UNIVERSITY - NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

UNOLS COUNCIL MEETING

SUMMARY REPORT

July 1-2, 1998

W. Alton Jones Campus
Whispering Pines Conference Center - Sycamore Lodge
University of Rhode Island
West Greenwich, RI

UNOLS Council Meeting Report
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W. Alton Jones Campus
University of Rhode Island

Appendices

1 July 1998

WELCOME & INTRODUCTION - The UNOLS Council met in the Sycamore Lodge conference room at the Whispering Pines Conference Center, W. Alton Jones Campus of the University of Rhode Island on 1-2 July 1998. The meeting was called to order at 0830 by Ken Johnson, UNOLS Chair. The items of the agenda, ***Appendix I,*** were addressed in the order as reported below. The participants of the meeting are listed in ***Appendix II.***

All participants introduced themselves and Ken asked for any additions to the agenda. Three items were added to the agenda, discussion on Science Mission Requirements (SMRs), ATLANTIS test schedule and discussion on RV BLUE HERON.

ACCEPT MINUTES - The meeting minutes of the UNOLS Council February meeting were accepted as written.

COMMITTEE REPORTS - Committee reports were provided in advance to Ken Johnson, and included as ***Appendix III.*** The committee chairs provided updates not included in their reports. Below is a brief summary of these reports.

Research Vessel Technical Enhancement Committee (RVTEC) - Ken reported that RVTEC would be hosting the second International Marine Technician Workshop (INMARTECH '98) conference in conjunction with their annual meeting. INMARTECH '98 will be held on 20-22 October in La Jolla, CA. The regular annual RVTEC meeting will be held the day before this conference on the 19th. RVTEC has been playing a major role is lending support for the Arctic Icebreaker Coordination Committee (AICC) in their effort to provide science systems testing for the USCG's icebreaker, MICHAEL HEALY, currently under construction at Avondale Shipyard in Louisiana.

Fleet Improvement Committee (FIC) - The Fleet Improvement Committee has been concentrating its efforts in developing Science Mission Requirements (SMRs) for an east coast intermediate sized vessel as well as a vessel suitable for the waters off Alaska. This second vessel requirements will have ice strengthening and will be capable of fisheries research.

DEep Submergence Science Committee (DESSC) - The DESSC has been working on an archiving policy for data collected using the National Deep Submergence Facility assets. They are also developing a "White Paper" on deep submergence science. Plans are being discussed for a national workshop to address future deep submergence asset needs. The committee is also working on the update of their Terms of Reference.

Arctic Icebreaker Coordinating Committee (AICC) - The AICC has been working with the RVTEC and the USCG in developing test procedures for testing the science systems on the Coast Guard icebreaker, MICHAEL HEALY. The AICC also sees their role as a advocacy group for Arctic science, similar to that of DESSC with the deep submergence community, and will be working on expeditionary planning for Arctic research. The terms of two AICC members will be coming up this fall. A brief discussion followed on the $24M in the Senate budget for facility support of Arctic science. There has been no decision on whether there will be operation support for HEALY. Without a subsidized dayrate, the ship may be too expensive to the science users. The AICC coordinated a Science of Opportunity cruise for POLAR SEA which is currently operating in the western Arctic.

Research Vessel Operators' Committee (RVOC) - The RVOC will be holding their annual meeting this year on 4-6 November at the University of Hawaii. The RVOC Safety Committee has been working on a safety video that will be used by all ships as an introduction to safety for scientists using the ships. The video is in the final stages of production and should be distributed soon. This committee is also working on an update to the RVOC Safety Standards. RVOC has a Medical Standards Committee that is working on medical standards for crew of UNOLS vessels.

Ship Scheduling Committee (SSC) - Both Ken Johnson and Don Moller discussed the trends in ship usage. ***Appendix IV*** provides a summary of ship days from 1995 to 1999. The 1999 numbers were developed from the 23 June Ship Schedule Review Meeting and reflect the schedules as posted at that time.

Year	1995	1996	1997	1998	1999
Total Days	4877	4315	5096	5399	4690

For 1998 three ships were scheduled for reduced schedules (MELVILLE half year, EWING one third year and ENDEAVOR full years lay-up) however, additional work materialized rounding out their schedules into modestly successful years. In 1999 it would appear that KNORR will not have a schedule and will lay-up. All intermediate ships reflect light schedules for 1999. The smaller ships in the Fleet are very busy. NSF had tasked the large ship operators to come up with a lay-up plan. KNORR's lay-up represents this. In 1999, large ship totals are down roughly 100 days from 1998.

The UNOLS Fleet charge days by agency were discussed, see Appendix IV.

AGENCY and OTHER REPORTS

Department of State (DOS) - The Department of State report was provided by Tom Cocke. A meeting was held with Mexican officials concerning sovereign immunity and the boarding of NOAA vessels along with other clearance issues. At the time, it appeared that significant progress was made, however, clearances still remain difficult. This is of concern since there are three NOAA fisheries cruises coming up soon. Because the U S is not a signature to the Law of the Sea Convention clearances around the world are becoming more difficult and requiring more conditions causing the process to slow. Tom noted that Cuba requests have gone without response. Tom reported fewer clearance requests this year, probably the result of a reduction in funding of NSF proposals.

The personnel situation in Tom's office has improved somewhat with the hiring of Elizabeth Maruschak. She is being funded for half time by NSF through CORE and hopefully be able to work full time if funding from ONR and NOAA materializes. State is working on hiring a full time backup for Tom. This issue was addressed at the FOFCC meeting. FOFCC was supportive of Tom's need for assistance. Ken Johnson offered to write a letter to DOS expressing UNOLS support on the issue.

National Oceanic and Atmospheric Administration (NOAA) - Commander Beth White provided the NOAA report. NOAA's TAGOS vessel, RELENTLESS, has been renamed GORDON GUNTER. The ship will be converted for fisheries work and will replace CHAPMAN in the Gulf of Mexico. MILLER FREEMAN will undergo a major overhaul starting in August of this year. DAVID STARR JORDON is scheduled for a major overhaul in 2000.

NOAA is completing a design review and model test for the FRV 40. This is the proposed design for the new generation acoustically quiet fisheries research vessel. Three of these ships are in the Presidential Budget (one each for 2000-2002). AQUARIUS, the undersea laboratory, is soon to get its certification.

An agreement has been reached to lift the hiring freeze on the NOAA Corps. The agreement includes a new ceiling of 240 Corps officers with no flag rank and a civilian in charge. A bill in Congress would alter this agreement to include a flag officer and increase the ceiling to 264-299. In either case recruiting will not start until next fiscal year.

RON BROWN is scheduled to operate 240 days at sea in 1999. Two NSF programs, tentatively planned for BROWN could not be scheduled (funding was declined on one and equipment scheduling conflicts prevented the other).

National Science Foundation (NSF) - The NSF report was given by Don Heinrichs. His view graphs are included as ***Appendix V.*** The NSF budget for 1999 is still pending and expectations remain the same as those reported at the February Council meeting in Galveston. The 1998 budget was flat when compared to 1997. In 1999 Ocean Science Research Support has requested a 13.7% increase. Facilities has requested $56.96M representing a 9% increase over 1998. Both the House and Senate Committees have different versions of the NSF funding bill but both show an increase. The bill goes to conference in September.

In an effort to resolve the conflicts in funding the shared use equipment/technical support for sea going programs, NSF is considering removing this support from the research proposal grant. Requests for technical support would come into the Technical Services Program. This should help to eliminate the problems associated with variable costs to the PIs when schedules change and science programs are moved from one ship to another. Some elements of this will be implemented in 1999.

Rita Colwell has been confirmed by the Senate but has not yet been sworn in. She will replace Neil Lane as Director NSF when he takes over OSDP. The Geoscience Directorate will be putting together a separate Facilities Plan of 5 years. It will respond to "What facilities are needed to implement the science plan".

The NSF newsletter is calling for an open solicitation to the science community to provide input to the academic fleet review.

Don reported that NSF will again conduct a performance review. They will most likely request assistance from the UNOLS Office in preparing the ship operations review section.

NSF is planning a symposium 28-30 October to celebrate the Foundation's 50th anniversary. Numerous leaders from the past have been invited.

Naval Oceanographic Center (NAVO) - Pat Dennis gave the report for NAVO. NAVO is completing a second year of funding ship time for the UNOLS Fleet. The third year funding is not firm, however, it looks promising. Pat explained that this should not be considered supplemental funding of the UNOLS Fleet but should be viewed as a mutually beneficial arrangement where NAVO gets quality scientific facilities and service at a cost

effective rate while UNOLS is able to maximize its schedule efficiency with the added work. Pat reiterated NAVO's full satisfaction with the UNOLS Fleet and complemented CDR Jim Trees' energetic and supportive role in coordinating the work.

Oceanographer of the Navy (OON) - RADM Tobin has retired as OON and has been replaced by RADM Ellis. Ed Witman, Technical Director of the OON office, is also retiring. John Dalton, Secretary of the Navy, has announced his plans for retirement. These have all been active and vocal supporters of oceanographic research and will be missed.

The Navy is presently operating seven TAG survey ships. TAG 63 is the 4th of the class and will soon join the fleet. The fifth ship, TAG 64, is under construction and should be launched in November or December. A sixth and last ship of this class should be funded in the 1999 budget. TAG 64 has been named USNS BRUCE HEEZEN. A national ship naming competition was held by the Navy. Nearly 2000 proposed names were submitted by schools across the country. The winning class were the fifth graders from Oak Lawn Elementary School of Cranston, Rhode Island with the name Bruce Heezen. The runner up was St. Martin's Lutheran School of Annapolis, Maryland. More information on the contest and the winner can be found at <http://www.oceanographer.navy.mil /winner.html>.

Office of Naval Research (ONR) - Pat Dennis provided the report for ONR. Pat reported that ONR has budgeted $5.5M facilities money for ship time support of oceanographic research. This money provides 80% of the funding while 20% comes from the science programs. This year KNORR was involved in a very successful operation with the Navy/Marine Corps when it supported a mine countermeasures operation off of Newfoundland. This was the first time Navy 6.3 funding was used by ONR for a UNOLS ship. It was suggested that an information package on UNOLS be developed. The package could be provided to groups like the Navy's 6.3 programs to describe the resources and capabilities of the UNOLS fleet.

Consortium for Oceanographic Research and Education (CORE) - The CORE report was provided by Dan Schwartz. A copy of the CORE viewgraphs is included as ***Appendix VI.*** CORE has 51 members 35 of which are also members of UNOLS. CORE institutions receive approximately $780M in Federal Support. CORE Projects include an Alumni Survey, Education inventory, Ocean science workshop/media cruises aboard SEWARD JOHNSON and CAPE HATTERAS, an Ocean Science Educators Retreat, Community College integration - MATE Program, CORE/NRL Postdoctoral Fellowship Program and Distinguished Visiting Scientists Program. CORE is actively involved in the National Ocean Science Bowl and the contractor for the National Ocean Partnership Program (NOPP) Office.

NOPP received $20.5M in funding for 1997 with $7.5M going to support NAVO surveys on UNOLS ships. In 1998, $24.5M was received and again $7.5M went to NAVO for UNOLS ship use. 72 proposals were submitted in 1998 for the NOPP funds, with 12

proposals selected for funding. CORE has been promoting the Oceans Act of 1998 which would convene a "Stratton Commission" type panel to review national ocean activities and recommend a coordinated national policy for the oceans. This bill is still working its way through Congress. The information on the FY99 appropriations visit the CORE webpage, http://core.cast.msstate.edu.

United States Coast Guard (USCG)- The Coast Guard was not represented at the meeting, however, Jon Berkson provided a written report which is included as ***Appendix VII.*** The report provides a update on HEALY. This ship is presently scheduled for delivery in early 1999 with a delay possible. A 30-meter coring system is being designed for this ship by Jim Broda of WHOI. The USCG is concerned that science funding has not been identified for HEALY operations.

POLAR SEA is presently deployed to the Arctic. Academic scientists are aboard as part of a "Science of Opportunity" cruise. POLAR STAR will be making an Arctic trip in July. Both ships will also support the SHEBA program. There is concern with an OMB instruction to require the Coast Guard to seek full reimbursement for operating costs of HEALY for non-DOD users. The Coast Guard has gone on record in opposition to the OMB position.

UNOLS ISSUES:

NSF Academic Research Fleet Review - Don Heinrichs provided an update of the NSF Fleet Review. The first meeting of the review was held at NSF in Arlington, VA on 8-10 June. The Review committee is chaired by Roland Schmitt, RPI retired, with committee members: Earl Doyle, Shell Development; Steve Ramberg, ONR; Hugo Bezdek, NOAA retired; Chris d'Elia, U. MD; Ellen Druffel, UC Irvine; Larry Mayer, U. New Brunswick; and George Weatherly, Florida State. The Committee Terms of Reference are included as ***Appendix VIII.***

NSF and UNOLS provided presentations to the Committee for the three days of the first meeting to provide a background on Fleet operations. The second meeting will be held at SIO in La Jolla, CA on 2-3 September with a site visit of MELVILLE, SPROUL and ATLANTIS scheduled for 1 September. This meeting will provide projections of future science trends and cost comparative operations models. Tasking for the second meeting has been developed. A third meeting is tentatively scheduled for 10-12 November.

The committee's report and recommendations are expected in late 1998/early 1999.

NSF is seeking input from the science ship use community. Ken Johnson and Tom Royer will write a letter encouraging input.

FOFCC Meeting Report - Ken Johnson gave a summary of the FOFCC meeting that was held on 30 June in Arlington, VA. The meeting was well attended. FOFCC will be updating their 1990 Report on Federal Oceanographic Fleet Requirements. The new plan

will include other facilities with the possible inclusion of buoys and submersibles. Ken provided FOFCC a report for UNOLS showing viewgraphs of the UNOLS Operating days over the last 20 year, operating days for 1998 by ship and UNOLS projected 1998 operations support. These viewgraphs are included as ***Appendix IX.***

National Oceans Conference - Both Ken Johnson and Jack Bash attended the National Oceans Conference in Monterey, CA on 11-12 June. The conference was considered useful in that it brought ocean issues to the highest levels of government and could result in funding increases for ocean research.

Science Mission Requirements (SMR) - Larry Atkinson, FIC Chair, led the discussion on the progress of developing SMRs for both an east coast research vessel and an Alaskan vessel. E-mail input has been received from all committee members working on the east coast SMRs. These will be consolidated with the original Class IV and III SMRs and prioritized. The East Coast SMRs should be ready in the fall. A conceptual design would be the next step after funding is secured.

SMR development is progressing on the replacement for ALPHA HELIX. An ice capability as well as a fisheries capability will be considered in the design of this vessel. Jim Meehan, NMFS and member of the SMR committee, commented on the fisheries capability of this vessel as compared to the NOAA FRV design. An update on the Alaskan SMRs will be provided at the fall meeting.

New Ship Construction - The replacement ship for BLUE FIN will be RV SAVANNAH. A contract for construction of this vessel is currently out for bid. The CALANUS replacement is still in the design phase. Florida Institute of Oceanography has a conceptual design for a replacement of SUNCOASTER. The new ship is planned to be 125 feet in length. More information on this ship is included in ***Appendix X.***

AGOR 26 Construction Update - Pat Dennis reported that AGOR 26 is under contract to Lockheed Martin/Ingalls and is presently in the design phase. This ship will be a SWATH hull form and will be operated by the University of Hawaii. A spread sheet with comparison design criteria is included as ***Appendix XI.*** Phase I, the design phase should be completed by 29 October 1998 and is budgeted at $1M. Phase II, the construction phase is budgeted at $36M. Outfitting and testing will be included in the remaining budget.

A design review meeting is planed for 17 August. The Council voiced concern that UNOLS has not been kept abreast of the construction project nor have they been given the opportunity to provide input. Pat reported that at this time it appears that the design capabilities meet the Science Mission Requirements recommended by UNOLS. A "virtual design" website has been established by Lockheed/Martin. It was suggested that UNOLS be given access to the site so that they can keep abreast of progress on the construction.

FIC will be invited to review the AGOR-26 design progress at a 28 or 29 July meeting at the Lockheed/Martin facility in Sunnyvale, CA.

Airships and Aerostats - Jim Hain (Associated Scientists at Woods Hole, Inc.) made a presentation on airships and aerostats. A report by Jim titled *Airships for Marine Mammal Research: Evaluation and Recommendations* is included as ***Appendix XII.*** Ninety Five percent of the current activities of airships are involved in the corporate market. Four percent are used for surveillance and less than one percent are used for research. Lighter than air platforms are well suited for research because of their slow flight, station keeping and stable platform. They provide an effective platform for photo and video data acquisition, remote sensing and lowering instruments. These facilities are particularly suitable for large mammal studies in the sea, ocean atmospheric studies, plume studies and flying instrument test beds. Most platforms use for science to date have been provided by commercial companies pro bono.

Jim is interested in seeking other interested investigators that might have a scientific need for lighter than air platforms. The Council agreed to provide outreach support to the community for solicitation of interest in lighter than air platforms. It was suggested that Jim submit an article for the UNOLS Newsletter. Jim was asked to keep UNOLS abreast of his progress.

2 July 1998

RVOC Safety Video - Steve Rabalais reported that production of the RVOC Safety Video has been completed. It will be ready for distribution over the summer.

Ship Scheduling Process - Don Moller provided background on the scheduling process and how it is evolving. In the past, the ship schedules consisted primarily of cruises with researchers from their own respective institution. This was a simplified scheduling process but not always the most cost effective way to do business. Now the user base has become more broad. More agencies are involved and the panel funding decisions are earlier. Communications have improved with the use of the Web. Also in the past, there was less equipment that was shared by the fleet and therefore less coordination was needed. The changing conditions have required more central coordination. Electronic ship time requests with instant distribution has been initiated. Electronic posting of these requests make them more accessible to schedulers. Schedules are updated and electronically posted more frequently. Efficiencies in cruise tracks are scrutinized. Two annual scheduling meetings followed by two schedule review meetings have given way to one schedule review meeting in June and a general scheduling meeting followed by a review meeting in September. Some scheduling problems remain. Late changes in schedules are traumatic for the science parties. There is a perception that scientists are disconnected from the process; that schedules are driven by the agencies and not the schedulers and the process is becoming more frustrating.

Don proposes changes in the scheduling process. The June meeting should be delayed until early July and be a full ship scheduling meeting followed by a review meeting. Schedulers with local schedules that do not require coordination need not attend. The later date will allow for more information to be available concerning funding decisions. It would also provide NSF program managers with additional time for making funding announcements. Schedulers should not be required to develop full schedules or cruise tracks until most funding decisions are known. In place of a schedule the schedulers should post a list of proposed cruises in the approximate order of anticipated timing. Schedules would be developed at or immediately following the July meetings. The September ship scheduling meeting would not take place and only a schedule review meeting would held at that time.

On a related topic, the Council discussed the **interchangability of ships**. Scientists often become very frustrated in instances when they are moved from one ship to another during the scheduling process or when they do not get scheduled on the ship that they requested. There is a perception among scientists that ships are not interchangeable. It was suggested that additional training is needed for ship support groups to improve interchangability of ships. One way to help remedy this problem would be to internally swap technicians among UNOLS ships so that they can obtain a broader knowledge and experience. It was also commented that more definition of the cruise plan is needed after the project is funded. This would better enable the ship operator to technically support the cruise. The UNOLS new ship time request two-part form will actually address this exact issue. Lastly, it was recommended that the community, particularly new PIs need educating on the ship scheduling process. The NSF general proposal guidelines should reference the UNOLS webpage.

Two action items resulted from the discussions on ship scheduling procedures and interchangability of ships:

1. Don Moller was asked to prepare his proposed revision to the ship scheduling and circulate them for further comment.

2. A "white paper" should be written on "How ships are scheduled - a guide for novices." The paper would be posted on the UNOLS website.

UNOLS Annual Meeting - The Council made suggestions for potential keynote speakers an presentations for the Annual Meeting.

UNOLS Town Meeting, Customer Satisfaction Survey & Long Range UNOLS Issues/Public Outreach - Because all three agenda items addressed a similar topic they were discussed together. Ken provided a brief update on the 12 February Town Meeting the AGU/OSLO Conference in San Diego. The meeting was well advertised but not well attended. It was designed to be both informational and to allow the community to express their concerns with UNOLS. The low attendance could be construed as general satisfaction or at least a lack of strong dissatisfaction. Those that did attend took part in a

friendly open discussion about the UNOLS activities. The Council encouraged continued efforts to reach the community. These should include: periodic customer satisfaction surveys (about every two to three years); advertise that the Council meetings are open and the community is encouraged to attend; a round table discussion with program managers at the Annual Meeting; the NSF inspection process should review ship assessment reports and continue a booth at the fall AGU meeting. It was recommended that UNOLS have a poster at the Fall AGU. It was further suggested that an agenda item for the next Council meeting should be post cruise assessment follow-up procedures.

Don Heinrichs reported that as part of the Academic Fleet Review, a customer satisfaction survey will be conducted. The Council agreed to postpone the development of a UNOLS survey until after the results of NSF's survey are available. Don Heinrichs invited the Council to provide suggestions for questions for the customer survey.

Antarctic Support Association (ASA) Logistic Support - The Council briefly discussed ASA's possible option for a U.S. oceanographic research facility to provide the functions of managing, planning, staffing and maintaining logistics support of PALMER and GOULD. No decisions or conclusions were reached.

Small Boats Designated as RVs - The Council briefly discussed the recent correspondence in the community about whether or not small boats fell within the Research Vessel Act and if their operators required passenger licenses. It was suggested that this issue should be passed on to George Ireland for advise.

UNOLS Office Transfer - Jack Bash provided the Council with a draft letter and schedule for the search for a UNOLS Office host and executive secretary replacement. The Council concurred with the letter and schedule.

UNOLS Charter Review - Clare Reimers led the discussion on the proposed changes to the UNOLS Charter. Changes are proposed for the basic Charter and three of the annexes. The primary thrust of the Charter changes are to allow for a more balanced representation between non-operator and operator members and to also address the issue of membership by consortia. The revised Charter would allow non-operator members an opportunity to hold chair positions on the Council and its committees. The annex changes followed this theme for the FIC annex and were general updates for the Ship Scheduling annex and National Facilities annex.

There was discussion by the Council on the issue of consortia. The proposed revised charter states that membership shall be by individual institution or by consortium. If a consortium is a UNOLS member, no constituent institution of that consortium may be a member.

It was decided that a separate vote would be taken for the consortium member issue at the Annual meeting so that the more routine changes could still be made if this issue were defeated.

UNOLS Council Membership - Dennis Hansell, Chair of the nominating committee reviewed the 1998 Council nomination process, see ***Appendix XIII***. In February/March 1998 the committee was formed and includes Dennis, Clare Reimers and Peter Lonsdale. A call for nominations was announced in April/May. The announcements were sent out via the UNOLS newsletter, EOS, and letters to the UNOLS representatives and Dean/Directors of member institutions.

Dennis presented a draft slate for the Chair, Vice Chair and Council members. It was noted that there were no candidates for Council Chair and that Tom Royer was running unopposed as Vice Chair. A nomination was made to nominate Bob Knox as Chair. The final slate will be advertised at least thirty days before the Annual Meeting.

The Council recommended that the nominating process conducted this year should be the model for future years.

CORE/UNOLS MOA - A discussion was held on the current CORE/UNOLS MOA. As written it is very broad and probably needs to be more specific. The Council recommended that the Chair and Executive Secretary work with CORE on possible revisions and proposed that the new MOA include a provision that required the two organizations to have a working meeting at least twice a year to coordinate activities.

SEA CLIFF and ATV Retirement Plans - Pat Dennis provided the Council with the latest information on SEA CLIFF and ATV. SEA CLIFF has been transferred to ONR and will soon be sent to WHOI. An engineering study is proposed to the agencies to determine how the vehicle or its parts can best be used. The decision on ATV still remains pending. Pat also informed the Council that TURTLE has been retired and will be transferred to either Mystic Museum or Hawaii.

Ship Scheduling Improvements - Jack Bash reported that improvements to the ship scheduling process should be up and running in a few of weeks.

AGOR Z-drive Thruster Status - Bob Knox informed the Council on the status of the AGOR Z-drive thrusters. Glosten has completed a study on the cause of the failures and has provided a report. Recommendations from that report are included as ***Appendix XIV.*** Two gears have been purchased for KNORR. The starboard gear has been replaced but not the port. Bearings and seals were replaced on both sets of gears. ONR has funded the purchase of two new gears for MELVILLE. Both will be installed at next dry-docking. It was recommended that one spare port upper gear and one spare starboard upper gear be purchased as spares for AGOR 23-25. ONR will fund this purchase. A complete lower unit spare exist.

AGOR 25 Test and Trials Schedule - Dick Pittenger reported on the test and trials schedule for ATLANTIS. The ship held its Post Shakedown Availability (PSA) in January and February of this year after completing six successful months of operations. The ship

has been operating since the PSA. SCN money ran out in May. The tests and ship operations have gone very well. ***Appendix XV*** provides a detailed schedule.

Applications for UNOLS Membership: An application for UNOLS membership from the University of Minnesota, Duluth was received. The University of Minnesota, Duluth recently acquired a vessel from the Department Of Commerce buy-back program. It has been outfitted for oceanography (with some NSF money) and is presently operating in the Great Lakes. Scientists have indicated an interest in using the ship. Although U. of Minn. has applied to become a member of UNOLS they have not applied for BLUE HERRING to be a UNOLS vessel but will be a non-operating member. The Council approved the application and moved to forward it for vote at the Annual Meeting.

The Council recommended that the two membership requests from consortia, New Jersey Marine Science Consortium and Southern California Marine Institute, be provisionally advanced to the Annual Meeting for vote conditionally based on the pending charter change.

UNOLS Brochure - Vicky Cullen of Woods Hole has been funded to publish an updated UNOLS brochure. It should be ready in about six months.

Miscellaneous Discussions - It was suggested that agency reports be heard at the Annual Meeting and not given at the September Council meeting. Dick Pittenger extended an invitation for the Council to hold their next summer meeting at Woods Hole.

The meeting was adjourned at 2:30 pm.

APPENDIX I

6/29/98

UNOLS COUNCIL MEETING
Wednesday-Thursday, July 1-2, 1998
W. Alton Jones Campus
Whispering Pines Conference Center - Sycamore Lodge
University of Rhode Island
West Greenwich, RI 02817-2158

Call the Meeting: Ken Johnson, UNOLS Chair, will call the meeting to order at 8:30 a.m., 1 July 1998.

Accept Minutes of the February, 1998 Council Meeting.

COMMITTEE REPORTS: Ken Johnson will provide a brief summary of the UNOLS Committee written reports and open the floor to a question/answer period. (Prior to the meeting, Committee Chairs submitted written reports for distribution to meeting participants.) Chairs will identify any important issues that need to be addressed further by the Council.

AGENCY and OTHER REPORTS: Reports from agency representatives on funding outlooks, facility updates, and special projects:

Department of State - Tom Cocke
National Oceanographic and Atmospheric Administration - CDR Elizabeth White
National Science Foundation - Don Heinrichs
Naval Oceanographic Center - CDR Jim Trees
Oceanographer of the Navy - Pat Dennis
Office of Naval Research - Pat Dennis
Consortium for Oceanographic Research and Education - Capt Dan Schwartz
United States Coast Guard - J. Berkson

UNOLS ISSUES:

NSF Academic Research Fleet Review - Don Heinrichs will provide a report on the June 8-10 NSF Fleet Review Meeting and plans for the follow-on meetings in September and November.

