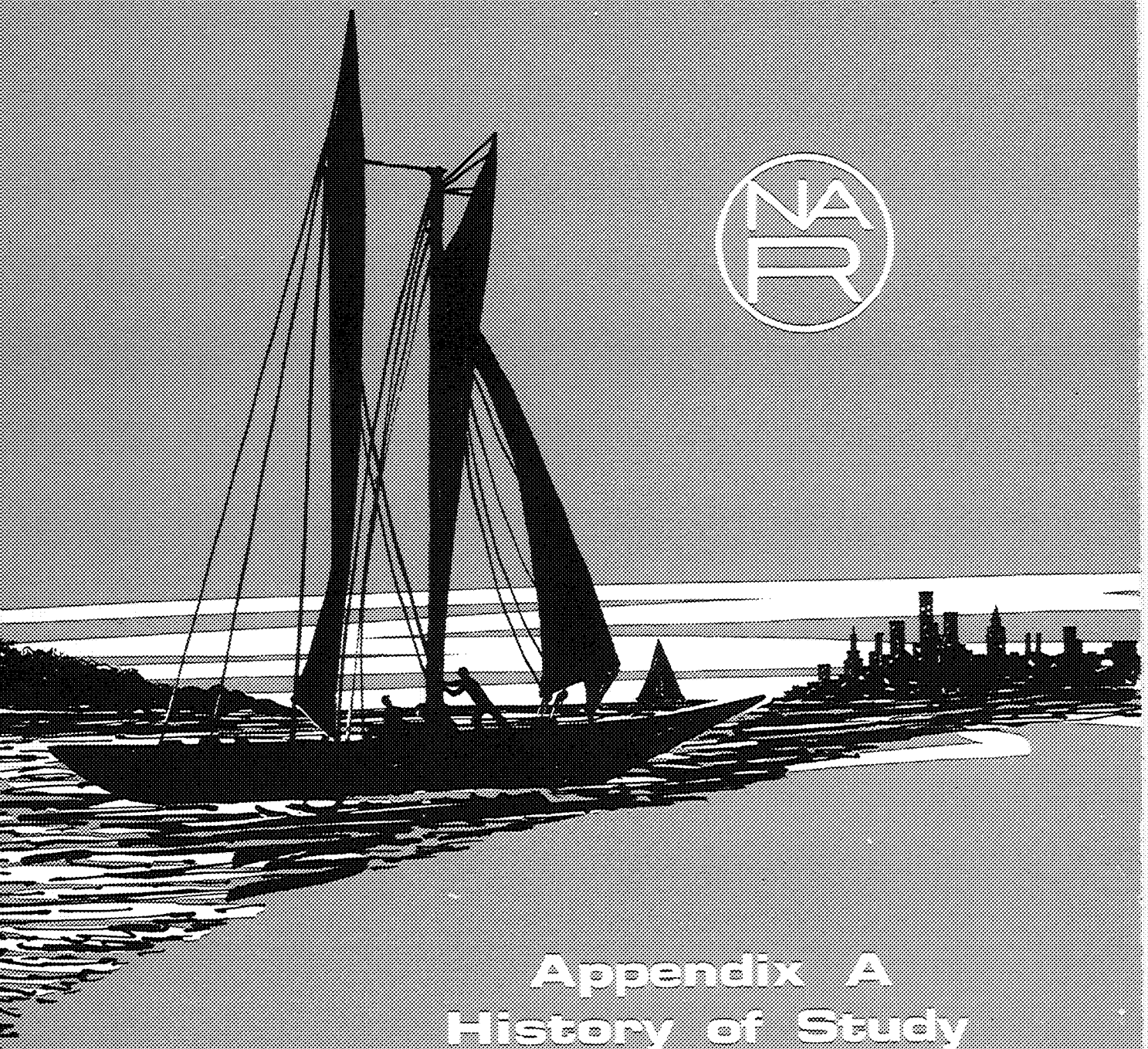
North Atlantic Regional Water Resources Study



Appendix A
History of Study

NORTH ATLANTIC REGIONAL WATER RESOURCES STUDY COORDINATING COMMITTEE
MAY 1972

The North Atlantic Regional Water Resources (NAR) Study examined a wide variety of water and related land resources, needs and devices in formulating a broad, coordinated program to guide future resource development and management in the North Atlantic Region. The Study was authorized by the 1965 Water Resources Planning Act (PL 89-80) and the 1965 Flood Control Act (PL 89-298), and carried out under guidelines set by the Water Resources Council.

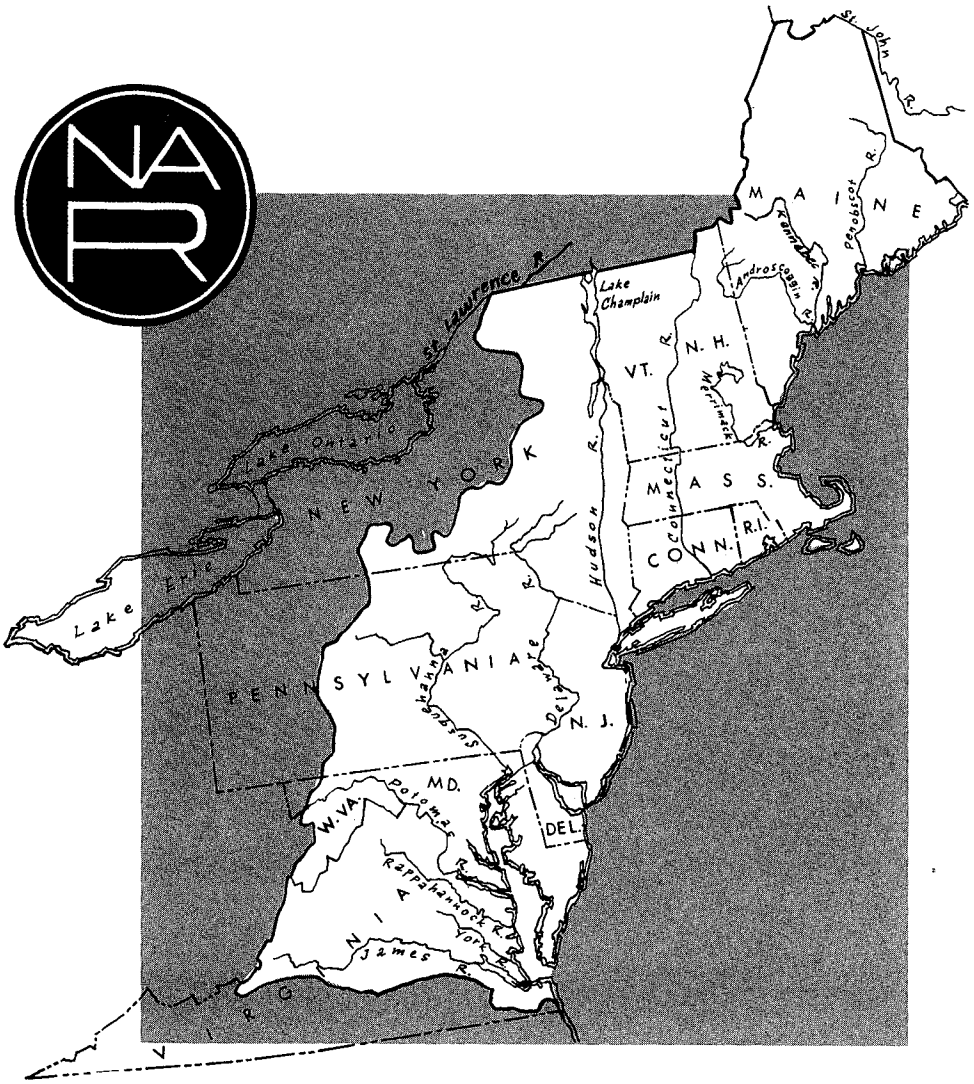
The recommended program and alternatives developed for the North Atlantic Region were prepared under the direction of the NAR Study Coordinating Committee, a partnership of resource planners representing some 25 Federal, regional and State agencies. The NAR Study Report presents this program and the alternatives as a framework for future action based on a planning period running through 2020, with bench mark planning years of 1980 and 2000.

The planning partners focused on three major objectives -- National Income, Regional Development and Environmental Quality -- in developing and documenting the information which decision-makers will need for managing water and related land resources in the interest of the people of the North Atlantic Region.

In addition to the NAR Study Main Report and Annexes, there are the following 22 Appendices:

A. History of Study
B. Economic Base
C. Climate, Meteorology and Hydrology
D. Geology and Ground Water
E. Flood Damage Reduction and Water Management for Major Rivers and Coastal Areas
F. Upstream Flood Prevention and Water Management
G. Land Use and Management
H. Minerals
I. Irrigation
J. Land Drainage
K. Navigation
L. Water Quality and Pollution
M. Outdoor Recreation
N. Visual and Cultural Environment
O. Fish and Wildlife
P. Power
Q. Erosion and Sedimentation
R. Water Supply
S. Legal and Institutional Environment
T. Plan Formulation
U. Coastal and Estuarine Areas
V. Health Aspects

Appendix A
History of Study



Prepared by

North Atlantic Regional Water Resources Study Group
North Atlantic Division
Corps of Engineers, U.S. Army

for the

NORTH ATLANTIC REGIONAL WATER RESOURCES STUDY
COORDINATING COMMITTEE

APPENDIX A

HISTORY OF STUDY

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SYLLABUS

The history of the North Atlantic Regional Water Resources Study is a brief description of its progress from authorization by Congress in 1965 to completion in 1972. This work is a chronology rather than a description of the Study as most definitive statements of the work during the Study are found in other sections of the Report, its Annexes and **Appendices.**

The NAR Study required the coordination and cooperation of a great many Federal, state, interstate and local agencies under the direction of the Corps of Engineers, and the Coordinating Committee as the final authority. The major historical stages that form the basis of this Appendix are the steps taken to cement the partnership of the agencies to develop the various stages of plan formulation, and the publication of the Final Report.

