WATER RESOURCES
OF
NORTH CAROLINA

AN INVENTORY OF INFORMATION AND DATA

by
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North Carolina Department of Water and Air Resources

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Project A-018-NC

Water Resources Research Institute
University of North Carolina
The Water Resources Research Institute was established to promote a multidisciplinary attack on water problems, to develop and support research in response to the needs of North Carolina, to encourage strengthened educational programs in water resources, to coordinate research and educational programs dealing with water resources, and to provide a link between the state and federal water resource agencies and related interests in the University.

Research and educational activities are conducted through established departments and schools of the University. All senior colleges and universities of North Carolina are eligible to participate in the Institute's research program.

As a basis for its research program, the Institute has prepared reports on Water Resources Problems and Research Needs, Water Resources Research Interests in the Senior Colleges and Universities of North Carolina, and an Inventory of Active Water Resources Research Projects in North Carolina. Water Resources of North Carolina: An Inventory of Information and Data is the final report of this series, which collectively provide the background information necessary for research planning and its integration with operating programs.

This bibliography also should be useful to consulting engineers, planners, regulatory agencies, citizen groups, and others who would like to know what information is available on the water resources of North Carolina and where it is located. It was prepared in recognition of the fact that few people have the time to conduct statewide searches for information in their fields of interest or concern. Repeated searches are unnecessary and uneconomic duplication. This report will bring to each such person the results of a comprehensive survey in the form of useful bibliography.
PREFACE

Virtually no project embracing the term “research” can be taken seriously if the investigator has not reviewed relevant work by previous investigators. Examples of classic “rediscoveries” are too well-known to warrant repetition. More important than the investigator’s embarrassment is the inefficient use of limited research funds. Because genius is limited, most research is evolutionary rather than revolutionary. Each investigator builds on the work of his predecessors. This document is intended to provide the research investigator with a quick, efficient review of previous work. Equally important perhaps, it should enable him to learn quickly what data and data sources touching on his problem are readily available. This can be particularly important in a multidisciplinary, loose-knit field of study such as water resources where the investigator, more likely than not, is a specialist with a career and a literature orientation based primarily on his own specialty.

The public servant, engineer, and planner are also concerned with the work of their predecessors and contemporaries. They should also find this document a useful lead-in to previous studies and reports, available data series, and other published records.

Both the subjects “water resources” and “North Carolina” are quite broad, with a tremendous literature. The criteria for inclusion of a particular reference were twofold, first, that it contain information relating to some aspect of water resources — water supply, pollution, navigation, recreation, irrigation, coastal erosion, et al. — and, secondly, that it refer in some particular way to North Carolina. Many fine water resources publications by North Carolinians are thereby excluded because of their national or nonspecific orientation.

Thus the purpose of this work, to compile and assemble, in a single publication, a comprehensive inventory and index to all significant printed information and data relevant to North Carolina’s water resources.

Our experience in preparing this document leads us to make a special plea for the future. We ask that any agency, consultant, scientist, local government, or institution preparing or sponsoring a report or study on water resources send single copies to:

Planning Division
Department of Water and Air Resources
P. O. Box 9392
Raleigh, N. C. 27603

and also to:

The North Carolina Collection
Louis Round Wilson Library
University of North Carolina
Chapel Hill, N. C. 27514

A copy to the first address will insure that the report will be coordinated with the North Carolina Water Plan, and also, that it will ultimately be included in any later versions of this bibliography.
A copy to the second address will insure archival preservation and wide availability through loan to any library in the state. One indication of the need for such a service is our finding that some local government units in the state cannot locate comprehensive water supply planning reports less than three years old.

We are indebted to many persons for their assistance. Over 600 items of correspondence attest to their number and to the cooperative spirit of North Carolinians and to their general interest in water resources. Not only the authors of this document but all the citizens of North Carolina owe a particular debt of gratitude to Col. Thomas G. Harton, Chief, Planning Division, North Carolina Department of Water and Air Resources, for his foresight and effort in collecting, cataloguing, and preserving North Carolina’s finest collection of reports and papers on the state’s water resources. Many of these were published informally or in limited editions and are virtually unavailable anywhere else. They were immensely useful in compiling this document and are invaluable source material.

The senior author is an engineer and a member of the faculty of the Department of Environmental Sciences and Engineering of the University of North Carolina at Chapel Hill. The junior authors, Miss "Polly" Coe and Mr. Bruce Knarr, at the time of the study were graduate students in the University’s School of Library Science. Never have stereotypes been so thoroughly destroyed as by these two young librarians. Their imagination, resourcefulness, diligence, initiative, enthusiasm, technical competence and general good cheer have made this project a delightful experience. The substance of this book is theirs.

The typing of the text, which even a cursory review will show to be as tedious a task as can readily be imagined, was ably done by Miss Cindy Moffitt and Mrs. Kris Andrus on an IBM Magnetic Tape/Selectric Typewriter.

We do not contend that this work is complete, although we are confident that with proper use it will “get one started” on most projects. We make the same plea of our “friends and readers” as did the publisher of a French Bible of 1540:

“We beg you in your Christian modesty to look well on our labour, which as much through the scantness of time as for several other reasons has been more troubled than we can well say now, and if there be some things not well done according to our art, it will be your duty to suffer the whole with kindly charity.”
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HOW TO USE THIS DOCUMENT
I. HOW TO USE THIS DOCUMENT

Author Index

The major body of this publication is its AUTHOR INDEX arranged alphabetically, with entry under a given letter numbered consecutively for ease of indexing and referral. Corporate entries are preferred, but there are cross references from individual authors to corporate entries under whom their work appears. The following are illustrative:


Buell is the 178th entry under the "B's." Entries 179 and 180 direct the searcher to other entries for which there is a complete citation. The symbol at the end of entry B0178, i.e., NcU-Bot., is an abbreviation for the Botany Library of the University of North Carolina where the referenced paper may be read. A complete list of these appears in the section, "Location Guides."

Entry style is based on the Engineers Joint Council's "Recommended Practice for Style of References in Engineering Publications," which specifies the following forms. Journal articles: author or authors, title of article, journal name, volume number, issue number, pagination, date. Books: author or authors, chapter title (if applicable), book title, edition number, volume number, pagination, series (in parentheses), publisher's location, publisher, date. Reports: author or authors, report title, report number, pagination, publisher's location, publisher, date. Format abbreviations give additional information:

<table>
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<tr>
<th>Vol.</th>
<th>volume</th>
<th>n.p.</th>
<th>no publisher given</th>
</tr>
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<tr>
<td>No.</td>
<td>number</td>
<td>n.p.:n.p.</td>
<td>no place of publication: publisher given</td>
</tr>
<tr>
<td>il.</td>
<td>illustrated</td>
<td>*</td>
<td>incomplete citation</td>
</tr>
<tr>
<td>proc.</td>
<td>processed (type-, written or mimeographed)</td>
<td>pt.</td>
<td>part</td>
</tr>
<tr>
<td>u.p.</td>
<td>unsaged</td>
<td>n.d.</td>
<td>no date given</td>
</tr>
<tr>
<td>v.p.</td>
<td>various paging</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For United States government documents an accepted bibliographic form was followed (see Boyd, A.M. and Ripps, R.R. United States Government Publications, 3d ed. rev. N.Y.: H.W. Wilson and Co., 1949. p.350-553). For the corporate entry of governmental offices or departments, the significant word in the name of the body is placed first; therefore, the U.S. Bureau of the Census is listed as U.S. Census Bureau. See references in the text refer the user to preferred terms. The publisher and place of publication of all U.S. entries have been omitted except when the entries are not published by the U.S. Government Printing Office in Washington, D.C.

