

**UNOLS SHIP SCHEDULING
COMMITTEE**

Report of Meeting

23 June 1993

**National Trust for Historic Preservation
1785 Massachusetts Avenue, N.W.
Washington, DC 20036**

SCHEDULING REVIEW MEETING

Report of Meeting

24 June 1993

**National Science Foundation
Washington, DC 20036**



UNOLS SHIP SCHEDULING MEETINGS

National Trust for Historic Preservation

1785 Massachusetts Avenue

Washington, DC 20036

23 June 1993

Appendices

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- III. Ship Use and Cost Summaries 1993 & 1994
- IV. Ship Cost Comparative Study
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INTRODUCTION:

This report is a summary of the discussions at the UNOLS Ship Scheduling Meetings held at the National Trust for Historic Preservation in Washington, DC on 23 June 1993. The morning session discussed the schedules of the East and Gulf Coast ships while the afternoon session covered the schedules of the West Coast ships. The meeting followed the agenda, Appendix I, except as noted herein. Program managers from the funding agencies were encouraged to attend for the purpose of providing advice on the various cruise programs that were being presented by the schedulers. A list of attendees for these meetings is included as Appendix II.

Prior to the meeting all schedulers had provided their proposed schedule or schedules to the UNOLS Office and these were posted on the SHIP.SCHED94 OMNET bulletin board. The schedulers also provided the UNOLS Office with cost estimates for their schedules. These figures were assembled in a summary and are included as Appendix III. Schedulers and scientists also provided the UNOLS Office with a copy of the Shiptime Request (Form 831). This inventory of requests was used as a cross check with the schedules to ensure all cruises were assigned to a schedule or otherwise accounted for.

The Ship Scheduling Meeting was called to order by Ken Palfrey, Chair at 0830 hrs.

REVIEW AND UPDATE SCHEDULES.

University of Michigan - LAURENTIAN. Linda Goad provided a view graph of the LAURENTIAN schedule. It included 95 days of ship time. All of these were NSF cruises of which 47 are presently funded and 48 pending. Linda then presented a cost analysis of the UNOLS fleet for both 1989 and 1992. The cost comparisons were calculated by \$/person, \$/foot (LOA), \$/foot/person and \$/scientist for each of these two years. A copy of this study is included as Appendix IV.

Woods Hole Oceanographic Institution - ATLANTIS II. Don Moller provided a summary of the schedules for WHOI. The AII will spend the entire year of 1994 in the Pacific. The schedule is driven by both the science and the weather windows of the areas to be worked. A record 359 dives have been proposed for the year. Of these, 167 are presently funded. Don was not able to develop a traditional schedule from the information available, however, he presented a proposed schedule grouping the dives into logical sets geographically and scheduling them as the science requirements and weather windows dictate. Once funding decisions become clear a full schedule is expected for AII operating from Juan de Fuca in the north to the EPR (10 N) in the south. Engineering dives are to get a high priority.

KNORR. Don presented a schedule for KNORR starting in Woods Hole in February after a maintenance yard period. The ship is then to work off Brazil with several cruises and then into the Pacific. Four of the cruises scheduled have requested investigative tools from the WHOI Deep Submergence Group. These include AMS-120, ARGO(EMO) and the MR-1. All of these are pending NSF proposals. Dolly recommended that KNORR consider the D. Barber (J. Martin) work in the Galapagos if the cruise gets funded and the schedule permits.

OCEANUS. A mid life refit is scheduled for OCEANUS starting in the fall of 1993. An early spring completion date is planned. If a Great Lakes yard is selected for the overhaul the ship could be delayed in departure due to the ice. All but two cruises of the scheduled work presented by Don for OCEANUS are WHOI investigators.

Dick Pittenger reported that a KNORR cruise this year used the P-Coded GPS which permitted navigation accuracy of 4-6 meters and allowed the ship's dynamic positioning to operate quite satisfactorily. Negotiations are going on with DOD to expand the P-Code usage to all UNOLS ships.

University of Rhode Island - ENDEAVOR. The proposed schedule for ENDEAVOR was presented by Bill Hahn. ENDEAVOR is expected to complete its mid life refit in the fall of 1993 and will be ready for operation after the first of the new year. Several cruises scheduled on ENDEAVOR are also booked on OCEANUS, HATTERAS and ISELIN. These double bookings need to be resolved.

Lamont-Doherty Earth Observatory - EWING. Mike Rawson was first to post a 1994 schedule which included a fully funded schedule and a significant list of cruises that could not be booked. Well done Mike! It was recommended that the Smethie cruise be transferred to the KNORR for more efficient scheduling. Two other of the funded but not booked cruises will need special consideration. These are the cruises of Detrick and Mann.

Duke/UNC - CAPE HATTERAS. The CAPE HATTERAS schedule was presented by Joe Ustach and included 318 operating days of ship time. Joe indicated that the work of Valenzuela is depended on a shuttle flight and may be difficult to fit in. It was pointed out that the transits for Montoya and Droxler were long suggesting these cruises might go aboard another ship.

Skidaway - BLUE FIN. No schedule was presented for BLUE FIN.

Harbor Branch Oceanographic Institution - EDWIN LINK. The schedule for EDWIN LINK was presented by Tim Askew. Tim was informed that the NSF work proposed by LaPointe has been declined.

SEWARD JOHNSON. A general schedule of both institution and NOAA work was presented for SEWARD JOHNSON. A more detailed schedule will develop in the future.

University of Miami - CALANUS. A very light schedule of 35 days was presented for CALANUS.

COLUMBUS ISELIN. Ron Hutchinson had posted on Telemail versions A, B and C of ISELIN'S schedule and brought with him versions D and E. The various schedules varied by one or two different cruises. Ron was informed that LaPointe and Cowen had been declined. Options D and E contain Paffenhofer which appears to be the same DOE cruise booked aboard ENDEAVOR as Saunders. All options included an expedition to Brazil and to the Galapagos.

LUMCON - PELICAN. Steve Rabalais presented the proposed schedule for PELICAN. It reflected 106 days with funded cruises from NSF, MMS, NOAA and DOE.

Texas A&M - GYRE. Doug Biggs filled in for Dean Letzring in presenting the proposed schedule of GYRE. The schedule reflected 161 operating days, however, only 25 of these days are funded at this time. Doug said the ship was positioned such that it could pick up the Droxler work in Belize on the return from Barbados.

University of Texas - LONGHORN. No presentation was given.

General Comments. It was apparent there were several double bookings and several assigned cruises that had long transits. These would need to be resolved. The GLOBEC program is planning a meeting in WHOI next week to finalize the ship scheduling requirements. Ken reminded the gathering of the newly printed "Scheduling Guidelines" that should get wide distribution. Additional copies are available in the UNOLS Office for those needing them.

The Federal agencies provided comments on funding issues at this time which are reported later in the minutes.

The meeting broke for lunch at 1130hrs.

The West Coast Scheduling Group met at 1300hrs.

University of Alaska - ALPHA HELIX. The schedule for ALPHA HELIX was presented by Tom Smith. The schedule included 180 days of ship time of which 153 has already been funded. JAMSTEC has proposed using ALPHA HELIX for a 20 day cruise. The Holbrook/Diebold work will be scheduled in coordination with EWING.

University of Washington - BARNES. Robert Hinton reported a light 56 days presently scheduled for BARNES.

THOMPSON. The THOMPSON schedule is driven by the JGOFS work in the Arabian Sea scheduled to start in the fall of 1994 and continue through 1995. Robert was informed that THOMPSON must be in the Arabian Sea ready for the first cruise by 1 October '94. This requirement will necessitate a change in the schedule as written. It was also suggested that THOMPSON plan to do what HOTS work will fit into the schedule if the cruise track takes the ship near Hawaii.

Oregon State University - WECOMA. Ken Palfrey provided the proposed 1994 schedule for WECOMA. The schedule starts in the spring when WECOMA is expected to complete its mid life refit and includes 173 operating days of which 84 are presently funded. Ken reported that the Joyce work was a joint project with NOAA/PMEL and would need special coordination. He also reported that the Trehu is keyed to the EWING schedule and would move to accommodate that ship.

Moss Landing Marine Laboratories - POINT SUR. The POINT SUR schedule was presented by Mike Prince. It included a well funded 203 day schedule. Mike also indicated that he had not been able to schedule 90 days of ship time most of which was funded. MLML will work closely with Scripps to see that the funded work is accommodated.

Scripps Institution of Oceanography - MELVILLE. The Scripps' ship schedules were presented by Bob Knox. Six options of MELVILLE schedules were offered, all included about 300 days. Only the second half of the year changed with the options and all complete the year in Fremantle in support of the Indian Ocean WOCE work. Bob was advised that the Dorman proposal had been declined.

NEW HORIZON. NEW HORIZON'S schedule included 274 days, all but one cruise remaining in the southern California area. Bob reported that the ship will be installing a new trawl winch in 1994.

SPROUL. Bob presented a modest 145 day schedule for SPROUL of which about half has been funded.

University of Hawaii - MOANA WAVE. The schedule of MOANA WAVE was provided by Stan Winslow. It included 104 days of ARPA funded work in the South Pacific. Discussion followed that this could go to a private contractor and not UNOLS. Stan is looking at the Hallock work off Japan if it is not picked up by THOMPSON. MOANA WAVE will not be able to cover the HOTS work between February and September.

GENERAL - Tom Smith reported that clearance requests for work in Russian waters are again becoming difficult. They require a long lead time then start the clock over if changes are made to the request.

Copies of the cruise tracks provided at the meeting are included as Appendix V.

AGENCY PRESENTATIONS.

NSF - Dolly Dieter provided information for the National Science Foundation. NSF requested a 16% increase in their 1994 budget. It appears now that this level of funding will not be sustained but that a lesser amount can be expected. Dolly said that she would need an eight to ten percent increase just to stay even with the 1993 funding.

ONR - Keith Kaulum and Pat Dennis represented the Office of Naval Research and Oceanographer of the Navy provided their funding outlook. Keith reported that 1993 had been a banner year funding wise and that 1994 would not do as well. The JGOFS work in the Indian Ocean will receive some ONR support that is not reflected on the current schedules. The Naval Research Laboratory (NRL) is expected to seek about \$1.33M in ship time from UNOLS in 1994 since their ships are now laid up. The scheduling process for this work is off to a bit of a shaky start but is expected to get on track.

NOAA - Scott McKellar and Steve Piotrowicz provided the input to the Committee for NOAA. Very little charter money is available to NOAA for 1994 with little or no UNOLS ship time planned. NOAA will be participating in WOCE with BALDRIDGE on line P 18. NOAA also expects to do P 15 in late '94 and '95. Attached as Appendix VI are copies of the NOAA slides presented to the Committee.

The meeting adjourned at 1530 hrs.

**Ship Scheduling Review
National Science Foundation
Washington, DC**

June 24, 1993

A meeting of the Scheduling Review Group was held at 0830 24 June to evaluate and make recommendations on the schedules presented at the UNOLS Scheduling Meeting of 23 June 1993. Present were Ken Palfrey, Chair Scheduling Committee; Ron Hutchinson, Vice Chair; Dolly Dieter, NSF; Keith Kaulum, ONR; Scott McKeller NOAA; Pat Dennis, ONR; Jack Bash and Mary D'Andrea, UNOLS Office. The funding picture for the 1994 operating year is expected to be limited with the possibility of one or more ships being laid up to meet funds available. The comments are attempts to consolidate schedules, reduce transits and develop the most efficient scheduling possible. Below is a summary of these deliberations including recommendations. Schedulers are requested to review these recommendations, and publish new schedules as indicated. These schedules should be posted on Telemail no later than 16 July 1993 in order to meet the Panel needs of NSF.

LAURENTIAN:

No recommendations are offered on the schedule presented.

ATLANTIS II:

No changes are recommended on the schedule as presented. It is recognized that a refined schedule will be necessary when funding decisions are known. Three areas of concern were noted as pointed out by the scheduler. These are: scheduling problems with the funded Ken Smith work; time between Mullineaux dives and the spacing of the Eckman dive series.

KNORR:

Several changes are recommended for the KNORR schedule. H. Dick's proposal will not be considered this year and thus not scheduled in 1994. Weatherly's work off Brazil should be added to the schedule for a late spring cruise. Include also the cruise of W. Martin. If the schedule and area of operation permits include the ancillary work of Sautter. Because of the likelihood that some of the Pacific MG&G work will not be funded it is recommended that the D. Barber (J. Martin) Galapagos Plume Study work be double booked with ISELIN. When funding information is firmer the most cost effective option will be exercised. It may also be necessary to compress the schedule by starting later in the year and returning to the Atlantic earlier.

OCEANUS/ENDEAVOR/CAPE HATTERAS AND ISELIN:

It appears that there is not enough work in the Atlantic to provide full schedules for all four of these ships. Presently, there are several double bookings, several longer than needed transit as well as optimistic scheduling. The schedulers should arrange a coordination meeting (electronic or otherwise) and readjust the schedules of the four ships under the following guidelines:

The OCEANUS schedule should not plan operations until summer at the earliest. The work of Repeta, Katz and all GLOBEC work should be passed to ENDEAVOR. The Whitehead work should go to ISELIN. The Richardson work will be either scheduled on a foreign ship or delayed until a vessel is available in the requested area. The Lentz/Butman work should go to ENDEAVOR for the heavy mooring work. If HATTERAS can accommodate the bottom sampling it should go aboard that ship. The double booking of Yamamoto should be resolved with the ENDEAVOR schedule.

ENDEAVOR's schedule should pass the Saunders (Paffenhofer) work to ISELIN. Pickart, now funded, should remain on ENDEAVOR. The dates for the Pickart work should be checked with Pickart and his program manager since there seems to be a discrepancy. The Rossby work may be the responsibility of the Canadians which should be investigated. The GLOBEC mooring cruise scheduled for 10/02 should read Brink/Lynch as PI.

CAPE HATTERAS should concentrate its schedule in the middle Atlantic as much as possible. This includes passing the Droxler work to ISELIN and the Montoya and Witman work to ENDEAVOR. If the Christensen work is declined the Townsend cruise should also go to ENDEAVOR. It should be noted that Littler has been declined and Anderson is ancillary work to go on funded cruises, as possible.

ISELIN's schedule should be aware that Cowen, Harbison and Lapointe have been declined. ISELIN should retain Barber (J. Martin) work on the schedule even though it is also scheduled aboard KNORR. (See KNORR above).

WEATHERBIRD II:

The schedule for WEATHERBIRD II should limit BATS related cruises to a maximum of 75 days. These are broken down as follows: Bloom cruises- 3 @ 3 days per cruise; Validation cruises - 3 @ 5 days per cruise; Hydrostation/Bats-50 days combined. A two day Purdy cruise has been funded but not scheduled. The remainder of the cruise schedule appears to be correct.

CAPE HENLOPEN:

The schedule for CAPE HENLOPEN appears fine as proposed. Two points of interest should be noted; the Jenkins cruises have been funded and the Kemp cruises should be listed as proposed at this time.

BLUE FIN:

No comment.

EDWIN LINK:

The schedule for EDWIN LINK should delete LaPointe who has been declined. Fisher has also been declined and de Angelis has been funded. Blair and Levin have been funded and should be scheduled.

SEWARD JOHNSON:

No comment with the schedule as written with the exception of LaPointe who has been declined.

CALANUS:

A 12 day Szmant cruise which is funded should be included on CALANUS. No further comments are offered.

PELICAN:

No comment.

GYRE:

Behrens is double booked with LONGHORN. If LONGHORN is capable of doing the science it should go on that ship at the lower day rate. No proposal is held by OCE for Phillips so this cruise will not be funded in 1994.

LONGHORN:

No comment.

EWING:

The "C" schedule presented is the preferred schedule. Smethie should be handled by KNORR for more efficient scheduling. The number of sea days assigned to Diebold and Hollister are in question and should be checked with the program manager. These cruises must also be coordinated with the ALPHA HELIX schedule. It will also be necessary to coordinate the OBS with Oregon State University. The Lyle cruise is recommended for THOMPSON. A maximum of 300 operating days should be scheduled. The Detrick RIDGE work in the Atlantic is expected to be deferred until 1995.

SPROUL:

The SPROUL schedule appears fine as presented with the following exceptions. The Orcutt cruise has been funded. The ONR Niiler cruise has been declined and the NSF Niiler cruise needs to be revisited to check funding status. The Craig Smith work is pending but should be tentatively booked aboard SPROUL.

NEW HORIZON:

Several actions are recommended for the NEW HORIZON schedule. The number of days for Childress needs to be checked. The funding status and the number of cruises for Ken Smith need to be checked. Goericke should be included as an ancillary project on the schedule. The ONR Haury cruise has been funded for one day only. The scheduling of Prah's funded work is a problem and needs to be addressed. The 30 day pending cruise of Hansell needs to be watched and scheduled aboard NEW HORIZON if funded.