Recognition is given not only to those member agencies, committees, subcommittees and other groups that participated in the Study, but even more importantly to the individuals who produced the Study.

INTRODUCTION

AUTHORIZATION

The North Atlantic Regional Water Resources Study is part of a program of study of all of the major river basins in the United States, as implemented by the Water Resources Council. As a result of the Senate Select Committee's report (January, 1961) the Water Resources Planning Act, Public Law 89-80 (July 22, 1965), was passed creating the Water Resources Council and establishing the machinery to coordinate the diverse interests represented by the large number of Federal, state and local agencies involved in planning for the development of water and related land resources. Subsequent enabling legislation of the cooperating agencies expanded the program and the North Atlantic Region was outlined as one of eighteen (now twenty) such regions in the United States. Congress authorized and directed the Secretary of the Army to have the Chief of Engineers prepare a framework plan for the North Atlantic Region in Section 208, Public Law 89-298 (October 27, 1965) which in part reads as follows:

> Sec. 208. The Secretary of the Army is hereby authorized and directed to cause surveys for flood control and allied purposes, including channel and major drainage improvements, and floods aggravated by or due to wind or tidal effects, to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its territorial possessions, which include the localities specifically named in this section....
>
> Watersheds of streams in the North Atlantic Region draining northward in New York toward the Saint Lawrence River below the international boundary and draining directly into the Atlantic Ocean above the Virginia-North Carolina State line with respect to a framework plan for developing the water resources of the region.

The Corps of Engineers was designated the interdepartmental leader and the Study was assigned to the Division Engineer, North Atlantic Division, by the Chief of Engineers in a letter dated 12 April 1966.

THE REGION

The North Atlantic Region, as described in Public Law 89-298, covers all or parts of thirteen northeastern states and the District of Columbia. Although the Region is small, covering about five percent of the nation's land area, it contains approximately twenty-five percent of the United States' population and generates almost a third of its gross national product.

For study purposes the Region was divided into twenty-one hydrologic Areas, made up of the major river drainage basins, which have for some purposes been further divided into sub-areas or aggregated into sub-regions. Since the boundaries of these Areas follow hydrologic rather than state boundaries, some basins are located wholly within a particular state, while others span several states.

PURPOSE

The overall objective of this preliminary or reconnaissance type of study is to provide broad-scaled analyses of water and related land resources problems in the North Atlantic Region of the United States. The Study provides general appraisals of the probable nature, extent and timing of measures to solve those problems and presents a fully coordinated Federal, state and local comprehensive program to meet the projected needs of, and all the purposes served by, the Region's water and related land resources use, development and conservation. The period of the Study is to the year 2020, with intermediate benchmark years at 1980 and 2000.

SCOPE

The Study is a multi-discipline study encompassing engineering and the physical, social and economic sciences. The water resources were analyzed only by major classes such as fresh, saline or brackish water. Related land resources are those the use or management of which affect, or are affected by, the Region's water resources. Needs were treated broadly and estimated only for the major purposes for which water is used. Devices were also broadly treated as they were chosen and grouped by their effects on those resources and needs. The data presented in the Final Report was compiled from information in existiing reports, either published or unpublished, from on-going studies which were in progress during the Study, and from specially assigned or contracted for investigations in fields where existing or projected information sources were inadequate.

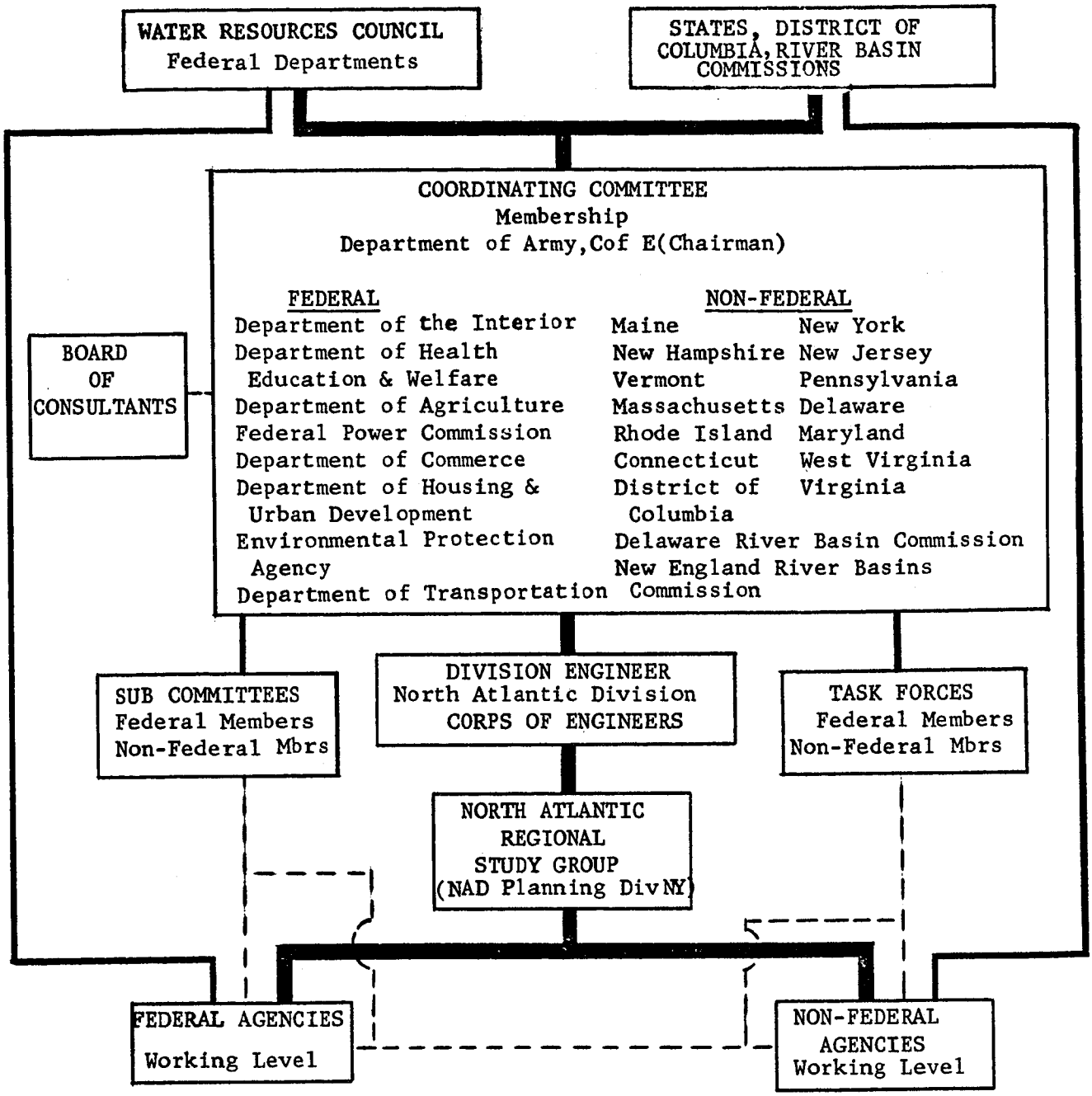
GUIDELINES

The Guidelines were developed to obtain a reasonable degree of uniformity and consistency in the management and procedures of the regional framework studies which comprise a major segment of the present nationwide comprehensive basin program. At the outset of the NAR Study the "Guidelines for Framework Studies," dated June 10, 1965, and prepared by the "Interdepartmental Staff Committee ad hoc Water Resources Council," formed the major part of the general guidance. The other part of the initial guidance was the "Tentative Terms of Reference" letter dated December 1965 also prepared by the ad hoc Water Resources Council. This letter in part stated:

"It is proposed that the necessary field coordination will be accomplished through a coordinating committee chaired by the Department of the Army, Corps of Engineers and consisting of designated representatives of the States concerned, interested Federal agencies and appropriate interstate commissions. Each State, Federal agency and commission should have representation on the coordinating committee. The coordinating committee will provide guidance for conduct of the overall study and provide coordination with subregion studies that initially may be undertaken separately. It will also provide for full participation and continuous coordination of the activities of the concerned agencies and other interested planning entities in the study effort. The chairman of the coordinating committee will provide leadership for coordination of budget estimates for the Departments of Agriculture; the Army; the Interior; and Health, Education and Welfare and the Federal Power Commission. These estimates will include, when and as appropriate, requirements of other Federal agencies and commissions established under P.L. 89-80."

Subsequent editions of the Guidelines for Framework Studies issued by the Water Resources Council amended the initial guidance but without important changes.

FIGURE A-1



CHANNELS:
- Study Management, Information, Coordination
- Organizational Control, Information, Coordination
- Information and Coordination

OVERALL DIRECTION

THE COORDINATING COMMITTEE

The North Atlantic Regional Water Resources Study area is a large, varied and complex region. Assessment of its water and related resources and needs requires the coordinated effort of people with highly specialized technical skills and knowledge. No single agency has qualified experts in all of the disciplines necessary to accomplish such a comprehensive study, nor an intimate appreciation of the hopes and needs of all the people and interest groups in such a diverse region. Thus coordination and cooperation were required between all of the Federal and state agencies involved in water resources planning in the Region. Each Federal, state and interstate agency involved assumed the lead in those disciplines of the Study in which it had the most competence, and to assure the desired coordination each participant was afforded a continuous opportunity to review and comment on the work of others, keeping the various agencies' efforts in phase and harmony.