Entries that are U.S. House or Senate reports or documents in the Congressional Serial Set have abbreviated explanations, as in this example: U.S. House, "Waterways and Harbors." 9p. (79th Cong. 3d sess. H.doc. 1149. In 12701) 1940. This shortened form may be read: "Seventy-ninth Congress, third session, House document 1149, in volume 12701." Other abbreviations for this purpose are S. (Senate), Rept. (Report), and Ex. Rept. (Executive Report). Legislative bills and resolutions are referred to by Senate or House, number, and title. Example: House Resolution 7545, of the 76th Congress, 2d session is written as H.R. 7545, 76th Cong. 2d sess. "To Prevent Profiteering in War Munitions." Slip laws are referred to by title, number, and Congress. Example: "National Security Act of 1947." Public 253, 80th Cong. Laws in the Statutes at Large are referred to by title, volume, and page number. Example: "Printing Law of 1895." 28 Stat. 601-604. Committee reports on bills or resolutions are referred to by name of Committee, Congress, and session, number, and title of the Report. Example: U.S. House Armed Services Committee, 80th Cong. 1st sess. H.Rept. 1107. "Universal Military Training." Committee hearings are referred to by name of Committee, Congress and session, title of bill or resolution (or its number). Example: U.S. Senate. Labor and Public Welfare Committee, 80th Cong. 1st sess. "Documentation
of Public Library Service," Hearings...on S. 48 (all examples in preceding paragraph are drawn from Boyd and Ripps, p. 550-553).

North Carolina state government entries are handled in a different manner. State offices and departments are entered as their titles appear; as an example, the Department of Conservation and Development is listed N.C. Department of Conservation and Development. Cross references within the text refer the user to preferred entries. Place of publication for North Carolina entries is omitted except when it is other than Raleigh. Publisher is also omitted when it is the same as the issuing agency.

Where publications are by a corporation or business firm, entries are alphabetical by the first significant word or letter of the firm name, e.g., J.N. Pease and company, not Pease, J.N., and Company.

In all entries plural authors are included if there are less than four. If there are five or more personal authors, only the first author is given plus "and others." Cross references within the text are of two kinds: see references, which refer to a preferred form of entry, and see also references, which refer to connected entries or further works by a personal author which are listed under another author or a corporate entry.

Subject and Geographic Indices

The SUBJECT INDEX and the GEOGRAPHIC INDEX are arranged alphabetically by subject and geographic location respectively and list relevant entry numbers to the AUTHOR INDEX under each topic of the indices. Entry numbers prefixed by double letters refer to the BIBLIOGRAPHIC INDEX.

The subject headings were drawn from the Water Resources Thesaurus published by the Office of Water Resources Research (Washington, D.C.: November, 1966). The use of this thesaurus insures adequacy of descriptive terms and generally accepted nomenclature. Cross references are included to refer the user to connected topics and preferred terms.

The Subject and Geographic Indexes are separated to facilitate comparison between the two. One can compare the item numbers for "Raleigh" and "Planning" to obtain material about planning in Durham. However, the Geographic Index is not entirely complete because indexing information was obtained from briefly reviewing each item and, sometimes, just from the titles. Therefore, when using the Geographic Index, look under all possible locations, i.e., when seeking water resources information about Raleigh, also look under Wake County.

Location Guide

An important purpose of this bibliography is to locate, as well as list, materials pertinent to North Carolina water resources. For this reason symbols have been used to designate specific libraries and agencies in the state; most of the symbols are common to major union lists, but a few have been invented by the researchers. A list of the symbols and their explanations is shown on the following page.

One or more of the symbols is generally shown following each entry, thus indicating at least one location where a copy may be found. It was impossible to look up each entry in each of the libraries in question; therefore, many items may be found in locations other than those noted. Where entries were not located, they may often be obtained or borrowed by writing to the issuing agency, especially in the case of the Tennessee Valley Authority and many of the consulting engineering firms. Some items which lack location guide symbols were obtained from the literature and not physically examined or were found to be out of print, but are included herein in order that others will know that such articles or reports have been made.

Appendix B is a location guide to water resources related periodicals in North Carolina libraries. It was compiled with the aid of a union list (Littleton, I.T. and Houser, G.W. North Carolina Union List of Scientific Serials. Raleigh: North Carolina State University, 1967). The purpose of this list is to locate the major periodicals dealing with water in North Carolina libraries and to indicate
LIBRARY LOCATION GUIDE: SYMBOLS

Nc  State Library
    Raleigh

NcD-Biol.  Biology Library
          Duke University
          Durham, N.C.

NcD-Chem.  Chemistry Library
          Duke University
          Durham, N.C.

NcD-Eng.  Engineering Library
          Duke University
          Durham, N.C.

NcD-Gen.  William R. Perkins Library
          Duke University
          Durham, N.C.

NcD-Med.  Medical Library
          Duke University
          Durham, N.C.

NcD-Pearse  Pearse Memorial Library
            Duke University
            Durham, N.C.

NcD-Phys./Math  Physics/Mathematics Library
                Duke University
                Durham, N.C.

NcGW  Library
      University of North Carolina at Greensboro
      Greensboro, N.C.

NcR-U.S.G.S.  United States Geological Survey
             Raleigh, N.C.

NcR-WRC  North Carolina Wildlife Resources Commission
         Raleigh, N.C.

NcRS-Hill  D.H. Hill Library
         North Carolina State University
         Raleigh, N.C.

NcRS-Design  Design Library
             North Carolina State University
             Raleigh, N.C.

NcRS-Tex.  Textiles Library
          North Carolina State University
          Raleigh, N.C.

NcU-Bot.  Botany Library
         University of North Carolina
         Chapel Hill, N.C.

NcU-Chem.  Chemistry Library
          University of North Carolina
          Chapel Hill, N.C.

NcU-DES&E  Department of Environmental Sciences and Engineering
          University of North Carolina
          Chapel Hill, N.C.

NcU-DHAL  Division Health Affairs Library
          University of North Carolina
          Chapel Hill, N.C.

NcU-Geol.  Geology Library
          University of North Carolina
          Chapel Hill, N.C.

NcU-Inst.  Institute of Government Library
           University of North Carolina
           Chapel Hill, N.C.

NcU-Instit.  Library
            Institute of Marine Science
            University of North Carolina
            Morehead City, N.C.

NcU-Law  Law Library
        University of North Carolina
        Chapel Hill, N.C.

NcU-LRW  Louis Round Wilson Library
        University of North Carolina
        Chapel Hill, N.C.

NcU-Math/Phys.  Math - Physics Library
               University of North Carolina
               Chapel Hill, N.C.

NcU-Pharm.  Pharmacy Library
           University of North Carolina
           Chapel Hill, N.C.

NcU-Plan.  Planning Library
          University of North Carolina
          Chapel Hill, N.C.

NcU-WRRI  Water Resources Research Institute
         North Carolina State University
         Raleigh, N.C.

NcU-Zool.  Zoology Library
         University of North Carolina
         Chapel Hill, N.C.

NcW&A  North Carolina Department of Water and Air Resources
       Raleigh, N.C.
the specific holdings that these libraries have of the various journals. It is arranged alphabetically by journal title, which is followed by symbols for the libraries, volumes covered, and the years of those volumes. When a volume number is in parentheses, this indicates that the volume is not complete. A double slash (//) at the end of a date means that the periodical stopped publishing at that date. An open entry (example: 1- 1962-) means that the periodical is being currently received and has been since the date before the dash.

**Appendices**

Several appendices are included in order to strengthen the utility of the basic bibliography. These provide a resource for seeking materials listed but not located, materials published since January 1, 1968 (the cutoff date for this bibliography), water resources literature non-specific to North Carolina, and other sources of information.

**Other Bibliographies**

Appendix A is a list of bibliographies useful in searching the water resources literature. They are not specific to North Carolina but can be highly useful for some specific purposes, for example, entries include such well known services as Dissertation Abstracts, and Chemical Abstracts. Some others are less well known but are quite useful for their particular topic, e.g., R.T. Rowe's *Bibliography of Rivers and Harbors and Related Fields in Hydraulic Engineering* (407 p., Princeton: Princeton Univ., 1953).

The list is incomplete certainly and probably insufficient for most. It contains those sources used during preparation of this document plus a number of others known directly to the senior author.