MELVILLE:

Funding decisions will determine which of the six MELVILLE schedule options make sense. No more than 300 operating days should be scheduled. Dorman was not funded, his time on the Lonsdale and Bloomer/Castillo cruises should not add days to their cruises. The Christie work could possibly be done on a French ship. Several pending cruises are not reflected on the schedule and should be considered if they become funded. These cruises are: Madison/Gridley/McDonald, Klinkhammer, Dick (Indian Ocean), and J P Morgan. The Castillo/Langmuir/Natland RIDGE South Pacific cruise needs to be checked as a possible MELVILLE cruise.

POINT SUR:

The schedule of POINT SUR looks fine with the following comments. The number of funded days/cruises for Ken Johnson needs to be checked. Change Burdige to a funded cruise. If possible Prahl should be worked in for an early winter cruise to keep his series going. Will the Monk, ARPA, cruise fit in your schedule? Coordinate with Scripps to see that the funded Childress work has found a home.

WECOMA:

WECOMA is expected to come out of a mid life refit in early April, however this could slip which could affect the early part of the schedule. Because of this OSU should coordinate the Joyce work with NOAA. The Zaneveld cruise should be labeled as funded.

BARNES:

There is an Edmondson funded cruise that should be scheduled. No other comments.

THOMPSON:

The THOMPSON schedule must be adjusted to be in the Arabian Sea to commence work on 1 October 1994. The funding status for the JGOFS work will need to be changed to include the ONR portion. If the schedule permits, when the funding is known, THOMPSON should plan for HOTS work when in Hawaii. Hallock, Sager, and Hochsteadter should be double booked with MOANA WAVE with the scheduling decision being made after funding for other scheduled cruises becomes clear.

ALPHA HELIX:

The ALPHA HELIX schedule looks fine as presented. Look at the Prahl winter work to see whether or not this can be accommodated on the trip to/from the shipyard.

MOANA WAVE:

Note the comment above on double booking with THOMPSON. Check the Clark work with NOAA, it does not seem correct as booked. MOANA WAVE should pick up as much HOTS work as possible. Cowen and Bruland should be one cruise and will be jointly funded by NSF/ONR. The Buffler/Coffin/Shor cruise off Australia should be included as a pending cruise. The Coffin/Breen/Frolich funded cruise will be planned for an Australian ship. Check the Tindale et al cruise in the Tasman Sea for possible early 1995 work.

AGENDA

UNOLS SHIP SCHEDULING MEETINGS

MEETING:	EAST and GULF	WEST
DATE:	23 June 1993	23 June 1993
PLACE:	National Trust for Historic Preservation 1785 Massachusetts Avenue Washington, DC 20036	
TIME:	0830 HRS	1300 HRS

The Ship Scheduling meetings will be called into session by Ken Palfrey, Chair.

AGENCY PRESENTATIONS. Representatives from NSF, ONR and NOAA will provide scheduling guidance, science program ship requirements and priorities, science funding decision outlook, ship ops funding outlook and related matters for the 1994 scheduling year.

REVIEW AND UPDATE SCHEDULES. Each scheduler will present and update their respective ship(s) schedule and cost information. Viewgraphs for this presentation are recommended.

IDENTIFY CONFLICTS AND UNSOLVED ISSUES. There will be a discussion on cruises not scheduled and those double booked. (Note: We will attempt to account for all cruises on the inventory list distributed by Jack Bash).

COSTS. The UNOLS Office will provide a summary of cost figures.

PRE-MEETING ACTION. All ship's schedules should have been on OMNET SHIP.SCHEDULERS.EAST.GULF or SHIP.SCHEDULERS.WEST by 15 May '93. Cost figures in the following format for both 1993 and 1994 should be passed to the UNOLS Office no later than 7 June.

1993	NSF	NAVY	OTHER	TOTAL
Ship Days/ Ship \$K				
1994	NSF	NAVY	OTHER	TOTAL
Ship Days/ Ship \$K				

Costs for 1993 should be your latest projection, and consistent with your last negotiation with NSF and/or ONR. Costs for 1994 should be realistic estimates.

WHAT TO BRING TO THE MEETING:

1. Viewgraphs and one hard copy to illustrate your 1994 schedule.
2. Viewgraph and one hard copy of track chart for 1994.
3. An extra copy of each Form 831 Ship Time Request not yet submitted to the UNOLS Office.
4. YOU SHOULD HAVE ALREADY SUBMITTED YOUR SCHEDULE AND COST INFORMATION AND SHOULD NOT NEED TO BRING COPIES.

Appendix II

UNOLS Ship Scheduling Meeting Attendees

Neil Anderson	NSF
Tim Askew	Harbor Branch Oceanographic Institution
Rodger Baier	NSF
Jack Bash	UNOLS
Doug Biggs	Texas A&M
Jeff Callahan	URI
Norman Cherkis	NRL
Mary D'Andrea	UNOLS
Pat Dennis	Navy
Dolly Dieter	NSF
Linda Goad	University of Michigan
William Hahn	URI/GSO
Roger Hanson	NSF
Robert Hinton	University of Washington
Ron Hutchinson	University of Miami
Tom Johnson	Duke University
David Karl	University of Hawaii
Keith Kaulum	ONR
Robert Knox	SIO/UCSD
Dick Lambert	NSF
Russ McDuff	University of Washington
Scott McKellar	NOAA
Don Moller	WHOI
Martin Mulhern	NOAA
Wadsworth Owen	University of Delaware
Ken Palfrey	OSU
Stephen Piotrowicz	NOAA/OAR
Dick Pittenger	WHOI
Mike Prince	Moss Landing Marine Labs
Steve Rabalais	Louisiana Universities Marine Consortium
Michael Rawson	Lamont-Doherty
Lisa Rom	NSF
Connie Sancetta	NSF
Martha Scott	NSF
Tom Smith	University of Alaska
Mark Stevenson	IMRA
Phil Taylor	NSF
Joe Ustach	Duke University

Richard West
Stan Winslow

NSF
University of Hawaii

Scheduling Review Meeting Attendees

Jack Bash
Mary D'Andrea
Pat Dennis
Dolly Dieter
Ron Hutchinson
Keith Kaulum
Scott McKellar
Ken Palfrey

UNOLS
UNOLS
ONR
NSF
University of Miami
ONR
NOAA
OSU

SUMMARY OF SHIP USE AND COSTS YEAR: 1994

SHIP/CLASS	NSF		NAVY		OTHER		TOTAL		DAILY RATE
	DAY	\$	DAY	\$	DAY	\$	DAY	\$	
MELVILLE	300	4,551	0	0	0	0	300	4,551	15,170
KNORR	305	4,368	14	200	0	0	319	4,568	14,320
ATLANTIS II	295	4,108	0	0	15	209	310	4,317	13,926
EWING - OPTION A	343	5,368	9	141	0	0	352	5,509	15,650
EWING - OPTION C	330	5,165	9	141	0	0	339	5,305	15,650
T.G. THOMPSON	261	3,821	0	0	51	747	312	4,568	14,641
MOANA WAVE	162	1,847	0	0	116	1,322	278	3,169	11,400
CLASS II - TOTAL A	1,666	24,063	23	341	182	2,278	1,871	26,682	--
CLASS II - TOTAL C	1,653	23,859	23	341	182	2,278	1,858	26,479	--
AVE: (6) - OPT. A	278	4,010	4	57	30	380	312	4,447	--
AVE: (6) - OPT. C	276	3,977	4	57	30	380	310	4,413	--
EDWIN LINK	50	400	0	0	60	480	110	880	8,000
ENDEAVOR	200	2,090	6	62.7	0	0	206	2,153	10,450
OCEANUS	167	1,448	8	69	18	156	193	1,673	8,668
GYRE	122	1,098	0	0	39	351	161	1,449	9,000
ISELIN - A & B	226	2,260	40	400	2	20	268	2,680	10,000
ISELIN - C	234	2,235	36	344	0	0	270	2,579	9,550
NEW HORIZON	199	1,787	41	368	34	305	274	2,460	8,978
SEWARD JOHNSON	14	112	0	0	128	1,024	142	1,136	8,000
WECOMA	147	1,749	26	310	0	0	173	2,059	11,902
CLASS III TOTAL - A & B	1,125	10,944	121	1,210	281	2,336	1,527	14,490	--
CLASS III TOTAL - C	1,133	10,919	117	1,154	279	2,316	1,529	14,388	--
AVE: (8) - A & B	141	1,368	15	151	35	292	191	1,811	--
AVE: (8) - C	142	1,365	15	144	35	290	191	1,799	--
PELICAN	46	184	0	0	60	240	106	424	4,000
LONGHORN	37	148	0	0	40	160	77	308	4,000
POWERSUR	120	749	66	412	17	106	203	1,267	6,241
CAPE HATTE	188	1,283	26	177	10	68	224	1,529	6,824
ALPHA HELIX	145	1,322	0	0	35	349	180	1,672	9,287
R. SPROUL	92	488	37	196	16	85	145	769	5,303
CAPE HENLOPEN	134	831	28	174	15	93	177	1,098	6,203
WEATHERBIRD II	244	1,196	0	4.9	0	4.9	244	1,206	4,942
CLASS IV	1,006	6,201	157	964	193	1,106	1,356	8,272	--
AVE: (8)	126	775	20	121	24	138	170	1,034	--
BLUE FIN	65	118	0	0	45	82	110	200	1,818
LAURENTIAN	95	399	0	0	0	0	95	399	4,200
BARNES	38	74	0	0	18	35	56	109	1,936
CALANUS	16	32	14	28	5	10	35	70	2,000
CLASS IV TOTAL	214	623	14	28	68	127	296	778	--
AVE: (4)	54	156	4	7	17	32	74	195	--
Fleet Total - Opt. A	4,011	41,831	315	2,543	724	5,848	5,050	50,222	--
AVE: (26)	154	1,609	12	98	28	225	194	1,932	--

NOTES: a. Includes for NPS (CNOC) 57 days, \$356 K

SUMMARY OF SHIP USE AND COSTS YEAR: 1993

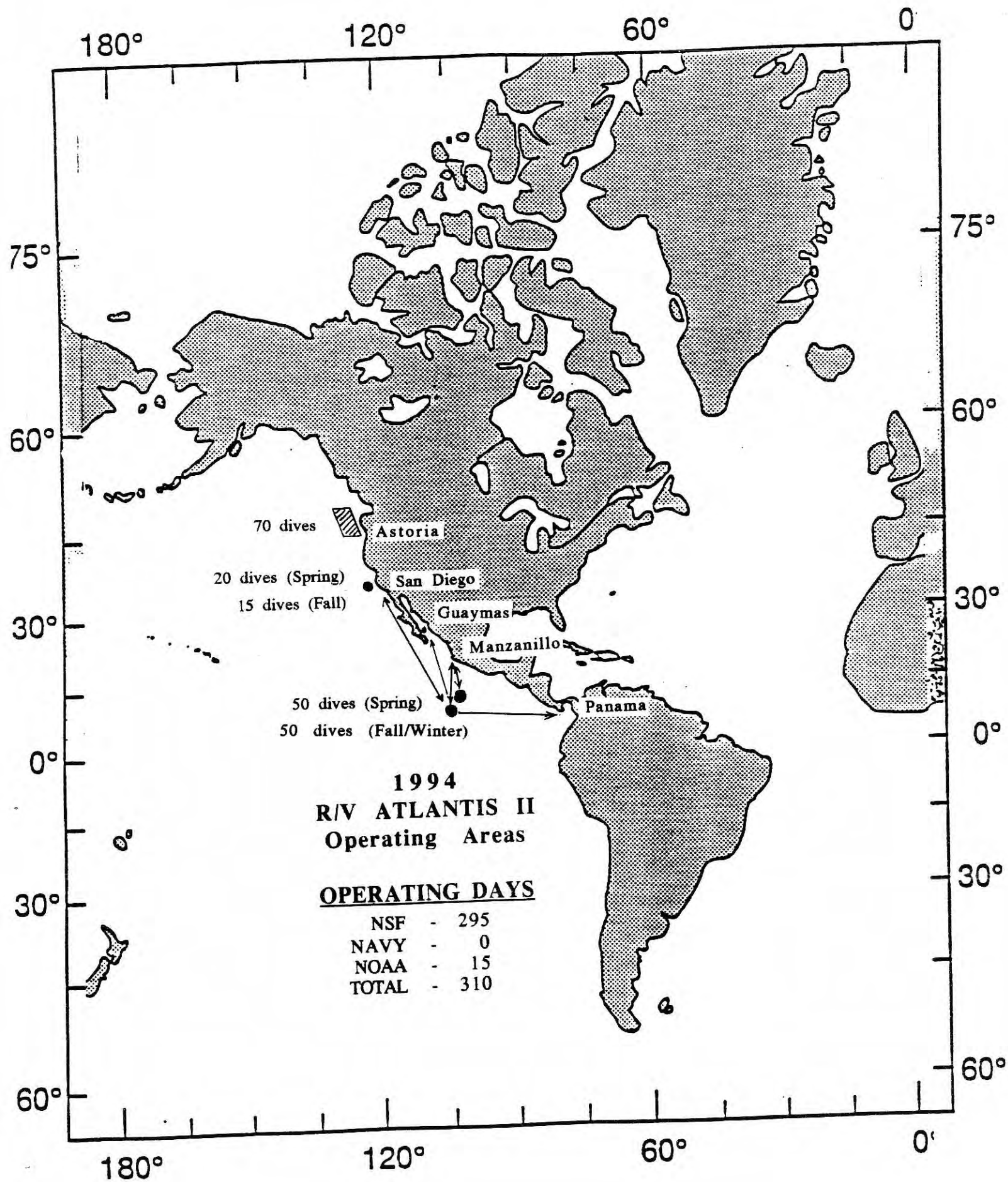
SHIP/CLASS	NSF		NAVY		OTHER		TOTAL		DAILY RATE
	DAY	\$	DAY	\$	DAY	\$	DAY	\$	
MELVILLE	242	3,724	34	523	29	446	305	4,693	15,387
KNORR	167	2,438	112	1,835	0	0	279	4,073	14,599
ATLANTIS II	158	2,623	53	880	33	548	244	4,051	16,602
EWING	221	3,900	0	0	0	0	221	3,900	17,647
T.G. THOMPSON	222	3,152	3	43	50	710	275	3,905	14,200
MOANA WAVE	202	2,041	64	659	5	52	271	2,752	10,155
CLASS II TOTAL	1,212	17,878	266	3,740	117	1,756	1,595	23,374	--
AVE: (6)	202	2,980	44	623	20	293	266	3,896	--
EDWIN LINK	0	0	0	0	99	772.2	99	772.2	7,801
ENDEAVOR	0	1,075	0	0	0	0	0	1,075	--
OCEANUS	84	731	94	818	9	78	187	1,627	8,701
GYRE	23	184	66	527	93	743	182	1,454	7,989
ISELIN	159	1,598	61	613	0	0	220	2,211	10,050
NEW HORIZON	175	1,579	27.5	248.0	44.5	401	247	2,228	9,020
SEWARD JOHNSON	31.0	241.8	2.0	15.6	103.0	803.4	136.0	1,060.8	7,800
VICKERS	46	552	0	0	81	972	127	1,524	12,000
WECOMA	138	1,430	88	911	0	0	226	2,341	10,358
CLASS III TOTAL	656	7,391	339	3,133	430	3,770	1,424	14,293	--
AVE: (8)	82	821	42	392	54	471	178	1,787	--
PELICAN	54	178	0	0	181	596	235	774	3,294
LONGHORN	14	56	0	0	38	152	52	208	4,000
POINT SUR	99	593	69 ^b	413 ^b	20	120	188	1,126	5,989
CAPE HATTERAS	185	1,198	12	78	14	91	211	1,366	6,475
ALPHA HELIX	129	1,145	0	0	38	358	167	1,505	9,011
R. SPROUL	43	222	47	243	65	336	155	801	5,168
CAPE HENLOPEN	134	848	18	114	12	71	164	1,033	6,299
WEATHERBIRD II	140	1,000	6	43	5	36	151	1,079	7,142
CLASS 1V	798	5,240	152	891	373	1,761	1,323	7,892	--
AVE: (8)	100	655	19	111	47	220	165	986	--
BLUE FIN	63	120	0	0	42	80	105	200	1,905
LAURENTIAN	74	323	0	0	10	44	84	366	4,360
BARNES	44	85	0	0	17	33	61	118	1,934
CALANUS	96	193	15	30	1	2	112	225	2,007
CLASS 1V TOTAL	277	720	15	30	70	159	362	909	--
AVE: (4)	69	180	4	8	18	40	91	227	--
FLEET TOTAL - A	2,943	31,229	772	7,793	990	7,444	4,704	46,468	--
AVE: (26)	113	1,201	30	300	38	286	181	1,787	--

