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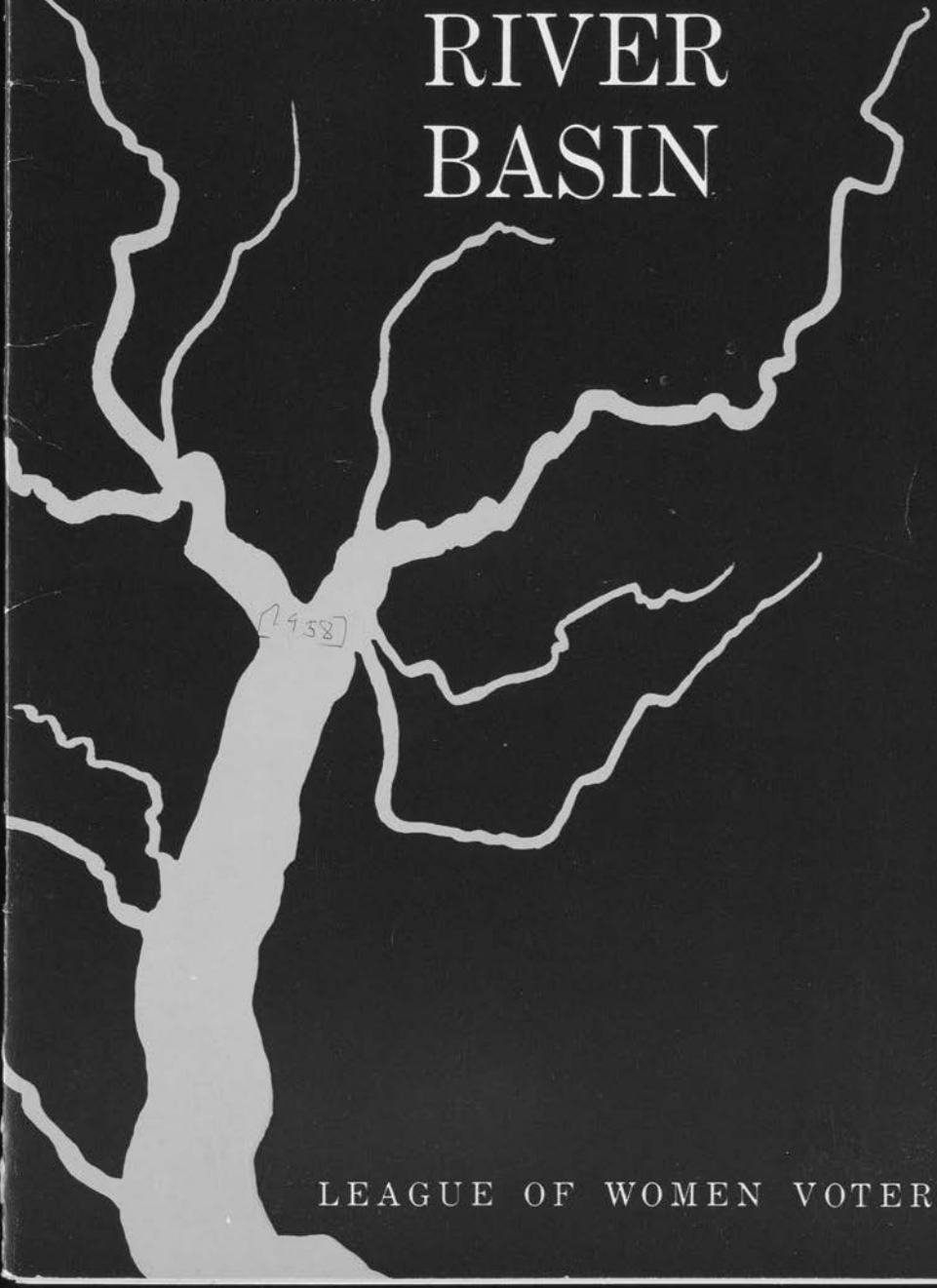
KNOW YOUR RIVER BASIN



LEAGUE OF WOMEN VOTERS

KNOW YOUR RIVER BASIN

An Outline for Study

LEAGUE OF WOMEN VOTERS OF THE UNITED STATES

1026 17th St., N.W.

Washington 6, D.C.

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KNOW YOUR RIVER BASIN

Introduction

THIS *Know Your River Basin* pamphlet, designed for use by local Leagues, offers the same kind of do-it-yourself techniques which Leagues have long used in getting to know their own towns, counties, or states.

By providing an opportunity for an over-all look at your own river basin, this pamphlet can help your League find out for itself the essential facts about your basin. Furthermore, it can provide a sound basis for your League members to sharpen their understanding of national water policies.

You may wonder how a study of a river basin can help develop an understanding of national water policies. *Ten Rivers in America's Future* explains it this way: The river basins "provide *practical examples* of the problems for which a national water policy must furnish *workable answers.*" For example, a study of your basin will almost certainly reveal a complex pattern of conflicting local interests and overlapping agencies concerned with river development. This interplay of interest and overlapping of functions so apparent in your river basin operate also in the "hot" issues in Congress (e.g., Omnibus Rivers and Harbors, Dixon-Yates, Hells Canyon, TVA revenue-financing bonds, Rural Electrification Administration, Upper Colorado River Storage Project, and Reed-Blatnik bills). (Also see articles in THE NATIONAL VOTER issues of February 1958, "View From a Water Front," and of August 1958, "Two Ways In, One Way Out".)

In other words, conducting your own *Know Your River Basin* study should do much to help your members understand the complexity of intergovernmental relations in river basin development and to help them recognize some of the difficult questions involved in deciding about national water policies.

In studying your river basin, it is well to keep in mind that answers to many questions depend largely on judgment and

preference. How much weight, for example, should be given to the noncommercial aspects of recreation or the sheer beauty of an unspoiled reach of river? Are there intrinsic merits in certain approaches to river basin development that counterbalance purely economic considerations? For instance, is private development preferable to public; or, when government action is involved, is state or local development preferable to federal?

You will also, of course, want to adapt this study to your particular needs. You needn't feel that you must find answers to everything in the outline during your study of your own basin. The detailed suggestions for conducting a local League *Know Your River Basin* study are given in a separate publication, publication Number 257, price 10¢.

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Crucial choices in river basin development which have to be made within the next ten or fifteen years will do much to set the pattern for many years to come. And so, this is a good time for each League to take part in helping to set this pattern. This pamphlet is intended to help you do this.

I

What Are the Characteristics of Your River Basin?

A. Physical Characteristics (Look at a map, a relief map if possible).

1. What geographical area is included? What is the character of the terrain: plains; mountains; gently rolling hills; other? What types of soils? Where located? What are the most common types of vegetation? Where located? Is land erosion a big problem?
2. Where are the major lakes, rivers, and streams located? Is there adequate underground water? What climate variations are there? Are some sections predominantly arid, semi-arid, humid? What is the average amount of precipitation? Is it seasonal or fairly evenly distributed throughout the year? From year to year?

B. Population Characteristics

1. What is the present population? What was it 20 years ago? What might it be 20 years from now? In 40 years?
2. How is it distributed? What is the average population per square mile? Where are the centers of population density? How are these related to geographical characteristics? In what sections is the most rapid growth occurring?

C. Economic Characteristics

1. What are the principal occupations in the area: agriculture; lumber; mining; manufacturing; trade; transportation; recreation; other?
2. Which provides the greatest source of income? Which employs the most workers? Is the economic wealth growing? What are some of the chief factors affecting the economic health? Is there sufficient water supply? Power? Is better utilization of natural resources needed?
3. What economic developments require change and which require preservation of the status quo in the basin?

D. Community Organization

What business groups are interested in water resources? What other civic organizations? What is the particular interest of each?

II

What Are the Water Use and Control Programs in Your River Basin?

A. Water Supply

1. What are the principal sources of your *local* water supply? Is it supplied by a public or private system? Does it serve only your community or is your system part of a water district? How did your present water supply system develop? What proportion of the costs are absorbed by users and what proportion by the local taxpayers? What proportion of the costs are being subsidized through federally operated upstream reservoirs or other federal projects? Is the same true for construction as well as maintenance costs? In recent years, have there been restrictions on the use of water? If so, for what uses, and why?
2. What are the principal sources of water supply in your *basin*: lakes; reservoirs; rivers; wells? Is there sufficient water supply for present population and industry? Is the ground water being depleted faster than it is being replenished? Will anticipated demands intensify the problem? What plans are there for expansion of water supply systems? What is the estimated cost of increasing the supply?
3. What state agencies have a responsibility in connection with water supplies in the river basin: Department of Public Works; Department of Commerce; Water Resources Commission; Department of Health; other? What federal agencies: U. S. Geological Survey; Army Corps of Engineers; Soil Conservation Service; Public Health Service; other?

B. Pollution Abatement

1. Is your local lake, pond, stream, or river polluted? To what degree?
2. What sections of your basin are polluted? To what degree? What are the sources of pollution: silt; sewage;

industrial waste? Are there satisfactory sanitary sewage disposal systems in your community? In all basin communities? To what extent is industry treating its waste? Is the treatment adequate? Do local industries need to purify the water before returning it to the river or using it? Is fishing or swimming spoiled by pollution? If so, where? Are there state laws for pollution control? If so, are they adequate? Are they enforced?
3. What federal agencies are concerned: Public Health Service; state agencies; Division of Health; Division of Sanitation; Water Pollution Control Division; Water Improvement Commission? How does the Federal Water Pollution Control Act affect your municipality? The basin as a whole? Is the state program satisfactory in implementing the Act? Are appropriations sufficient for water pollution control under the Act for your basin?