**Location Guide to Water Resources Periodicals**

Appendix B is a location guide to water resources or water resource-related periodicals in North Carolina Libraries. The location guide symbols follow the format shown on the preceding page.

**Water Resources Agencies**

Appendix C is a directory of state, federal, and private agencies dealing with water resources. These are tremendous repositories of information and an inquiry directed to the appropriate agency is often highly productive. The relationships of the state agencies are outlined by the chart in the appendix.

**The North Carolina Water Plan**

A recently initiated activity of the North Carolina Department of Water and Aid Resource is the NORTH CAROLINA WATER PLAN. In future years this should be a fruitful source of information on North Carolina's water resources. The PLAN is described in Appendix D.

**Bibliographic Note**

Appendix E, "Bibliographic Note on the Water Resources Literature of North Carolina," reflects our experience in preparing this document and may be of interest to others faced with similar tasks.

**Searching the Water Resources Literature**

Appendix F is a brief manual on searching the water resources literature. It is designed to introduce the literature to graduate students and other investigators new to one or more of the many disciplines involved in water resources research.
II

AUTHOR INDEX

Abell, D. S. see also N. C. Board of Health.


Abshier, G. see N. C. Agricultural Experiment Station.

Ackermann, W. C. see Linsley, R. K.


"An Act to Authorize the Establishment at Some Point in North Carolina of a Station for the Investigation of Problems Connected with Marine Fishery Interests of the Middle and South Atlantic Coast." 1p. Public 101, 56th Cong. May 12, 1900.


NcU-LRW

NcU-LRW

NcU-LRW

NcU-LRW

NcU-LRW

NCW&A

NcRS-Hill

NcRS-Hill

NCU-LRW

NcRS-Hill

A0030. Adams, O. S. See U. S. Coast and Geodetic Survey.

NcU-DES&E

NCU-DHCL

A0033. Agricultural Experiment Station See N. C. Agricultural Experiment Station.

A0034. Agricultural Extension Service See N. C. Agricultural Extension Service.


A0059. Allen J. C. see Tennessee Valley Authority.


A0085. Appalachian Regional Commission see U. S. Appalachian Regional Commission.


A0088. Aquatics Recreation Study Commission see N. C. Aquatics Recreation Study Commission.


A0092. Arrington, J. see N. C. Wildlife Resources Commission.


A0097. Ashe, W. W. see also N. C. Department of Conservation and Development; U. S. Agriculture Department; U. S. Forest Service; and U. S. Geological Survey.


A0103. Asheville, N. C. Metropolitan Planning Board of the City of Asheville and Buncombe County see also Harboure-Cooper and Associates, Inc.

A0104. Ashton, D. F. see N. C. Board of Health.


A0106. Atkins, S. W. see N. C. Agricultural Experiment Station.


A0113. Atlantic States Marine Fisheries Commission. "Marine Resources of the Atlantic Coast." No. 1-. 1965-. NcS-Hill


A0116. Augustine, M. T. see N. C. Agricultural Experiment Station.


Badger, W. L. see U. S. Saline Water Office.

Bailey, J. R. see N. C. Department of Conservation and Development; and N. C. Wildlife Resources Commission.

Bain, G. L. see N. C. Department of Water Resources.


Baity, H. G. see also N. C. University; White, A. M.; and Worth, A. M.


Baker, F. R. see N. C. Agricultural Experiment Station.

Baker, W. D. see Louder D. E.; and N. C. Wildlife Resources Commission.


Barber, L. see N. C. Wildlife Resources Commission.

Barber, Y. see N. C. Wildlife Resources Commission.


Barick, F. B. see also N. C. Wildlife Resources Commission.

Barkalow, F. S., Jr. see N. C. Wildlife Resources Commission.

Barker, F. B. see U. S. Geological Survey.

Barksdale, R. G. see N. C. Department of Water Resources.


Barnes, H. H., Jr. see U. S. Geological Survey.


Barnes, L. H. see U. S. Soil Conservation Service.

Barnes, R. D. see Barnes, B. M.


Barnes, W. L., Jr. see also Hahn, W. J.


Bartel, F. O. see also N. C. Agricultural Experiment Station; and U. S. Public Roads Bureau.


Bass, T. C. see U. S. Soil Conservation Service.

Batchelder, A. R. see U. S. Agricultural Research Service.


Battle, R. B. see N. C. Agricultural Experiment Station.


Bayless, J. D. see also Gilbert, M. J.; and N. C. Agricultural Experiment Station.

Bayless, J. D. see also N. C. Wildlife Resources Commission.

Bayley, W. S. see U. S. Geological Survey.


Beard, J. see N. C. Wildlife Resources Commission.


B0064. Bell, F. M. see also N. C. University.


B0067. Bennett, H. W. see also N. C. Agricultural Experiment Station.

B0068. Bennett, R. E. see N. C. State College.


B0073. Berry, E. L. see N. C. Department of Water Resources.


B0082. Bertie Soil and Water Conservation District see N. C. Bertie Soil and Water Conservation District.


B0089. Birsch, W. L. see N. C. Department of Conservation and Development.


B0091. Black, C. E. see U. S. Forest Service.


B0094. Blackmore, J. see Baum, E. L.

B0095. Blair, A. W. see N. C. Agricultural Experiment Station.


B0097. Blake, J. G., III see N. C. Department of Conservation and Development.


B0154. Brown, J. T. see N. C. Department of Conservation and Development.


B0157. Brown, P. M. see also LeGrand, H. E.; N. C. Department of Conservation and Development; and N. C. Department of Water Resources.


B0160. Brown, T. C. see N. C. State College.


B0188. Burdick, G. see N. C. Wildlife Resources Commission.
B0190. Burgess, J. see North Carolina League of Municipalities.
B0197. Busta, F. F. see N. C. Department of Conservation and Development.
C0001. Cabarrus Soil and Water Conservation District see N. C. Cabarrus Soil and Water Conservation District.

C0002. Cable, L. E. see U. S. Coast and Geodetic Survey; and U. S. Fisheries Bureau.

C0003. Cadwallader, E. A. see Gainey, R. J.

C0004. Cahoon, W. G. see N. C. Wildlife Resources Commission.

C0005. Cain, W. see N. C. Board of Health.


C0007. Caine, L. S. see also N. C. Wildlife Resources Commission.

C0008. Caldwell, N. M. see N. C. Board of Health.


C0010. Callahan, J. T. see also Wait, R. L.

C0011. Candelas, G. C. see Candelas, G. A.


C0025. Carnes, W. C. see N. C. Wildlife Resources Commission.

C0026. Carney, C. B. see N. C. Agricultural Experiment Station; and U. S. Weather Bureau.


C0033. Carson, R. L. see U. S. Interior Department.

C0034. Carter, V. E. see N. C. Department of Conservation and Development.


C0047. Cerame-Vivas, M. J. see also Gray, I. E.


C0051. Chamblee, D. S. see N. C. Agricultural Experiment Station.

C0052. Chang, H. L. see Geyer, J. C.


C0061. Chase, J. C. see N. C. Board of Health.

C0062. Chatham County Soil and Water Conservation District see N. C. Chatham County Soil and Water Conservation District.

Cheek, R. P. see also Davis, J. R.; and N. C. Wildlife Resources Commission.


Chestnut, A. F. see also N. C. University; and Porter, H. J.

Childs, D. D. see N. C. Board of Health.


CO0081. Chrisko, H. F. see White, A. M.


CO0088. Clapper, L. S. see N. C. Wildlife Resources Commission.


CO0092. Clark, P. M. see U. S. Forest Service.


CO0096. Clarke, T. G. see N. C. Department of Conservation and Development.


C0116. Cohan, L. M. see Pooser, A. K.


C0122. Coker, R. E. see also N. C. Department of Conservation and Development; N. C. Geological and Economic Survey; and U. S. Fisheries Bureau.