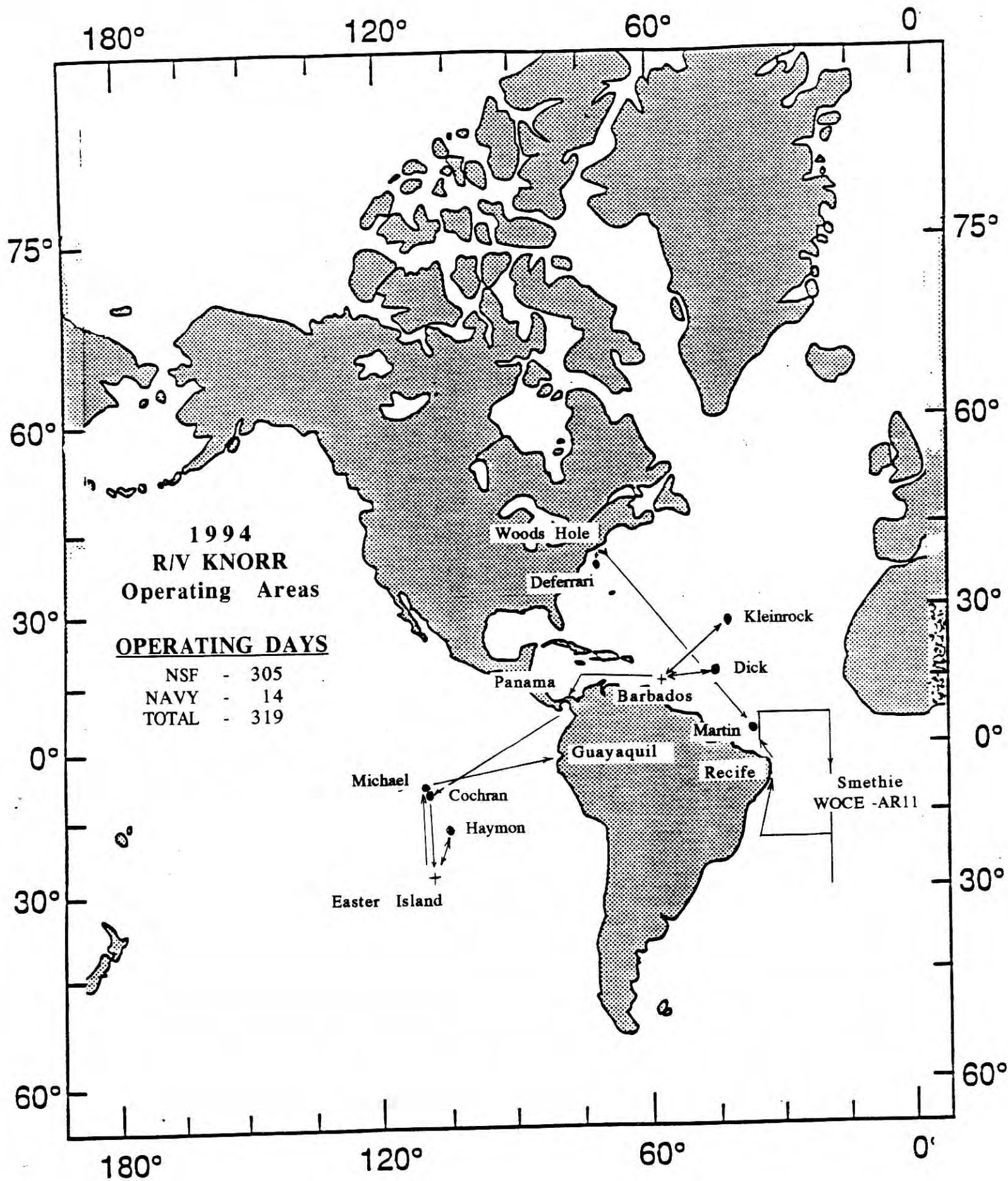
NOTE: a NSF support for lay-up expenses.

b Includes for NPS (CNOC): 57 days, \$356 K

CLASSIFICATION	FUI	ACTUAL	1989 DATA						CLASS	CLASS	ACTUAL
			POB	POB	LOA	DAYS	COST	\$/PERSON/ DAY	\$/FOOT/ DAY	AVERAGE PER PERSON	AVERAGE PER FOOT
LARGE											
WASHINGTON	45	3919	209	260	\$2,910,000	\$249	\$54	\$261	\$61	\$743	
ATLANTIS II	56	3500	210	220	\$3,777,000	\$307	\$82	\$41	\$18	\$1,079	
EWING (NOT IN SERVICE)	50		230								
THOMPSON (OLD)	49		209								
MELVILLE (OLD)	52	4088	245	224	\$2,652,000	\$228	\$48			\$649	
KNORR (OLD)	52		245								
INTERMEDIATE											
ISELIN	36	3510	170	222	\$1,904,000	\$238	\$50	\$265	\$44	\$542	
NEW HORIZON	29	2148	170	169	\$1,532,000	\$313	\$53	\$58	\$9	\$713	
OCEANUS	24	2367	177	252	\$1,991,000	\$329	\$45			\$841	
WECOMA	33	3100	177	217	\$1,924,000	\$269	\$50			\$621	
ENDEAVOR	28	3082	177	258	\$1,988,000	\$275	\$44			\$645	
GYRE	32	2619	182	163	\$797,000	\$153	\$27			\$304	
MOANA WAVE	32	4312	210	295	\$2,634,000	\$279	\$43			\$611	
SPECIAL PURPOSE											
SEWARD JOHNSON	30		176								
EDWIN LINK	30		168								
REGIONAL/OPEN OCEAN											
ALPHA HELIX	23	1884	133	155	\$1,508,000	\$423	\$73	\$334	\$55	\$800	
POINT SUR	21	1734	135	163	\$951,573	\$278	\$43			\$549	
CAPE HATTERAS	22	1907	135	187	\$1,241,000	\$302	\$49			\$651	
REGIONAL											
WEATHERBIRD I	16		65	237	\$556,000	\$147	\$36	\$280	\$48	#DIV/0!	
CAPE HENLOPEN	19	795	120	103	\$858,000	\$438	\$69	\$148	\$19	\$1,079	
SPROUL	19	1451	125	117	\$565,000	\$254	\$39			\$389	
LOCAL											
CALANUS	8	1030	64	160	\$354,000	\$277	\$35	\$263	\$40	\$344	
BARNES	8	901	66	109	\$197,000	\$226	\$27	\$24	\$9	\$219	
BLUE FIN	11	156	72	57	\$175,000	\$279	\$43			\$1,122	
LAURENTIAN	14	326	80	57	\$224,000	\$281	\$49			\$687	
LONGHORN	17	1064	103	77						\$0	
PELICAN	20	1051	105	89	\$446,000	\$251	\$48			\$424	

CLASSIFICATION	1992 DATA							PERCENT				
	POB	LOA	DAYS	COST	\$/PERSON/ DAY	\$/FT/ DAY	\$/PERSON		\$/PERSON		\$/FOOT	
							INCREASE		1992	1992		
LARGE								CLASS AVG		AVG		
ATLANTIS II	56	210	178	\$3,524,222	\$354	\$94	15%		\$300		\$72	
EWING	50	230	301	\$4,764,860	\$317	\$69		SD	\$46	SD	\$14	
THOMPSON (NEW)	49	274	277	\$4,262,682	\$314	\$74						
MELVILLE (NEW)	58	279	170	\$2,273,215	\$231	\$55	1%					
KNORR (NEW)	59	279	271	\$4,567,705	\$286	\$69						
INTERMEDIATE												
ISELIN	36	170	209	\$2,440,284	\$324	\$69	36%		\$297		\$50	
NEW HORIZON	29	170	179	\$1,697,069	\$327	\$56	5%	SD	\$53	SD	\$11	
OCEANUS	24	177	314	\$2,354,372	\$312	\$42	-5%					
WECOMA	33	177	271	\$2,524,094	\$282	\$53	5%					
ENDEAVOR	28	177	197	\$1,829,145	\$332	\$52	20%					
GYRE	32	182	117	\$683,000	\$182	\$32	19%					
MOANA WAVE	32	210	278	\$2,825,886	\$318	\$48	14%					
SPECIAL PURPOSE												
SEWARD JOHNSON	30	176	211	\$1,645,800	\$260	\$44						
EDWIN LINK	30	168	147	\$1,146,600	\$260	\$46						
REGIONAL/OPEN OCEAN												
ALPHA HELIX	23	133	146	\$1,395,748	\$416	\$72	-2%		\$351		\$57	
POINT SUR	21	135	181	\$1,130,851	\$298	\$46		SD	\$60	SD	\$13	
CAPE HATTERAS	21	135	203	\$1,454,698	\$341	\$53	13%					
REGIONAL												
WEATHERBIRD II	16	115	245	\$1,039,045	\$265	\$65	81%		\$279		\$51	
CAPE HEN/OPEN	19	120	180	\$1,071,000	\$313	\$50	-29%	SD	\$30	SD	\$13	
SPROUL	19	125	163	\$798,258	\$258	\$39	1%					
LOCAL												
CALANUS	8	64	130	\$277,420	\$267	\$33	-4%		\$225		\$35	
BARNES	8	66	125	\$226,500	\$227	\$27	0%	SD	\$58	SD	\$11	
BLUE FIN	11	72	112	\$200,000	\$162	\$25	-42%					
LAURENTIAN	14	80	58	\$256,988	\$316	\$55	13%					
LONGHORN	17	103	75	\$255,000	\$200	\$33						
PELICAN	20	105	167	\$591,162	\$177	\$34	-29%					