The vehicle selected to achieve this coordination and cooperation was the Coordinating Committee, with its membership composed of one representative from each of the initial Federal department members of the Water Resources Council, a representative from each of the NAR states and the District of Columbia, and one from the Delaware River Basin Commission. Added at later dates during the Study were representative members from the Departments of Health, Education and Welfare, Housing and Urban Development, and Transportation, from the Environmental Protection Agency, and from the New England River Basins Commission.

Under the guidelines set by the Water Resources Council, the Coordinating Committee established the broad guidelines for the NAR Study and provided the general direction under which the participants worked. The Committee took into consideration the views and needs of all concerned, and coordinated the work being carried out by the individual Federal and state agencies. It established policies, resolved conflicts, reviewed reports, provided information to the public, established subcommittees and special task forces, and drew conclusions and made recommendations. The Committee could not make decisions or establish policies contrary to the statutes, regulations or policies under which any of the members operated. If a Committee request conflicted with existing policies, statutes or directives, the problem was passed up to higher authority for resolution. The Coordinating Committee provided constant leadership, meeting for official Committee meetings througnout the Region. All Coordinating Committee meetings were open to the public.

Through the life of the Study 87 individuals served as members or alternates on the Coordinating Committee. Table A-1 lists these members and their term of tenure as well as identifies the Chairmen and Executive Secretaries and their tenure. The Coordinating Committee met 13 times. Table A-2 shows location, date, attendance and major decisions made at these meetings.

TABLE A-1

COORDINATING COMMITTEE MEMBERSHIP

Agency or State	Position	Name	Tenure
Department of the Army	Chairman	B.G. David S. Parker	1966
	Chairman	B.G. Harry G. Woodbury	1966
	Chairman	B.G. Francis P. Koisch	1966-1968
	Chairman	M.G. Charles M. Duke	1968-1971
	Chairman	M.G. Richard H. Groves	1971-1972
	Executive Secretary	Burnham Dodge	1966-1968
	Executive Secretary	Harry E. Schwarz	1968-1972
Department of Agriculture	Member	Richard W. Akeley	1967-1972
	Member	Selden Lee Tinsley	1966-1967
	Alternate	Claude J. Price	1966-1972
Department of Commerce	Alternate	Richard M. Greening	1966-1969
	Alternate	Edwin W. Weber	1966
	Alternate	Richard L. Walton	1967
	Alternate	John Thomas	1970-1972
Department of Health, Education & Welfare	Member	Ralph J. VanDerwerker	1967-1969
	Member	Everett L. MacLeman	1969-1971
	Alternate	Earl J. Anderson	1966
	Alternate	Sylvan C. Martin	1966-1967
	Alternate	Frank Tetzlaff	1966-1971
Department of Housing and Urban Development	Member	Judah Gribitz	1967-1970
	Member	W. William Green	1970-1972
	Alternate	Frank A. Batstone	1967-1972
	Alternate	Arthur A. Davis	1966-1967
	Alternate	Jack A. Underhill	1966-1967
Department of the Interior	Member	Mark Abelson	1966-1972

TABLE A-1 (Cont'd)

COORDINATING COMMITTEE MEMBERSHIP

Agency or State	Position	Name	Tenure
Department of Transportation	Member	George M. Chandler	1968-1970
	Member	William R. Riedel	1971-1972
	Alternate	Philip E. Franklin	1968-1972
Environmental Protection Agency	Member	Lester Klashman	1971
	Member	Gerald M. Hansler	1972
Federal Power Commission	Member	Paul H. Shore	1966-1971
	Member	John H. Spellman	1971-1972
	Alternate	Lazur B. Woll	1966
	Alternate	John H. Spellman	1966-1971
	Alternate	Martin Inwald	1971-1972
Maine	Member	Austin H. Wilkins	1966-1970
	Member	Philip Savage	1970-1972
	Alternate	Raeburn W. MacDonald	1966
	Alternate	Dr. Warren Viessman, Jr.	1966
	Alternate	Edgar A. Imhoff	1969-1970
	Alternate	Austin H. Wilkins	1970-1972
New Hampshire	Member	George M. McGee, Sr.	1966-1972
Vermont	Member	John E. Cerutti	1970-1972
	Alternate	Reinhold Thieme	1966-1972
	Alternate	Richard H. Macomber	1966
Massachusetts	Member	Malcolm E. Graf	1966-1967
	Member	Charles F. Kennedy	1968-1972
	Alternate	Charles H. W. Foster	1966
Rhode Island	Member	Alonzo W. Quinn	1966-1968
	Member	William I. McDonald	1968-1971
	Member	Robert B. Russ	1971-1972
Connecticut	Member	John J. Curry	1967-1972
	Alternate	William S. Wise	1966-1967
New York	Member	F. W. Montanari	1966-1971
	Member	John A. Finck	1971-1972
	Alternate	Nicholas L. Barbarossa	1971-1972
	Alternate	Ambrose F. Brennan	1971-1972

TABLE A-1 (Cont'd)

COORDINATING COMMITTEE MEMBERSHIP

Agency or State	Position	Name	Tenure
New Jersey	Member	Robert A. Roe	1966-1969
	Member	Joseph Barber	1969-1970
	Member	Richard J. Sullivan	1970-1972
	Alternate	George R. Shanklin	1966-1970
	Alternate	Robert L. Hardman	1970-1971
	Alternate	Charles M. Pike	1971-1972
	Alternate	Robert E. Cyphers	1966-1972
Pennsylvania	Member	C.H. McConnell	1966-1972
	Alternate	Alan J. Sommerville	1966-1972
	Alternate	Maurice K. Goddard	1966
Delaware	Member	B.G. Norman M. Lack (USA Ret)	1966-1968
	Member	John Bryson	1968-1972
	Alternate	Jack Karanick	1968-1970
Maryland	Member	James J. O'Donnell	1966-1968
	Member	Vladimir A. Wahbe	1968-1972
	Alternate	Paul W. McKee	1966-1972
	Alternate	Dr. Albert R. Miller, Jr.	1966-1972
West Virginia	Member	Edgar N. Henry	1966-1972
	Alternate	John Hall	1966-1972
	Alternate	Bern Wright	1966
	Alternate	Lyle Gillenwater	1966-1967
	Alternate	Houston Wood	1967
	Alternate	M.S. Baloch	1968-1972
Virginia	Member	Julian M. Alexander	1966-1972
	Alternate	Dale F. Jones	1968-1972
	Alternate	Donald B. Richwine	1968-1972
District of Columbia	Member	Roy L. Orndorff	1966-1970
	Member	Norman E. Jackson	1970-1972
	Alternate	William H. Cary, Jr.	1966-1972
	Alternate	Malcolm C. Hope	1969-1972
Delaware River Basin Commission	Member	James F. Wright	1966-1972
	Alternate	Dr. C.H.J. Hull	1966-1972
New England River Basins Commission	Member	Malcolm E. Graf	1968-1972
	Alternate	Walter M. Newman	1968-1972

TABLE A-2

COORDINATING COMMITTEE MEETINGS

Meeting No.	Location	Date	No. In Attendance	Major Decisions
1	Newark, N.J.	27 Jan 1966	91	Formed Ad Hoc Subcommittee for Plan of Study.
2	Newark, N.J.	2 March 1966	50	Established Board of Consultants. Proposed Public Relations Subcommittee.
3	Portland, Me.	28, 29 June 1966	82	Approved Reviewed Plan of Study. Added Departments of Health, Education & Welfare and Housing & Urban Development to Coordinating Committee. Appointed Board of Consultants. Established Public Affairs Subcommittee. Accepted Redraft of Plan of Study. Adopted Name-North Atlantic Regional Water Resources Study.
4	Williamsburg, Va.	26, 27 April 1967	112	Created Task Force to prepare Regional portion of National Assessment of Water and Related Land Resources. Created separate Appendix on Coastal Studies. Adopted Charter & Work Plan of Public Affairs Subcommittee.
5	Brookline, Mass.	13, 14 Sept 1967	97	Approved Revised Outline of Appendix U. "Coastal and Estuarine Areas." Adopted Rationale of Plan Formulation and Outline for Appendix U. Distributed initial information leaflet. Adopted review procedure.
6	Cherry Hill, N.J.	22, 23 May 1968	101	Recommended extending study time frame. Extended membership on the Coordinating Committee to the Department of

TABLE A-2 (Cont'd)

COORDINATING COMMITTEE MEETINGS

Meeting No.	Location	Date	No. In Attendance	Major Decisions
				Transportation. Agreed on content and format of State Summaries. Recommended Appendix on Health Aspects. Added Appendix V "Health Aspects".
7	Baltimore, Md.	20, 21 Aug 1968	84	Proposed Plan Formulation Work Group.
8	Harrisburg, Pa.	25, 26 Nov 1968	91	Adopted the Proposal. Recommended Public Affairs Subcommittee prepare information plan. Adopted Basin Economic Projections as the base for the Study. Combined Coordinating Committee and Board of Consultants Meetings.
9	Burlington, Vt.	17, 19 June 1969	82	Proposed increased implementation of computer technology.
10	Arlington, Vt.	25, 26 Feb 1970	112	Explored Planning Models Further. Review & reappraisal of report goals ordered with definitions of all assumptions. Use of computers emphasized.
11	Lake Luzerne, N.Y.	17, 18 Sept 1970	75	Further state involvement requested, and state, Area and sub-area meetings planned.
12	Providence, R.I.	6, 7 Jan 1971	74	Interim Public Incormation Pamphlet approved. Basin Summaries to be revised to give more explicit reasons supporting statements therein. Coordinating Committee to have a work session on basin transfers.

TABLE A-2 (Cont'd)

COORDINATING COMMITTEE MEETINGS

Meeting No.	Location	Date	No. In Attendance	Major Decisions
13	Newark, N.J.	10, 11 April 1972	58	Ordered the Draft Findings and Recommendations to be drafted to show: assumptions; conflicts; relation to other studies; cost distribution; demand control; land planning and several Areas added to those recommended for further study.