C0129. Commission on Draining Mattamuskeet Lake in Hyde County see N. C. Commission on Draining Mattamuskeet Lake in Hyde County.

C0130. Committee on Commercial Fisheries see N. C. Committee on Commercial Fisheries.


C0135. Conner, N. W. see N. C. State College.


C0138. Cook, E. F. see Idaho.


C0140. Cooley, C. E. see Virginia. State Water Control Board.
Cooper, A. J. see N. C. State College.


Cooper, A. W. see also N. C. Wildlife Resources Commission.

Copley, T. L. see N. C. Agricultural Experiment Station; and U. S. Agriculture Department.

Correll, F. E. see Ballinger, W. L.

Cote, D. N. see Smallwood, C., Jr.


Coutu, A. J. see also Baum, E. L.; N. C. Agricultural Experiment Station; and Tennessee Valley Authority.
C0183. Cruikshank, J. W. see U. S. Forest Service.
C0184. Crutchfield, J. see N. C. University.
C0185. Culvern, F. E. see N. C. University.
C0186. Cummings, G. A. see Ballinger, W. E.
C0187. Cummins, R., Jr. see U. S. Fish and Wildlife Service.
C0188. Cunningham, G. B. see Hibbert, A. R.
D0001. Dabney, C. W., Jr. see N. C. Board of Health.


D0003. Daly, A. R. see U. S. Census Bureau.


D0005. Dare County, N. C. Board of Commissioners. "Deposition of Dare County Board of Commissioners, Public Hearing--March 5, 1965: Hatteras Inlet and Related Channels." 69 l. l. n. p.: 1963?

D0006. Dare County, N. C. Board of Commissioners. "Survey of Dare County Waterways and Harbors," by D. Stick. 8 l. proc. n. p.: April, 1961.


D0010. Darling, J. M. see also U. S. Engineers Corps (Army).


D0013. Davidson, S. E. see U. S. Soils Bureau.


D0015. Davis, C. see N. C. Wildlife Resources Commission.


D0019. Davis, J. see N. C. Wildlife Resources Commission.


D0042. Department of Interior see U. S. Interior Department.

D0043. Department of Labor see N. C. Department of Labor.

D0044. Department of Water and Air Resources see N. C. Department of Water and Air Resources.

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Y0006
APPENDIX A

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APPENDIX B

LOCATION GUIDE
TO
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Appendix B

LOCATION GUIDE TO PERIODICALS RELATING TO WATER RESOURCES

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352
Water Pollution Abstracts.  
NoD-Eng.  8-(11,13)-(15), (17)-(19-20)-(22)-, 1935-1938, 1940-1942, 1944- .  
NoRS-Hill  32-, 1959-.  
NoU-DHAL  20-21,23-, 1947-1948, 1950-.  

Water Pollution Control Federation. Journal.  
NoD-Eng.  1-, 1928-.  
NoRS-Hill  1-, 1928-.  
NoU-DHAL  1-19, 22-(36)-, 1928-1947, 1950-.  

Water Resources Bulletin.  
NoRS-Hill  1-, 1965-.  

Water Resources Research.  
NoRS-Hill  1-, 1965-.  
NoU-Geol.  1-, 1965-.  
NoU-DHAL  1-, 1965-.  

Water Works Engineering.  
NoD-Eng.  91-116, 1938-1963//  
NoU-DHAL  79-(80)-(98)-116, 1926-1963//
APPENDIX C
DIRECTORY OF WATER RESOURCES
RELATED AGENCIES
NORTH CAROLINA STATE GOVERNMENT EMPHASIZING AGENCIES WITH WATER AND RELATED LAND RESOURCE ACTIVITIES
## Appendix C

### LIST OF AGENCIES DEALING WITH WATER RESOURCES

#### State Agencies

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<tr>
<td>Agricultural Experiment Station&lt;br&gt; North Carolina State University&lt;br&gt; Raleigh, N.C. 27607</td>
<td>919-755-2717</td>
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<td>Agricultural Extension Service&lt;br&gt; North Carolina State University&lt;br&gt; Raleigh, N.C. 27607</td>
<td>919-755-2612</td>
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<tr>
<td>Board of Conservation and Development Education Building&lt;br&gt; Raleigh, N.C. 27603</td>
<td>919-829-3077</td>
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<tr>
<td>Board of Sciences and Technology&lt;br&gt; Research Triangle Park, N.C. 27709</td>
<td>919-829-7357</td>
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<tr>
<td>Commercial and Sports Fisheries Advisory Board&lt;br&gt; c/o Department of Conservation and Development Education Building&lt;br&gt; Raleigh, N.C. 27603</td>
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<td>Consolidated University&lt;br&gt; University of North Carolina&lt;br&gt; 223 East Franklin Street&lt;br&gt; Chapel Hill, N.C. 27514</td>
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<td>Department of Agriculture&lt;br&gt; Agriculture Building&lt;br&gt; Raleigh, N.C. 27601</td>
<td>919-829-7125</td>
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<tr>
<td>Department of City and Regional Planning&lt;br&gt; 104 New West&lt;br&gt; University of North Carolina&lt;br&gt; Chapel Hill, N.C. 27514</td>
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<td>Department of Environmental Sciences and Engineering&lt;br&gt; 106 School of Public Health Building&lt;br&gt; University of North Carolina&lt;br&gt; Chapel Hill, N.C. 27514</td>
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<tr>
<td>Department of Water and Air Resources&lt;br&gt; Jones and Dawson Streets&lt;br&gt; P. O. Box 9392&lt;br&gt; Raleigh, N.C. 27603</td>
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<tr>
<td>Institute of Fisheries Research&lt;br&gt; University of North Carolina&lt;br&gt; Camp Glenn&lt;br&gt; Morehead City, N.C. 28557</td>
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<td>Institute of Government&lt;br&gt; Knapp Building&lt;br&gt; University of North Carolina&lt;br&gt; Chapel Hill, N.C. 27514</td>
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<td>Local Government Commission&lt;br&gt; Revenue Building&lt;br&gt; P.O. Box 430&lt;br&gt; Raleigh, N.C. 27602</td>
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360
Research Triangle Institute
Hanes Building
Research Triangle Park, N.C. 27709

School of Engineering
Duke University
Durham, N.C. 27706

Federal Agencies

Agricultural Research Service
Department of Agriculture
14th and Independence Avenue, S.W.
Wash., D.C. 20250

Agricultural Research Service Regional Office
Animal Health Division, Agricultural Building
Raleigh, N.C. 27601

Coastal Plains Soil and Water Conservation Research Center
Agricultural Research Service
P.O. Box 3039
Florence, S.C. 29501

Southern Piedmont Soil Conservation Research Center
Agricultural Research Service
Watkinsville, Ga. 30677

Agricultural Stabilization and Conservation Service
Department of Agriculture
14th and Independence Avenue, S.W.
Wash., D.C. 20250

Agricultural Stabilization and Conservation Service Regional Office
1330 St. Marys
Raleigh, N.C. 27605

Wake ASC County Committee
201 West Davie
Raleigh, N.C. 27601

Appalachian Regional Commission
1666 Connecticut Avenue
Wash., D.C. 20250

Bureau of Outdoor Recreation
Department of the Interior
18th and C Streets, N.W.
Wash., D.C. 20240

Bureau of Outdoor Recreation
Southeast Regional Office
610 New Walton Building
Atlanta, Ga. 30303

Bureau of the Budget
The Executive Office Building
17th and Pennsylvania Avenue, N.W.
Wash., D.C. 20503

Bureau of Public Roads
Department of Transportation
1717 M Street, N.W.
Wash., D.C. 20590
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Interstate Commerce Committee
15th and Constitution Avenue, N.W.
Wash., D.C. 20442

National Park Service
Department of the Interior
16th and C Streets, N.W.
Wash., D.C. 20240

Naval Research Laboratory
Department of Defense
4555 Overlook Avenue, S.W.
Wash., D.C.

