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WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY

March, 1974

by

David R. Allardice and George E. Radosevich

and

Kenneth R. Koebel and Gustav A. Swanson

ENVIRONMENTAL RESOURCES



CENTER

**Colorado State University
Fort Collins, Colorado**

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March 31, 1974

by

David R. Allardice and George E. Radosevich
Department of Economics

and

Kenneth R. Koebel and Gustav A. Swanson
Department of Fishery and Wildlife Biology
Colorado State University

submitted to

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Colorado Water Resources Research Institute
Colorado State University
Fort Collins, Colorado 80523

Norman A. Evans, Director

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Preface

During the past quarter century, the United States has become aware of an environmental crisis caused by rapid growth and mobility in the population, affluence, technological innovations and increased energy consumption. This has created an urgent need to evaluate the status of key control factors upon environmental quality. Water law is one of the factors which, through the implementations of its principles and resulting operations, has a direct effect upon the fish and other life dependent upon the water resources. These effects need to be identified and considered.

More specific reasons for determining the effects of water and related laws are the man-made modifications of natural water areas including highway construction in or along streams, dredging, filling, drainage, and dam-building which are often destructive of important environmental values and which can often proceed without adequate legal controls. Some states, however, have made excellent progress in recent years in providing legal protection for environmental values of one kind or another, and it was felt that an analysis of such efforts in all parts of the country should reveal legal and administrative arrangements worthy of wider adoption.

This study is a review of state water laws and state and federal water-related laws affecting environmental quality with particular

reference to fish and other aquatic life and habitat. The focal point centers upon the traditional quantity oriented state water laws that evolved in an era when development of resources was synonymous with production. Although continually changing, many of these state laws remain development oriented where tangible benefits can be derived. Consequently, direct and indirect injury is inflicted upon the aquatic environment associated with the intangible benefits of recreation, aesthetics and preservation of nature.

Several efforts have been made to circumvent the adverse effects resulting from the operation of state water laws, and also certain activities of the federal government. These efforts have culminated into conservation legislation. Those enactments having an impact, detrimental or favorable, are included in the analysis undertaken by this project.

This report does not restrict itself to any particular geographical area in the United States. Rather, due to the jurisdictional characteristics of the law, and in particular since each state has developed a system of water law unique to its needs, the study covers the entire 50 states with various intensities depending upon the availability of information and importance of legal provisions. The water related conservation laws discussed in this report were selected according to their relationships to the project objectives.

The enactment of a law, even a very good law, does not assure that it will be enforced and be effective in accomplishing its purpose.

To gain an understanding as to the manner in which available legal controls have been implemented, several states were visited to confer with their officials. Field sites were inspected in these states so as to better understand the physical setting within which the laws are operating.

While the state laws are given primary attention, relevant federal legislation is, of course, included. In many cases it is the passage of federal legislation which stimulates similar state laws. This was particularly evident in the cases of wild and scenic river legislation, and environmental protection acts.

Part of the background for demonstrating the need for protective legislation is a brief section on the environmental parameters which discussed first ecological considerations, and the degree to which natural water resources have been modified by various man-made intrusions.

The subject matter given most intensive attention are those legal efforts of states to assure that natural streams will not be completely dried up through economic demands upon them, but will be permitted some minimum flow; the efforts to minimize water level fluctuations in lakes and reservoirs and to provide for permanent "conservation pools"; and the legal efforts to restrict the disturbance of natural streams, lakes, and wetlands by highway construction and other such intrusions upon natural bodies of water.

Since the study involves the environmental and legal institutions to preserve its quality it is appropriate that it be conducted by a team representing both legal and environmental experiences and qualifications. Professor Radosevich is a water law specialist with an academic background in political science, agricultural economics, and law. In addition to law practice, he has conducted extensive research and consulting in the field of water resources law and national water law systems both in the United States and several countries in Africa, Asia, and South America. At Colorado State University he teaches water law and environmental law.

Professor Swanson is a wildlife biologist and natural resources conservationist with experience in teaching, research, and administration in both university and government organizations. Courses which he has taught which are relevant to the present study include conservation of natural resources, land use policy, ecology, and wildlife administration, law and policy.

Mr. Allardice is a doctoral student in economics. His subject area of concentration includes the identification, research and analysis of water and related laws, as well as water policy and the goals of society. Mr. Koebel is a masters candidate in natural resources, with a background in physical sciences, and engineering. His efforts focused upon the identification and discussion of the environmental parameters.

It is hoped that this study will result in more rapid adoption by the states of needed modifications in their water laws to maintain and restore those recreational and esthetic values which our society is increasingly recognizing and demanding. In this type of legislation, as in legislation generally, there is often a serious time lag between the recognition of a need and the enactment of legislation to meet the need. Our intent is to contribute toward reducing that time lag.

Acknowledgments

The study would not have been possible except for the wholehearted interest and cooperation of the many state and federal officials who responded to our requests for information. State information was received from numerous agencies in each state that are directly or indirectly related to the subject matter of this study. Almost without exception officials in these agencies were generous in their cooperation. It is not possible to acknowledge separately the help of so many individuals, but we do sincerely appreciate their assistance, and hope that they will find in this report evidence of their contributions. Examples of the letters we sent to the state offices are an appendix to the report.

The following persons not only participated frequently in conferences during the course of the study, but as the manuscript for the report was approaching completion they read drafts carefully, and contributed useful suggestions: Dr. Kenneth Nobe, Chairman of the Economics Department at Colorado State University, an experienced authority on economics of natural resources; Dr. Evan Vlachos, Professor of Sociology at Colorado State University who has a special interest in natural resources and their relationship to social institutions; Dr. John Peters, now environmental advisor to the Bureau of Reclamation, U.S. Dept. of the Interior at Denver.

In addition we wish to express our appreciation to the several typists who have prepared the various drafts of the report.

CHAPTER I

INTRODUCTION

Part A. Objectives

The objectives of the study are both broad and narrow in scope. The broad objectives are to define the activities of man and his influences which have adversely affected the natural aquatic environment of the United States, and thus to determine the importance of water law as one of the influences. The narrow objectives are to examine specific types of physical degradation caused by man, and the legal measures which have been developed and employed to limit or prevent unreasonable physical degradation. These objectives are as follows:

Objectives

1. To define the activities of man, and cultural and institutional influences which have adversely affected the natural aquatic environment in the United States, and thus to determine the importance of water law as one of the influences.
2. To determine the effects of statutory and case law relating to water (rivers, lakes, and reservoirs) and wetlands on environmental quality with particular reference to recreational and esthetic values and fishery and wildlife resources.
3. To analyze the law and legal devices applied by state and federal governments to prevent the destruction or physical degradation of water and wetlands environments.

4. To select representative areas in a few states for determining by on site inspection and by consultation with officials of the agencies involved how effective, in actual practice, the laws, regulations and organizational arrangements have been.
5. To integrate the results of the biological and legal research so as to identify selected features for model legislation that will promote the preservation and enhancement of our aquatic environment.

Part B. Conceptual Framework

To achieve the objectives enumerated in Part A, a conceptual framework was developed that identifies the key non-structural institutional elements. Figure 1 illustrates this conceptual framework. It is a representation of four major dimensions intimately related and responsible for the conditions and trends in our environment.

The outer parameter consists of the physical and social system within which the elements of control predeveloped. It takes into account the natural conditions and laws of the non-human resources -- for example, geo-climatic variations, migration of fish and wildlife, and the hydrologic characteristics of water resources. The social dimension includes not only the formation of societies, the interactions between members, population growth and dispersement, but also the products of social interaction: the political and economic system and the artificial political boundaries that develop in conjunction with the jurisdiction of the institutional dimension.

As a result of increased interaction between the physical and social systems, a point is reached where usages and impacts exceed