**1994
R/V OCEANUS
Operating Areas**

OPERATING DAYS

NSF	-	167
NAVY	-	8
DOE	-	18
TOTAL	-	193

- Repeta
- White
- Yamamoto
- Pickart
- GLOBEC
- Stanton
- BUTMAN
- LANE

Katz

Woods Hole

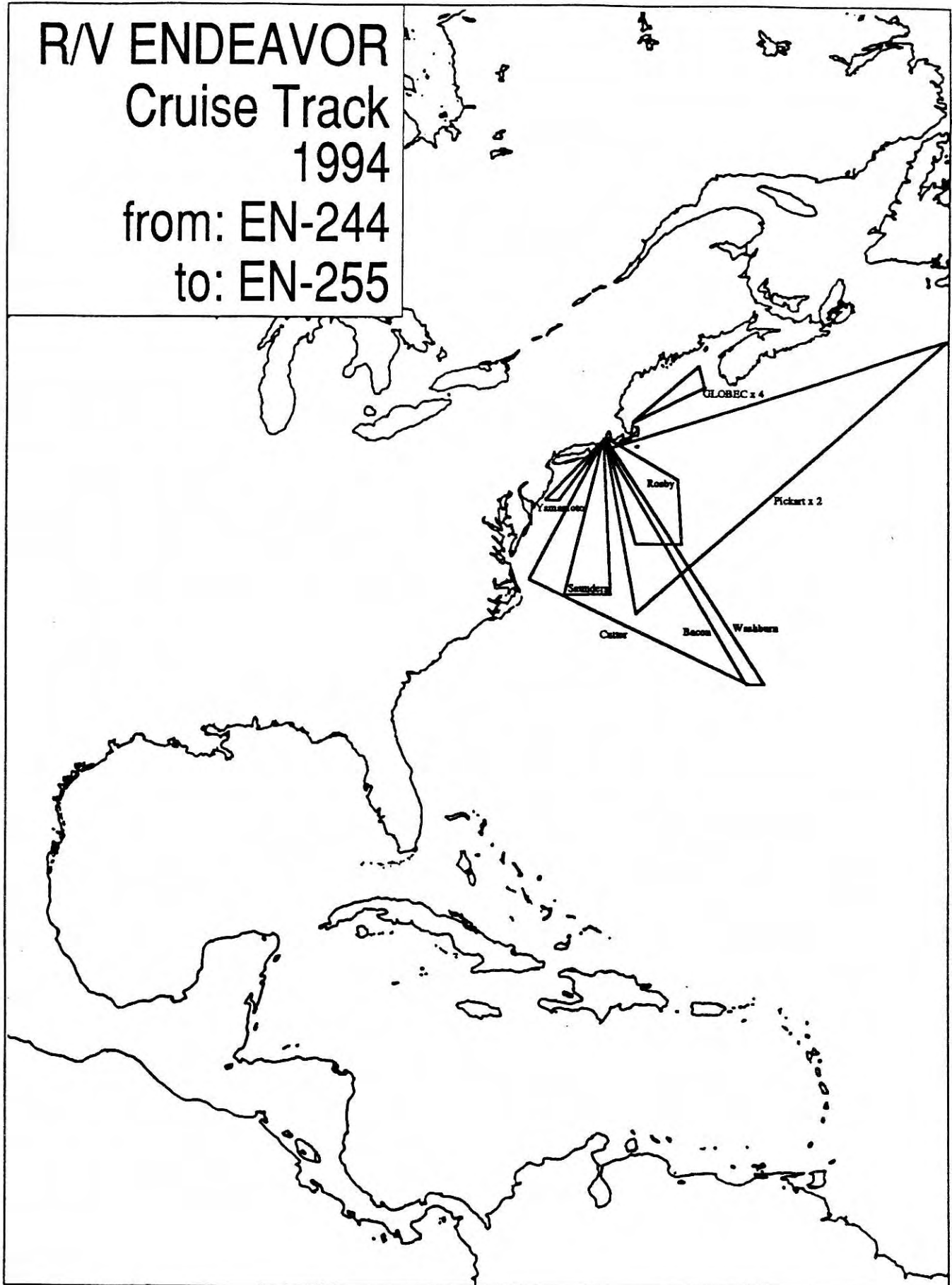
Whitehead

Recife

Richardson

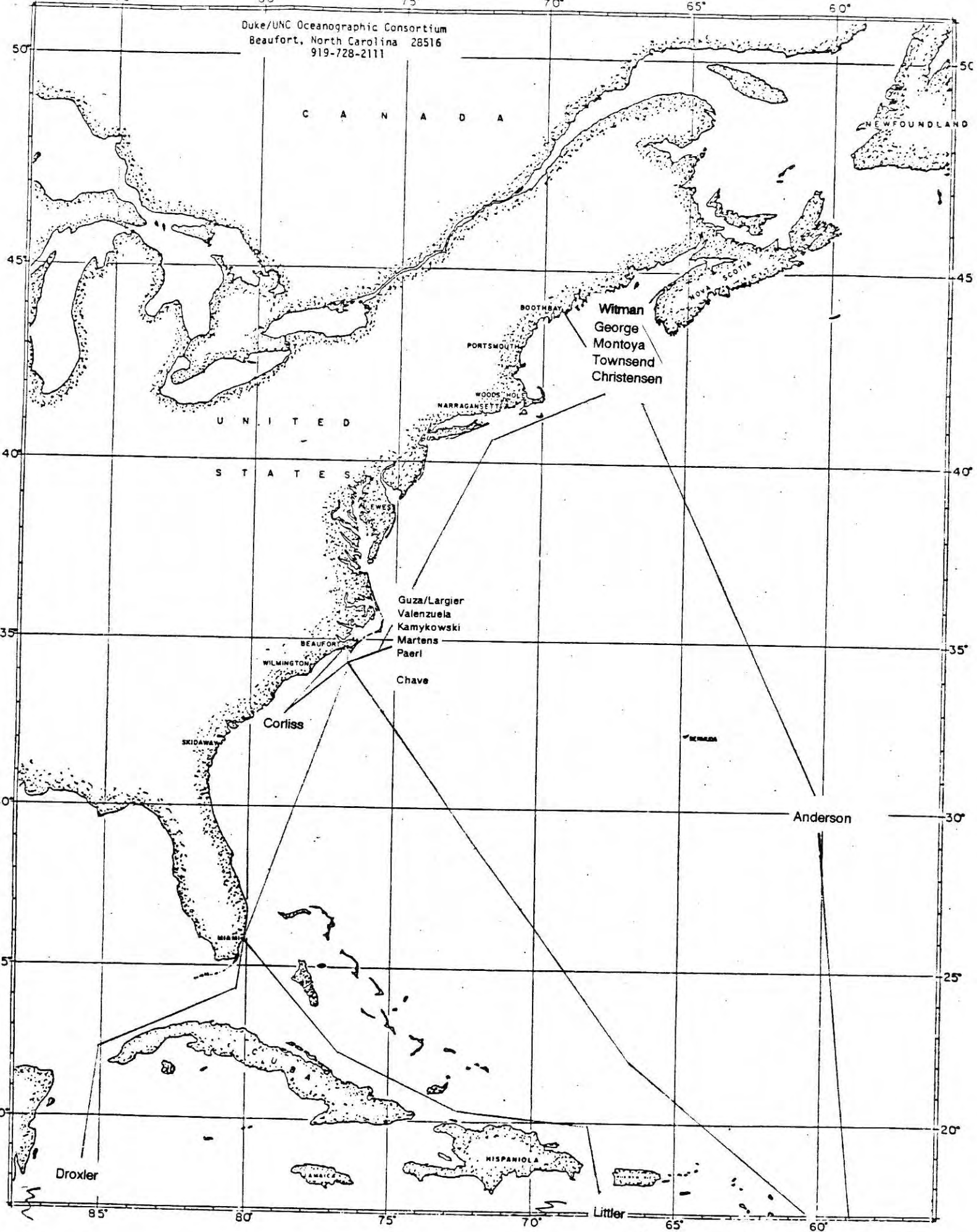
Capetown

R/V ENDEAVOR
Cruise Track
1994
from: EN-244
to: EN-255



85° 90° 75° 70° 65° 60°

Duke/UNC Oceanographic Consortium
Beaufort, North Carolina 28516
919-728-2111



C A N A D A

NEWFOUNDLAND

U N I T E D
S T A T E S

Witman
George
Montoya
Townsend
Christensen

Guza/Largier
Valenzuela
Kamykowski
Martens
Paerl
Chave

Corliss

Anderson

Droxler

Littler

85°

80°

75°

70°

65°

60°

50°

45°

40°

35°

30°