C. Flood Control

1. Are floods a problem locally? How often have they occurred? Last year? Within the last 10 years? In 25 years? What has been the damage: to life; farms; business; industry? What are the causes of the floods? Are steps being taken to control them? Is there flood-plain zoning in your locality? What are the local interests expected to contribute to local flood protection projects?
2. How often do floods occur in the basin? To what extent is flood-plain zoning practicable in the basin? What estimates have been made for the over-all cost of flood control? Do flood control plans provide for the creation of upstream river storage reservoirs? Would these reservoirs be economically feasible?
3. What flood control functions are performed by the following: Army Corps of Engineers; Flood Control Board; Natural Resources Council; Department of Conservation; Department of Public Works; other?

D. Irrigation

1. Are there any irrigation projects in your locality? How many acres are under irrigation? Are they mainly federal irrigation projects? Any private construction of irrigation

facilities? What share of the cost of irrigation projects is borne by the industries or nonagricultural interests which will be benefited (directly or indirectly) by the project?

2. Are there any irrigation projects authorized but not yet constructed in the basin? Are there reasons for proposed projects other than the land and food needs of the population? What are the plans for sharing the cost? Are government subsidies needed in order for the project to be built?
3. What is the repayment period for the projects: 40, 50, 60, 80, or 100 years? How much of the costs allocated to irrigation are to be repaid by the water users? What portion of the revenues from power are assigned for repayment beyond the water users' ability to pay? What portion of the revenues from furnishing water for municipal water supply or miscellaneous purposes are assigned for repayment beyond the water users' ability to pay?
4. What are the acreage limitations? Are they enforced?
5. How are the costs shared by federal, state, and local agencies? Does the law make clear the ownership of water or water rights?
6. What federal, state, or local agencies are concerned: Bureau of Reclamation; Water Rights Board; State Engineer; Water Users' Association; Irrigation Districts?

E. Power

1. What are the sources of electric power in your basin?
2. Is hydroelectric energy a key feature of the water development program for your basin? What is its importance for the regional economy? What are the existing hydroelectric power facilities?
3. What are the estimates of the potential development of this resource? How many of the proposed projects are economically feasible?
4. What agencies and groups participate: Federal Power Commission; Corps of Engineers; Bureau of Reclamation; water boards; public utility district; irrigation district; municipal utility district; private power companies?

F. Navigation

1. How many miles of the waterways of the basin are navigable? How far can ocean-going vessels proceed? What are the channel depths throughout navigable portions? How important is navigation to the economy of the basin? Are other methods of transportation more economical?
2. What is the principal traffic: movement of petroleum products; movement of wheat, logs, or lumber; other cargoes?
3. How much tonnage, upstream and downstream, per year? Is it increasing? Is it mainly inbound or outbound?
4. Any projects completed or authorized to provide harbors for: ocean-going vessels; small boats for recreational use; excursion trade; other?
5. What is the cost to date of all navigation projects of the Corps of Engineers in your basin? Have the benefits from these projects been fully analyzed? What are they?
6. What state agencies are concerned: Division of Economic Development; Department of Conservation and Development; Division of Water Resources; other?

G. Watershed Management

1. What is your immediate watershed? Does local watershed management cover the many diverse local situations of soil, slope, cover, and climate?
2. What are the basin's watershed problems: burned-over areas; grassland overgrazed; overlogging; soil erosion; sheet wash; gullying?
3. How many farms are under soil and water conservation practices? Which soil conservation farm practices remain to be established: contour plowing; deferred grazing; land preparation; strip cropping? How many farm ponds have been built? How many idle or marginal acres are planted to trees and wildlife protection areas? How many acres of woodland have improved management plans?

MAJOR DRAINAGE AREAS

4. What agencies are concerned: Soil Conservation Service; Forest Service; Soil Conservation District; State Forester; State Soil Conservation representatives; Agricultural Extension Service; County Agent?

H. Recreation, Fish, and Wildlife

1. What are the park and water recreation assets in your locality? Are they being used fully? Can they be expanded?
2. What are the park and water recreation assets in your basin?
3. Do plans for reservoir construction include provisions for recreation: access roads; feet above flood crest to be acquired; use of surrounding lands and water surface to assist in maintaining waterfowl; restoration of wildlife habitat; fishways?
4. How many acres in the basin are in national forests? What is the investment? How many visitors annually to forest areas? How many acres in state forests? Investment? Number of visitors? Is other use being sought? Would this adversely affect national or state forests?
5. What federal agencies are concerned: Corps of Engineers; Bureau of Reclamation; Fish and Wildlife Service; Soil Conservation Service; National Park Service; Forest Service? What state agencies: State Departments of Forests and Waters and Agriculture; State Conservation Commission; Soil Conservation Districts?

I. Multiple-Purpose Projects

1. How many multiple-purpose projects directly affect your locality? What are they?
2. How many completed projects are there in your basin? Under construction? Authorized but not constructed? Proposed? Where located (show on a map)? What purposes are they designed to accomplish?

III

What Is the Administrative Organization in Your River Basin?

A. Local

1. How many local agencies are engaged in various aspects of water administration: municipal and other local water supply systems; Water Authorities; county and city health departments; Soil Conservation districts; small watershed districts; water users' associations; others?

B. State

1. How many state departments are concerned: Division of Water Power and Control; Public Works; Commerce; Health; Agriculture and Markets; Executive Department?
2. How many Public Authorities are established in your state? How many other state agencies? Water Pollution Control Board? Natural Resources Council? Interstate Commission? District Commission? Any Joint Legislative Committees?
3. How many state agencies in all are concerned with water resources? On which state agencies is administrative responsibility for water programs mainly centered: State Departments; Commissions; Authorities?

C. Federal

1. What form of organization for multiple-purpose river development exists in your basin: an Interagency River Basin Committee; an Interstate Commission; an Authority? How do these forms of organization fit your basin?
2. Do you live in a river basin that has established in it a federal-state Interagency River Basin Committee? What is the relationship to the federal Interagency Committee on Water Resources? What are the advantages or disadvantages of this type of organization?
3. Does your state belong to an Interstate Commission? Is it a serviceable instrument for bringing about joint action

by a group of states in meeting common problems of a regional nature? Or is it a purely educational and advisory body of limited powers and resources? What is the purpose of the Compact? Has the Compact Commission compiled a basin-wide inventory of the water resources? Has it developed comprehensive plans for water resource conservation? Including fish, wildlife, and recreation? Is there a need for more state initiative?

4. Do you live in a region that has a valley authority established? If so, how effective is this form of organization? Advantages? Disadvantages?
5. What are the chief federal agencies concerned in the administrative setup: Corps of Engineers; Geological Survey; Public Health Service; Soil Conservation Service; Weather Bureau; Federal Power Commission; Bureau of Reclamation?

D. Federal–State–Local

1. How do the many agencies operate? What are their relations with one another; with federal agencies in the field; with local organs; with pressure groups? Is full advantage being taken of the services of the various agencies? Are there other public agencies which might become active in the field? What new developments are in sight?

IV

What Are the Major Conflicts among Uses?

1. Are there conflicts between upstream and downstream interests? If so, what are the conflicts? Between need for storage reservoirs and present uses of land to be inundated (i.e., residential, agricultural, highways)? Between Indian rights and water development reservoir inundation? Would there be tax losses to local areas? Is removal of water for supplementary irrigation upstream resented downstream?
2. Are there conflicts between specific uses of the water resource? Between fish-wildlife-recreation interests, and

other water developments? Between irrigation, domestic, and other water uses? Between flood control and other uses?

3. Are there conflicts over locating dams in areas considered valuable in their natural state?
4. Are there conflicts between use of coal and hydroelectric power in development of your basin? Conflicts between irrigation and power in the regulation of the waters of your basin? Conflicts between recreation and other uses in the operation of storage reservoirs? Conflicts between expansion of supplementary irrigation (in humid East) with other uses of water?

V

What Are the Major Problems of Allocating Benefits, Responsibilities, and Costs?

1. To what extent do local and state governments participate in planning, programming, financing, and operating water resources facilities? To what extent do private citizens and organizations participate in water resource control and development? Is there a need for more local and state initiative? Do the local interests share in the costs of projects which benefit them?
2. Are political subdivisions of upstream states compensated for loss of tax sources through the creation of reservoirs which are largely for the benefit of downstream states? What provisions are there for compensating local political units for losses or handicaps incurred in the development of water resources or use of watershed lands for regional or national benefit?
3. To what extent does the federal government take responsibility for the protection and enhancement of fish, wildlife, and recreation resources? Should the costs incurred be considered nonreimbursable? Should states bear some of the cost?
4. To what extent, if any, do international treaties affect the development of your basin?

VI

What Is the Future of Your Basin?

1. What are the main problems needing attention in your river basin: flood control; control of siltation; control of pollution; storage for periods of low rainfall; replenishing groundwater; other?
2. Is the solution of these major problems a part of the planning objectives for your river basin? Short-range objectives? Long-range objectives?
3. What has been done in the past to fulfill the planning objectives for your basin? Did the plan succeed? If not, why? Was there lack of public understanding and support?
4. Are the planning objectives currently operating according to a timetable? Is public support of present objectives being developed? Is there a thorough understanding by people living in the basin of the problems involved and possible solutions? Is there realization of the complicated intergovernmental relationships which exist with respect to agency functions in water resources development?
5. What are the major proposals for improving coordinated planning in your basin? Establishing or strengthening over-all planning and reviewing agencies in the executive branches of federal and state governments? Strengthening federal-state and interstate cooperation? Consolidating executive activities in one department? Consolidating legislative work in one legislative committee? Some combination of these? New forms of organization?