FOFCC Meeting Report - Ken Johnson will provide a report on the 30 June FOFCC meeting.

National Ocean Conference - Ken Johnson and Jack Bash will report on the National Ocean Conference in Monterey, CA.

Ship Scheduling Process - Don Moller will lead a discussion on ship scheduling process issues.

Interchangability of Ships - Ships in similar size classes are becoming more specialized in capabilities and training. Transfer of cruises depending on these specialized capabilities places an increasing burden on science parties. How should we respond - encourage cross training, recognize explicit specialties (biogeochemistry, moorings, MGG/Swath mapping, etc.)?

UNOLS Annual Meeting - The Annual Meeting has been scheduled for Thursday, 17 September. Suggestions for kenote presenter and agenda items will be discussed.

AGOR 26 Construction Update - Pat Dennis will provide an update on the Navy's construction of AGOR 26, SWATH research vessel.

Airships and Aerostats - Jim Hain (Associated Scientists at Woods Hole) will report on applications of airships (blimps) and aerostats (tethered balloons) for oceanographic research **(Enclosure 1).**

Science Mission Requirements (SMR) - Larry Atkinson will review the status of SMR development for an East Coast Research Vessel and a vessel for work in Alaskan waters.

UNOLS Town Meetings - Ken Johnson will report on the Town Hall Meeting held on 12 February at the AGU/OSLO meeting in San Diego. Should we hold another Town Hall meeting at the Fall AGU Conference in December, 1998?

Antarctic Support Association (ASA) Logistic Support - ASA is exploring the possible option for a U.S. Oceanographic research facility to provide the functions of managing, planning, staffing and maintaining logistics support of PALMER and GOULD.

Customer Satisfaction Survey - The last customer satisfaction survey was conducted in 1995. Is it time to re-survey the community?

CORE/UNOLS MOA - Discussion on whether the CORE/UNOLS MOA needs to be revisited and redefined.

SEA CLIFF and ATV Retirement Plans - Pat Dennis will review plans for the future of DSV SEA CLIFF and ATV following their retirement from the Navy.

Ship Scheduling Improvements - Jack Bash will report on the progress of the improvements to the UNOLS ship scheduling process.

AGOR Z-drive Thruster Status - Bob Knox and Dick Pittenger will review the latest status of any AGOR Z-drive issues.

New Ship Construction - Update on Skidaway's construction of R/V SAVANNAH. Update on plans for replacement of CALANUS.

Long Range UNOLS Issues/Public Outreach - At the last Council meeting public outreach was identified as an area needing greater attention by UNOLS. Review recent public outreach activities and discuss other methods for reaching out to the community.

UNOLS Office Transfer - Discussion on plans for transfer of the UNOLS Office. The current UNOLS Office grant with the University of Rhode Island will expire on 30 April, 2000.

UNOLS Charter Review - Clare Reimers will review the recommended revisions to the UNOLS Charter and structure as prepared by the ad hoc committee ***(Enclosure 2).***

UNOLS Council Membership - Dennis Hansell, Nominating Committee Chair, will report on nominations for UNOLS Chair and Council members. The terms of Ken Johnson, Tom Royer, Dick Pittenger and Bob Wall are expiring.

Applications for UNOLS Membership :

- The University of Minnesota, Duluth has applied for UNOLS Membership. A copy of their application is included as ***Enclosure 3.***
- The New Jersey Marine Sciences Consortium and the Southern California Marine Institute applied for UNOLS Membership in 1997. Discussion on the status of their applications.

UNOLS Brochure - Update on plans for updating the UNOLS brochure.

Calendar for UNOLS Meetings:

MEETING	LOCATION	DATES
FIC	TBD	Summer, 1998
NSF Fleet Review	SIO, San Diego, CA	Sept 1-3, 1998
Ship Scheduling Comm.	NSF, Arlington, VA	Sept 14, 1998
Schedule Review	NSF, Arlington, VA	Sept 15, 1998
UNOLS Council	NSF, Arlington, VA	Sept 16, 1998
UNOLS Annual	NSF, Arlington, VA	Sept 17, 1998
RVTEC	SIO, La Jolla, CA	Oct 19, 1998
INMARTECH '98	SIO, La Jolla, CA	Oct 20-22, 1998
RVOC	U.Hawaii, Honolulu, HI	Nov 4-6, 1998
DESSC	AGU, San Francisco, CA	Dec 1998
AICC	Avondale, LA	Winter, 1998/99

Adjournment

APPENDIX II

Council Meeting - July 1-2, 1998

NAME	AFFILIATION	PHONE/FAX/INTERNET ADDRESS
Larry Atkinson	ODU	(757) 683-4926/(757) 683-5550/atkinson@ccpo.odu.edu
John Bash	UNOLS	(401) 874-6825/(401) 874-6167/unols@ gso.uri.edu
Chuck Byrne	NOAA/NMFS/NEFSC	(508) 495-2224/(508) 495-2258/charles.byrne@noaa.gov
Tom Cocke	Department of State	(202) 647-0240/(202) 647-1106/tcocke@state.gov
Annette DeSilva	UNOLS	(401) 874-6825/(401) 874-6167/unols@gso.uri.edu
Pat Dennis	Navy Support/CORE	(703) 696-2161/(703) 696-2007/dennisp@onr.navy.mil
John Freitag	URI	(401) 874-6579/(401) 874-6578/jfreitag@gso.uri.edu
Jim Hain	WHOI	(508) 564-4449
Dennis Hansell	BBSR	(441) 297-1880x210/(441) 297-8143/dennis@bbsr.edu
Don Heinrichs	NSF	(703) 306-1576/(703) 306-0390/heinric@nsf.gov
Ken Johnson	MLML	(408) 755-8657/(408) 753-2826/johnson@mlml.clastate.edu
Bob Knox	SIO/UCSD	(619) 534-4729/(619) 535-1817/rknox@ucsd.edu
Jim Meehan	NOAA/NMFS	(301) 713-2363/(301) 713-1875/james.m.meehan@noaa.gov
Don Moller	WHOI	(508) 289-2277/(508) 457-2185/dmoller@whoi.edu
Dennis Nixon	URI	(401) 874-2147/(401) 874-2156/dnixon@uriacc.uri.edu
Mike Perfit	U of Miami	(352) 392-2128/(352) 392-9294/perfit@geology.ufl.edu
Dick Pittenger	WHOI	(508) 289-2597/(508) 457-2185/rpittenger@whoi.edu
Steve Rabalais	LUMCON	(504) 851-2808/(504) 851-2874/srabalais@lumcon.edu
Claire Reimers	Rutgers University	(908) 932-6555x236/(908) 932-8578/reimer@ahab.rutgers.edu
Tom Royer	ODU	(757) 683-5547/(757) 683-5550/royer@ccpo.odu.edu
Daniel Schwartz	CORE/NOPP	(202) 232-3900x222/(202) 332-9751/dschwartz@brook.edu
Tom Shipley	U of Texas, Austin	(512) 471-0430/ 512-475-6338/tom@utig.ig.utexas.edu
Jim Swift	SIO	(619) 534-3387/(619) 534-7383/jswift@ucsd.edu
CDR. Beth White	NOAA/OAR	(301) 713-2465 x184/(301) 713-0158/elizabeth.white@noaa.gov

APPENDIX III

UNOLS Committee Reports
July 1998

Committee report from RVTEC to UNOLS Council:

RVTEC activities for the first half of this year have concentrated mainly in two areas. The first is the upcoming RVTEC/INMARTECH 98 meeting scheduled to be held in La Jolla on 19-22 October. To date all of the RVTEC meetings have involved only participants from UNOLS institutions, NSF, ONR, NOAA, NAVO and ASA. Last year we were joined by representatives from the Polar operations group of the Coast Guard. The 1998 meeting in La Jolla will be unique in that we will involve groups from the international community. This effort resulted from a successful INMARTECH 96 in Southampton, England in which technical groups from the international community gathered for a joint meeting. Subsequent to this meeting efforts were made to include US representation and through the efforts of the NSF a tentative decision was made to host an international meeting here in the United States.

The subject was an agenda item at last years meeting in Seattle bringing a consensus to host a combined meeting in 1998 at La Jolla. Through the unflagging efforts of Annette DeSilva of UNOLS and Woody Sutherland, Technician manager at Scripps Institution of Oceanography the program has moved forward and final preparations are presently in progress.

The RVTEC group will meet for a one day session prior to the international meeting which will last for 3 days. Present plans include Workshops on several subject of interest to Marine Technicians, a reception and poster session at the Birch Aquarium facility on the SIO campus, a Bar-B-Que at SIO Marine Facilities and a Mexican dinner.

In other activities, RVTEC has been working closely with the U.S. Coast Guard and the AICC in planning the scientific ice trial of the new Coast Guard icebreaker USCGC HEALY. Because HEALY is the first USCG vessel with science written into her mission statement it is clear that the Coast Guard is serious in making HEALY a first rate scientific platform for Arctic operations. AICC was brought in early on to assist in the selection of the scientific suite and RVTEC has been involved in the planning of the scientific testing regime as well.

The Coast Guard is seriously looking at a variation of the UNOLS model for technical staffing of the vessel. Toward this end they have, at our invitation, sent Coast Guard Marine Science Technicians out on UNOLS vessel in order to become acquainted with the UNOLS way of doing business.

Submitted,
John S. Freitag
Chair, RVTEC

Fleet Improvement Committee
Status Report

FIC has two SMR activities in progress at this time.

The committee to develop an SMR for a vessel suitable for work in the shallow waters of the east coast continental shelf and bays includes Gus Paffenhofer (SKIO), Charlie Flagg (BNL), Al Hine (SFU), Mary Scranton(SUNY, Stony Book), Clare Reimers (Rutgers), and Larry Atkinson (ODU and Chair). The committee is working from existing SMR's and at this point each committee member have provided their own assessment of requirements. In the next few months the SMR will be finalized.

The second SMR is to develop a Science Mission Requirement (SMR) document for a vessel suitable for work in the Alaska region. The committee will be lead by co-chairs Drs. Tom Weingartner and Vera Alexander, both from the University of Alaska. Other members include George Hunt (UC Irvine), John Christensen (Bigelow Laboratory), Larry Atkinson (ODU), and Jim Meehan (NOAA/NMFS). The Alaska SMR committee has a more difficult task as it must consider not only the needs of general oceanographic research in Alaska waters but also ice strengthening and fisheries research. A draft plan should be ready by December.

DEep Submergence Science Committee Report - June 1998
Submitted by Mike Perfit, Chair

Operations on ATLANTIS since the last PSA at the beginning of this year have been going very well. Some of the major problems that were plaguing the new ship were addressed during the PSA....others will continue to be worked on over the next year. DESSC was made aware of the operators plans for upgrading the ATLANTIS in the coming months (e.g. further work on the HVAC, propulsion control systems, consistent lab power supply, crane upgrade, noise abatement). The operators and DESSC will work together to get input from the science community to prioritize these upgrades. The next major shipyard period is in two years.

ALVIN and ROV work has been very successful. Bottom time with ALVIN has increased (avg. 5.2 hrs). A number of advances with imaging, mapping and navigation have been made with Jason. The WHOI operators have continued to work on upgrades to the vehicles that the community requested and were funded through the federal agencies. WHOI is continuing to work on the data logging and navigation systems, video upgrades, scanning sonar, a "virtual ALVIN" computer model and a ring laser gyroscope. WHOI has also funded a steerable elevator for Jason that will be tested later this summer.

At the suggestion of DESSC, the WHOI operators have instituted a new "Science Liaison" position to help facilitate cruise planning and to act as a science coordinator. They are in the process of searching for an assistant coordinator and staff assistant now.

Scheduling for ALVIN and the ROV's for '99 and beyond is beginning. There is again a good deal of proposal pressure for the traditional "yo-yo" regions (JdF-N EPR) but more proposals are coming in for S. EPR , Atlantic and Gulf of Alaska. NOAA/NURP plans to have 21 dives in the N Pacific in 1999. DESSC has had some success in developing global deep submergence initiatives (SW Pacific, Indian Ocean).

WHOI and DESSC are still waiting to learn about the final disposition plans of SEACLIFF. The operators at WHOI submitted a proposal to the fed. agencies to do an engineering study regarding the potential uses of SEACLIFF and costs involved. This proposal is in the process of being revised at present.

DESSC has started to write a "White Paper" that will begin to address the future needs of deep submergence science and deep submergence science initiatives beyond 2000. Of particular interest was the role of ROV's and AUV's and how deep they will need to dive in order to complete the proposed science objectives. This document will be a precursor to wider community involvement and discussions regarding the development of new facilities in the near future. These community meetings may take place starting in the early part of 1999.

M. Perfit has completed his three year term as DESSC chair and Patty Fryer was nominated to replace him by the committee. In addition, three members of the committee (including Patty) are rotating off and nominations to replace them were given to M. Perfit. He is in the process of contacting them to see if they are interested.

AICC Report to Council

1. Funding for HEALY

Although the AICC has not yet taken an activist role in working to secure long-term funding for HEALY science logistics, the Chair is aware of some discussions which have taken place by various parties regarding the possibility of using congressional funding through the National Ocean Partnership Program to provide such support to the Department of Transportation. This is a quite different approach than another concept that has been discussed, namely of achieving seagoing science logistics parity between Arctic and Antarctic oceanography programs at NSF/OPP. As noted, the AICC is not involved at this time, and is simply awaiting information or advice on either matter. As far as is known to the AICC, support for even a significant fraction of the 240 days per year that is conceived for HEALY operations is not yet in place.

2. 1998 Western Arctic SOO program

An SOO cruise now underway in the western Arctic was preceded by the planned sequence of announced opportunity, assessment of proposals to participate for logistics suitability and compatibility, notification of PIs (none were turned down outright), selection of a Chief Scientist, and then leaving the program to the Coast Guard and participants. Earlier notice (due out soon) is expected for 1999.

An incident at sea in which radioactive materials may have been transported and brought on board without required notifications and documentation is now being investigated by the Coast Guard. The AICC has recommended that the Coast Guard be guided in handling these matters by existing UNOLS policies and procedures.

3. "SHEBA" SOO program

A late-breaking possibility for a second 1998 Science of Opportunity cruise (during August 1998) surfaced during late January 1998, with the option raised of some association with the SHEBA program. But the SHEBA program office made it clear that they would prefer what amounted to straight logistics support (crew rotation and equipment transfers) to a science-oriented "SOO" mission. (Bunk space limitations on the Polar class icebreakers mean that the vessel in effect cannot do both science and crew rotation on the same trip, without transfers at a port stop.) In the end, due to numerous uncertainties the choice of how to proceed was left to the Coast Guard and no formal announcement of opportunity to participate was issued by the AICC.

4. HEALY science systems testing

Mostly due to outstanding work by John Freitag (UNOLS RVTEC) and Jack Bash, a science systems testing program for USCGC HEALY is rapidly taking shape. This is science-oriented testing, and differs substantially from the builder's-type tests that are part of construction acceptance. An announcement of opportunity was broadcast, all tests were subscribed without controversy, the UNOLS Office solicited actual subcontract

proposals, and a $500k proposal was submitted to NSF to cover the testing of the indicated systems.

5. Long coring from HEALY

A major recurring issue has to do with details and capabilities of the HEALY's core handling system. Community input result in a shift in the maximum core length specification to 30 m, necessitating, if provided, a number of expensive modifications which at times could interfere with other science operations. A good bit of e-mail traffic continues about this
issue.

6. MST staffing strategy

The AICC has reviewed and commented upon a Marine Science Technician staffing strategy proposed by the Coast Guard for USCGC HEALY. The plan was an excellent start, although two primary concerns arose out of the AICC review: adequate provisions for tech support for true 24-hour operations and the training and science-time availability of the technicians.

7. HEALY science systems outfitting

An ongoing effort of the AICC is to clarify the science systems, including spares and accessories, to be delivered with USCGC HEALY, and to recommend to the Coast Guard a prioritized "wish list" to eventually bring the ship into line in this regard with the large UNOLS vessels. This ranges from spare CTD systems to an isotope van.

8. 1999 (and beyond) SOO programs

The first phase of the new Shelf-Basin Interactions initiative may bring unprecedented interest in using Coast Guard vessels for Science of Opportunity missions. This appears (at first glance) to derive partly from a much lower level of intended/funded ship support for this phase of SBI by NSF relative to the many scientists who for whatever reason anticipate sufficient research funds (from whatever sources) to participate, but without ship funds. At any rate, the straightforward process that lead to the 1997 and 1998 SOO assessments may not be sufficient to handle demand during the SBI program.

Report from the RVOC Committee Vice Chair - Steve Rabalais

The 1998 RVOC meeting will be hosted by the University of Hawaii on 4-6 November. A tentative agenda will be circulated in July and will include:

- UNOLS Reports and Committee Updates
- Agency (NSF, Navy, NOAA, etc.) Reports
- Special Reports to include presentations from operators of foreign vessels, and updates on new vessels and conversions
- A review of the charter experience on the *EWING* presented by Paul Ljunggren.
- One afternoon will be dedicated to seminars relevant to operators. Two topics under consideration at this time are:

Option 1: STCW Awareness Training(ABS Seminar)
The impact of the 1995 Amendments to the International Convention on the Training and Certification of Watchkeeping for Seafarers. Issues to be discussed include transitional provisions, certification, new requirements and various training information.

Option 2: ISM (ABS or P& H Marine Associates or others to make a presentation)
Over view of the International Safety Management(ISM) Code. What are the requirements of the ISM Code? How do you become certified and who can issue the certificates? What kind of audits are required? Who does this apply to research vessels? What are the implications of being certified and not being certified with the increased emphasis on port state control? How do you go about implementing the ISM Code?

- Marine Superintendents round table discussion

RVOC Committee Reports:

Safety - The Safety Committee met on 10 June to review a draft version of the Science Safety Video under production be Jamestown Marine Services. The film, with an Introduction by Dr. Robert Gagosian, was shot on board the R/V ENDEAVOR with special effects and graphics provided by Jamestown Marine. After minor editing corrections, as recommended by the Safety Committee, the final version will be ready for distribution on July 3. Master copies will be provided to the UNOLS office and each UNOLS Operator. UNOLS will retain the right to copy and distribute the film as they deem appropriate. The Safety Committee was very pleased with the rough draft and felt that with revisions the film will provide valuable information to the scientists using our ships.

The Committee also reviewed their progress with current revisions to the RVOC Safety Standards. All chapters are complete except Chapter 4 - Stability. After some discussion it was determined that the majority of this section, as it exists, is not relevant to the context of the Standards and will be removed. A condensed version of stability, as it pertinent to the operation of an academic R/V, will be

provided by Joe Coburn. The final copy will be available for review by RVOC and UNOLS before the 1 January 1999 deadline.
A discussion of STCW regulations and their application to U.S. academic R/V's followed. New interim rulings from the US Coast Guard are not clear as to how the new IMO standards are to be applied beyond commercial vessels. This in conjunction with existing ambiguities in U.S. code governing the operation of uninspected (undocumented) research vessels moved the Committee to consider addressing this issue through more direct discussion. A letter of intent is being prepared and will be circulated through RVOC after review by the Safety Committee. This letter will announce the Committees intentions to investigate, through independent council, if necessary the intended application of recent IMO rulings as implemented through the U. S. Code. While this investigation will focus on the new guidelines it is anticipated that the status of uninspected vessels relative to existing regulations will be addressed.

In addition to the developing the Science Safety Video and revising the RVSS the Safety Committee has been asked by the U.S. Coast Guard Maintenance and Logistic Command, Pacific (Vessel Specification Branch) to review the Handling Hazardous Waste Shipboard procedures to be used on the Polar Class vessels and the HEALY. The review is in progress and the Committees report will be forwarded to the Coast Guard before the end of next month.

APPENDIX IV

Charge/Operating Days
(1995-1996-1997-1998-1999)

	1995 Total	1996 Total	1997 Total	1998 Total	1999 Proj't
A-II / Atlantis	319	93 *	185 *	272 *	332
Ewing	310	315	273	215 *	330
Knorr	350	279	284	263	0 *
Melville	297	297	308	229 *	304
Revelle		80 *	288	299	214 *
Thompson	333	246	214	277	269
Edwin Link	175 *	186	214	182	232
Endeavor	228	147	201	158 *	143
Gyre	122	219	184	149	61
Moana Wave	195	144	202	169	136
New Horizon	240	174 *	259	221	158
Oceanus	187	168	209	247	213
Seward Johnson	271	304	284	281	225
Wecoma	145	198	199	226	223
Alpha Helix	144	73	118	172	138
Cape Hatteras	175	0	221	205	150
Cape Henlopen	198	185	206	195	185
Longhorn	72	130	46	63	45
Pelican	182	201	206	244	184
Pt. Sur	164	118 *	188	193	193
Sea Diver	180	132	105 *	133	48
Sproul	145	155	182	172	126
Weatherbird	154	167	151	134	120
Days	4586	4011	4733	4699	4017
Barnes	77	86	126	119	103
Bluefin	75	96	82	95	135
Calanus	48	50	111	167	111
Laurentian	91	72	44	146	215
Urraca	0	0	0	173	109
Grand Total Days	4877	4315	5096	5399	4690

* Overhaul or partial service

Note: Based on data available on 26 June '98

7/1/98 - DAM

LARGE SHIP CHARGE DAYS

(by Agency & Year)

		1995	1996	1997	1998	1999
NSF	**Days**	1371	1124	1018	920	816
	%	85.2	85.8	65.6	59.2	56.3
ONR	**Days**	84	20	88	53	114
	%	5.2	1.5	5.7	3.4	7.9
NOAA	**Days**	20	25	89	49	211
	%	1.2	1.9	5.7	3.2	14.6
NAVO	**Days**	0	0	184	213	224
	%	0	0	11.8	13.7	15.5
OTHER	**Days**	134	141	173	320	74
	%	8.3	10.8	11.2	20.6	5.1
TOTAL	**Days**	1609	1310	1552	1555	1449

7/1/98 - DAM

UNOLS FLEET CHARGE DAYS

(by Agency & Year)

		1995	1996	1997	1998	1999
NSF	**Days**	3249	2738	2909	2708	2645
	%	66.6	63.5	57.1	50.2	56.4
ONR	**Days**	403	454	499	416	472
	%	8.3	10.5	9.8	7.6	10.1
NOAA	**Days**	354	145	378	619	506
	%	7.3	3.4	7.4	11.5	10.8
NAVO	**Days**	0	0	373	449	436
	%	0	0	7.3	8.3	9.3
OTHER	**Days**	872	978	937	1207	631
	%	17.9	22.6	18.4	22.4	13.4
TOTAL	**Days**	4877	4315	5096	5399	4690

7/1/98 - DAM

APPENDIX V

NSF Budget Request - FY 1999

(figures in millions)

	FY 1998	FY 1999	Increase	Percent
Geosciences				
Atmospheric Sciences*	153.82	170.22	16.40	10.7%
Earth Sciences	95.13	106.70	11.57	12.2%
Ocean Sciences	206.16	230.39	24.23	11.8%
	$455.11	**$507.31**	**$52.20**	**11.5%**

	FY 1998	FY 1999	Increase	Percent
Ocean Sciences				
Ocean Sciences Research Support	112.15	127.50	15.35	13.7%
Oceanographic Centers & Facilities	52.26	56.96	4.70	9.0%
Ocean Drilling Program	41.75	45.93	4.18	10.0%
	$206.16	**$230.39**	**$24.23**	**11.8%**

*MRE account includes $21.0M for Polar Cap Observatory

NSF Budget Request - FY 1999

(figures in millions)

	FY 1998	FY 1999	Increase	Percent
Research and Related Activities				
Biological Sciences*	370.82	416.52	45.70	12.3%
Computation and Information Sciences	307.17	329.64	22.47	7.3%
Engineering	357.97	400.55	42.58	11.9%
Geosciences	455.11	507.31	52.20	11.5%
Math & Physical Sciences	715.71	792.03	76.32	10.7%
Social & Behavioral Sciences	130.66	150.26	19.60	15.0%
Polar Sciences	228.53	244.96	16.43	7.2%
Critical Tech. Institute	2.73	2.73	0.00	0.0%
	$2,568.70	**$2,844.00**	**$275.30**	**10.7%**
Education & Human Resources	**$632.50**	**$683.00**	**$50.50**	**8.0%**
Major Research Equipment**	**$109.00**	**$94.00**	**($15.00)**	**-13.8%**
Administration/Operations	**$141.80**	**$152.00**	**$10.20**	**7.2%**
NSF Total	**$3,452.00**	**$3,773.00**	**$321.00**	**9.3%**

*BIO includes $40.0M for Plant Genome Research
**MRE includes $31.0M for MPS projects, $42.0M for Polar Sciences projects, and $21.0M for GEO projects

APPENDIX VI

Consortium for Oceanographic Research and Education

Presentation to the UNOLS Council

July 1 & 2, 1998

W. Alton Jones Campus,

University of Rhode Island

http://core.cast.msstate.edu

Daniel S. Schwartz

Institutions of the Board of Governors

Naval Surface Warfare Ctr./Carderock

North Carolina State University

University of California Consortium

- Irvine
- Los Angeles
-
- Santa Cruz

University of North Carolina at Chapel Hill

Pennsylvania State University

University of Massachusetts at Dartmouth

Mississippi State University

Monterey Bay Aquarium Research Inst.

College of William and Mary

Woods Hole Oceanographic Institution

CORE

Consortium for Oceanographic Research and Education

Associate Members

Battelle

National Aquarium in Baltimore

NOAA Environmental Research Laboratories

New England Aquarium

Monterey Bay Aquarium

Research Centers of the US Geological Survey

Moss Landing Marine Laboratories

US Naval Postgraduate School

Mystic Marinelife Aquarium and Institute for Exploration

CORE

Consortium for Oceanographic Research and Education

CORE Capabilities

- 51 Institutions--Academic, Industrial, Aquaria, & Govt.
- Nearly 10,000 Professionals: Staff, Faculty, Technicians, and Postdocs
- Over 2200 Undergraduates
- 2800 Graduate Students
- Approx. $780 million, Federal Support
- Nearly $1 billion total national ocean science & education endeavor

CORE
Consortium for Oceanographic Research and Education

CORE PROJECTS

- Alumni Survey
- Education inventory
- Ocean sciences workshop / media cruise
  R/V S. Johnson & R/V C. Hatteras
- OSER 98
- Community College integration-MATE Program

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CORE PROJECTS cont.

Partnership with Naval Research Laboratory (NRL)

- Postdoctoral Fellowship & Distinguished Visiting Scientists Program

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Consortium for Oceanographic Research and Education

CORE PROJECTS cont.