25°

20°

50°

45°

40°

35°

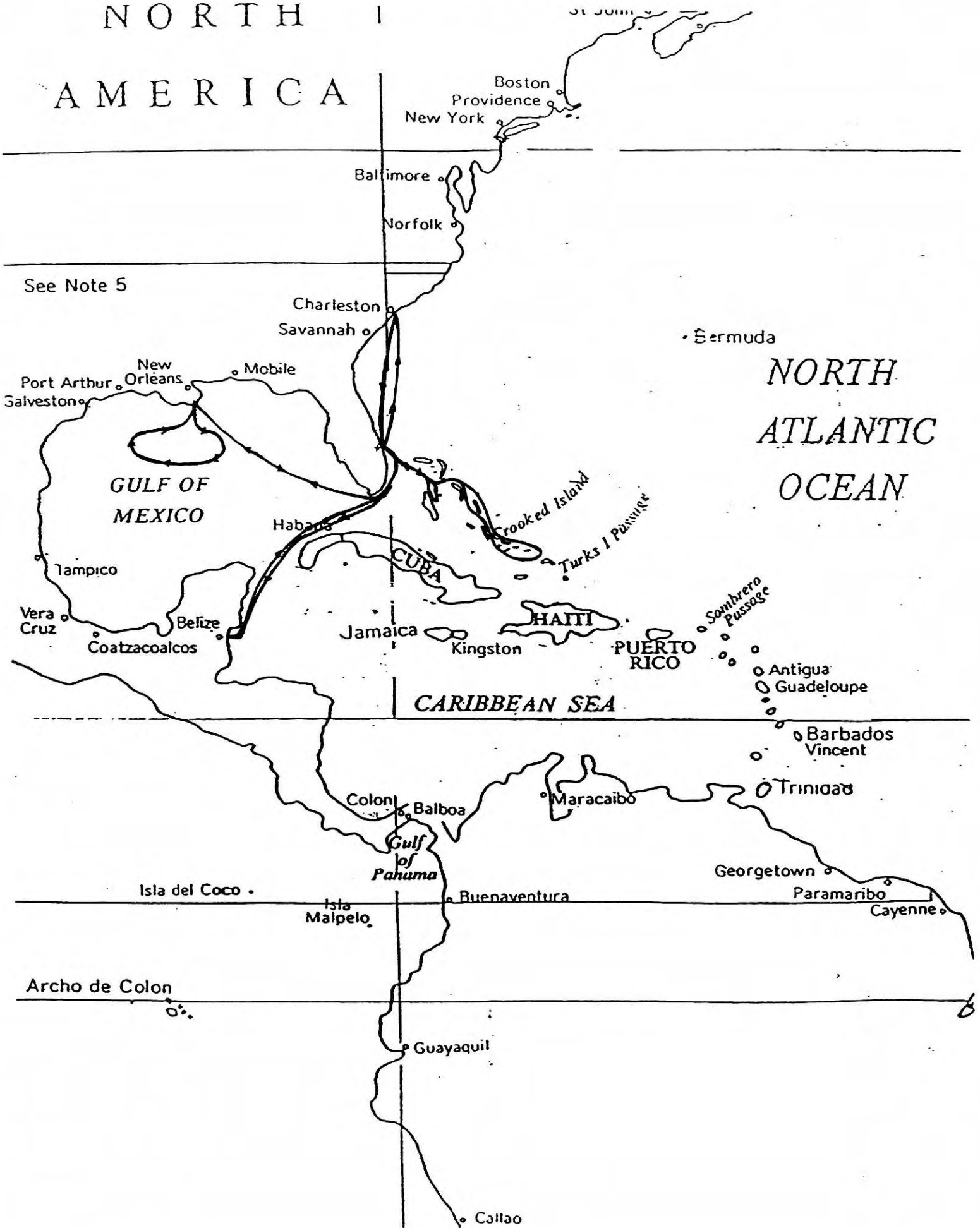
30°

25°

20°

R/V EDWIN LINK
1994 CRUISE TRACK

NORTH
AMERICA



See Note 5

NORTH
ATLANTIC
OCEAN

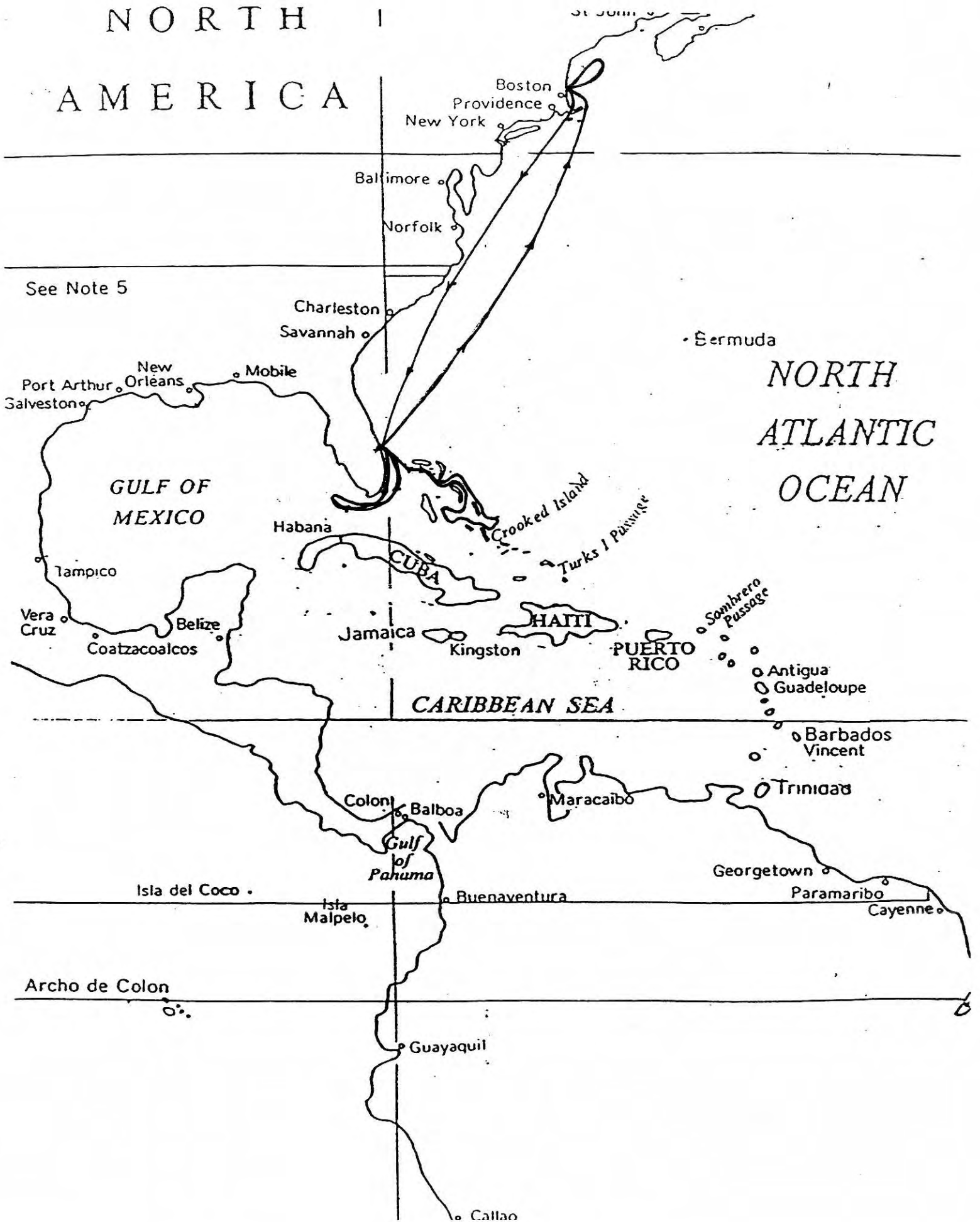
GULF OF
MEXICO

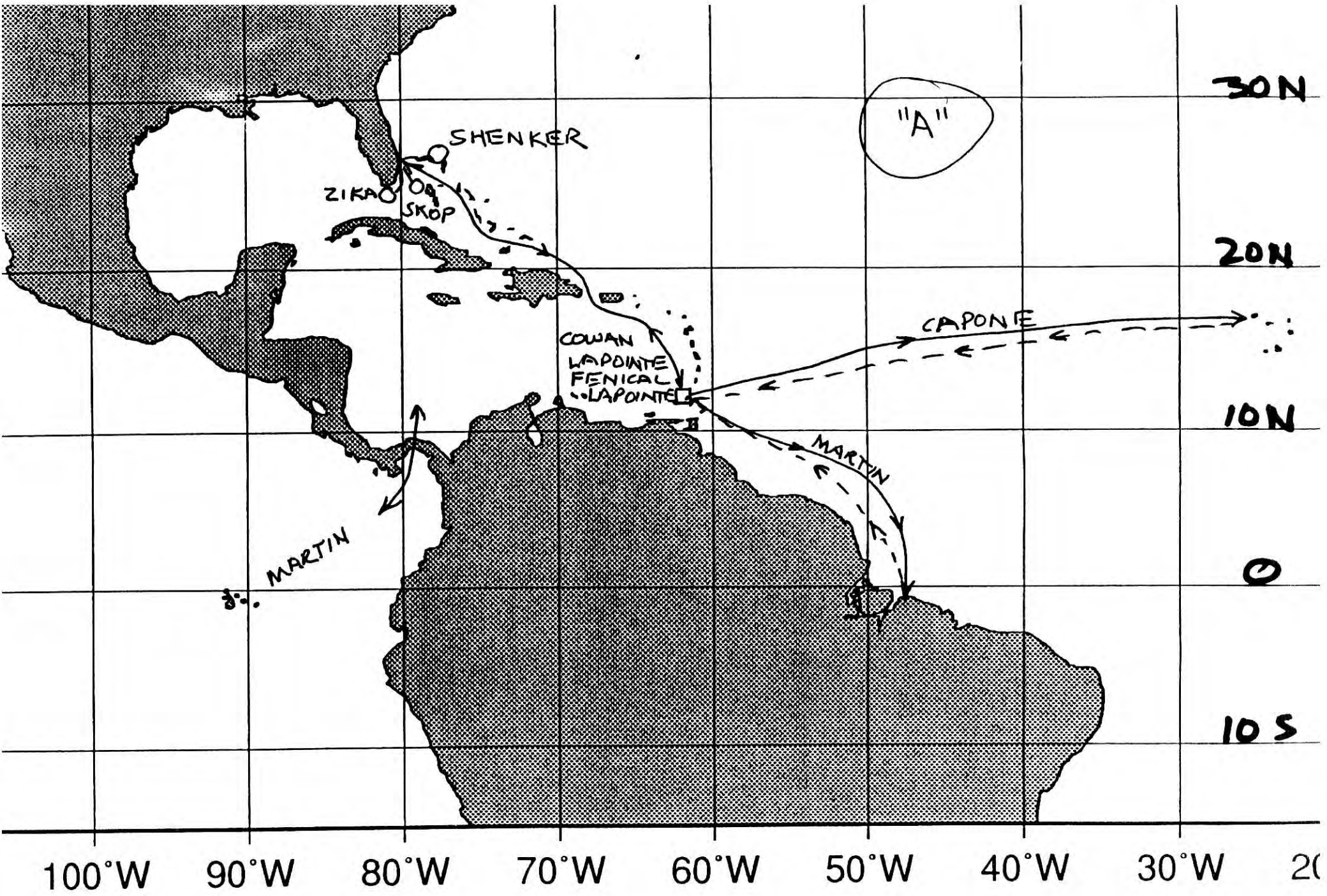
CARIBBEAN SEA

Gulf
of
Panama

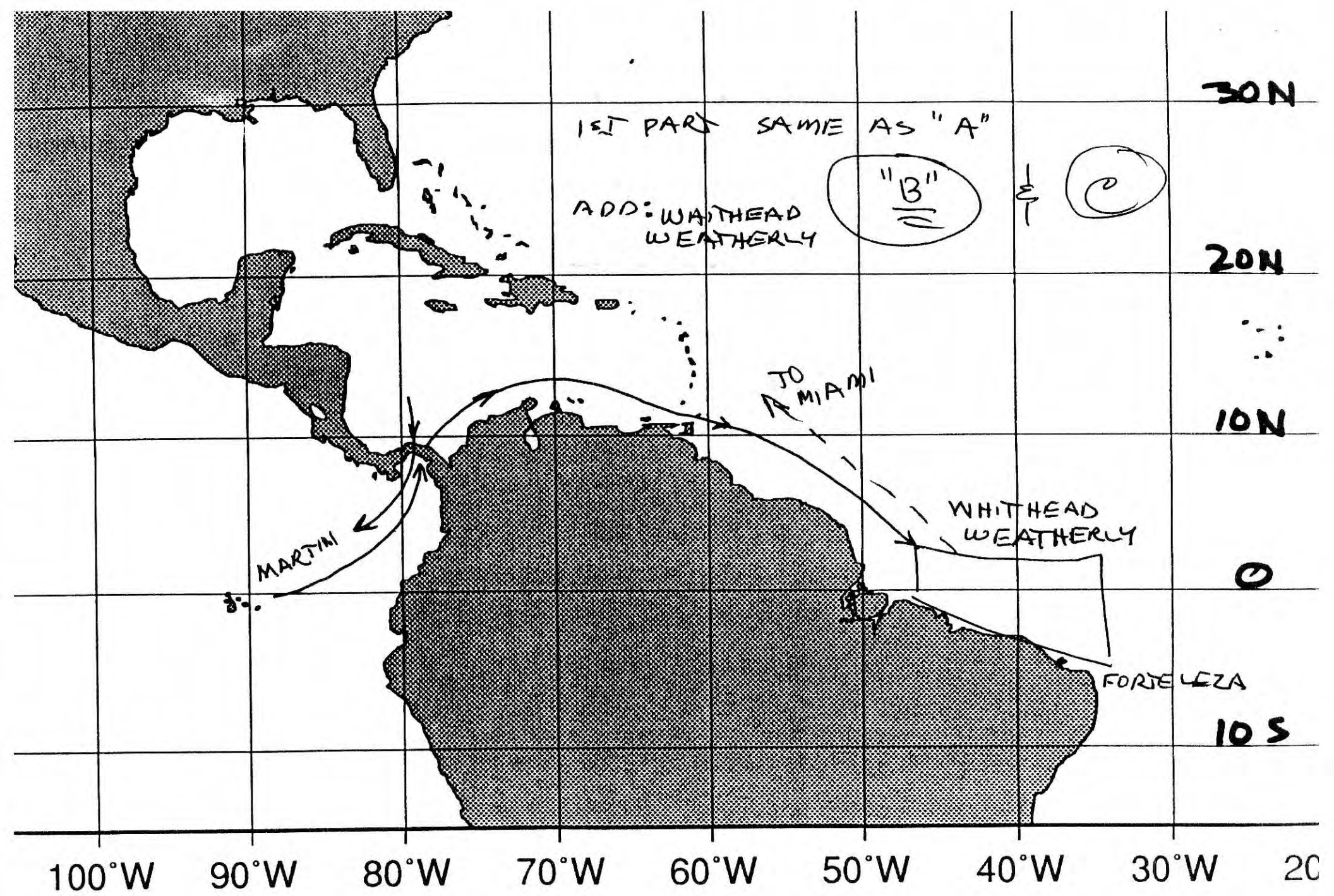
Archo de Colon

R/V SEWARD JOHNSON
1994 CRUISE TRACK

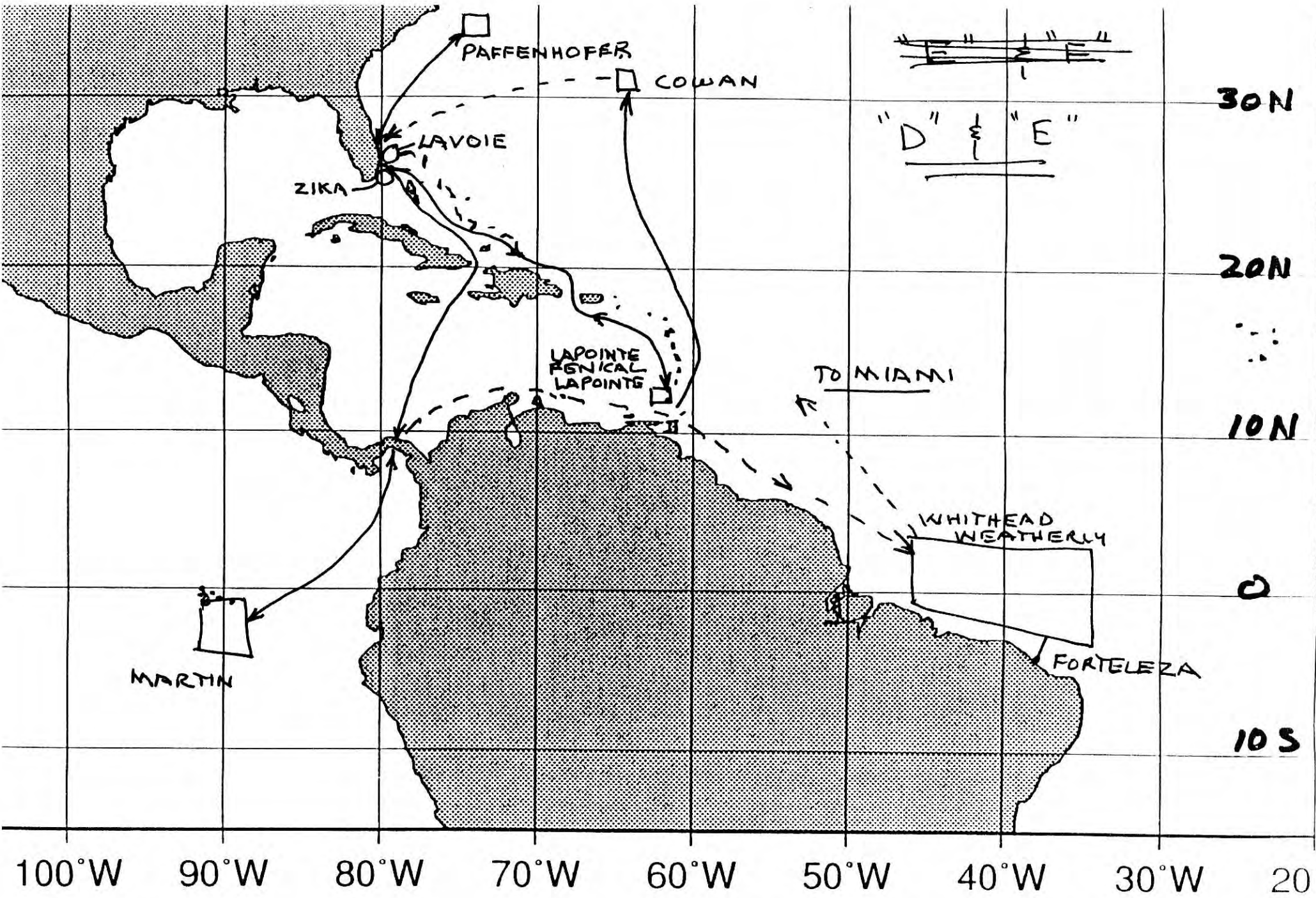




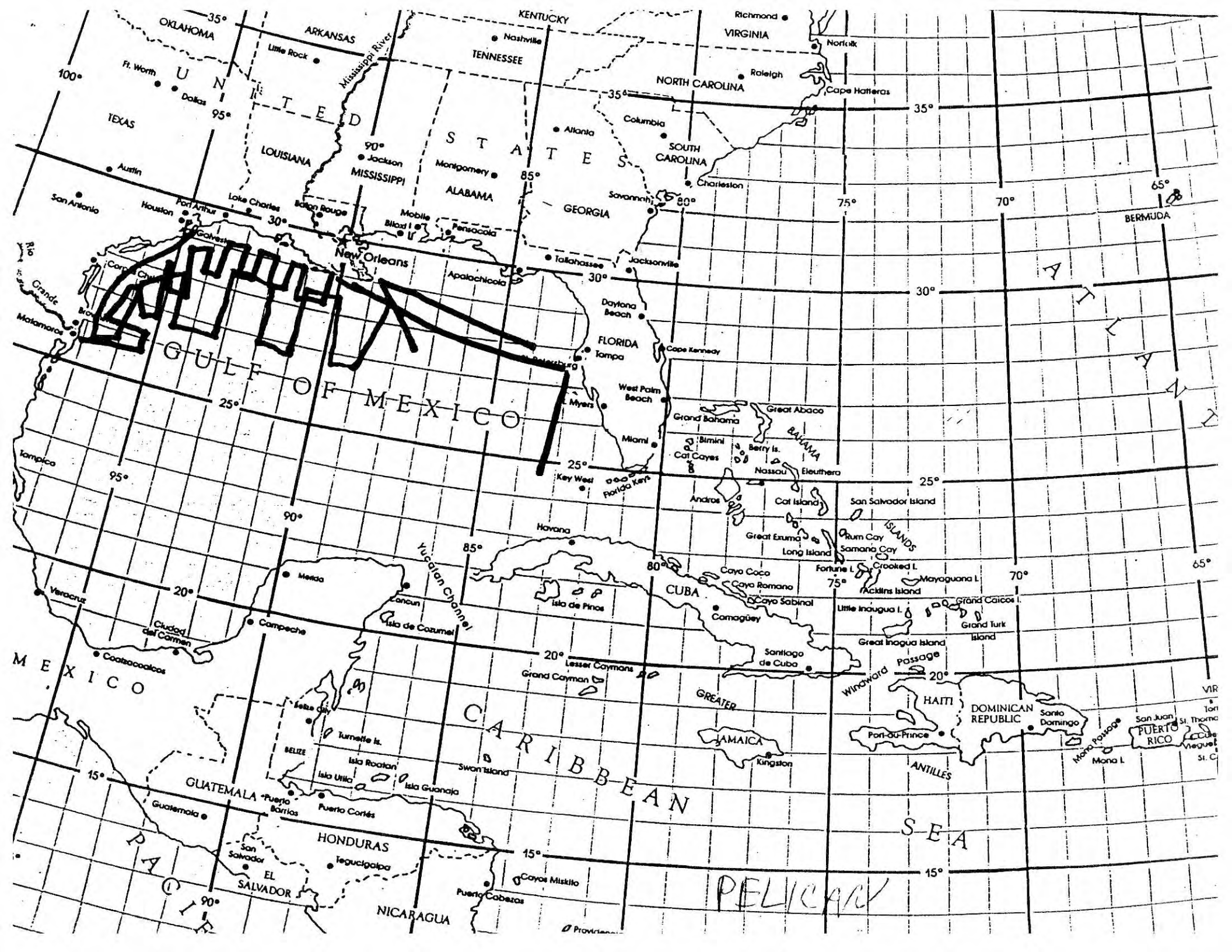
Iselin



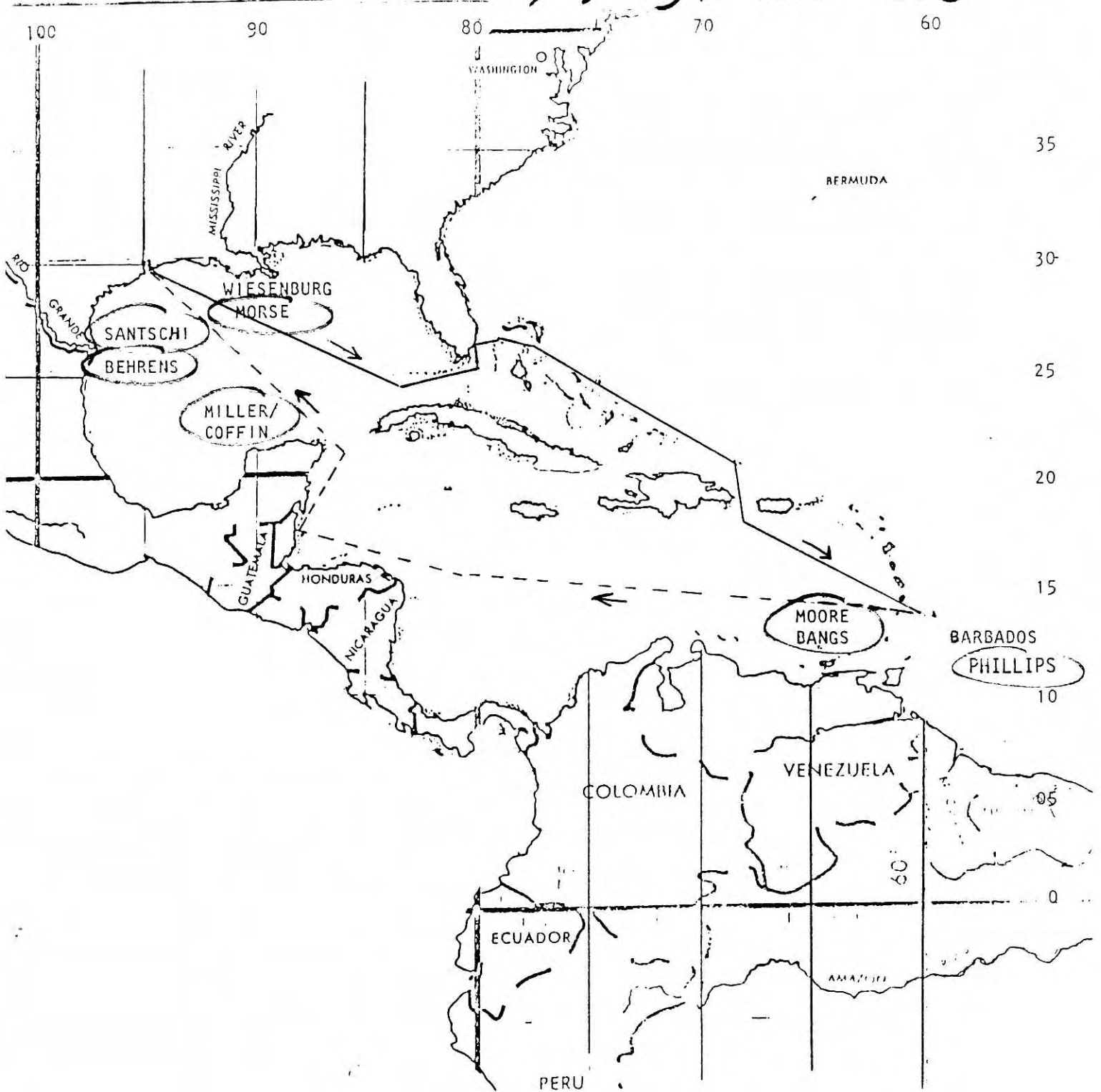
Iselin



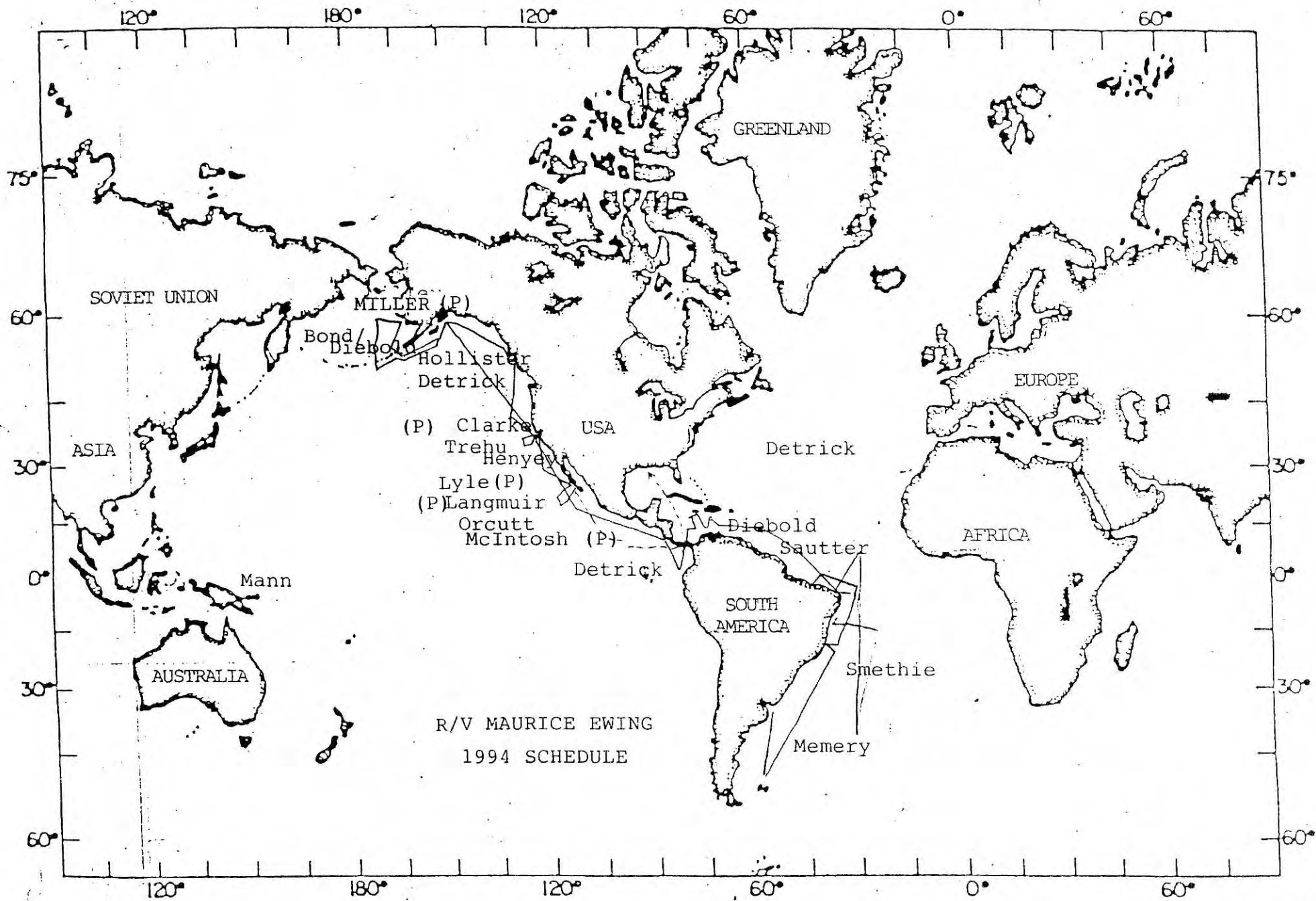
Iselin



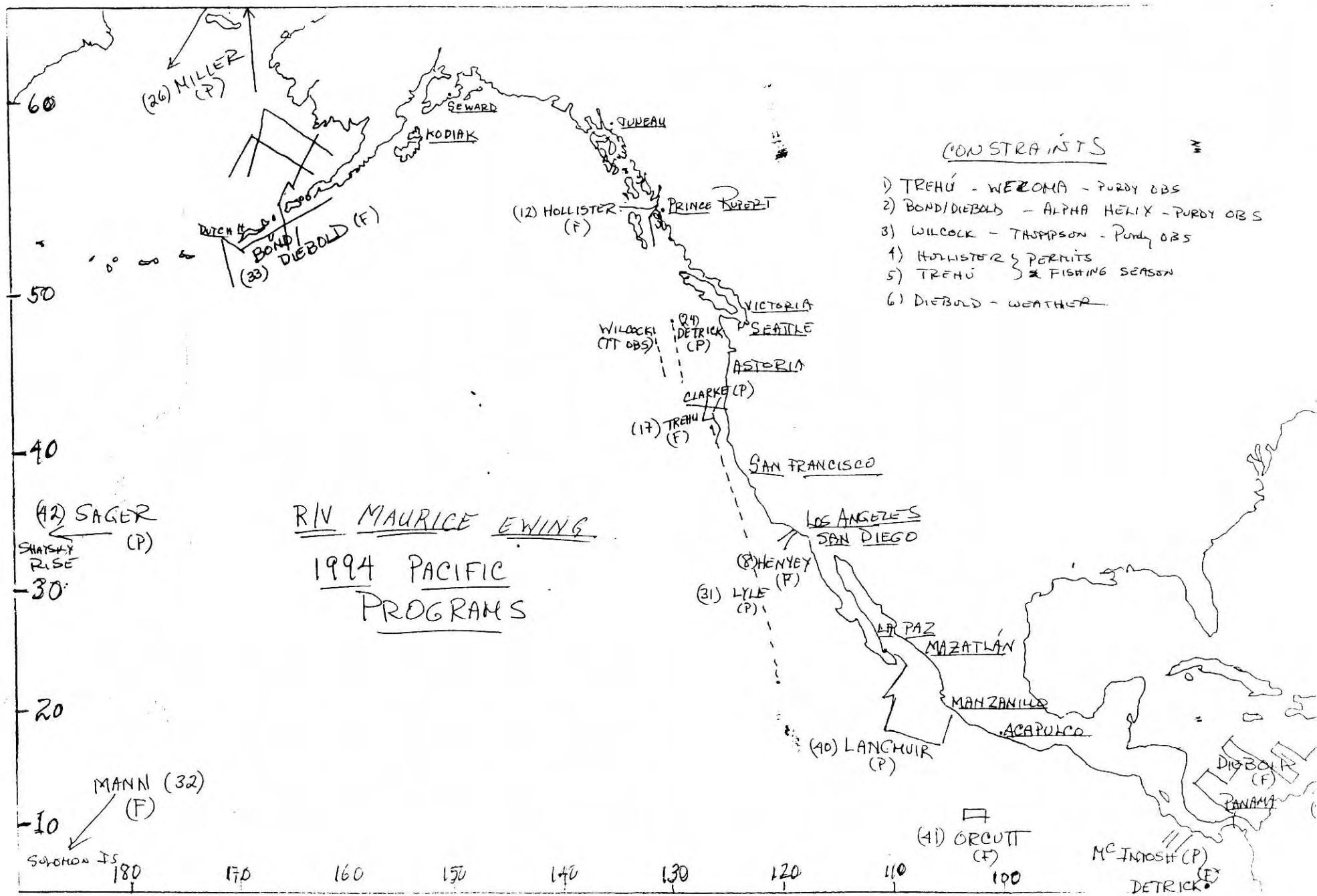
*R/V Gyre for 1994: Ship time requests from
six scientists proposing to NSF-OCE*