DEFINITIONS

Comprehensive development of water resources has been defined legally as "basin-wide development for optimum beneficial uses of a river system and its watershed." Or this variation: "A comprehensive development program for a river valley involves working with three resources of equal importance—water, land, and people. In the past, water has tended to receive a major emphasis, while the other two factors played a minor role or were disregarded altogether in project and program formulation."

Planning: Focusing in a systematic way upon all the immediate and long-range issues facing the state or community, with the goal of coordinating the arrangements for meeting present and future needs in such fields as water supply, recreation, highway construction, education, housing, etc.

Regionalism: Type of social organization through which the people of areas larger than a state, or portions of several states, or a city and the surrounding rural area, can participate democratically, politically, and financially in the necessary area development.

Regionalism means an adjustment of a nationwide program or activity to the peculiarities of an area, and also the reverse, namely, fitting the possibilities of an area into the needs of the nation. The object of regionalism is always to accomplish the greatest possible degree of cooperation between an area and other parts of the nation and the world.

Regions may need to be defined in terms of metropolitan city planning or geographic, climatic, and topographic influences. In parts, regionalism may need to be based on the hope of urban and industrial decentralization, while in others the emphasis may need to be on building cities and urban centers of the type that will assist the new region to grow and express itself.

River Basin Planning is the investigation of the needs of an area and the opportunities for development of its water and related land resources to help meet those needs. This frequently involves irrigation, flood control, hydroelectric power,

municipal and industrial water supply, recreation, fish and wildlife conservation. Because the heart of a development is so commonly the surface water supply, the river system has become the accepted base for developmental plans.

Drainage area or basin: Synonymous with watershed. A watershed is the area contained in a drainage divide above a specified point on a stream. In water-supply engineering it is termed a watershed and in river-control engineering it is termed a drainage area, drainage basin, or catchment area.

Watershed concept: Essentially one of conservation treatment of watershed lands supplemented as necessary by small dams and other water and sediment control structures.

READING LIST

LEAGUE MATERIALS

On the Water Front. Washington: League of Women Voters of the U. S., 1026 17th Street, N. W. 1957. 25¢. Basic publication on water.

Little Drops of Water. Washington: League of Women Voters of the U. S., 1026 17th Street, N. W. 1957. 5¢. A more "popular" presentation of the water story.

National Voter issues of Oct. 15, 1956; August 1957; February, July, August, and September, 1958. Washington: League of Women Voters of the U. S., 1026 17th Street, N. W. 10¢ each.

GOVERNMENT PUBLICATIONS

Documents on the Use and Control of the Waters of Interstate and International Streams. Washington 25, D. C.: U. S. Government Printing Office. $2.00. 1956. Includes various interstate compacts, such as for the Potomac, Delaware, Ohio and Columbia Rivers, Great Lakes, etc., also international treaties and interstate adjudications.

Ten Rivers in America's Future. Report of the President's Water Resources Policy Commission, Vol. 2, 1950. Washington 25, D. C.: U. S. Government Printing Office, 1950. $6.00. The ten basins covered are: Columbia, Central Valley of California, Missouri, Colorado, Rio Grande, Connecticut, Alabama-Coosa, Potomac, Ohio, and Tennessee. Reprints from this volume are available on five basins: Rio Grande, 60¢; Missouri, $1.00; Connecticut, 60¢; Colorado, $1.00; and Alabama-Coosa, 50¢.

BOOKS

Clawson, Marion. *Statistics on Outdoor Recreation.* Washington: Resources for the Future, Inc., 1145 19th St., N. W. 1958. $2.00. It is only recently that the use of leisure time for recreation has emerged as a major problem requiring economic analysis. Areas dealt with in this book are the national parks system, national forests, national wildlife refuges, TVA reservoir system, Corps of Engineers reservoir system, state parks and related areas, municipal and county parks and related areas. There are forty pages of interpretive text as well as tables, charts highlighting the main features of the data, and a detailed index.

Fisher, Joseph L. *Concepts in Regional Economic Development.* Washington: Resources for the Future, Inc., 1145 19th St., N. W., 1954. Single copy available free on request.

Gulick, Luther. *Metro, Changing Problems and Lines of Attack.* Washington: Governmental Affairs Institute, 1725 Massachusetts Ave., N. W. 1957. 75¢.

Krutilla, John V., and Eckstein, Otto. *Multiple-Purpose River Development.* Baltimore: Johns Hopkins University Press. 1958. $4.50. Selected case studies are offered, including detailed analyses of the Hells Canyon project, the Alabama-Coosa River system, and the Willamette River, Oregon. The book underlines the fact that there is no simple overall solution applicable to all river basin needs.

Law and Contemporary Problems. "River Basin Development." Durham, N. C.: School of Law, Duke University. Spring 1957 issue. $2.00. Also Summer 1957 issue entitled: "Water Resources." $2.00. The river basin issue discusses the economic dynamics, evaluation, and politics of river basin development. The water resources issue covers such topics as national water policy issues, national water resources administration, federalism and water resources development.

State Administration of Water Resources. Chicago: The Council of State Governments, 1313 East 60th St. $2.50. The book is helpful in considering the administration of water resources in each state. This book has an appendix which lists the major state reports on water resources for the period 1951-57.

clean water

IT'S UP TO YOU

"Of all the reckless devastations of our natural heritage, none is more shameful than the continued poisoning of our rivers. . . ."

—President Lyndon B. Johnson

THIS BOOKLET was prepared by the Izaak Walton League's "Citizen Workshops for Clean Water for America" project, financed in part by Demonstration Grant No. WPD 128-02-67 of the Federal Water Pollution Control Administration, United States Department of the Interior.

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Responsibility for errors and inadequacies, however, is ours alone.

Free copies may be obtained from:

Izaak Walton League of America
1326 Waukegan Road
Glenview, Illinois 60025

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IT'S UP TO YOU

Whoever you are, wherever you live, WATER POLLUTION AFFECTS YOU because your nation's waters are polluted. Pollution is a spoiler. It is ugly, costly, and insidious. It closes your beaches and prevents your youngsters from wading, swimming, boating, water-skiing, fishing, and other recreation close to home. It fills your lakes, streams, and estuaries with debris, scum, foam, oil, garbage, other loathsome wastes, and bubbles from foul-smelling gases.

It may jeopardize your farm, factory, or business and threaten your health and your neighbor's. It increases the cost of your drinking water, but decreases the value of your property. It contaminates shellfish, destroys game fish, poisons waterfowl and other wild creatures. It degrades the quality of your environment. In the future, it could adversely affect not only the quality of your environment, but the duration of your life.

If you care enough about the kind of world you live in—if you want enough clean, unpolluted water in the future to use in your work, your home, your recreation—IT'S UP TO YOU TO DO SOMETHING ABOUT POLLUTION!

There are things you can do and there are tools to do them with. One of the best of

the pollution control tools available to you—a citizen—are the water quality standards the states are now setting for their rivers, streams, and lakes. These standards are supposed to provide every community with water clean enough for drinking, swimming, fishing, boating, and other uses. When approved by the Secretary of the Interior, the standards become federal as well as state clean water goals.

With standards set, it would be easy to sit back contentedly, believing that the pollution control job is done, that overnight your local lake or creek will become clean enough to enjoy again for every use. Nothing could be farther from the truth. Your job is just beginning. The law is on the books. Now it's up to you to see that the standards have been properly set, that they are properly enforced, and that developing technology is fully used to achieve clean water. That will take a lot of doing, but it can be done.

The purpose of this booklet is to help you do the job—to become involved and join the battle. It gives you some background on water pollution problems and offers suggestions for individual and group action.

Background On Pollution Laws

Traditionally, pollution control has been considered a state responsibility. All states have had pollution control laws on their books for years. Originally, state laws were developed to protect public health and most state program and enforcement authority was placed in state departments of health. Gradually states recognized the need to protect all other beneficial water uses.

Presently the states place water pollution control authority either in an independent agency *outside* the state health department, in a statutory agency *within* the state health department, or as a function of the state health department. In most cases, the chosen agency is responsible for all aspects of pollution control, including law enforcement, and

setting water quality standards. Other state agencies, however, also have a vital interest.

Until 1948 the federal role was confined to three somewhat ineffectual laws. By the end of World War II it was evident that the states needed more assistance and in 1948 Congress passed a weak and temporary federal pollution control measure. Finally, in 1956 came Public Law 84-660—the breakthrough in anti-pollution legislation. This law is the basic authority for the comprehensive federal program to prevent and control water pollution. With it the federal government entered the pollution abatement field in a serious and permanent way.

One essential feature of the 1956 federal law helped communities to build waste treatment facilities by providing them with federal grants of up to 30 percent of project costs. Another provision allowed grants to state pollution control agencies to help them improve their programs. Both types of assistance were broadened, federal enforcement powers strengthened, and the research program expanded under the 1961, 1965, and 1966 amendments to the original act. So present law provides for even more effective state-federal cooperation in a national pollution control program, although primary responsibility still rests with the state.

The Law And You

From the citizen's point of view, the 1965 amendment, termed the Water Quality Act of 1965, was perhaps the "giant-step" forward in anti-pollution legislation. Under this law the states (and territories) were given the opportunity to hold public hearings and establish water quality standards for interstate and coastal waters within their borders. The hearings gave citizens a chance to say what water uses they wanted and how clean their local waters should be.

Water quality standards include three elements: (1) a determination of *uses* for each stretch of interstate and coastal water in the

the pollution control tools available to you—a citizen—are the water quality standards the states are now setting for their rivers, streams, and lakes. These standards are supposed to provide every community with water clean enough for drinking, swimming, fishing, boating, and other uses. When approved by the Secretary of the Interior, the standards become federal as well as state clean water goals.

