forty nominees. Those selected, together with their terms of office, were:

John V. Byrne, Oregon State Univ., 3-years
John P. Craven, Univ. Hawaii, 3-years
Charles L. Drake, Dartmouth College, 3-years
David W. Menzel, Skidaway Institute, 2-years
Robert A. Ragotzkie, Univ. Wisconsin, 1-year
Henry M. Stommel, M. I. T., 2-years
Warren S. Wooster, Scripps Institution, 1-year

The newly formed Advisory Council agreed to hold its first meeting on December 6th at San Francisco.

- iii. In keeping with the guidelines set forth at the establishment of UNOLS, the initial focus and principal subject dealt with at the meeting was research ships. Specialized facilities, however, were included within the scope of the proceedings.
- iv. Ship schedules for 1972 of the twenty-seven UNOLS vessels over 65 feet were displayed together and ship operators described in detail the scientific programs and cruises for each of the ships. This probably marks the first time that such an effort has been mounted and had the following results:
 - information and liaison was established between ship programs having areas of common interest.
 - two research projects needing ship time were accommodated "on the floor". Information on other potential ship time was made available to investigators.
- v. Considerable discussion was generated amongst the participants as to the precise role of UNOLS in coordinating research ship schedules. Alternatives ranged from an information service only to mandatory blocks of time assigned to and for UNOLS central action. A decision was deferred pending identification and analysis of the total real needs for ship time by type and area. This to be accomplished by the UNOLS Office in the form of questionnaires and fact finding.

vi. It was generally agreed that information on the larger "UNOLS vessels" (over 65 feet) was developing but a real need existed for information on coastal-type vessels 65 feet and under. Presently only about five such craft have direct Federal support although many others are indirectly supported from Federal funds or Sea Grant supported. It was decided that information on these kind would be developed on a regional basis possibly using regional organizations.

vii. A subject which aroused common interest was the capability of the university research fleet and its future. Concern was expressed over two developing situations:

- new research vessel construction, although urgently needed, might result in a reduction in the total numbers of ships.
- the developing broader base of users for the existing, or even reduced, fleet size would have the ironic effect of diminishing the available ship time per individual investigator.

It was agreed that this should be a priority matter for Advisory Council attention.

viii. Additional discussions including participation by Federal Agency representatives indicated that UNOLS is being looked to by the Federal Government for:

- the establishment of criteria for effective ship utilization.
- the setting of priorities in the allocation of Federal shipbuilding and operating funds.

This role will fall chiefly to the Advisory Council.

ix. A number of institutions present singled out as an important need a coastal research vessel of which blocks of time could be made available to their institutions. Such a vessel it was envisioned should be from 100-120' long and accommodate standardized modules.

x. Regarding specialized facilities other than a coastal research vessel, the meeting identified the following areas for early attention and recommendations by the Advisory Council:

- Aircraft
- Radio Stations
- Bathythermograph facilities
- Technicians pools
- Submersibles
- Stable Platforms
- Standardized depots and bases

RESOLUTIONS: UNOLS Meeting, 16-17 November 1971

1. Noting that funding for new research vessels may result in reducing the total capability of the Nation's academic research fleet in terms of numbers of ships and adequate operating funds, and Further Noting that the UNOLS concept through the development of a broader range of users may have the effect of increasing the demands on an already overtaxed ship operating schedule, Urges that priority attention be given to maintaining and improving the existing capability of the UNOLS fleet.

2. Considering the goals and objectives of UNOLS and the need for a wide range and balance of expert advisory bodies, and Recognizing the efforts and common interests of the Research Vessel Operators' Council (RVOC), Recommends that RVOC become a sub-body of the UNOLS organization for a trial period of one year and at the end of which time the arrangement shall be reviewed and renewed as appropriate, and Invites the agreement by RVOC to the foregoing and to participation by RVOC within the framework of UNOLS.

3. Complying with the UNOLS charter concerning the composition and selection of the UNOLS Advisory Council, and Considering a list of nominees made in open session, Elects the following individuals to the UNOLS Advisory Council for the terms indicated:

John V. Byrne, Oregon State Univ., 3-years
John P. Craven, Univ. Hawaii, 3-years
Charles L. Drake, Dartmouth College, 3-years
David W. Menzel, Skidaway Institute, 2-years
Robert A. Ragotzkie, Univ. Wisconsin, 1-year
Henry M. Stommel, M. I. T., 2-years
Warren S. Wooster, Scripps Institution, 1-year

4. Recognizing that consideration of specialized facilities is a function of the UNOLS Advisory Council under the terms of its charter, and Having identified the following specialized facilities which may be needed in the national interests, viz: coastal research ships, aircraft, radio stations, bathythermograph facilities, technicians pools, submersibles, stable platforms and standardized bases and depots, Calls upon the Advisory Council to give early attention to these specialized facilities.

5/9/72

Summary Report

SECOND ANNUAL UNOLS MEETING, MAY 3-5, 1972

College Station, Texas

1. The open meeting was attended by about 70 persons representing operating and research institutions and Federal agencies.
2. Reports on activities of the UNOLS Advisory Council, Working Group on Submersibles, Federal Funding Support, Foreign Clearances, Freedom of Academic Research, Coastal Zone Research Vessels and research ship construction were presented and discussed.
3. Research ship operating schedules were reviewed along with scheduling procedures and time availability by operating institutions.
4. UNOLS established a category of research facility to be designated "National Oceanographic Facility" and defined as a facility, specialized and otherwise which shall be made available for the use of qualified scientists who do not operate or have available the required facilities. A new Annex II to the UNOLS Charter was adopted which establishes the framework for National Oceanographic Facilities. A copy of the new Annex II is attached. The principal difference between the new Annex and the earlier proposed version is that a separate Review Committee is to serve for each facility.
5. To implement the new concept of National Oceanographic Facilities, UNOLS proposed that the R/V EASTWARD and the Research Submersible ALVIN be so designated. In the case of ALVIN a significant fraction (up to 50%) of operating use would be so assigned. UNOLS considered the case for R/V ALPHA HELIX as a National Oceanographic Facility and deferred action pending further examination of the role of ALPHA HELIX as an oceanographic facility.
6. UNOLS will explore the possibility of setting up a small working group to assist the State Department Coordinator for Ocean Affairs in developing uniform procedures and in expediting clearances for conducting research in foreign waters.
7. A comprehensive report of the meeting including minutes of the sessions will be distributed in the near future.

ANNEX II TO UNOLS CHARTER

National Oceanographic Facilities

1. In addition to regular institutional UNOLS facilities there may be identified National Oceanographic Facilities, defined as those facilities, specialized and otherwise, that are made available for the use of qualified scientists from any institution and the use of which shall be determined by a UNOLS Review Committee.
2. A research vessel or other research facility may be designated as a National Oceanographic Facility upon the approval of the UNOLS Membership after review by the UNOLS Advisory Council, with the concurrence of the owner and operator of the facility and with reasonable assurance of support. National Oceanographic Facilities may be multi-or special purpose facilities and may be designated for the entire annual operating period or any significant period thereof.
3. The purpose of National Oceanographic Facilities is:
 - To provide oceanographic vessel and other facility support to scientists who do not operate or have available the required facilities.
 - To provide for the support and use in academic research of specialized and unique facilities.
4. A Review Committee for each facility shall be established for the purpose of considering proposals for facility use and for recommending programs to be scheduled. Members of the Committee shall be nominated by the UNOLS Advisory Council and shall be appointed by UNOLS. Members shall serve for terms of three years on a rotating basis. Each institution operating a National Oceanographic Facility may designate an ex-officio member in addition to those members appointed by UNOLS. The Review Committee shall elect its own Chairman from among the members appointed by UNOLS.

5. In recommending the allocation of facility time the Review Committee shall act primarily on the scientific merit of the proposed research and its compatibility with the individual facility.
6. Operational scheduling of the facility will be the function of the operating institution. The time frame for scheduling generally shall be in accordance with Annex I of the UNOLS Charter.
7. Information and announcements advertising the availability of a National Oceanographic Facility will be a joint function of the operating institution and the UNOLS Office.
8. Receipt, acknowledgement, collating and structuring of requests for facility use will be the function of the operating institution in consultation with the UNOLS Office.
9. An annual report to UNOLS on the use of each National Oceanographic Facility will be prepared by the appropriate operating institution in cooperation with the Review Committee and UNOLS Office.
10. Requests for funding the operation of the facility will be the responsibility of the operating institution.

Approved and adopted at the UNOLS Meeting at College Station, Texas, on May 5, 1972.

APPENDIX IV

REPORT OF WORKING GROUP FOR UNIVERSITY

SUBMERSIBLE

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

An association of Institutions
for the coordination and support
of university oceanographic facilities

April 1, 1972

REPORT OF THE WORKING GROUP FOR A UNIVERSITY SUBMERSIBLE FACILITY

1. Background

Formation of the Working Group was directed by the UNOLS Advisory Council in response to the proceedings of the First UNOLS Meeting at LaJolla, California, November 1971. At that meeting, submersibles, along with several other specialized facilities were identified for early attention. The charge of the Working Group for a University Submersible Facility was to develop the role for submersibles for use in university research. In seeking members the guidelines were not so much exponents of submersibles but researchers themselves in disciplines where submersibles have or might prove an essential facility.

2. Members

| | |
|---------------------------------------|-----------------------------------|
| Robert D. Ballard, W.H.O.I. | Dr. Ruth Turner, Harvard Univ. |
| Dr. A. Conrad Neumann, Univ. of Miami | Dr. Adrian Richards, Lehigh Univ. |
| Dr. Hugh H. DeWitt, Univ. of Maine | Dr. George D. Grice, NSF |

R.P. Dinsmore, Executive Secretary of UNOLS, participated as secretary of the Working Group.

3. Work of the Group

The Working Group met once on January 19, 1972, at the National Academy of Science Building, Washington, D.C. The remainder of its work was conducted by correspondence. The Working Group did consider its charge was neither to document nor justify the many effective uses of submersibles in academic research. This has been demonstrated by the numerous research efforts reviewed by the Working Group and cited in part, by the list of references compiled and appended to this report. The Working Group viewed its role to develop and propose institutional arrangements by which submersibles might be brought to use in university research.

4. Conclusions

The Working Group concluded that submersibles were an essential part of university research facilities and that both deep and coastal submersibles should be Federally funded and made available to researchers as "National Cooperative Facilities". Succinct recommendations by the Working Group are attached.

5. Attachments

- APPENDIX I - Recommendations
- APPENDIX II - Status of Deep Submersibles
- APPENDIX III - List of References (separate distribution - request only)

RECOMMENDATIONS BY THE UNOLS
WORKING GROUP FOR A
UNIVERSITY SUBMERSIBLE FACILITY

Introduction:

A crisis presently exists in the funding of deep-diving submersibles used for university research! A university subcontract partially supporting the DEEP QUEST operations on the west coast expires at the end of 1972, and the probability of future funding is bleak. Without funding in 1973 the DEEP QUEST may be laid up. The future of the DEEP STAR 2000 on the east coast, while not presently operated by the university community, is uncertain because of the lack of funds. The ALVIN, also on the east coast, urgently requires continuity of funding; and block funding would greatly help make available submersible time to both W. H. O. I. and non-Woods Hole Scientists and engineers requiring her services for on-going projects. In the past few years many well-known submersibles (ALUMINAUT, BEN FRANKLIN, DEEP STAR 4000) have been laid up. The use of the few remaining deep-diving submersibles in the United States must not be lost to university investigators.

Research associated with submersibles is in its infancy. Submersibles and the research which they support are as important as that performed from surface vessels, and submersibles are therefore as important a national facility as surface vessels.

Coordination and support of an ability to perform scientific and engineering research underwater using submersibles is a logical function of UNOLS. Submersibles, like ships, should be available to qualified researchers and their students on a competitive basis without regard to source of financial support or affiliation with a submersible-owning institution.

It is therefore recommended that:

1. There should be developed, beginning now, for university research use a minimum national facility which should include two submersibles on the Atlantic and two on the Pacific, to provide a shallow-water capability (< ca. 1000 ft) and a deep-water capability (> ca. 1000 ft) in each area. It is recognized that the Gulf of Mexico, the Great Lakes, and the waters of Hawaii and Alaska shall be included insofar as is practicable. Vehicles with the required deep-water capabilities which are presently fully operational are, on the East Coast, ALVIN, and on the West Coast, DEEP QUEST, SEA CLIFF, TURTLE and TRIESTE.

Submersible Recommendations (Cont'd)

Vehicles with shallow water capabilities include SEA LINK, the NEKTONS, the PERRY BOATS and DEEP STAR 2000.

It is important to recognize that the above submersibles have differing operational capabilities.

2. A significant portion (not less than one-third) of the total operational time of each vessel (or vessels) so identified (together with their support facilities) be made available to the entire oceanographic community as a national cooperative facility.

3. In addition to designated national cooperative facilities, a fund should be allocated to provide submersible support through lease, charter or other short-term arrangements that because of special needs cannot otherwise be accommodated.

4. A review committee be established to administer the allotment of time and funds which have been committed for national cooperative facilities and to review proposals for research to be carried out on the cooperative vessels or by facility funds allocated.

The committee will:

- a) be appointed by UNOLS in consultation with scientists and engineers having research experience with submersibles.
- b) be comprised of six members in addition to an ex-officio member from the operating institution (or one each from each operating institution).
- c) be comprised of not more than one member from any institution
- d) represent as many interests and disciplines within the marine sciences and engineering community as is practicable.

5. The review committee should review proposals submitted to Federal funding agencies which require submersible use within the UNOLS program to insure that the submersible will play a unique and valuable role in the proposed research and that an individual's needs can best be met by this technology. Proposals may also be submitted directly to the review committee if the research requires no separate support from other agencies. If the proposals are approved by the committee and the Federal funding agencies, UNOLS submersible time will be allocated for the research.