National Ocean Sciences Bowl

Sponsored by US Navy, NOAA, NSF, NASA, and corporate sponsors

CORE

Consortium for Oceanographic Research and Education

NOPP Organization

National Ocean Research Leadership Council (NORLC)
Chair, Vice-chair and ten other permanent members

Interagency Working Group (IWG)
Representatives from participating USG Agencies

National Oceanographic Partnership Program Office (NOPPO)
Contractor
CORE

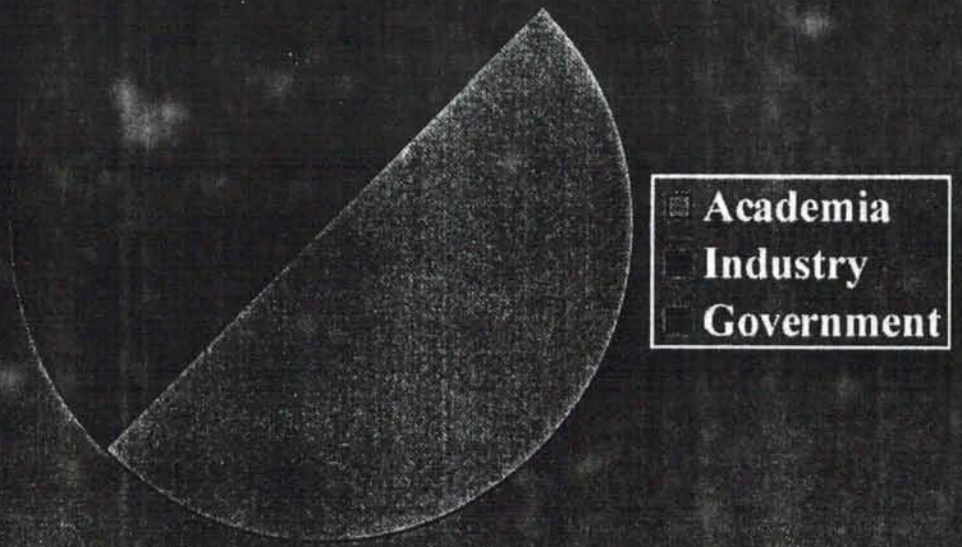
Ocean Research Advisory Panel (ORAP)
Up to 18 Non-Federal members

CORE
Consortium for Oceanographic Research and Education

Prescribed FY 97 NOPP Elements
($20.5M)

- $7.5M Oceanographic Surveys Using UNOLS Academic Ships
- $13M Partnership Projects
  - $2M Ocean Data and Remote Sensing Center
  - $2M National Littoral Laboratory
  - $5M General Partnership Projects
  - $2.5M Education and Training
  - $1M MEDEA Ocean Panel
    - » Investigating deliberate declassification for national needs
  - $0.5M Program Office

FY 1997 NOPP Program



- $20M of research and education
- 12 projects
  - 55 proposals reviewed by 16 external peer reviewers and 30+ Federal science managers
- 70 institutions in 19 states receiving funds

Consortium for Oceanographic Research and Education

FY 1998 National Oceanographic Partnership Program

$24.5M

- Existing efforts (~$6.5M)
- Coastal & Open Ocean Observational Technologies (~$6M)
- Regional Scale Coastal & Open Ocean Prediction Systems (~$4M)
- YOTO Drifter Project (~$0.5M)
- Oceanographic Surveys using UNOLS Ships (~$7.5M)

CORE
Consortium for Oceanographic Research and Education

FY 1998 National Oceanographic Partnership Program

"South Atlantic Bight Synoptic Offshore Observational Network" Harvey E. Seim, Skidaway Institute of Oceanography

"Ocean Acoustic Observatory Federation" John A. Orcutt, Scripps Institution of Oceanography

"Developing Long Range Autonomous Underwater Vehicles for Monitoring Arctic Ocean Hydrography" J.G. Bellingham, Massachusetts Inst. of Technology

"A Near-Real-Time, High-Resolution, Ocean-Surface-Current Mapping System" Thomas M. Georges, NOAA/ETL

"Design Study for NEPTUNE: A Fiber Optic Telescope to Inner Space" John R. Delaney, University of Washington

"Oceanographic and Fisheries Data Collection and Telemetry From Commercial Fishing Vessels" Ann Bucklin, University of New Hampshire

CORE

Consortium for Oceanographic Research and Education

FY 1998 National Oceanographic Partnership Program

"Oceanographic-Systems for Chemical, Optical, and Physical Experiments" Tommy D. Dickey, University of California, Santa Barbara

"Low Cost Modular Telemetry for Coastal Time-Series Data" Bradford Butman, U.S. Geological Survey/ Woods Hole

Consortium for Oceanographic Research and Education

FY 1998 National Oceanographic Partnership Program

"An Innovative Coastal-Ocean Observing Network (ICON)" Jeffrey D. Paduan, Naval Postgraduate School

"Demonstration of a Relocatable Regional Ocean Atmosphere Modeling System with Coastal Autonomous Sampling Networks" Scott M. Glenn, Rutgers University

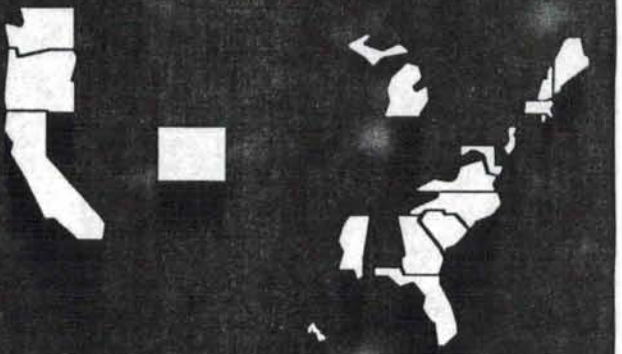
"The Prediction of Wind-Driven Coastal Circulation" Allen, John S., Oregon State University

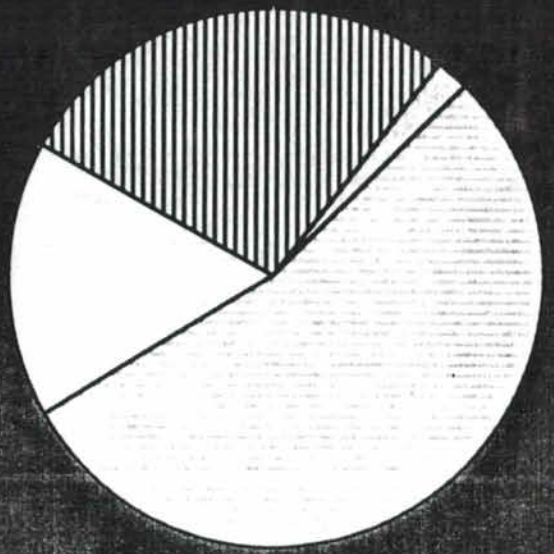
"Coastal Marine Demonstration of Forecast Information to Mariners for the U.S. East Coast" Leonard Walstad, University of Maryland

Consortium for Oceanographic Research and Education

FY98 Proposal package

- 61 institutions
- 17 states plus Bermuda
- Funding distribution:





- Academia
- Industry
- Government
- Other

CORE

Consortium for Oceanographic Research and Education

FY98 NOPP Proposals With Shiptime Requirements

>So. Atlantic Bight Synoptic Offshore Observational Network
--approx. 14 days, Class III or IV-

>An Innovative Coastal-Ocean Observing Network
--20 days over two years, Class III-

>The Prediction of Wind-Driven Coastal Circulation
--30 days over two years, Class III-

CORE
Consortium for Oceanographic Research and Education

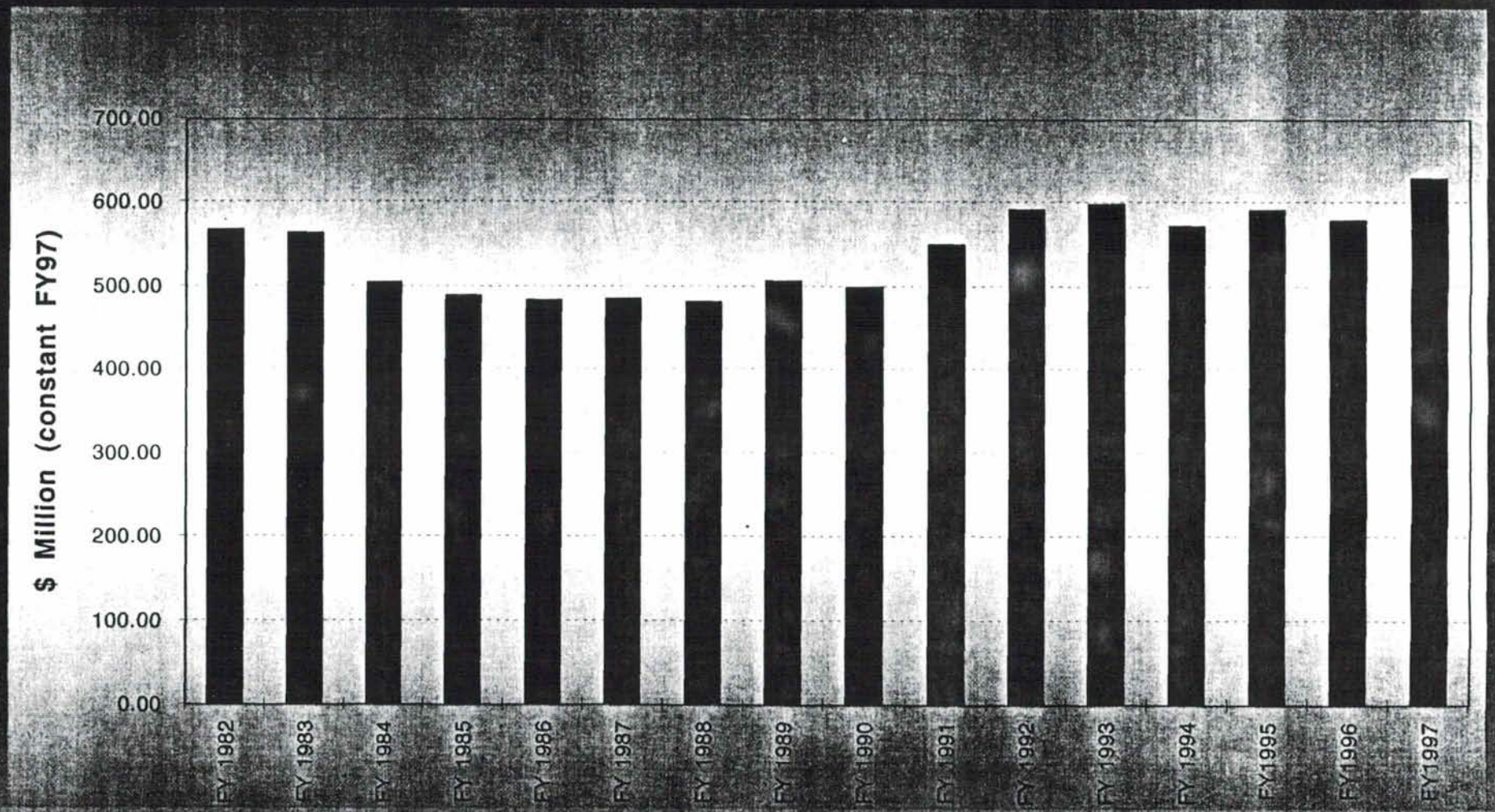
National Oceanographic Partnership Program Plan

- FY 1999 and Outyear Plans
  - Navy requested $10M in the FY 1999 Budget Request
  - NOAA requested $2M in the FY 1999 Budget Request
  - NSF requested $5.50 million for "basic research ... in partnerships with national consortia such as NOPP..."
  - NOAA, NSF, NASA, USGS, DoE are providing support for YOTO Drifter project
  - Ten agencies have indicated support for NOPP in the outyears
  - *'NOPP 2000"* Plan in development for ORAP

CORE

Consortium for Oceanographic Research and Education

US Federal Ocean Sciences Basic Research (Constant $FY97)



Consortium for Oceanographic Research and Education

FY '99 Appropriations

Presently in Process:

For Up-To-Date Information
Please visit the CORE Web Site

http://core.cast.msstate.edu

CORE
Consortium for Oceanographic Research and Education

Oceans Act of 1998

- HR 3445: Purpose--to convene a "Stratton Commission" type panel to review national ocean activities and recommend a coordinated national policy for the oceans
- Markup canceled by House Resources Committee June 17th due to substantial opposition to a planned Committee amendment
- Committee re-evaluation in process -- will try for another mark-up date next month
- Presidential Support expressed at National Ocean Conference

APPENDIX VII

COAST GUARD AGENCY REPORT
UNOLS COUNCIL MEETING
JULY 1-2, 1998

1. USCGC HEALY UPDATE

DELIVERY: Feb 99 is still the official delivery date from Avondale Shipyards. Unofficially, some in the Coast Guard doubt that Avondale can make the February 1999 delivery date, which is crucial to the summer '99 ice trials schedule. The Coast Guard expects to be able to provide a more firm projection by the August Ice Trials Meeting. Ice trials planning has been progressing extremely well. John Freitag (UNOLS RVTEC Chair) and Terry Tucker (CRREL) have been designing much of the science and ice trials protocols and have been doing a superlative job.

CORING UPGRADE: Funding has been secured by the Coast Guard Icebreaking Program to proceed with the development of the 30-meter coring system on HEALY. Woods Hole (Mr. Jim Broda) has been negotiating with the HEALY Project staff on the design, which has been submitted to the Arctic Icebreaker Coordinating Committee for review and approval.

RESEARCH FUNDING: There is some concern within the Coast Guard over the apparent lack of a coordinated science plan for HEALY once the ship becomes operational. Of equal concern is what seems to be the consensus among potential users that there will be no additional funds budgeted to support researchers on the ship. The Coast Guard's impression is that there is a "Field of Dreams" approach ("build it and they will come"). While this may be true, top managers feel that there should be a fully articulated plan supporting a proposal for dedicated funds to put the government's investment to full use.

2. POLAR ICEBREAKER UPDATE

POLAR SEA deployed on 29 April for a three-month Arctic West Summer cruise. In May she participated as the command and control platform for the largest U.S./Russian/Japanese oil spill exercise to date off of Sakhalin Island. After picking up a 15-member science party in Nome she proceeded to the Arctic for 20 days of multi-discipline science operations. She will complete her assignments by assisting the Canadian Coast Guard with a crew change at the SHEBA site after the ice runway alongside the CCGS DEGROSEILLIERS becomes unsuitable for fixed wing aircraft caused by deterioration due to warm temperatures. POLAR SEA will deploy on Operation DEEP FREEZE in November.

POLAR STAR will be departing for an Arctic trip in late July. She too will provide transport for SHEBA scientists and crew in early August and again in early September. In between she will be conducting a science of opportunity cruise.

3. OMB ICEBREAKER REIMBURSEMENT PROPOSAL

As part of the OMB budget passback, the CG was instructed to seek full reimbursement for operating and capitol costs of the icebreakers from non-DOD users. This would require legislative changes to be submitted in the CG Omnibus Act of 1998, which contains a number of legislative proposals. The proposed Omnibus Act is currently held up in DOT for a variety of reasons. Once the bill clears DOT, OMB will put it into interagency clearance.

The Icebreaking Program's response to this OMB mandate was to point out that the government maintains a fleet of icebreakers for a variety of reasons including: (1) the need to regularly project U.S. presence in the Polar regions in general; (2) search and rescue (the GREENWAVE casualty stands as an excellent example); (3) marine environmental protection in the high latitudes, particularly with the ever increasing focus on Arctic oil reserves; (4) DOS-led Antarctic Treaty inspections; (5) support of research; and (5) for any future national contingency. For these reasons, the Coast Guard has gone on record as recommending that the incremental reimbursement system presently in place be continued as the most equitable one. It has also been pointed out that a substantial increase in rates by the Coast Guard would make these ships uncompetitive with other oceanographic platforms and would result in a net decrease in recoupment of operating costs.

APPENDIX VIII

Terms of Reference

1) Review and evaluate the current and projected research vessel fleet required for research sponsored by the National Science Foundation within a national framework that includes research requirements of other federal agencies, state and local governments, and private sources.

   This review should be done in the context of environmental and geoscience research, in general, and the specific contributions the Academic Research Fleet provides to the research enterprise as a whole.

   Specific issues include:

   - Do the capabilities and operating modes of the academic ships meet research requirements?
   - Is the number of ships overall, and distribution within size categories, consistent with the level of research support and type of seagoing research projects expected in the future?
   - Are specialized capabilities required to meet research priorities adequately included in the overall fleet profile?

Terms of Reference

2) Review and evaluate overall management structure of the Academic Research Fleet; review and evaluate existing capabilities and services provided by the operating organizations; and review and evaluate possible future changes in academic fleet operations to ensure optimal operations of the academic fleet to support research requirements.

   The review context should include consideration of the distributed ownership of the fleet, cost sharing for both capital acquisition and operations and requirements of multiple research sponsors who participate in scientific, operational and financial support.

   Specific issues include:

   - Are organizational arrangements and structures appropriate?
   - Can the Academic Research Fleet system be managed in a more cost-effective manner?
   - Should elements of the research fleet or its operation be recompeted?

Terms of Reference

3) Provide recommended actions by NSF to improve the organization, management, and cost effective operation of the Academic Research Fleet in support of scientific capabilities required to maintain world leadership in ocean and environmental science research.

The recommendations should be formulated in the context of the results of the review and evaluations of the first two terms of reference. Key elements include providing a perspective on Academic Research Fleet operations within a national context, relevance and quality of scientific, educational, and technical support; and benefits and added value of any recommended actions for peer reviewed competition or recompetition of research fleet components.

Academic Fleet Review - Upcoming Areas to be Addressed

CUSTOMER SATISFACTION/NEEDS

- Develop questionaire for committee to address research scientist needs, support, capabilities, improvements to system, etc.
- Community input directly to Committee for candor.
- Involve NSF Science Resource Studies re questionaire design.

ACTION: NSF to do first draft and circulate to Committee for comments before sending.

TIMING: ASAP to receive responses before next meeting in September.

SHIP OPERATIONS

- Fleet history of operating institutions, ship changes, numbers, size to get context for operations capabilities and days.
- Couple with history of days used vs days available to assist with analysis of fleet size/use issues.

ACTION: UNOLS to provide via NSF.

* Science capabilities of fleet and their evolution. This includes a science systems "compilation" of available instrumentation broken out ship classes - not just a list but capability oriented.
* "Productivity measures" and investigator days/berths analysis with goal to better define evolution of science capabilities, investigator productivity, etc with changes/new ships in fleet.

ACTION: UNOLS to provide via NSF.

TIMING: Intersessional - for both items. Provide when compiled but with target date of mid-July.

COMPARATIVE OPERATIONS

- Antarctic program systems contractor practices for science support services. Presentation at next committee meeting - 1 hour max.- with goal to better understand possible alternative approaches.
- Scheduling, operations, support mechanisms for science projects used by both other US systems, e.g. NOAA and Navy, and other countries with goal as above to better understand alternative possibilities.

ACTION: NSF to arrange with NSF/OPP for Antarctic input and organize data and presentation re second items.

TIMING: Second meeting agenda.

NSF PROPOSAL TRENDS

- Overall budget trends and support from the Ocean Sciences Division for research programs and facilities programs including ship use as a program percentage. Include data on total proposals submitted for ship use and related ship size distributions and comparative success rates for seagoing projects vs laboratory, analysis, theoretical studies with goal of understanding factors in declining number of days at sea sponsored by NSF.

  ACTION: NSF to organize and present.

  TIMING: Second meeting agenda.

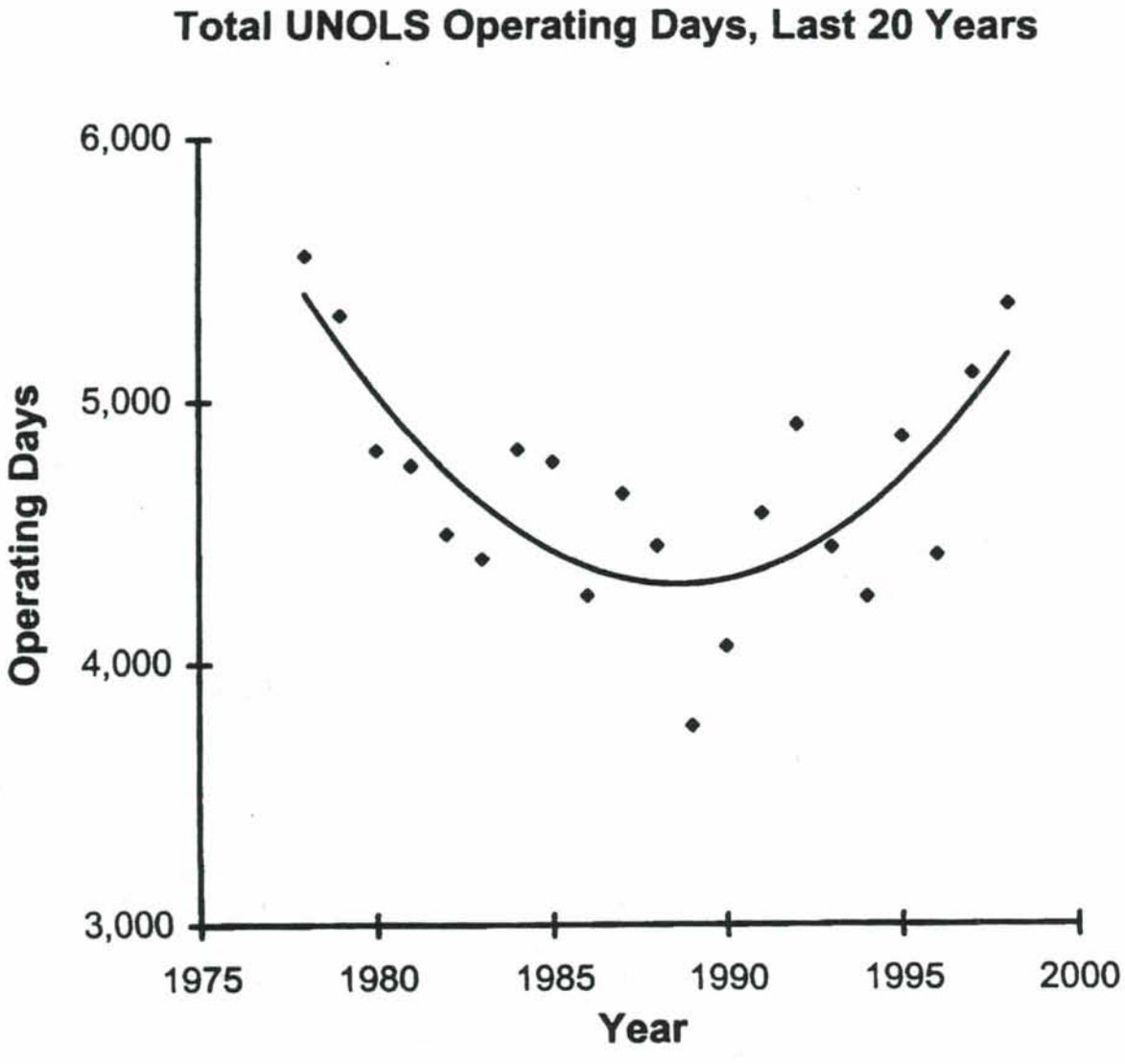
FINANCIAL ANALYSES

- Provide operations and support data using standard accounting practice with identification of fixed cost vs variable cost parameters. Include in analyses both operatations and layups, including for NSF explaination of practice and policy re layups.
- Provide data/analysis of comparative operations costs for UNOLS, NSF longterm charters in OPP, other federal operations, commercial operations and other country operations. Use standard accounting practice.

ACTION: NSF to obtain independent external "financial/audit" consultant to review/obtain required data and provide analysis.

TIMING: Progress report at second meeting. Committee input to study at that time prior to final report at third meeting.

APPENDIX IX


Total UNOLS Operating Days, Last 20 Years
6,000
5,000
4,000
3,000
Operating Days
1975
1980
1985
1990
1995
2000
Year

UNOLS SHIP OPERATION DAYS: 1998

SHIP/CLASS	Days Operating	Days Available	Percent Utilization
GLOBAL/EXPEDITIONARY SHIPS			
ATLANTIS	272	275	
R. REVELLE	299	275	
MELVILLE	229	275	
KNORR	263	275	
EWING	215	275	
T.G. THOMPSON	277	275	
TOTAL	**1555**	**1650**	**94%**
INTERMEDIATE/REGIONAL SHIPS			
MOANA WAVE	169	275	
EDWIN LINK	174	250	
ENDEAVOR	158	250	
OCEANUS	233	250	
GYRE	131	250	
NEW HORIZON	221	250	
SEWARD JOHNSON	281	250	
WECOMA	226	250	
	1593	**2025**	**79%**
POINT SUR	193	180	
CAPE HATTERAS	205	180	
ALPHA HELIX	172	180	
R. SPROUL	169	180	
TOTAL	**739**	**720**	**103%**
LOCAL/NEAR-SHORE SHIPS			
PELICAN	244	180	
LONGHORN	58	180	
CAPE HENLOPEN	202	180	
WEATHERBIRD II	134	180	
SEA DIVER	149	180	
	787	**900**	**87%**
BLUE FIN	95	110	
LAURENTIAN	146	110	
BARNES	119	110	
CALANUS	167	110	
URRACA	173	110	
TOTAL	**700**	**550**	**127%**
FLEET TOTALS	**5374**	**5845**	**92%**

UNOLS PROJECTED 1998 OPERATIONS SUPPORT

AGENCY	$M	%
NSF	28,526	53
NAVO	5,337	10
ONR/NRL	3,170	6
NAVY LABS	1,153	2
NAVY POSTGRAD	113	0
NOAA	5,407	10
INST/STATE	4,554	8
INDUSTRY	2,549	5
INTERNATIONAL	517	1
MMS	472	1
USGS	222	0
DOE	---	
ARPA	---	
ALL OTHERS	1,650	3
Total	53,690	

APPENDIX X

FLORIDA INSTITUTE OF OCEANOGRAPHY
830 First Street South
St. Petersburg, Florida 33701
Telephone (813) 553-1100
Fax (813) 553-1109

June 23, 1998

Dr. Jack Bash
Executive Secretary
University-National Oceanographic Laboratory System (UNOLS)
P.O. Box 392
Saunderstown, RI 02874

Dear Jack:

Per our conversation at the National Oceans Conference earlier this month, I write to inform you of our plans to replace the *R/V Suncoaster* with a new coastal oceanographic ship. While our *R/V Bellows* (71 ft.) continues to provide excellent service primarily as an educational platform for graduate and undergraduate students, the *R/V Suncoaster* (100 ft.), a 35 year-old, former oil field supply vessel, is increasingly unable to serve the expanding technological capabilities of Florida's universities and agencies. Last year, we obtained the commitment of President Betty Castor of the University of South Florida (USF), our administrative home, and Chancellor Adam Herbert of the State University System (SUS) to work with us and the Legislature to fund design and construction of a new ship.

As a Type I Institute of the SUS as well as a member of UNOLS, the FIO will work cooperatively with UNOLS operators as well as other institutions in the region. We intend to meet all UNOLS requirements with the new vessel and will keep our options open with respect to its future operational associations.

For your information, I enclose the material that we are using to define the vessel and our mission requirements at this time. We will keep UNOLS informed as our plans proceed. I will personally appreciate your comments at any time.

Sincerely,

John C. Ogden
Director

cc. Dr. Larry Atkinson, UNOLS Fleet Improvement Committee
FIO Executive Committee
Betty Castor, President USF
Dr. Thomas Tighe, Provost USF
Dr. Adam Herbert, Chancellor SUS

Proposal of the Florida Institute of Oceanography

A New Coastal Oceanographic Ship for Research and Education

What is the need for a scientific and educational research vessel in Florida?