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Water quality standards include three elements: (1) a determination of *uses* for each stretch of interstate and coastal water in the

United States and its territories, (2) critical *limits* of the amount of various pollutants allowed into the waters, and (3) *an implementation plan*, a documented step-by-step outline of remedial measures needed to prevent and control pollution in a given stretch of water.

The states were to submit their standards to the Secretary of the Interior. If the states did not establish standards, the federal government would. *Once approved* by the Secretary, standards become *state* and *federal goals*, legally enforceable by *both* governments. All states have submitted state-adopted standards and the Department of the Interior will approve most by early 1968. If the state and federal governments cannot agree, the act provides for further hearings to air issues and revise standards.

But the law itself will not clean up any water. First of all, the federal law must be backed up by effective state and local legislation. Then it must be put to use by public officials at every level of government. If these officials are to enact and enforce effective local laws, they must know that clean water is the express and determined wish of the citizens they represent—the voters in their town, county, and state. So you must let your public officials know you want—and expect—strict enforcement of clean water laws.

And you, in turn, should know what the laws require of your own communities, industries, and states. What are the laws? Who makes them work? How can you be sure they are enforced?

Getting The Law Enforced

Water quality standards are like speed limits. They are useless unless put into practice and successfully enforced. Getting the implementation plans carried out and the goals met on time is the responsibility of individual citizens, municipalities, industries, and government agencies.

As a concerned and informed citizen, you can make your interest in standards known at every level. Make it clear to your local elected officials and administrators of your local and state pollution control agencies that you want the clean water goals met—and met on time.

Join an organized local group working for the cause of clean water. (Refer to pages 20, 47, and 48.) Let your local and state pollution control agencies know of your interest and support. Find out how you can help in their efforts to get your waters clean.

Vote for candidates who support clean water. Make other candidates aware of and interested in the clean water issue.

At the same time, state publicly that you know controlling pollution to meet standards is going to cost money and that you are willing a pay your share of the price. Support local and state clean water bond issues and adequate funding of state pollution control programs.

As a clean water leader, you can do much more than just make statements and pay your share of the bill. You have the right and the duty—along with your official enforcement agency—to guard your own local waters. In other words, you can serve as a citizen "watchdog" over local lakes and streams.

You don't have to be an expert to recognize floating oil and debris, scum and foam, discoloration, odor, and other noxious materials. Observe where these pollutants are coming from. Report what you find to your local health officer or sanitation authority. Explain how the pollution endangers a desired water use—swimming, fishing, boating, or waterfowl habitat, for example—or otherwise violates standards.

Visit your local sewage treatment plant. Learn what kind of treatment it provides, how efficiently it operates, and how well it is meeting established water quality standards.

WHERE YOU COME IN

It's up to you to see that we get ahead and stay ahead of pollution. That may take a mighty effort, but you can do it! You must discover the causes of pollution in your community. Learn what must be done to prevent and control it. Demand that your responsible authorities employ every legal, administrative, and technological control device to their command.

We are now at the point of being forced to prevent and control pollution to guarantee an ample water supply in the future. We have the desire, technical know-how, laws, and money to provide enough clean water. But technology, laws, and money won't clean up any water. They are only tools which must be put to use by citizens, public officials, and industry. Your job is just beginning.

The Problem

Pollution results from many activities, both man's and nature's. Water becomes polluted when wastes from these activities flow into a lake or stream in such quantities that the water's natural ability to cleanse itself is lessened or completely destroyed. The natural purification process uses oxygen to decompose organic matter—to break down the pollutants into a harmless and inoffensive form. But when too much waste—even treated waste—is dumped into a given stretch of water, the natural process can't handle the job. The result is visible and sometimes unhealthy pollution. The damage may be nearly permanent.

Once our waterways could use their natural purification processes successfully because of the relatively large volumes of water and limited amounts of pollutants. But with the growth of our nation, greater demands for water and increased amounts of

waste have reduced the capacity of our waters to assimilate the waste loads. The additional wastes result from increased population, greater industrial water use demands and disposal of more complex wastes, and expanded farmland irrigation.

Among the wastes being dumped into our waters every day are some or all of the following:

- Sewage and other wastes from cities and industries, from pleasure boats, commercial ships, and marinas.
- Nutrients (principally phosphates and nitrates) from sewage, industrial wastes, and land run-off.
- Complex chemicals (from household detergents, pesticides and herbicides, wastes from industrial processes).
- Oils from ships, on-land and offshore drill rigs, and shoreline industrial facilities. Crankcase oils from your local auto service station.
- Acids from underground and surface mines and industrial processes.
- Silts, sands, debris from city streets, from urban construction, highway building, farm surface erosion, and dredgings from channel clearings.
- Salts from our winter streets, from field irrigation, and from industrial processes.
- Heated water from power projects, industrial processes, and reservoir impoundments.
- Disease-causing bacteria, mainly from municipal sewage.
- Radioactive wastes from mining and processing of radioactive ores, from materials used in power plants and in industrial, medical, and other research, and from fallout during nuclear weapons testing.
- Heavy metals from industrial plants.

These wastes have placed serious strains on our waste treatment systems, as well as our waterways. Some are very difficult to

remove. Others respond to conventional treatment, but we haven't built enough treatment facilities to keep them out of our waters.

Without adequate waste treatment, the organic load being put into the water soon exceeds the amount of oxygen needed to decompose it. As the waste decays it uses oxygen and gives off odors. In extreme cases the process takes most or all of the oxygen from the water. This results in the death of fish and other oxygen-requiring animals and produces an environment unpleasing to the senses and unhealthy to live in. Recreation and business opportunities may be adversely affected as well.

Thus from a social and actual survival viewpoint, our cities and industries have had to begin thinking about how to remove as much as possible of the oxygen-demanding pollutants from their wastes. Providing adequate waste treatment and a sufficient supply of clean water have become major economic and social concerns.

The daily available water supply flowing in our rivers has been estimated at between 1,100 and 1,300 billions gallons a day. Between 560 and 700 billion gallons a day of this is the most experts expect to capture through water development and engineering projects (building dams and reservoirs, tapping new ground water reserves, etc.). Currently, we use about 355 billion gallons a day. By 1980, when we will have perhaps 515 billion gallons of water available each day, we will need between 570 and 600 billion gallons a day. By the year 2000 our daily use may reach the 900 to 1,000 billion gallons a day mark—causing us to withdraw between 80 and 90 percent of our daily river flows each day. While not all water withdrawn is consumed (evaporated), the used water is returned to the stream polluted by man's activities. It is not acceptable for reuse without treatment.

These estimates of water use and supply clearly indicate that we must prevent and control pollution NOW.

The Present Climate

Government: Responsibility for water pollution control, once considered the burden of local governments alone, is now shared by state and federal governments. Cooperation among all three levels is essential. State and federal programs assist communities in many ways. Financial grants and loans for planning and building waste treatment facilities, other technical assistance, research and training grants, and enforcement of water pollution laws are some of the state and federal aids.

The People And Industry: Because people want water for many uses, recreational as well as municipal and industrial, public concern over pollution control is at an all-time high. Polls indicate that more and more citizens support public leaders willing to act against pollution.

Once people understand the economic and social costs of not having clean water, they are ready to pay their share of the cost of pollution control. The cost will be expressed in bond issues and higher taxes to build waste treatment facilities. It will be expressed in slightly higher consumer prices reflecting industrial investment for pollution controls, including process changes, improved waste treatment facilities, by-product recovery, increased water reuse, and so forth. It may find expression in tax incentives to help industries solve their complex waste problems.

Cleaning up our dirty water in some cases is going to be expensive. But for each year of delay, it will become more costly. According to a 1968 study by the Federal Water Pollution Control Administration, it will cost approximately $35 or $40 annually per person between now and 1973 to construct and operate the waste treatment facilities needed to clean up our polluted waterways, 72¢ per week, on the average.

This includes the costs of updating old and constructing new municipal and industrial sewage treatment plants, thermal cooling facilities, and needed sanitary sewers. These capital and operating expenditures are required to meet water quality goals. Not included in these estimates are costs of separating combined sewers, nor controlling acid mine drainage, sediments, and radioactive wastes.

The Elected Officials: At all levels of government, elected officials are responding to public demands for improved water pollution control. Already a number of political figures have exercised the strong legislative leadership needed to pass more effective state and federal legislation.

The Objectives

Congress unanimously passed the Water Quality Act of 1965. For the first time specific clean water objectives became possible because the states were given the option to plan specific water quality goals and time schedules for cleaning up their interstate waters.

The new law recognized your right as a citizen to say how you want your waters used. It was especially designed, in fact, to help the many economic and social interests in the states to determine jointly how available waters could be shared to fulfill all their varied legitimate needs: for recreation and and aesthetics, fish and wildlife, municipal water supply, industry, agriculture, and navigation.

As a citizen, then, you can now play a major role in getting clean water by learning about the goals and plans your community and state have established through their water quality standards. You can insist that every goal be met by the deadline scheduled. This will require you to provide aggressive, responsible, and determined support of your public officials who are charged with getting the standards implemented.

WATER QUALITY STANDARDS ...AND YOU

Where The Standards Came From

The Water Quality Act of 1965 (Public Law 89-234), now part of the basic federal water pollution control law, intended: "to enhance the quality and value of our water resources and to establish a national policy for the prevention, control, and abatement of water pollution."

The Act allowed the states until June 30, 1967, to submit their proposed standards to the U. S. Department of the Interior for review and approval. Once approved by the Secretary of the Interior, the standards are legally enforceable by both state and federal governments.