Submersible Recommendations (Cont'd)

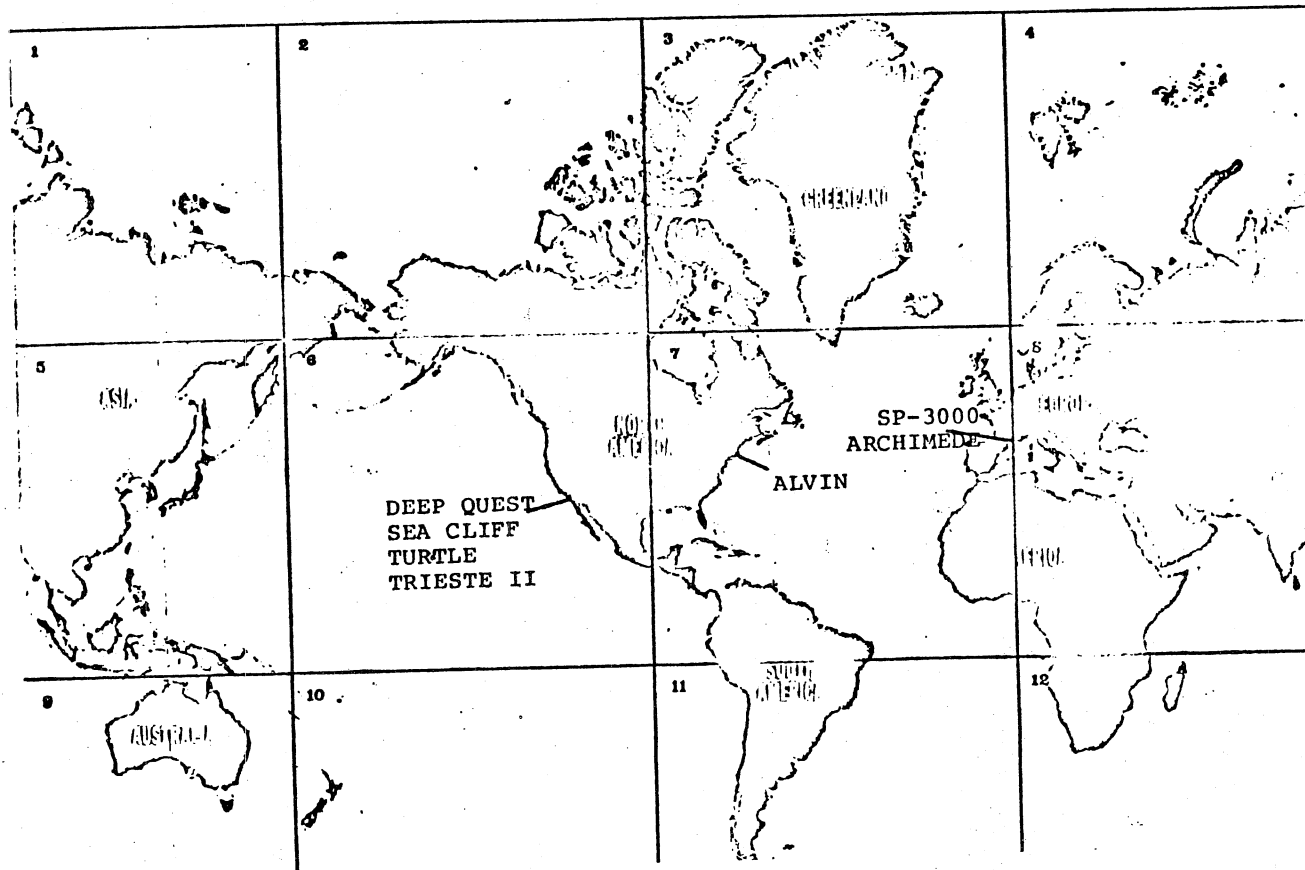
6. The committee should maintain a reasonable balance between scientific and engineering disciplines, between scientists and engineers inside and outside the operating institution, and between geographic areas.
7. The review committee, in its time allotment and scheduling activities, should carefully consider the special needs of certain research efforts and should make recommendations for using the submersible(s) in the most efficient manner possible.
8. Funds granted in support of the National Cooperative UNOLS Program should cover not only "basic" support costs, but also provide for common facilities presently provided neither by the user nor the submersible operator (e. g. basic environmental sensors, cameras, etc.) and for expenses uniquely associated with the at-sea operations (e. g. travel, communications and shipping).

STATUS OF DEEP SUBMERSIBLES
(in excess of 1000')

| NAME | COUNTRY | OPERATOR | DEPTH RANGE | STATUS |
|----------------------|------------------|-------------------------------|-----------------------------|--------------------------|
| ALUMINAUT | USA | REYNOLDS INTERNATIONAL | 9,000' | No longer operational |
| ALVIN | USA | WOODS HOLE OCEANOGRAPHIC | 6,000' (72) 12,000' (73) | Operational |
| ARCHIMEDE | FRANCE | FRENCH NAVY | 36,000' | Operational |
| AUGUSTE PICCARD | USA/ CANADA | HYCO | 2,500' | Not operational |
| BEN FRANKLIN | USA/ CANADA | HYCO | 2,000' | Not operational |
| DEEP QUEST | USA | LOCKHEED | 8,700' | Operational |
| DEEP STAR 2000 | USA | WESTINGHOUSE | 2,000' | No longer operational |
| DEEP STAR 4000 | USA | WESTINGHOUSE | 4,000' | No longer operational |
| BEAVER | USA | NO. AMERICAN ROCKWELL | 2,000' | No longer operational |
| DOWB | USA | GENERAL MOTORS | 6,500' | No longer operational |
| DSRV-1 | USA | U.S. NAVY | 3,500' | Operational |
| DSRV-2 | USA | U.S. NAVY | 5,000' | Under final construction |
| PISCES-1 | USA/ CANADA | HYCO | 1,800' | No longer operational |
| PISCES-2 | GREAT BRITAIN | VICKERS | 3,000' | Operational |
| PISCES-3 | USA/ CANADA | HYCO | 3,000' | Operational |
| PISCES-4 | USA/ CANADA | HYCO | 6,500' | Under final construction |
| STAR III | USA | SCRIPPS INST. OCEANOGRAPHY | 2,000' | Not operational |
| TRIESTE II | USA | U.S. NAVY | 16,000' | Operational |
| SDL-1 | CANADA | CANADIAN NAVY | 2,000' | Operational |
| SEA CLIFF/ TURTLE | USA | U.S. NAVY | 6,500' | Operational |
| SP-3000 | FRANCE | CNEXO | 10,000' | Operational |
| ARGYRONETE | FRANCE | CNEXO | 3,000' | Not operational |
| GA-200 | USSR | INST. OF OCEANOGRAPHY | 6,600' | Unknown |
| JOHNSON- SEALINK | USA | SMITHSONIAN | 2,000' | Operational |

CHARACTERISTICS OF OPERATIONAL SUBMERSIBLES WITH DEPTH RANGES OVER 6,000'

| SUBMERSIBLE | COUNTRY | DEPTH RANGE | SPEED (max.) | CREW | ENDURANCE | LENGTH/WT. | PAYLOAD FOR SCIENCE | SURFACE SUPPORT |
|----------------------|---------|-------------|--------------|------|-----------|-----------------------|-------------------------------|---------------------------------|
| ALVIN | USA | 6,000'(72) | 3 kts. | 3 | 10 hrs. | 22' / 32,000 lbs. | 500 lbs.(72) 1000 lbs.(73) | R/V LULU or R/V KNORR |
| ARCHIMEDE | FRANCE | 36,000' | 2 kts. | 3 | 12 hrs. | 69' / 120,000 lbs. | 4000 lbs. | Tow ship |
| DEEP QUEST | USA | 8,700' | 5 kts. | 4 | 12 hrs. | 40' / 112,000 lbs. | 3400 lbs. | R/V TRANSQUEST |
| TRIESTE II | USA | 16,000' | 2 kts. | 3 | 8 hrs. | 67' / 100,000 lbs. | 20,000 lbs. | Tow ship |
| SEA CLIFF/ TURTLE | USA | 6,500' | 5 kts. | 3 | 8 hrs. | 26' / 43,000 lbs. | 400 lbs. | Conventional ship with crane |
| SP-3000 | FRANCE | 10,000' | 3 kts. | 3 | 8 hrs. | 19' / 16,000 lbs. | 100 lbs. | Conventional ship with crane |



APPENDIX V

REPORT OF WORKING GROUP FOR COASTAL
ZONE RESEARCH

April 12, 1972

REPORT OF UNOLS WORKING GROUP
ON
COASTAL ZONE RESEARCH VESSELS

1. Purpose of Report

The purpose of this report is to inform the UNOLS Members and Advisory Council of the efforts and recommendations of the Working Group for discussion and further guidance at the UNOLS Meetings, May 3-5, 1972.

2. Background

The need for coastal zone research vessels to meet the needs of academic research institutions was raised at the first UNOLS Meeting in November 1971 at LaJolla, California. Such vessels, it was envisioned, should be more capable than those presently used in the growing efforts of institutions responding to the existing and documented needs of coastal zone research. At subsequent meetings the UNOLS Advisory Council directed that a Working Group be formed to examine the needs for Coastal Zone research facilities, and ships in particular, and to develop a plan to implement those needs.

3. Members of the Working Group

Dr. R. J. Wold, University of Wisconsin-Milwaukee, Chairman
Dr. W.S. Gaither, University of Delaware
Dr. M. Gilmartin, Stanford University
Dr. D.W. Menzel, Skidaway Institute of Oceanography
Dr. R.E. Smith, State University System of Florida
Dr. G.H. Savage, University of New Hampshire
Captain T.K. Treadwell, Texas A&M University
Mr. John Dermody, University of Washington

Captain R.P. Dinsmore, Executive Secretary, UNOLS

4. Meetings

The Working Group has held two meetings to date; the first on March 14-15, 1972 at the University of Delaware, Lewes; and the second at the University of Wisconsin at Milwaukee on April 12, 1972.

5. Goal of the Working Group

The Working Group considered that the recommendations should be directed principally to academic research needs, both basic and applied, including the role played by graduate research. Emphasis is to be placed on multi-institutional operational arrangements. Three major components are recognized, viz: vessels and other platforms, shore facilities and support systems. These components are further developed in Appendix II.

6. Requirements for Coastal Zone Research

In considering the needs for coastal research facilities the Group concurred that science as well as other socio-economic requirements cannot be disassociated from facilities and currently are being documented by past and present efforts, and this group should not endeavor to "re-invent the wheel" in defining the research needs for the Coastal Zone. The Group compiled and reviewed a series of Federal, regional and industry reports on the problems and needs for coastal zone research and from this compiled a listing of facility requirements vis-a-vis academic research disciplines. A synopsis of requirements is given in Appendix I. A non-exhaustive but comprehensive list of reports is given in Appendix IV.

7. Concepts of a Coastal Zone Research Vessel

In the course of its progress the Working Group established the following points of agreement.

- a. That coastal research vessels under consideration should be cooperative vessels to serve the research needs of a group of institutions. Institutional vessels operated for and by a single laboratory, whether or not use is shared as determined by that laboratory, are not within the scope of this report. However, the numbers and availability of such vessels should be included as a factor in assessing the total facility needs of a particular area.
- b. That the general size (and inferred capability) of a coastal cooperative research vessel is somewhere between 70-ft and 120-ft., and that it be specifically adapted for coastal applications.
- c. That the coastal cooperative research vessel should be of the modular-concept where standardized, transportable vans, labs, or other components would be equally adaptable to shore use as well as shipboard.

- d. That ship operations be regional in concept. A regional approach would better respond to regional research needs as well as improve such matters as data management, equipment standards, etc.
- e. That a regional cooperative research vessel (as well as associated facilities) should be managed and operated by a capable institution within the region, but its use be controlled by a regional review group on behalf of the regional needs and scientific merit. Such regional facilities would be coordinated nationally through UNOLS.

8. Regional Concept for Facility Operation

The Group considers that the regional approach for operating and controlling a coastal zone research vessel is the optimum arrangement. Being responsive to a region would responsibly tie together many of the problems of the region into common efforts. As a regional responsibility portions of operating support could be more readily identified.

Coastal zone facility scheduling requires considerable flexibility. Projects tend to be short in duration and sometimes have very short lead times.

A regional policy group should be made up of individual users. This regional association will determine overall scheduling policies based on regional needs and/or scientific merit. Direct operations and maintenance would be assigned to a participating institution or institutions within the region who would operate the facility on behalf of the region.

The size and scope of regions tend to become arbitrary matters and precise lines are usually difficult to fix. A certain amount of overlap probably is both necessary and good and therefore regional lines should not be drawn too strictly. The Group concurred generally that regions might comprise New England (Maine to Block Island), Mid-Atlantic (Block Island to Cape Hatteras), Southeast (Cape Hatteras to Florida), Gulf of Mexico, Great Lakes, Pacific Southwest and the Pacific Northwest. Additionally, because of the intensity or focus of problems "mini" or "sub-regions" may emerge. The seven major regions are portrayed as Appendix III.

Within a region the plans for ship acquisition and operation based on cooperative multi-institutional use should be developed as a coherent effort on the part of the region based on a needs analysis. Once established, a regional arrangement could serve as a focus for the development and support for other kinds of research facilities.

9. Conclusions

In response to its charge the Working Group concluded

- (a) That capable multi-purpose ships are a fundamental need for coastal research. However, it is often institution arrangements and not ships which are lacking.
- (b) That interest of the scientific and regional community, within given geographical regions, can best be served by a multi-institutional, cooperative ship facility.
- (c) That Coastal Facility needs should include more than ships alone and that ships, even though of principal concern, must also include associated elements of laboratory interfaces as well as instrument standards, calibration and repair, as well as data processing and techniques. Furthermore there is a need to consider specialized coastal facilities such as coastal drilling rigs, habitats, submersibles, and even large, low-cost mobile barges.
- (d) That there be a strong recommendation whereby the acquisition of, and support for, regional cooperative coastal research vessel systems be assigned a singularly high priority; and that operational funding for such vessel systems be established from a broader base than the usual NSF-ONR sources and that assured funding be sought from additional Federal, regional and state sources.