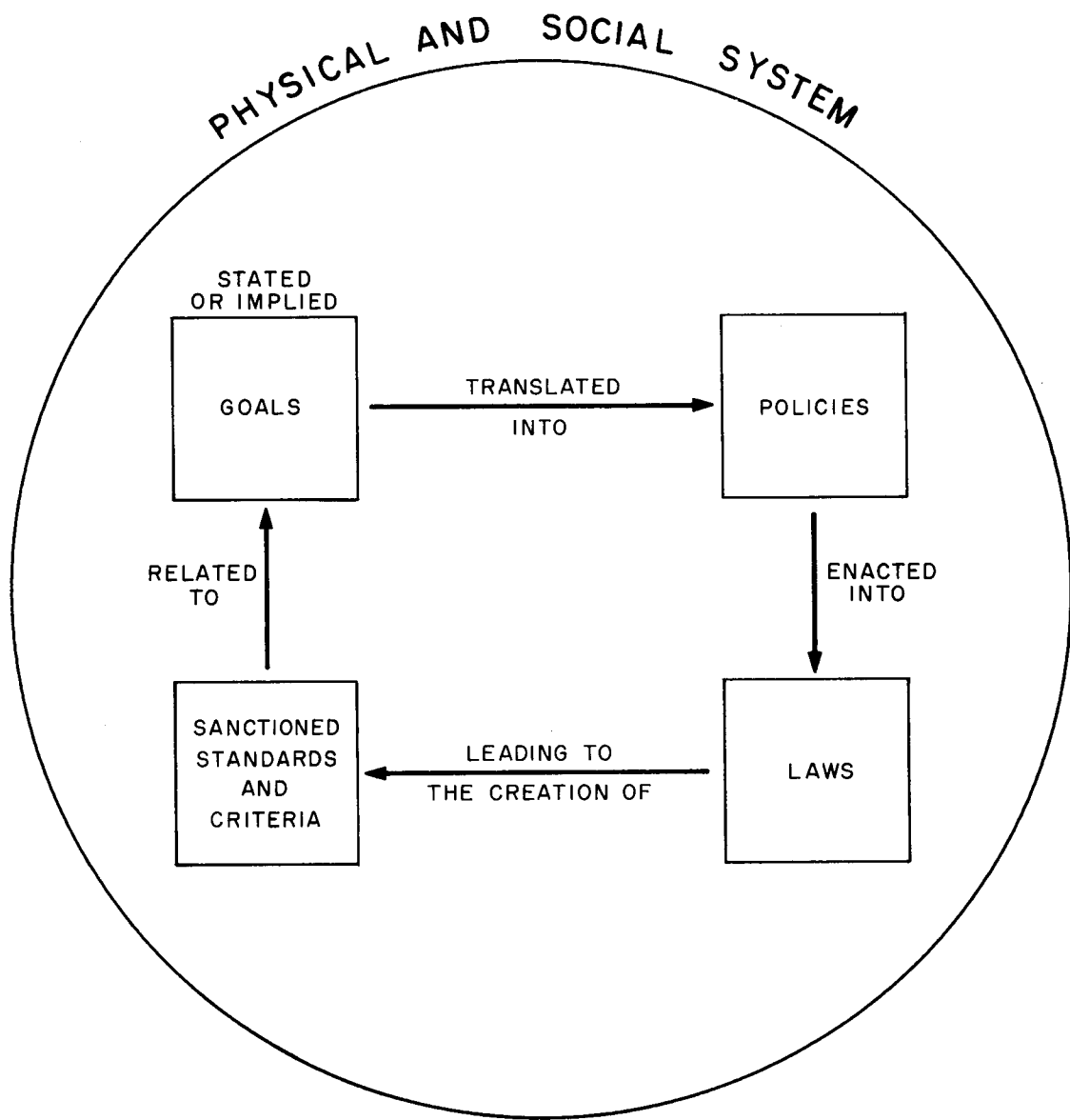


Figure 1

the assimilative capacity of both systems to exist in mutual harmony without conflict. These adversities give rise to a need for control which emerges in rudimentary principles initially and gradually becomes more sophisticated and institutionalized with time. The process is that of sacrificing or internalizing some rights to insure that others will be protected.

The complexity of the institutional dimension depends upon the nature of control requirements, persistence of pressure upon the environment, and the absorption capacities and trade-offs with the eco-system. In general, however, four non-structural elements can be defined for their roles and relevance in attempts to manage and regulate man's interactions with his surroundings. Although several instances can be cited where a neat classification into these four elements is impossible, it is concluded that avoidable environmental assaults frequently exist where there is a clear absence or weakness of one of the elements.

The first element consists of stated or implied goals. These goals are targets of the particular social system that express man's interests and desires concerning the interaction of the human and natural resources. Goals are then usually translated into policies by the executive and/or legislative organs of governments. Policies serve as the guidelines for action, setting out the theoretical strategies and tactics to be applied for any given program.

These policies in turn lead to the enactment of laws which contain the substantive and procedural provisions essential to carrying out the program. Substantive law creates, defines, and regulates rights* of individual and community (public) actions. It also provides for creation of organizational entities to carry out the law, setting forth their functions, duties and scope of authority. Procedural law prescribes the method of pursuing and enforcing the private and public rights. This element of law includes judicial interpretation through litigation of specific issues concerning the applicability and scope of statutory provisions.

The final element of sanctioned standards and criteria emerges from the mandate of the law. Its function is implementation of the policies and laws. It is particularly relevant in cases where legislative pronouncements require, and thus sanction, an entity of the executive branch to develop and enforce standards and criteria for both general jurisdictional applicability and specific problem area control. These standards and criteria have or should have direct relationship to and response for achievement of the goals.

The circuitous chain of elements allows for feedback and improvement in the control and management efforts. In the examination

*The term rights is used broadly here to mean both the expectation of a particular relationship between man and some thing or object and the converse obligation in response to another's right. "One man's rights end where another's begins."

of the institutional dimension, major emphasis is directed toward identifying failures or constraints in the composite features. It is at this point that the analysis will produce a beneficial result in terms of efforts to improve the control process.

The project objectives were designed to describe and analyze the relationship between water laws and water-related laws and environmental quality, and in the process of analysis to identify institutional deficiencies alluded to above. The flow chart of Figure 2 schematically illustrates the application of the conceptual framework in the process of interaction and system improvement.

The elements of the institutional dimensions from figure one serve in the aggregate as the catalysts for actions between the physical and social systems. Relative to this project, the system is composed of ecological parameters and social criteria for use. The ecological parameters are discussed in Chapter III, Part A, and the social criteria in Chapter II, Part A.

The resulting activity produced from the interactions of these three dimensions may be either positive or negative in terms of environmental quality. Where positive, no immediate concern need be exhibited, except to note the process for successful control. The adverse or negative effects upon the environment are of primary significance. Identification of the environmental assaults resulting from the activity is essential (as discussed in Chapter III, Part B) and,

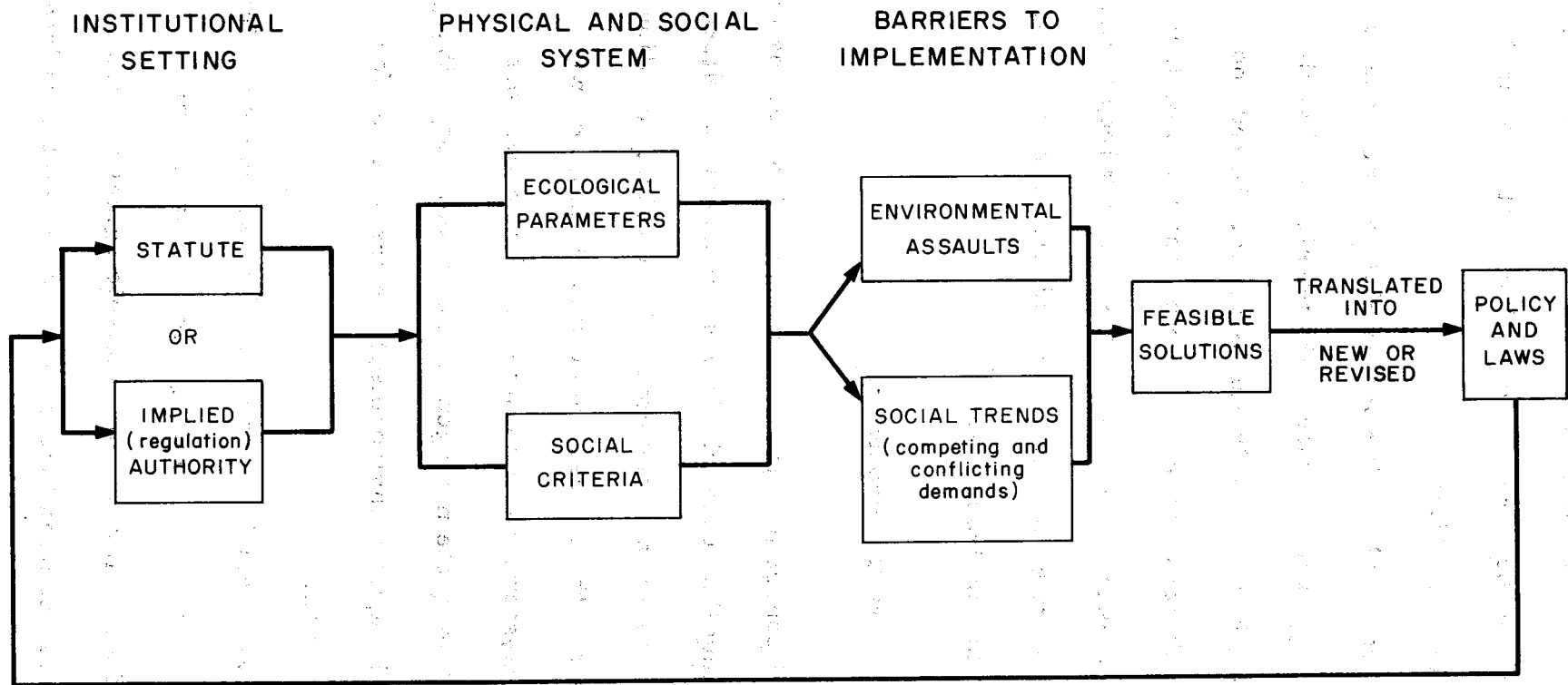


Figure 2

weighted against the social trends (discussed in Chapter II, Part B), will provide a description of the barriers to implementation of environmental quality enhancement efforts.

The next step toward resolving the adversities that occur is to examine the total interaction and reaction of the physical and social systems and the identified barriers to implementation. Based upon this analysis, feasible solutions can be formulated which can be translated into new or revised policies and laws. The feedback loop to the institutional setting thus allows for a dynamic analysis of the process of control over man and his environment.

Part C. Procedures

The objectives and conceptual framework provided guidelines to be followed. In conducting the research, it was necessary to collect and analyze data on both water laws and physical-biological conditions. Based upon the analysis and the interaction between man's control mechanisms and the ecosystem, those policies and law provisions which provided the most adequate management and protection of the fish and wildlife and their aquatic environments, were selected for inclusion in model legislation.

Three techniques were employed to obtain the needed data. The principal technique used involved reviewing a substantial amount of literature in the field of water law and physical-biological science. The legal information was acquired through a review of statutory laws

and key judicial decisions relating to water use and conservation of natural resources.

The second technique employed to furnish the needed information involved sending several questionnaire-letters to various state agencies. An inquiry was sent to each state fish and game agency, water management agency, highway department and legislative research council. These letters sought agency views and information relating to the project objectives. A sample of letters sent to these agencies is contained within the appendix of this report.

The third technique used to acquire both legal and physical-biological data involved making on-site inspections to four states: Florida; Montana; New York and Wisconsin. The trips provided useful information pertaining to the project objectives. Also they enabled the researchers to view first-hand the manner in which various laws were administered at the state level, and to see examples of the impact of various construction projects upon the natural environment.

The first major product from the research effort was the compiling and publishing of a bibliography based on the literature examined. The bibliography was published in February of 1973, as Water Law and its Relationship to Environmental Quality: A Bibliography of Source Material, by George E. Radosevich, David R. Allardice, Gustav A. Swanson, and Kenneth R. Koebel, Environmental Resources Center, Colorado State University, Ft. Collins, Colorado, Information Series No. 6.

The second major product from the research effort is this report which contains the collected data, analysis, and selected features for model legislation.