Office of Business Economics
Department of Commerce
1532 M Street, N.W.
Wash., D.C. 20230

Office of Saline Water
Department of the Interior
C Street Between 15th and 19th Streets, N.W.
Wash., D.C. 20242

Office of Saline Water Laboratory
Harbor Island
Wrightsville Beach, N.C. 28480

Office of Water Resources Research
Department of the Interior
15th and C Streets, N.W.
Wash., D.C. 20240

Public Health Service
Department of Health, Education, and Welfare
9000 Rockville Pike
Bethesda, Maryland

Public Health Service District Office
220 7th Street, N.E.
Charlottesville, Va. 22901

Science Information Exchange
Smithsonian Institution
Madison National Bank Building, Suite 300
1730 M Street, N.W.
Wash., D.C. 20036

Soil Conservation Service
Department of Agriculture
14th and Independence Avenue, S.W.
Wash., D.C. 20250

Soil Conservation Service Regional Office
1330 St. Marys
Raleigh, N.C. 27605

Tennessee Valley Authority
Woodward Building, Room 435
1426 H Street, N.W.
Wash., D.C. 20444
also
Tennessee Valley Authority
New Sprankle Building
Knoxville, Tenn. 37902

U.S. Army, Corps of Engineers
Department of Defense
Pentagon
Wash., D.C. 20301

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APPENDIX D

THE NORTH CAROLINA WATER PLAN
Appendix D
THE NORTH CAROLINA WATER PLAN

This is a special program of the Department of Water and Air Resources financed in large part by a continuing grant from the Water Resources Council under the provisions of Title III, Water Resources Planning Act of 1965. Under this program the State of North Carolina is committed to the eventual production of a completed NORTH CAROLINA WATER PLAN and its maintenance in a current state.

Since the NORTH CAROLINA WATER PLAN (NCWP) depends upon all the programs of the Department of Water and Air Resources and programs of other State, Federal, and local agencies, the effort and financing attributable to the program include selected activities of several agencies.

Budget elements in the NCWP program cover (1) collection of selected information, (2) agency liaison, (3) provision of information for public understanding, (4) drafting of preliminary reports, (5) plan formulation and the drafting of tentative segments of the NCWP, and (6) updating and revision.

Ideally, the NORTH CAROLINA WATER PLAN would be prepared in support of State economic development goals and in keeping with population and economic information provided by other State sources having responsibility for such matters. The Department of Water and Air Resources would prepare plans grounded on such guidance. After approval, the State Water Plan would be used as a control in the development of lower level intra-state area plans, as a basis to critically review proposed Federal plans as well as those of adjacent States. In fact, many local and Federal plans are far advanced. The State has also committed itself firmly to various existing and proposed projects.

In merging the ideal with the practicable, the preparation of the NORTH CAROLINA WATER PLAN becomes, in the earlier stages, an active process of

(1) Collection and analysis of feeder information,
(2) Participation in Federal and local planning to assure that known State goals are met to the extent possible,
(3) The drafting of plan segments initially as "progress" reports defining what is now known including the commitment to de facto plans, and
(4) Obtaining reactions to possible specific plans from various interests.

The Department of Water and Air Resources has issued a work plan entitled 'The North Carolina Water Plan and Associated Publications'. This publication established the general format of the NORTH CAROLINA WATER PLAN, listed 53 subject titles and a series of 106 reports covering two stages for each title. A schedule was established for completion of all 106 reports by December 1970.

The family of reports comprising the NORTH CAROLINA WATER PLAN is listed on the following page. Reports to be published will be prepared in five major categories:

Part I Introduction and Summary
(Ultimately to be the single-volume version of NCWP)

Part II Water Policy, Institutions, and Management
(Seven or more reports)

Part III Functional Aspects of Water Resources Use and Development
(Seventeen or more reports)

Part IV Water Resource Geographical Planning Units
1. River Basins
2. Regions
(25 or more reports)

Part V Appendixes
(Undertermined number)

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Scheduling has been delayed by necessary diversion of staff and effort to the Appalachian Water Resources Survey Report. A massive first draft of the Appalachian study was released for review and then superseded by a 108-page report proposed for use as the North Carolina State Supplement to the report, Development of Water Resources in Appalachia. After the close of the last biennium, the State Planning Task Force submitted the copy as part of a larger report for inclusion as the official State Supplement. This provided partial data on thirteen river basins.

Information System

A contract was awarded in the summer of 1967 for the drafting of twenty-six base maps for use in water resource planning. These have been completed and printed. As a result the Department now has a family of maps and charts coded to a geographical numbering system which makes possible the recording all manner of water resource data in such manner as to assure a constantly more valuable information source for sound planning. It will take years to record all the desired information, but effective planning will be aided by the immediate usefulness of data when posted. The digital numbering system identifies about 60,000 rectangular units, slightly over one square mile each, and facilitates storage of statistical data, aerial photo prints, public works information, etc.

Information Projects

A 10-volume geographical compendium of dams in North Carolina has been assembled. Each dam identified is represented by a one-sheet form filed geographically. Supplemental information is placed in this loose leaf reference as it becomes available.

In the Fall of 1967 a similar compendium was begun for industry with the intent to provide an information sheet on every industrial facility in the State (probably over 7,000) showing its location, ownership, industrial code, classification, employment, type of water use and source, type of waste created and disposal, plus other selected information. A complete listing properly located geographically is required on a one-time basis. Thereafter, concentrated attention will be given to the heavy water users and waste creators. These will be posted on the 7.5-minute maps.

In June of 1968 a beginning was made on a complete water use survey of Wake County. This is intended not to be a prototype for the other 99 counties, but to provide concrete data and possible development of various constants to permit more accurate estimation of actual use and hence, better projections of probably future use.

NORTH CAROLINA WATER PLAN
PRELIMINARY LIST OF REPORT TITLES

PART I
INTRODUCTION AND SUMMARY

PART II
WATER POLICY, INSTITUTIONS, AND MANAGEMENT

1. Water Policy and Law
2. Economic Data, Other Data, Objectives, and Economic Development
3. Planning Mechanics and Procedures
4. Management Institutions
5. Intergovernmental Relationships and Programs
6. Research
7. Emergency Resource Management (Water)

PART III
FUNCTIONAL ASPECTS OF WATER RESOURCES USE AND DEVELOPMENT

1. Agriculture and Water
   A. Drainage
   B. Irrigation
   C. Rural Water Supply and Other Uses
   D. Soil Conservation (including salinity to the extent applicable)

(Continued on following page)
PART IV WATER RESOURCE GEOGRAPHICAL PLANNING UNITS

1. River Basins
   A. Broad
   B. Cape Fear
   C. Catawba
   D. Chowan
   E. French Broad
   F. Hiwassee
   G. Little Tennessee
   H. Lumber
   I. Neuse
   J. New
   K. Pasquotank
   L. Roanoke
   M. Santee (Broad and Catawba)
   N. Tar Pamlico
   O. Watauga
   P. White Oak
   Q. Yadkin – Pee Dee

2. Regions (of innumerable regions only a few probably entailing reports are listed)
   A. Appalachia
   B. Atlantic Coastal Plain Commission Region
   C. Coastal
   D. Eastern North Carolina Above Cape Lookout
   E. Estuarine
   F. Neuse – Pamlico – Castle Hayne Area
   G. Piedmont
   H. Tennessee Valley

PART V APPENDICES
APPENDIX E

BIBLIOGRAPHIC NOTE
ON THE WATER RESOURCES LITERATURE
OF NORTH CARolina
Appendix E

BIBLIOGRAPHIC NOTE ON THE WATER RESOURCES LITERATURE
OF NORTH CAROLINA

Until now no comprehensive bibliography, inventory, or even checklist has
been made of the printed literature of North Carolina water resources. There
are bibliographies, inventories, and checklists of North Carolina publications,
but there are few such lists in specialized fields that concern themselves ex-
clusively with North Carolina. The methodology used in this study may therefore
be of interest to some.