Florida is the fourth most populated state in the nation with a rapidly expanding coastal human population. It has the longest and most complicated coastline in the contiguous U.S., the largest underwater continental shelf, one of the largest tourism industries, nationally-prominent fisheries, and the only coral reef-- the third largest in the world. Florida is one of the few states in the nation which is developing an ocean policy. The key elements of this policy, defined by cooperation of Florida's governmental and educational institutions, are to monitor and understand the detrimental effects of human activities and to manage them for the long-term health of the coastal ocean and to sustain the quality of life that has made Florida famous.

Socially and biologically, Florida is a part of the Gulf of Mexico and the greater Caribbean Sea. Many of Florida's universities have students and faculty from Latin America and the Caribbean and have strong interests in program development in the region. The USF, for example, has just hired a new director of international programs for Latin America and the Caribbean. Florida is connected to the Caribbean region through ocean currents which sweep larvae and pollutants across the Caribbean Sea to the Gulf, the Florida Current and the Gulf Stream. Florida's lobster industry depends for it annual replacement on larvae originating in the Caribbean. Pollution by organic pesticides such as DDT, long banned in the U.S., but used freely in Latin America may be transported to the state by ocean currents. At a number of levels, our state and national interests and future are wound up in the Caribbean.

Over the past decade, Florida has led the nation in the application of science to the practical management of its coastal ocean. The Everglades Restoration combined with the recently declared Florida Keys National Marine Sanctuary are the most complicated, expensive, and politically contentious attempts in our history to manage human behavior for the sustainable use of the environment. These projects will be high profile in the state and national consciousness and budget for the next two decades. During the same period, Florida's universities have increased tremendously in scientific expertise and technological capacity, reaching parity with the leading institutions in the nation. Florida's institutions and agencies are a major source of state-of-the-art innovations in research and education and of students who will be the scientists and resource mangers of tomorrow.

Unfortunately, Florida has lagged behind in developing ocean-going facilities to match this growing research and technological expertise. The principal research vessel of the Florida Institute of Oceanography (FIO) serving these needs, the *R/V Suncoaster*, is a 35 year old oil field supply ship which was seized for running marijuana from Colombia, pressed into service by the FIO in 1982, and slowly modified over the past 15 years. While it has served well, it's limited capabilities have made it the weak link in coastal ocean research and education and its age has made refit economically unfeasible.

What is a research vessel?

A research vessel, like a building for science or engineering, is a technologically highly specialized facility. Ideally it is specifically designed to provide maximum flexibility in the handling of a wide variety of scientific gear, under highly variable sea conditions, 24 hours a day, while still providing for the safety and comfort of its crew, many of whom are students with limited experience on the ocean.

Why not refit a vessel?

Ships are minor miracles of engineering and architectural design which compress high tech features into tight spaces for specific purposes such as pleasure, speed, load-carrying capacity, and passenger transport. The design decisions that are made to serve these various purposes create a unit of welded steel that cannot be easily or economically re-arranged or converted to serve other purposes. For the same reasons we do not easily turn, say, a gymnasium into a laboratory.

The *R/V Suncoaster*, the larger of the FIO's two ships, was designed to carry drill pipe and drilling mud to offshore oil platforms. Below its decks there are huge tanks which take up space which cannot be economically or effectively converted to scientific or educational use. Thus, while the ship functions to serve education and research, it carries this original design limitation to the detriment of its overall mission.

Yachts are often offered to educational institutions through customs seizures or by their owners for tax write-offs. The lavish use of space on a yacht for comfort and recreation, combined with limited load carrying capacity and stability, makes the effective conversion of a yacht for scientific and educational purposes an expensive, long-term proposition, which never lives up to initial expectations in spite of the best intentions. The *R/V Hernan Cortes*, recently sold by the DEP, is a case in point. In spite of the best efforts of many people and extensive modification, the ship, built as a yacht for diving trips, never operated effectively as a research vessel. It is safe to say that there has never been a yacht conversion to a research ship that has been satisfactory.

Why not obtain a research ship from another agency?

There are few existing research ships available that would serve Florida. The NOAA fleet, once numbering over 20 ships, is mostly too old, or the ships are too large to be suitable. The several small NOAA ships are aging and designed for many more crew than is economically feasible for a university-based operation.

What will it take to build a research ship in Florida?

Support of the Florida Legislature

The FIO though its existing program has had a impact in every corner of the state. We have significant research support in place in a variety of locations. The "Team Florida" approach forged by the new ship and the advanced capabilities afforded will attract new funding to state institutions.

Support of Florida's Universities and Agencies

The FIO is a consortium of the key ocean science and education institutions and agencies in the state. A new ship has been an agenda item for a number of years.

Agency Partnerships

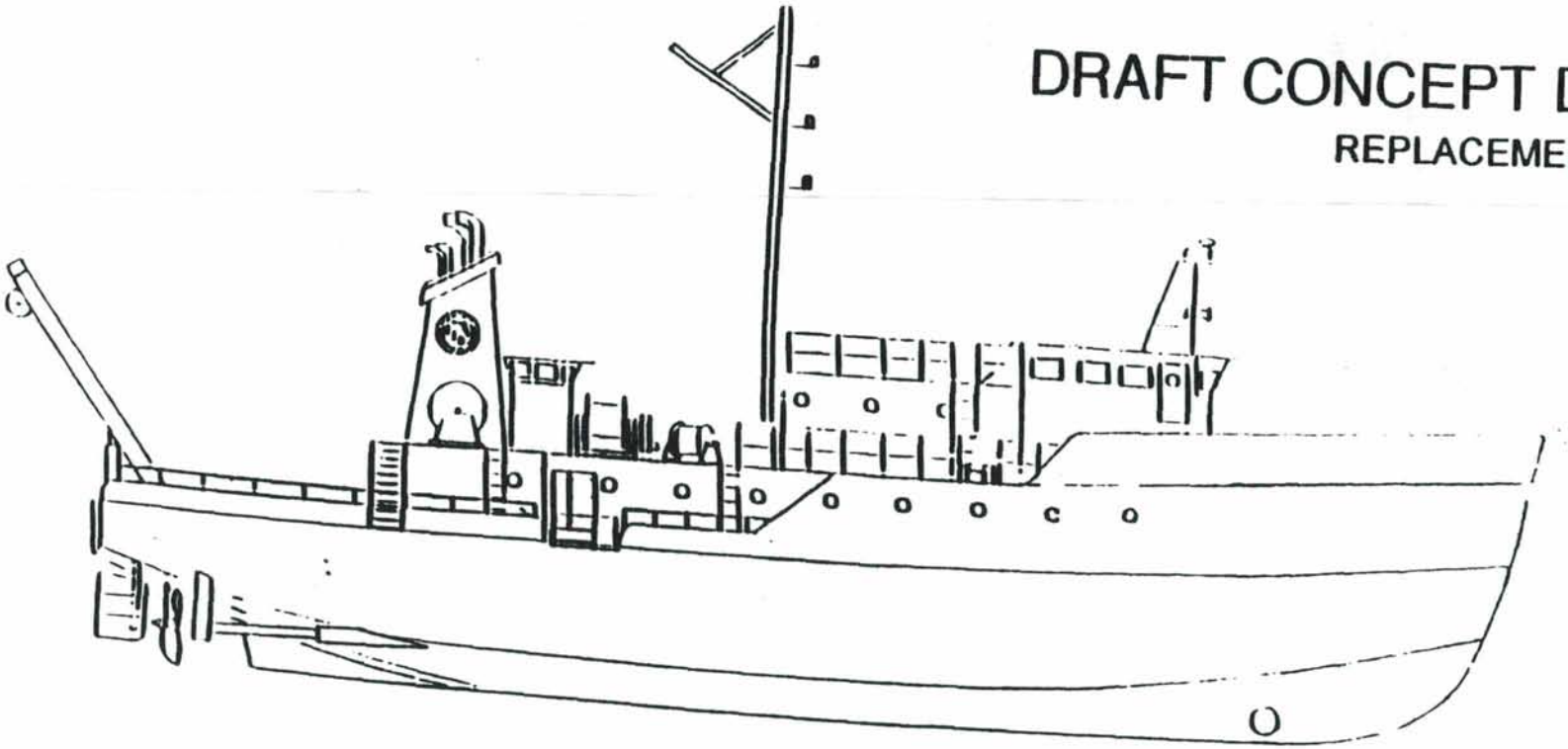
The key to operating a ship over the long term is income from a full operating schedule of about 250 days per year. We believe that between Florida's universities and agencies. local and regional educational programs, and federal agency ship need, such a schedule can be maintained over the long term, significantly "amortizing" the cost to build the vessel.

Estimated design parameters (attached) and costs

A ship of the appropriate overall design parameters and capabilities (attached) can be built in Florida for a total cost of $10 million, including design, construction, outfitting, and modification of support facilities.

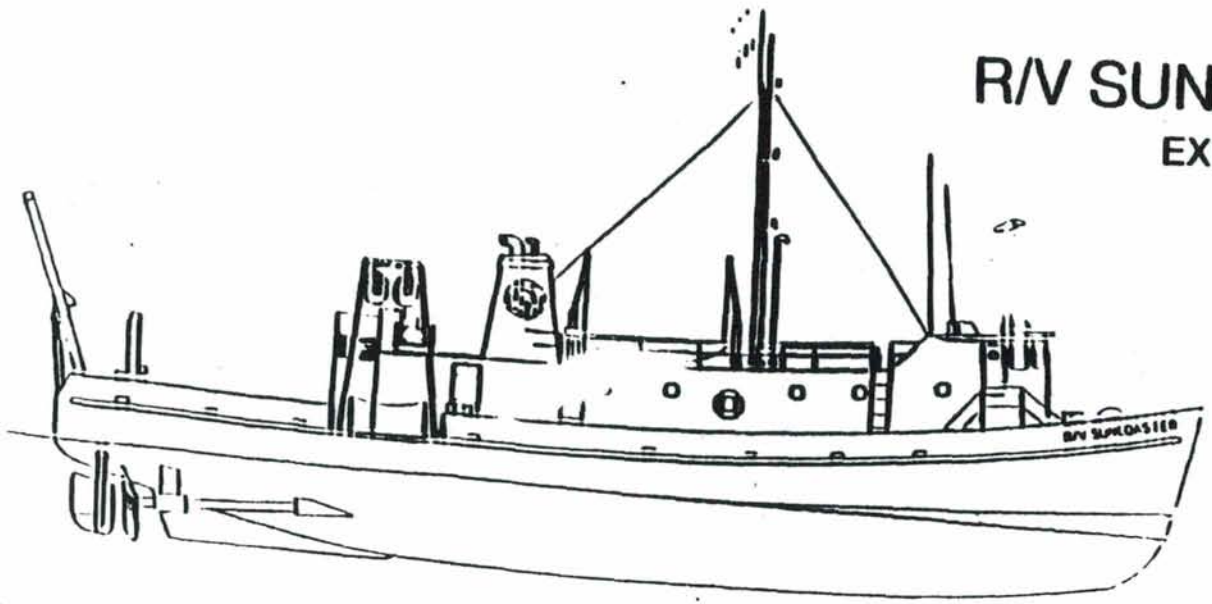
DRAFT CONCEPT DESIGN

REPLACEMENT VESSEL



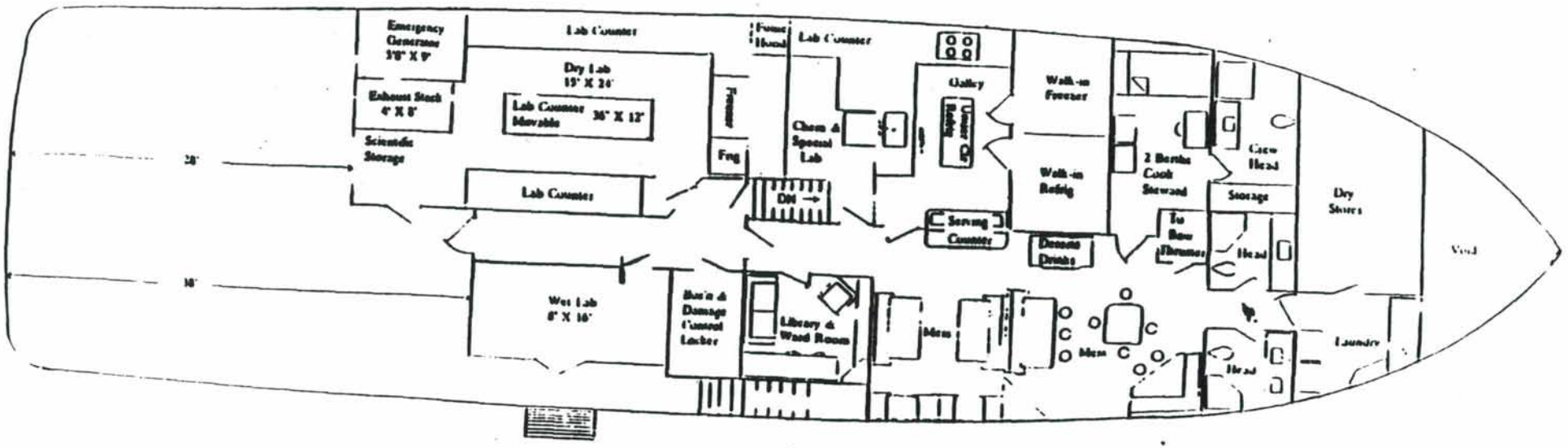
R/V SUNCOASTER

EXISTING VESSEL



VESSEL COMPARISON

	Suncoaster	New Ship
Length	102'	125'
Beam	24'	32'
Draft	8'	8'
Bow Thruster	None	200 HP
Lab, main	350 sf	400 sf
Lab, chem	None	130 sf
Lab, wet	50 sf	150 sf
Satellite communications, navigation and integrated data system	None	Full capability
Electronic lab	None	60 sf
Study area	None	120 sf
Science storage below	None	850 cf
Science storage main deck	None	800 cf
Freezer/refrigerator	125 cf	400 cf
Main deck work area	600 sf	970 sf
Main deck length	27' port and stb	28' prt, 38' stb
Fume hoods	None	2
Van capability, main deck	One 8 x 20	Two 8 x 20
Van, 01 deck	None	One 8 x 20
Fuel capacity	17,500 gals.	30,000 gals.
Water capacity	8,500 gals.	15,000 gals.
Endurance	15 days	30 days
Crew	5	7
Scientists	12	18



DRAFT CONCEPT DESIGN

MAIN DECK INTERIOR LAYOUT

APPENDIX XI

AGOR SWATH Comparisons

Priority	Capability	AGOR SWATH	KAIYO	SEA STAR (paper design)
1	Sea Keeping	Fully Operational SS6	Unrestricted Ops SS6	Unrestricted Ops SS6
2	Deck Space	2,000 sq ft	Main deck: 13,000sq ft Second deck: 2,800 sq ft	Main deck: 10,500 sq ft Second deck: 2,800 sq ft
3	Station Keeping	"+ or -" 50 meters in SS6	5% of water depth in SS3 (max water depth=6,000m)	greater of 10m or 5% of water depth in SS3
4	Science Payload	100 tons	approx 440 LT	490 LT
5	Draft	Max 17 ft at pier 24 ft max	16.4 ft at pier 20.7 ft full load	16.4 ft at light draft 20.7 ft full load
6	Lab Space	3,000 sq ft	approx 630 sq ft	5,600 sq ft
7	Science Staff	25 plus crew	40 plus 29 crew	35 plus 23 crew
8	Speed	15 kts	14.2 kts at MCR 13.3 kts at cruise	14.8 kts at MCR 12 kts at cruise
9	Endurance	50 days at sea	not defined	47 days
10	Range	10,000 nm	5,100 nm	8,000 nm at 12 kts 12,000 nm at 3 kts
11	Science Storage	15,000 cu ft	approx 30,000 cu ft	15,000-17,000 cu ft
	Sail Away Price	$37M	$23.2M ship 1985 $12.9M equip 1985 $35.2M ship 2000	$39M (est., 1985-87 $$$)

APPENDIX XII

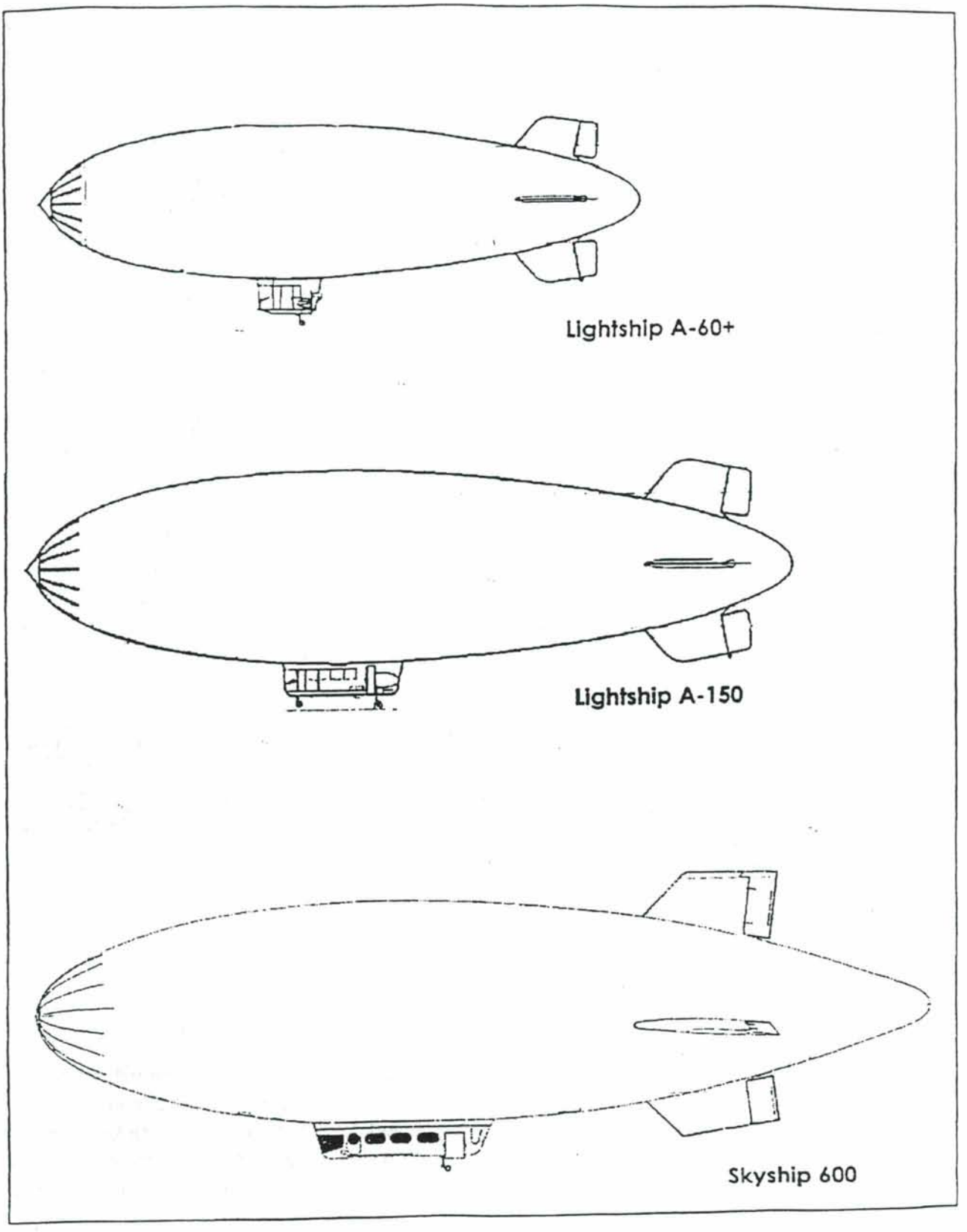


Figure 1. A new generation of airships is available for scientific research missions. Capabilities and costs can be matched to mission requirements and funding levels. The types of airship include: (top) The Lightship A-60, a 132 ft, 2000 m^3 helium volume ship carrying 1 pilot and 2 scientists for 4-6 hr flights; (middle) the Lightship A-150, a 165 ft, 4500 m^3 helium volume ship carrying 1-2 pilots and 4-5 scientists for 8 hr flight days; and (bottom) the Skyship 600, a 194 ft, 6000 m^3 helium volume ship carrying 2 pilots and 4-5 scientists for 8-10 hr flight days.

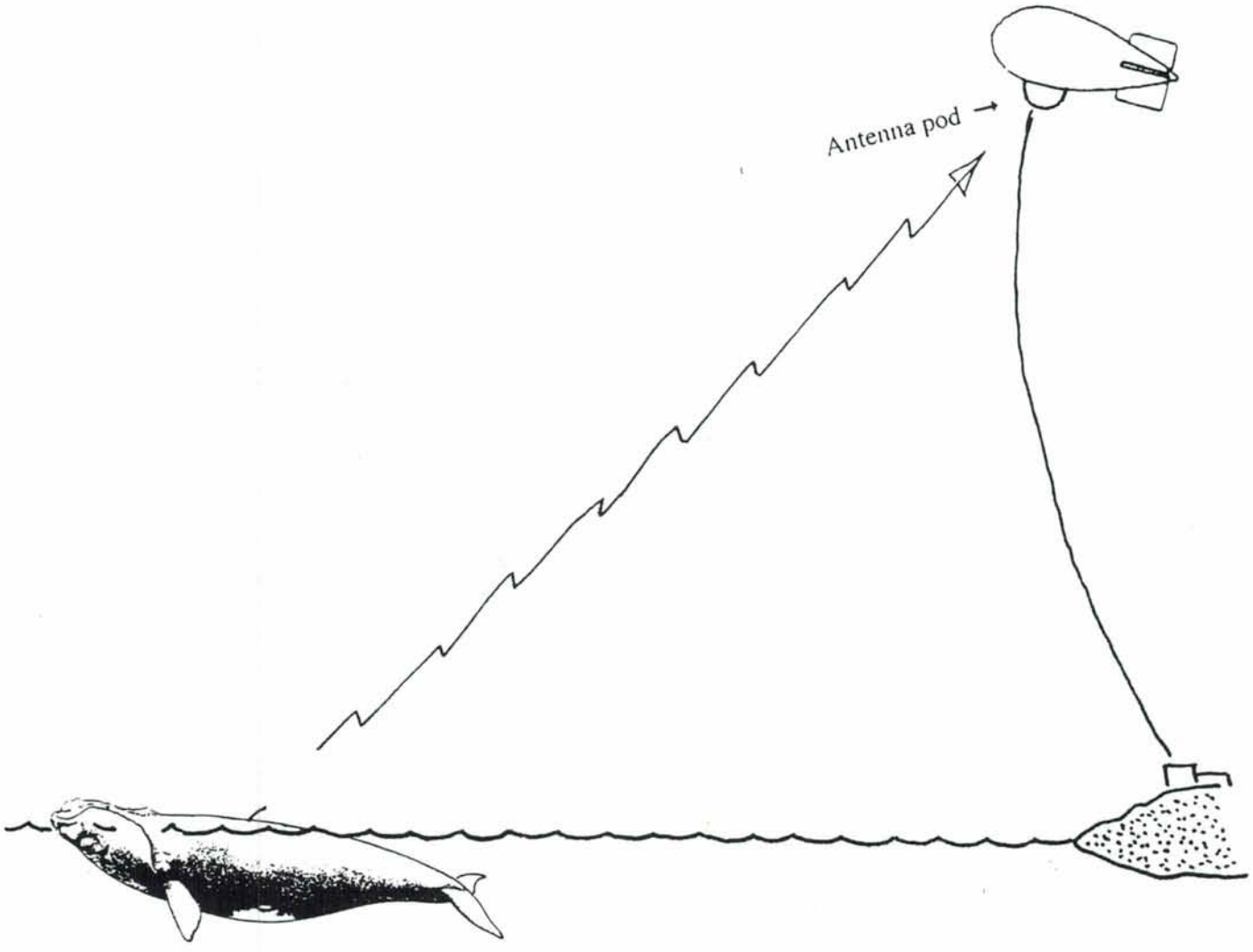


Figure 2. Aerostats, or tethered balloons, are also emerging as scientific instrument platforms. Still and video cameras can be remotely operated and images downlinked. In this example, a radio-telemetry antenna is carried aloft to increase range and data continuity when tracking right whales in both calving and feeding habitats. This study, recently initiated will also evaluate cost reduction of both costs and possible behavioral impacts on the animal (relative to tracking from a vessel).

Table 1. Airships are available in a range of sizes, capabilities, and costs that compare in range to oceanographic research vessels and aircraft. Similarly, increased endurance and payload is associated with bigger ships and higher costs. Conversely, a scientist with a nearshore, light payload, project can utilize a smaller, less expensive ship. Not all cells are filled in, as it is difficult to directly compare costs; costs are approximate and based on 1997 estimates; payload, number of scientists, and cost will vary somewhat with mission requirements.