CHAPTER II

CONSERVATION AND PROTECTION OF THE WATER ENVIRONMENT

Part A. Institutional Setting

It is essential to provide the reader with a point of reference to the institutional dimensions of this project as they specifically relate to water resources development, use and management and the impacts upon the natural or induced environmental quality. An expansion of each non-structural element of this crucial dimension attempts to focus upon the identification and significance of the element with particular reference to fish and wildlife and their habitat.

1. Goals in Water Resources Utilization

This section examines goals of our society in relation to the use of the nation's water resources (see Figure 3). Subsequent sections will discuss the means which have been employed in trying to achieve these goals.

A goal may be generally defined as an object of man's interest or a tangible representation of an objective to be achieved. It may thus emerge as a physical object, such as a dam or a navigable waterway or it may be some other measurable intent such as a given level of income target for an array of persons or those within a specified

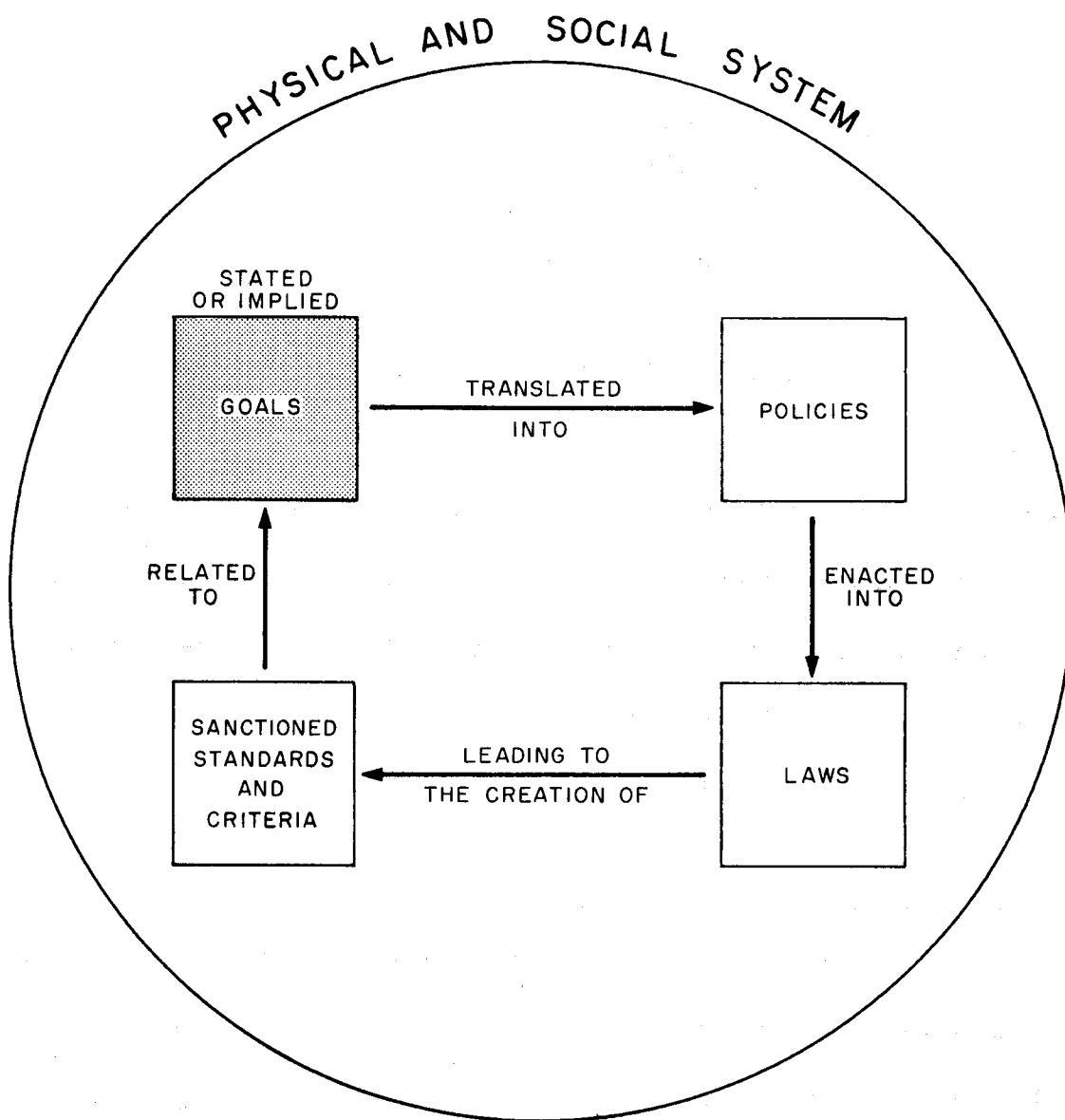


Figure 3

geographic area. Since man's interests change, it follows that the goals of society also change over time. As a society experiences a change in its values and a rising level of expectations, it will establish new goals or modify old ones. The more knowledge man possesses with respect to the limited nature of some resources the more significant they become in establishing new goals.

Throughout our history the people of the United States have been defining goals that they feel are desirable to achieve. These targets have had a significant impact upon the laws, policies, and programs of the nation. In the Preamble to the Constitution of the United States, it is stated that our broad goals should be directed toward:

...a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare and secure the blessings of liberty to ourselves and our posterity...

It is within the framework of promoting the "general welfare" and the welfare of posterity that many of our goals with respect to water resource management are aimed.

One only needs to look at the history of water resource management in the United States to see what our goals have been with respect to the use of water resources. It is possible to identify two major phases in the development of water resource goals: 1) the period prior to World War II, and 2) the post-World War II period.¹

The pre-World War II period for the most part was characterized by the establishment of specific goals directed toward the physical

and economic development of water resource projects until the early 1903's. But with the emergence of the Great Depression, the conservation goal moved to the forefront. The literature of this period abounds with references to the goals of the development of irrigation, navigation, and power uses of water.

The post World War II period, placed less emphasis on achieving specific or piecemeal goals and instead shows a trend towards multiple goals for the management of water resources. During this period there has been more of a trend toward viewing water as an integral part of the overall resource problem and this in turn led to an increasing emphasis on a national environmental quality goal.

The Pre-World War II Era

During the pre-World War II period much of man's view toward nature was one of subjugation and development, with only secondary consideration given to a conservation goal. It has often been stated that the goal of our country with respect to natural resources in general, and toward water resources in particular, was one of taking "from the environment the riches with which it was endowed."²

During the 19th century the national goals were centered around the economic development of water resources in the areas of transportation, flood control, irrigation and water power.³ The Federal government has shown a great deal of interest in promoting inland water transportation from the very beginning of our country. In much

of our early legislation the statement is made that navigable waters shall be considered "public highways" and "shall forever remain free and open."⁴ To achieve this development of navigation, grants of public lands were made for river improvements and the government purchased stock in canal companies.⁵

In 1808 the Gallatin Report made the recommendation that a complete nation-wide system of canals be established so as to provide for the economic development of the West, ensure political unity, and promote the national defense.⁶ As early as 1848, the Congress became involved in flood control programs, although it was many years later before an effective national flood-control program was established.⁷

With the passage of the Swamp Land Acts of 1849 and 1850,⁸ the federal government turned over the proceeds of the sales of public swamp lands to the states of Arkansas, Louisiana, Mississippi and Missouri to be used for flood control and drainage projects.⁹

In 1879 the first Director of the U.S. Geological Survey, Major J. W. Powell, published a report concerning the sparsely settled dry lands in the West.¹⁰ This was followed in 1890 by a statute that reserved to the United States a right of way for ditches and canals that would thereafter be constructed on all public lands west of the 100th meridian if the ditches and canals were patented under any of the land laws of the United States.¹¹

This act, in conjunction with the Mining Act of 1866,¹² the Act of 1870,¹³ and the Desert Land Act of 1877,¹⁴ serve as legislative evidence of the nation's goal for state control over waters arising within state boundaries. As a result of the judicial interpretation of the intent of these acts collectively, states, particularly in the arid west, developed policies and laws for water distribution, administration and management.

Starting in 1879, Congress passed several statutes which either authorized the Secretary of the War to lease water power to private companies or authorized the construction of private power dams.¹⁵ While subject to modification, these statutes for the most part were perpetual in their terms and without any major restrictions except for the protection of navigation.¹⁶ In 1890, the Congress prohibited the building of dams and other structures in navigable waters without the permission of the Secretary of the Army.¹⁷

One may sum up the developments in the 19th century by saying that "man was viewed as part of nature only so long as nature was more or less in its virgin state and man did not have the means to significantly impair its balance."¹⁸ By the end of the 19th century, man's exploitive approach toward nature had been well established.

The outgrowth of the exploitive conditions of the 19th century was the development of the conservation movement in the early 20th century. For the most part, the conservation movement began with parks and forestry, but soon spread into other natural resource areas.¹⁹

It did not, however, become dominant in the case of water resources until the 1930's. The mood of the conservation era resulted in several general principles:

(1) Conservation of natural resources "for the greatest good of the greatest number for the longest time."

(2) "Honest" government with no "giveaways" of the public resources to special interests.

(3) Opposition to control of the economy by monopolies and their exploitation of natural resources.

(4) A desire to encourage small individual enterprise.

(5) A desire to insure the equality of opportunity and promoting the well being of the population.²⁰

During the early 1900's three Federal commissions were established to examine water resource problems. The first was the Inland Waterways Commission in 1908 which reported on the condition of the United States waterways, the status of commercial navigation and other related water resource problems.²¹

Among other recommendations, the Inland Waterways Commission concluded that: "hereafter any plans for the use of inland waterways in connection with interstate commerce shall regard the streams of the country as an asset of the people, shall take full account of the conservation of all resources connected with running waters, and shall look to the protection of these resources from monopoly and to their administration in the interests of the people."²²

The National Conservation Commission made its report in 1909. It called for additional hydrological research to aid in the development of multiple-purpose waterway improvements.²³ This commission set forth several goals that were in many respects in direct conflict with the conservation theme set forth by the Inland Waterways Commission. They included:

- (1) Waterway improvements to reduce floods and improve navigation,
- (2) Improved utilization of waters,
- (3) Prevention of pollution,
- (4) Irrigation development,
- (5) Power development, and
- (6) "When consistent with other uses of the water, fish should be propagated and protected in streams and lakes, and necessary fishways should be provided in connection with dams and other works; and State and federal laws relating to fish and fisheries in inland and coast waters should be unified."²⁴

While item 6 alone did recognize fisheries as being important in the development and planning of water resource projects, it also made it clear that this was to be a secondary consideration; i.e. "when consistent with other uses." The report went on to state that: "the chief values of our streams are for navigation and for development of power..."²⁵

The third commission, the National Waterways Commission, was created jointly by Congress in the Rivers and Harbors Act of 1909.²⁶ This commission was primarily concerned with seven major issues. It examined the present status of river commerce, proposed artificial waterways, urged legislation regulating public water transportation, control of water terminals, flood prevention recommendations, examined the influence of forestation on water resources, and proposed legislation to develop water power.