Attachments

Tentative Recommendations

- Appendix I -- Development of Academic Research Requirements for Coastal Zone Vessels
- Appendix II -- Component Listing of Regional Cooperative Coastal Zone Research Facilities
- Appendix III -- Map--Proposed Coastal Research Regions for Cooperative Coastal Research Facilities
- Appendix IV -- (Separate Distribution -- limited) Compilation of References Documenting Research Requirements in the Coastal Zone.

RECOMMENDATIONS OF UNOLS WORKING GROUP
ON
COASTAL ZONE RESEARCH VESSELS

The Working Group recommends:

1. That there be established within UNOLS a category designated Regional-Cooperative Coastal Zone Research Facility, hereinafter designated Cooperative Coastal Research Facilities. Cooperative Coastal Research Facilities may be either multi-purpose or specialized ships or platforms.
2. That Cooperative Coastal Research Facilities shall be multi-institution facilities operated within designated geographic regions serving the research requirements of academic and related institutions conducting basic and applied research in response to regional needs.
3. That Coastal Research Regions be established along geographic lines approximately as follows:
 - . New England Region (Maine to Block Island)
 - . Mid-Atlantic Region (Block Island to Cape Hatteras)
 - . Southeast Region (Cape Hatteras to Florida)
 - . Gulf of Mexico Region
 - . Great Lakes Region
 - . Pacific Southwest Region
 - . Pacific Northwest Region
4. That within a stated geographic region the community of academic research users be represented by a regional organization which shall seek to identify the regional research requirements and develop a system approach to the acquisition and operation of regional facilities. Within a region facilities may be operated on behalf of participating users to meet regional needs by one or more member institutions.
5. That priority attention at the outset should be directed not only to multi-purpose ships which should have a capability inferred within an approximate size range from 70 to 120 feet, but also to specialized vessels such as coastal drilling rigs, undersea-habitat systems and floating laboratories.

6. That Cooperative Coastal Research Facilities be of a modular concept where standardized, transportable vans, labs or other components would be equally adaptable to shore use as well as shipboard and also between vessels wherever possible. They should include such support systems as navigation, communications, data processing, technicians and technical standards. Where possible, uniform standards should be set which might apply not only to coastal research craft but to ocean-going ships. The role for developing such standards could be assigned to the Research Vessel Operators Council (RVOC).
7. That the scheduling and use of a Cooperative Coastal Research Facility be controlled by a regional organization. Facility use should be awarded on the basis of regional needs and scientific merit.
8. That funding for the support and operation of Cooperative Regional Research Facilities be developed taking into consideration the obligations Federal, State and Regional Agencies which have responsibilities and needs to support Coastal Zone Research.
9. That the aforementioned system be implemented effective in 1973. This should be accomplished in two ways:
 - (a) By the commitment of funding by appropriate Federal, Regional and State Agencies for the operation of Regional-Cooperative Coastal Zone Research Facilities when such facilities are identified and a regional plan is approved.
 - (b) By the acquisition of at least two ships (multi-purpose or special purpose) from Federal FY-73 ship construction funds.

April 12, 1972

APPENDIX I

DEVELOPMENT OF ACADEMIC RESEARCH REQUIREMENTS FOR COASTAL ZONE RESEARCH VESSELS AND OTHER FACILITIES

COMPARTMENT & DISCIPLINE

GENERAL & SPECIAL REQUIREMENTS

1. Bedrock and deep sediments

Geology
Geophysics
Geochemistry
Rock mechanics
Mineral extraction

General requirements for accurate navigation, capability of towing and lowering survey instruments, and obtaining long (piston) cores.

Special requirements for deep drilling, with accurate station-keeping and heavy lifting capability.

2. Superficial sediments and Sediment/Water interface

Physics of sedimentation and compaction; boundary layer flow; bottom friction; density currents.

Mechanical properties in situ and in samples; engineering measurements.

Chemistry, particularly of sediment/water exchanges and chemical history of the drainage basin.

Biology, bottom fauna, microbiological conversions; biogeochemistry; demersal populations and fish.

General requirements as for 1, except that shorter cores are needed, with provision for keeping interface intact. The principal surveying instruments will be in the Sonar class; and, as for compartment 1 also, the data reduction and plotting requirements will be extensive.

In addition to handling of special grabs, dredges, trawls, and suitable winches, a special requirement will be the placement on the bottom and recovery of in situ devices for short-term (e.g. cameras to observe animal (behavior) or long-term observations (e.g. sediment/water exchanges of oxygen and other substances; near-bottom flow; sedimentation and re-suspension). Placement of such devices must be carried out with minimum disturbance.

3. The water/shore interface-beach studies

Physics - sediment transport; wave action.

Engineering, see 7

Chemistry, sorting and exchange, placer deposits, calcareous deposits.

Biology, attached algae; inshore fauna; fish spawning activities.

Placement and recovery of underwater habitats or diver stations is another possible special requirement.

Special platforms (e.g. towers, shallow draft boats) will be required for near-shore studies; and these may have to be carried either on road trailer or be carried or towed by a larger vessel. Divers and diver support will also be needed.

4. The Water Column

Physics: radiation fluxes; distribution of physical properties; water motions (periodic, "steady", turbulent) on space scales ranging from whole-basin dimensions to those of local turbulence and short waves, and on time scales ranging from months to seconds; processes of stratification and destratifications; upwelling; internal wave generation and decay.

Chemistry: distribution and exchanges of dissolved materials; turbulent diffusion of conservative and non-conservative substances.

Biology: growth, distribution, and decay of components of the food web, from micro-organisms to fish.

Engineering: behavior of moored, towed, and self-propelled objects and research platforms.

General requirements are for (1) station keeping ability, in all but the roughest weather, and winches for lowering and raising water bottles, sampling pumps, electronic probes, and plankton nets; (2) ability to tow probes and sampling pumps, nets and midwater trawls, at known constant or varying depths, sometimes at ship's cruising speed; and (3) ability to place and remove moored instruments, buoys, and sampling gear--again in all but the roughest weather, and with mooring arrangements to stand exposure for several months. To match the data gathering capability of probes, towed sensor packages, and moored instruments, a data reduction system must be provided on ship, and on shore, and perhaps with ship-to-shore links.

Special requirements will be for synoptic or quasi-synoptic surveys, cooperatively with other vessels, with aircraft, and with satellite survey boats carried by a "mother" research ship. Communications between craft (air & water) and between craft and moored or drifting instruments will be needed.

Special craft or structures will be desired for some studies, i. e. stable towers or floating platforms (moored and unmoored) for offshore work, perhaps some with diver habitat facilities. Towing, placing, tracking, and recovering such structures will also be a required capability. Special sonars will be developed for plankton and fish surveys.

APPENDIX II

Component Listing of Regional Cooperative Coastal Zone
Research Facilities with the Scope of the Working Group
on Coastal Zone Research Vessels

- - - - -

A. Vessels and other platforms-

1. These should be multipurpose as far as reasonably possible.
2. Operating economy must be a major consideration in the design.
3. Containerized labs should account for the major portion of the lab space aboard a vessel or platform. These labs must be quickly interchangeable. They should be considered as a facility a particular investigator can use 12 months of the year. These labs must be no larger than what can be transported by truck without special permits.
4. The operating crew must be a minimal size.
5. The maximum duration at sea should be on the order of two weeks.
6. Other platforms:
 - a) Spartan Barge -
Self-powered, A frame ability, capable of being moored in fast-running currents.
 - b) Submersible -
Inexpensive with maximum depth capability of 800'
 - c) Semi-submersible -
Mobile stable platform
 - d) Habitat -
Mobile shallow water capability, 100-150' depth.
 - e) Jack-up units -
Shallow water only
 - f) Aircraft

B. Shore Facility -

1. The shore facility should be completely compatible with vessels. It is a component of a total system.
2. Should have containerized handling capabilities.

C. Support Systems -

1. Navigation
2. Communications
3. Data Processing including software
4. Technicians
5. Oceanographic equipment standards lab

Compartment & Discipline
continued

General & Special Requirements
continued

5. The Air/Water Interface

As the site of exchange of radiation, energy, materials and momentum, this interface will receive increasing attention. Although the main emphasis will be on physical processes and exchanges, some attention will be paid to chemical (materials exchange) and biological aspects (neuston community) of this interface.

Engineering aspects will be concerned with wave and wave forecasting.

6. The Meso-Scale Region of Water Atmosphere Interaction

Studies of marine meteorology on scales of up to, say, ten times the basin dimensions; shore and lake breeze phenomena; weather modification; structure of storm systems; including the basin responses to periodicity, divergence, and curl of the wind stress.

7. Engineering Studies

including coastal engineering and ice research. For improvement of navigation, port and marina development, and control of shorelines, research and engineering applications are needed in such subjects as ice breaking techniques, ice forecasting, dredging and landfill, shore erosion, wave forecasting and behavior of materials and structures in the lakes.

Many of the general requirements for 4 will apply to this compartment also, with the qualification that the sampling and measurements are required in the air also. To some extent, the research vessels and satellite survey boats can be instrumented, but much reliance will have to be placed on measurements on moored or drifting platforms or on towers, or on free-fall devices.

Special requirements will be a ship-borne instrument and data-gathering system, in which the observations are not seriously influenced by the presence or motions of the vessel.

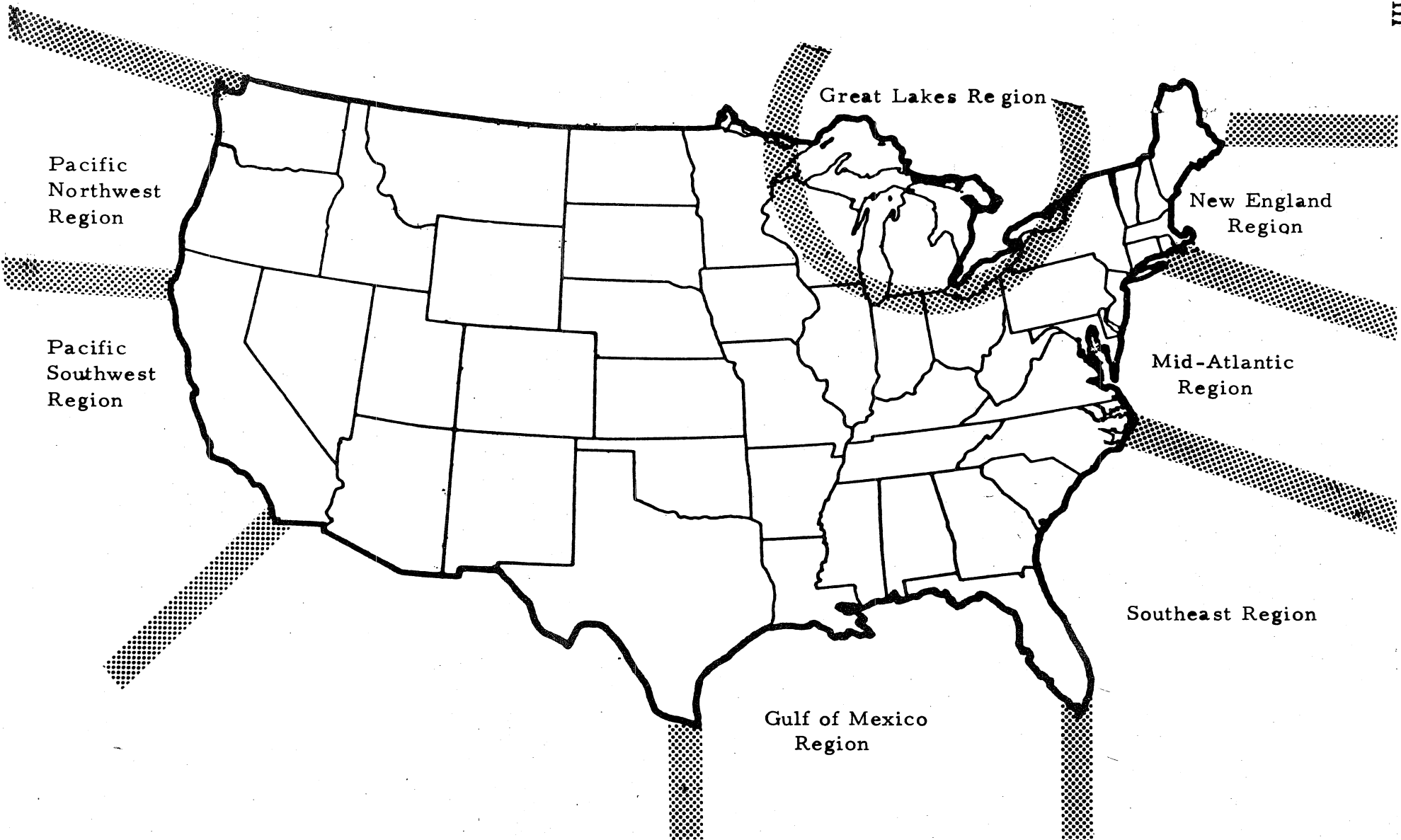
Although a large part of the observing network may be land based, measurements will also be made from craft (water and air) and from in-water structures. Sonde measurements of the lower atmosphere (up to 1000m?) will be needed on synoptic measuring grids.

The general requirements are similar to those of Compartment 3, i.e., working platforms in shallow nearshore waters--also space on shore for pilot experiments, assembly of large structures or components and the ability to tow such to the sites being studied.

Special requirements will vary with the project, but could include large physical models (of ice breakers, shore protection structures, harbor marinas and airports).