*Copies for UNOLS office
6/23/93*



TRACK CHART



CONSTRAINTS

- 1) TREHU - WERONA - PURDY OBS
- 2) BOND/DIEBOLD - ALPHA HELIX - PURDY OBS
- 3) WILCOCK - TASPSON - PURDY OBS
- 1) HOLLISTER } PERMITS
- 5) TREHU } FISHING SEASON
- 6) DIEBOLD - WEATHER

R/V MAURICE EWING
1994 PACIFIC
PROGRAMS

60
50
40
30
20
10
SOUTH IS

(26) MILLER (F)

BUTCH
(33) BOND/DIEBOLD (F)

(12) HOLLISTER (F)

WILCOCK (TT OBS)

(24) DETRICK (P)

(17) TREHU (F)

(42) SAGER (CP)

SHASTKY RISE

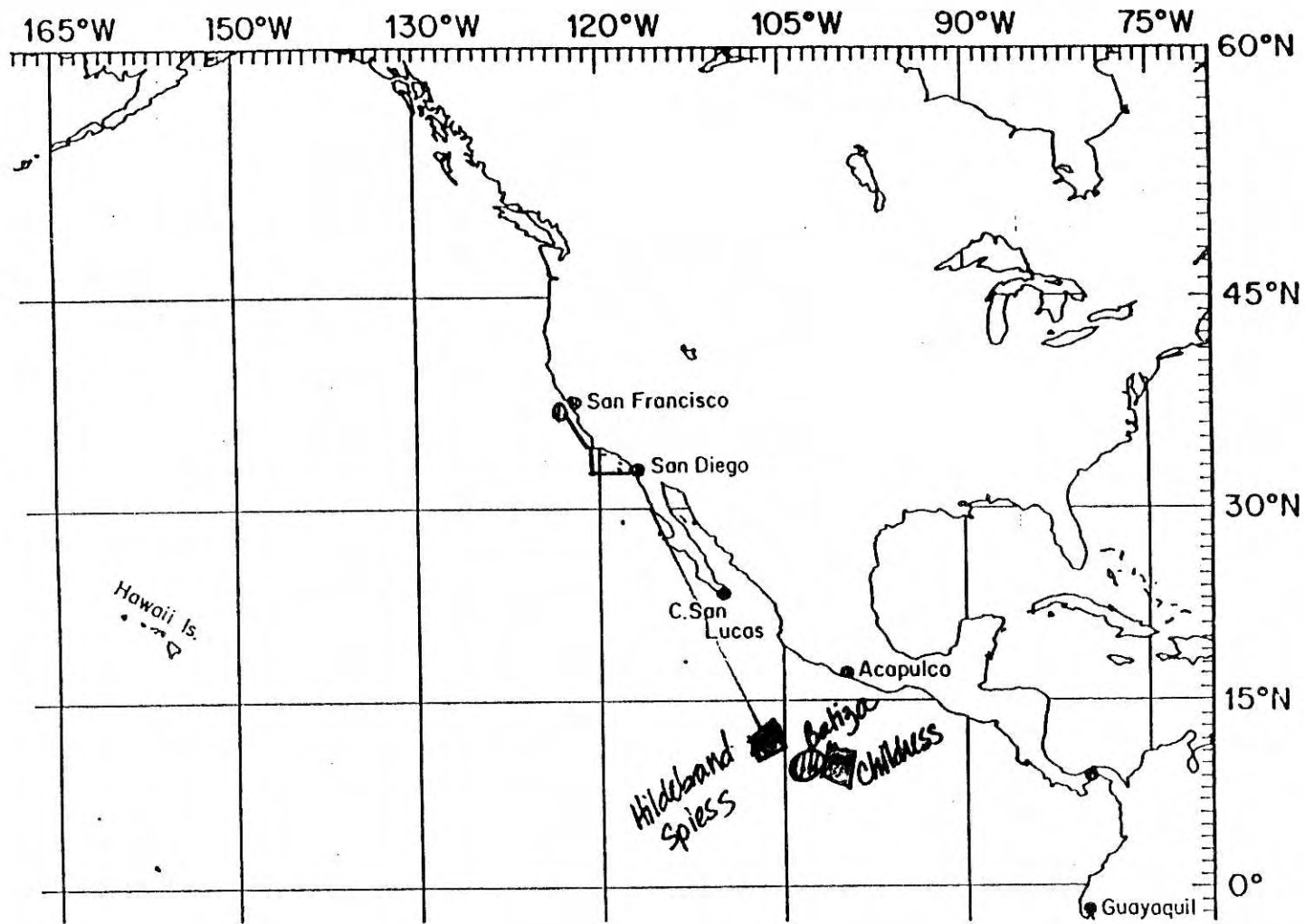
30

MANNI (32) (F)

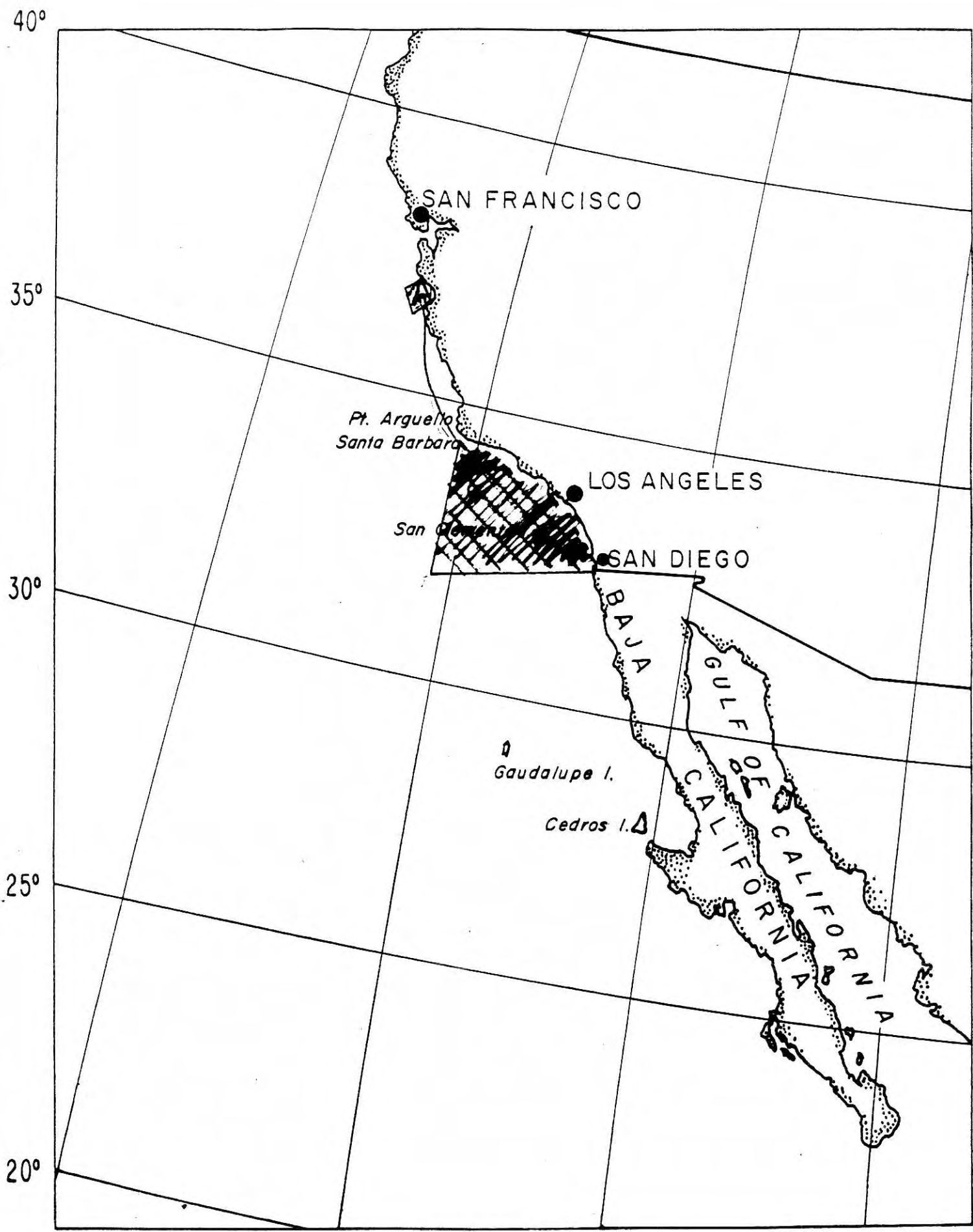
(41) ORCUTT (F)

MCINTOSH (P)
DETRICK (F)

180 170 160 150 140 130 120 110 100



New Horizon
1991

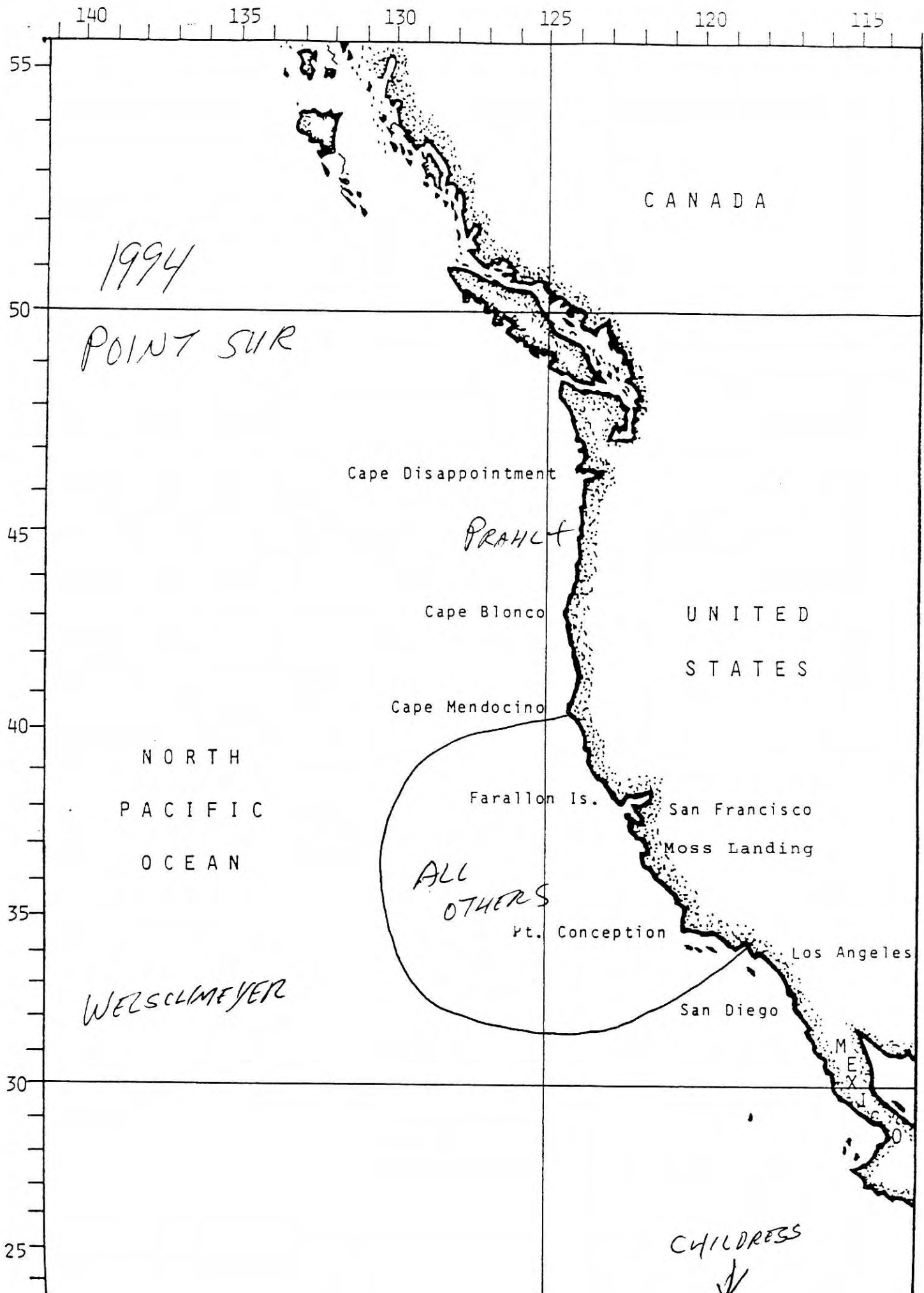


Survey 1991 + 1992

120°

115°

110°



1994

POINT SUR

WELSCHEMEYER

ALL OTHERS

PRAHL

CHILDRESS
↓

NORTH
PACIFIC
OCEAN

CANADA

UNITED
STATES

MEXICO

Cape Disappointment

Cape Blanco

Cape Mendocino

Farallon Is.