During the period from 1921 to 1933 the government began to reject the antimonopoly and income redistribution goals of the previous periods, contending that they were destructive of the American way of life.²⁷ Further, it was felt that private enterprise could develop water projects more effectively than could public operation. An example of this is the action taken by President Harding in terminating all work on the virtually complete Wilson Dam on the Tennessee River.

During the early years of the Great Depression, starting in 1929, President Hoover's administration showed some tendency to favor public works projects to help stimulate the economy. On many occasions, however, he indicated his unwillingness to support public projects, finding them too expensive in keeping with the concept of a balanced budget.²⁸ In President Roosevelt's "New Deal" administration, however, the basic goal of water resource projects became one of providing a stimulus to the construction industries and of providing

jobs for the unemployed,²⁹ one which was increasingly directed to a secondary objective of soil and water conservation.

The National Resources Board was established during the darkest years of the depression.³⁰ In keeping with the goals of the New Dealers, the Board operated under the premise that individual water resource projects were to be coordinated with plans for comprehensive development of entire river basins.³¹

The Board in examining the problems related to water resources stated:

The use and control of water resources presents a bewildering array of problems, some technological, some economic, some social, in which, without a guiding principle, it is easy to lose one's way. The vastness of our country, the wide range of climate and topography, the abrupt seasonal changes affecting most of our watersheds, all tend to make the formulation of a national water policy difficult. At the same time they also make it essential. Nothing short of a national policy can deal effectively, justly, and democratically with the situation.³²

The Board set forth the following goals as being necessary with respect to the use and development of the nations water resources:

- (1) To develop more productive uses of water resources-- power, water supply, navigation, power, irrigation, recreation.
- (2) To eliminate, modify, or neutralize harmful influences of waters, such as floods and erosion.
- (3) To eliminate, modify, or neutralize harmful handling of waters, --pollution, waste through run-off and drainage.
- (4) To accomplish the above purposes effectively from the point of view of technology, geographical conditions, existing public agencies and the intelligent understanding of good-willed citizens.³³

As reflected in these goals, the New Deal movement took from the Conservation Movement many of its policies related to conservation, distrust of monopolies, the desire to promote public health and welfare and the regulation of private enterprise in the public interest.³⁴

President Roosevelt established the National Resources Planning Board in 1939.³⁵ This Board was directed to develop a program of public works "in the order of their relative importance with respect to (1) the greatest good to the greatest number of people, (2) the emergency necessities of the Nation, and (3) the social, economic and cultural advancement of the people of the United States."³⁶ The Board lasted only four years. In 1943, the Congress abolished it and directed that its duties not be transferred to any other agency as it responded totally to a new and dominant "win the war" goal.³⁷

With the abolition of the National Resources Planning Board, the Executive Branch lost much of its ability to prepare or evaluate water resource plans that were proposed by the construction agencies.³⁸ More and more, the development of water resource projects became the responsibility of Congressional committees, which were responsible for the enabling legislation and appropriations.

During the pre World War II era of water resource use and management, appreciation of esthetic beauty, wildlife, and recreation related to water resources was, to a large extent, the concern of the "upper class" sportsman or nature enthusiast. In many cases, they were opposed to water projects that would be of obvious benefit to

great numbers of people.³⁹ The post-World War II period saw a return to full employment, shorter working hours, paid vacations and an increased mobility of the population, all of which led to an increased interest in outdoor recreation, thus, with the end of World War II increasing concern was again shown for the Nation's fish and wildlife resources, per the 1946 amendments to the Reclamation Project Act of 1939.⁴⁰ The amendment stated the "the preservation and propagation of fish and wildlife" were to be considered as a purpose to which a part of the project costs might be allocated.⁴¹ The stage was now set for ushering in the Era of Post War Affluency.

The Post World War II Era

The post World War II Era began with the aftermath of global conflict which provided an interruption of long-term goals and objectives. It provided for a release of stored up demand, a sense of new directions and the need for new policy guidance. Whereas the American people had responded to the aftermath of World War I with entrepreneurship, they now met the post-World War II era with a penchant for management. The difference is significant in a restatement of American values and the resulting impact on national policy, as set forth below:

American values had not changed, but they had undergone noticeable reinterpretation as a result of the nationally traumatic experiences of the Depression and World War II. Liberty was still held as the number one value - to most Americans that was what the War was all about - but liberty was read more in political terms than in economic

or sociological terms. For the two latter facets of American life, the emphasis shifted from a reliance on individual initiative to the manifestations of the value we have termed improvement. And this value itself was to begin a process of reinterpretation, evolving from its traditional conception in terms of material well being into an enlarged concept which included qualitative aspects of life as well. The process of translating this value conception into a new objective, environmental quality, and its implementation by means of a national policy structured in managerial terms is the subject...⁴²

Immediately after the end of World War II, the dominant view of Congress was that the nation's organizational expertise developed during the New Deal era, and honed to a fine cutting edge during the war years, should now be reorganized to meet the new challenges of the post-war era. This view was translated into action in July 1947 when Congress authorized yet another commission, to be chaired by ex-President Hoover, to study and make recommendations on the reorganization of the Executive Branch. The Commission established a number of Task Forces and in January 8, 1949, began submitting its series of nineteen major reports.

The Commission's Task Force on Natural Resources in particular advocated a number of changes in how the nation's resources were to be managed, with particular reference to water. In suggesting these changes, the Task Force set forth a set of objectives including government economy, efficiency, national development and conservation, while noting that the overall objective was to be "sound management in the national interest."⁴³

The major recommendations of the Task Force on Natural

Resources included:

1. The establishment of a Water Development Service to include (1) the functions of the Bureau of Reclamation, (2) the river development functions of the Corps of Engineers, (3) most of the Federal Power Commission (however, the Tennessee Valley Authority was specifically excluded;)
2. Regional decentralization by river basin of as many development functions as possible;
3. The creation of a Board of Coordination and Review in the Executive Office of the President "for making certain that only projects which are economically and socially justifiable are recommended for approval";
4. The creation of a Department of Natural Resources to supplant the Department of the Interior;
5. Increased emphasis upon recreation values through their effective incorporation in all appropriate river-basin and land-use projects..., and
6. The rectification of conflicting legislation in land use and water development and of varying methods of estimating feasibility in river basin projects.

The Hoover Commission agreed with this Task Force on items 1, 3, and 6, rejected item 4 in favor of a reorganization of the Department of the Interior, and ignored items 2 and 5 since they had already been incorporated in broader statements.⁴⁴ Congress took due note of the overall recommendations of the Commission, and noted that a comprehensive water policy had not yet been formulated and agreed that a new Presidential Commission for Water Resources Policy was needed to carry out this function.

The President's Water Resources Policy Commission was established in 1950 to examine the status of our water resources and to make recommendations for changes in water related legislation.⁴⁵

This Commission is significant in that it presented a comprehensive

statement concerning our national water goals and objectives for development, use and management of this resource. In the words of the Commission:

Because past expressions of congressional policy have been directed at meeting specific problems, there has not been a statement of national objectives in the whole field of water resources.⁴⁶

The Commission was of the opinion in 1950 that:

We as a people are embarked on a great adventure in the conservation of resources. Our objectives will determine not only what water resources are bequeathed to future generations, and in what condition; they must further point to the kind of economic and social environment we want to hand down.⁴⁷

The Commission then proceeded to set forth what they felt should be our goals with respect to the use of our nation's water resources, as follows:

- (1) The safeguarding of our heritage of useful resources against deterioration from careless use or neglect, preventing the ultimate decline of our productivity at the very time when we require an expanding base.
- (2) The improvement of this heritage and its higher utilization in order to provide, through increasing production of land and water resources, a broader base for a steadily expanding national economy, with its contribution to national security. This objective covers management of our water resources to transform them from ineffective or destructive into beneficial agents, watering arid land, supplying municipal and industrial needs, improving channels for water transportation, and generating hydroelectric power.
- (3) Opportunity for farms, urban homes, commercial establishments, and industries to make full use of electric power, through a marketing policy for Federal power aimed at encouraging maximum use at the lowest possible rates.

- (4) Coordination of water and land resources undertakings with specific plans to meet needs of national security.
- (5) The development of balanced regional economies, with particular emphasis on those which are characterized by low economic opportunity, offering maximum opportunity for farming coupled with nonagricultural rural employment.
- (6) Provision of expanding cultural opportunities, including all phases of recreational development from wilderness areas to wisely designed, artificial multiple-purpose reservoirs.
- (7) The protection of the public health, particularly through pollution abatement and control, mosquito control, and all necessary provisions for an abundance of high-grade municipal water supply.⁴⁸

In its recommendations, the Commission indicated that basic planning should be as broad as possible. They further recommended that:

Full and equitable consideration may be given to flood control, irrigation, navigation, power, municipal and industrial water supply, control of pollution, fish and wildlife, recreation, and the development, use and conservation of related land, forest, and mineral resources.⁴⁹

In 1955 the Presidential Advisory Committee on Water Resources policy made a further recommendation as to what a national policy should be with respect to water resources. They stated that:

The basic elements of a sound policy are clear. That policy must (1) look toward an adequate water supply for our people, (2) prevent waste of water, (3) provide for a greater reuse of water, (4) reduce water pollution to the lowest practicable level, (5) provide means for the useful and equitable distribution of available water supply and (6) take steps to check the destructive forces of water which threaten to injure or destroy land, property, and human life.⁵⁰

Many of the water resource goals outlined above were not transformed into national policy until the Congress passed the Water Resources Planning Act of 1964.⁵¹ This Act finally made it clear that the Congress recognized the need for "...conservation, development and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal Government, States, localities, and private enterprise..."⁵²

When President Nixon signed the National Environmental Policy Act in 1969⁵³ he stated that "improving the quality of the environment is a major goal for the nation." This is the theme that has been carried out in the early 1970's. In the development of water resource goals during this period there seemed to be an "increased concern with social well-being."⁵⁴ But the recent focus on the energy crisis now suggests that a national goal of self sufficiency is becoming dominant.