Methods Employed in Compilation

The three major methods employed in compiling this work were bibliographic
searches of available indices, searches of the holdings of important libraries
in the state, and direct inquiries addressed to potential authors or sponsors
of relevant work.

The major indices used were: Monthly Catalog of U.S. Government Publications,
Documents Catalog, Public Affairs Information Service, Engineering Index, Disses-
tation Abstracts, and Bibliography of North American Geology. Many other
bibliographic materials were also used and are included in Appendix A, List of
Bibliographic Sources.

The major libraries covered by the researchers in the search for appropriate
material were: The University of North Carolina's Louis Round Wilson Library,
Geology Library, and Institute of Government Library, the D. H. Hill Library of
North Carolina State University at Raleigh; the State Library in Raleigh; and
Duke University's main and engineering libraries. The collection of Colonel
Thomas G. Horton at the North Carolina Department of Water and Air Resources
was opened to us and proved to be one of the most valuable collections. Also
the collection of the Water Resources Research Institute, located on the North
Carolina State University campus, was thoroughly searched.

Over 400 letters of inquiry were sent to engineerine consultants and to
county and municipal officials who might have unpublished or informal reports
concerned with water resources. The responses (about 20 percent) to these letters
were varied; some officials sent copies of documents and others sent citations,
which were not always complete. When citations in the bibliography are incom-
plete because we did not have an opportunity to look at the material in question,
an asterisk (*) follows the notation.

Maps and soil surveys have not been included in this work because they are
too voluminous in number. However, indices to maps may be located through the
Subject Index. Both the United States Geological Survey office in Raleigh and
the North Carolina Department of Water and Air Resources collect numerous maps
concerning drainage basins and geological formations. These are open to the
public.

Federal and state publications comprise the majority of entries in the
inventory because governmental agencies publish the major portion of reports and
surveys specifically oriented to North Carolina problems. Privately generated
periodical literature is more often than not concerned with general problems than
with a North Carolina orientation. Dissertations and theses produced in North
Carolina institutions were a valuable source of material.

Federal Documents

The Monthly Catalog of United States Public Documents proved to be the
richest single source of Federal citations. It produced the major portion of
current Federal entries and a good proportion of the ones for the U.S. Engineers
Corps (Army), the U.S. Geological Survey, and the Tennessee Valley Authority.

The Monthly Catalog and its predecessor, the Documents Catalog, were
searched thoroughly to their inception. Specialized bibliographies for the
Engineers Corps and the Geological Survey provided earlier citations; however
the general bibliographies of Federal documents were not surveyed for the earlier
period. The coverage of this inventory for the period prior to 1855 is then
incomplete, however many citations for this earlier period were found in
the specialized bibliographies and through the card catalog of the North Carolina
Collection of the University of North Carolina Library.

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Specialized and in-depth coverage of Federal publications was achieved by using more narrowly defined indices. These often listed non-GPO publications and were more useful in locating specific interest areas than the broad ranging *Monthly Catalog*. We made extensive use of specialized indexes for U.S. Geological Survey (USGS) and U.S. Army Engineers Corps materials. These are described in detail in Appendix F.

**State and Local Documents**

The major source of state and local documents for this inventory was the card catalog of the North Carolina Collection of the University of North Carolina Library. This collection is an official depository for all North Carolina state documents, and is the official archives of the University. Besides this, the Collection has carefully gathered all state documents printed before the Collection was designated an official depository, and it actively collects local government documents. Still the Collection was incomplete. This necessitated a survey of the collections at North Carolina State University, the North Carolina State Library, and the Duke University Library. The collection gathered by Col. Thomas C. Harton, Chief of the Planning Division of the North Carolina Department of Water and Air Resources, was one of the most valuable collections surveyed outside Chapel Hill.

"North Carolina Publications" (currently called "Checklist of Official North Carolina Publications") is for North Carolina what the *Monthly Catalog* is for the United States. "North Carolina Publications" has the same problems as the *Monthly Catalog* - the lack of real depth and completeness. The University of North Carolina Library in cooperation with the North Carolina State Library publishes the checklist. It was published from 1940 to 1946 with publication being resumed in 1952. The checklist can be supplemented by the card catalogs of the various libraries in the area and by publications of various state agencies. The Annual Report of the Department of Water and Air lists its publications for the year, and the Department has also issued a bibliography of all its publications. The annual reports of other agencies of the state government often mention their publications, and others, too, have published bibliographies.

Citations of North Carolina state government publications can also be found in the Library of Congress' "Monthly Checklist of State Publications." Published since 1910, it indexes all state government publications sent to the Library of Congress. The breadth of its indexing and the practice that only those publications that the states wish to send to the Library of Congress are listed in the checklist limit its usefulness. The major source of the retrospective bibliography besides the various university collections was M.L. Thornton's *Official Publications of the Colony and the State of North Carolina, 1749-1939: A Bibliography*. (Chapel Hill: University of N.C. Press, 1934). This publication was invaluable in locating older books and papers and in verifying series information and other bibliographic details.

The difficulties we have experienced with local government documents lead us to repeat our plea that at least one copy of every locally sponsored or produced document be deposited in the North Carolina Collection of the University of North Carolina Library at Chapel Hill. Only in this way can its long-term availability be absolutely assured.

The state would also benefit if copies of those documents with a water resources planning orientation or effect were deposited with the Planning Division of the North Carolina Department of Water and Air Resources in Raleigh.

**Dissertations and Theses**

Dissertations and theses provided this inventory some of the depth that would otherwise not have been achieved. While federal and state governmental publications were largely concerned with hydrologic problems, many of the theses and dissertations cited examined biological problems of North Carolina water resources. Many of the papers included were written for the institutions of North Carolina, North Carolina State University, and Duke University [This was partially because the researchers had full access to the checklists of these universities and to the documents themselves. Also, these universities produced the major portion of papers dealing in the desired subjects.]

The University of North Carolina's *"The Graduate School Dissertations and Theses"* lists all papers accepted for advanced degrees by the University. The series was first published in 1947, and the original book was retrospective to the first advanced degree. Subsequent editions are published irregularly to update.
the list. The Humanities Division of the University Library has a card catalog that updates the printed edition to the current year.

North Carolina State University Library has compiled the "Bibliography of Dissertations and Theses Accepted in Partial Fulfillment of Requirements for Advanced Degrees at North Carolina State College, 1894-1963." North Carolina State University's publication, "Faculty Publications and Research," listed doctoral dissertations and masters' theses through 1965. After 1965, the publication lists only the titles of doctoral dissertations. The Reference Room at the D.H. Hill Library maintains a file of these dissertations.

The theses and dissertations at Duke University have been compiled as "A Preliminary List of Masters Theses and Doctoral Dissertations Accepted at Duke University Through 1965." This list is kept up to date by a file in the main library.

For theses and dissertations from schools other than those listed above, the authors consulted Dissertation Abstracts, American Doctoral Dissertations, and Masters Abstracts. Even though an occasional paper was found that dealt with North Carolina, lack of access made them difficult to verify.

Periodicals

The major portion of this inventory consists of government documents produced by either Federal, state, or local agencies. The journal and periodical literature produced by non-governmental agencies with the North Carolina orientation was sparse. Governmental agencies on the whole are geographically oriented whereas the literature of societies and associations is mainly subject oriented.

Of the many indices and abstracts used the Engineering Index was the most fruitful. This index provided a substantial number of the technical papers included in the inventory. The Applied Science and Technology Index (formerly a section of the Industrial Arts Index) and the Bulletin of the Public Affairs Information Service both proved to be of very limited use for the purposes of this inventory. Neither indexed North Carolina material in any depth nor in any detail for Federal publications.

The availability of water resources and water resources related periodicals in several major North Carolina libraries is outlined in Appendix B. This can also be used as a checklist for evaluating adequacy of holdings by these and other libraries.
APPENDIX F

SEARCHING THE WATER RESOURCES LITERATURE
Appendix F
SEARCHING THE WATER RESOURCES LITERATURE

Introduction

Water resources is a mission-oriented field. Unlike a subject- or discipline-oriented field such as chemistry or biology in which the literature is concerned with the discipline itself and some crossover to other disciplines, a mission-oriented field is a hybrid concerned with many discipline-oriented subjects.