PLATFORM	LENGTH	# SCI	# CREW	COST/DAY	COST/FLT HR
Ship					
WHOI *Atlantis*	274'			$17,000	
NOAA *Albatross IV*	187'	15	18	$11-12,000	
NOAA *Delaware II*	156'	15	15	$8-9,000	
[contracted] *Abel-J*	106'	9-10	5	$4,700	
Conventional Aircraft					
CG HH-60J Helicopter		3-4	3-4		$3,500
NOAA P-3		6-8	4-5		$3,100
NOAA Twin Otter		4-5	2		$600
[contracted] Cessna-337		3	1		$275-385
Airship					
Skyship 600	194'	4-5	2	$8-10,000	
Lightship A-150	165'	3-4	1		
Lightship A-60+	130'	2	1	$6,000	
Interface Ecoblimp	87'	1	1	$1,200	

SLOW FLIGHT
STATION KEEPING
STABLE PLATFORM

PHOTO- AND VIDEO DATA ACQUISITION
REMOTE SENSING
LOWERED INSTRUMENTS
AIR-DROPPABLE SENSORS

LIGHTER-THAN-AIR PLATFORMS

- Airships (blimps)
- Aerostats (tethered balloons)
- Remotely piloted airships (RPAs)

Whale research — ASWH, NMFS

Manatee research — Fla DEP

Ocean/atmosphere interface Studies —
JPL, NRL/WHOI/UWash

Atmospheric plume studies — NOAA ARL

DoD Projects (radar etc.) — Army/Air Force

CURRENT LTA USE

Corporate marketing 95%

Surveillance 4%

- olympic games
- political events
- DoD, DEA

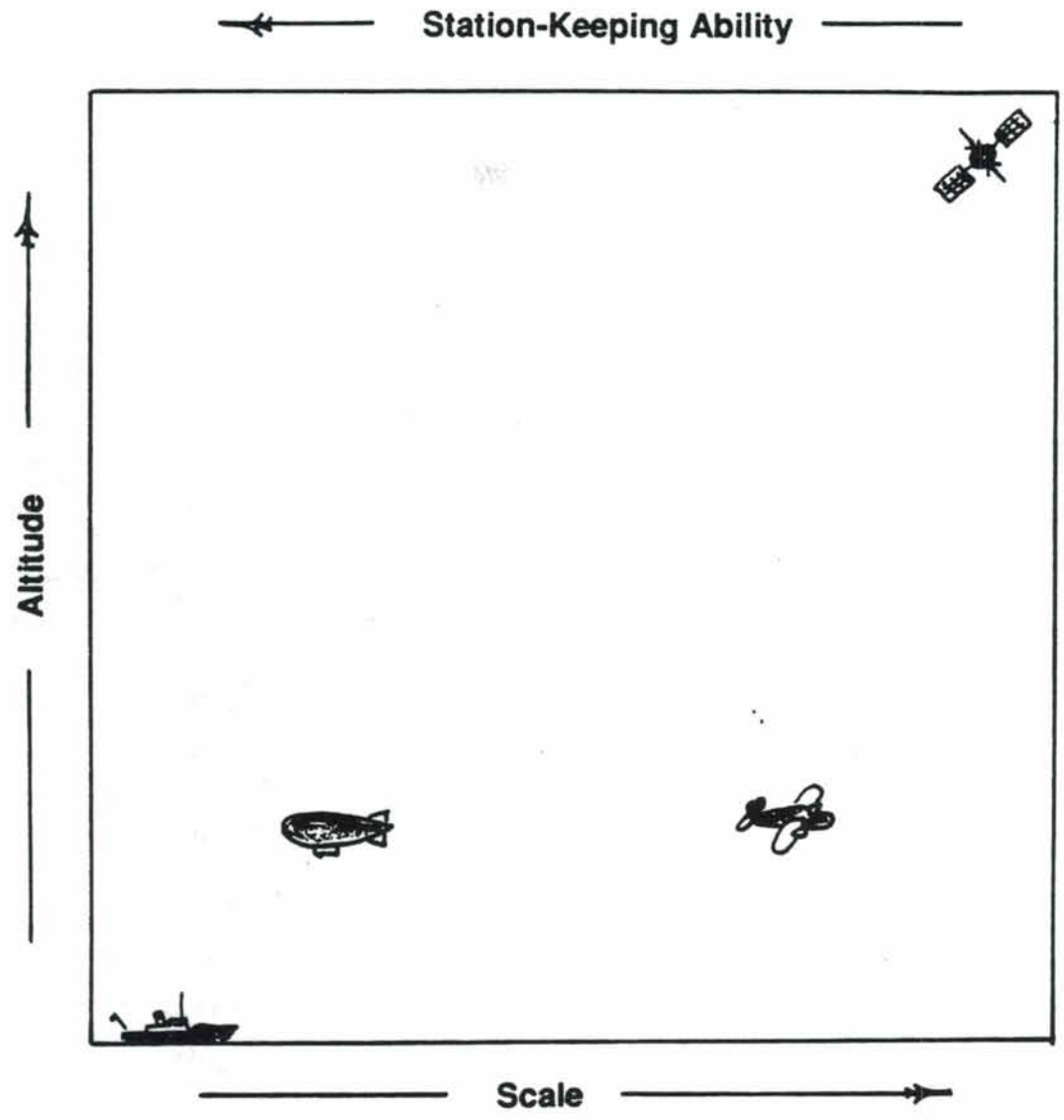
Research 1%

- DoD projects
- science

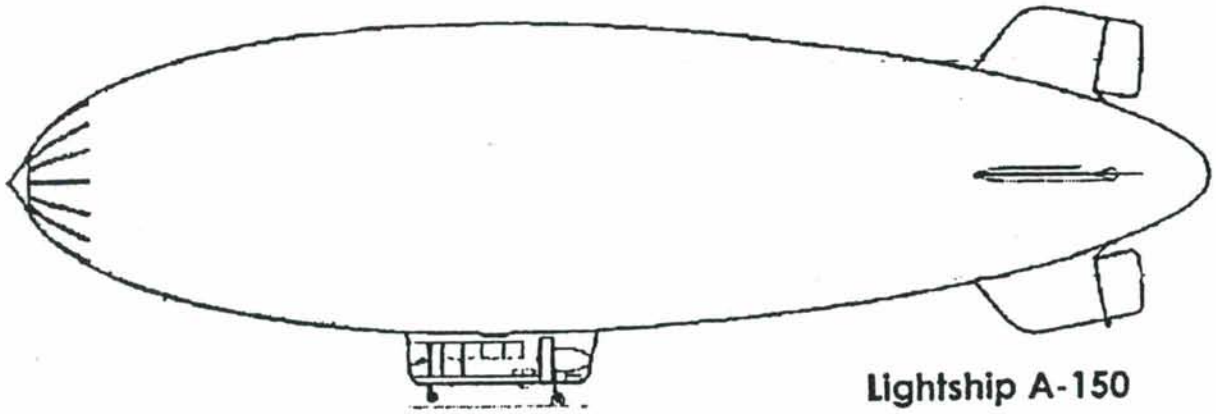
Since 1990 . . .

CAPABILITIES DEMONSTRATED

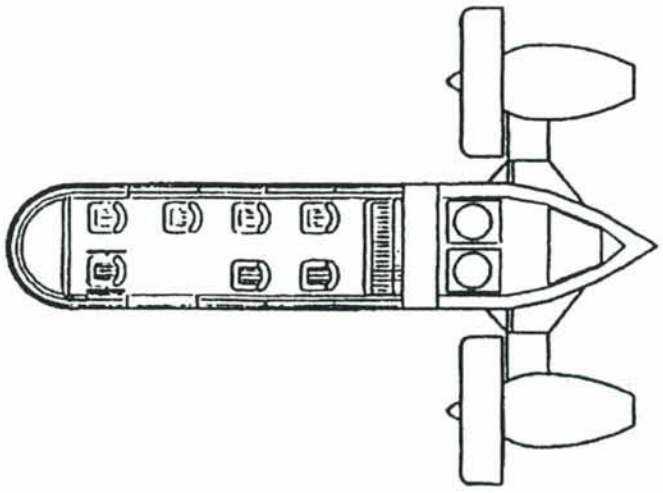
PROOF-OF-CONCEPT ESTABLISHED



Addressing logistically difficult ocean science problems requires matching the platform to the problem. The proposed project maintains that airships have a capability that is distinct from, yet complementary to, that of aircraft, ships, buoys, and satellites. Airships offer a combination of perspective, resolution, flexiblity, and station-keeping ability that may prove valuable to a wide range of ocean science problems.



Lightship A-150

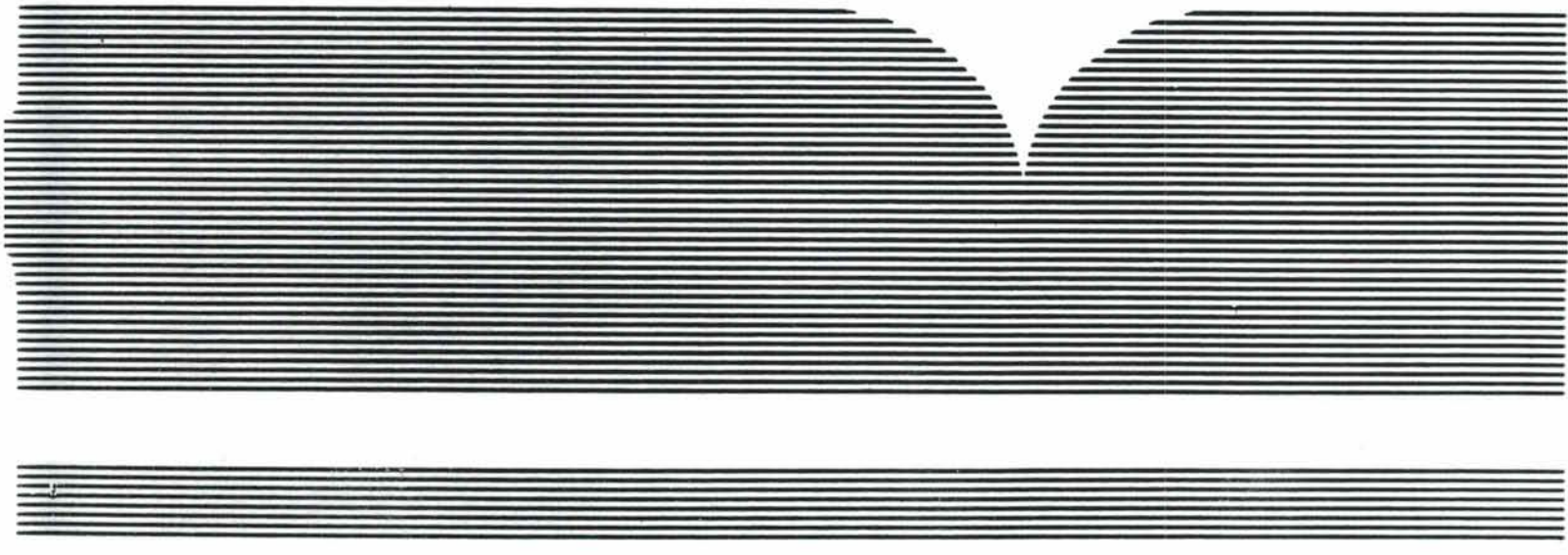


PB92-128271

AIRSHIPS FOR MARINE MAMMAL RESEARCH: EVALUATION AND RECOMMENDATIONS

James H. W. Hain
Associated Scientists at Woods Hole

June 1991



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Airships for Marine Mammal Research: Evaluation and Recommendations

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A Report to the Marine Mammal Commission
Contract No. T68108863

June 18, 1991

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

PB92-128271

2. REPORT DATE: June 1991

3. REPORT TYPE AND DATES COVERED: Final Report

4. TITLE AND SUBTITLE

Airships for Marine Mammal Research: Evaluation and Recommendations

5. FUNDING NUMBERS

Contract T68108863

6. AUTHOR(S)

James H. W. Hain

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Associated Scientists at Woods Hole, Inc.
P.O. Box 721
Woods Hole, MA 02543

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Marine Mammal Commission
1825 Connecticut Avenue, NW
Washington, DC 20009

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

The views and opinions expressed in this report may not be shared by the Marine Mammal Commission, its Committee of Scientific Advisors on Marine Mammals, or the Commission staff.

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

What we see and learn often depends on our vantage point. Research platforms influence the data we gather and the conclusions we draw. This report describes an investigation of how existing and "next generation" airships might be used in marine mammal research. Sixteen flights, resulting in 65 hours and 1400 miles of surveys were made under various weather conditions. A great deal about the operation and potential of airships for prolonged observations of marine mammals was learned. The airship combines capabilities for slow-speed surveys with stability, a roomy cabin, and a demonstrated ability to accurately fly survey lines. It has the advantage of being able to stop, make observations, or "pace along" with a swimming whale, for instance. In the case of marine mammal studies, the airship, despite the constraints associated with it, provides a highly desirable research platform for ocean observations.

14. SUBJECT TERMS

Research methodology, marine mammal research, research platforms

15. NUMBER OF PAGES: 37

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited

Contents

Introduction

Perspective. What we see and learn often depends on our vantage point. This is true in many areas, including marine mammal science. Research platforms influence the data we gather and the conclusions we draw.

These platforms are changing. Boats and ships have been joined by aircraft, and they in turn, by satellites. Aerial platforms remain important, and have often been the method of choice in programs to estimate the numbers of cetaceans (for example, CETAP, 1982). These platforms have also provided insights to behavior (for example, Hain et al., 1982; Leatherwood, 1975; Nishiwaki, 1962; Watkins and Schevill, 1979).

However, after extensive time in fixed-wing aircraft, curiosity arose about the advantages of using airships for marine mammal research. This was not a unique idea, since many had considered it. Nor was it a new idea, since W. A. Schevill and W. A. Watkins of the Woods Hole Oceanographic Institution, had flown aboard Navy airships in the late 1950s. More recently (June 1987), Stephen Leatherwood, of the San Diego Natural History Museum, and colleagues used a blimp to conduct surveys of bottlenose dolphins along the southwestern California coast.

Despite various expressions of interest, what seemed to be lacking was a sustained effort to evaluate and develop this platform.

In December 1989, I began an effort to investigate how modern airships might be used in marine mammal research. One year later, after 16 flights, discussions with colleagues, meetings with airship builders and operators, and attending professional meetings on both airborne science and lighter-than-air aeronautics, I have prepared this report assessing the utility of airships as a platform for marine mammal research.

Definitions

An airship is a lighter-than-air aircraft having propulsion and a steering system. These in turn are classified as rigid (shape maintained by internal framework), semirigid, and nonrigid (shape maintained by internal pressure only). Dirigible is generally synonomous with airship. A zeppelin is a rigid airship, and "blimp" is said to have been coined as a term for the nonrigid airships by the British—supposedly based on the sound made when one flicked a finger on the envelope to test the gas pressure inside.

A Short History

Following on Germany's experiments with the military use of zeppelins in World War I, the United States initiated its own fleet of airships. The Navy was the principal agency, and Lakehurst, New Jersey, was the center for lighter-than-air (LTA) aeronautics in the United States. Several nonrigids had been built, but attention seemed to focus on the large, rigid airships.

Four of the large "rigids" were flown in the period from 1923 to 1935: the 680 ft *Shenandoah*, the 650 ft *Los Angeles* (acquired from Germany), the 785 ft *Akron*, and 785 ft *Macon*. While their exact role was not always clear, these airships were conceived primarily as scouts for the fleet. After about 1926–27, they were tested as flying aircraft carriers—carrying planes that served to "sweep" areas to either side of the airship and increase coverage. Over time, all but the *Los Angeles* were lost in crashes. The *Los Angeles* was decommissioned in 1932.

At the same time (1920s and 30s), the development of commercial passenger-carrying rigid airships was pursued vigorously by Germany. One ship, the 787 ft *Graf Zeppelin*, had a remarkable career. During her 1935 season, she crossed the Atlantic every two weeks from Germany to South America. In the nine years between 1928 and 1937, the ship made 590 flights, covered more than a million miles, visited five continents, and crossed the ocean 144 times.

In 1936, a German zeppelin, the *Hindenburg*, made 10 successful round trips across the North Atlantic from Europe to Lakehurst. Based on this success, 18 flights were scheduled for the 1937 season. On the first, the *Hindenburg* burned and crashed on its landing approach at Lakehurst.[1] This event, on May 6, 1937, ended the period of rigid airships in the United States.

As World War II approached, the Navy's mostly dormant airship program was revived—but this time with nonrigid airships. The primary impetus was the submarine threat, and the airships were assigned to anti-submarine patrol, convoy escort, mine detection, and other missions.

By late 1943, the naval airship fleet totalled 132—operating out of air stations in South Weymouth, Massachusetts, Lakehurst, New Jersey, Weeksville, North Carolina, Glynco, Georgia, Tillamook, Oregon, Moffett Field, California, Santa Ana, California, and elsewhere. Patrols ranged from close inshore to a few hundred miles out to sea. Crew size on operational flights was 9–10, and mission length typically ranged from 8 to 20 hours. The airships were in the 220–250 ft range, although several larger 290 ft ships came on line toward the end of the war. In all of World War II, airships made 58,000 flights and totalled 550,000 hours in the air . These numbers do not include the 280,000 hours of training flights (Althoff, 1990).

By the 1950s, the Navy's anti-submarine warfare (ASW) airships had grown to 340 ft, with a crew of 24. Endurance had likewise increased, and was demonstrated on several occasions. In May, 1954, an airship departed Lakehurst, flew northeast to Cape Cod, south past Bermuda to Puerto Rico, and landed in Key West, Florida. The record was set for 8.3 unrefueled days in the air. In 1957, another airship completed a transatlantic circuit from South Weymouth to Europe, Africa, and Key West, extending the record to 11 unrefueled days aloft.

To convincingly demonstrate all-weather, sustained station-keeping, the Navy maintained an airship on station for 1,277 hours, on a 24-hour basis, for two months in February and March, 1960. This was described as "an all-out effort" during often severe weather, and

involved in-flight refueling (Althoff, 1990). To extend offshore range, carrier landings were made in the 1940s and 50s, although by about 1956 the airships had gotten too large for safe handling on deck.

Throughout, the principal role of the Navy airship had been ASW . However, in the 1950s, the Navy used several large airships as radar platforms. The Airborne Early Warning (AEW) airships were large—the largest was 403 ft in length and contained 1.5 million ft^3 (42,500 m^3) of helium. These ships were the largest nonrigid airships ever flown. Although the technological advances and new models continued through the 1950s and into the early 60s, the role of the naval airship gradually diminished. The last flight of a Navy airship was on August 31, 1962, from Lakehurst.

This short history illustrates the considerable experience with overwater airship operations—an experience that, for the most part, ended 30 years ago.

The Airship in Exploration and Research

The first crossing of the Arctic was made by an airship. Norwegian explorer Roald Amundsen, the first man to reach the South Pole, had failed in an attempt to reach the North Pole by airplane. In 1926, he prepared for another attempt—in an Italian-built semirigid dirigible. The 350 ft *Norge* cast off from King's Bay, Spitsbergen, in May 1926, crossed over the pole, and landed in northwestern Alaska. The ship made the 3,180-mile crossing in 71 hours at an average speed of 45 miles an hour. The effort was the first to establish that no land lay between Spitsbergen and Alaska.

The Arctic was the site of another record airship flight. In what seems to have been largely a capabilities demonstration, the Office of Naval Research sponsored a flight from South Weymouth, Massachusetts, in July 1958. The airship departed for Resolute Bay in the high Arctic, reached an ice station only 400 miles from the Pole, and returned to the airstation. The ship had covered 6,200 miles, including two landings and refuelings on Canadian runways without mooring (Althoff, 1990).

Airships have frequently served as test platforms. Much of this again had Navy origins. The development of the magnetic anomaly detector (MAD), airborne radar, and "dip" sonar all involved the use of airships. In the early 1960s, an airship served as a flying wind tunnel. In a cooperative project with Princeton University, a Lakehurst ship was fitted with a 20 ft hydraulically operated strut on which test models were mounted. These tests provided unique

data wholly free of wind-tunnel wall effects.

Closer to oceanographic research, a Goodyear ship was used in the mid-1980s to measure water vapor in the ocean/atmosphere boundary layer off California (Hagen, 1987, 1988). In Australia, two demonstration projects took place. In February 1989, an airship was evaluated for use as a geophysical survey platform (Cull, 1989; Musgrave, 1989). Later that year, in June, a multi-task experiment took place where five oceanographic stations were sampled at distances up to 19 miles from shore. The devices included a surface water sampler, plankton net, submersible data logger, current follower, and expendible bathythermograph. The ship worked at altitudes from 250 to 50 feet (Creswell, 1989). Also in 1989, but on the other side of the globe, a hot-air dirigible was used by French botanists in a study of the tropical rain forest canopy in French Guiana (Halle', 1990).

A project now in the final planning stages is one by Blanc et al. (1989a, 1989b). Here, a series of air-sea interaction experiments will be conducted using an instrument package suspended 60 m beneath a blimp flying at an altitude of 70 m. The instruments will be positioned 5 to 10 m above the ocean surface and measure surface flux and microwave backscatter with an accuracy difficult to obtain by other means. Flights are scheduled to begin in October 1991.

Demonstration of the scientific value of the airship to date has been diverse and generally positive. However, all scientific experience to date has been aboard opportunistic platforms (donated flight time), sporadic in nature, and not sustained beyond one or a few initial flights.

The PACE Study

The closest that the United States has come to developing an airship for maritime uses and ocean research was in 1983. The Patrol Airship Concept Evaluation (PACE) study was a combined effort of the U. S. Navy and Coast Guard, with the involvement of the National Aeronautics and Space Administration (NASA).

Both the Navy and the Coast Guard had been considering lighter-than-air platforms. A literature study and analysis (Bailey et al., 1980) led to a proof-of-concept flight demonstration. The program was conducted in 1983 using a modern 164 ft S-500 airship manufactured by Airship Industries, Ltd., London, England.

The objectives of the program were to 1) evaluate the performance characteristics of the airship, and 2) assess the potential of the modern airship/sensor system for various missions. The missions had a largely military focus, but did include a portion relating to the Coast Guard's interest in environmental sampling. The sensors and equipment specific to the Coast Guard tests included:

- ◊ Marconi thermal imaging system
- ◊ boarding boat system (a modified Avon inflatable)
- ◊ 300-lb.-capacity winch
- ◊ surface current probe
- ◊ data-gathering/transmitter marker buoys
- ◊ current drift cards
- ◊ expendible bathythermograph system (XBT)
- ◊ 1.7 l sampling bottle
- ◊ portable gas chromatograph with sampler
- ◊ Hasselblad and Pentax cameras

The Coast Guard's operational tests took place on August 22–29, 1983, off Oregon Inlet, North Carolina. The personnel rescue/winching demonstration and boarding boat recovery/deployment demonstration took place September 19–21 over the nearby Pasquotank River. The oceanographic data gathering demonstrations were largely successful. Where not, the experiments resulted in recommendations. The one area where tests failed was in the deployment and recovery of the inflatable boat. Because of certification delays, operations with an unmanned boat were required. This, and problems with aerodynamic instability and winching rates, led to failure. Since then, however, the French Navy has successfully conducted tests with a manned craft and a redesigned system.

By and large, the conclusions for these portions of the tests were that the airship provided an excellent platform for visual searches, and a stable and extremely effective platform for most other tasks. An overall conclusion was that a serious consideration of the airship in maritime roles could be technically substantiated (Bailey, 1985).

Modern Airships

Modern airships (Figures 1–4), generally considered to be those built after the late 1970s, are quite different from the WWII Navy blimps or the familiar Goodyear ships. Computer-aided design produces new structural designs and streamlined shapes. Multi-layered, high-tech fabrics make the envelope more impervious to helium loss—and degradation of helium purity through contamination by other gases. The envelope is also considerably more resistant to sunlight and the associated UV deterioration of the fabric. Weight savings are realized through construction with kevlar, fiberlam, and other new materials. Lastly, ground handling and maneuverability in the air are considerably improved by the use of vectored-thrust propulsion. Here, the propellors are housed in ducts that rotate both above and below the horizontal. Among the advantages is the ability to hover in zero wind, an ability not possible in conventionally powered ships.

Results

To date, colleagues and I have made 16 flights aboard airships. This has resulted in about 65 hours and 1,400 miles of surveys for marine mammals. We have flown off Santa Maria, California; Cape Hatteras, North Carolina; the mouth of the Chesapeake Bay; Cape Cod, Massachusetts; and most recently, the coasts of Florida, Georgia, and South Carolina. We have experienced conditions that ranged from grey and windy, with sea states of Beaufort 4+, to sunny and calm with a sea state of 0. We have sighted humpback, fin, minke, and right whales, dolphins, turtles, sharks, rays, fish schools, birds, shipwrecks, oil slicks, plumes, and oceanic fronts. We have experimented with airship maneuvers, observer seating, and equipment. We have learned a great deal about the operation and potential of airships. In addition, we have talked at length with flight and ground crews, met with airship builders and operators, and attended a number of professional meetings.

An airship provides a highly desirable research platform for ocean observations. It combines capabilities for slow-speed surveys (up to about 35 kts cruising speed) with stability, a roomy cabin, and a demonstrated ability to accurately fly survey lines. At the same time, it has the advantage of being able to stop, make observations, or "pace along" with a swimming whale, for instance. In the case of marine mammal studies, it is an ideal platform for the still and video photography that documents characteristics and behaviors. Our experience is

that the platform is stable and nearly vibration-free (Figures 5–7).

With the floor hatch available for downward-looking instrumentation (Figure 8), the ship provides the ability to collect environmental data. Because lowered samplers have been used in other studies (described previously) an airship being used for visible or infrared remote sensing has the ability to collect its own "ground truth" data.

Like any research platform, and specifically any aircraft, the airship has constraints associated with it. However, the one constraint most often mentioned—wind and weather—is not the constraint it is generally thought to be, at least in marine mammal research. Experience from various platforms during 10 years indicates that sea states above Beaufort 3, and winds above 15 knots are mostly unsuitable for marine mammal work. As wind and whitecaps increase beyond this threshold, sighting cues decrease precipitously. The airship operational threshold is well above this (28 kts), so in fact the research constraints are more restrictive than the operational constraints.

The strength of the airship—its slow speed—does introduce a constraint in the way it is used however. The airship is not a "long-legged" platform. Hundreds of miles of trackline or large areas are not feasible. The airship is best employed for fine-grain work in smaller areas.

Speed and performance characteristics also mean that the ship is best positioned at an airfield close to the operations area. For example, an airfield 45 miles from the coast presents a minor or negligible consideration to a fixed-wing aircraft. However, in an airship, it can be an hour and a half slog—particularly if head winds are encountered. Compounding the problem, pushing into a head wind requires increased power settings and results in higher fuel consumption—decreasing time and range once in the operational area.

Once in the operational area and on survey, head winds and the corresponding power settings also mean the engines are noisier. In this situation, we observed a higher percentage (>50% in some cases) of animals of all species that responded to the presence of the ship and "ducked under" as we approached and passed. This was most extreme in cases of higher power settings and reduced altitudes (<350ft). In these cases, the airship elicits the same kind of response as I have seen from fixed-wing aircraft.

A final comment on constraints deals with ground handling and ground crew. This remains a major factor in airship operation and expense. The required ground crew of about 15 (for the S-600) becomes expensive, moreso in a mobile operation when meals and lodgings are included. This factor is being addressed by the industry. Trials are now underway to develop the use of "mules" (Figure 9) that will partially mechanize the operation and reduce costs.

When planning and logistics take into account the existing constraints, and survey conditions are good, the airship is a highly successful platform. In light to moderate conditions and favorable wind directions, the ship is quiet and animal reaction is considerably reduced. On the best of days, the ship seemed to elicit no reaction from most animals. Indeed, the reaction sometimes became one of apparent curiosity. I have seen dolphins roll over, and turtles crane their necks and elevate their heads for a "look."

When used in applications that take advantage of their strengths, airships are unmatched. In a handful of trials, we have also found them useful in multiplatform applications (airship/boat, airship/plane). This area of research is continuing.

The Next Step—A Dedicated Airship

In the last 18 months, we have learned about, refined, and evaluated the potential of the airship for use in marine mammal/ocean research. Flight time was made available by corporations who operate these ships for marketing and advertising purposes. These contributions have been most valuable indeed.

Building on this experience, it is now appropriate to consider a dedicated airship. Prior to suggesting that an agency or institution (or consortium thereof) purchase and operate a ship, the logical next step would seem to be leasing a ship for a period of weeks or months over a number of years. Discussions are now underway exploring the possible arrangements. As envisioned, this would be a multi-project, multi-investigator effort with multi-agency support.

Three options are being examined:

- The new Westinghouse Airships S-1000 ship. A larger ship (222 ft/10,000 m^3), with extended range and endurance. This ship will have the ability to work, for example, off Cape Hatteras and out to the Gulf Stream. (Figure 10).
- The American Blimp Corporation A-60 Lightship. A smaller ship(130 ft/1,700 m^3), suited for nearshore work. This ship is being evaluated for use in coastal waters of the SE U.S.— right whale/manatee/turtle/seabird work. (Figure 11).
- The US–LTA 138S airship. This mid-size ship (160 ft/4,000 m^3) is similarly being evaluated for coastal research projects (Figure 12).

The Role of the Airship in Marine Mammal Research

The airship is best used for fine-scale "follow-on" studies. When data from other sources have indicated areas of interest—such as feeding or calving grounds, or migration corridors—the airship can function as the platform most appropriate to elucidating the details. This capability may have particular value in areas where human impacts may be detrimental to marine mammals, and mitigating or management procedures are sought. Three examples of research particularly suited to airships follow.

Abundance estimation. Once an area has been identified as being important to large numbers of animals, or perhaps to smaller numbers from a small population, obtaining an accurate estimate of abundance may be important. While aerial survey data are often relied upon for providing these abundance estimates, there remains great reliance on estimators and correction factors (Hiby and Hammond, 1989; Scott and Gilbert, 1982). There are also confounding factors, such as for example, whales alternating at the surface—reported for several species by Watkins and Moore (1982).