THE BOARD OF CONSULTANTS

The Board of Consultants consisted of six eminent specialists in various disciplines related to water resources planning. The Board of Consultants was appointed and the Board officially established at the third Coordinating Committee Meeting in June, 1966. The Board first met in October of that year and held eight subsequent meetings during the Study. A summary of these meetings is shown in Table A-3.

The Board provided a broad professional overview of the Study, pointing out shortcomings and suggesting new or modified approaches to various problems as the Study progressed. It acted as a sounding board for ideas on the formulation of the Study plan, appraised the progress of the Study, and generally brought the range of experience of its members to bear in recommending lines of approach. The members served without compensation and made a highly valuable contribution to the Study. Its membership was as follows:

Mr. David V. Auld	Consulting Engineer Former Director of Sanitary Engineering, District of Columbia
Dr. Arthur Maass	Professor of Government, Harvard University
Mr. Eugene W. Weber	Consultant Former Deputy Director, Civil Works Corps of Engineers
Dr. Gilbert F. White	Professor of Geography University of Colorado
Dr. Nathaniel Wollman	Dean, College of Arts and Science University of New Mexico
Dr. Abel Wolman	Professor Emeritus Sanitary Engineering Johns Hopkins University

TABLE A-3

BOARD OF CONSULTANTS MEETINGS

Meeting No.	Location	Date	Recommendations
1	New York, N.Y.	26 Oct 1966	Include studies of Urban Land Use and Development and Esthetic and Cultural values. Develop alternative goals and plans for water and related resource development.
2	Newark, N.J.	19 May 1967	Areas where deficiencies exist should be the subjects of further studies following the completion of the Final Report. The plan in the Final Report should be an integrated plan and not a collection of discreet recommendations.
3	Newark, N.J.	8 Dec 1967	Develop three basis plans, one for each NAR objective and recommend the planning elements each plan should be concerned with. Complete the Urban Land Studies so they can be used effectively in Plan Formulation.
4	New York, N.Y.	3, 4 Sept 1968	Explore maximum use of multiple objectives. Attain greater planning flexibility by using low, middle and high demand estimates. All areas, purposes and devices should be dealt with equally regardless of amounts of detailed data available.
5	Burlington, Vt.	17, 18, 19 June 1969	All remaining meetings held jointly with Coordinating Committee meetings. Study should deal with four broad objectives: National Efficiency, Environmental Improvement, and Regional Development split into Regionwide Development and Area-wide Development. Study end-product should be requirement models for each basin defined as a statement of needs

TABLE A-3 (Cont'd)

BOARD OF CONSULTANTS MEETINGS

Meeting No.	Location	Date	Recommendations
			and costs for solutions for varied levels of need satisfaction. Computer techniques should be utilized further. More emphasis should be placed on a coastal and estuarine study, and generating data on water storage costs, costs for attaining various water quality levels and nonstructural measures such as pricing mechanisms, regulation and flood plain management.
6	Arlington, Va.	25, 26 Feb 1970	Assumptions must be explicitly stated along with the results that are presented to give clues as to which additional runs and input variations must be made. Establish three pollution projections.
7	Lake Luzerne, N.Y.	17, 18 Sept 1970	Much more input is needed in various aspects of water quality. More imput needed on impact of changing technology. State participation has been insufficient and meetings should be held as soon as possible to assure maximum impact from their participation, with alternative development programs drawn up for their comments. Very important is the need to have all state participants agree to what the Study comes out with in the Final Report. A definitive methology of how the information was handled by this Study, and how conclusions were reached, should be included with the Final Report.
8	Providence, R.I.	6, 7 Jan 1971	Computer models should be made available for continued planning. Sensitivity analysis

TABLE A-3 (Cont'd)

BOARD OF CONSULTANTS MEETINGS

Meeting No.	Location	Date	Recommendations
			should be conducted for the most significant Areas and the results included in the Final Report. Area Summaries should be more specific, precise and use standardized terms, especially for mixed objectives, and more use of alternatives. Major problems with institutional arrangements should at least be pointed out.

MANAGEMENT AND ADMINISTRATION

STUDY MANAGEMENT

In the Terms of Reference published by the ad hoc Water Resources Council in June, 1965, the Department of the Army, Corps of Engineers, was assigned to chair the Coordinating Committee as Executive Agent for the North Atlantic Regional Water Resources Study (NAR STUDY). In that position the Corps provided overall management services including the annual preparation of a coordinated budget for all of the Federal partners in the investigation.

The Division Engineer of the North Atlantic Division (NAD) of the Corps of Engineers, New York City, was assigned the management function by the Office of the Chief of Engineers in April 1966. Within the NAD office an NAR Study Group was established, which was subsequently merged into the Speecial Studies Branch of the Planning Division. This group, and similar groups in all partner agencies, functioned as the staff of the Coordinating Committee. Day to day management activities were carried out by the Corps of Engineers acting as the Executive Agency. The head of the Special Studies Branch acted as the Executive Secretary of the Coordinating Committee and as such was responsible for directing technical and administrative functions. One of the basic functions of the NAR Study Group was to prepare and maintain time schedule charts for all components studies and to perform other NAR Study-related tasks as directed by the Division Engineer. At times special committees and task forces were employed, the most important of which was the Plan Formulation Task Force, which operated from 10 October, 1968, to the end of the Study.

The overall responsibility for the Study remained in the Coordinating Committee which reviewed and commented upon the various stages of the reports, ultimately incorporating final views and comments in the Final Report. This comprehensive report, containing the coordinated findings of all partners in the Study, constitutes the basis of the end product the recommendations of the Coordinating Committee. Figure A-1 shows the organizations relationships between Study participants.

BUDGET

Early in the study a procedure was adopted by the Water Resources Council to develop coordinated budgets for all the Federal department and agencies. The Corps of Engineers as the executive agency each spring developed in cooperation with the Federal members of the Coordinating Committee a coordinated budget for submission to the Water Resources Council. Figure A-2 presents as an example the budget submission of April 1968 for fiscal year 1969. This process successfully

FIGURE A-2

COORDINATED COMPREHENSIVE RIVER BASIN PLANNING
ESTIMATES FOR FISCAL YEAR 1970

April 1, 1968

(In thousands of dollars)

Division Engineer
North Atlantic Division
Chairman

Coordinating Committee

North Atlantic Regional
Water Resources Study

Type I

I	PROGRAM	METHOD OF FINANCING	Total* Estimated Cost	To June 30 1968	FISCAL YEAR 1969	1970	1971					
	Department of Agriculture		1172	756	205	151	60					
	Soil Conservation Service	Direct	(838)	(556)	(128)	(112)	(42)					
	Forest Service	Direct	(113)	(62)	(20)	(21)	(10)					
	Economic Research Service	Direct	(221)	(138)	(57)	(18)	(8)					
	Department of the Army		1638	586	408	434	210					
	Corps of Engineers	Direct	(1638)	(586)	(408)	(434)	(210)					
	Department of the Interior		1238	557	320	288	73					
	Mines	Transfer from Army	(78)	(45)	(15)	(12)	(6)					
	Outdoor Recreation	Direct	(19)	(19)	-	-	-					
		Transfer from Army	(94)	(39)	(26)	(20)	(9)					
	Sport Fisheries and Wildlife	Transfer from Army	(115)	(44)	(35)	(26)	(10)					
	Geological Survey	Transfer from Army	(119)	(80)	(21)	(12)	(6)					
	National Park Service	Transfer from Army	(48)	(13)	(12)	(18)	(5)					
	Water Pollution Control Administration	Direct	(659)	(211)	(211)	(200)	(37)					
		Transfer from Public Health Service	(106)	(106)	-	-	-					
	Department of Health, Education and Welfare		187	70	66	35	16					
	Public Health Service	Direct	(162)	(51)	(60)	(35)	(16)					
		Transfer from Army	(25)	(19)	(6)	-	-					
	Department of Commerce		214	214	-	-	-					
	Office of Business Economics	Tranfer from Army	(214)	(214)	-	-	-					
	Department of Housing and Urban Development		31	-	12	13	6					
		Direct	(24)	-	(5)	(13)	(6)					
		Transfer from Army	(7)	-	(7)	-	-					
	Federal Power Commission		73	24	22	20	7					
	Bureau of Power	Direct	(73)	(24)	(22)	(20)	(7)					
	TOTAL PROGRAM		4553	2207	1033	941	372					
II	TOTAL APPROPRIATION REQUIRED											
	Department of Agriculture		1172	756	205	151	60					
	Department of the Army		2338	1040	530	522	246					
	Department of the Interior		678	230	211	200	37					
	Department of Health, Education and Welfare		268	157	60	35	16					
	Department of Housing and Urban Development		24	-	5	13	6					
	Federal Power Commission		73	24	22	20	7					
	TOTAL APPROPRIATIONS		4553	2207	1033	941	372					

* Direct funds in this column are: (1) Agriculture--estimated obligations; (2) Army-appropriations; (3) Interior-allocations; (4) HEW - allocations; (5) HUD - allocations; and (6) Federal Power Commission - allocations

simplified for the member agencies their budgeting and justification procedure.

The study cost estimates on which the budget submissions were based varied throughout the period of study. Table A-4 shows the total estimated cost and its distribution to departments for three estimates: one made in 1964 prior to initiation of the study; the first fully coordinated estimate in 1967; and the actual funds expended. Table A-5 shows the distribution of the study total with time as envisioned in 1964, in 1967 and how it actually occurred.

DATA SOURCES

The various sources of information used in the data gathering process of the Study were threefold; existing completed (published or unpublished) studies, on-going or already proposed studies, and special studies. The existing (historic) information available through the agencies involved in the Study had to be reformulated to fit into the multiple-objective approach of the NAR Study. Some of the efforts were unsuccessful, but for the most part the existing material was capable of reformulation. Changes in the ongoing or proposed studies were markedly more successful.