The National Goals Research Staff, in a 1970 document entitled: Toward Balanced Growth: Quantity with Quality, made the statement that it is becoming necessary for the "American people to decide just what sort of a country they want this to be,"⁵⁵ and that the solution will lie somewhere between the conflicting goals of preserving and developing the natural environment.

In a recent study for the National Water Commission, various major goals were specified as they relate to current water projects and programs. These overall goals were stated as follows:

- (1) The development of a more efficient national transportation system through the improvement of water transportation facilities.
- (2) The settlement and development of the arid West, and the expansion of the nation's agricultural plant by furthering the growth of irrigation in the arid region.
- (3) The expansion of the agricultural plant by the reclamation of wetlands.
- (4) The protection of the lives and property of the people from floods and other natural phenomena.
- (5) The development of the power potentials of the nation's rivers in order to further economic development.
- (6) The provision of adequate water supplies for municipal and industrial use by the construction of reservoirs in which to store flood waters for subsequent use.
- (7) The development of the recreation potentials created by water resource developments.
- (8) The preservation and enhancement of the fish and wildlife resources as one of the purposes of water resource development.
- (9) The protection and improvement of the quality of the nation's waters by adequate treatment of wastes by increasing the dry-season flows of streams and by other means; for the several purposes of protecting the health of the public, protecting and enhancing the fish and wildlife resource, and achieving aesthetic gains.
- (10) The development of the water resource as a means of inducing economic development in those regions in which incomes and living levels are low relative to those of the more highly developed portions of the nation.
- (11) Contributing to the solution of the problems of the metropolitan regions, to the extent that water resource development can be utilized to achieve this end.
- (12) Providing for more effective participation in water resource planning and development by the states, lower levels of government, private enterprise and the general public.⁵⁶

The National Water Commission concluded that the United States is in a period of dynamic change, and that the time has come for serious consideration of environmental quality as a national goal. The Commission recommended that serious consideration must be given to the following:

1. Protecting and improving the environment and finding a middle ground between returning to a "state of Nature" on the one hand, and on the other, permitting society to be engulfed by its own wastes.
2. Population growth and distribution, taking into account the need for "encouraging growth in alternate population centers away from the large urban masses," complemented by the creation of "new towns".
3. Assessing the consequences of emerging technologies with a view to determine in advance what, if any, adverse impacts might result from their introduction.
4. Finding a way to improve the "quality of life," while at the same time adequately meeting the material needs of all the people.⁵⁷

The National Water Commission concluded in its Final Report that there must be "major changes in present water policies and programs."⁵⁸ The Commission further specified that "no longer is it a national goal to stimulate settlement of the West. That goal has been accomplished..."⁵⁹ Among the many other changes in national goals noted by the Commission, perhaps the most important of all is the desire to clean up our rivers and lakes and to preserve as much as possible of the rivers that have not yet been developed. "As recently as a decade ago this did not seem a high priority national goal. But in the past 10 years repeated acts of the Congress, and of State and local

legislative bodies, have attested to the emergence of this vital new national policy objective."⁶⁰

This section should not leave the impression that the majority of our national goals are directed towards water resource development for they are only one part of a broader picture. On the contrary, "public enterprise, more important in the water development field, should, and to some extent does, recognize that the goal is the best use of all resources rather than development of water resources at the sacrifice of all other interests."⁶¹

The national concern for all resources is evidenced most dramatically by a crisis reaction to any major shortage situation. The current energy crisis is but one case in point. Out of this broader concern for an adequate total resource there is emerging a new national goal of energy self sufficiency. What its long run impact on water resources management may be remains to be seen. In the short run, however, the concern over the energy crisis has already compromised an earlier goal for a quality environment to a considerable degree.

2. Water Resource Policies

Water resource policies evolve from the stated or implied goals and values of society (see Figure 4). These policies establish guidelines or parameters that are intended to lead to the achievement of the stated or implied goals. It is not the intent of this section to examine

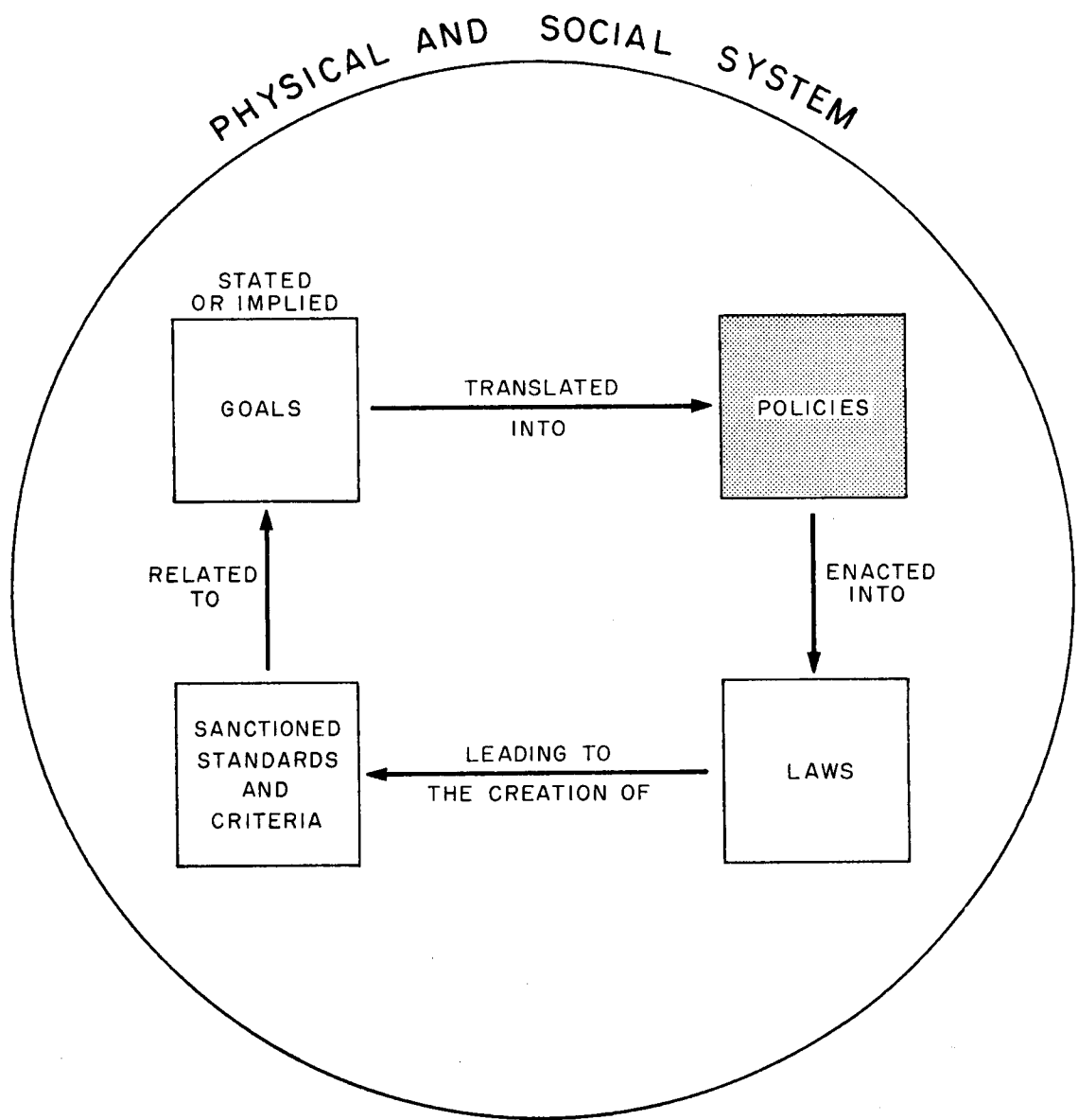


Figure 4

the entire spectrum of water resource policies in detail. Rather, attention will be given to general water resource policies intended to protect or preserve the fish, wildlife, recreation and esthetic resources.

Many of our early National water policies were intended to promote the development of water resources toward clearly identifiable economic ends. This limited objective of economic development was achieved, in many cases, at the expense of the fish and wildlife resources. Policies during the early 1900's stressed federal assistance to achieve private development of the water resources. Private development failed to give proper consideration to the social values associated with fish and wildlife resources.

In the 1930's, one of the Nation's goals was to promote the conservation of natural resources in general. As such, policies were intended to foster the "wise use" and "sustained yield" of our natural resources. Federal policy, in general, was to provide central planning and direction to achieve the conservation goal.

Not until late in the 1960's did the United States formally establish a goal of environmental quality. To achieve this goal, federal policy stressed subsidies to state governments, and regulation and enforcement to promote and maintain the quality of the environment.⁶²

The policy of the federal government concerning the goal of environmental quality is stated in the National Environmental Policy Act.⁶³ The policy being that:

...it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans.⁶⁴

For the most part, federal water policies directed at preserving and protecting the natural water environments provide payments or subsidies to state and local governments, or impose federal regulation, enforcement and administration of the water environment. Specific to this project, the payments program makes available to state and local governments funds needed to develop and administer water resources and protect the fish and wildlife habitat. The policies of administration, regulation, and enforcement are intended either to manage the use of water and related resources or to place the resource entirely under federal control so as to promote the general welfare of society.