April 12, 1972

PROPOSED COASTAL RESEARCH REGIONS
FOR
COOPERATIVE-COASTAL RESEARCH FACILITIES



APPENDIX VI

RESEARCH SHIP OPERATING SCHEDULE - 1973

UNIVERSITY NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

TENTATIVE RESEARCH VESSEL OPERATING SCHEDULE

1973

A Compilation of Preliminary
Ship Schedules of University
Oceanographic Laboratories for
coordination and review by UNOLS
Participants and Researchers

April 1, 1972

UNOLS Office
Woods Hole Oceanographic
Institution
Woods Hole, Massachusetts

TENTATIVE RESEARCH VESSEL OPERATING SCHEDULE

1973

Explanation:

This compilation of ship operating schedules is in accordance with Annex I to the UNOLS Charter which provides that each laboratory responsible for the operation of research vessels will develop a tentative schedule incorporating as broad an input as possible, and will forward it to the UNOLS Office by March of each year. The UNOLS Office will collate the various tentative schedules and distribute these to members of UNOLS and widely to other interested institutions and scientists having Federally funded oceanographic research programs. After these schedules have had appropriate distribution and sufficient time has elapsed for interested parties to submit to the UNOLS Office requests for time on specific cruises, a meeting of representatives of UNOLS members will be convened by the UNOLS Chairman for the purpose of coordinating ship schedules and accommodating as many additional requests as possible. In general, one representative from each member institution will attend, with a provision for adequate direct communications to his home laboratory. Other scientists and laboratories not members of UNOLS but who have indicated their requirements for work at sea in the area under discussion may also attend and discuss their interests at the meeting if they so elect. This meeting is to compare the various schedules, to modify them as desirable in order to achieve more effective use of ships, and to incorporate as many as possible of the requirements that could not be integrated in earlier schedules.

The following schedules are reproduced from information furnished by UNOLS members. At this stage it should be recognized that all schedules are tentative and subject to change based on further developments during the year and to the requirements and contingencies of the operating institution.

The meeting for coordinating these schedules will be held May 4, 1972 (the day following the UNOLS Annual Meeting) at Texas A&M University, College Station, Texas.

For further information contact the Institution representative or

R. P. Dinsmore
UNOLS Office
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543
Tel (617) 548-1400, Ext 352

INDEX OF TENTATIVE 1973 OPERATING SCHEDULES

| <u>SCHEDULE NO.</u> | <u>SHIP</u> | <u>OPERATING INSTITUTION</u> |
|---------------------|------------------|---|
| 1 | ACONA | University of Alaska |
| 2 | T.G. THOMPSON | University of Washington |
| 3 | YAQUINA | } Oregon State University |
| 4 | CAYUSE | |
| 5 | MELVILLE | } Scripps Institution |
| 6 | THOS. WASHINGTON | |
| 7 | AGASSIZ | |
| 8 | ALPHA HELIX | |
| 9 | VELERO IV | University of Southern California |
| 10 | KANA KEOKI | University of Hawaii |
| 11 | ATLANTIS II | } Woods Hole Oceanographic Institution |
| 12 | CHAIN | |
| 13 | KNORR | |
| 14 | TRIDENT | University of Rhode Island |
| 15 | CONRAD | } Lamont-Doherty Geological Observatory |
| 16 | VEMA | |
| 17 | R. WARFIELD | Johns Hopkins University |
| 18 | EASTWARD | Duke University |
| 19 | GILLISS | } University of Miami |
| 20 | ISELIN | |
| 21 | TURSIOPS | Florida State University |
| 22 | ALAMINOS | Texas A & M University |
| 23 | INLAND SEAS | University of Michigan |

UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM
(UNOLS)

April 1972

EAST COAST RESEARCH VESSEL OPERATING SCHEDULE
1973

| | LOA | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|-------------|---------------|---------|--|------------------------------------|--|--|-------------------------------------|--------------------------------|------------------------------|------------------------------|------------------------------|---------------------------|-----------------------|
| CONRAD | Lamont | 208 | Argentine Continental Margin | Falkland Plateau & Argentine Basin | Eastern Argentine Basin | Shipyard Overhaul | Rio Grande Rise | M.A.R. - Walvis Ridge Junction | M.A.R. & East | N.E. Brazil Margin | Caribbean Margins | Equatorial Pacific | Manihiki Plateau |
| VEMA | | 202 | Westward continuation of low latitude fracture zones | Low latitude fracture zones | Extension of F.Z. 28 | M.A.R. 30° - 40°N | Azores-Gibraltar Ridge - M.A.R. 23° | East Ext. 52°N F.Z. | Rockall Bank to Faeroe-Ridge | Greenland Margin | Norwegian Sea | Eastern Q.Z. Cont. Margin | M.A.R. Crest 30°-40°N |
| TRIDENT | U.R.I. | 180 | N.W. Atlantic (Swift) | Caribbean (Kester) | Gulf Stream (Lambert) | 28°N 68°W (Sturges & Narra) | Sargasso Sea (Duce) | 28°N 68°W (Sturges) | N. Atlantic (Kennett) | Iceland (Schilling) | Iceland (Schilling) | N. Atlantic (Schmücker) | Grand Banks (Webb) |
| ATLANTIS II | | 210 | Woods Hole | Northwest Coast of Africa | MODE 1 MOORED CURRENT METER ARRAYS - PHYSICAL OCEANOGRAPHY | MODE 1 MOORED CURRENT METER ARRAYS - PHYSICAL OCEANOGRAPHY | Bay of Biscay | Mediterranean | Mid-Atlantic Ridge | North Atlantic and Caribbean | North Atlantic and Caribbean | Trinidad | Carriaco Trench |
| CHAIN | W.H.O.I. | 213 | Woods Hole | Sargasso Sea | MODE 1 MOORED CURRENT METER ARRAYS - PHYSICAL OCEANOGRAPHY | MODE 1 MOORED CURRENT METER ARRAYS - PHYSICAL OCEANOGRAPHY | Labrador-Norway-N. Atlantic | Labrador-Norway-N. Atlantic | Labrador-Norway-N. Atlantic | Labrador-Norway-N. Atlantic | Shipyard Overhaul | Shipyard Overhaul | S. Atlantic to 50°S |
| KNORR | | 245 | Atlantic - Antarctic GEOSECS | South Atlantic GEOSECS | West Atlantic GEOSECS | Maintenance | DEEP TOW | Mid Atlantic Ridge | GEOL & GEOPHY | W.N. Atlantic | W.N. Atlantic | W.N. Atlantic | Sargasso Sea |
| GOSNOLD | | 99 | Local Cruises and Cruises along the Atlantic Shelf - Escort of ALVIN/LULU | | | | | | | | | | |
| R. WARFIELD | Johns Hopkins | 106 | Short Cruises in Chesapeake Bay and Chesapeake Bight in cooperation with Univ. of Maryland and Virginia Institute of Marine Sciences | | | | | | | | | | |
| EASTWARD | Duke | 118 | (End of Schedule) | | | | | | | | | | |
| GILLIS | Miami | 208 | Puerto Rico Trench | Caribbean | Norfolk Canyon | Bahamas | Norfolk Canyon | Julf/Mex | Bahamas | Caribbean | S & E Atlantic | SE Atlantic | E Atlantic |
| ISELIN | | 170 | Bahamas | Gulf of Mexico | St. of Florida | Caribbean | Blake Plat. | St. of Florida | Florida | Gulf of Mexico | Sargasso Sea | Gulf | W. Caribbean |
| TURSIOPS | Florida State | 65 | Short Cruises in Gulf of Mexico, Florida Keys and East Florida - FSU and cooperating regional institutions | | | | | | | | | | |
| ALAMINOS | Texas A&M | 180 | TEST/TRAIN | Gulf of Caribbean | N.W. Gulf | Gulf & NW | Gulf & Caribbean | Gulf & Caribbean | Gulf & Caribbean | Gulf & Caribbean | NEARBY PHYSIOLOGY | DEEP SEA PHYSIOLOGY | Student |
| INLAND SEAS | Michigan | 114 | Short Cruises in Lake Michigan and adjoining Lakes -- University of Michigan and cooperating regional institutions | | | | | | | | | | |

WEST COAST RESEARCH VESSEL OPERATING SCHEDULE
1973

| | LOA | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|-------------|------------|---------|---|----------|-------------|---------|--|--------|--------|-----------|--------------------|----------|-----------------|
| ACONA | Alaska | 85 | Gulf of Alaska Area including Pr. William Sound, Valdez Arm & S. Central Alaska | | | | | | | | | | |
| YAQUINA | Oregon | 180 | WIND-ZOO | DAVIDSON | MICRONETKON | BENTHOS | Gulf Alaska - Calif. CO ₂ STUDIES | OPTICS | UP | BENTHOS | Sub-Arctic Pacific | GEO | E. Cen. Pacific |
| CAYUSE | | 80 | PHYSICAL OCEANOGRAPHY | | | | | | | | | | |
| THOMPSON | Washington | 208 | East Tropical Pacific, Gulf Dulce, C.R. Dome, E. Trop. So Pacific | | | | | | | | | | |
| MELVILLE | | 245 | (Maintenance) | | | | | | | | | | |
| WASHINGTON | | 208 | Shipyard Overhaul | | | | | | | | | | |
| AGASSIZ | Scripps | 180 | Maintenance | | | | | | | | | | |
| SCRIPPS | | 95 | Short Cruises off the Southern California Coast | | | | | | | | | | |
| OCONOSTOTA | | 100 | Short Cruises off the Southern California Coast | | | | | | | | | | |
| ALPHA HELIX | | 133 | Solomon Isl. BIOLOGY | | | | | | | | | | |
| VELERO IV | USC | 110 | Weekly Cruises off So. & Central California Coast | | | | | | | | | | |
| KANA KEOKI | Hawaii | 156 | South Pacific GEOLOGY AND GEOPHYSICS | | | | | | | | | | |
| TERITU | | 90 | Short Cruises in Hawaiian Waters supporting specific investigations, Sea Grant programs | | | | | | | | | | |

Note: All schedules are tentative and subject to meet the requirements and contingencies of the operating institution

| | |
|------------|----|
| LOA | 85 |
| Scientists | 9 |
| Crew | 6 |

R/V ACONA
 University of Alaska
 College, Alaska

Tentative 1973 Operating Schedule

| <u>DATES</u> | <u>SEA DAYS</u> | <u>REGION</u> | <u>CHIEF SCIENTIST</u> | <u>PROGRAM</u> |
|---------------|-----------------|--|------------------------------|-----------------------------|
| Feb 5-Feb 14 | 10 | Prince William Sound South-central Alaska | Muench-Cooney | Do-Ch, Sa, T, Bd, P |
| Feb 19-Feb 23 | 5 | Valdez Arm South-central Alaska | Hood-Muench | Do-Ch, Sa, T, P, Bd, We, Cm |
| Mar 12-Mar 16 | 5 | Gulf of Alaska | Royer | Do-W |
| Apr 9-Apr 18 | 10 | Prince William Sound South-central Alaska | Muench-Cooney | Do-Ch, Sa, T, Bd, P, Cm |
| Apr 23-Apr 27 | 5 | Valdez Arm South-central Alaska | Hood-Muench | Do-Ch, Sa, T, P, Bd, We, Cm |
| May 1-May 10 | 10 | Prince William Sound South-central Alaska | Muench-Cooney | Do-Ch, Sa, T, P, Bd |
| May 14-May 18 | 5 | Valdez Arm South-central Alaska | Hood-Muench | Do-Ch, Sa, T, P, We |
| May 28-Jun 4 | 8 | Prince William Sound South-central Alaska | Burrell-Reeburgh | Do-W, We, T, P |
| Jun 7-Jun 11 | 5 | Gulf of Alaska | Royer | Do-W |
| Jun 12-Jul 26 | 45 | Bering Sea | Hood-Goering McRoy-Kelley | Do-Ch, Sa, T, P, Bd, W, Cm |
| Jul 30-Aug 8 | 10 | Prince William Sound South-central Alaska | Muench-Cooney | Do-Ch, Sa, T, P, Bd, P, Cm |
| Aug 9-Aug 13 | 5 | Valdez Arm South-central Alaska | Hood-Muench | Do-Ch, Sa, T, P, W, Cm |
| Aug 16-Aug 21 | 6 | Gulf of Alaska | Royer | Do-W |
| Aug 22-Aug 26 | 5 | Gulf of Alaska | Royer | Do-W |
| Sep 3-Oct 8 | 36 | Bering Sea | Hood-Goering McRoy-Kelley | Do-Ch, Sa, T, P, Bd, W, Cm |
| Oct 15-Oct 24 | 10 | Prince William Sound South-central Alaska | Muench-Cooney | Do-Ch, Sa, T, P, Bd |
| Oct 25-Oct 29 | 5 | Valdez Arm South-central Alaska | Hood-Muench | Do-Ch, Sa, W, Cm |
| Dec 3-Dec 12 | 10 | Prince William Sound South-central Alaska | Muench-Cooney | Do-Ch, Sa, T, P, Bd, P, Cm |
| Dec 13-Dec 17 | 5 | Valdez Arm South-central Alaska | Hood-Muench | Do-Ch, Sa, W, Cm |

PROGRAM CODES:

- Do - Descriptive Oceanography
- Ch - Chemistry
- Sa - Salinity
- T - Temperature
- P - Plankton
- Bd - Biological Dredge
- Cm - Current Measurements
- We - Weather
- W - Waves

| | |
|------------|--------|
| LOA | 208-ft |
| Scientists | 18 |
| Crew | 23 |

R/V THOMAS G. THOMPSON
 University of Washington
 Seattle, Washington

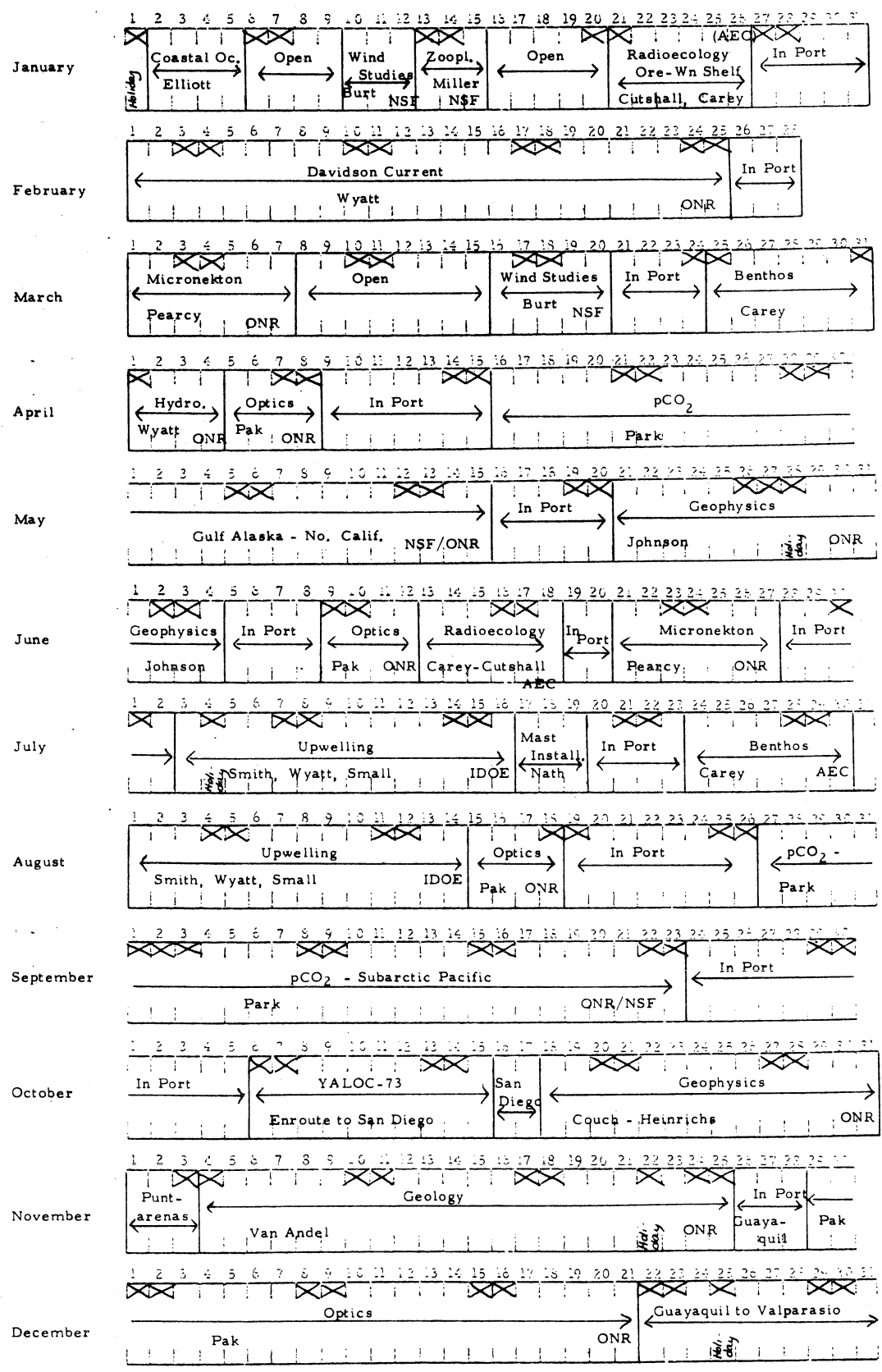
Tentative 1973 Operating Schedule

| DATE | PRINCIPAL INVESTIGATOR(s) | AREA AND PROJECT | DAYS* IN PORT | DAYS* AT SEA | OUTPORT DAYS | |
|---|--|---|------------------|-----------------|-----------------|---------|
| 12/4/72 | Lewis, Booker, Richards, LvSDO Dugdale, Packard, Healy. | E.Trop.Pac., Gulf Dulce, C.R.Dome, E.Trop.S.Pac | | (27)+95 | | |
| 4/6/73 | | Arrive Seattle | 31 | | | |
| 5/7/73 | McManus LvSeat | Nitinat Fan area (48°N, 126°30'W) | | 28 | | |
| 6/4/73 | | Arrive Seattle | 7 | | | |
| 6/11/73 | Kelley, Dugdale LvSeat | CUE II (IDOE Upwelling) off Oregon coast | | 25 | | |
| 7/6/73 | | Arrive Seattle | 5 | | | |
| 7/11/73 | Rattray, Dworski, LvSeat | Deploy Internal Waves Arrays at 49°N, 127°W | | 6 | | |
| 7/17/73 | | Arrive Neah Bay | | | 0 | |
| 7/17/73 | Carpenter, Piper LvNeahBay | Ferro Manganese Modules, Juan de Fuca Ridge | | 7 | | |
| 7/24/73 | | Arrive Neah Bay | | | 0 | |
| 7/24/73 | Rattray, Dworski LvNeahBay | Pick up arrays | | 7 | | |
| 7/31/73 | | Arrive Seattle | 6 | | | |
| 8/6/73 | Frost, Anderson, Pamatmat LvSeat | Columbia River Effects; Deep Scattering Layer | | 17 | | |
| 8/23/73 | | Arrive Seattle | 14 | | | |
| 9/6/73 | Booker, Lister, Lewis LvSeat | Geophysical Studies in Aleutian Trench | | 31 | | |
| 10/7/73 | | Arrive Dutch Harbor | | | 2 | |
| 10/9/73 | Coachman, Aagaard LvD.H. | Physical Oceanography of Bering Sea | | 53 | | |
| 12/1/73 | | Arrive Seattle | 31 | | | |
| *Day of departure is a day at sea; day of arrival is a day in port. | | | TOTALS: | 94 | 269 | 2 (365) |

| | |
|------------|--------|
| LOA | 180-ft |
| Scientists | 18 |
| Crew | 17 |

R/V YAQUINA
Oregon State University
Corvallis, Oregon

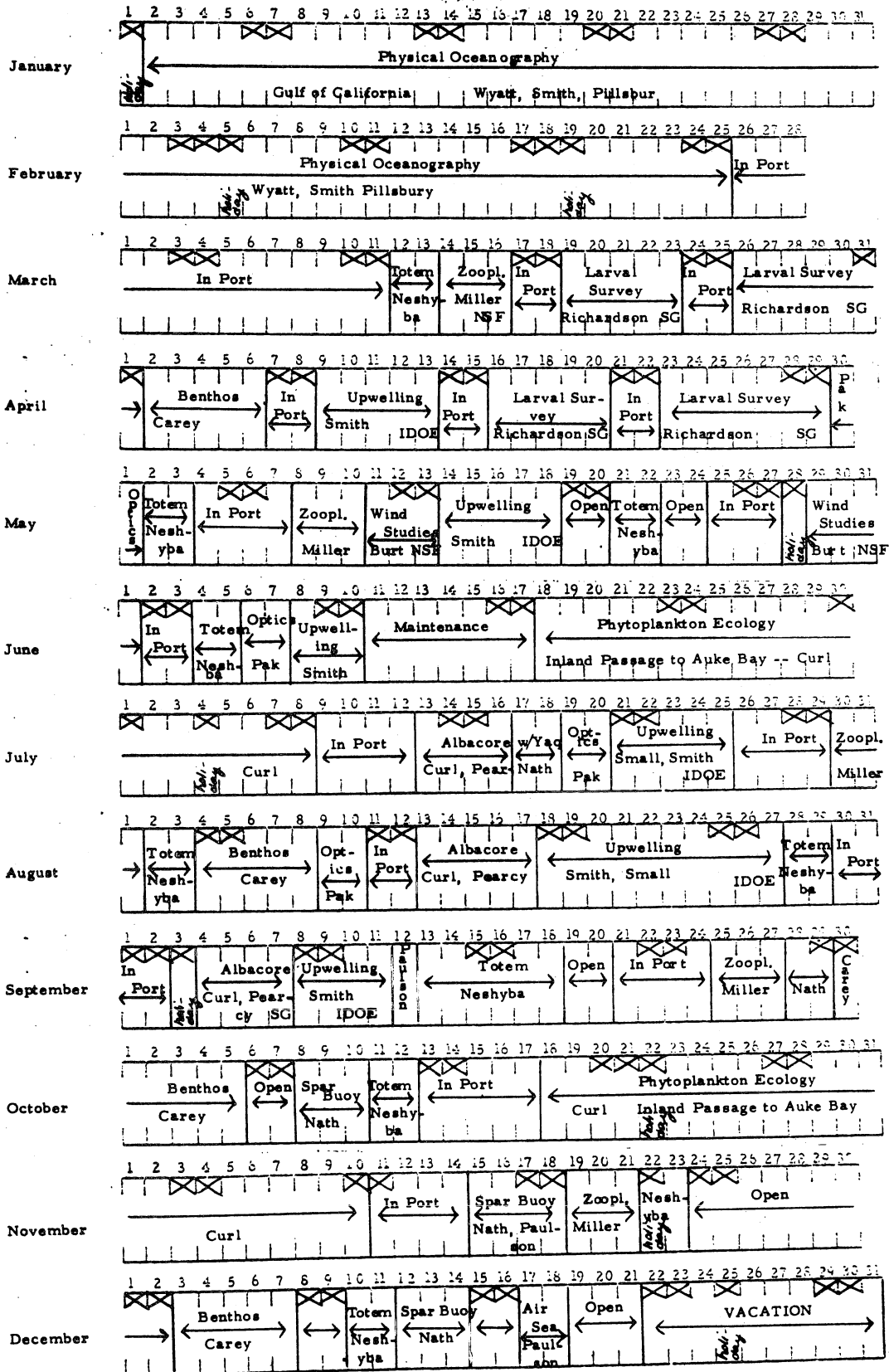
Tentative 1973 Operating Schedule



| | |
|------------|----|
| LOA | 80 |
| Scientists | 7 |
| Crew | 7 |

R/V CAYUSE
Oregon State University
Corvallis, Oregon

Tentative 1973 Operating Schedule



| | |
|------------|-----|
| LOA | 245 |
| Scientists | 25 |
| Crew | 25 |

R/V MELVILLE
 Scripps Institution of Oceanography
 La Jolla, California
 TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Chief Scientist(s) | Port of Call | Area and Objectives |
|------------------|----------------------|--------------|---|
| 2-28 Mar | Winterer | San Diego | (Shipyard) Geology-West Coast of No. & Central America |
| 1-27 Apr | Spieß/Davis | San Diego | Geophysics-West Coast of North & Central America |
| 1-31 May | | San Diego | GEOSECS-Pacific preparatory cruise |
| 1-13 June | | San Diego | Enroute-San Diego to Adak |
| 15 Jun-15 Jul | Craig/ Bainbridge | Adak | Pacific Geochemical Ocean Sections Program (GEOSECS) of IDOE |
| 19 Jul-15 Aug | | Tokyo | <p>TRACK OF R/V MELVILLE PACIFIC SECTION GEOSECS JULY 1973 - FEB 1974</p> |
| 19 Aug-15 Sept | | Guam | |
| 19 Sept - 15 Oct | | Samoa | |
| 19 Oct-15 Nov | | Samoa | |
| 19 Nov - 20 Dec | | Wellington | |
| 26 Dec | (end of schedule) | Wellington | |

R/V THOMAS WASHINGTON
 Scripps Institution of Oceanography
 La Jolla, California

| | |
|------------|-----|
| LOA | 208 |
| Scientists | 17 |
| Crew | 25 |

TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Chief Scientist(s) | Port of Call | Area & Objectives |
|-----------------|--------------------|--------------|---|
| 28 Dec-22 Jan | Spiess | Apia | Central Pacific, Geo-physics |
| 26 Jan-19 Feb | McGowan | Honolulu | |
| 21-28 May | Hessler | San Diego | North Pacific, Biology (Ship Overhaul) |
| 4-30 June | McGowan | San Diego | West Coast, Biology |
| 5-25 July | Taft | Honolulu | North Pacific, Biology |
| 28 Jul-15 Aug | Taft | Tokyo | Northwest Pacific, Phy. Oceanography |
| 19 Aug-6 Sept | Karig | Tokyo | Northwest Pacific, Current Studies |
| 10 - 27 Sept | Karig | Manila | Phillipine Sea, Geology |
| 1 - 31 Oct | | Manila | Phillipine Sea, Geo-physics |
| 29 Nov-23 Dec | McGowan | Singapore | Northeast Indian Ocean, Geology |
| | | Darwin | |
| | | Honolulu | |
| | | Honolulu | North Pacific, Biology |
| | | San Diego | |

| | |
|------------|-----|
| LOA | 180 |
| Scientists | 13 |
| Crew | 18 |

R/V AGASSIZ
Scripps Institution of Oceanography
La Jolla, California

7

TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Scientist(s) | Port of Call | Area & Objectives |
|-------------------------|--------------|--------------|---|
| (Maintenance) | | San Diego | |
| 24 Jan - 12 Mar | Schwartzlose | | So. California and Baja California; Geology and Currents |
| 19 Mar-26 Apr | Wisner | San Diego | West Coast Mexico, Biology |
| 1-15 May | Schwartzlose | San Diego | Southern California Coast, Currents |
| (Maintenance 16-23 May) | | San Diego | |
| 15-30 Jun | Schwartzlose | | Southern California Coast, Currents |
| (Maintenance 2-13 July) | | San Diego | |
| 23 Jul-5 Aug | Schwartzlose | | Southern California Coast, Currents |
| 15 Aug-1 Sept. | McGowan | San Diego | North Pacific, Biology |
| 4 - 19 Sept | McGowan | Honolulu | North Pacific, Biology |
| 1 Oct-31 Oct | Schwartzlose | San Diego | Southern California Coast, Geology and Currents |
| (Ship Overhaul) | | San Diego | |