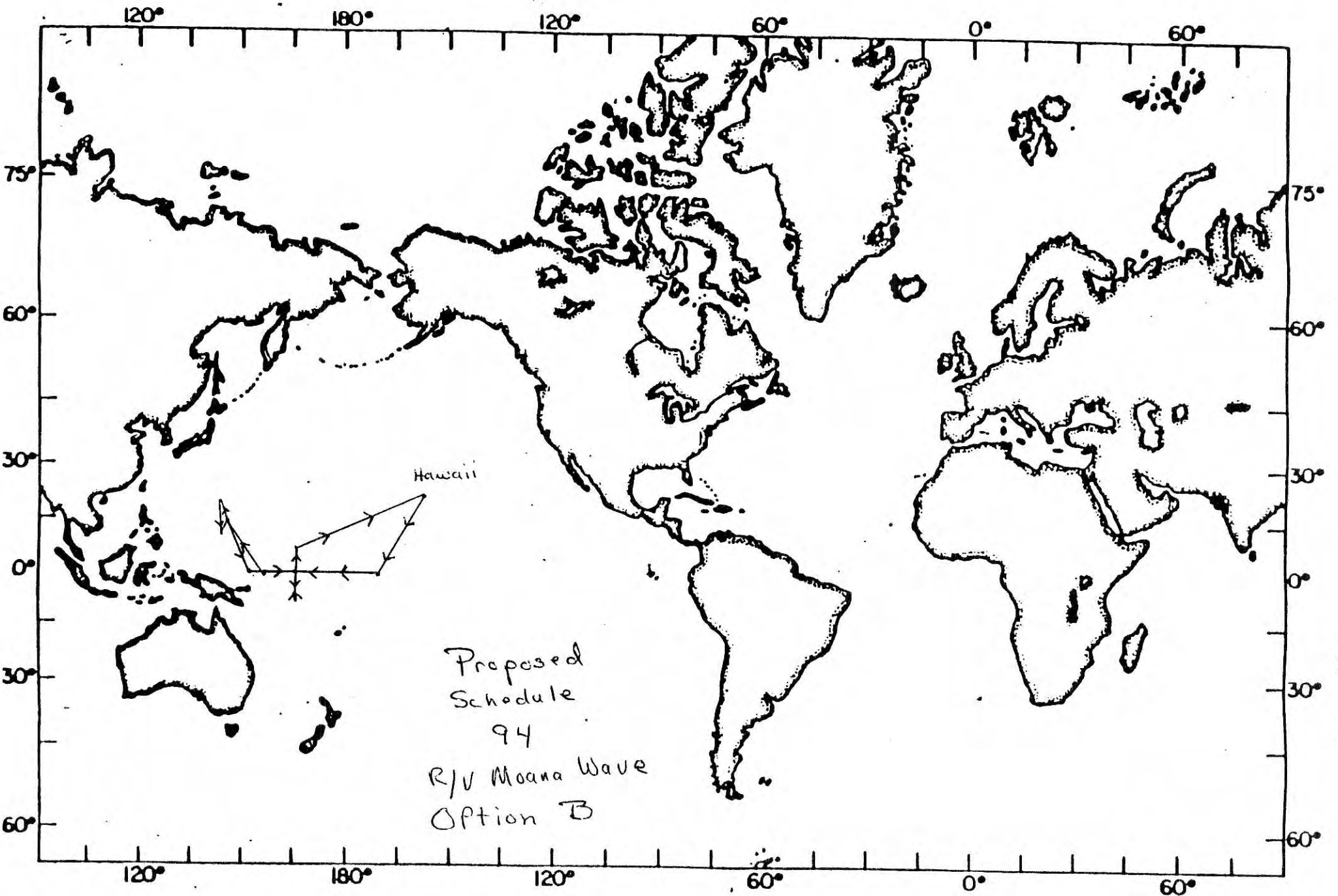
San Francisco

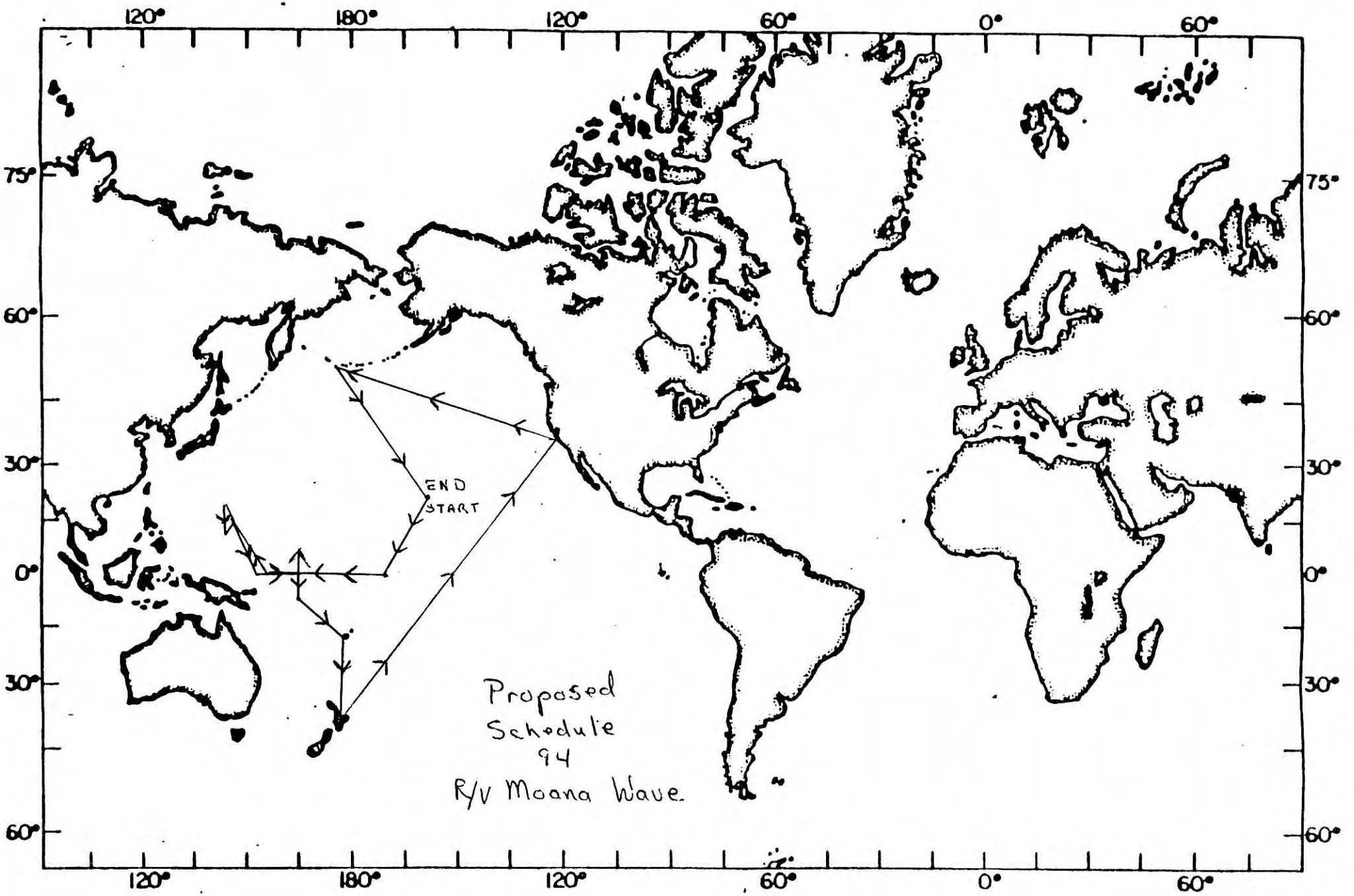
Moss Landing

Pt. Conception

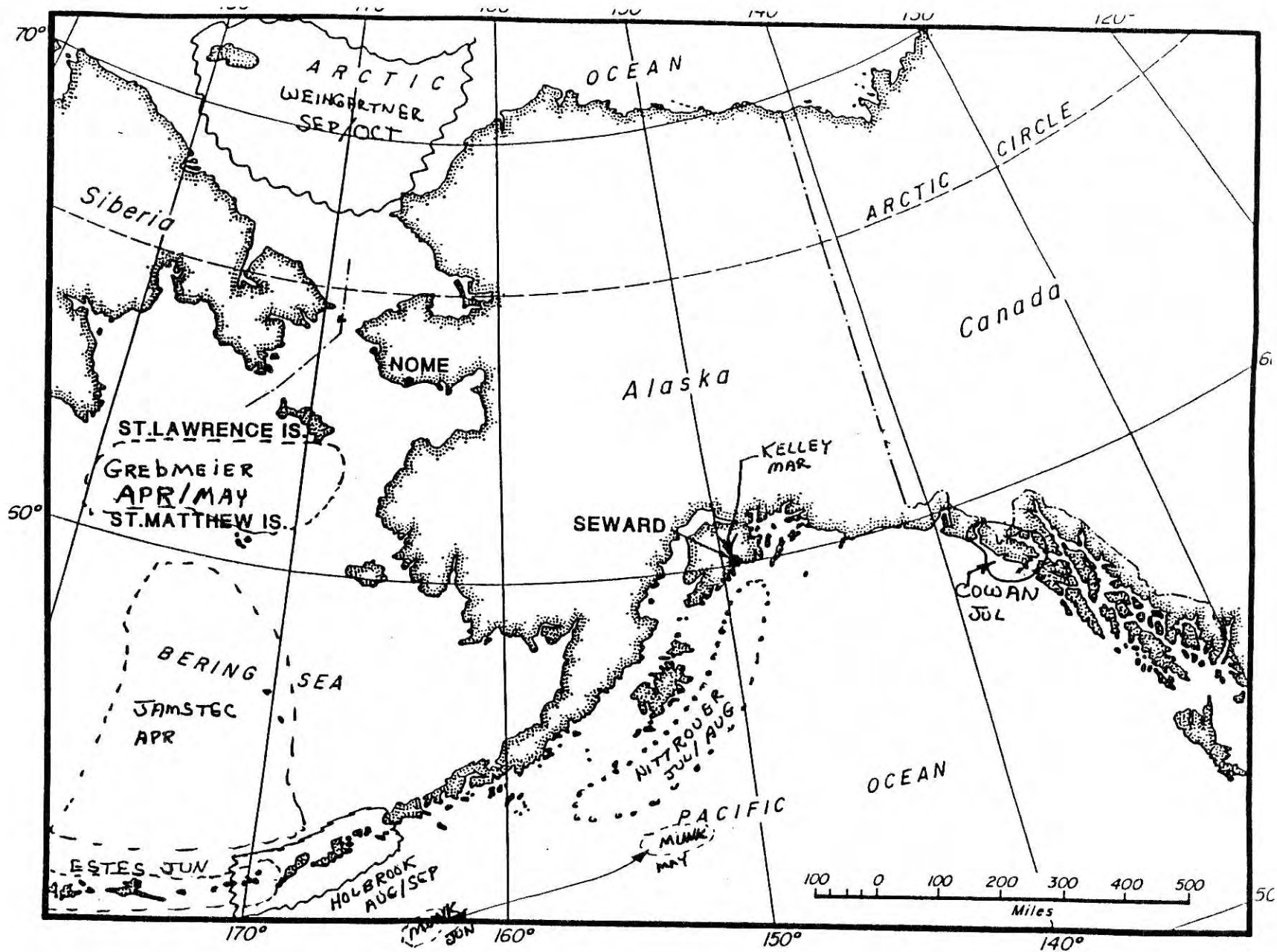
San Diego

Los Angeles

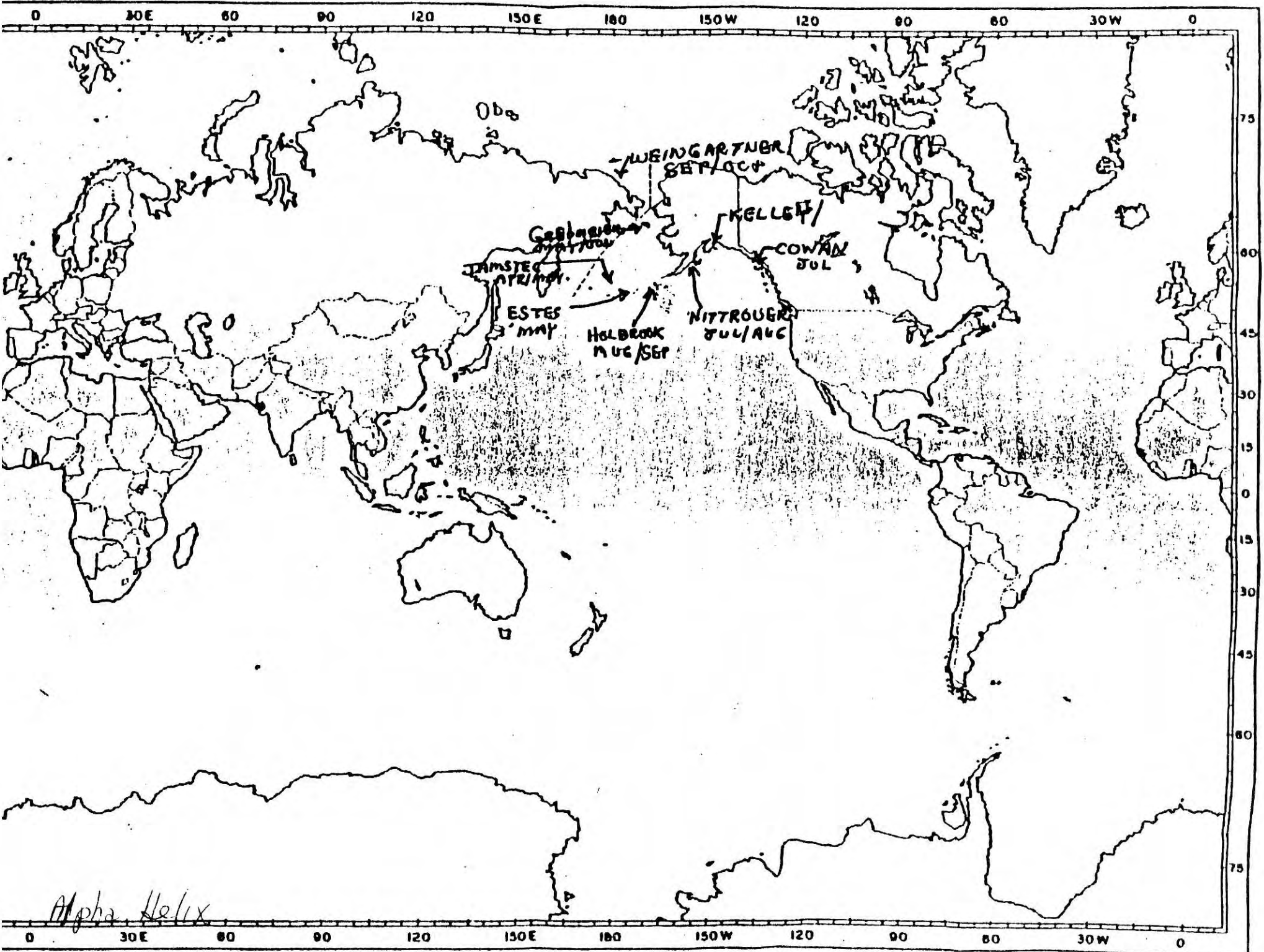




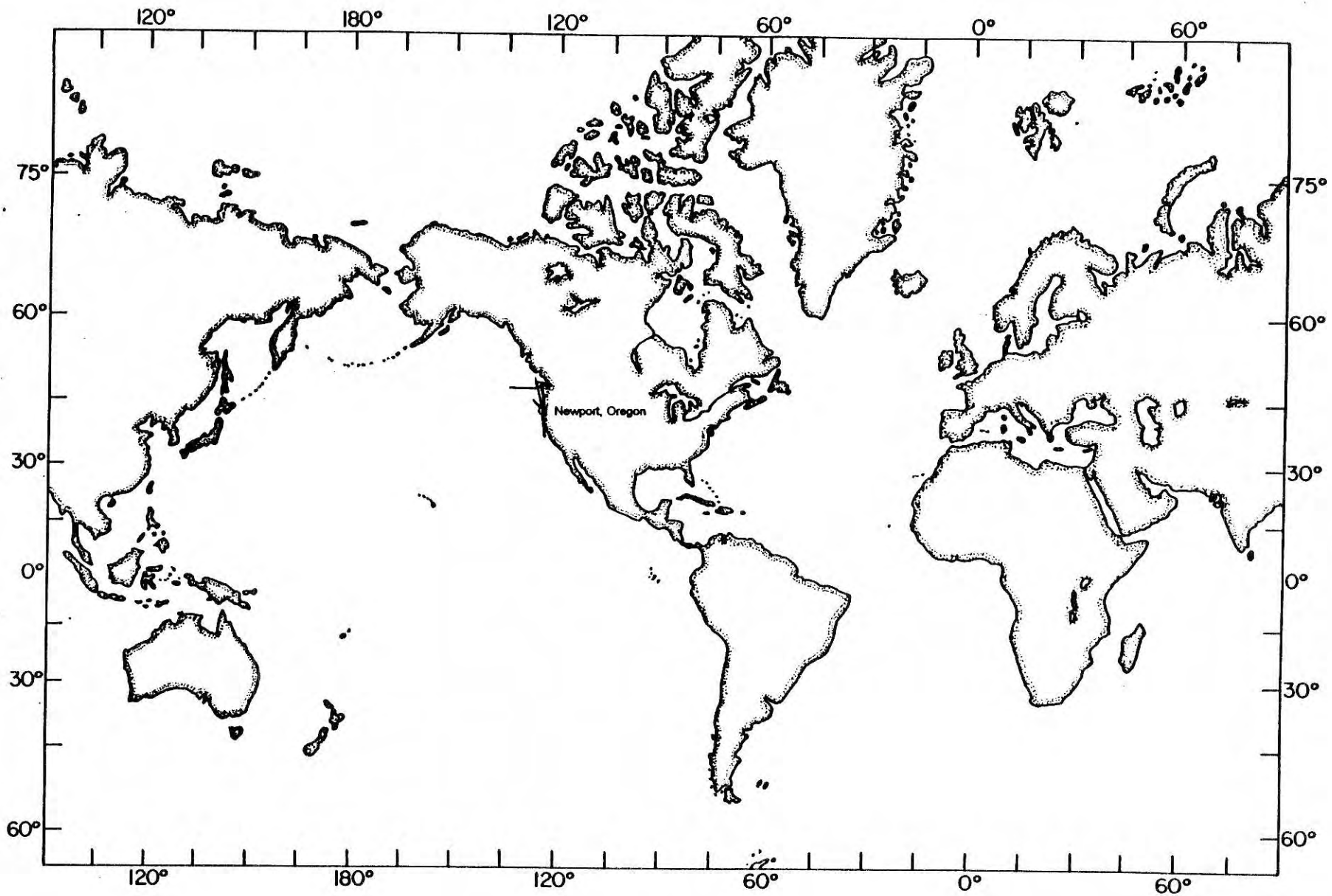
Proposed
Schedule
94
R/V Moana Wave.



Alpha No 1ix



Alpha Helix



**1994
PROPOSED CRUISE TRACKS
R/V WECOMA
OREGON STATE UNIVERSITY**

NOAA/OAR FLEET ALLOCATION REQUIREMENTS
3rd & 4th Quarters FY 1993 - FY 1995

The following represent NOAA/OAR's shiptime requirements for this period. The actual schedules are delimited in the Allocation Plans distributed at the UNOLS Meeting on 23 June 1993. Shown as requirements on the Pacific projection but not delimited in the FY 1995 Allocation Plan are two cruises that NOAA has insufficient time available on its platforms to accommodate. NOAA is attempting to obtain funding to charter these cruises.

Atlantic

All are on NOAA Ship MALCOLM BALDRIGE.