Of particular importance, however, was the column of material generated through special studies made, or contracted for, by the responsible agencies to fill existing gaps in information and to accumulate a volume of material of new and/or old needs not previously studied. These studies and the guidelines by which they were conducted form an important information base for future studies.

SPECIAL WORK GROUPS, TASK FORCES, COMMITTEES ETC.

Interdepartmental Staff Committee, ad hoc Water Resources Council. This committee is not a part of the North Atlantic Regional Water Resources Study itself, but is important inasmuch as its interdepartmental subcommittee prepared the guidelines for framework (Type I) studies under which the NAR Study was conducted. These guidelines were presented in a letter dated June 10, 1965, and can be found in the volume Plan Of Study. The membership of this Committee was as follows:

Mr. Henry P. Caulfield	Chairman	Department of the Interior
Mr. James J. Flannery		Department of Health, Education and Welfare
Mr. George E. Tomlinson		Federal Power Commission
Mr. Hollis R. Williams		Department of Agriculture
Brig. Gen. H. C. Woodbury, Jr., USA		Department of the Army

TABLE A-4

COMPARISON OF STUDY COST

I	PROGRAM	METHOD OF FINANCING	ESTIMATE NOV 1964	ESTIMATE JUNE 1966	ACTUAL EXPENDITURES
	Program				
	Department of Agriculture		1,060,000	1,132,000	1,223,000
	Soil Conservation Service	Direct	(760,000)	(810,000)	(875,000)
	Forest Service	Direct	(100,000)	(108,000)	(118,000)
	Economic Research Service	Direct	(200,000)	(214,000)	(230,000)
	Department of the Army		1,600,000	1,675,000	1,988,000
	Corps of Engineers	Direct	(1,600,000)	(1,675,000)	(1,988,000)
	Department of Commerce	Transfer from Army			45,000
	Department of the Interior		421,000 (1)	1,216,000	1,149,000
	Mines	Transfer from Army		(72,000)	(79,000)
	Outdoor Recreation	Direct	(21,000)	(23,000)	(19,000)
		Transfer from Army		(87,000)	(101,000)
	Sport Fisheries & Wildlife	Transfer from Army		(109,000)	(117,000)
	Geological Survey	Transfer from Army		(104,000)	(107,000)
	National Park Service	Transfer from Army		(49,000)	(49,000)
	Federal Water Pollution Control Administration	Direct		(772,000)	(571,000)
		Transfer from Public Health Service			(106,000)
	Department of Health, Education and Welfare		750,000		183,000
	Public Health Service	Direct	(750,000)		(158,000)
		Transfer from Army			(25,000)
	Department of Housing and Urban Development				21,000
		Direct			(14,000)
		Transfer from Army			(7,000)
	Federal Power Commission			76,000	74,000
	Bureau of Power	Direct		(76,000)	(74,000)
	TOTAL PROGRAM		3,831,000	4,099,000	4,683,000
II	Appropriations:				
	Department of Agriculture		1,060,000	1,132,000	1,223,000 (2)
	Department of the Army		2,000,000	2,096,000	2,518,000
	Department of the Interior		21,000	795,000	590,000
	Department of H.E.W.		750,000		264,000
	Department of H.U.D.				14,000
	Federal Power Commission			76,000	74,000
	TOTAL APPROPRIATIONS		3,831,000	4,099,000	4,683,000

(1) $400,000 Transfer from Army
(2) Includes $40,000 transfered from other studies.

TABLE A-5

ANNUAL DISTRIBUTION OF STUDY EXPENDITURES

Fiscal Year	Estimate Nov 1964	Estimate June 1966	Actual
1966	227,000	213,000	203,500
1967	770,000	906,000	901,000
1968	1,030,000	1,201,000	1,079,500
1969	920,000	1,012,000	881,000
1970	744,000	767,000	809,000
1971	140,000	--	428,500
1972	--	--	380,500
TOTAL	3,831,000	4,099,000	4,683,000

ad hoc Plan of Study Subcommittee. This Subcommittee was organized when the Coordinating Committee met for the first time in 1966. It was formed to examine the planning effort and produce a comprehensive guide for study action. This group, whose membership is listed below, generated the first Plan of Study for the second Coordinating Committee meeting. The Plan of Study was a document specifying a time profile of events concerning three major tasks; economic studies, plan formulation, and the Final Report with complementing appendices. The Plan of Study was amended at the third meeting and was then adopted, subject to the addition of agency work plans, which were included in the final package for distribution. The members of the ad hoc Plan of Study Subcommittee were as follows:

Mr. Burnham H. Dodge	Chairman	Corps of Engineers
Mr. Mark Abelson		Department of the Interior
Mr. James H. McDermott		Department of Health, Education and Welfare
Mr. C. L. Overstreet		Department of Agriculture
Mr. John H. Spellman		Federal Power Commission
Mr. Nicholas L. Barbarossa		New York
Mr. James J. O'Donnell		Maryland
Mr. William S. Wise		Connecticut

National Assessment Task Force. This group was formed at the fourth meeting of the Coordinating Committee to prepare the North Atlantic regional portion of the Water Resources Council's 1967 National Assessment of Water and Related Land Resources. The task force was made up of three Federal and three state members. The assessment was drawn up by the task force and then sent to the Coordinating Committee members for comments. The report was then forwarded to the Water Resources Council on behalf of the Coordinating Committee. The membership of the National assessment Task Force was as follows:

Mr. Mark Abelson	Department of the Interior
Mr. Robert Martin	Department of Agriculture
Mr. Harry E. Schwarz	Department of the Army
Mr. Reinhold Thieme	Vermont
Mr. Marshall S. Goulding	Pennsylvania
Mr. Herbert M. Sachs	Maryland
Mr. Robert M. August	Maryland

ad hoc Work Group on Plan Formulation. The work group was made up of one or more members from each of the Federal agencies, states, and interstate river basin commissions involved in the Study. Work group meetings were held throughout the Study in as many locations of the Region as was necessary to assure complete coordination of effort between all Study participants. Plan formulation itself was carried out in three stages.

TABLE A-6

PLAN FORMULATION WORK GROUP MEETINGS

Meeting No.*	Date	Place	
1	**10/30/68**	New York, N.Y.	Stage One
2	**12/10/68**	New York, N.Y.	
3	**1/06-08/69**	Boston, Mass.	
4	**1/13-15/69**	Boston, Mass.	
5	**1/20-22/69**	Boston, Mass.	
6	**2/03-06/69**	Albany, N.Y.	
7	**2/17-20/69**	Philadelphia, Pa.	
8	**3/10-12/69**	Harrisburg, Pa.	
9	**3/24-26/69**	Arlington, Va.	
10	**4/07-09/69**	New York, N.Y.	
11	**1/08/70**	New York, N.Y.	Stage Two
12	**8/05,06/70**	New York, N.Y.	
13	10/20,21/70	Augusta, Me.	Stage Three
14	10/26,27/70	Richmond, Va.	
15	11/12,13/70	Boston, Mass.	
16	11/17,18/70	Albany, N.Y.	
17	11/24,25/70	Harrisburg, Pa.	
18	12/01,02/70	Baltimore, Md.	
19	12/07/71	New York, N.Y.	
20	3/30/71	Newark, N.J.	
21	12/07/71	New York, N.Y.	

*These were Regional or Sub-Regional meetings. Special state meetings were also held 5-16 Oct. 1970.

The work group, chaired by the representative from the Corps of Engineers, North Atlantic Division, did not maintain the same membership throughout. The various agencies sent a wide variety of representatives to the meetings thus taking advantage of their knowledge in the vast number of fields connected with water and related land resources development. Table A-6 lists the Plan Fromulation Meetings.

Public Affairs Subcommittee. An ad hoc Public Relations Subcommittee was formed after the second Coordinating Committee Meeting and made permanent as the Public Affairs Subcommittee, complete with work plan and charter, at the fourth meeting. Its membership was made up of three Federal and three state representatives as listed below. The Subcommittee was redesignated after the June, 1969, Coordinating Committee meeting as the ad hoc Public Affairs Subcommittee, the membership of which is also listed below.

Coordinating Committee
Public Affairs Subcommittee

Jared Miller	Department of the Army
Bernard A. Roth	Department of Agriculture
Arthur T. Doyle (Succeeded by)	Department of Commerce
Charles E. Fogg	Department of Commerce
William E. MacDonald	Maine
John Hirsch	New York
Carl J. Johnson	INCOPOT

Coordinating Committee
Redesignated ad hoc Public Affairs Subcommittee

Col. Allen P. Richmond	Department of the Army
Mr. Mark Abelson	Department of the Interior
Mr. Richard W. Akeley	Department of Agriculture
Mr. C. H. McConnell	State of Pennsylvania
Mr. F. W. Montanari	State of New York

AGENCY STAFFS

This study is the product of the labor of a large number of individuals that participated in various capacities, at different times and to different degrees of involvement. The work of all that contributed to the NAR Study is acknowledged here. Listed by department or state are those whose names were submitted by the various contributing offices.