The field of water resources is concerned with such diverse subject fields as civil engineering, geology, agriculture, chemistry, biology, physics, public administration, political science, economics, and innumerable others. A water resources specialist may be working with water supply, sewers, irrigation systems, drainage, water power, underground water, navigation, pollution, recreation, commercial fishing, flood control, or any one of hundreds of water related activities.

There is no truly comprehensive handbook or treatise on all phases of water resources. Nor can there ever be one. It is necessary to consult a variety of sources. These cover many disciplines in as many ways. Because of its great diversity of sources, the literature of water resources is difficult to work with bibliographically. Unlike a physical science such as chemistry with its great reviewing and abstracting series, Chemical Abstracts and Chemisches Zentralblatt, water resources specialists have only just begun to approach the problem of systematic bibliography. But than water resources as a distinctive field of study is relatively new and remains intimately associated, as it probably should, with its parent disciplines. A simple literature search on a particular topic in water resources may require that a researcher use many and varied tools in several disciplines. Bibliographic work in water resources requires some knowledge of the field itself, a knowledge of general and specific information sources, and specific knowledge of water resources information sources.

An additional problem arises in cross-disciplinary searching because the subject oriented bibliographic tools are not slanted toward the needs of the water resources field. A paper in biology, for instance, that is abstracted in Biological Abstracts and that contains information valuable to the water resources specialist may not be indexed or abstracted in Biological Abstracts in such a way that the information is available to the water resources specialist. If water were not the main subject of the paper, it would not receive full emphasis in indexing or abstracting. If the same paper were indexed and abstracted in a water resources oriented index or abstract, the water aspects of the paper would receive greater emphasis.

This appendix outlines a few of the information sources with particular relevance to water resources. No attempt is made to describe more widely used sources such as library card catalogs, Dissertation Abstracts, patents, encyclopedias, etc. These are well known to trained librarians and numerous texts are available describing their use.

Starting the Search

Assuming that one already knows his subject well enough to be familiar with at least the basic references, texts, and recent major papers, the most valuable information, ceteris paribus, is the most recent. "What's new?" For example, the latest result of another investigator may immediately make one's own proposal obsolete. Unfortunately moreover, the lag time from the laboratory to the library, even for primary sources, may easily be several years.

This difficulty has been largely overcome in the field of water resources by two activities of the Federal government, the Science Information Exchange of the Smithsonian Institution and the Water Resources Research Catalog of the Office of Water Resources Research.

The Science Information Exchange (SIE) of the Smithsonian Institution provides a unique service as a center for information about currently active research in the physical, biological, and social sciences and the engineering fields. Summaries of proposed and ongoing research projects are being received by SIE at the rate of over 100,000 per year from over 1,000 research organizations which include Federal agencies, private foundations, academic institutions, state and city governments, and industrial facilities. All registered research is analyzed and indexed in depth.
by a staff of professional scientists and engineers who later retrieve this information in response to a broadening range of subject and administrative questions. For twenty years this service has been provided free of charge to members of the scientific community associated with recognized research establishments.

In October, 1964, President Johnson designated the Science Information Exchange to be the National Cataloguing Center for Water Resources Research. This assignment followed the passage of the Water Resources Research Act of 1964 which recognized that substantial improvement in research activities will result from the general availability to research workers of current information about projected and ongoing research projects. The duties of the cataloguing center are to collect, index, and disseminate information related to all research activities in the water field and to provide close support to the publication efforts of the Office of Water Resources Research, Department of the Interior.

The first publicly available catalog of ongoing water research activities, the Water Resources Research Catalog (Vol. 1, Pt. 1), was prepared by SIE and published in February, 1965. It contains information about 1,545 federally-supported water projects. The following October a supplement covering 501 non-federal projects was published (Vol. 1, Pt. 2). The second edition, Volume 2 of the Catalog, is a combined federal-non-federal issue published in October, 1966, which contains information about 3,905 current investigations. A third edition was published in December 1967. New editions will continue to be released periodically. In addition, Water Resources Thesaurus, a vocabulary for indexing and retrieving the literature of water resources research and development was published in November, 1966. All of these publications can be obtained from the Government Printing Office in Washington, D.C. or examined in depository libraries.

The number of notices of water research projects now registered with SIE, and thereby available for distribution within the scientific community, is more than 4,500. Registration of projects can readily be accomplished through the use of a one page form, the Notice of Research Project, available on request.

Research investigators associated with recognized research institutions may request information from SIE on who is working on a specific problem. Write or telephone the Exchange stating the specific research or problem on which information is desired. The Exchange will promptly forward pertinent Notices of Research Projects. A concise definition of the problem will insure the best selection of information. Services of the Exchange are currently (1968) provided free of charge.

For further information about its operations and services, write:

SCIENCE INFORMATION EXCHANGE
209 Madison National Bank Building
1730 M Street, N.W.
Washington, D.C. 20036

or telephone: (202) 381-5511

or visit: Suite 300
Madison National Bank Building

Primary Sources

Primary sources devote themselves almost exclusively to the reporting of new information and are the primary means of first announcing new research and findings. Generally primary sources fall into the following types of literature: journals, dissertations, government publications, and patents. The chief attribute of primary source material is currentness. These materials are of great importance in making public announcements of the latest discoveries in special fields.

The second importance of primary sources is that they are great storehouses of knowledge. Much information in the primary source is never repeated in the secondary sources, and many of the details of a discovery or experiment are omitted when published in the secondary sources. If one wishes to check the references of a secondary source, he must see the original publication.

Reporting of experiments and studies is basically a sharing experience whereby researchers report their findings to other researchers through the media of periodicals or journals. Reports in periodicals are often preliminary and only part of the research that may be conveyed through full scale reports of governmental or institutional nature or through patents.
Publications comprising the primary sources are very numerous. Because the field of water resources is so broad and diverse there is space for only brief consideration of the different types.

U. S. Government Publications

Many agencies of the federal government issue a great variety and large number of publications that are related to water resources. Except for certain annual reports and serials, most of these publications are irregular. Bibliographic problems are compounded by the fact that the Government Printing Office is the world's largest publisher, and it publishes the bulk of its production in pamphlet form. Often in the past, sometimes even now, federal documents have been treated by librarians, indexers, and abstracters as ephemeral. Because federal documents did not fall into either the categories of books or journals they were all too often relegated to secondary position in library catalogs and in abstracts and indices. With the greatly increased number of federally sponsored reports of research and development since World War II, the bibliographic problems have increased proportionately.

The only source that attempts to index all federal publications is the Monthly Catalog of United States Public Documents (commonly referred to as the Monthly Catalog). This chiefly indexes federal publications that are printed by the Superintendent of Documents in the Government Printing Office (GPO). It has never pretended to index all federal publications, and since World War II and the increased proliferation of federal research and the increased number of agencies, the percentage indexed has decreased. It has not listed all Federal publications because not all federal printing or even publication has been done by the Superintendent of Documents. Individual agencies do some printing independent of the Government Printing Office. Often this non-GPO material is processed. While the Monthly Catalog attempts complete coverage, with the present system it cannot hope to be more than partial. Still the Monthly Catalog is the richest single source of federal citations.

The Monthly Catalog began in 1895, and since 1940, when the Catalog of Public Documents of ... Congress ... and Other Departments of the United States (commonly known as the Document Catalog) ceased publication, the Monthly Catalog has remained the sole government generated index to all federal publications. The Document Catalog, which began publication in 1893 and ceased in 1940, indexed federal documents along a subject arrangement and was issued for each Congress. It is valuable in locating older Federal documents and for retrospective bibliography.