In considering the problems of aerial surveys, Scott and Gilbert (1982) state that one solution is to lower the ground speed. The airship does this. And, in our work during the past year, we have often noted our ability to sight and identify submerged animals and those making fleeting appearances at the surface (Hain, unpublished data). Because the airship provides the capability for slower survey speeds and longer scan times, the accuracy of the sightings and the counts increase. As a secondary product, data on sighting distance, sea state, weather, time of day, species characteristics, and submergence times will be useful to analyzing data from most aerial platforms.

A second common method of abundance estimation, mark and recapture (photograph and rephotograph) depends on quality photographs where identifying marks can be seen with clarity (Figure 13). The open-window, no-glass photography from an airship positioned by a whale can provide this quality in a greater percentage of instances. There is the added consideration of a less obtrusive presence than from a circling airplane.

Behavior and habitat studies. Examples of behavioral studies from aerial platforms have been previously given. Due to the positioning capability of the airship, these kinds of observations can be extended, rather than "grabbed" on fly-bys or during circling. Our

experience supports our expectations (Figure 14). We have also found the airship to be useful in recording relationships between sightings of all forms of marine life and ocean "edges," fronts, or "weed lines." As with the behavioral observations, the combination of slow speed and the aerial vantage point contribute greatly to the success of the observations.

Management-directed objectives. Of the various behavior and habitat studies, perhaps the most important are those where human activities have an impact. In an area where these impacts may be detrimental, observations from an airship may provide solutions. Detailed distribution and behavioral data, as well as potential conflict intersections might be used to identify mitigating and management procedures. Two examples illustrate this point:

The northeastern Florida/Georgia coastal waters have been identified as an important winter calving ground for right whales (Kraus et al., 1988). At the same time, right whale mortality due to human activities may be inhibiting the recovery of the species (Kraus, 1990). The right whale mortalities are predominantly calves and juveniles. Among the factors identified were ship strikes from large vessels. This author was present in March of 1991 when a 2-year old female came ashore on Amelia Island, Florida (Figure 15). The cause of death was a ship strike. The St. Marys Channel/Jacksonville area is an area of heavy ship traffic. It is also a primary area for right whales.

During the period of peak right whale occurrence, observations from an airship could describe whale behaviors relative to ship traffic. Do the whale distribution and traffic lanes conflict? What are the reactions of right whales to ships? Are whales effective at getting out of the way? What changes in ship traffic lanes, procedures, or speeds might be appropriate?

Stellwagen bank, off Cape Cod, Massachusetts, is an area of high whale abundance—a feeding grounds. Yet, in recent years, human presence—from whalewatching boats, recreational boats, airplanes, divers, and others—has converged on the area. Local naturalists describe summertime weekends in particular as "a circus," but one with negative implications.

This area appears to be an example of an case where marine mammals may be on a detrimentally intersecting path with humans. In addition to the above elements, a sewer outfall pipe from Boston is in the final planning stages. With the threat of clear problems, but designation as a sanctuary imminent, Stellwagen Bank may be an arena where the data collection and monitoring capabilities of an airship might be put to good use.

Both of the foregoing examples illustrate the type of research and the sequence of operations appropriate to the use of an airship. In each case, larger-scale surveys and other data sources have indicated areas of interest—and possible problems. At this point, the airship is brought in for follow-on studies on the next plateau. This also illustrates the specialized yet complementary nature of the airship as a research platform. Subscribing to the "many tools in the toolbox" concept, the airship is not an initial or stand-alone platform, but is likely best operated in coordination (simultaneous or sequential) with other "tools"—fixed-wing aircraft, boats and ships, opportunistic sources, radio tags, and satellites.

Recommendations

Given that today's airships are largely designed and built for commercial advertising, and given that a mission-specific airship is to be modified or built for science, the following recommendations are offered—in a more or less prioritized list.

Overwater operations. It has been 30+ years since the United States operated airships over water. Pilots and technicians are retired. Operations manuals, when available, are archived at scattered locations. A compilation of knowledge on operations, meteorological factors, and safety procedures should take place. The ability for routine offshore work needs to be re-established.

Observer visibility. The forward and downward view is probably the most important for marine mammal searches. As it is, this view is mostly obstructed by the flight instrument console (Figure 16).[2] The most desirable configuration would be an arrangement similar, for example, to the nose seats in the modified Beech AT-11, a survey aircraft used in several offshore marine mammal studies. Here, the observer(s) sit forward and slightly below the

flight deck. This provides a 180° lateral view and nearly a 70° (below the horizontal) downward view. A seat for perhaps a single observer could be achieved by reconfiguring the forward section of the car. The navy patrol airships of WWII had such a station—the bombardier's seat. (I am advised, however, that this option would likely involve considerable re-engineering and expense).

Sparing that option, an observer seated in the co-pilot's seat can improve sighting by sitting up on a spare camera case or other elevating device. A change to the removable plexiglass section in the forward flight compartment window would be beneficial. If this section were enlarged and positioned higher, an observer in the right seat would have a glass-free forward view—highly desirable (refer again to Figure 16).

A third option would involve the use of a belly mounted pod. Here, a "bubble" would be attached under the airship belly, with access through a hatch. The visibility forward and downward would be good, and the engineering and cost less than in reconfiguring the nose of the airship car.

Little or no changes are required in the side windows. However, in a science airship, "observer seats" would need to be higher than the present "passenger seats"—again, for best forward and downward views. Our experience suggests a seat level 6–8 in below the window ledge is about right.

For prolonged observing, experiments might be conducted to assess the benefits of a small, perhaps detachable, wind screen on the forward edge of the windows.

Noise abatement. At times, the engines can be noisy.[3] Particularly for endangered species observations and other sensitive situations, noise reduction would be most desireable. There should be a study of frequency and levels generated, muffler feasibility, and general noise abatement. Airship operators have expressed concern about the power loss associated with muffler systems. One solution might be a cut-out or bypass system, where full power is available when needed, yet engines can be muffled during routine operations.

Glare. At times there is considerable glare on the forward windows (S-600 ship). It may be from the sea, sky, envelope, curvature of the plexiglass, or a combination. The solution could be as simple as flat black paint on the envelope directly above and forward of the window, or a modification in the glass coating.

Car configuration. On a science airship, the inside of the car would be fitted with a system of "hard points" with standard attachment hardware for equipment racks, camera mounts, etc. (Figure 17). Reliable AC and DC power would be readily available with standard connectors. Several attachment points would exist on the outside of the car for antennas and the like. In certain instances a small winch could be fitted. A "science manual" would be prepared giving specifications on available power supplies, power restrictions, logistical constraints, procedural information, necessary measurements, and providing, for example, a template for hatch-mounted equipment.

Conclusions

Aerial surveys have become the method of choice in many programs to estimate numbers of many cetacean species. Descriptions of characteristics and behaviors have also been valuable. The airship should now be considered as an important complement to existing platforms and capabilities.

On survey, the slower speed of the airship increases viewing or scan time. Animals with minimal sighting cues, fleeting appearances at or near the surface, or submerged are more likely to be detected.

When animals are sighted, clearer, longer, and less obtrusive periods of uninterrupted viewing will increase accuracy of numbers, markings, size, behaviors, and descriptions of individuals within a group or sighting. With window panels removed, the no-glass photographic ability is a real advance.

In short, the ability to both fly survey lines and to stop and do "station work" is unique. Various photographic gear and instrumentation is possible.

In summary, the airship can fill a definite need. A number of the priority data requirements in marine mammal science—time/space variability, improving abundance estimates, behavioral studies, anthropogenic effects, and habitat characterization—can perhaps be addressed best from the airship as a sole or as a complementary research platform.

Airship technology—if used exclusively to carry TV cameras over sporting events—is quite simply being underutilized. An important and worthwhile use of the airship is in ocean and environmental research. Marine mammal and protected species work could well be the logical first step in developing the airship for research. This avenue should continue to be vigorously pursued.

Endnotes

1. The *Hindenburg* used hydrogen (flammable) as a lifting gas. Even though the ship was designed and built to use helium (nonflammable), in the climate preceding World War II, the United States prohibited the export of helium to Germany. All airships now use helium.
2. Engine noise in airships is a variable—depending on the engines, ship, altitude, and conditions. Under normal conditions, observers on boats with which we were working described the engine noise as less than fixed-wing aircraft. In recent trials with the American Blimp Corporation's Lightship, observers described engine noise as barely noticeable. We are presently studying frequencies and levels generated by airship engines.
3. Forward visibility is likewise a variable—depending on the ship and its configuration. In the WAI S-600, the cockpit console reduces visibility. In the ABC A-60 Lightship, the console and seat positioning makes for better visibility. In upcoming trials with the US-LTA 138S ship, we will include a visibility evaluation.

Acknowledgments

Manuscript review: Carol P. Fairfield, Robert D. Kenney, and John A. Taylor.

Program support: Center for Marine Conservation, Fuji Photo Film USA, International Wildlife Coalition, Marine Mammal Commission, MetLife, Minerals Management Service, National Science Foundation, Sea World, and Virgin Lightships.

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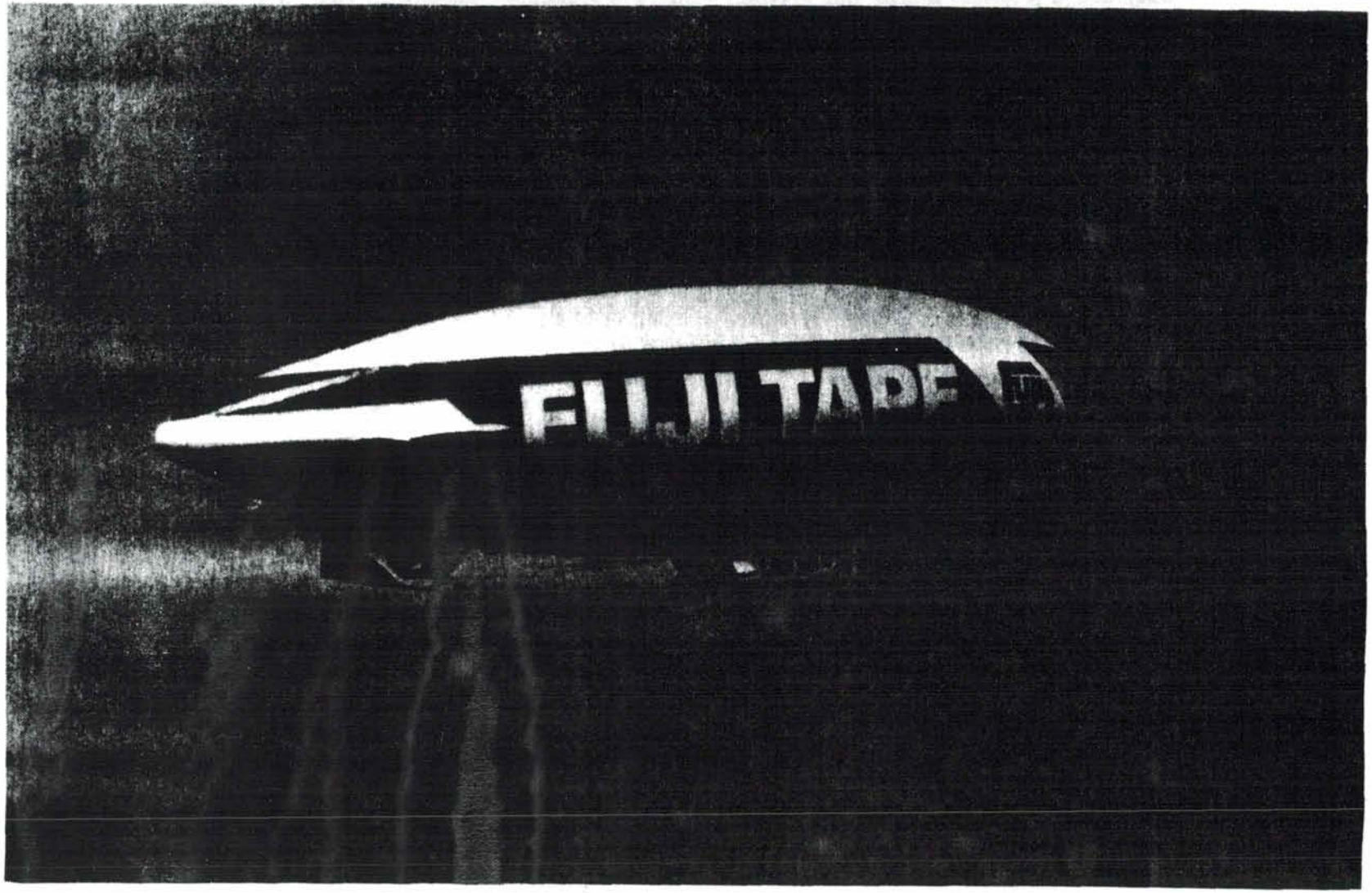
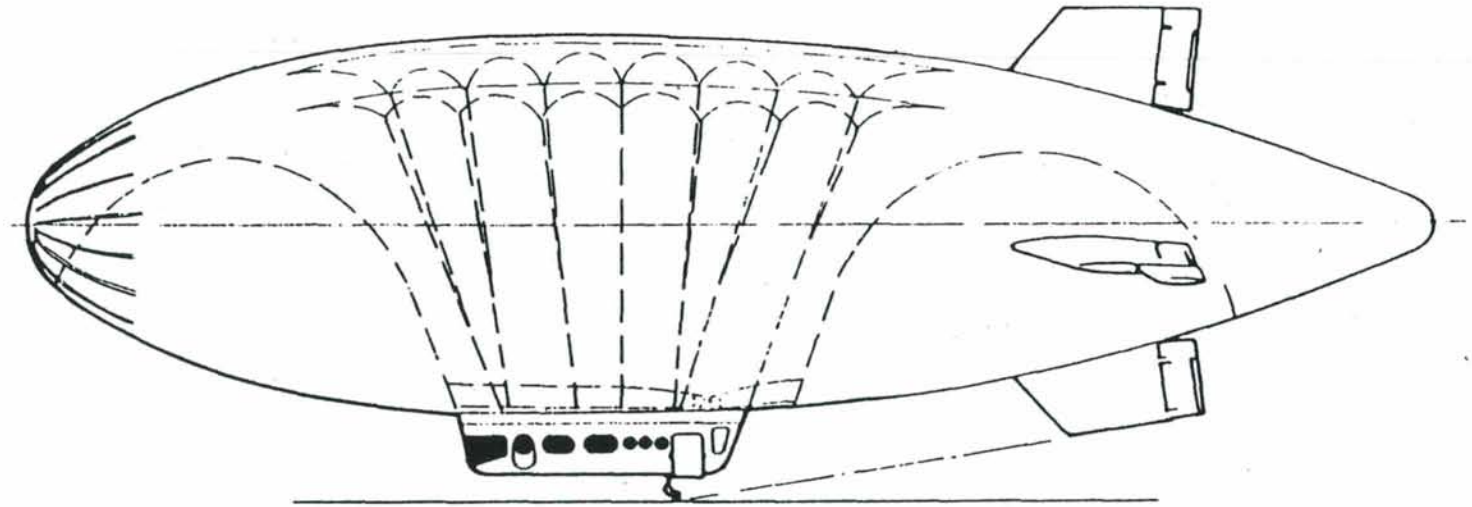
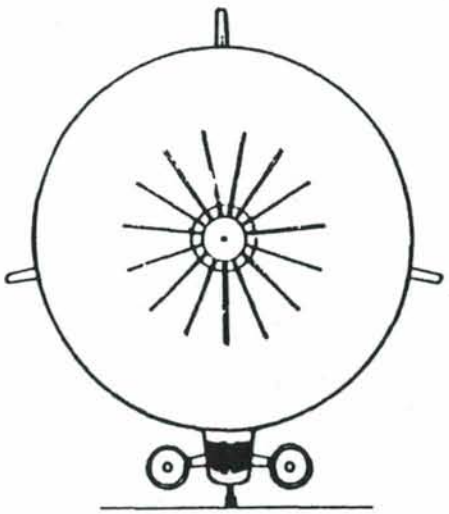


Figure 1. One of the new generation of airships—built by Airship Industries—uses modern technology for design, materials, and vectored propulsion. This 194-foot-long airship has an 8–10 hour working endurance, and excellent slow-speed and hover capabilities.





Skyship 600

Principal Dimensions		
Gross envelope volume	6666m³	235,400ft³
Ballonet volume	26% of gross envelope volume	
Length (overall)	59.0m	193.6ft
Diameter	15.2m	49.9ft
Height (overall)	20.3m	66.6ft
Tailspan	19.2m	63.0ft
L/D ratio	3.88	—
Gondola Dimensions		
Length (overall)	11.67 m	38.3ft
Width (overall)	2.56m	8.4ft
Main cabin headroom	1.92m	6.3ft
Main cabin length	6.89m	22.6ft

Figure 2. The Westinghouse/Airship Industries Skyship 600, giving principal dimensions.

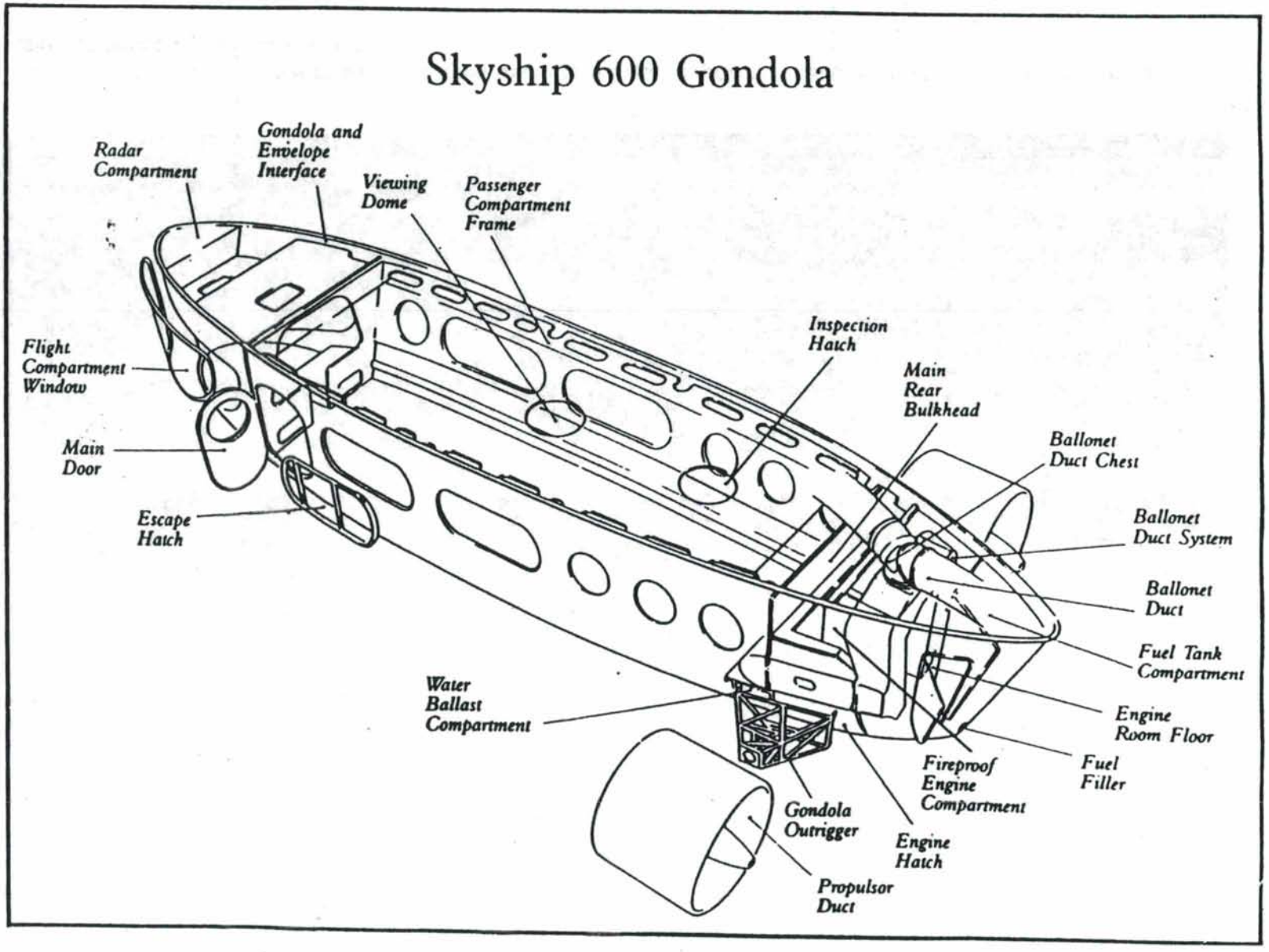


Figure 3. The airship car or gondola. The large side windows have removable panels for unobstructed viewing and photography. The vectored propulsor ducts rotate above and below the horizontal to aid in manuvering and station-keeping.

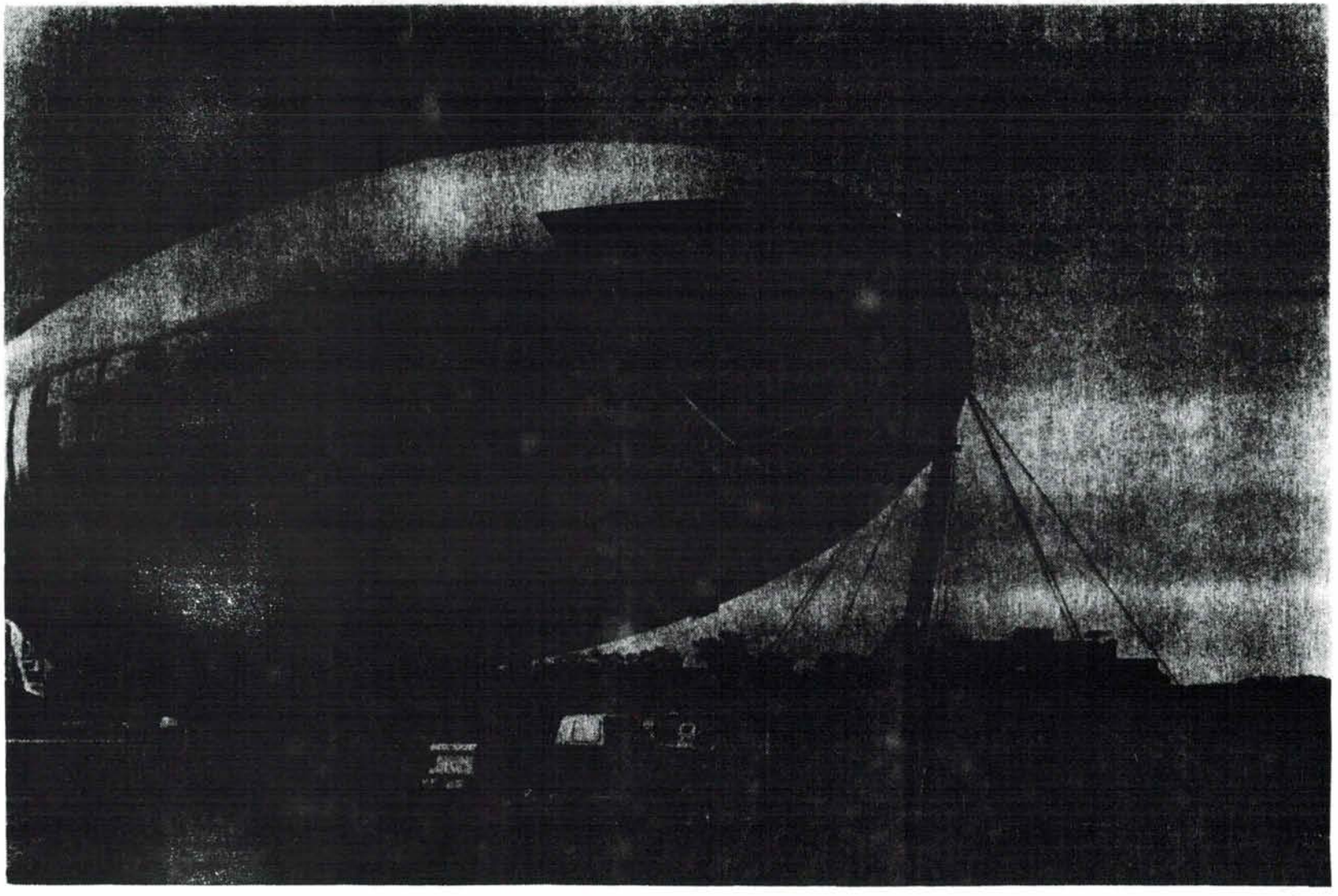


Figure 4. The airship on the mast. The mast truck, fuel truck, supply van, and personnel carriers are mobile and positioned at various airfields.

Figure 5. Observer seating while on survey for marine mammals. Window panels by the left and right observers are removed—providing unobstructed view and ability to lean outboard for forward and downward views. A third observer is seated in the co-pilot's seat.

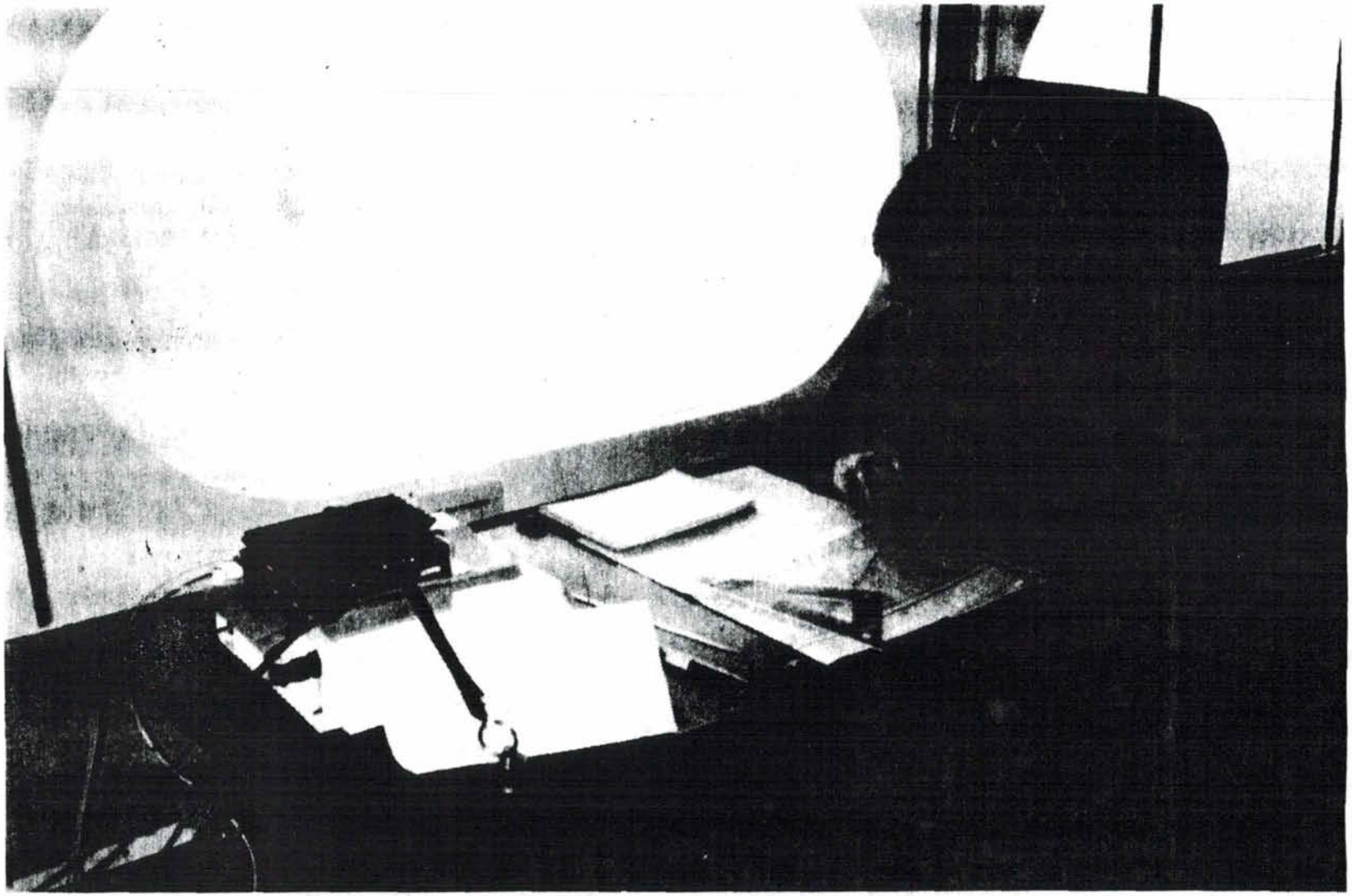


Figure 6. An example of a work station set up in the airship car—in this case a navigation/plotting table.