R/V ALPHA HELIX
 Scripps Institution of Oceanography
 La Jolla, California

| | |
|------------|-----|
| LOA | 133 |
| Scientists | 10 |
| Crew | 12 |

TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Chief Scientist(s) | Port of Call | Area & Objectives |
|----------------------------|--------------------|--------------|--|
| 20 Sept 72 to 20 Jan 73 | Dunson | Rabaul | Biology |
| 23 Jan-9 Feb | | Honolulu | (Enroute) (Maintenance) |
| 10 Mar-21 Mar | | Dutch Harbor | (Enroute) |
| 25 Mar-9 Jun | Elsner/Miller | Dutch Harbor | Bering Sea and Bristol Bay, Biology |
| 11-19 Jun | | Honolulu | (Enroute) (Maintenance) |
| 1 Jul-9 Sept | Dreizen | Hilo | Kona Coast of Hawaii, Bio-Chemistry & Physiology |
| 12 -21 Sept | | San Diego | (Enroute) (Shipyard Overhaul) |
| 25 Nov - 23 Dec | Hager | San Diego | Guadalupe Island, Halogenation |

| | |
|------------|--------|
| LOA | 110-ft |
| Scientists | 9 |
| Crew | 11 |

R/V VELERO IV
University of Southern California
Los Angeles, California

Tentative 1973 Operating Schedule

9

| CRUISE PERIOD | CHIEF SCIENTIST | AREA OF OPERATION | OBJECTIVE |
|-------------------|---|--|---|
| <u>JANUARY</u> | | | |
| 25-4 February | SHIP MAINTENANCE | | |
| <u>FEBRUARY</u> | | | |
| 1-4 | SEE ABOVE | | |
| 5-9 | D. Gorsline | Central California Borderland, transect from shore to deep margin at base of Patton Escarpment | Piston coring, high resolution profiling, use of transmissometer and STD |
| 10 | H. Fernandez | San Pedro Basin | Collection of lanternfish for vision study |
| 12-16 | Gorsline/Drake | Santa Monica Basin and out to Patton Escarpment | Use of Alpha-meter, STD, and Van Horn Bottles |
| 17 | H. Fernandez | San Pedro Basin | Collection of lanternfish for vision study |
| 20-23 | R. Kolpack | Santa Monica Bay | Oceanography |
| 26-2 March | R. Pieper | Catalina and Clemente Areas | Use of opening/closing midwater trawl and other oceanographic measurements |
| <u>MARCH</u> | | | |
| 1-2 | SEE ABOVE | | |
| 5-9 | D. Straughan | Catalina Island, Coal Oil Point and Pismo Beach | Box coring and/or use of Campbell grab |
| 10 | H. Fernandez | San Pedro Basin | Collection of lanternfish for visual study |
| 12-17 | D. Gorsline/Haner R. Kolpack | Coastal slope, San Diego area Santa Barbara Channel | High resolution profiling, box coring Marine geology and oceanography |
| 19-23 | B. Nafpaktitis H. Fernandez | Santa Catalina and San Clemente and San Pedro Basins | Midwater Sampling Collection of lanternfish |
| 26-30 | K. Fauchald | Off Catalina Island, on both sides | Sampling of polychaetous annelids for anatomy studies |
| <u>APRIL</u> | | | |
| 2-6 | T. Henyey | Outer Borderland | Piston coring and profiling |
| 9-13 | SHIP MAINTENANCE | | |
| 15- 15 July | B. Nafpaktitis B. Lavenberg Janss Foundation/ Los Angeles County Museum | Off Costa Rica and Gulf of Panama | Transect sampling of biotic communities from inshore to deep waters and the presentation of courses of instruction in tropical marine ecology. Physical and hydrographic sampling enroute or on return from main study area |
| <u>MAY / JUNE</u> | | | |
| SEE ABOVE | | | |
| <u>JULY</u> | | | |
| 1-15 | SEE ABOVE | | |
| 16-20 | SHIP MAINTENANCE | | |
| <u>JULY</u> | | | |
| 23-27 | R. Pieper | Catalina and Clemente Areas | Use of opening/closing midwater trawl and other oceanographic measurements |
| 30 - 3 August | D. Gorsline/Booth | Santa Barbara and Santa Cruz Basins | Oceanographic measurements and box coring |

AUGUST

| | | | |
|----------|---------------------------|---|---|
| 1-3 4 | See Above H. Fernandez | San Pedro Basin | Collection of lanternfish for vision study |
| 6-10 | Gorsline/Drake | Santa Monica, San Pedro Basins and out to Patton Escarpment | Measuring currents in submarine canyons |
| 13-17 | Gorsline/Haner Kolpack | Coastal slope in Oceanside area Santa Barbara Channel | Profiling and box coring Marine Geology and Oceanography |
| 20-24 | B. Nafpaktitis | Santa Catalina and San Clemente Basins | Midwater sampling |
| 27-31 | T. Henyey | Outer Borderland | Piston Coring and Profiling |

SEPTEMBER

| | | | |
|-------------|-----------------------------|--|--|
| 4 - 8 | D. Straughan | Catalina Island, Coal Oil Point, Pismo Beach | Box coring and/or Campbell Grab |
| 10-14 15 | D. Gorsline H. Fernandez | San Quentin Basin San Pedro Basin | Piston and box coring, profiling Collection of lanternfish for vision study |
| 17-21 | R. Pieper | Catalina and Clemente areas | Use of opening/closing midwater trawl and other oceanographic measurements |
| 24-28 | R. Kolpack | San Pedro Channel | Oceanography |

OCTOBER

| | | | |
|---------------|----------------|--|--|
| 1-5 | D. Gorsline | No Name Basin | Profiling, box and piston coring |
| 8-12 | T. Henyey | Outer borderland | Piston coring and profiling |
| 13 | G. Bakus | San Pedro Basin | Teach biological oceanographic techniques |
| 15-19 | B. Nafpaktitis | Santa Catalina and San Clemente Basins | Midwater sampling |
| 20 | H. Fernandez | San Pedro Basin | Collection of lanternfish for vision study |
| 22-26 | R. Kolpack | Santa Monica Bay | Oceanography |
| 29-2 November | R. Pieper | San Pedro and Santa Catalina Basins | Teaching cruise for oceanology course |

NOVEMBER

5-9 SHIP MAINTENANCE

| | | | |
|---------------|--------------------|--------------------|--|
| 12-7 December | J. Bischoff/Henyey | Gulf of California | Marine Geology: grab sampling, and seismic profiling |
|---------------|--------------------|--------------------|--|

DECEMBER

| | | | |
|-------|------------------|---------------------------------|--|
| 1-7 | See Above | | |
| 10-14 | D. Gorsline/Karl | Coastal shelf, Santa Monica Bay | Profiling and box coring |
| 15 | H. Fernandez | San Pedro Basin | Collection of lanternfish for vision study |
| 17-21 | R. Kolpack | Santa Barbara Channel | Oceanography |

| | |
|------------|--------|
| LOA | 156-ft |
| Scientists | 15 |
| Crew | 15 |

R/V KANA KEOKI
 University of Hawaii
 Honolulu, Hawaii

TENTATIVE 1973 OPERATING SCHEDULE

15 April 1972 - - - - - Arrive Guayaquil
 19 April - - - - - Leave Guayaquil

(one stop at Punta Arenas - refuel of Scripps's ship)

11 May - - - - - Arrive Acapulco
 18 May - - - - - Depart Acapulco
 15 June (Thurs) - - - - - Arrive Honolulu
 26 June (Mon) - - - - - Depart Honolulu (Hoberly)
 24 July (Mon) - - - - - Arrive Honolulu
 2 Aug - 31 Oct - - - - - Tentatively OPEN
 November 1972 - - - - - DRYDOCK - - - - -

December 1972
 January 1973
 February 1973
 15 March 1973

OIR/NSF (South Pacific)
 Geology & Geophysics

15 March 1973 - - - - - Arrive Nasca Plate
 15 July - - - - - Depart Nasca Plate

R/V ATLANTIS II

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts

| | |
|------------|---------|
| LOA | 210-ft. |
| Scientists | 25 |
| Crew | 30 |

TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Chief Scientist | Ports of Call | Area & Objectives |
|------------------|-----------------|---------------------------|--|
| 20 Jan-10 July | K. O. Emery | Woods Hole Nouackchott | International Decade of Ocean Exploration (IDOE) Cruise Northwest Coast of Africa Geology and Geophysics |
| 13 July-3 August | Uchupi | Oporto Bilbao | Bay of Biscay - Geology & Geophysics |
| 7 Aug-29 Aug | Williams | Punta Delgada | Eastern North Atlantic-Azores Marine Chemistry studies of Mediterranean Outflows |
| 1 Sept-29 Nov | Bowen et al | Port au Spain | Western North Atlantic - Caribbean Sea Marine Chemistry, radioisotopes, physical oceanography |
| 4 Dec-21 Dec | Jannasch | Woods Hole | Caribbean Sea - Carioca Trench. Benthic microbiology in anaerobic conditions |

| | |
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| LOA | 213-ft |
| Scientists | 26 |
| Crew | 31 |

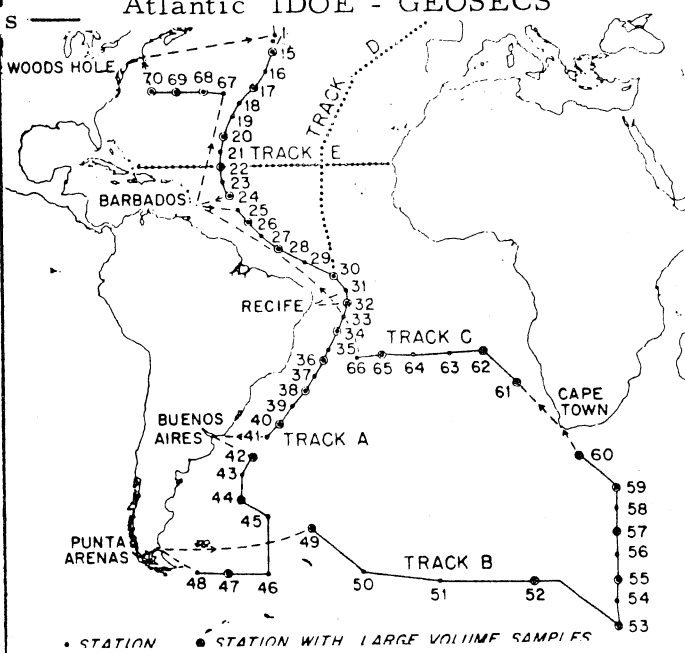
R/V CHAIN
Woods Hole Oceanographic Institution
Woods Hole, Massachusetts

TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Chief Scientist(s) | Ports of Call | Areas and Objectives |
|-----------------|---|------------------------------------|---|
| 30 Jan-4 Feb | Backus | Woods Hole | Western North Atlantic-Marine Biology - Test of net tow |
| 4 Feb-3 Mar | Vaccaro | Woods Hole | Gulf of Maine, Sargasso Sea, Hudson Canyon-Studies on variations in biochemical cycle |
| 6 Mar-9 July | Fofonoff Webster Schmitz Sanford | Woods Hole Calls at Bermuda | MODE 1 - Southwest N. Atlantic MODE area - A 2° square somewhere in 26-29N 67-70W. Set and recover Moored Current Meter Arrays (Fofonoff, Webster). Shipborne density work, both STD's and hydrocasts. Horizontal STD tows (Katz) Vertical profiles of velocity (Sanford) |
| 16 Jul-16 Sept | Backus and/or Hays | Woods Hole | North Atlantic - Labrador to Iceland to Norway transect Marine Biology and/or North Atlantic - marine acoustics |
| 20 Sept-20 Oct | Fuglister | St. John's Nfld. | North Atlantic-Gulf Stream East of 50° W - Physical Oceanography |
| 11 Nov-15 Mar | Phillips et al | YARD | South Atlantic to 50° S Geology and Geophysics |

TENTATIVE 1973 OPERATING SCHEDULE

| | |
|------------|-----|
| LOA | 245 |
| Scientists | 25 |
| Crew | 25 |

| Tentative Dates | Scientist(s) | Port of Call | Area and Objectives |
|-----------------|--------------------------------|--------------|--|
| 28 Dec-4 Feb | Craig | Punta Arenas |  <p>Atlantic IDOE - GEOSECS</p> <p>Woods Hole Oceanographic Institution</p> <p>Woods Hole, Massachusetts</p> <p>• STATION • STATION WITH LARGE VOLUME SAMPLES</p> <p>TRACK B ANTARCTIC PUNTA ARENAS - CAPE TOWN R/V KNORR JAN - FEB 1973 TRACK C S ATLANTIC R/V KNORR FEB - APR 1973 TRACK D EASTERN ATLANTIC JEAN CHARCOT LATE 1973 TRACK E EQUATORIAL ATLANTIC FS METEOR MID 1973</p> <p>Bermuda Transect - Life history and spatial distribution of Deep Sea Benthos</p> |
| 8 Feb-12 Mar | Reid | Cape Town | |
| 16 Mar-5 Apr | Takahashi Sayles Grassle | Barbados | |
| 1 May - 4 Jun | Luyendyk Hollister | Woods Hole | Mid-Atlantic Ridge; Geology & Geophysics, "Deep-Tow" instrument array |
| 5 June-6 Aug | Heirtzler et al | Woods Hole | Mid-Atlantic Ridge, Cooperative International Expedition, Geology and Geophysics; ALVIN operations |
| 11 Aug-4 Sept | Fofonoff Webster | Woods Hole | Western North Atlantic - Buoy Station Physical Oceanography, internal waves |
| 7 Sept-4 Oct | Teal | Woods Hole | Sargasso Sea-Bird Studies, Marine Bio. |
| 8 Oct-5 Nov | Fofonoff Webster | Woods Hole | Western North Atlantic-Buoy Station Physical Oceanography, internal waves |
| 8 Nov-30 Nov | Vaccaro | Woods Hole | Gulf of Maine-Sargasso Sea-Hudson Canyon-Studies on variation in bio-chemical cycle. |
| 6 Dec-22 Dec | Fofonoff | Woods Hole | Buoys Western No. Atlantic, Physical Oceanography |

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| LOA | 180-ft. |
| Scientists | 13 |
| Crew | 18 |