For the period prior to 1893 there are several tools that may be useful for extensive and thorough research. The basic index to the federal documents from the founding of the republic to the late nineteenth century is B.P. Poore's A History of Publications of the Government of the United States, Sept. 5, 1774-March 4, 1881, Comp. by Order of Congress. This publication is a general index to the period, and it gives full bibliographic citation and a brief abstract for each document listed. Public Documents of the First Fourteen Congresses, 1789-1817. Papers Relating to Early Congressional Documents by A.W. Greely may be used to supplement Poore's coverage. J.G. Ames' Comprehensive Index to the Publications of the United States Government, 1881-1893 bridges the gap between Poore's Descriptive Catalogue and the first volume of the Document Catalog. The Checklist of United States Public Documents is a checklist, not a catalog, that covers Congressional documents through the 60th Congress and department and bureau publications at the end of 1909. The Checklist is extremely valuable as a verification tool and for locating documents in the Congressional Serial Set.

Specialized and in-depth coverage of federal publications may be achieved by using more narrowly defined indexes. These often list non-GPO publications and are more useful in locating specific interest areas than the broad ranging Monthly Catalog. For example, Publications of the Geological Survey lists in a single place all publications of the U.S. Geological Survey except open-file reports. These are generally reports generated at a district office and awaiting publication in Washington. Open-file reports are elusive to researchers. They are not picked up in indices or bibliographies until they are published in Washington. As long as they remain open file the only method of access for the researcher is direct inquiry to the district office.

The basic source for citations of early Engineers Corps civil works surveys, examinations, etc., to 1936, is:

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This is an index to January 1, 1936. For preliminary examinations it lists the date of the report and the recommendation of the Chief of Engineers. For surveys it lists the date of the report, estimated cost, and the recommendation. The bibliography lists where the report is published (as a Congressional document and/or in the Annual Report of the Chief of Engineers) and whether a map is published with the report.

There are two indices especially for the Annual Reports of the Chief of Engineers. These are:


There is basically no difference between the reports issued with Congressional document numbers and the unnumbered reports in the Annual Reports of the Chief of Engineers. Current practice is to issue the Annual Reports of the Chief of Engineers in two volumes with one volume being a summary of the year's activities and the other volume being a compendium of specific project data.

Even with all these Congressional documents, annual reports, and what not, much Corps literature remains evasive. This literature is generated basically at two sources: the district offices of the Corps and the Waterways Experiment Station at Vicksburg, Mississippi. Their publications are not printed or published or even handled by the Government Printing Office and therefore seldom listed in the Monthly Catalog. The publications of the district offices generally fall into two categories: preliminary reports pending the approval of the Chief of Engineers and progress reports on river basins or areas within the district. These publications are available from the district offices and some are available in the major libraries of the area. The publications of the waterways Experiment Station at Vicksburg are listed in its "List of Publications of the U.S. Army Engineers Waterways Experiment Station ..." [See entry BU017].

Secondary Sources

Secondary Sources comprise the publications that collect and disseminate the information reported in the primary sources. They generally consist of journals, textbooks, indexes, abstracts, bibliographies, and such reference works as handbooks, treatises, dictionaries, and encyclopedias.

Primary sources are generally in a confused state, voluminous and unorganized. Secondary sources attempt to unravel the mysteries and to compile the information and location of primary sources in a readily accessible form. Secondary sources organize, tabulate, and distill data and citations to data.

Secondary sources are secondary only in the sense that they report research and development that was first reported in primary sources. A time lag is thus involved. The currentness of secondary sources is roughly in the following order: first reported in primary sources, then in index serials, then in abstracting journals, then in review serials, then in monographs, then in textbooks and handbooks and encyclopedias.

Indices and Abstracts

Index serials perform the first step in the collection of information scattered in the primary sources. Indices generally give a minimum of information about the paper or book in question. Usually an index citation includes author, title, and in the case of an article or paper the journal, volume, issue number, pagination and date, or in case of a book, publisher, place, date, and pagination. Even though titles are author generated and
even though publishers are urging authors to write more descriptive titles, many titles are vague, too general, or simply unrevealing. To be most valuable for indexing, titles should be a one sentence abstract of the article.

Indices are basically finding and locating devices. They have little to do with the actual process of communication to the reader of the information found in a paper or a document.

Important indices in the water resources field are the Monthly Catalog of U.S. Public Documents, the United Nations Documents Index, Engineering Index, Applied Science and Technology Index, Agricultural Index, Index Medicus, and Hydata. All but Hydata index water resources literature incidental to more general coverage.

Abstracting serials, in which notice of articles or papers is given after the index stage, actually transfer significant information about the article or paper to the reader. An abstract is a brief summary or digest of the significant items in a primary source. There are basically two types of abstracts the indicative and the informative. An indicative abstract acts initially as an alerting mechanism. It tells the reader what the paper is about without going into details or facts. The informative abstract on the other hand can serve as a substitute for the paper itself. This kind of abstract tries to extract the important points and put them into terse language. In most cases informative abstracts are preferred. Abstracts are supposed to be done by someone competent in the field. However, quality varies widely, both between and within abstracting services.

There are many sources of abstracts. They may appear in a section of a journal, or if there are enough of a specialized kind there may be a journal devoted entirely to those abstracts. Many journals are now publishing abstracts of their own articles in the journal itself.

Attempts are now being made by at least one government agency and by one professional association to provide a systematic bibliography of water resources. The American Water Resources Association (AWRA) has initiated three separate bibliographic publications. Hydata, mentioned earlier, is the oldest of the three publications, beginning in January, 1965. It is a monthly title list and index of the world's scientific literature in the field of water resources. Hydata generally comprises four parts: the reproduction of the whole table of contents of the most important water resources periodicals; a listing of pertinent titles from periodicals not entirely devoted to water resources; a listing of titles of non-periodical literature on water resources; and a computer produced index. The Hydata Reader Service is an information dissemination service whereby readers may obtain articles listed in Hydata as reprints, Xerox copies, or tear sheets. Hydor is an annual computer produced index to Hydata in two parts: a computer produced index and a bibliography. Hydor was first published in 1968 and indexed the 1967 issues of Hydata. AWRA's newest publication is Water Resources Abstracts which began in January, 1968. This service provides its readers with abstracts of many of the papers indexed in Hydata. It is published monthly and is issued in forty-nine sections according to specific fields of interest.

The Water Resources Scientific Information Center (WRSIC) of the U.S. Department of the Interior began in January, 1968 to publish a monthly, Selected Water Resources Abstracts. It is a selected list of current monographs, journal articles, translations, and reports. The contents of these documents cover the physical, life, and social sciences, as well as related engineering and legal aspects of the characteristics, conservation, control, use, and management of water. The coverage is broad by intention, and the sections thus far established cover such diverse topics as administration and management, civil engineering, concrete technology, electrical engineering, irrigation, rock mechanics, and water resources.

WRSIC has contracted with a number of "centers of competence" in various subjects, e.g., water resources economics, to search the current literature and to provide abstracts for inclusion in Selected Water Resources Abstracts and also for storage in their computer-based retrieval system. (Only about 20% of the abstracts are published in Selected Water Resources Abstracts.) Access to the entire abstract set will be available through a program of Selected Dissemination of Information to be available to a limited number of investigators by 1969. Further information can be obtained from WRSIC or from the Director of the Water Resources Research Institute.
Numerous indices and abstract journals exist for independent disciplines which may be involved in water resources problems. A few examples are Index to Legal Periodicals, Water Pollution Abstracts, World Fisheries Abstracts, et al. Judicious questioning of a few knowledgeable individuals can be highly productive in sharpening the focus of a bibliographic effort.

Reviews and Bibliographies

Reviews and bibliographies are often excellent sources of information. Unfortunately one must first find the review or bibliography. For example the publication, Water Quality Criteria [entry RC003] is not immediately recognizable as a comprehensive review and annotated bibliography of some 3,827 references. This work, a secondary source and a state document, is well known however to senior research scientists in its field, illustrating once again the desirability of professional consultation early in the search.

An abbreviated listing of review and abstracts journals, bibliographies, and similar sources is listed as Appendix A.