Enforcement of standards by either authority applies only to *interstate* waterways, because standards presently apply to *interstate* waters, unless your state has also set standards for its *intrastate* waters.

Many states already have. Others will. (Federal law offers a financial bonus grant incentive for treatment works discharging into waters for which standards have been set, whether *intra* or *inter* state.)

Water quality standards include three essentials:

1. WATER USES. As required by the law, the states held public hearings to determine water uses desired for and appropriate to each stretch of their interstate and coastal waters. Hearing witnesses—including private citizens, conservation spokesmen, and representatives of industry, agriculture, local government, and others—helped decide uses for which particular water stretches would be reserved. In most cases, several desired uses—such as drink-

ing water, swimming, fishing, boating, agriculture, industry, navigation—applied to the same stretch of water. In such cases, standards were set to permit the highest use, thus requiring other users to bring their waste treatment up to this standard. After the hearings, state pollution control officials made final decisions assuring the uses each stretch of water must support . . . now and in the future.

2. CRITERIA. Once uses were chosen, state authorities, in consultation with scientists, engineers, and other water experts, decided what substances and how much of each the waterway could absorb—and still be fit for the desired uses. These limits (in the Act called "criteria") are expressed in terms of ranges or critical levels of substances (such as dissolved oxygen, total dissolved solids, sediment, heat, bacteria, toxic elements, etc.) legally allowed in the water. To be acceptable, the criteria had to be adopted by the state agency as a state rule or regulation having the force of law.

3. IMPLEMENTATION PLAN. After deciding uses and scientific criteria, state pollution control officials and technical experts surveyed municipal, industrial, and other wastes flowing into the waters to decide what type of treatment these wastes required to protect or improve the receiving waters. Then the authorities developed specific, detailed plans to produce the desired water quality. These implementation and enforcement plans are supposed to identify every known source of pollution, to provide a step-by-step schedule for building or improving municipal and industrial treatment facilities, and to outline other anti-pollution measures needed to make the water quality meet the criteria. Some include a discussion of state programs being undertaken to eradicate a few of the more complex pollution problems

such as combined sewer overflows, acid mine drainage, vessel pollution, siltation, nutrient removal, irrigation return flow, and others. Study these plans to see if your community is following a desirable program.

Characteristics of Approved Standards

Official Interior Department policy requires standards that will enhance existing water quality and permit no stream to be designated solely as a carrier of wastes. No approved standard allows wastes which can be treated or controlled to be discharged into any interstate water without treatment or control. The policy is to accept nothing less than secondary treatment for all municipal waste discharged and the equivalent for all industrial discharges. This is the rule unless it is demonstrated that a lesser degree of treatment or control will meet the criteria the established uses require. Standards require as well that the criteria be met during critical water periods—low flow months, for example.

Waters whose existing quality is better than standards established must be maintained at their existing high quality. These and other state waters must not be lowered in quality unless it can be demonstrated that such change is justifiable for neccessary economic or social development. This means that any industrial, public, or private project or development which would be a source of new or increased pollution will be required to provide the highest and best degree of known waste treatment.

Approved standards in most cases include specific criteria which describe the water characteristics scientifically. The scientific parameters or limits, for example, indicate amounts of dissolved oxygen, pH (acidity or alkalinity), temperature, bacteria, toxic substances, and other materials permitted in the

ENFORCING YOUR STANDARDS

As a citizen you should be informed about the water quality standards established for your local rivers, lakes, streams, and estuaries. How and where you can get this information and what you can do as a citizen to get your standards enforced is the subject of this chapter.

Actions You Can Take

1. Join a local group working for clean water in your community and state. Many organizations have active clean water programs. Among them are unions, service clubs, women's clubs, sportsmen's, boating, and skindiving clubs, church groups, chambers of commerce, industrial, agricultural, and business organizations.

A core of anti-pollution support is usually found in local conservation organizations such as Audubon, Garden Club, and Izaak Walton League chapters, and League of Women Voters groups. There may also be a Clean Streams Committee in your area incorporating many citizen groups concerned about polluted water.

2. Encourage other individuals and groups to join the action program for clean water.

3. Work with educational, scientific, and technical groups. University faculties, technical societies (fisheries and wildlife biologists, sanitary engineers), and professional organizations (doctors, lawyers, teachers) are sources of cooperation and competent scientific assistance. Seek their help.

They can provide the expertise you may lack to interpret water quality criteria and facts about the capacity and adequacy of your local sewage treatment works. They can

give you information on how pollution affects fish and wildlife and human health and safety.

4. Find out the standards established for your rivers and lakes and streams.

5. Find out how your standards will be implemented and enforced. Implementation and enforcement are primarily the responsibility of your state. If your state fails to assume its obligation, the federal government will be forced to step in.

The implementation plan, and the step-by-step enforcement of that plan, are as important for you to study and follow-through on as the criteria. Remember, the CRITERIA SET the clean water GOALS; the PLAN SPECIFIES the STEPS to get there; ENFORCEMENT ENSURES the STEPS will be taken.

For example, your plan says communities A, B, and C and companies X, Y, and Z are polluting the Hometown River. Certain actions outlined in the plan will stop the pollution. To begin, all bad practices, such as dumping raw sewage into the river, must be stopped. Communities A, B, and C must build new treatment facilities by 1972 and companies X, Y, and Z must install improved treatment facilities by 1971. The plan gives dates when each step toward completion of the facilities must be accomplished. The communities and companies are under pollution abatement schedules and they can be brought to court to force compliance with these schedules if necessary.

So, the plan indicates remedial measures and underscores the authority which will compel their implementation. Enforcement of the remedies will, in time, bring the water quality of the Hometown River to the improved state described by the accepted criteria.

6. Find out what monitoring programs have been planned to help enforce your standards.

plank and by choosing the right candidates to lead a clean water campaign. If you've nominated and elected a "clean water candidate" who fails to come through on needed legislation or appropriations for a strong local and state program, "throw the rascal out!"

10. Make sure your community and state use grants and other federal assistance to full potential. The federal government provides grants to communities to help them build treatment plants. In 1966 the federal construction grants program was broadened and extended through 1971. The 1966 act increased the funding authorization (although total funds authorized have not always been appropriated). It also extended the federal share of project costs to a high of 55 percent under certain conditions. This means that while your community would once have paid 100 percent of the costs of a sewage treatment plant, it may now pay as little as 20 percent.

Presently the minimum federal share of eligible project costs is 30 percent. If your state puts up 30 percent, the federal share is increased to 40 percent and your community's share is reduced to 30 percent. If, in addition, your state has approved water quality standards for the stream on which the plant is located, the federal share may be increased to 50 percent. Then your state and community need only put up 25 percent each. If your state planning agency certifies a project as part of a comprehensive area plan, the federal government will increase its share by another 10 percent (by 3 percent on a 30 percent grant, 4 percent on a 40 percent grant, or 5 percent on a 50 percent grant). This reduces your city's share to 20 percent, though your state's contribution remains at 25 percent.

Many states already qualify for the increased federal grants. Does your state provide funds for waste treatment plant construction? If not, your community is losing

out on money which is available to help build facilities. Urge your state government to pass enabling legislation and to provide funds for community construction grant aid. The federal-state program has already aided thousands of communities to build nearly $4 billion worth of waste treatment facilities.

11. Support a state certification and licensing program for sewage treatment plant operators. Building waste treatment facilities is one key to pollution control. But building the finest facility is of little use if the people operating it are not skilled and technically trained.

Most states have mandatory or voluntary operator certification programs in effect. Does yours? Is your local facility run by qualified personnel? If not, campaign to improve operator qualifications. Enlist the help of state unions or trade associations.

Certification and licensing programs cost money, so do highly trained plant personnel. But graduates of such programs will be better qualified people, capable of operating existing and new "super" sewage treatment plants at the highest possible degree of efficiency. So state certification is a legitimate cost of pollution control and should be accepted as such.

12. Organize your own program to monitor local water quality. While boating, fishing, or swimming, you can check conditions existing in your local waters. Even by simple physical observation you can discover whether local waters meet standards requirements regarding debris, scum, taste, odor, color, and other obvious pollutants.

Your local high school or college science classes could cooperate by testing local water quality, checking their findings against legal standards, and writing the state agency for explanations of their findings.

Or your organization could finance a special project to double-check local water quality against established standards. For example,

you could hire a scientist, engineer, or interested graduate student to conduct a summer survey or do a project paper on progress being made toward achieving local standards.

Scientific members of your organization could train other members in the basics of taking pH or other water quality counts for your records. Or they could run laboratory tests on local water samples and keep accurate records of findings.

You can also organize pollution clean-up teams to remove floating trees, beer cans, and other trash from your local lakes and streams. Scouting, school, and other youth organizations are frequently sources of help for such projects. These activities are newsworthy.

13. Don't overlook the possibility of bringing direct court action against polluters. If your local pollution control goals are not met and the responsible agencies fail to take appropriate action, you may be able to institute court proceedings to get your standards enforced.

This kind of court action instituted by citizens is usually a last resort. When this becomes necessary, however, *gather* all pertinent *facts* about the recalcitrant polluters *first*. Who are they? Where does the pollution occur? What type of pollution is it? What waters are affected? What community and state(s) are affected? *Next*, write your Governor and ask what action the state water pollution control agency is taking against the polluters. (Send copies of your letter to the Secretary of the Interior and your local and state pollution control officials, to other conservation and water groups.)