The Land and Water Conservation Fund Act of 1965,⁶⁵ as amended, is an example of a federal payments policy intended to protect and preserve water resources. Specifically, the Act provides funds for and authorizes federal assistance to the States in planning, acquisition and development of needed land and water areas and facilities for recreational purposes. The federal government provides up to 50 percent of the cost of the planning acquisition and development. The states make up the remaining share of the cost.

Federal regulation and enforcement policies directed toward water and related resources cover a broad spectrum. Such policies include regulation of: highway construction, channelization, dam construction and dredging and filling in waterways, as well as wetland areas. Specific laws regulating these activities are discussed in the body of the report. Federal administration of the water environment to promote environmental quality is illustrated by the establishment of wild and scenic rivers. Laws relating to the establishment of these federal wild and scenic rivers is also discussed in the body of this report.

The National Water Commission's final report, Water Policies for the Future, proposes numerous recommendations concerning needed changes in specific water policies. The primary objective of the Commission's report is: "To determine what policies the Nation should adopt at this point in its history so that its finite water resources yield the highest measure of utility to society..."⁶⁶ The report contains recommendations for water policies in the general areas of water protection, development and use.

With respect to fish and wildlife resources, the Commission has recommended that these resources be given equal consideration and be coordinated with other development and use values. The report recommends that for those areas outside the jurisdiction of federal control, State action be taken to protect the fish and wildlife values.⁶⁷

Although the Commission has tried to identify and propose solutions for better water policies, problems will and do continue to exist. These problems have been grouped into three problem areas.⁶⁸ The first problem area is concerned with trying to achieve a "rational" public understanding of problems and opportunities surrounding water resources. For the most part, public views concerning water resources have been influenced by political and social goals of the time. Only in recent years has the public become aware that our water resources and associated fish, wildlife, recreation and esthetic resources are not unlimited. The recognition of this scarcity, in terms of quality and quantity, has come to have a profound impact on our water policies.

The second problem in the field of water resource policy concerns the achievement of a "reasonable" degree of social benefit through the public decision making process. Too often policies reflect or weigh the social costs and benefits resulting from such administration.

The third policy problem deals with changing policies to reflect the changing social and physical environments or conditions under which water resource projects are developed. As water resources become pressured by new and competing uses, policies must reflect these pressures, as well as the goals of society at that point in time. As such, the political and legislative process must be responsive to these changing conditions.

In part, this report will examine those specific policies that have been adopted by various federal and state governments to preserve, protect and enhance the water environment and related fish and wildlife values. Attention is also given to state policies intended to augment or provide protection for these values, where federal policies are insufficient or lacking.

3. Evolution and Theory of Basic Water Law

The ideal situation is for substantive and procedural laws concerning a particular field or subject of control and regulation, to develop from the stated policies and evolve into a mature system law through additional legislative enactments and judicial interpretations (see Figure 5). In the field of water law, unfortunately, states created and adopted legislation in their early statehood that frequently lacked basis in soundly formulated water policies. Many constraints to effective water management and the resulting adverse effects can still be traced to these early enactments. Water law has become a highly dynamic and specialized field as a result of greater public awareness and interest in the environment and shifts within the classes of water users. However, resistance to change still persists among those users who have developed their economy upon the early principles of the law.

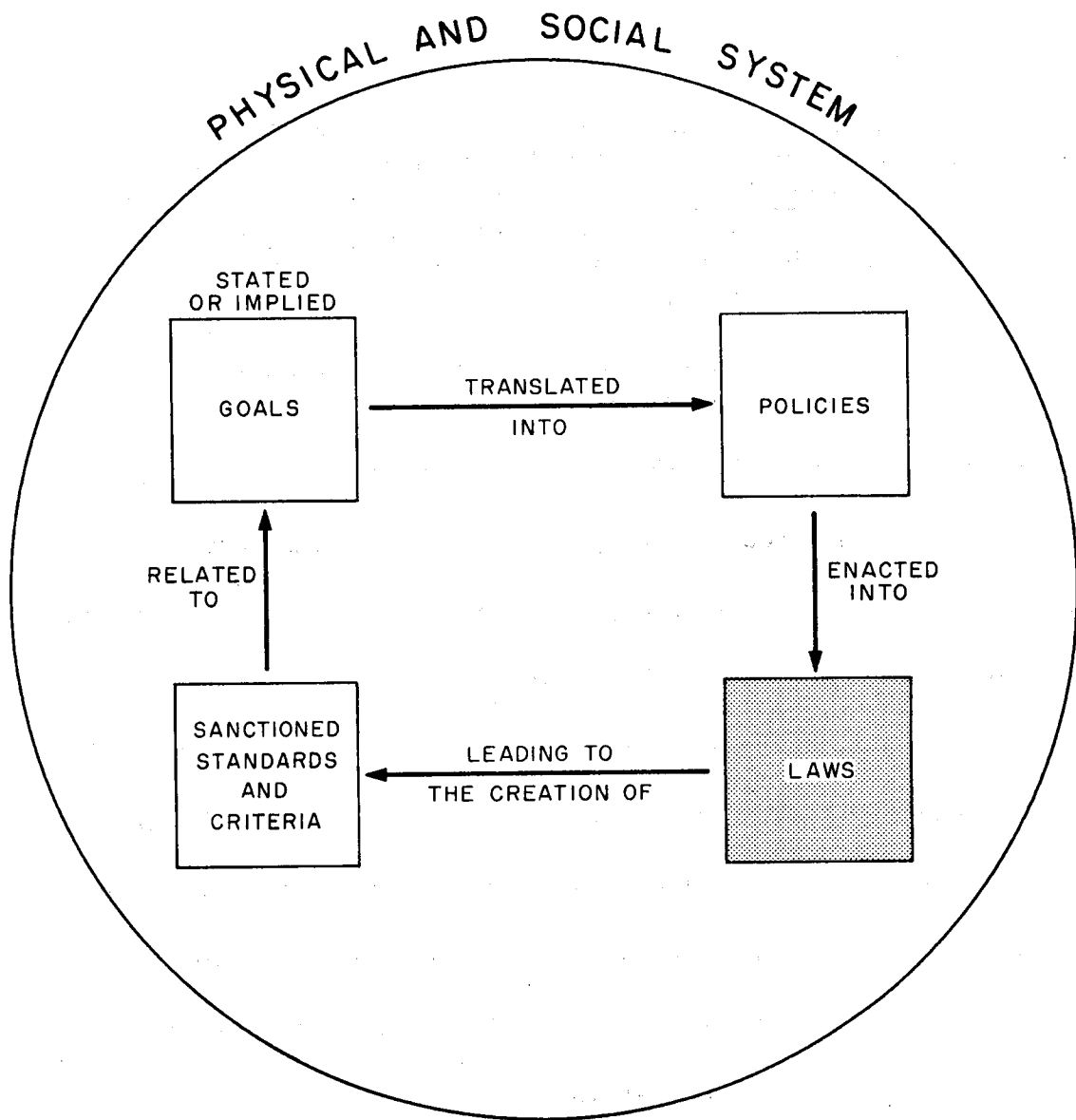


Figure 5

The water law concepts adopted in our early history were patterned after the laws of England.⁶⁹ In an early English case the courts stated:

Flowing water is publici juris, (the property of the state, held by it in trust for the people) not in the sense that it is a bonum vacans to which the first occupant may acquire an exclusive right, but that it is publici and common in this sense only; that all may reasonably use it who have a right of access to it, that none can have any property in the water itself except in the particular portion which he may choose to abstract from the stream and take into his possession only.⁷⁰

Although the situation has changed considerably in England with respect to the abundance of water, the 1851 decision propounds a concept of water resource use suitable in humid areas. Emerging from this common ownership concept is the doctrine of riparian use.

The main characteristic of the riparian⁷¹ doctrine is that it gives the owners of land adjacent to a body of water equal rights to the use of the water.⁷² It is frequently stated that the riparian owner is entitled to the use of the natural flow of the stream past his land, undiminished in both quality and quantity.⁷³ This right is referred to as the English rule of "natural flow."

Under the natural flow theory, the primary or fundamental right of each riparian proprietor on a water course or lake is to have the body of water maintained in its natural state, not sensibly diminished in quantity or impaired in quality.⁷⁴ Each proprietor, however, is recognized as having a privilege to make natural or extraordinary uses as long as such uses do not sensibly or materially affect the