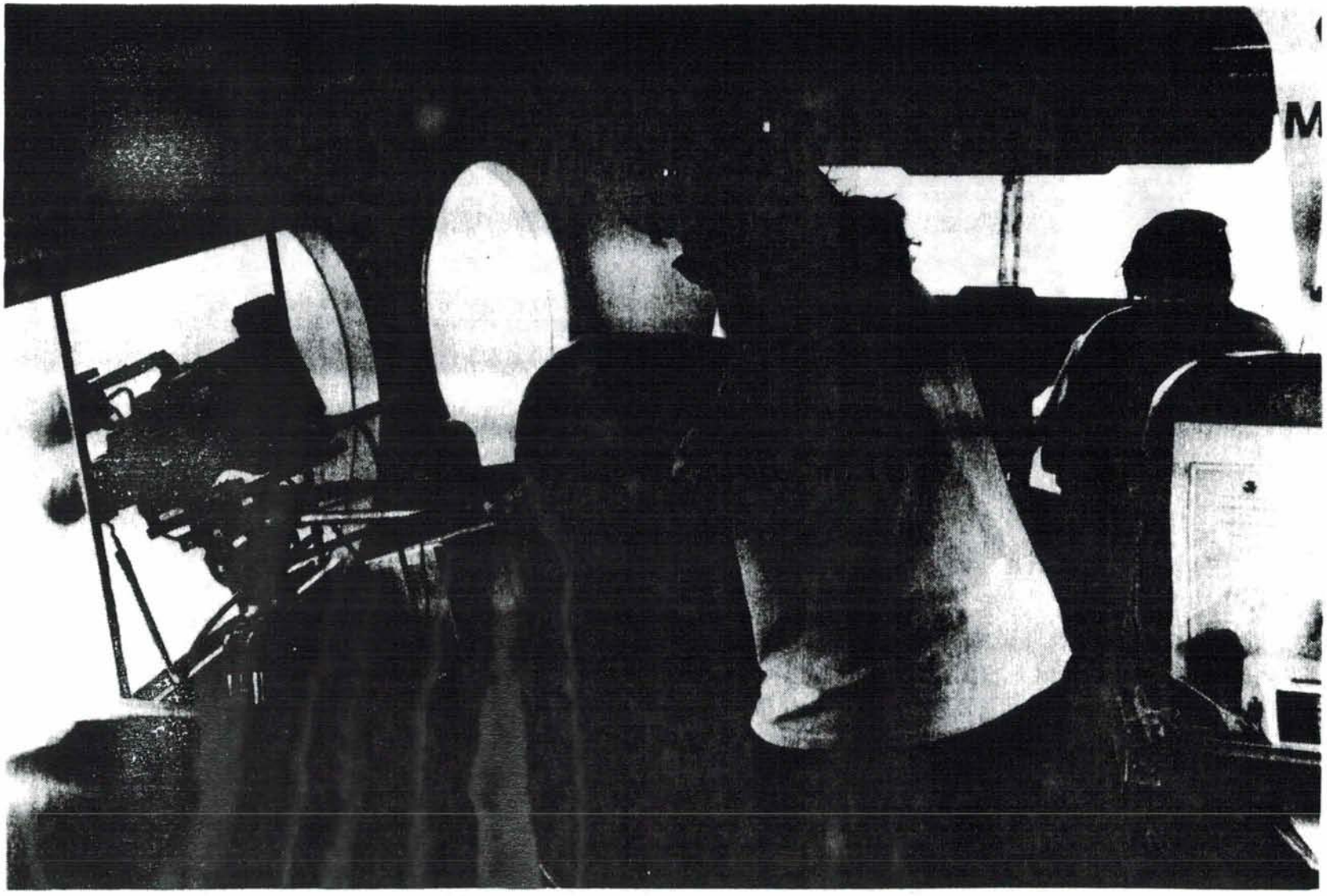


Figure 7. Video data acquisition is an effective complement to the stability and positioning capabilities of the airship. In this way, behavioral data can be captured, quantified, and analyzed.

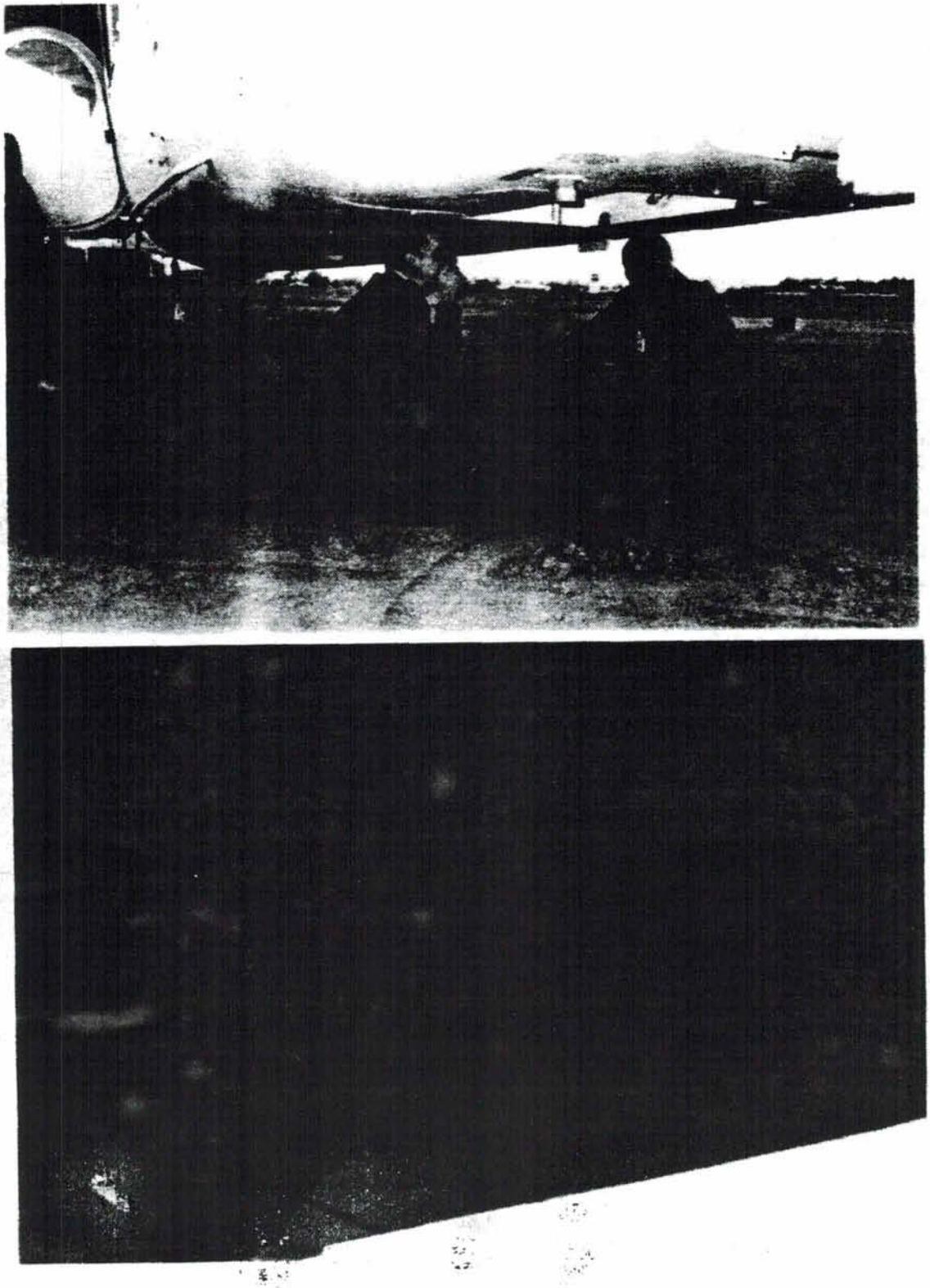


Figure 8. Two views of the floor hatch in the after section of the car. Dimensions are 20 X 35 inches. The hatch could be used for downward-looking instrumentation, cameras, or lowered samplers.

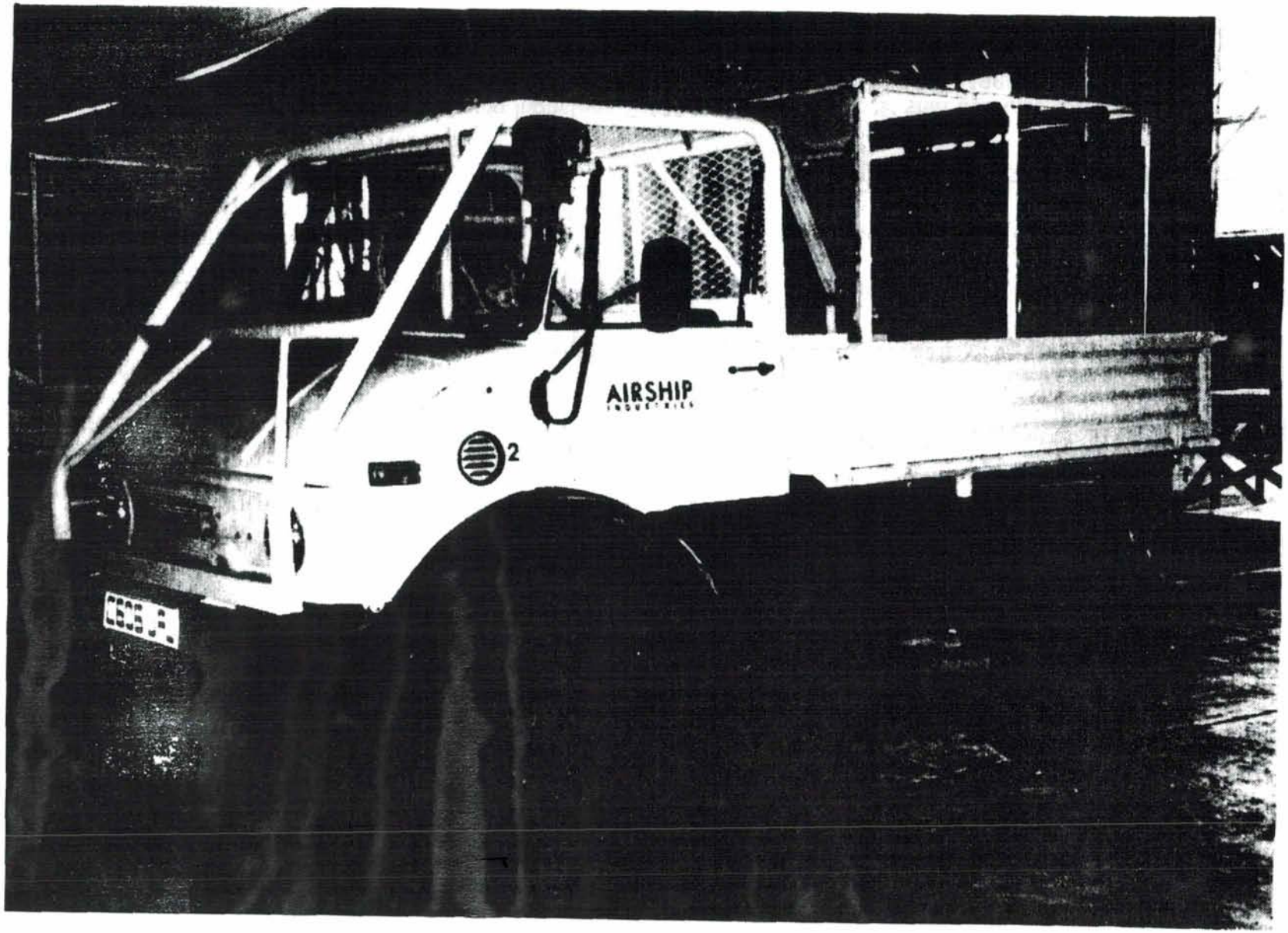
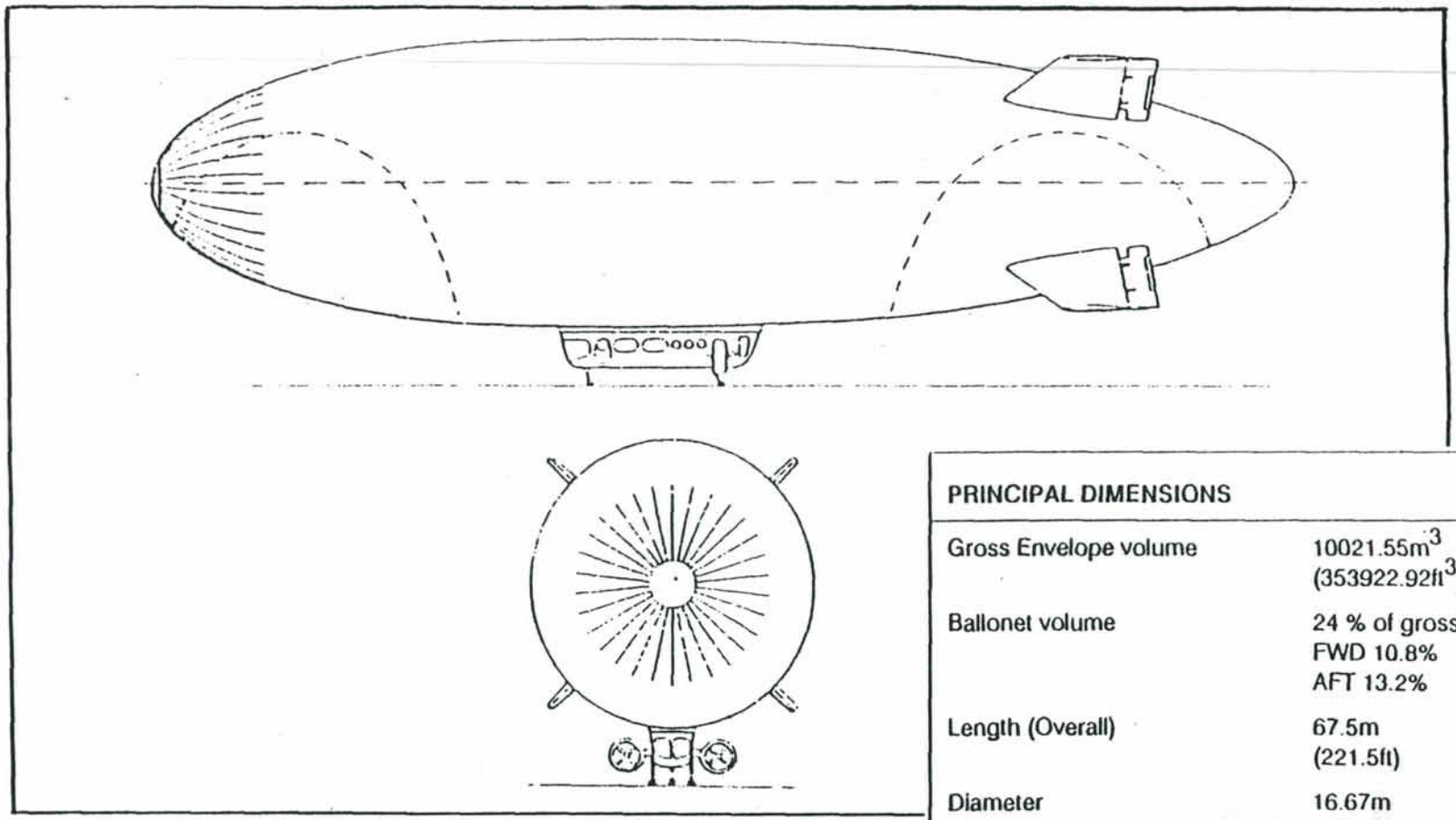


Figure 9. A "mule." To reduce size of the ground crew, airship operators are experimenting with the use of "mules" or tractors to partially mechanize the operation. This example, in Weeksville, NC, will be used in association with the new S–1000 airship.



PRINCIPAL DIMENSIONS	
Gross Envelope volume	10021.55m^3 (353922.92ft^3)
Ballonet volume	24 % of gross FWD 10.8% AFT 13.2%
Length (Overall)	67.5m (221.5ft)
Diameter	16.67m (54.7ft)
Height (Overall)	20.162m (64.88ft)

Figure 10. The new Westinghouse/Airship Industries S-1000 airship. This 222' ship will have the range, endurance, and lift for offshore scientific missions. The ship is scheduled to fly in June 1991.

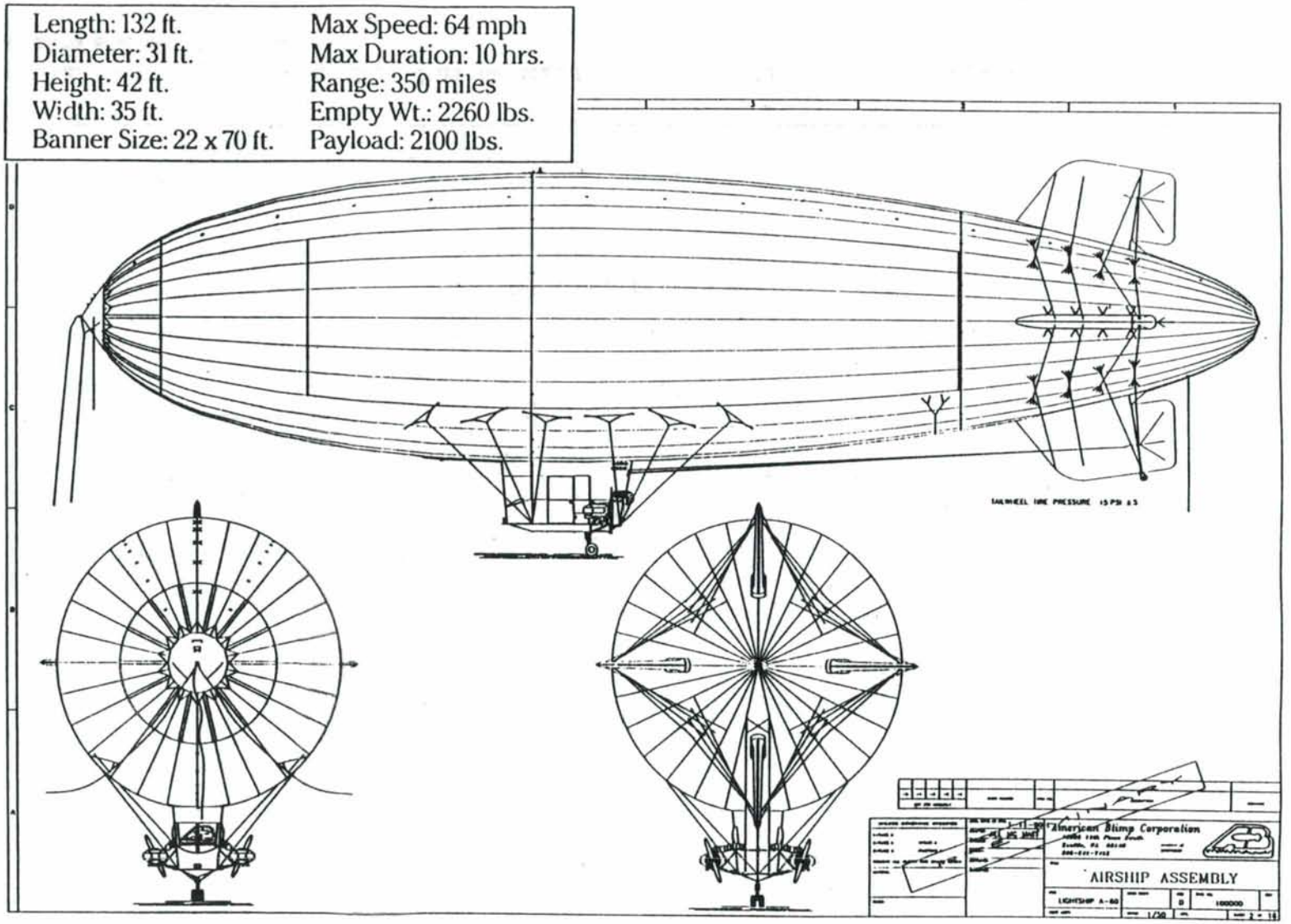


Figure 11. The American Blimp Corporation's A-60 Lightship. This smaller (130') ship is being evaluated for coastal work.

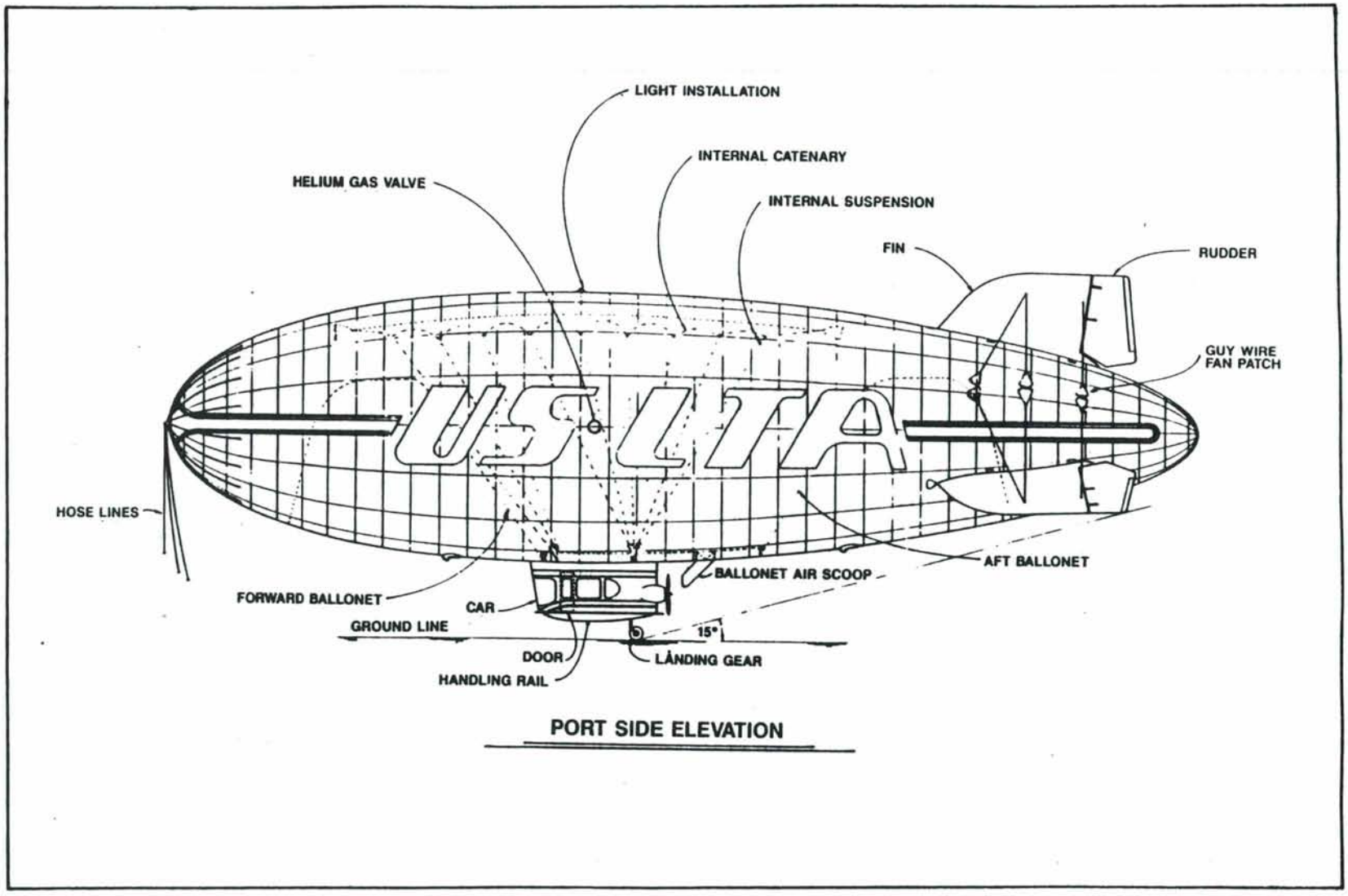


Figure 12. The US-LTA 138S airship. This mid-size ship (160 ft/4,000 m^3) has the range, endurance, and lift suitable for coastal scientific missions.