If your letter fails to get results, your organization, alone or with other interested groups, can engage a lawyer to advise you how best to proceed. He may suggest that you present a legal petition to the federal or other agency responsible for enforcing water quality standards and compliance laws. The petition would be signed by citizens and residents of the state, with addresses, and would contain the facts about the pollution laws being

violated, by whom, and what community and state, and what waters are affected. Next step would be a conference with the officials concerned. If these officials will neither confer nor act, then the court should be petitioned to act to force the agency to exercise its statutory powers to stop pollution. This would be done by seeking a *writ of mandamus* from the appropriate court (state or federal, depending on the agency responsible and on what waters are involved).

14. Take a more active role in local and regional planning activities. You can help with standards implementation by insisting on careful and foresighted regional planning and coordination. Ask your planners to produce overall plans and zoning maps which include appropriate consideration and use of flood plains and estuarine areas. Demand that sewers and waste treatment facilities be included in area master planning—and especially that consideration be given to possibilities for building regional waste treatment facilities. Often new industrial plant needs can be met when a local municipal facility is built, if planning is done ahead. Suggest that plans for facilities and land development of every type consider effects of the land use on local water quality.

Information Channels You Can Use

A listing of private anti-pollution groups and of typically responsible officials and authorities may be found on pages 47-48. Following are brief explanations of how various sources can be helpful to you.

1. Membership organizations of every kind. Anti-pollution groups furnish a base from which to work with local and state pollution control authorities and to conduct community information-education programs. More important, community or regional organizations can concentrate on the problems of a particular watershed and become highly informed experts on a certain body of water. This

makes the organization a potent spokesman. Likewise, individual members should specialize in matters within their talents. For example, your group could set up special committees—on standards, surveillance, enforcement, local industry, and municipalities —and put at least one expert member on each to guarantee effective action.

2. Elected officials and agency personnel. Certain township, municipal, county, regional, state, and federal elected officials and agency authorities have information about pollution control.

These officials are cooperative and responsive to citizen inquries. In most cases contacting the right official—and following up on your inquiry after an appropriate lapse of time (whether or not you have had a reply) —will help you to get the information you seek about a local problem.

In cities, water pollution control is usually the function of the city engineer's office, the city's water agency, or its health department. Your state water pollution control agency is usually located in your state capital.

Go right to the top in cases of a serious problem or emergency. Contact your Governor, U.S. Representative or Senator, the head of your state pollution control agency, and the Secretary of the Interior.

a. **Elected officials (and their supporting political party organizations).** The President and many governors have declared their support for clean water. Congress unanimously voted a national clean water mandate. Carrying the program forward requires public officials at all levels—local, state and national—to provide support. They must exert the financial and administrative action necessary to assure clean water within their political jurisdictions. Support them.

b. **Local, state, and federal pollution control agencies.** The responsible agencies are usually the State Department of Health,

the State Water Quality Control Board, the State Department of Water Resources, and the State Department of Fish and Game.

It is very important for citizens to work with these agencies for several reasons: 1) they are the professionals and are *your* public servants; 2) they have the best information available; and 3) they have authority to take legal and administrative action unavailable to the private citizen. Learn what they are doing and what their attitudes and plans are. Show them they have strong public support for their clean water activities. Make them work for you.

c. **Other local, state, and federal agencies interested in pollution control.** Possibilities include: county farm organizations, local soil conservation districts, metropolitan sanitary districts, port directors, harbor masters, etc.

d. **Administrative agencies.** These agencies hold decision-making authority. Among them are licensing agencies, zoning boards, and federal permit-granting agencies (Federal Power Commission, Atomic Energy Commission, Corps of Engineers, etc.).

3. News Media. The recently enacted "Public Information Act," P.L. 89-487, places new emphasis on the public's right to information in the hands of the federal government.

If you can't pry information loose, you can complain loudly to your local news media—press, radio, and TV. Offer evidence of the problem, the steps taken, information discovered, and the problem you're meeting.

It is often helpful to raise questions and to ask for information in personal interviews with authorities, in letters to the editor, in speeches, etc. This can bring things out in the open. Invite public officials to your organization's Annual Dinner. Sometimes the public nature of an inquiry or statement on such an occasion evokes facts you would not discover and produces statements in the nature of true public commitment.

YOUR ROLE IN THE FUTURE

Your waters will not become clean and wholesome overnight, even though the laws, technology, good intentions, and money needed for pollution control exist.

So **YOUR JOB** is to bring responsible public inquiry to bear, to coax and urge, prod and irritate (if necessary), to assure successful clean water activity in your community and state.

YOUR JOB is to demand comprehensive pollution SURVEILLANCE (that means official "watchdogging"!) first in your local waters and then in your state waters.

YOUR JOB is to insist on strict ENFORCEMENT of water quality standards and other pollution control laws. Unless you are viligant, tough, persuasive, *and public* in making demands, things won't be any rougher for polluters than in the past. And your water won't get cleaner.

YOUR JOB is to provide vigorous all-out SUPPORT FOR DYNAMIC LOCAL, STATE, AND NATIONAL POLLUTION CONTROL PROGRAMS. A good program must be based on valid and sufficient legal authority, efficient administration, and a budget capable of providing ample salaries and adequate grant, loan, and training programs.

Securing acceptable surveillance, enforcement, and overall state control programs isn't a quick and easy mission. You will have to spend hours on routine chores like making phone calls, writing letters, publishing information bulletins, attending meetings and hearings. You will repeatedly have to explain to neighbors, friends, and others why they must vote *yes* for pollution control bond issues, why your city or state needs a bigger pollution control budget, why your state needs a grant program for building waste treatment facilities, why your treatment plant operators should be licensed and better paid, why your local industry needs a tax break to build treatment facilities. These are all thankless tasks, duties without excitement or glamour. But they are the only way to get the job done.

You may meet some common stumbling blocks. Agencies often do not move quickly to implement suggestions. Funds are not always available in the right amounts at the right times. Legislation is hard to get enacted immediately. Administrative and legal delays frequently slow action. Letters, complaints, and pollution reports may go unacknowledged for a time. But persistence pays off. Despite obstacles and frustrations, you will prevail if you keep at it! It is only where citizens don't speak up and don't get to work that failure results.

So hitch up your resolutions, warm up your typewriter, and get started! POLLUTION CONTROL IS UP TO YOU!

APPENDIX

CITIZEN ACTION CHECKLISTS

A. YOUR LOCAL WATERS

Which are interstate, intrastate, coastal waters in your area?

What is the present condition of these waters?

Municipal Pollution Problems

1. Which cities and towns contribute pollution to local waters?
2. Does each community provide adequate waste treatment?
3. How well do existing facilities measure up to present pollution loads?
   - Is your treatment plant able to handle present waste loads even during storm periods? If not, why not?
   - Does your plant operate 24 hours a day, 365 days a year? If not, why not?
   - Is your plant run by trained and licensed sewage treatment operators?
   - If your plant claims 90 percent efficiency, is that percentage reached once a year, once a month, every day?
   - How well do existing facilities measure up to established water quality standards?
4. Are new facilities needed?
5. If so, are they in the planning stages? When will they be in operation?
6. What local official is responsible for initiating and following through on planning, contracting, etc.?
7. Are there areas now using septic tanks which need sewers and treatment facilities?
8. Are such facilities planned for? By whom?
9. How will they be paid for?

Industrial Pollution Problems

1. What industries add pollution to local waters?
2. Where are the effluent outfalls?

3. What types of waste are being discharged?
4. What degree of treatment does each industry provide?
5. If treatment is inadequate, what steps is the industry planning to improve its facility?
6. What will be the cost of such steps? Who will pay? When will the steps be completed?
7. Are any local industries discharging waste which should *not* be allowed in your waterways under any circumstances (for example, poisons or substances which cannot be removed by treatment)?
8. What is being done about this problem?
9. What steps are planned to assure that all new plants and projects will comply with established water quality standards?

B. YOUR LOCAL STANDARDS

Compare your standards with the guidelines prepared by the Federal Water Pollution Control Administration. Check out the following points, for example:

1. Will your standards actually enhance the quality of your local rivers, lakes, streams, and estuaries?
2. Will your standards prevent any increase in pollution of your local waters?
3. Has any portion of any local water been designated solely for transport of wastes?
4. What is the present and proposed quality of your local water?
   - Is present water quality correctly described?
   - Are adequate provisions made to maintain and protect existing high quality water? Or will your standards permit lowering existing water quality?
   - Will proposed standards upgrade and

enhance receiving waters now polluted?

- Are appropriate measures planned to produce better water quality in the future in accord with uses desired?

5. What uses have been proposed for waters in your area?
   - Will the waters to which these standards apply be clean enough for all desired uses?
   - Are present water uses identified?
   - Are future desired uses described?
6. What criteria have been proposed for each use?
   - Do trained scientists feel these criteria can provide the water use to which they are assigned?
7. What is included in your plan of implementation?
   - Do your standards have a plan for implementing and enforcing criteria?
   - Is there evidence to show that all wastes amenable to treatment are or will be treated?
   - Are all wastes discharged to interstate waters receiving adequate treatment?
   - If less than secondary treatment is called for, will it provide for required water quality?
8. How will the plan be enforced?
   - Do your standards describe the nature of actions to be taken to achieve compliance?
   - Do they give timetables for compliance?
   - Do they describe controls and surveillance for measuring compliance?
   - Do they describe enforcement authority and measures for ensuring compliance?
   - What is your guarantee dates will be met?
   - What administrative procedures (such as reports on monitoring and meeting of time schedules) and what legal

procedures (such as court orders, injunctions, etc.) are planned?
   - Have previous enforcement action recommendations been included?
   - Are provisions made for revision to reflect recommendations resulting from future enforcement actions?
9. Is your time schedule now being met, step-by-step?
10. Who in your community is responsible to see that the time schedule is met?
11. What other remedial measures are needed?
12. Does your state's plan for your local waters conform with plans of other states sharing the same waters?