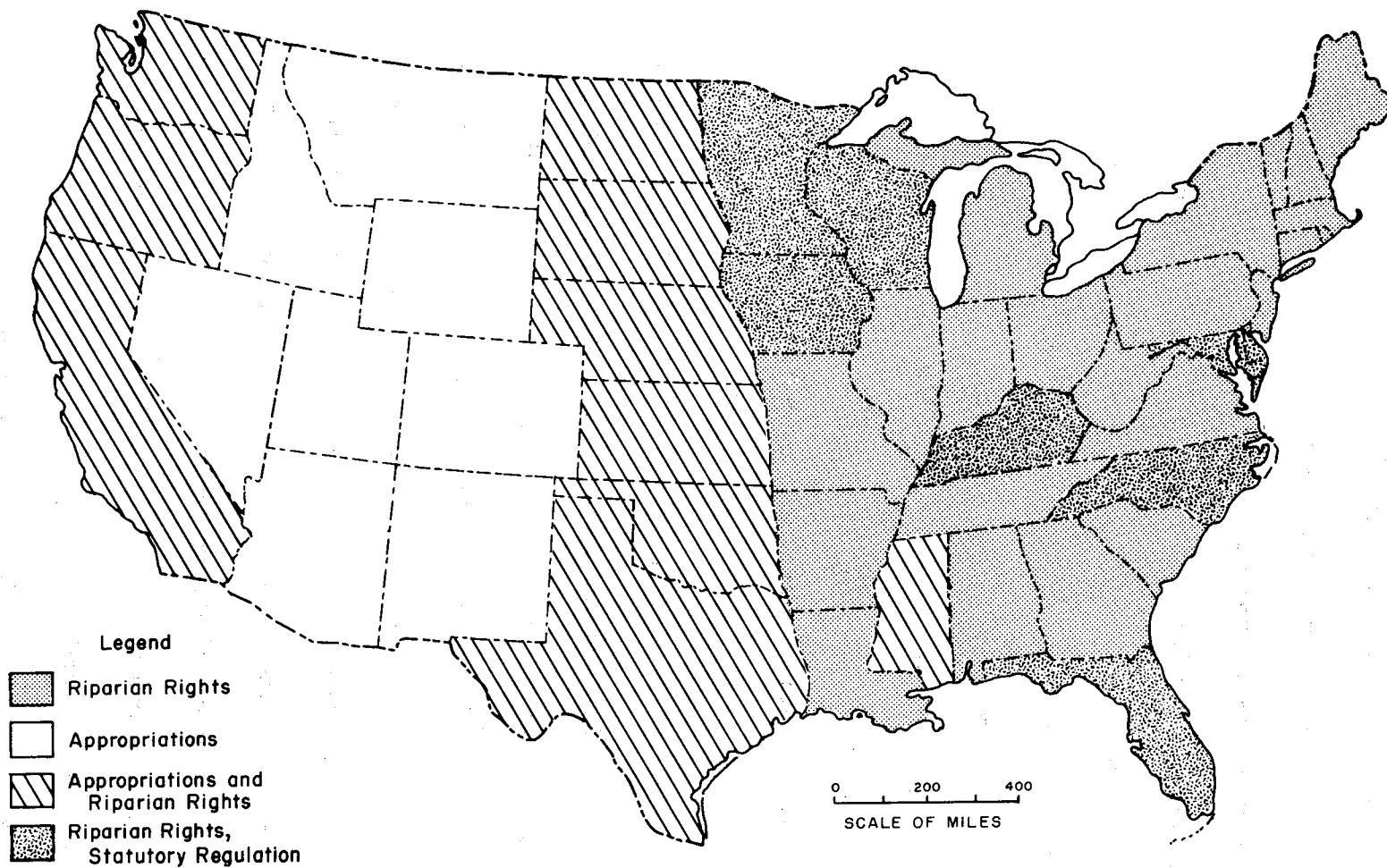


Figure 6. Basic water law doctrine in the 48 states.

natural quantity or quality of the water, and are made on or in connection with the use of the riparian land.⁷⁵ As Trelease points out, the major use of water in early times was to power water wheels.⁷⁶ Thus, due to the non-consumptive nature of the use, downstream areas could expect the water to arrive at their land in its natural condition. Obvious constraints to efficient use of water resources lie in this fundamental doctrine. The states in the eastern United States adopted this common law concept concerning the rights to the use of water with some modification to conform to the different physical characteristics of each state. At the present time there are approximately twenty-two (22) states that apply the riparian doctrine (see Figure 6).

In more recent times this narrow interpretation has been modified to the point where the riparian may make a "reasonable use" of the water consistent with the uses of other riparians. Under this so-called American rule of "reasonable use," the primary or fundamental right of each riparian proprietor on a water course or lake is to make a reasonable use of the waters on his own land and be protected from unreasonable uses of the water by other riparians. In some states the riparian privileges of use include reasonable non-riparian uses and may, to that extent, be transferred from the land to non-riparians or acquired on non-riparian lands.⁷⁷

Each use is required to be beneficial, suitable to the water-course and of economic and social value. If these requirements are

met, reasonableness may require each riparian to put up with minor inconveniences and to adjust to the quantity of water used or the method of its use so that both uses can coexist. If uses cannot be reconciled in this fashion, because the interference is caused by the defendant taking the substance of the water from the plaintiff and using it himself, resolution of the conflict involves consideration of these reciprocal factors: (1) are the first user's investment and other values entitled to protection and (2) should the new user compensate the former user for the loss of that which the latter has gained. In most of the cases in which the plaintiff has suffered substantial harm to his water supply in that a supposedly reasonable use has been taken, the decision has been that the new use is unreasonable.⁷⁸

It should be noted that not much remains of the riparian doctrine as it was first seen in England. The "Mill Acts," some of which date to colonial times, changed the common law and regulated the owner of riparian rights by injecting something resembling priority into the law. The builder of a mill dam was given a superior right to ensure an adequate flow to his mill over those who might later erect dams above him, and the same builder was given a right to be free from interference from a dam builder below him in that the lower builder's pond could not back up and interfere with the senior builder's use.⁷⁹

In addition, cities do not fit within the riparian doctrine. In some statutes were enacted to authorize cities to withdraw and desired amount of water from a river, usually requiring satisfaction of

the claims of those who suffered damage from such taking.⁸⁰ More often, it appears, such power was implied from the city charter or from general legislation applying to all cities.⁸¹

The riparian doctrine is further distinguished by the fact that a riparian retains his right to the water regardless of whether or not use is made of the water or any diversion is made; thus the riparian owner can commence his use at any time and require that his right be fulfilled.⁸²

Today, many states have enacted statutes which affect riparian law. Some have adopted features of the prior appropriation doctrine, most often by requiring a permit before making use of water.⁸³ At this time, there are at least eight states that have had some type of statutory modification to the "pure" riparian system. In addition, nine states bordering the arid west have adopted both water law doctrines for water distribution (see Figure 6).

It is obvious the riparian system will work only in regions where there is adequate water to supply the needs of the users, within the bounds of reasonable use. Even now, however, the changes in the doctrine indicate that growth and development has exceeded the natural supply of water and greater control and efficiency is required.

In much of the arid and semi-arid Western United States, water was not adequate to meet the needs of the users. Therefore, the riparian doctrine could not be applied to the same extent that it had been in the East. Further, the economic activities were different and

placed different demands upon the water supplies. Mining in the East was an extraction process that frequently was burdened with too much water. Mining in the West was first discovering, then processing.

In diverting water from nearby streams to their diggings, gold miners in California applied their rules of mining claims to the use of water. It became customary for the first diverter of water to have a prior right to the use of water, during times of scarcity, over later diverters. A system of priorities was soon established. This practice was quickly accepted by the agricultural settlers. As agricultural, municipal and industrial requirements grew, there arose a need for some civilized way to resolve emerging conflicts.⁸⁴ The water law doctrine that evolved to resolve these conflicts is known as prior appropriation.⁸⁵

The prior appropriation doctrine is basically the same as that developed through custom in California. That is, a water diversion "first in time is first in right,"⁸⁶ thereby establishing a list of priorities.⁸⁷ In order to validly appropriate water, it must be diverted from the stream⁸⁸ and put to beneficial use.⁸⁹ Since its creation, a few other principles have been added to the doctrine. Land ownership is not required to appropriate water,⁹⁰ and water may be transferred out of the watershed of origin.⁹¹ Also, an appropriation is for a specific quantity of water⁹² and a property right⁹³ is recognized in the appropriation which is salable like any other commodity.⁹⁴

The prior appropriation doctrine has come to be the dominant water law theory applied in the eighteen states west of the 98th meridian. Nine of these states⁹⁵ have adopted the prior appropriation doctrine to the exclusion of the riparian doctrine of the east, which is discussed in the following section. The other nine states have adopted a combination of the prior appropriation doctrine and the riparian doctrine, "although the measure of practical importance of the riparian doctrine varies from 'underlying and fundamental' in some jurisdictions to quite limited in others."⁹⁶ (See Figure 6)

The constitution or the water codes in the western states specify which waters are available for appropriation. They range from all waters within the boundary of the state,⁹⁷ to all surface waters, or to just those waters in natural streams.⁹⁸ The states have declared that waters are either property of the public held in trust by the state⁹⁹ or the property of the state. These waters are subject to appropriation as provided in the statutes.

The doctrine has witnessed numerous court interpretations in its application to specific circumstances. In resolving water conflicts, courts have had to determine what constitutes a watercourse, waste, return salvaged, developed, foreign and spring waters, abandonment, beneficial use and a number of other major issues. It is this process of judicial interpretation and the flexibility of the doctrine itself that has allowed for progressive water development.

The law is flexible in a number of ways. Even though a property right in the holder exists, the waters are not rigidly locked to that use; water rights are salable and transferable to other uses. For those uses given statutory preference, condemnation can be exercised by the preferred use over the non-preferred use. In addition, abandonment and forfeiture can reclaim unused water.

A statement as to what is essential for an appropriation to exist is presented by the case of Union Mill and Mining Company v.

Dangberg.¹⁰⁰ It provides the framework of the prior appropriation or "Colorado Doctrine" as it is sometimes referred to. The court held that:

Under the principles of prior appropriation, the law is well settled that the right to water flowing in the public streams may be acquired by an actual appropriation of the water for a beneficial use; that, if it is used for irrigation, the appropriator is only entitled to the amount of water that is necessary to irrigate his land, by making a reasonable use of the water; that the object had in view at the time of the appropriation and diversion of the water is to be considered in connection with the extent and right of appropriation; that if the capacity of the flume, ditch or other aqueduct, by means of which the water is conducted, is of greater capacity than is necessary to irrigate the lands of the appropriator, he will be restricted to the quantity of water needed for the purposes of irrigation, for watering his stock, and for domestic use; that the same rule applies to an appropriation made for any other beneficial use or purpose; that no person can, by virtue of his appropriation, acquire a right to any more water than is necessary for the purpose of his appropriation; that, if the water is used for the purpose of irrigating lands owned by the appropriator, the right is not confined to the amount of water used at the time the appropriation is made; the appropriator is entitled, not only to his needs and necessities at that time,

but to such other and further amount of water, within the capacity of his ditch, as would be required for the future improvement and extended cultivation of his lands, if the right is otherwise kept up; that the intention of the appropriator, his object and purpose in making the appropriation, his acts and conduct in regard thereto, the quantity and character of land owned by him, his necessities, ability, and surroundings, must be considered by the courts . . . that the mere act of commencing the construction of a ditch with the avowed intention of appropriating a given quantity of water from a stream gives no right to the water; this purpose and intention are carried out by the reasonable, diligent, and effectual prosecution of the work to the final completion of the ditch, and diversion of the water to some beneficial use; . . . that the diversion of the water ripens into a valid appropriation only where it is utilized by the appropriator for a beneficial use . . . that, in controversies between prior and subsequent appropriators of water, the question generally is whether the use and enjoyment of the water for the purpose to which the water is applied by the prior appropriator have been in any manner impaired by the acts of the subsequent appropriator.