Agency & Name	Disciplines	Date

Department of the Army, Corps of Engineers

Planning Division, North Atlantic Division (NAD)

Burnham Dodge	Supervisory Civil Engineer	66-69
Herbert Howard	Supervisory Civil Engineer	68-72
John Wrocklage	Supervisory Civil Engineer	66-72

NAR Group, NAD

Major Professional Contributors

Lawrence Brown	Civil Engineer	66-72
Robert Callegari	Regional Economist	70-72
Thomas J. Carney, Cpt	Oceanographer	69-71
Frank Fabozzi	Regional Economist	69-71
Eugene T. Fleming, Jr.	Supervisory Civil Engineer	66-72
John E. Frost, Jr.	Social Scientist	68-72
Samuel Gofseyeff	Supervisory Civil Engineer	66-69
Robert A. Hahn, 1 Lt.	Civil Engineer	71-72
Thornton M. Henry, Cpt	Lawyer	70-72
Alexander Katz	Administrative Officer	69-72
Onell Leon-Pasarell	Civil Engineer	69-72
Philip Levine	Regional Economist	69-72
Lawrence F. Levy, 1 Lt.	Environmental Engineer	70-72
Anthony Maggi	Engineering Technician	66-72
David Major	Regional Economist	66-72
Alan Marder	Civil Engineer	70-72
Jared Miller	Technical Writer-Editor	66-72
Kyle Schilling	Civil Engineer	69-71
Harry E. Schwarz	Supervisory Civil Engineer	66-72
Peter Shaw	Regional Economist	68-72
Ira Silver	Regional Economist	68-72
Eugene Stakhiv	Oceanographer	69-72
Neil Stuart	Civil Engineer	72
Stanley Wechsler	Sanitary Engineer	66-71
Pearl Willing	Regional Economist	66-72

Administrative and Minor Contributors

Lee K. Azzara	Administrative Assistant	69-72
Nancy Barretti	Clerk-Stenographer	66-68
Kathy Bennett	Student Aid	69
Angela Bianco	Secretary	66-70
Colen Bradford	Regional Economist	69
Walter E. Butler	Civil Engineer	69-71
Water Campbell	Clerk	67-72

Agency & Name (Cont'd)	Disciplines	Date
NAR Group, NAD		
Administrative and Minor Contributors (Cont'd)		
Elizabeth Clerkin	Engineering Aide	68-69
Allen Cohen	Economic Assistant	67
Richard DuBriske	Engineering Aide	68
Angela Flack	Student Aid	70-72
Agatha Foard	Secretary	72
Delores Foster	Clerk-Stenographer	71-72
William R.D.Froehlich, Col	Civil Engineer	70-72
Mary Johnson	Student Aid	68
Elisabeth Jones	Secretary	70-71
Spencer Joyner	Land Architect	71-72
David Kenyon, Cpt	Agricultural Engineer	72
Cathy Landis	Student Aid	70
Alan Litwin	Engineering Aid	67
Henry Marin	Student Aid	67
Patricia Miller	Clerk-Stenographer	70-72
Fay Moore	Clerk	
Georgia Oatis	Clerk-Typist	69-71
Richard Palchik	Physical Science Aid	67
Joseph Priday	Engineering Aid	69
David Shapiro	Engineering Aid	69
Peter Sucher	Engineering Aid	69
Kenneth Y. Sugita, Cpt	Lawyer	69
Loretta Williams	Student Aid	68
Elsie Yurchuk	Secretary	66-71
Peter S. Zell	Regional Economist	68
Baltimore District, NAD		
Stanley C. Fong	Supervisory Civil Engineer	66-68
Harold L. Nelson	Supervisory Civil Engineer	67
Thomas P. Whelley, Jr.	Supervisory Civil Engineer	67
James J. Guerrini	Hydrologic Technician	66-67
Kenneth E. Hartzell	Civil Engineering Technician	67
Andrew Matuskey	Civil Engineering Technician	66-67
Robert Plott	Civil Engineering Technician	66-67
New England Division		
Carmine N. Ciriello	Civil Engineer	68-71
Joseph L. Ignazio	Supervisory Civil Engineer	66-72
Buffalo District, NCD		
Robert B. McKee	Supervisory Civil Engineer	66-71

Agency & Name (Cont'd)	Disciplines	Date
Department of Agriculture		
Economic Research Service		
Staff		
P. Thomas Cox	Agricultural Economist	67-72
Wayne Ehlers	Agricultural Economist	66-67
Adrian Haught	Agricultural Economist	66-71
Robert Martin	Agricultural Economist	66-68
Office and Other Personnel		
Ellen Balch	Clerk-Typist	66-68
Cecilia Etzler	Secretary	66-72
John Green	Agricultural Economist	68-71
Thelma Marx	Clerk-Typist	70-71
Nan Mitchner	Statistical Clerk	66-68
Forest Service		
Staff		
Frank E. Casanova	Forester	65-72
Richard Kere	Forester	67
Robert Lindahl	Forester	66-67
Frank J. Paradise	Forester	65-67
Roger W. Rich	Forester	67-70
Soil Conservation Service		
Staff		
Richard W. Akeley	Supervisory Soil Conservationist	67-72
Arthur Flickinger	Supervisory Soil Conservationist	66-72
C.L. Overstreet	Supervisory Soil Conservationist	66-67
Claude Price	Supervisory Soil Conservationist	66-72
Selden L. Tinsley	Supervisory Soil Conservationist	66-67
Thomas Anderson	Engineering Technician	67-72
Richard Fisher	Civil Engineer	66-68
Norman Miller	Civil Engineer	66-69
John Schmidt	Soil Conservationist	67-72

Agency & Name (Cont'd)	Disciplines	Date
Department of Agriculture		
Soil Conservation Service (Cont'd)		
Office and Other Personnel		
Grace Best	Secretary	66-71
Duncan Campbell	Agricultural Economist	69-70
Ronald Page	Geologist	70
Helen Refi	Clerk	68-71
Clifford Waters	Soil Conservationist	69-70
Department of Commerce		
Office of Business Economics		
Henry de Graff	Economist	66-72
Robert Graham	Economist	66-72
Department of Interior		
Bureau of Mines		
Stanley A. Feitler	Supervisory Physical Scientist	66-72
John W. Hartwell	Mining Engineer	66-68
William A. Hayes, Jr.	Cartographic Technician	66-72
Joseph Krickich	Mineral Specialist	66-72
C. Gordon Leaf	Geologist	66-72
Lawrence Y. Marks	Geologist	66-68
Robert W. Stephan	Chemical Engineer	68-69
James L. Vallely	Mining Engineer	70
Bureau of Outdoor Recreation		
Kenneth R. Compton	Outdoor Recreation Planner	66-70
Joseph Toland	Outdoor Recreation Planner	70-72
Bureau of Sport Fisheries and Wildlife		
Bruce Birnhak	Fish and Wildlife Biologist	68-71
David Crestin	Marine Biologist	71-72
Ralph Schmidt	Fish and Wildlife Biologist	66-71
Geological Survey		
John A. Baker	Hydrologist	66-72
D. John Cederstrom	Hydrologist	66-72
George R. Tarver	Hydrologist	66-72
National Park Service		
David A. Kimball	Chief, Federal, State and Private Assistance	69-72

Agency & Name (Cont'd)	Disciplines	Date
Environmental Protection Agency		
Water Programs Office		
John Conlon	Sanitary Engineer	66-70
Merrill S. Hohman	Program Planning Director	66-70
Greene A. Jones	Sanitary Engineer	66-70
William J. Librizzi	Civil Engineer	66-70
John Ulshoefer	Natural Resource Specialist	66-72
Richard V. Watkins	Sanitary Engineer	66-70
John W. Witkowski	Civil Engineer	66-70
Public Health Service		
Thomas L. Lothrop	Water Supply Consultant	68-72
Everett L. MacLeman	Chief, Water Supply Branch	68-72
Federal Power Commission		
Martin Inwald	Civil Engineer	66-72
Lazur B. Woll	Engineeer-in-charge, Electrical	66
Commonwealth of Massachusetts		
Water Resources Commission		
Charles F. Kennedy	Director and Chief Engineer	
Emerson H. Chandler	Resource Planner	
State of Rhode Island and Providence Plantation		
Rhode Island Water Resources Board		
Peter P. Calise	Principal Planner	
Henry F. Munroe	Staff Director	
William I. McDonald	General Manager	
Professor Alonzo W. Quinn	Vice Chairman, WRB	
Robert B. Russ	General Manager	
State of New York		
Department of Health		
John C. Bumstead		
Office of Planning Services		
Charles L. Crangle		

Agency & Name (Cont'd)	Disciplines	Date
State of New York (Cont'd)		
Department of Commerce		
Leonard R. Pritchard		
Office of Parks and Recreation		
Ivan Vamos		
Department of Environmental Conservation		
Frank S. Davenport		
Paul Eastman		
Albert G. Hall		
Albert Jensen		
Edward Karath		
Frank M. LaBar		
James O. Preston		
Randolph Stelle		
Donald Stevens		
Allan C. Tedrow		
Ricardo Vargas		
David H. Wallace		
Irving E. Wolpert		
State of New Jersey		
Department of Environmental Protection		
Division of Water Resources		
Robert E. Cyphers	Bureau Chief	
Donald J. Kroeck	Supervising Engineer	
Haig Kasabach	Supervising Geologist	
Kemble Widmer	Bureau Chief	
Joseph Miller	Principal Geologist	
Ernest Segesser	Assistant Director	
Chris Hofman	Supervising Engineer	
Douglas Clark	Supervising Engineer	
Robert Vincent	Bureau Chief	
Sam Giallella	Supervising Engineer	
Richard Bellis	Supervising Engineer	
John Wilford	Bureau Chief	
Division of Parks		
Joseph Truncer	Director	
Frank Rigg	Bureau Chief	
Alfred A. Guido	Assistant to the Commissioner	