C. YOUR STATE POLLUTION PROGRAM

1. Does your state agency have a good public education program which provides: films dealing with water pollution and clean water issues in your state; radio and TV spots for public service time; exhibits or displays on state pollution problems for meetings and conferences?
2. Does your state agency provide any other assistance to citizen groups for public information programs (small grants or loans, for example)?
3. Does your state agency notify citizens of public hearings on pollution, standards, requests for exceptions to standards, issuance of effluent permits, and other important matters?

CITIZEN POLLUTION REPORT

In reporting a pollution problem or emergency, you should include the basic information which a water pollution official will require to take prompt action. For example, he will need to know the following details:

1. Location—name of stream, lake, or water and exact place (by reference to identifiable land marks).

2. Date and time observed.
3. Nature of pollutant—oil, scum, algae, foam, garbage, raw sewage, floating debris, etc.
4. Appearance: color, odor—describe: ....
.....
5. Fish or wildlife affected: fish, frogs, turtles, waterfowl, birds, or other species. Estimate numbers.
6. Source of pollution, if found: industrial or municipal outfall, septic tank outlet, drain tile, manure lagoon or other lagoon overflow, oil rig, commercial vessel, marina, etc.
7. Name and address of alleged polluter.
8. Your own name, address, and phone number, and the same information for other known witnesses.

Copies of the report should be sent to your local and state water pollution control agency as soon as possible.

A simple form with spaces for the above information can be prepared for use by your organization's members.

WASTE TREATMENT PRIMER

The most common means of pollution control in the United States consists of a system of sewers and waste water treatment plants. The sewers collect waste water from homes, businesses, and many industries and deliver it to treatment plants designed to make it fit for re-use or discharge into receiving streams. Man-made treatment processes may be mechanical, biological, or chemical in nature. In each case they speed up the natural processes by which water purifies itself. Primary and secondary plants provide conventional waste treatment methods. Tertiary treatment will soon become equally common.

Primary treatment, a mechanical process, removes solids which will float or settle out of water. Called clarification or sedimentation because it "clears" the water of some of its turbidity (cloudiness from suspended sol-

id materials), sediments, and floating materials, primary treatment is the first step. It is usually followed by chlorination if the waste water is then to be discharged to a receiving stream. Proper chlorination is beneficial in reducing the number of disease-causing bacteria in the water.

Thirty percent of our municipalities presently give only primary treatment to their sewage, although this process used alone is considered inadequate. Today's cities and industries, faced with greater waste loads and with complex wastes which are difficult to remove from water, must turn to secondary and even tertiary treatment.

Primary treatment removes only about 40 percent of the organic matter in waste water. The resulting effluent, if then discharged to a stream, may cause great harm. For example, the effluent may use up most or all of the stream's oxygen supply to decompose the remaining waste. This need of oxygen, expressed as biological or biochemical oxygen demand (BOD), is a measure of waste treatment efficiency. The greater the BOD in the stream, the less adequate has been the treatment.

Secondary treatment goes one step beyond primary. Basically, it destroys organic matter (which can be decomposed through biological processes). Whereas primary treatment is a mechanical process, secondary treatment is a biological process which duplicates nature's purification method by using bacteria to decompose organic matter in the waste water. More bacteria are used and conditions are controlled, however, to speed up treatment. There are a number of biological treatment methods, but the activated sludge process is becoming the most common. Among its advantages are the smaller area required for the plant, lower capital cost, higher degree of purification, greater flexibility, and more precise control.

Secondary treatment can remove an additional 40 to 50 percent of the organic matter

in the waste water, giving an 80 to 90 percent efficiency (BOD removal) for a primary-secondary plant. Combined treatment, then, reduces the burden on the receiving waters by eliminating more oxygen-consuming material. Final step in secondary treatment is effluent chlorination.

But these two conventional waste treatment processes are already hard-pressed to hold the pollution line as our population and industrial production increase. Already a third step called "tertiary" treatment is necessary in large metropolitan and/or heavily industrialized areas. Tertiary treatment, essentially a chemical process, is built on the primary-secondary steps, but goes beyond them. The combination of methods used in tertiary treatment depends on a number of factors, among them composition and volume of wastes, geography, and water quality requirements of the receiving water.

Tertiary treatment steps may include chemical treatment in the following sequence: *coagulation-sedimentation* for additional solids removal (and over 90 percent reduction of phosphate concentration); *filtration* to remove all remaining turbidity; and *absorption* to remove over 98 percent of the dissolved refractory organics—stubborn organic matter which resists normal biological treatment. If a reduction in dissolved salts is required, *electrodialysis* may be the final step. This is a complicated process which uses electricity and chemically treated plastic membranes to remove mineral salts from waste water. Electrodialysis is generally used only if water will be reused for municipal or industrial supplies.

These further steps can remove an additional nine percent of the organic matter remaining after primary and secondary treatment, bringing total efficiency of the combined methods to 99 percent. Obviously, none of these processes stands alone. They should be planned and designed to handle each particular pollution control situation.

Properly planned, they can produce any degree of pollution control desired. Water produced by such treatment systems becomes too good to throw away because it is of a quality suitable for any desired reuse—including drinking water supply and recreational water.

Research and development are now working toward advanced techniques which will improve and may someday replace existing waste treatment technology with simpler and more economic methods.

GETTING YOUR WASTE TREATMENT PLANT BUILT

Construction of waste treatment plants is one key to pollution control because many cities, towns, and industries today still dump raw sewage and other wastes into their waterways. This means they must build waste treatment facilities at an unprecedented rate just to catch up.

As an interested citizen, you should understand what is involved in getting a new or improved community waste treatment plant. Learn something about types of facilities (local or regional, for example), costs, financing available, building time schedules, etc. Be sure to consider the influence local and regional politics may have on approval of plans and projects.

FIRST STEPS

First step in planning a waste treatment facility is to *demonstrate the need* for a new or improved plant. Your local water quality standards law may have defined the need already.

Next, your local government must get plans underway. Certain necessary steps must be taken, each requiring some time. Each step should follow a definite time schedule, available to the public. Then as each deadline arrives, you can check on progress. If delays occur, seek explanations from your responsible local officials. If explanations are

unsatisfactory, ask your state agency what measures are being taken to enforce compliance.

Remember that each step gives you an opportunity and a duty to ask questions and participate in planning. Insist that your community consider the merits of a regional as opposed to a local facility. Is the facility being planned most appropriate to your needs and finances Is it the best size plant with regard to operation and financing? Could costs be shared with other communities or local industries? Is the scope of the planning appropriate, especially with regard to future predictions of population increase, industrial growth and other factors?

Building a regional or metropolitan facility has several advantages: unit cost decreases and better financing is available; better management, operation, and maintenance are possible.

If you plan to seek federal funds make sure your community develops a coordinated comprehensive plan. Also, consider the availability of funds early in your planning. These questions should be reviewed when your community calls in the consulting engineer.

While no universal steps nor time schedules exist, here is a suggested list of usual steps and time requirements for building a treatment plant.

USUAL STEPS

1. Local government decides to take first steps.
2. Consulting engineer hired.
3. Engineering report made.
4. Site selected.
5. Facility designed.
6. Plans and specifications completed.
7. Financing arranged.
8. Grants accepted.
9. Contracts awarded.
10. Construction started.
11. Plant opened, operation and maintenance begun.

SUGGESTED TIME FOR PROJECTS

Treatment Plants (in general)

From engineering report to plant operation	from 1 year 4 months to 2 years 6 months
From arrangement of financing to plant operation	from 1 year 4 months to 2 years 6 months
From start of construction to plant operation	from 10 months to 2 years

Treatment Plants (communities under 10,000 and small industries)

From completion of plans and specifications to completion date	18 months
From contract awards to completion date	12 months

Treatment Plants (communities over 10,000 and large industries)

From completion of plans and specifications to completion date	30-33 months
From contract awards to completion date	21-24 months

Chlorination Facilities

From completion of plans and specifications to completion date	12 months
From contract award to completion date	12 months

POLLUTION PROBLEMS AHEAD

Some of the following top priority pollution sources and locations require development of improved control techniques.

Thermal Pollution: Power plants and some industries use large volumes of water for cooling. Use of cooling water will increase dramatically over the next several decades as more power stations are built.

Cooling water returned to source streams without pre-cooling may raise stream temperatures from 10 degrees to 30 degrees F above normal temperatures. Many discharge

temperatures now range up to 115 degrees F, often resulting in river temperatures above 95 degrees F as far as five miles downstream from a power plant.

Water temperatures exert a profound influence on aquatic life. Heat, for example, reduces water's capacity to hold oxygen. With less oxygen present, water becomes less efficient in assimilating wastes and may harm fish and other aquatic life. While limited temperature increases may benefit some aspects of fish growth and reproduction, uncontrolled temperature increments could have disastrous ecological effects, particularly in fine trout streams and sensitive estuaries.

Given the growing use of nuclear power plants, which require greater volumes of cooling water than fossil fuel stations, and the present lack of regulation to control heated discharges to streams, thermal pollution is one of the major problems to be overcome in the next few years. Two types of water cooling facilities, cooling towers and closed circuit cooling systems, now exist. The job ahead is to get these essential facilities included in the design for power plants. States should not grant exceptions to water quality standards to allow hot water discharges to their waterways.

Storm Water Overflows: There are two kinds of sewer systems, combined and separate. Combined sewers carry away both water polluted by human use and water polluted as it drains off homes, streets, or land during a storm. In a separate system, sanitary sewers carry only sewage and storm sewers handle the large volumes of water from rain or melting snow. Most older and larger cities have combined systems. During storms, because of increased water volumes, much of the combined storm and sanitary water by-passes the local treatment plant. Thus, completely untreated sewage enters local waters during storm periods. Separation of combined sewer systems would relieve as much as 50 percent of the pollution problem in some areas, although even where sewers are separated surface water run-off problems may still exist.