R/V TRIDENT
 University of Rhode Island
 Kingston, Rhode Island

TENTATIVE 1973 OPERATING SCHEDULE

| Cruise # | Chief Scientist/ Co-Investigator | Area | Departure | Arrival | No. of Days |
|---------------------------------|-------------------------------------|---------------|---------------------------|---------------------------|----------------|
| 127 | Swift | N.W. Atlantic | 5 Jan 73 Narr., R.I. | 19 Jan 73 San Juan | 15 |
| 128 | Kester/Betzer Carder, Lambert | Caribbean | 22 Jan 73 San Juan | 14 Feb 73 San Juan | 24 |
| 129 | Lambert/Richardson | Gulf Stream | 17 Feb 73 San Juan | 6 Mar 73 Narr., R.I. | 18 |
| -----UPKEEP----- | | | 7 Mar 73 | 11 Mar 73 | 5 |
| 130 | Sturges/Scarlet | 28°N 68°W | 12 Mar 73 Narr., R.I. | 9 Apr 73 Bermuda | 29 |
| 131 | Duce | Sargasso | 12 Apr 73 Bermuda | 23 Apr 73 Bermuda | 12 |
| 132 | Sturges | 28°N 68°W | 26 Apr 73 Bermuda | 20 May 73 Bermuda | 25 |
| 133 | Duce | N.W. Atlantic | 23 May 73 Bermuda | 30 May 73 Narr., R.I. | 8 |
| -----UPKEEP----- | | | 31 May 73 | 12 June 73 | 13 |
| 134 | Kennett/ Schilling | N. Atlantic | 13 June 73 Narr., R.I. | 2 July 73 Reykjavik | 20 |
| 135 | Schilling | Iceland | 5 July 73 Reykjavik | 24 July 73 Akureyri | 20 |
| 136 | Schilling | Iceland | 27 July 73 Akureyri | 15 Aug 73 Reykjavik | 20 |
| 137 | Schnitker | N. Atlantic | 18 Aug 73 Reykjavik | 2 Sept 73 St. John's | 16 |
| 138 | Webb | Grand Banks | 5 Sept 73 St. John's | 19 Sept 73 Narr., R.I. | 15 |
| -----UPKEEP----- | | | 20 Sept 73 | 28 Sept 73 | 9 |
| 139 | Lambert/ Richardson | N.W. Atlantic | 29 Sept 73 Narr., R.I. | 16 Oct 73 Bermuda | 18 |
| 140 | Smayda | Sargasso | 19 Oct 73 Bermuda | 4 Nov 73 Bermuda | 17 |
| 141 | Duce | Sargasso | 7 Nov 73 Bermuda | 24 Nov 73 Narr., R.I. | 18 |
| -----UPKEEP-----INSPECTION----- | | | 25 Nov 73 | 4 Jan 74 | 40 |

| | |
|------------|--------|
| LOA | 208-ft |
| Scientists | 22 |
| Crew | 21 |

R/V CONRAD
 Columbia University
 Lamont Doherty Geological Observatory
 Palisades, New York

Tentative 1973 Operating Schedule

| PORT | ARRIVAL/DEPARTURE | MAIN PURPOSE OF LEG: |
|---|------------------------------|---|
| BRIDGETOWN BARBADOS | ETD 3 July 1972 | CARIBBEAN, ANEGADA PASSAGE MANGANESE STUDIES |
| ST. GEORGES BERMUDA | ETA 7 Aug ETD 10 Aug | BLAKE OUTER RIDGE AND CONTINENTAL MARGIN |
| KINGSTON JAMAICA | ETA 5 Sept ETD 8 Sept | WEST INDIAN TRENCH SYSTEM |
| PORT OF SPAIN TRINIDAD | ETA 9 Oct ETD 12 Oct | M.A.R. NEAR EQUATOR N.E. CONTINENTAL MARGIN S.A. |
| RECIFE BRAZIL | ETA 7 Nov ETD 10 Nov | MAGNETIC PATTERN, N. BRAZIL BASIN |
| RIO DE JANEIRO BRAZIL | ETA 28 Nov ETD 1 Dec | RIO GRANDE RIDGE & CONTINENTAL MARGIN |
| BUENOS AIRES ARGENTINA | ETA 29 Dec ETD 2 Jan 1973 | ARGENTINE CONTINENTAL MARGIN |
| USHUAIA ARGENTINA | ETA 5 Feb ETD 8 Feb | FALKLAND PLATEAU & ARGENTINE BASIN |
| BAHIA BLANCA ARGENTINA | ETA 12 Mar ETD 15 Mar | MAGNETIC PATTERN EASTERN ARGENTINE BASIN |
| BUENOS AIRES | ETA 16 Apr | |
| Overhaul- six weeks scheduled. It is probable this can be shortened to one month, in which case the succeeding schedule will be advanced appropriately. | | |
| BUENOS AIRES | ETD 25 May | RIO GRANDE RISE - M.A.R. JUNCTION |
| RIO DE JANEIRO BRAZIL | ETA 20 June ETD 23 June | M.A.R. - WALVIS RIDGE JUNCTION |
| LUANDA ANGOLA | ETA 23 July ETD 26 July | M.A.R. & E. BRAZIL BASIN |
| RECIFE BRAZIL | ETA 27 Aug ETD 30 Aug | N.E. BRAZIL MARGIN & SIERRA LEONE RISE |
| PORT OF SPAIN TRINIDAD | ETA 1 Oct ETD 4 Oct | CARIBBEAN MARGINS |
| COLON BALBOA PANAMA | ETA 31 Oct ETD 4 Nov | MAGNETIC PATTERN, EQUATORIAL PACIFIC |
| TAHITI PAPEETE | ETA 3 Dec ETD 6 Dec | MANIHIKI PLATEAU |
| SUVA FIJI | ETA 30 Dec | |

| | |
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| LOA | 202-ft |
| Scientists | 17 |
| Crew | 19 |

R/V VEMA
Columbia University
Lamont Doherty Geological Observatory
Palisades, New York

Tentative 1973 Operating Schedule

NOTE: Shipyard overhaul Halifax, N.S. scheduled from mid-October to end of November. It is probable this overhaul can be shortened to one month, in which case the succeeding schedule will be advanced appropriately.

| PORT | ARRIVAL/DEPARTURE | MAIN PURPOSE OF LEG: |
|-------------------------|------------------------------|---|
| HALIFAX, N.S. | ETD 30 Nov | WESTERN CONTINENTAL MARGIN AND EDGE OF RISE. TERMINATION (?) OF FRACTURE ZONES AT QUIET MAGNETIC ZONE |
| SAN JUAN PUERTO RICO | ETA 30 Dec ETD 2 Jan 1973 | WESTWARD CONTINUATION OF LOW LAT. FRACTURE ZONES TO CONTINENTAL MARGIN |
| RECIFE BRAZIL | ETA 30 Jan ETD 2 Feb | ASCENSION I, CHAIN &, ROMANCHE F.Z., ST. PAUL ROCKS, 4°N & 8° N FRACTURE ZONES |
| DAKAR SENEGAL | ETA 28 Feb ETD 3 Mar | EXTENSION OF KANE FRACTURE ZONE, EXAMINE EASTERN QUIET ZONE BOUNDARY |
| LAS PALMAS CANARIES | ETA 28 Mar ETD 31 Mar | M.A.R. CREST BETWEEN 30° & 40° N QUIET ZONE & J ANOMALY |
| PONTA DELGADA AZORES | ETA 25 Apr ETD 28 Apr | AZORES, GIBRALTAR RIDGE, M.A.R. NORTH OF AZORES |
| PONTA DELGADA AZORES | ETA 23 May ETD 26 May | EASTWARD EXTENSION 52° N FRACTURE ZONE |
| CORK IRELAND | ETA 20 Jun ETD 23 Jun | BETWEEN ROCKALL BANK AND FAEROE-ICELAND RIDGE |
| REYKJAVIK ICELAND | ETA 23 Jul ETD 26 Jul | GREENLAND MARGIN, ICELAND-JAN MAYEN RIDGE |
| BODØ NORWAY | ETA 22 Aug ETD 25 Aug | NORWEGIAN SEA, GREENLAND SEA, BARENTS SHELF, CREST, M.A.R. |
| BODØ NORWAY | ETA 24 Sept ETD 27 Sept | EASTERN QUIET ZONE & CONTINENTAL MARGIN |
| LISBON PORTUGAL | ETA 24 Oct ETD 27 Oct | M.A.R. CREST BETWEEN 30° & 40° N QUIET ZONE AND J ANOMALY |
| LAS PALMAS CANARIES | ETA 26 Nov ETD 29 Nov | M.A.R. CREST 15° - 20° N |
| DAKAR SENEGAL | ETA 24 Dec | |

| | |
|------------|-----|
| LOA | 118 |
| Scientists | 15 |
| Crew | 15 |

R/V EASTWARD
Duke University Marine Laboratory
Beaufort, North Carolina

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Tentative 1973 Operating Schedule

| Tentative Dates | Chief Scientist(s) | Port of Call | Area and Objectives |
|-----------------|--|--|---|
| 27 Dec-8 Jan | Sheridan (Univ of Del.) | | Research Cruise-Geological Studies on the Continental Margin off Eastern No. America |
| 8-9 Jan | | Nassau | |
| 10-20 Jan | Pilkey (Duke) | | Geology 206, Geological Oceanography, Training Cruise |
| 20-22 Jan | | St. Croix | |
| 22-30 Jan | Multer (Fairleigh-Dickinson Univ.) Pilkey (Duke) | | Research Cruise-Geological Cruise in St. Croix Area of the Caribbean |
| 30-31 Jan | | St. Croix | |
| 01-13 Feb | Watkins (Univ. N.C.) | | Research Cruise - Geophysical investigation of the origin of the Venezuelan Basin |
| 13-14 Feb | | Curacao | |
| 15-24 Feb | Paul (Florida State) Pierce (George Washington) | | Predoctoral Cruise-Benthic Biomass in the Fosa de Cariaco, Venezuela Research Cruise - Terrigenous phase of suspended sediment continental shelf, southeastern United States |
| 24-26 Feb | | Kingston, Jamaica | |
| 26 Feb-5 Mar | Land (Univ of Texas) Bloom (Cornell Univ) | | Research Cruise-Deep transport & diagenesis of reef sediments, North Jamaica Training Cruise - Geological Oceanography 444 |
| 5-6 Mar | | Kingston, Jamaica | |
| 6-13 Mar | Goodbody (Univ of W. I.) Robinson (Univ of W. I.) | | Training Cruise-Advanced Zoology Mar. Biology Training Cruise-Advanced Geology Mar. Biology |
| 13-16 Mar | | Kingston, Jamaica | |
| 16-30 Mar | Heezen (Columbia) | | Training Cruise Geology W4948, Ocean Floor |
| 30 Mar - 1 Apr | | Keywest, Florida | |
| 2-5 Apr | Pomeroy (Univ. Georgia) | | Training Cruise -Marine Biology, Zoology 811 |
| 5-6 Apr | | Miami, Florida | |
| 6-11 Apr | Zingmark (Univ S. C.) | | Training Cruise-Biology 728, Advanced Phycology |
| 11-12 Apr | | Charleston, S. C. | |
| 12-17 Apr | Marshall (Old Dominion) Kirby-Smith (Duke) | | Training Cruise - Biology 419 Marine & Estuarine Plankton Research Cruise-Bench Mark Collections of Animals from the North Carolina Continental Shelf and Continental Slope |
| 18-23 Apr | | Beaufort, N. C. | |
| 24-26 Apr | Litchfield (Rutgers) | | Training Cruise-Marine Microbiology |
| 27-30 Apr | Colwell(Georgetown) | | Training Cruise-Marine Microbiology |
| 1-4 May | Coull (Clark) | | Training Cruise -Biological Oceanography |
| 5-12 May | Musick/Grant (Virginia Inst.) | | Training Cruise-Ichthyology, Advanced Problems in Marine Science |
| 13 May | | In port | |
| 14-19 May | Zimmerman (Union College) | | Research Cruise - Sedimentary processes on the east coast continental margin |
| 20-31 May | | Beaufort, N. C. (Availability Period) | |

| | |
|------------|--------|
| LOA | 208-ft |
| Scientists | 19 |
| Crew | 22 |

R/V GILLIS
 University of Miami RSMAS
 Miami, Florida

Tentative 1973 Operating Schedule

| <u>Cruises</u> | <u>Tentative Dates</u> | <u>TOTAL DAYS</u> | <u>Scientist</u> | <u>Ports of Call</u> | <u>Objectives and Areas</u> |
|--------------------------------------|---|-------------------|---|-------------------------|---|
| SHIPYARD: 20 Nov. 1972 - 3 Jan. 1973 | | | | | |
| GS-7301 | Jan. 9 (T)-Jan. 24 (W) | 16 | Voss Staiger | | Puerto Rico Trench. Study of systematics, geographic & vertical distribution and community structure of microorganisms, both pelagic and benthic. |
| GS-7302 | Feb. 1 (Th)-Mar. 2 (F) | 15 15 | Emiliani Ball | | Caribbean. (A) Recover 90' long globigerina ooze sections; and (B) Reflection magnetic and gravity surveys to supplement structural interpretations based on-shore work. |
| GS-7303 | Mar. 9 (F)-Mar. 28 (W) | 20 | Grant Musick | | Virginia Institute of Marine Science ship time request: Norfolk Canyon (off Virginia) and adjacent slope & shelf. Study of ecosystem structure and dynamics in Norfolk Canyon and adjacent slope. |
| GS-7304 | Apr. 5 (Th)-Apr. 20 (F) | 16 | Robins Staiger | Freeport Nassau | Tongue of the Ocean. A quantitative analysis of the mid-water and benthic fish populations of the TOTO. |
| GS-7305 | April 28 (St)-April 29 (S) | 2 | Corcoran | | Education. Straits of Florida. |
| GS-7306 | May 4 (F)-May 23 (W) | 20 | Grant Musick | | Virginia Institute of Marine Science ship time request: Ditto Cruise GS7303. |
| GS-7307 | May 30(W)-June 10(S) | 12 | Duing Moers Perkins Kraus Geisler | Miami-Key West | Gulf of Mexico. Install an array of moored current meters and temperature recorders. |
| GS-7308 | June 11 (M)-June 15 (F) | 5 | Daubin | Key West-Miami | Caribbean An acoustic propagation & ambient noise experiment drifting midwater using ACODAC Systems combined with free LORA-PROBES. |
| GS-7309 | June 22 (F) - July 11 (W) | 20 | Ball | | Bahamas Cruise to complete seismic program in the NE Bahamas (in conjunction with the R/V CALANUS). |
| GS-7310 | July 31 (T)-Aug. 4 (M) InPort: Aug. 5-6 | 5 2 | Daubin | Miami to San Juan | Caribbean. Ditto Cruise GS-7308. |
| GS-7311 | Aug. 7 (T) - Sept. 5 (W) InPort: Sept. 6-7 | 10 20 2 | Kraus Voss | San Juan to Jonrovia | South and East Atlantic. (A) A multiship calibration and testing program in preparation of the GATE Experiment; collection of background climatological & oceanographic data in the eastern subtropical Atlantic for GATE. (B) Study the systematics, geographic and vertical distribution & community structure, of macroorganisms, both pelagic and benthic. |