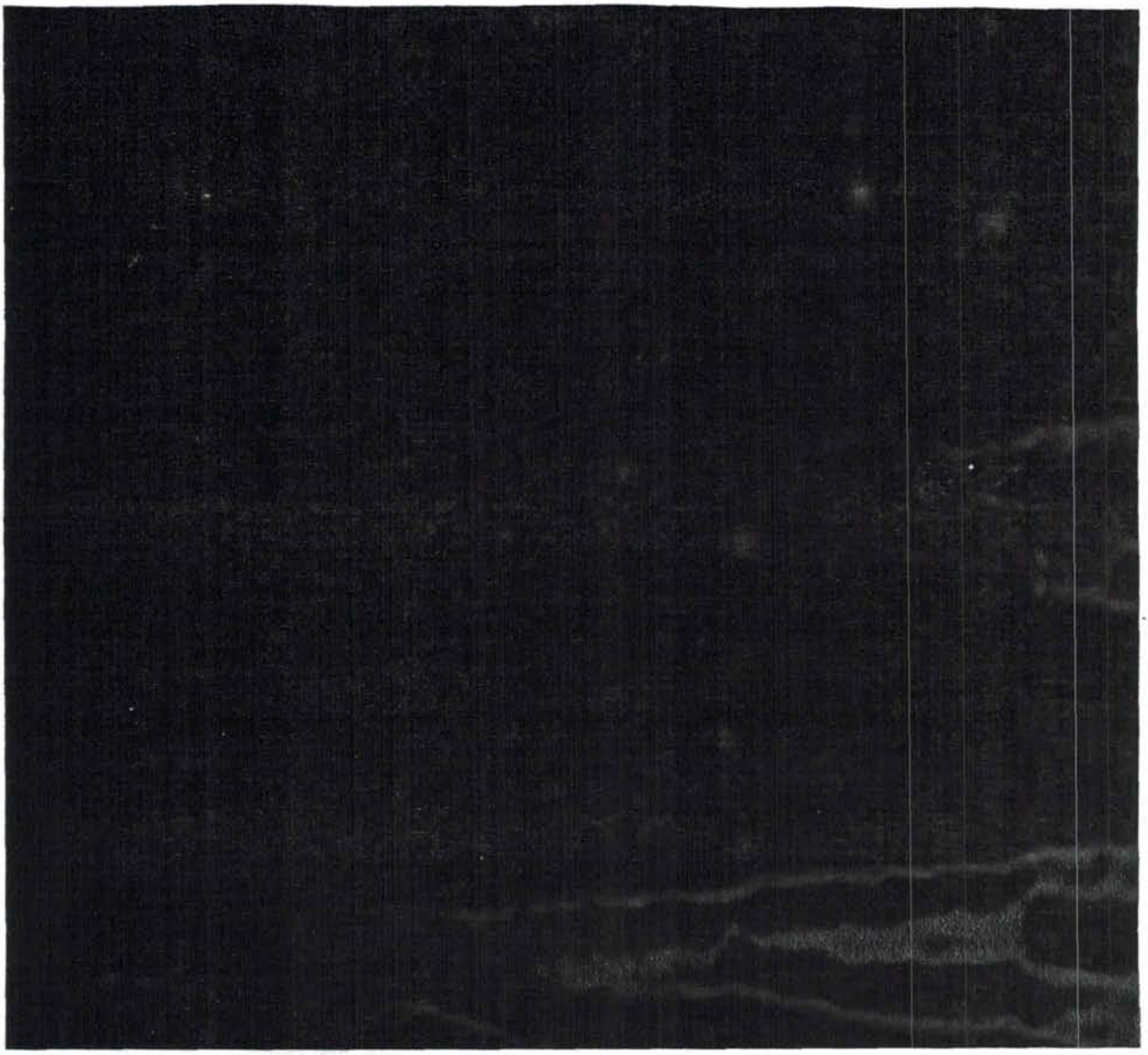


Figure 13. Four fin whales northeast of Provincetown, Massachusetts on August 16, 1990. The marks/scars on the leftmost whale were distinctive—this whale was resighted on several occasions. (Photographed from the Fuji airship by R. D. Kenney).

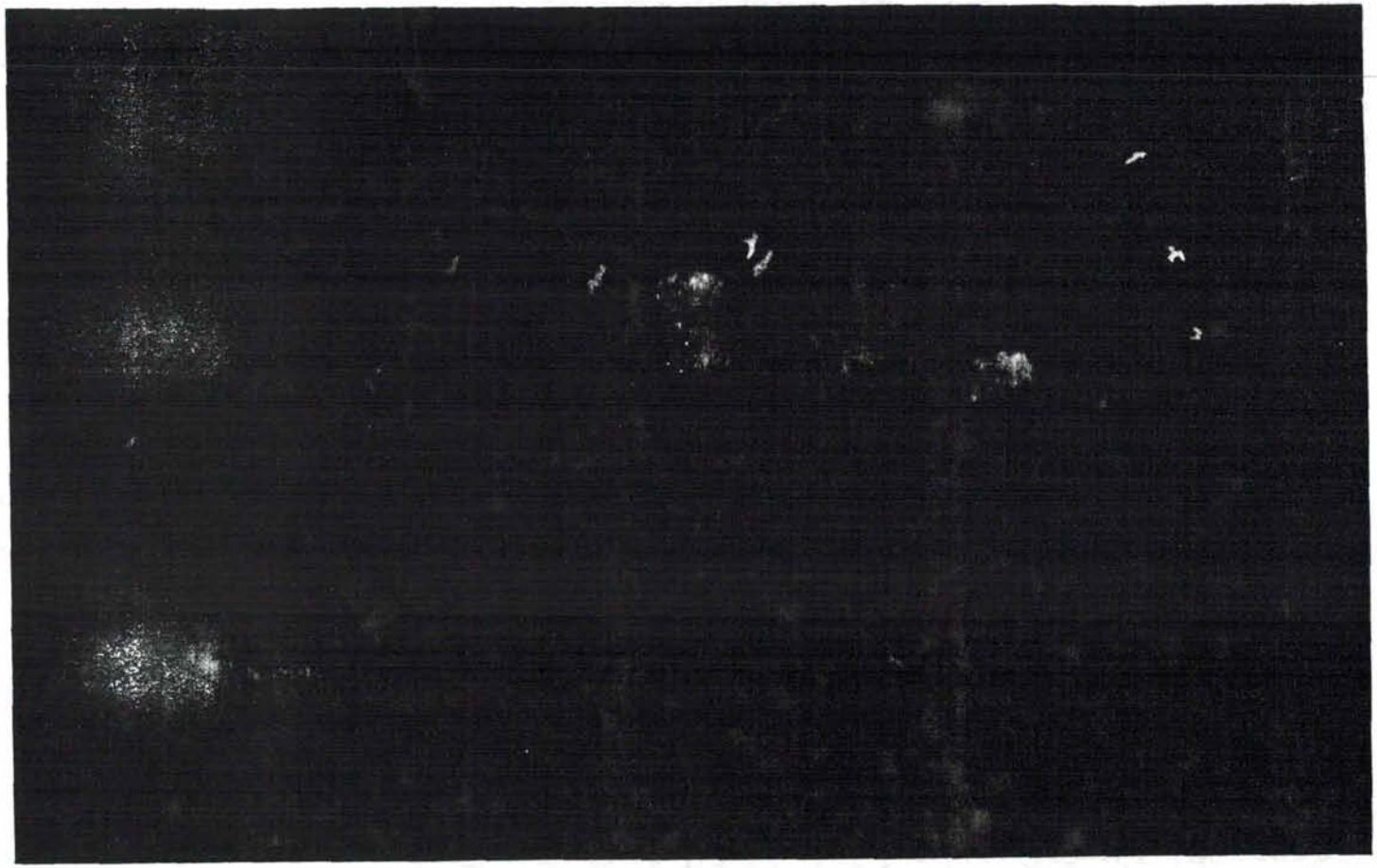


Figure 14. Looking down the throats of two humpbacks—an example of the positioning capabilities of the airship. Here, feeding humpbacks were located northeast of Provincetown, Massachusetts on 21 August 1990. In the 30 seconds preceding this shot, one of the whales swam underwater in a circular pattern, exhaling in bursts along the way. The pulsed underwater "blows" rose to the surface as columns to form a corral around the prey. The two whales, mouths open, then rose vertically through the inside.
(Photographed from the MetLife airship by R. D. Kenney).

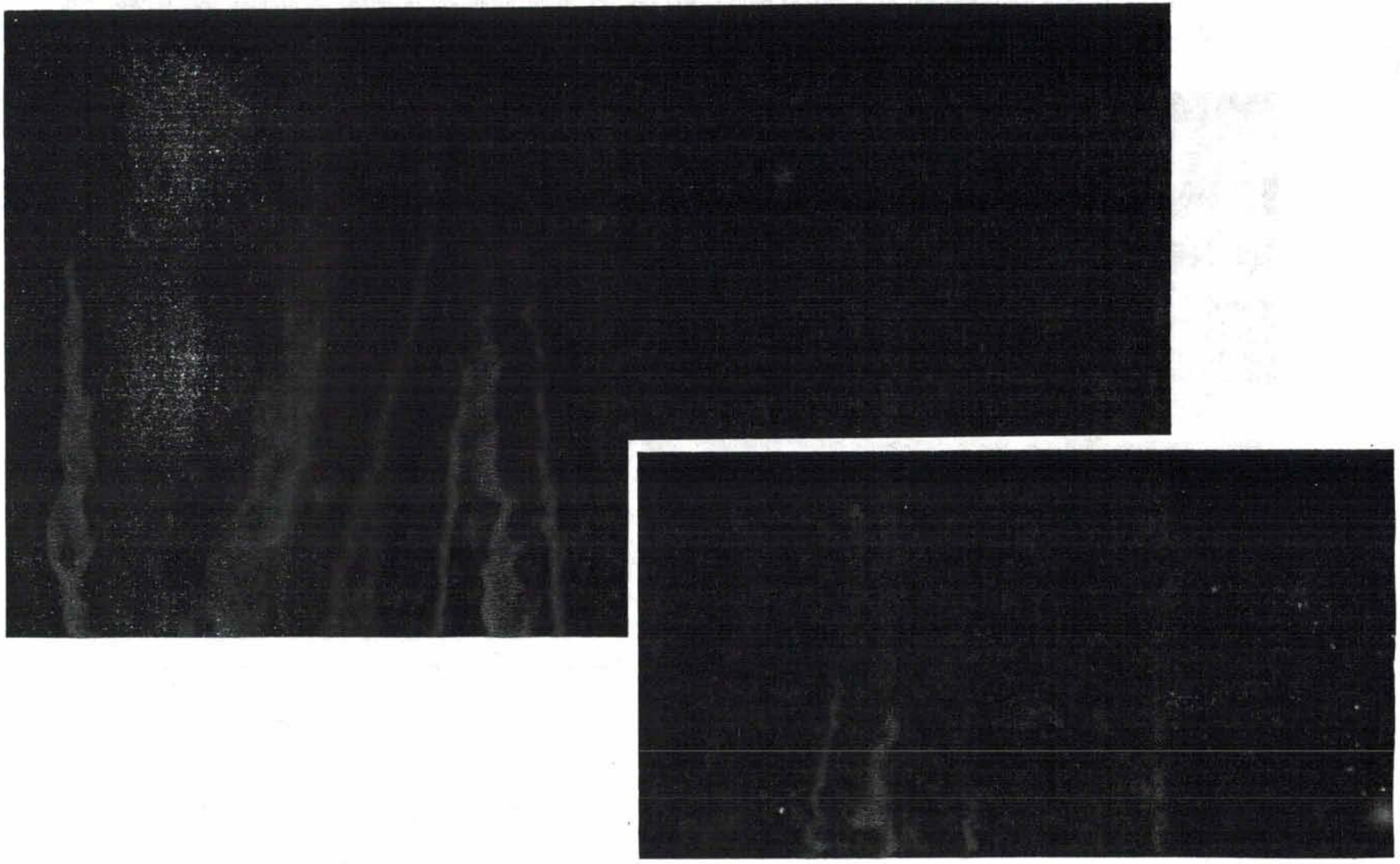


Figure 15. A right whale photographed 21 February 1991 south of New Smyrna Beach, Florida. Photographs revealed that the whale was dragging line, buoys, and net. This individual washed up dead on 12 March 1991, 115 miles to the north on Amelia Island. Cause of death: ship strike. (Photographed from the Sea World airship by S. L. Ellis).

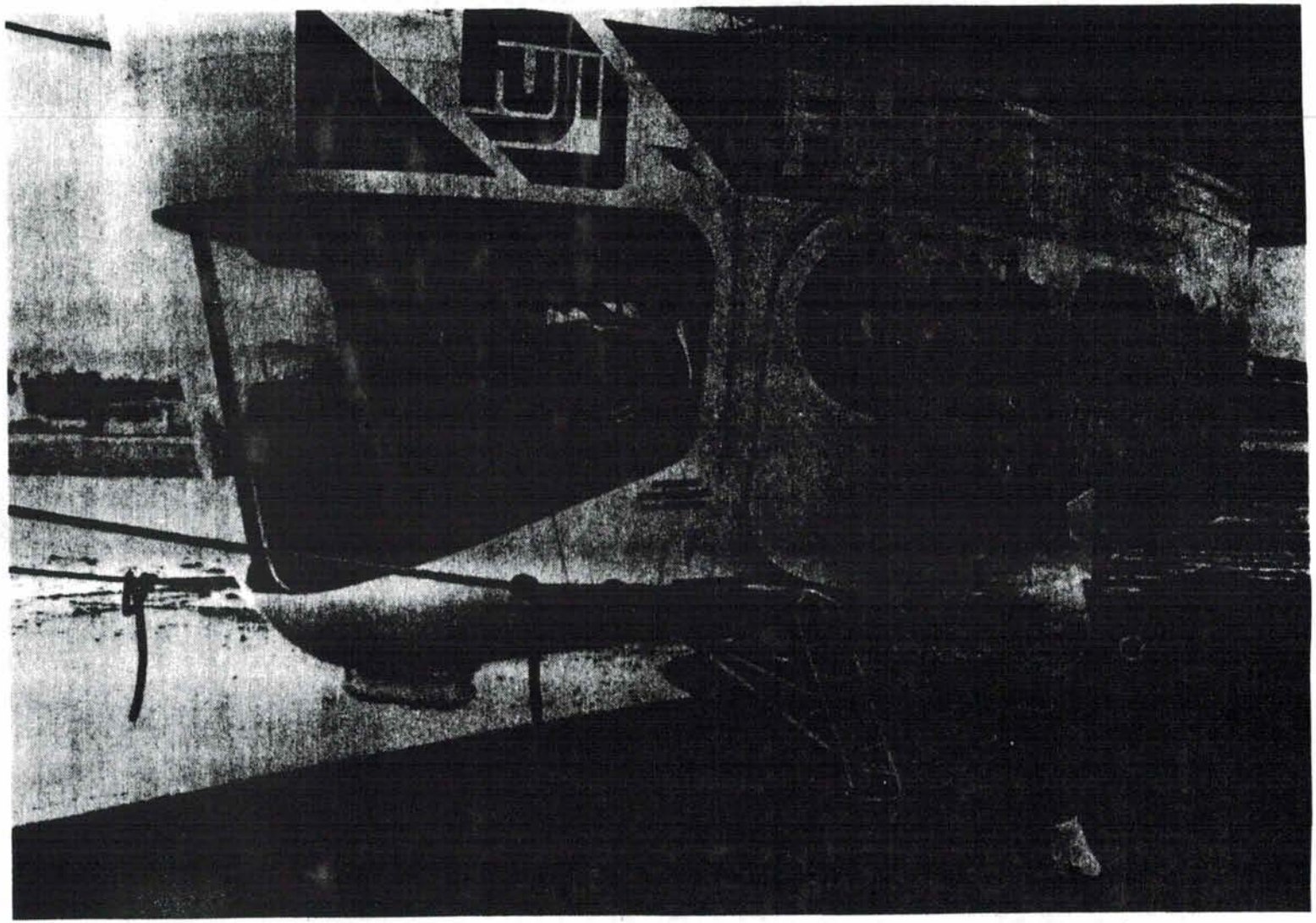


Figure 16. Forward end of the car showing large windshield. In a science-modified airship, the direct-view panel (the hinged and removable panel at shoulder level) on the right could perhaps be repositioned slightly and enlarged. This would give an observer in the right seat the option for an unobstructed forward view.

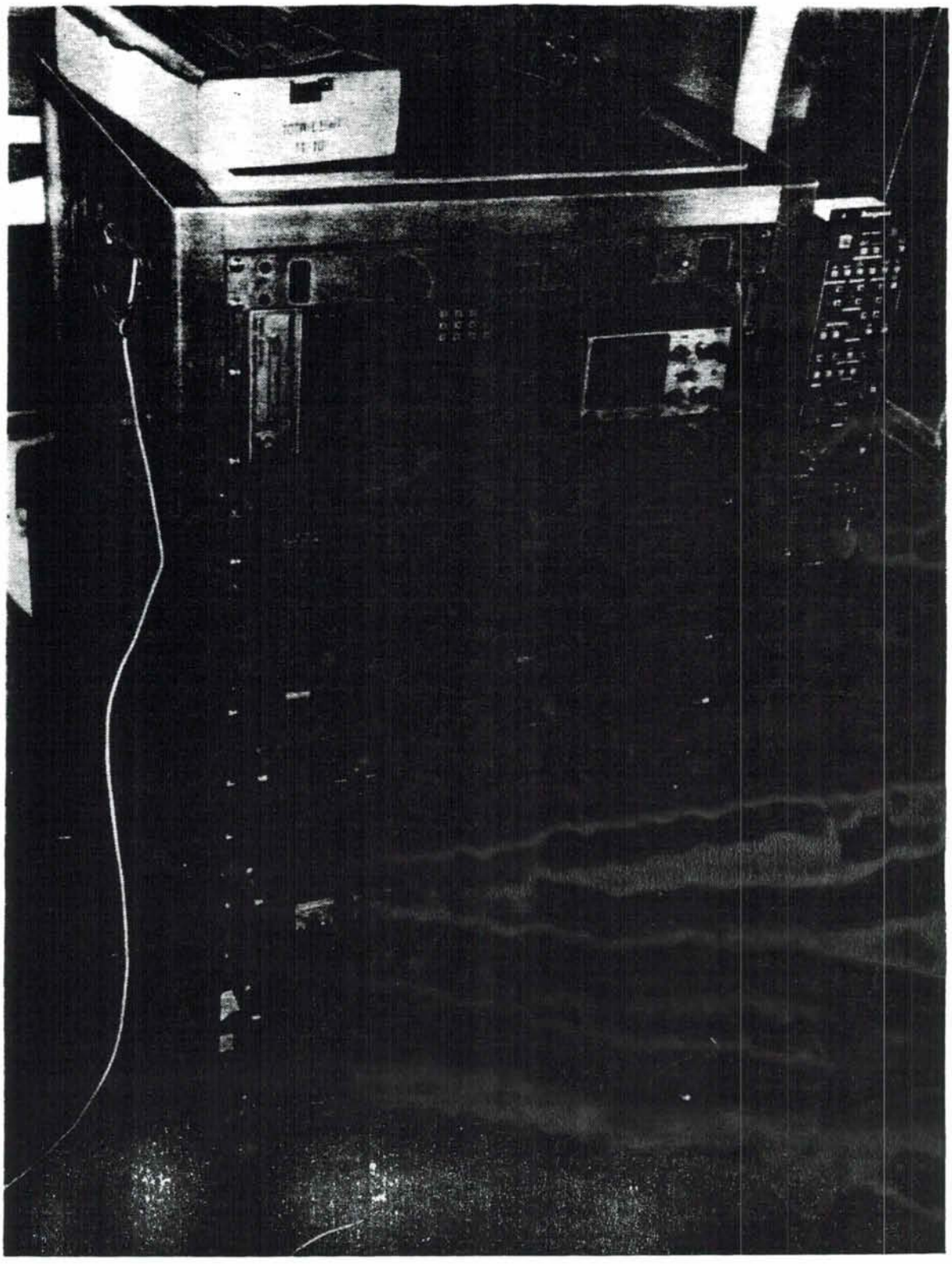


Figure 17. An example of an instrument rack mounted in the airship car. (This one belonged to aerial videographers of Winged Vision, Inc.)

APPENDIX XIII

UNOLS COUNCIL NOMINATIONS 1998

Nominating Committee

Dennis Hansell (Chair), Clare Reimers, Peter Lonsdale

Time Frame

1) February/March 1998 - Nomination Committee formed
2) April/May 1998 - Announcements published
3) July 1998 - Draft Election Slate presented to Council
4) July/August 1998 - Election Slate finalized
5) September 1998 - Council Elections

Announcements Requesting Nominations

1) UNOLS Newsletter
2) Advertisement in EOS
3) Letters to the Institutional Representatives to UNOLS
4) Letters to Dean/Directors of UNOLS institutes.

UNOLS COUNCIL NOMINEES 1998

Name	Discipline	Institute
~~Austin, James~~	~~Geophysics~~	~~UT Austin~~
Bauer, Jim	Biogeochemist	VIMS
Bryant, Bill	Geology	TAMU
Cowles, Tim	Biologist	OSU
~~Cutter, Greg~~	~~Chemist~~	~~ODU~~
Firing, Eric	Physics	UH
Fornari, Dan	MG&G/DeepSubmerg.	WHOI
~~Goss, John~~	~~Geophysics~~	~~UT Austin~~
Lee, Tom	Physics	RSMAS
~~Moran, Brad~~	~~Chemist~~	~~URI~~
Royer, Tom	Physics	ODU
Youngblouth, Marsh	Biologist	HBOI

*Strikeout indicates nominations not forwarded to the final election slate.

6/30/98

DRAFT NOMINATION SLATE
(July 1, 1998)

CHAIR

VICE CHAIR

Royer, Tom	Physics	ODU

COUNCIL

OPERATOR

Bryant, Bill	Geology	TAMU
Firing, Eric	Physics	UH
Youngblouth, Marsh	Biology	HBOI

NON-OPERATOR

Bauer, Jim	Chemistry	VIMS

AT-LARGE

Cowles, Tim	Biology	OSU
Fornari, Dan	MG&G/DeepSubmerg.	WHOI
Lee, Tom	Physics	RSMAS

Candidate Profiles

Tom Royer, Physics, ODU, current Vice Chair, eligible for one more term.

Bill Bryant, Geology, TAMU Oceanography Department Head

Eric Firing, Physics, UH, Previously a member of FIC, currently on SWATH Design Committee at UH

Marsh Youngbluth, Biology/Submersibles, HBOI, Agency experience with NSF/NOAA

Jim Bauer, Chemistry, VIMS, nominated by Dean Don Wright

Tim Cowles, Biology, OSU, currently Assoc. Dean, nominated by Dean Brent Dalrymple

Dan Fornari, MG&G/DeepSubmerg, WHOI, Chief Scientist for Deep Submergence at WHOI

Tom Lee, Physics, RSMAS, active in RSMAS Ship Ops and joint RSMAS/HBOI committees; nominated by Dean Otis Brown

APPENDIX XIV

Z Drives

Glosten Report Recommendations, 1998, and Current Status

1. The original R/V Knorr *lower starboard gear was replaced at the May 1998 drydocking. This was important to do because the original gear was a high risk gear. WHOI had purchased two new lower gear sets for* Knorr *in advance of this drydocking, and checked the contact area of the installed port side 1997 replacement lower gear. At this time it was determined that in accordance with the "moderate risk" definition, the cost/risk assessment determined that the 1997 replacement gear (port side) should not be replaced. Both units had bearing/seal replacements.*

Status:

- Two gears purchased.
- Starboard gear replaced, but not port gear, by ONR direction.
- Bearings and seals replaced on both sides.
- Remaining new gear held as spare.
- New gears are of Klingelnberg manufacture (firm with best tooth contact/hardening performance to date on earlier gears), but were on hand/rapidly available, thus meet 0.094 in. case depth, not the more stringent 0.104 in. specification.
- *Knorr* continues to operate de-rated due to the unreplaced gear.
- The new gear bought but not installed should serve as a competent, if not optimal, fleet spare provided good tooth contact is maintained.

2. Replace the original R/V Melville *lower port gear at the next drydocking. The contact area of the 1993 replacement gear should be checked at this time, and a cost/risk assessment made as to replacement of this starboard gear.*

Status:

- ONR funded purchase of two new gears; both to be replaced at next drydocking.
- ABS is reviewing gear specs./certification process *via* a Corrective Action Team (CAT), which may lead to changes.
- Purchase of gears being held until CAT is settled, due August 15, 1998.
- ONR has asked Lips to meet/discuss the issue after CAT analysis is received.

3. Obtain one spare lower gear set for Melville/Knorr *class, held in reserve in case of a failure. This gear will serve as a spare for all 4 thrusters.*

Status:

- WHOI gear purchased but not installed should serve for now
- But see discussion in #1 above; there may be cause for additional changes in *Knorr* after CAT results, ONR/Lips meeting, etc.

4. Obtain one spare port upper gear and one spare starboard upper gear for AGOR 23-5.

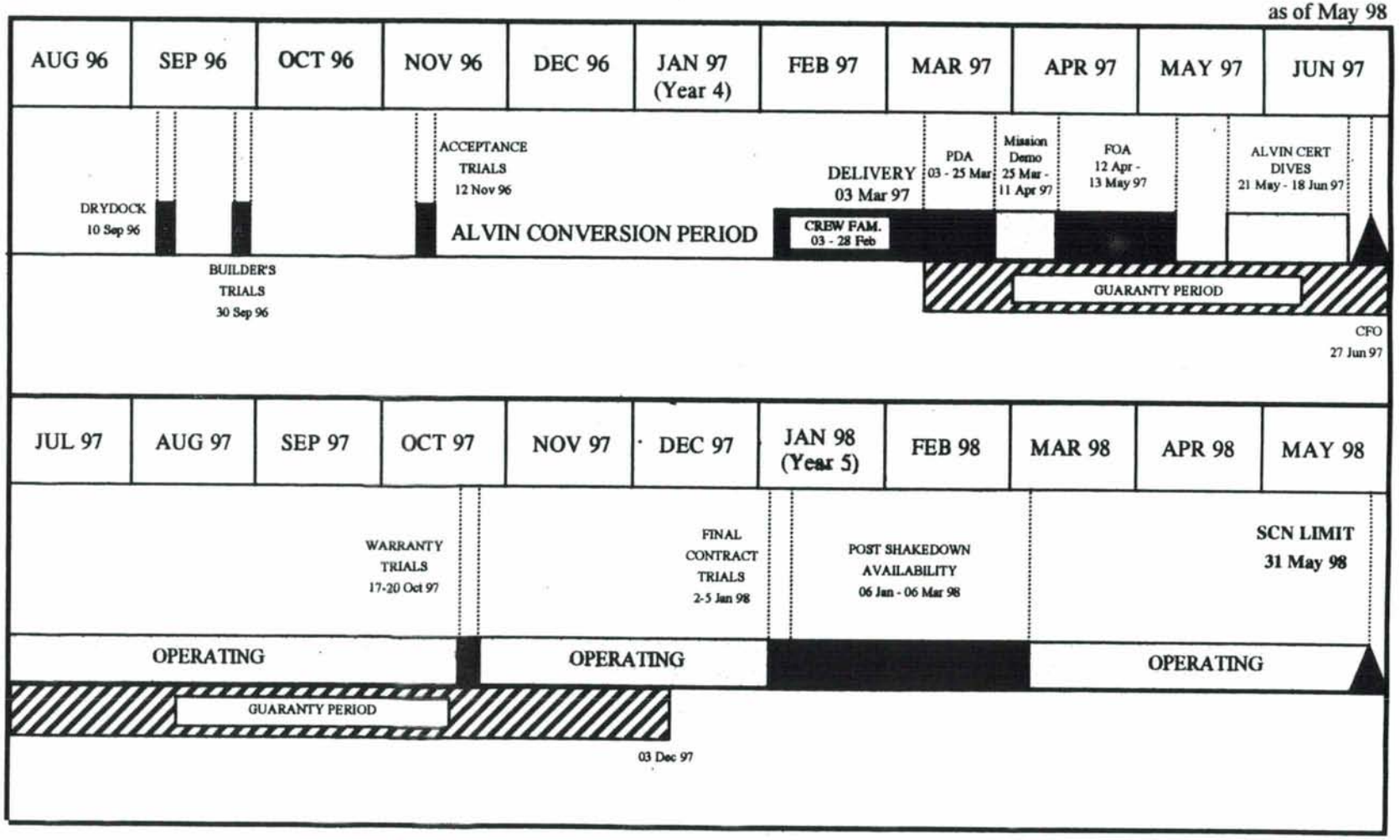
Status:

- Funded by ONR.
- Complete lower unit spares exist, so spares complement will cover all 4 possibilities (port upper, port lower, starboard upper, starboard lower) when these are purchased/on hand.
- This purchase also on hold pending CAT results.

APPENDIX XV

AGOR 25 TEST & TRIALS SCHEDULE

as of May 98



- Trials - In Port - At Sea - Milestones

AGOR 25 R/V ATLANTIS