Oil Pollution: Pollution of ocean surface, coastlines and beaches, estuaries, harbors, rivers, lakes, and land from oil spills, whatever the source, is a serious problem. Oil damages and destroys important land and water areas and essential forms of life as well.

Tankers, handling terminals and commercial and naval shipyards where oil can be loaded or unloaded, tank cleaning companies, on-land and offshore drilling rigs, refineries, petrochemical plants, other industrial operations, storage facilities, sunken tankers and other ships, and natural oil seeps off certain coastlines are all sources of oil pollution. Another source is service stations and garages which may dump used crankcase oil into community storm and sanitary sewers. The effect on local water quality is considerable since the used oil also contains detergents and other chemicals.

Vessel Pollution: Studies have shown that vessel pollution poses a growing threat to harbors, bays, lakes, estuaries, and other heavily used waterways. It is senseless to expect cities and industries along these waters to clean up their waste discharges only to have the water remain polluted by sewage; oils; litter; bilge, ballast, and wash waters; sludge; and other substances discharged from vessels. Federal regulations governing such discharges have been proposed for vessels of all descriptions.

Irrigation Pollution: Irrigation of crop lands can damage water quality. Water leaching through the soil collects salts and minerals which increase in concentration as the water is repeatedly reused. Further concentration occurs as water is lost through transpiration by plants and from evaporation. The brackish water resulting may not be fit for municipal purposes or for further agricultural uses downstream. Better methods must

be found to reduce concentrated salts and minerals from irrigation return flows.

Agricultural Run-off: Rains washing agricultural lands carry wastes from animal feedlots as well as non-degradable pesticides and herbicides (chemicals which do not break down on reaching the water but remain to produce harmful effects on plants and animals). Land drainage pollution is hard to control because all the waters in a given watershed cannot be collected and treated as wastes from cities and industries can. Because of its detrimental effect on water quality, land run-off must be controlled.

Acid Mine Drainage: Acid mine drainage from abandoned underground and surface mines harms fish, wildlife, plants, and aquatic insects. While low acid concentration may not kill fish and wildlife, it can change their physical condition or growth rate. High acid concentration may suppress or prevent reproduction of desirable fish species or may prove lethal. Preventive control measures being tried include recontouring disturbed land and grouting, flooding, or airsealing old mines to stop the flow of polluted water. Water treatment methods are also being studied.

Sediments: Large volumes of soils, sands, and minerals washed from the land and paved areas of communities into our waters cause another pollution problem. Sediment fills stream channels and harbors, requiring expensive dredging, and fills reservoirs, reducing their capacity for a useful life. It erodes power turbines and pumping equipment and reduces fish and shellfish populations by blanketing fish nests and food supplies. More importantly, sediments reduce the amount of sunlight penetrating water. Sunlight is required by green aquatic plants which produce oxygen necessary to normal stream balance. Sediment greatly increases treatment costs for municipal and industrial water supply

and for sewage treatment where combined sewers are used.

Estuaries: Destruction of estuarine areas by pollution, by dredging to improve navigation channels or harbors, or by bulkheading or filling (for land development) threatens U. S. commercial and sport fisheries and wildlife populations. Estuaries — including sounds, marshes, bays, lagoons, and coastal waters— are critically important in maintaining the food chain of water and water-dependent creatures. Complex areas encompassing both land and water, they are fertile in the production of plant life, shellfish, sport and commercial fish, waterfowl, and shore birds.

Experts claim that over 60 percent of our annual commercial fish harvest (in volume and in value) consists of species spending some part of their life cycle in estuarine environments. The estuarine fishery harvest annually yields over 3 billion pounds valued at nearly $400 million. It includes shrimp (our most valuable fishery resource), salmon, oysters, clams, and about 70 other commercial and sport species.

Estuaries are also valuable recreation areas. Half of the people in the U. S. live within an hour's drive of an estuary. But given the smallness of our estuarine areas and the large public demands being made on them, we could totally destroy them in 20 to 25 years. Water quality management and land and shoreline management (including enlightened zoning practices) must be included in preservation attempts. Presently, no national regulations protect our estuaries.

Eutrophication: Lakes, like men, are born, grow old, and die. The natural aging process of a lake (due to enrichment of the waters with nutrients) occurs in terms of geologic time—hundreds, thousands, even millions of years. Most lakes were born in the glacial ages and probably supported no aquatic life at birth. Gradually nature added nutrients and these, accompanied by gradual warming, encouraged growth of plants able to feed fish

and other aquatic life. Throughout the youth of a lake the aquatic plants increase and die. As the lake ages, organic deposits pile up on the bottom, making the lake shallower, smaller, and warmer. Organic decay depletes the water's oxygen supply until it once again sustains no life. Over thousands of years the lake becomes a marsh and "dies" by merging into land.

Man's activities add excessive nutrients (fertilizers) which greatly accelerate the natural process, sometimes aging a lake as much in 20 years as nature would in 1000 years. The nutrients, principally phosphates (commonly found in municipal sewage, human wastes, agricultural fertilizers, detergents, and industrial discharges) and nitrates cause algae and other water weeds to flourish—first along the shoreline and then farther and farther into the lake. This causes several problems: slime and odor on beaches, disappearance of game fish (deprived of oxygen by the dying algae), fouling of fishermen's nets, taste in drinking water supplies. The sooner these signs of eutrophication are detected and remedied, the greater the chance of saving the lake.

Scientists think phosphates may be the chief cause of the problem because even extremely minute amounts of these encourage the excessive plant growth which eventually chokes and kills a lake. If phosphates are controlled, other nutrients will be less harmful. To slow down this againg process we must prevent phosphate from reaching the water. Lakes have little or no flushing action to remove the excessive nutrient loads and present biological waste treatment does not remove enough of the nutrient material either.

If we are to save our lakes from extinction, we must utilize on a much larger scale the existing waste treatment methods which are capable of removing as much as 80 percent of the phosphates from waste water. We must also develop even better phosphate-removal techniques.

INFORMATION DIRECTORY:

A. Among Private Organizations Interested in Pollution Control Are:

American Fisheries Society
719 13th Street, N.W.
Washington, D. C. 20005

American Littoral Society
Sandy Hook
Highlands, New Jersey 07732

Conservation Foundation
1250 Connecticut Avenue
Washington, D. C. 20036

Garden Club of America
598 Madison Avenue
New York, New York

General Federation of Women's Clubs
1734 N Street, N.W.
Washington, D. C. 20006

Izaak Walton League of America
1326 Waukegan Road
Glenview, Illinois 60025

League of Women Voters
1200 17th Street, N.W.
Washington, D. C. 20036

National Association of Counties
1001 Connecticut Avenue
Washington, D. C. 20036

National Association of Soil and Water Conservation Districts
1025 Vermont Avenue, N.W.
Washington, D. C. 20005

National Audubon Society
1130 5th Avenue
New York, New York 10028

National Council of State Garden Clubs
4401 Magnolia Avenue
St. Louis, Missouri 63110

National Wildlife Federation
1412 16th Street, N. W.
Washington, D. C. 20036

Sierra Club
1050 Mills Tower
San Francisco, California

Sport Fishing Institute
719 13th Street, N.W.
Washington, D. C. 20005

Trout Unlimited
900 Lapeer Avenue
Saginaw, Michigan 48607

UAW-CIO Department of Conservation and Resource Development
8000 E. Jefferson Street
Detroit, Michigan 48214

Wildlife Management Institute
709 Wire Building
Washington, D. C. 20005

Wildlife Society
1734 N Street, N.W.
Washington, D. C. 20006

B. Local, State, Federal Officials

Local

Elected Officials: mayor • city manager • county supervisor • city councilmen • county board of supervisors, etc.

Agency Officials: chief pollution control officer • chief health officer • head, department of public works • city engineer treatment plant superintendent • chief sanitary engineer • fish and game officials • soil conservation service officer

State

Elected Officials: the governor • state representative (or assemblyman) • state senator

Agency Officials: director, regional office, state pollution control agency • director, central office, state pollution control agency • director, state fish and game agency director, state conservation agency (department of natural resources, etc.)

Federal

Elected Officials: the President • U.S. Senator • U.S. Representative

Agency Officials: Write the Commissioner, Federal Water Pollution Control Administration, U. S. Department of the Interior, Washington, D. C. 20036, or your Regional Director, FWPCA, at the following addresses:

Northeast Region
J. F. Kennedy Building, Room 2303
Boston, Massachusetts 02203

Middle Atlantic Region
918 Emmet Street
Charlottesville, Virginia 22901

Southeast Region
1421 Peachtree Street
Atlanta, Georgia 30323

Ohio Basin Region
Robert Taft Engineering Center
Cincinnati, Ohio 45226

Great Lakes Region
33 East Congress Parkway. Room 410
Chicago, Illinois 60605

Missouri Basin Region
601 East 12th Street
Kansas City, Missouri 64106

South Central Region
1402 Elm Street
Dallas, Texas 75202

Southwest Region
100 McAllister Street
San Francisco, California 94102

Northwest Region
Room 570
Pittock Block
Portland, Oregon 97205

YOUR POLLUTION CONTROL OFFICIALS:

LOCAL:

Name and Title: .....

Address: .....

Telephone Number: .....

STATE:

Name and Title: .....

Address: .....

Telephone Number: .....

FEDERAL (Regional):

Name and Title: .....

Address: .....

Telephone Number: .....