The CO₂ cruise will occur in August and September of 1993. It is pictured to nominally represent the track which is intended to be WOCE line A24N.

The western boundary current work in the North Atlantic and the equatorial Atlantic work are continuing efforts in FY 1993.

The RITS/IGAC effort is being conducted in December 1994/January 1995.

The east-west section in the North Atlantic is to be conducted along 26.5 N in September of 1995.

Indian Ocean

All are on NOAA Ship MALCOLM BALDRIGE.

All of the cruises are on the FY 1995 Allocation Plan. For presentation purposes the CO₂ program is pictured as a longitudinal section. The effort is intended to be a south to north program along WOCE line I8.

Pacific Ocean

NOAA Ship MALCOLM BALDRIGE:

The WOCE P18 line in the eastern south Pacific will be a south to north section beginning in January of 1994.

NOAA Ship DISCOVERER:

All of the EPOCS/TAO and TAO cruises will be conducted by DISCOVERER.

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JUL 01 1993
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Platform and Support Unidentified:

The WOCE P15S line in the southwest Pacific is proposed to be conducted in the latter part of CY 1994. The Tasman Sea RITS/IGAC work is proposed to begin in January of 1995. These efforts are estimated to require 126 days Hawaii-Hawaii to fulfill. The support for these efforts is part of the 1995 budget process.

Coastal North America

The VENTS program occurs annually in late summer. These are conducted off of the NOAA Ship DISCOVERER.

FOCI (Fisheries Oceanography Cooperative Investigations) is a joint program with NMFS and is normally conducted annually off of NOAA Ships MILLER FREEMAN and SURVEYOR.

The Sea Grant activities are conducted annually off of the NOAA Ship FERREL.

The NECOP/MACII (Mississippi-Atchafalaya Coastal Interaction Initiative) is scheduled for FY 1995 only and will require the chartering of small, coastal vessels. Support for this effort is part of the 1995 budget process.

FY 1994 NOAA FLEET ALLOCATION PLAN

		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
PMC														
DISCOVERER	230	EPDCB 16	TOGA TAO	OAR 47		EPOCS/TOGA EQ. PACIFIC	OAR 82	TOGA TAO EQ. PACIFIC	NOS 60	DRYDOCK	VENTS NE PACIFIC	OAR 86		
SURVEYOR	177		RITS OAR	14 ANTARCTIC			NMFS 122	VENTS WINDS 4		DRYDOCK	FOCI NMFS 18	OAR 36		
RAINIER	188	N. CHART. ALASKA	NOS 35		DOCKSIDE REPAIR		N. CHARTING SE ALASKA	NOS 46		NAUTICAL CHARTING S. ALASKA PENINSULA	NOS 78	N. CHART. PR. WM. IND.	NOS 30	
FREEMAN	243	RES. ASSESSMENT	NMFS 31	DOCKSIDE REPAIR	RESOURCE ASSESSMENT	NMFS 60	FOCI NMFS 32	OAR 20	62 TSUN 9		RESOURCE ASSESSMENT	NMFS 78	FOCI 8 7	
McARTHUR	100	PORPOISE SURVEY		NMFS 85		DOCKSIDE REPAIR			STATUS & TRENDS WEST COAST	NOS 66	MARINE MAMMALS		NMFS 60	
CROMWELL	243	RESOURCE ASSESSMENT								NMFS 243	REPAIR			
JORDAN	243	PORPOISE SURVEY	30	RESOURCE ASSESSMENT CALIFORNIA/MEXICO COAST					NMFS 153	DOCKSIDE REPAIR	MARINE MAMMALS		NMFS 60	
COBB	140	RES. ASSMNT	NMFS 30		RESOURCE ASSESSMENT	NMFS 35		RESOURCE ASSESSMENT					NMFS 75	
AMC														
BALDRIGE	203		DOCKSIDE REPAIR		C/CGC/CFC/CO2/WOCE PACIFIC		OAR 80	ACCP	OAR 60	EPOCS/TOGA EQ. PACIFIC	OAR 83			
MT. MITCHELL	188	N. CHARTING U.S.V.I.	NOS 45		DRYDOCK			NAUTICAL CHARTING GULF OF MEXICO, TX/LA					NOS 141	
WHITING	188	N. CHARTING BUZZARDS BAY	NOS 60					NAUTICAL CHARTING BUZZARDS BAY, NANTUCKET/VINEYARD SOUNDS, MA					NOS 136	
OREGON II	243	RESOURCE ASSESSMENT GULF OF MEXICO			NMFS 78	DOCKSIDE REPAIR		RESOURCE ASSESSMENT GULF OF MEXICO					NMFS 166	
ALBATROSS IV	210	REPAIR			RESOURCE ASSESSMENT								NMFS 210	
DELAWARE II	243	RESOURCE ASSESSMENT			NMFS 80	DRYDOCK		RESOURCE ASSESSMENT					NMFS 183	
CHAPMAN	180	RESOURCE ASSESSMENT	NMFS 32		RESOURCE ASSESSMENT				NMFS 126	DOCKSIDE REPAIR	RES. ASSMNT		29	
FERREL	180	S&T GOM	NOS 20	SG 22	DRYDOCK			SG 4	S&T NORTHEAST U.S.	NOS 80	SG 14	SG BUNY 20	S&T G. OF MEX.	NOS 60
RUDE	184	N. CHARTING BUZZARDS BAY	NOS 40		DRYDOCK			NAUTICAL CHARTING BUZZARDS BAY, NANTUCKET/VINEYARD SOUNDS, MA					NOS 144	
HECK	184	N. CHARTING G. OF MEX.	NOS 40		DRYDOCK			NAUTICAL CHARTING GULF OF MEXICO, TX					NOS 144	
CHARTER														
UNOLS R/V	25			SW 6			SW 8			SW 8		SW 10		

APPROVED: _____

DATE: _____

08/02/93

13:49

0301 443 9339

NO/RES HGMT SIP

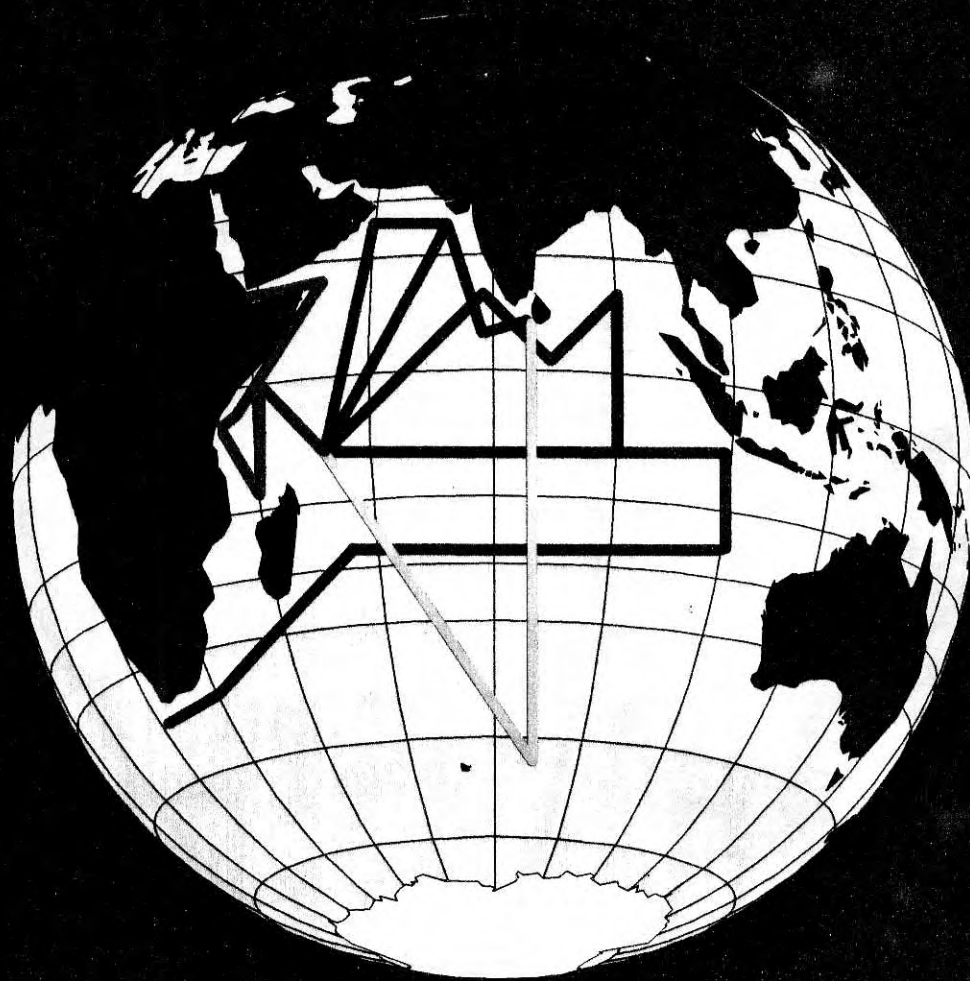
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FY 1995 NOAA FLEET ALLOCATION PLAN





		OCT	NOV	DEC	JAN	FEB	MAR.	APR	MAY	JUN	JUL	AUG	SEP			
PMC																
DISCOVERER	180	TOGA TAO CENT. PACIFIC			OAR 62	EPOCS/TOGA S. PACIFIC		OAR 64	TOGA TAO WINDS	50	REPAIR-TO-EXTEND					
OCEANOGRAPHER	65	REPAIR-TO-EXTEND										VENTS	OAR 55			
SURVEYOR	122	AMLRP ANTARCTIC					NMFS 122									
RAINIER	180	N. CHARTING ALASKA	NOS 40	DOCKSIDE REPAIR				N. CHARTING SE ALASKA	NOS 40		NAUTICAL CHARTING S. ALASKA PENINSULA			NOS 100		
FREEMAN	243	RES. ASGMT	NMFS 31	DOCKSIDE REPAIR		RESOURCE ASSESSMENT		NMFS 80	FOCI NMFS 32	OAR 20	TBUN 9	RESOURCE ASSESSMENT		NMFS 78	FOCI 8	7
TAGOS	75	CONVERSION										EPOCS/TOGA E. PACIFIC		OAR 75		
McARTHUR	180	PORPOISE SURVEY		NMFS 65		DOCKSIDE REPAIR				STATUS & TRENDS WEST COAST		NOS 65	MARINE MAMMALS	NMFS 80		
CROMWELL	210	REPAIR		RESOURCE ASSESSMENT										NMFS 210		
JORDAN	243	RESOURCE ASSESSMENT		NMFS 60		RESOURCE ASSESSMENT CALIFORNIA/MEXICO COAST				NMFS 123		PORPOISE SURVEY		NMFS 80		
COBB	140	RES. ASGMT	NMFS 30	DOCKSIDE REPAIR		RESOURCE ASSESSMENT		NMFS 35		RESOURCE ASSESSMENT			NMFS 75			
AMC																
BALDRIGE	230	HITB/CO2 S. ATLANTIC/INDIAN		OAR 70	GLOBEC/ JGOFS 25		CO2/LONGLINE C. INDIAN	OAR 60	GLOBEC/ JGOFS 25		WOCE INDIAN	OAR 50				
MT. MITCHELL	180	N. CHART. TX/LA		NOS 40		NAUTICAL CHARTING GULF OF MEXICO, TX/LA						NOS 140				
WHITING	180	N. CHARTING BUZZARDS BAY		NOS 60		NAUTICAL CHARTING BUZZARDS BAY, VINEYARD SOUND, MA						NOS 130				
OREGON II	243	RESOURCE ASSESSMENT GULF OF MEXICO				NMFS 140		DRYDOCK		RESOURCE ASSESSMENT GULF OF MEXICO				NMFS 103		
ALBATROSS IV	240	RESOURCE ASSESSMENT		NMFS 60		DOCKSIDE REPAIR		RESOURCE ASSESSMENT					NMFS 180			
DELAWARE II	190	RESOURCE ASSESSMENT				NMFS 190					REPAIR-TO-EXTEND					
CHAPMAN	180	RES. ASGMT	NMFS 32	RESOURCE ASSESSMENT				NMFS 125			DOCKSIDE REPAIR		RES. ASGMT	NMFS 73		
FERREL	180	B&T GOM	NOS 20	B&T OAR 25					B&T NORTH EAST U.S.	NOS 50	B&T OAR 25	G. OF MEXICO	NOS 50			
RUDE	180	N. CHARTING BUZZARDS BAY		NOS 40		NAUTICAL CHARTING BUZZARDS BAY, NANTUCKET & VINEYARD SOUNDS, MA						NOS 140				
HECK	180	N. CHARTING GULF OF MEXICO		NOS 40		NAUTICAL CHARTING GULF OF MEXICO, TX						NOS 140				

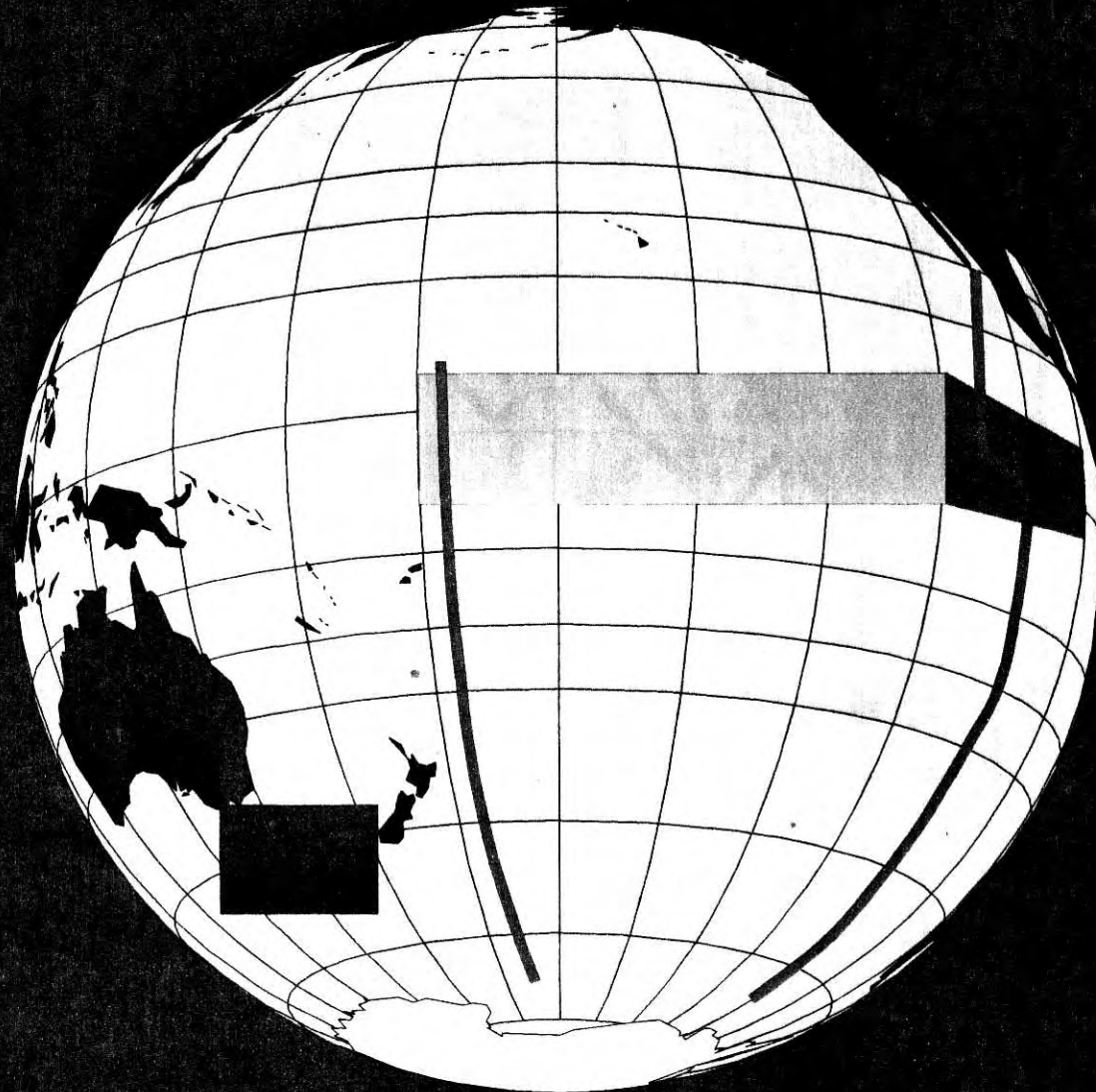
APPROVED: _____ DATE: _____

NOAA FLEET ALLOCATION PLAN







Legend

-  RITS/IGAC
-  GLOBEC/
JGOFS
-  CO₂
-  WOCE







Legend

-  RITS/IGAC
-  EPOCS/
TAO
-  TAO
-  WOCE






Legend

-  VENTS
-  FOCI
-  NECOP/
MACII
-  Sea Grant



Legend

-  RITS/IGAC
-  CO₂
-  ACCP