Agency & Name (Cont'd)	Disciplines	Date
State of New Jersey (Cont'd)		
Division of Fish and Game		
Lester G. MacNamara	Director	
Russell A. Cookingham	Director	
A. Bruce Pyle	Assistant Bureau Chief	
George Alpaugh	Bureau Chief	
Robert Hayford	Bureau Chief	
Dr. Hoskins	Professor of Zoology (Rutgers)	
Division of Marine Services		
Richard Goodenough	Director	
James Rankin	Bureau Chief	
Commonwealth of Pennsylvania		
Department of Agriculture		
Halferd W. Wertz, II	Plant Pathologist	71-72
Department of Commerce		
Frank Schrey, III	Resources Analyst	68-72
Department of Community Affairs		
John R. Rosso	Civil Engineer	68-72
Department of Environmental Resources		
Engineering & Construction		
V. M. Beard	Hydraulic Engineer	66-72
W. N. Frazier	Hydraulic Engineer	69-72
Marshall S. Goulding	Hydraulic Engineer	66-69
John E. McSparran	Hydraulic Engineer	67-71
Environmental Protection & Regulation		
Richard M. Boardman	Sanitary Engineer	68-72
Theodore P. Clista	Sanitary Engineer	68-72
Joseph Smurda	Sanitary Engineer	68-72
Carlyle Westlund	Geologist	68-72

Agency & Name (Cont'd)	Disciplines	Date
Commonwealth of Pennsylvania (Cont'd)		
Department of Environmental Resources		
Resource Management		
George Fogg	Landscape Architect	68-72
C. Victor Funk	Watershed Specialist	69-72
Walter Peechatka	Soil & Water Director	69-72
Kenneth F. Reed	Forester	68-72
James Tabor	Planning Analyst	68-72
Cyrus Yoakam	Landscape Architect	68-72
Topographic & Geologic Survey		
Alan R. Geyer	Geologist	68-72
Arthur A. Socolow	State Geologist	68-72
Department of Transportation		
Harold H. Huber	Highway Engineer	68-72
Office of State Planning & Development		
Ellis W. Harned	Planning Analyst	68-72
George Burns	Planning Analyst	68-72
Pennsylvania Fish Commission		
Gordan Trimbley	Fisheries Biologist	68-72
Pennsylvania Game Commission		
Nicholas Vukovich	Resources Planner	68-72
Pennsylvania Utility Commission		
John B. Hetzel, Jr.	Civil Engineer	70-72
State of Delaware		
Department of Natural Resources and Environmental Control		
John C. Bryson		
N. C. Vasuki		
John M. Karanik		
B. E. Lane		
Robert D. Henry		

Agency & Name (Cont'd)	Disciplines	Date
State of Maryland		
Department of Natural Resources		
Anthony F. Abar	Natural Resources Planner	69-72
Department of Water Resources		
Herbert M. Sachs	Natural Resources Planner	66-69
Department of State Planning		
Robert M. August	Natural Resources Planner	66-69
Roy G. Metzgar	Natural Resources Planner	69-72
Commonwealth of Virginia		
Roy L. Brown		
Government of the District of Columbia		
Department of Environmental Services		
Paul W. Reed	Sanitary Engineer	67-72
Arnold Speiser	Sanitary Engineer	70-72
New England River Basin Commission		
David Burack		

CONTRACTORS

Several private forms and individuals contributed their efforts to this Study as listed below.

Research Planning and Design Associates, Amherst, Mass.
"Study of Visual and Cultural Environment for North Atlantic Region"
An inventory and evaluation of environmental landscapes and cultural patterns in the NAR and preparation of a program showing alternative procedures for developing these patterns. Published as Appendix N.

Cornell University, Ithaca, N.Y.
"Estimation and Projection of Industrial Water Use in NAR"
Estimation of present and future water use and returns for all industries in the NAR that use over 20 mg per year.

Regional Plan Association, New York, N.Y.
"Present and Projected Urban Development and Land Use for NAR"
Inventory of present projections of future urban land uses in the NAR based upon three separate objectives and an economic analysis.

The Travelers Research Corporation, Hartford, Conn. (now Center for Environment and Man)
"Study of Coastal and Estuarine Areas of NAR"
Identification and evaluation of coastal problems and possible solutions of the NAR including those problems and solutions which are critical, management related and research related. Published as Appendix U.

Peter S. Eagleson, Consulting Hydraulic Engineer, MIT.
Development of a mathematical model of water withdrawal demands based on demographic and economic parameters.

Meta Systems, Inc., Cambridge, Mass.
Development of a linear programming model of water supply allocating water demand to various water sources on the basis of least cost.

Ralph M. Field, Planning Consultant, N.Y., N.Y.
"Alternatives in Urban Development in the NAR"
Preparation of a report on alternative urban development patterns likely to occur in the NAr and an analysis of urban-related water resource problems.

PUBLICATIONS

Throughout the Study a steady stream of information flowed from the staff to the members of the Coordinating Committee, the Board of Consultants, the participating Federal and state agencies and interested parties. The vehicle of communication was Memorandums to Coordinating Committee, a series of publications transmitting both routine information and major work items. Table A-7 shows the number of such memoranda issued. The major publications emanating from this Study are the main Report, and its Annexes and Appendices. Table A-8 presents an abbreviated chronology of the issue of major publications and a list and short description of them in contained in Table A-9.

TABLE A-7

MEMORANDUM OF THE COORDINATING COMMITTEE

Time Period	No. of Memoranda
Feb. 66 - June 66	8
July 66 - June 67	37
July 67 - June 68	37
July 68 - June 69	28
July 69 - June 70	21
July 70 - June 71	33
July 71 - June 72	

TABLE A-8

LIST OF NAR WATER RESOURCES REPORTS DISTRIBUTED TO THE MEMBERS OF THE COORDINATING COMMITTEE

Report	Status	Prepared by	Date Prepared
Plan of Study	Final Draft	Corps of Engrs	Oct 1966
Appendix B - Economic Base	First Draft	Dept of Comm. Corps of Engrs	June 1967
Bibliography of Water Resources	Preliminary	U.S. Geological Survey	Aug 1967
Summary of Meteorologic and Hydrologic Basic Data	Preliminary	NAR Group	Oct 1967
Health Guidelines on Solid Waste Disposal	Preliminary	Public Health Service	Oct 1967
Health Guidelines on Recreation Area Development Vector Control	Preliminary	Public Health Service	Nov 1967
Study of Visual and Cultural Environment (Vol I)	Preliminary	Research Plan and Design Associates	Nov 1967
Health Guidelines for Water Resources Management	Preliminary	Public Health Service	Jan 1968
Land Use and Water Area	Preliminary	Department of Agriculture	Jan 1968
Appendix B - Economic Base	Final Draft	Dept of Comm. Corps of Engrs	May 1968
Appendix I - Irrigation	Preliminary	Department of Agriculture	May 1968
Health Guidelines on Water Quality Criteria for Shellfish Growing and Harvesting Water and for Agricultural Use	Preliminary	Public Health Service	May 1968
Appendix B - Economic Base (Part II)	Preliminary	Corps of Engrs	Aug 1968

TABLE A-8 (Cont'd)

LIST OF NAR WATER RESOURCES REPORTS DISTRIBUTED TO THE MEMBERS OF THE COORDINATING COMMITTEE

Report	Status	Prepared by	Date Prepared
Rural Domestic & Livestock Water Requirements	Preliminary	Department of Agriculture	Dec 1968
Study of Visual and Cultural Environment (Vol II)	Preliminary	Research Plan and Design Associates	Jan 1969
Study of Present and Projected Urban Development and Land Use in the North Atlantic Region	Preliminary	Regional Plan Association	Mar 1969
Appendix Q - Erosion & Sedimentation	First Draft	Department of Agriculture	Apr 1969
Health Aspects - Vector Control	Preliminary	Public Health Service	July 1969
Agricultural Land Drainage	Preliminary	Department of Agriculture	Aug 1969
Effects of Recreational Developments on Rural Income	Preliminary	Department of Agriculture	Nov 1969
Aspects of Coastal Resource Management Problems	Preliminary	Travelers Research Corp.	Jan 1970
Ground Water in the North Atlantic Region	Preliminary	U.S. Geological Survey	Mar 1970
Status of Fish and Wildlife Resources and Their Uses	Preliminary	Fish and Wildlife Service	Mar 1970
The Cost of Ground Water	Preliminary	U.S. Geological Survey	Apr 1970
Appendix G - Land Use and Management	Preliminary	Department of Agriculture	June 1970
Agricultural Pollutants	Preliminary	Department of Agriculture	July 1970

TABLE A-8 (Cont'd)

LIST OF NAR WATER RESOURCES REPORTS DISTRIBUTED TO THE MEMBERS OF THE COORDINATING COMMITTEE

Report	Status	Prepared by	Date Prepared
Appendix I - Irrigation	Final Draft	Department of Agriculture	Aug 1970
Appendix N - Visual and Cultural Environment	Final Draft	Research Plan and Design Associates	Nov 1970
Study of Alternatives in Urban Development in the North Atlantic Region	Preliminary	Ralph M. Field	Dec 1970
Appendix F - Upstream Flood Prevention and Water Management	First Draft	Department of Agriculture	Jan 1971
Appendix U - Coastal and Estuarine Areas	First Draft	Ctr Environment and Man, Inc.	Jan 1971
Appendix V - Health Aspects	First Draft	Environmental Protect. Agency	Feb 1971
Appendix P - Power	First Draft	Fed Power Comm	Feb 1971
Appendix H - Minerals	First Draft	Bureau of Mines	Feb 1971
Appendix Q - Erosion and Sedimentation	Final Draft	Department of Agriculture	Mar 1971
Appendix M - Outdoor Recreation	First Draft	Bureau of Outdoor Recreation	Mar 1971
Appendix D - Geology and Ground Water	Final Draft	U.S. Geological Survey	Mar 1971
Appendix B - Economic Base	Final Draft (Rev Mar 71)	Department of Commerce Corps of Engrs	Mar 1971
Appendix Q - Erosion and Sedimentation	Final Draft	Department of Agriculture	Mar 1971

TABLE A-8 (Cont'd)