| <u>Cruises</u> | <u>Tentative Dates</u> | <u>TOTAL DAYS</u> | <u>Scientist</u> | <u>Ports of Call</u> | <u>Objectives & Areas</u> |
|----------------|--|-----------------------|--|--|---|
| GS-7312 | Sept. 8 (St) - Sept. 29 (St) InPort: Sept. 30; Oct. 1-2 | 22 3 | Harrison Ball Prospero Honnorez | <u>LEG I:</u> Monrovia to Luanda | Legs I, II, and III Objectives: South and East Atlantic: Determine the structure of Vema, Romanche & Ascension Island fracture zones. Determine the structure of the Ascension Is. To sample the rocks exposed along these fracture zones, and to collect sediment cores for geochemical studies. To collect cores in the Angola Basin and Walvis Ridge Area to determine changes in CaCO ₃ compensation depth. |
| | Oct. 3 (W) - Oct. 22(M) InPort: Oct. 23-24 | 20 2 | Hay Prospero Rooth | <u>LEG II:</u> Luanda to Luanda | |
| | Oct. 25 (Th) - Nov. 14 (W) InPort: Nov. 15-16 Nov. 17 (St)-Dec. 9 (St) | 21 2 23 | Bostrom Bonatti Prospero | <u>LEG III:</u> Luanda to Monrovia to Miami | |
| Total Days: | | 273 | | | |

| | |
|------------|--------|
| LOA | 170-ft |
| Scientists | 13 |
| Crew | 12 |

R/V COLUMBUS ISELIN
University of Miami RSMAS
Miami, Florida

Tentative 1973 Operating Schedule

| <u>Cruise</u> | <u>Tentative Dates</u> | <u>TOTAL DAYS</u> | <u>Scientist</u> | <u>Ports of Call</u> | <u>Objectives and Areas</u> |
|---|---|-------------------|---|--------------------------|--|
| CI-7211 | Dec. 1 (F)-Dec. 16 (St) | 16 | Robins Staiger | Freeport Nassau | Tongue of the Ocean. A quantitative analysis of the midwater and benthic fish population of the TOTO. |
| 19 Dec 1972 - 10 Jan 1973 SHIPYARD | | | | | |
| CI-7301 | Jan. 15 (M) - Jan 20 (St) | 6 | Perkins Duing Van Leer | | NW Providence Channel. Tests of unattended cycling current profilers in deep water. |
| CI-7302 | Jan. 24 (W) - Feb. 2 (F) | 10 | Moers Duing Perkins Kraus Geisler | Miami to Key West | Gulf of Mexico Installation of moored current meters in the Eastern Gulf of Mexico. |
| CI-7303 | Feb. 3 (S) - Feb. 11 (S) | 9 | Houde | Key West to Miami | Off Western Coast of Florida. Estimate abundance of eggs and larvae of commercial fishes off Western Fla. |
| CI-7304 | Feb. 19 (M) - Mar. 2 (F) | 12 | Voss | | Straits of Florida. The distribution, abundance and community structure of the fauna and flora of the continental shelf between Elliott Key and Ft. Pierce, Fla., in relation to environmental factors. |
| CI-7305 | Mar. 7 (W) - Mar. 23 (F) Inport: Mar. 24-25-26 | 17 3 | Zillioux | Miami to San Juan | Mona Passage and south to operate off the Mona escarpment along the islands in southern coast. Continue studies on the behaviour and physiology of vertically-migrating zooplankton. |
| CI-7306 | Mar. 27 (T)-Mar. 31 (St) Inport: April 1 | 5 1 | Bader | Puerto Rico to Belize | British Honduras. Marine Biology. |
| CI-7307 | Apr. 2 (M) - Apr. 13 (F) | 12 | Ginsburg | Belize to Miami | British Honduras Study of geology of British Honduras reefs, emphasizing internal processes. |
| CI-7308 | Apr. 20 (F) - May 4 (F) | 15 | Perkins Van Leer Duing | | Blake Plateau. Current profiling in deep ocean. |
| CI-7309 | May 9 (W) - May 17 (Th) | 9 | Houde | Miami to Key West | Off Western Coast of Fla. Estimate abundance of eggs and larvae of commercial fishes off Western Florida. |
| CI-7310 | May 18 (F) - May 21 (M) | 4 | Owre | Key West to Miami | Yucatan Channel and Straits of Florida. Sampling macro-zooplankton to determine bulk transported by Florida Current. |
| CI-7311 | May 24 (Th) - June 4 (M) | 12 | Voss | | Straits of Florida. Ditto Cruise CI-7304. |
| CI-7312 | June 9 (St) - June 18 (M) Inport: June 19 | 10 1 | Betzer Carder | Miami to Tampa | University of South Florida ship time request: Gulf of Mexico, Yucatan Channel, and Florida Straits. Study the optical & chemical properties of suspended particulates of the Gulf of Mexico |

| <u>Cruises</u> | <u>Tentative Dates</u> | <u>TOTAL DAYS</u> | <u>Scientist</u> | <u>Ports of Call</u> | <u>Objectives and Areas and to determine the effects of certain particle sources and sinks.</u> |
|----------------|--|-----------------------|------------------------------|-------------------------------|---|
| CI-7312 | Continued | | | | |
| CI-7313 | June 20 (W) - June 28 (TH) Inport: June 29-30 | 9 2 | Houde | Tampa to Tampa | Off Western Coast of Florida. Ditto Cruise CI-7309. |
| CI-7314 | July 1 (S) - July 10 (T) | 10 | Duing | Tampa to Miami | Gulf of Mexico. |
| CI-7315 | July 16 (M) - Aug. 1 (W) | 17 | Duing Van Leer Perkins | | Sargasso Sea. Current profiling in deep ocean. |
| CI-7316 | Aug. 6 (M) - Aug. 14 (T) | 9 | Houde | | Off Western Coast of Florida. Ditto Cruise CI-7309. |
| CI-7317 | Aug. 20 (M) - Sept. 12 (W) | 24 | Bunt | Jamaica (Discovery Bay) | Western Caribbean Metabolism of plankton communities, benthic productivity (coral reef and sediment) and micro- biology. |
| CI-7318 | Sept. 18 (F) - Sept. 29 (S) | 12* | Voss | | Straits of Florida. Ditto Cruise CI-7304. |
| CI-7319 | Oct. 4 (Th) - Oct. 12 (F) Inport: Oct. 13-14 | 9 2 | Houde | Miami to Key West | Gulf of Mexico. Ditto CI-7309. |
| CI-7320 | Oct. 15 (M) - Oct. 18 (Th) | 4 | Owre | Key West to Miami | Yucatan Channel & Straits of Florida. Ditto Cruise CI-7309. |
| CI-7321 | Oct. 24 (W) - Nov. 8 (Th) | 16 | Duing | | Straits of Florida. Current profiling in the Florida Current from anchored vessel |
| CI-7322 | Nov. 13 (T) - Nov. 14 (W) | 2 | Voss | | Straits of Florida. Education. |

| | |
|------------|-------|
| LOA | 65-ft |
| Scientists | 5 |
| Crew | 3 |

R/V TURSIOPS
Florida State University
Tallahassee, Florida

21

Tentative 1973 Operating Schedule

| <u>Dates</u> | <u>Cruise Number</u> | <u>Area</u> | <u>Chief Scientist</u> | <u>Project Description</u> |
|--------------------------|----------------------|----------------------------------|---|---|
| 5-7 June 1972 | 7213 | N. W. Gulf Shelf | H. Kritzler, F. S. U. | Infauna Studies |
| 10-12 June | 7214 | Eastern Gulf | J. Calder, F. S. U. | Organic geochemistry - water & Sediments |
| 12-18 June | 7215 | Florida Keys | R. Livingston, F. S. U. | Reef Ecology, Fisheries Biology |
| 18-21 July | 7216 | N. Gulf | J. Calder, F. S. U. | Organic geochemistry - water & Sediments |
| 22-28 July | 7217 | Miss. Delta & Mobile Bay | W. Ahr, Texas A&M J. Hanor, L. S. U. R. Harriss, F. S. U. | Chemical sedimentation, fate of pollutants, organic carbon studies. |
| 11-14 August | 7218 | Eastern Gulf (Tampa Bay area) | P. LaRock, F. S. U. | Marine pollution studies, microbiology |
| 15-22 August | 7219 | Eastern Gulf & Gulf Stream | E. Zillioux, U. Miami | Plankton migration studies |
| 23 Aug. - 4 Sept. | 7220 | Bimini Bank | W. Herrinkind, F. S. U. | Lobster distribution & <u>in situ</u> behavior studies. |
| 5-11 September | 7221 | Florida Keys | R. Livingston, F. S. U. | Reef ecology, fisheries biology |
| 20-27 September | 7222 | Eastern Gulf | S. Collard, U. West Fla. | Macroplankton - water mass studies |
| 4-9 October | 7223 | N. Gulf | J. Calder, F. S. U. | Organic geochemistry |
| 10-19 October | 7224 | Miss. Delta & Mobile Bay | W. Ahr, Texas A&M J. Hanor, L. S. U. R. Harriss, R. S. U. | Chemical sedimentation, fate of pollutants, organic carbon studies |
| 20-22 October | 7225 | N. Gulf Shelf | R. Shipp, U. South Alabama | Fisheries Biology |
| 1-12 November | 7226 | Eastern Gulf | K. Warsh, F. S. U. | Physical oceanography |
| 16-20 November | 7227 | Eastern Gulf Shelf | C. Moore, L. S. U. | Marine geology Florida Shelf |
| 30 Nov. - 4 Dec. | 7228 | N. Gulf | J. Calder, F. S. U. | Organic geochemistry |
| 8-18 December | 7229 | N. Gulf (Middle grounds) | T. Hopkins, U. West Fla. | Plankton, benthic community studies |
| 19 Dec. - 15 Jan. (1973) | | DRY DOCK | & | MAINTENANCE |
| 20-24 January | 7301 | N. Gulf | J. Calder, F. S. U. | Organic geochemistry |
| 1-14 February | 7302 | N. Gulf | T. Hopkins, U. West Fla. | Plankton, benthic community studies |
| 1-6 March | 7303 | N. Gulf | J. Calder, F. S. U. | Organic geochemistry |
| 7-16 March | 7304 | Miss. Delta & Mobile Bay | W. Ahr, Texas A&M J. Hanor, L. S. U. R. Harriss, F. S. U. | Chemical sedimentation, fate of pollutants, organic carbon studies |

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| LOA | 180 |
| SCIENTISTS | 14 |
| CREW | 17 |

R/V ALAMINOS
Texas A&M University
College Station, Texas

TENTATIVE 1973 OPERATING SCHEDULE

| Tentative Dates | Chief Scientist(s) | Port of Call | Area and Objectives |
|------------------|-----------------------------------|--------------|---|
| 10-11 January | Treadwell | | Instrumental & Ship Shakedown Cruise |
| 15-20 January | Treadwell | | Student Cruise |
| 23 Jan - 15 Feb. | Sackett | | Chemistry of Gulf & Caribbean |
| 20 Feb - 1 Mar | Moore/Bouma | | Geology of N. W. Gulf (UNOLS) (cooperative with Univ. of Wisconsin et al) |
| 5 Mar - 15 Mar | | | Physical Oceanography Gulf & N. W. Caribbean |
| 20 Mar - 15 Apr | | | Biological Oceanography Gulf & Caribbean |
| 20 Apr - 15 May | | | Biological Oceanography Gulf & Caribbean |
| 20 May - 20 July | Bouma/Bryant/Poag/Rezak/Treadwell | | Geology & Geophysics Gulf & Caribbean |
| 25 July - 15 Aug | Sackett | | Chemistry of Gulf & Caribbean |
| 20 Aug - 1 Oct | Bauer, (Univ. N. C.) | | Deep Sea physiology N. E. Caribbean (UNOLS) |
| 10 Oct - 15 Oct | Treadwell | | Student Cruise |
| 20 Oct - 1 Dec | Nowlin | | Physical Oceanography Caribbean & Gulf |

| | |
|------------|--------|
| LOA | 114-ft |
| Scientists | 7-13 |
| Crew | 8-15 |

R/V INLAND SEAS
University of Michigan
Ann Arbor, Michigan

TENTATIVE 1973 OPERATING OUTLOOK

(Sailing Season: Mid-March/Mid-December)

| Investigator | Institution | Program Area | Days |
|----------------|-----------------------------------|-----------------|------|
| Arnold, D. | The University of Michigan | Biology | 20 |
| Callender, E. | The University of Michigan | Geochemistry | } |
| Bowser, C. | University of Wisconsin-Milwaukee | Geochemistry | |
| Robbins, J. | The University of Michigan | Chemistry | |
| Edgington, D. | Argonne National Laboratory | Chemistry | |
| Clay, D. | University of Wisconsin-Madison | Geophysics | } |
| Meyer, R. | University of Wisconsin-Madison | " | |
| Spain, J. | Michigan Technological University | " | |
| Gross, D. | Illinois Geological Survey | Geophysics | } |
| Meyer, R. | University of Wisconsin-Madison | Geophysics | |
| Wold, R. | University of Wisconsin-Milwaukee | Geophysics | |
| Silver, M. | University of Illinois-Chicago | Geophysics | |
| Moore, C. | University of Illinois-Chicago | Geophysics | |
| Leland, H. | University of Illinois-Urbana | Geophysics | } |
| Hough, J. | The University of Michigan | Grad. Teaching | |
| Moore, R. | The Ohio State University | Biol. Chemistry | } |
| Herdendorf, C. | The Ohio State University | Biol. Chemistry | |
| Jackson, W. | Bowling Green University | Biol. Chemistry | |
| Schelske, C. | The University of Michigan | Biology | 20 |
| Stoermer, E. | The University of Michigan | Biology | 8 |

Note: The above listing is not a schedule but an outlook based on shiptime requests received.