LIST OF NAR WATER RESOURCES REPORTS DISTRIBUTED TO THE MEMBERS OF THE COORDINATING COMMITTEE

Report	Status	Prepared by	Date Prepared
Appendix G - Land Use and Management	Final Draft	Department of Agriculture	Apr 1971
Appendix J - Land Drainage	Final Draft	Corps of Engrs Department of Agriculture	Apr 1971
Appendix O - Fish and Wildlife	First Draft	Bur of Sport Fish and Wild-life	Apr 1971
Appendix L - Water Quality and Pollution	First Draft	Environmental Protect Agency	May 1971
Appendix S - Legal and Institutional Environment	First Draft	Corps of Engrs States and D.C.	June 1971
Appendix K - Navigation	First Draft	Corps of Engrs	Sep 1971
Appendix A - History of Study	Draft	Corps of Engrs	Feb 1972
Appendix C - Climate, Meteorology and Hydrology	Draft	Corps of Engrs	Feb 1972
Appendix E - Flood Damage Reduction and Water Management for Major Rivers and Coastal Areas	Draft	Corps of Engrs	Feb 1972
Appendix R - Water Supply	Draft	Corps of Engrs	Feb 1972
Appendix T - Plan Formulation	Draft	Corps of Engrs	Feb 1972
Report	Draft	Corps of Engrs	Feb 1972
Annex 1 to Report	Draft	Corps of Engrs	Feb 1972

TABLE A-8 (Cont'd)

LIST OF NAR WATER RESOURCES REPORTS DISTRIBUTED
TO THE MEMBERS OF THE COORDINATING COMMITTEE

Report	Status	Prepared by	Date Prepared
Annex 2 to Report	Draft	Corps of Engrs	Feb 1972
Draft Environmental Impact Statement	Draft	Corps of Engrs	June 1972

TABLE A-9

MAJOR REPORTS

Appendix	Title	Descriptions
	Plan of Study	Background of Study; Guidelines and Terms of Reference; coordination and procedure outlines; work plans and packages for Appendicies; completed studies; annotated outlines and activities sequence diagrams for the appendicies.
A	History of Study	Pertinent events prior to the authorization of Study; authority; objective organization; conduct of Study; coordination; meetings digest; and public relations.
B	Economic Base	Nature of projections, national projections of summary aggregates; industrial composition of industry projections; regional projections; OBE economic areas-measures of output; and economic and demographic information, historical and projected, for specified areas.
C	Climate, Meteorology, Hydrology	Temperature, rainfall, snowfall and stream flow data; hydrologic summary; discharges and duration of major floods; rainfall deficiencies and flows during major droughts; runoff records, low flow frequency; yield-storage relationship; and flood frequency.
D	Geology and Groundwater	Relationships of ground water to surface water; groundwater in coastal plain deposits, in consolidated rocks, and from glacial deposits; artificial recharge of groundwater; recharge per square mile and water availability; use of ground storage; and the cost of ground water.
E	Flood Damage Reduction	Flood damage data; Flood plain use; Future Flood plain use; Regional Trend in flood plain use; passive

TABLE A-9 (Cont'd)

MAJOR REPORTS

Appendix	Title	Descriptions
		flood control measures; future flood control needs; reservoirs costs data; low flow augmentation costs; storage effect on flood reduction; flood reduction local protection costs and control of water-related disease vector transmission.
F	Upstream Flood Prevention	Average annual flood damage; damage projections; extent and timing of structural flood prevention measures; flood plain management; Regional and subregional summaries of present status problems and needs, and means to satisfy needs of flooding and management.
G	Land Use and Management	Regional Base; land use, competition for land use; urbanization processes and trends; evaluation of urban development trends; evolution of social and cultural values; development possibilities for future urban growth; agriculture and forestry in the Region's economy; land management problems and needs; urban land needs; land for food and fiber needs: Means to satisfy needs; land and institutional services for conclusions; guiding urban growth and land development conclusions; and subregional summaries.
H	Minerals	Importance of the mineral industry to the economy of the Region; relation of operations to water; and a description of mineral resources in the Region.
I	Irrigation	Methodology and assumptions; present status; future demands; means to satisfy demands; needed research; conclusions; and sub-regional summaries of trends, sources and methods of distribution, irrigation

TABLE A-9 (Cont'd)

MAJOR REPORTS

Appendix	Title	Descriptions
		water requirements and irrigable land.
J	Land Drainage	Basic concepts; plant environment; soil with excess water for agricultural use; agriculture wetland adequately treated; flood crop and timber production; drainage design criteria and measures, effects of drainage; agricultural land, including forest, drainage summaries; and major drainage projects.
K	Navigation	Methodology-commercial navigation and recreational boating; technology assessment-marine craft, vessels and ships; Regional summary of land transportation, waterways, waterborne commerce and recreational boating; and sub-regional and Area summaries.
L	Water Quality and Pollution	General description of water quality; sub-region summaries of the economy; present and future water uses; sources of water quality problems; pollution control alternatives, and pollution control progress.
M	Outdoor Recreation	Methodology and Assumptions; Regional summary of the present status, future demands, means to satisfy those demands and conclusions, and sub-regional summaries of needs and means to satisfy those needs. Inspected seven recreation activities - swimming, sailing, waterskiing, picknicking, camping, canoeing and boating.
N	Visual and Cultural	Cultural values; landscapes analysis; visual and cultural needs; landscape planning and management; planning framework; devices - legal, physical and non-physical; and basin

TABLE A-9 (Cont'd)

MAJOR REPORTS

Appendix	Title	Descriptions
		summaries.
O	Fish & Wildlife	Status of wildlife and fishing resource; rare and endangered species; sport fishing and hunting demand and problems; fish and wildlife conservation and development plan; subregional and Area summaries for sport fisheries, commercial fisheries, wildlife, and rare and endangered species; and cost and benefit estimates.
P	Power	Description of power market areas; power market requirements; utility power supply for market; potential hydroelectric power in the Study Region; thermal power; future generating capacity; and water requirements for thermal generation.
Q	Erosion and Sedimentation	Regional summary of present status; future problems to problem solution and sub-regional summaries of existing conditions, predicted rates and problem Areas.
R	Water Supply	Inventory of present municipal, industrial and centralized rural-domestic water use; future water demand; needs; means to satisfy needs; inventory of existing, authorized planned and considered projects; drinking water standards; and food-processing water supply standards.
S	Legal and Institutional Environment	Federal laws, policies and programs state laws, policies and programs; and interstate-federal cooperative bodies.
T	Plan Formulation	Summaries of the stages of the development of Plan Formulation; computer supply and demand models.

TABLE A-9 (Cont'd)

MAJOR REPORTS

Appendix	Title	Descriptions
U	Coastal & Estuarine Areas	History of coastal and estuarine problems Regional summary of general status, shore erosion, major storms, and methods to satisfy those needs, and sub-regional analyses with a summary and conclusions.
V	Health Aspects	Epidemiological assessment; health aspects of water supply; vector control; environmental health analyses; and health guidelines for water resources and related land use management.
	Main Report	Summary of Study information; background material physical and economical Regional description; status report on available and projected water and land resources development and availability; list of problems and needs of Region with alternative plans for their solution; discussion of alternative plans with conclusions and a description of steps to implement those plans; recommended regional program.
	Annex 1 - Area Summaries	Area descriptions; possible alternative planning objectives; recommended mixed objectives; needs; devices; benefits; costs; alternative programs; tables of needs, devices, costs and interactions.
	Annex 2 - State Summaries	State descriptions; largest needs; fastest growing needs; most important needs; costs; benefits; similar to Area Summaries.

PUBLIC RELATIONS AND COORDINATION

From the outset of the North Atlantic Regional Water Resources Study it was deemed essential that the citizens in the North Atlantic Region, primarily through political representatives and interest groups, be involved in the planning and decision-making processes for the development of water and related resources in the Region. No perfect way was found to accomplish that goal, but the Study made use of information bulletins, and press, radio and television releases throughout the Study. The Coordinating Committee Meetings were public and were widely announced.

The initial information effort was a brochure entitled the "North Atlantic Regional Framework Study of Water and Related Land Resources," which was assembled from available data of the North Atlantic Region and published for the first Coordinating Committee meeting in January, 1966. Pursuant to recommendations made at the second Coordinating Committee meeting an ad hoc Public Relations Subcommittee was formed. That subcommittee recommended at the third Coordinating Committee meeting that a permanent committee be established and that the present group would submit a proposed charter and work plan. It was also decided at that meeting that groups not represented by membership on the Coordinating Committee would channel their inputs to the Study through the appropriate state or Federal agency members. The Public Affairs Subcommittee was made permanent at the fourth Coordinating Committee meeting and the membership was established at six members, made up of three state representatives and three from Federal agencies.

The second information publication entitled "Water and Related Land Resources in the North Atlantic Region" was distributed in 1967. This publication stressed the coordination of the partners in the Study in a brief description of the Study. This brochure was distributed at the fifth Coordinating Committee meeting in September.

At the eighth meeting of the Coordinating Committee it was stressed that a carefully organized program for public participation on various levels, including time schedules, funds, and lists of participants, be prepared as soon as possible. Experienced personnel from the various agencies were asked to aid in this effort and were requested to supply complete mailing lists.

By the ninth meeting of the Coordinating Committee the Public Affairs Subcommittee was experiencing communication problems of its own, and because of the difficulty in contacting members the subcommittee was redesignated. In a rejuvenated public information effort it was suggested that a film be made to publicize the NAR Study. This suggestion was met with initial support when it was recommended at the tenth Coordinating Committee meeting, but

by the twelfth meeting it was found that there was insufficient support by the various Coordinating Committee members to warrant its production. At the twelfth meeting the contents of a new pamphlet were approved and the brochure entitled "Public Information" was published dated January, 1971. The final information publication was released upon completion of the Study in 1972.