This rather lengthy, but concise view, plus the information presented previously give rise to four general principles of the appropriation doctrine. First, making a beneficial use of the water is the basis and measure of the right to its use. Secondly, the appropriation is based on a definite quantity of water, and does not vary according to stream conditions. Also, in most of the states the right depends upon a physical diversion of the water from the stream.¹⁰¹ Third, priority of right will determine the allocation of waters in times of shortage. Fourth, an appropriation of water is a property right.

Based on these principles, it becomes readily apparent that the doctrine was established to promote and encourage the development of the water resources of the West. This development of the water

resource was intended to promote the economic growth and general welfare of the people in an area where water is relatively scarce. This procedure made good sense as long as our goals were directed towards economic development and efficiency in the use of water resources. However, as noted previously in the discussion of goals, we are now in an era of multiple goals, development being only one aspect.

One area of the appropriation doctrine illustrates excellently the states desires to use the waters for economic purposes. This is in the area of preferences to the use of water. A true preference is one in which a junior appropriator may take water from a senior appropriator without having to pay compensation, based on the fact that the junior's use is preferred to that of the senior. Only one of the western states has adopted this true preference system.¹⁰² Three types of preferences have been adopted by the western states: (1) where the preferred user may condemn and compensate a non-preferred user; (2) where the state may withdraw water from appropriation and hold it for the future use of a preferred user; (3) using the preference system as a decision tool to allocate water between simultaneous applications.¹⁰³

The underlying theme that runs throughout the preference statutes of the various states is that "some users are more important than others and should receive some type of favored treatment."¹⁰⁴ A quick review of the preference statutes indicates that the

non-economic uses (i.e., fish and wildlife habitat; recreation and esthetic users), for the most part, have not been recognized nor have they received any of this favored treatment. Various states in the past, as well as the present, continue to place primary emphasis on the economic and life sustaining uses of water.

There is no general rule that may be stated as to how the states structure their preferences. Some examples will help to illustrate this point.¹⁰⁵

In Colorado, for example, the constitution declares that "Priority of appropriation shall give the better right as between those using the water for the same purposes; but when the waters of any natural stream are not sufficient for the service of all those desiring the use of the same, those using the water for domestic purposes shall have the preference over those claiming for any other purpose, and those using water for agricultural purposes shall have preference over those using the same for manufacturing purposes."¹⁰⁶

A distinction is often made between domestic and municipal uses of water, but they usually rank first in the preference scheme. Agricultural uses, as noted in the Colorado Constitution, is recognized in the preference system of most of the states.¹⁰⁷ Additional economic preferences include items, such as: manufacturing, stock watering, power, mining, navigation, "steam engines and general railway use, culinary, laundry, bathing, refrigeration, steam and hot water heating plants, (and) steam power plants."¹⁰⁸

Evidently only four (4) of the nineteen western states have placed the non-economic uses of water into the preference systems. These will be reviewed in turn. In Arizona, the law holds that: "As between two or more pending conflicting applications for the use of water from a given water supply, where the capacity for the supply is not sufficient for all applications, preference shall be given...according to the relative values to the public for the proposed use."¹⁰⁹ In the following section of the law the relative values to the public listed. They are: (1) Domestic and municipal use; (2) Irrigational and stock watering; (3) Power and mining uses and (4) Recreation and wildlife uses including fish.¹¹⁰ (Emphasis added.)

Kansas also has recognized non-economic uses in its statutes dealing with preferences, although the priority of appropriation determines the relationship among appropriators when supplies are limited. The order of preferences are as follows: (a) domestic, (b) municipal, (c) irrigation, (d) industrial, (e) recreational, and (f) waterpower.¹¹¹ (Emphasis added.)

In North Dakota, a broad range of economic and non-economic uses is recognized in the preference system. In the statutes, it is stated that preferences shall be established in the following order: (1) domestic, (2) livestock, (3) irrigation and industry, and (4) fish, wildlife, and other outdoor uses.¹¹² (Emphasis added.)

The fourth state to recognize the non-economic values in its preference system is Texas. A section of the Texas water code sets

forth the requirement that water must be used for a beneficial purpose and that the "public welfare" requires a "constructive public policy" in the management of the water resources. Following these requirements, the statute lists those uses which have "preference and priority" over other uses. The uses identified are:

- (1) Domestic and municipal uses, including water for sustaining human life and the life of domestic animals.
- (2) Water to be used in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, and to include water necessary for the development of electric power by means other than hydro-electric.
- (3) Irrigation.
- (4) Mining and recovery of minerals.
- (5) Hydro-electric power.
- (6) Navigation.
- (7) Recreation and pleasure. (Emphasis added.)¹¹³

There exists a third system of water rights in the United States, one which overlaps the riparian and appropriation doctrines. Known as the federal reservation doctrine, it gives the federal government the power to reserve water on lands that have been withheld from private appropriation. This right differs from other federal powers over water in that it is a distinct proprietary right. The reservation doctrine has been discussed and examined in detail elsewhere.¹¹⁴ What follows is a brief summary of its background, meaning and implications.

Article IV, section 3, clause 2 (the Property Clause) of the Constitution states that: "The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States; and nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State." Included in the "Property belonging to the United States" were the lands and appurtenant waters in the western states. As these states were admitted to the Union, they obtained power over navigable waters, but acquired no proprietary rights or title to the lands owned by the federal government nor waters arising on or flowing through such land. Thus, unless the United States has disposed of these lands the federal government is still the owner.¹¹⁵

The states have contended that the federal government transferred the rights to water on the western lands by the Act of 1866¹¹⁶ the Act of 1870,¹¹⁷ or the Desert Land Act of 1877.¹¹⁸ The view has been held that the federal government did not dispose of federal waters under these acts.¹¹⁹

The reserved rights controversy has created a great deal of concern regarding the jurisdiction of western states over the use and rights to waters. The states are concerned that unquantified reservations by the federal would limit future development and investment in water projects. In many of the western states federal reserves cover large portions of the water producing areas. These reserves

were established in many cases prior to state establishment of water rights. Therefore, a dual jurisdiction over rights has developed.

The reservation doctrine is in conflict with many of the major principles of the prior appropriation doctrine. Federal reservation rights are: (1) created without diversion or application to beneficial use, (2) not lost by nonuse, (3) established according to the date the lands were withdrawn, and (4) the measure of the right is the amount of water reasonably necessary to fulfill the purposes for which the land has been withdrawn.¹²⁰

These differences have led to conflicts between federal and state objectives. As shown previously, many of the Western states still do not recognize fish, wildlife, recreation and esthetics as beneficial uses of water. Those that do have given preference to the more traditional uses, i.e., domestic, irrigation etc. This has caused concern that Federal programs, particularly those for fish, wildlife and recreation, may not be fully served if the Federal agencies must rely on state water law requirements.

The reservation doctrine has distinct advantages to the federal government.¹²¹ (1) As federal demands for water increase on reserved lands, these demands may be met without regard to state water law requirements, i.e., diversion and beneficial use. (2) The reserved waters have a distinct advantage over state-determined priorities. (3) The federal government is not required to compensate

for the taking of non-federal rights initiated after the creation of the reservation.

The reservation doctrine has strong implications for the preservation of fish, wildlife, recreation and esthetic resources. Federal reservation of waters is in many cases directed at promoting these values. It will insure that sufficient water is available for these uses, without being subject to appropriation by other uses. Much of the water required by the federal agencies is for instream use. This will aid in the preservation of the fish and wildlife resources in those states requiring waters be diverted from the stream for a valid appropriation.

Some have contended that the water requirements for federal uses will be minimal and that the loss involved (where no compensation is paid) will be negligible. There are counter arguments to this position. First there is nothing to insure that in the future, requirements for waters on reserved lands will not become extensive. For example, with the rising demands for recreation more water will be required. There may also be uses that will develop in the future that are not foreseen now. Twenty years ago the development of oil shale reserves was not viewed as being essential. Such is not the case today, and this development will require substantial quantities of water.

Secondly, the taking by the federal government cannot be approved because the taking is small. As Trelease points out,

"unconscionable acts of the national government can hardly be justified on the grounds that they only result in petit larceny and only hurt little people."¹²²

Judicial rulings supporting the reservation doctrine began with U.S. v Grande Dam & Irr. Company.¹²³ Herein the courts recognized "the right of the United States, as the owner of lands bordering on a stream, to the continued flow of its waters; so far at least as may be necessary for the beneficial uses of the government property."¹²⁴

For some time, the impression was left with the states that they had complete control over the appropriation and use of all waters within their boundaries.¹²⁵ This view was changed in the case of F.P.C. v Oregon,¹²⁶ sometimes known as the Pelton case. This case was the first in a series of cases that held that the federal government had not divested itself of title to all Western waters.¹²⁷

In the Pelton case, the State of Oregon questioned the authority of the Federal Power Commission to license a power project to use waters on reserved lands and the adequacy of the protection afforded anadromous fish. The court stated that: "The purpose of the Acts of 1866 and 1870 was governmental recognition and sanction of possessory rights on public lands... The Desert Land Act served, for purposes of private acquisition, soil and water rights on public lands, and provided that such water rights were to be acquired in the manner provided by the law of the State of location."¹²⁸ The court continued by saying "these Acts are not applicable to the reserved lands and

water here involved." For "the lands before us in this case are not public lands but 'reservations'."¹²⁹

If the states felt that they still retained control, this view was changed in Arizona v. California.¹³⁰ Therein the court held that there was "no doubt about the power of the United States under the clauses (Commerce Clause and Art. IV, Sec. 3 of the Constitution) to reserve water rights for its reservations and its property."¹³¹

During 1963, a case was handed down which was the first federal decision to apply the reservation doctrine to a non-Indian reservation where the nonfederal user was uncompensable.¹³² In this case, Glenn v. U.S.,¹³³ the court ruled that the United States had the right to use water arising on the Ashley National Forest and that the priority date was based on the date of reservation in 1897.

Recent court action appears to require the federal government to have its claims adjudicated in the state courts. In U.S. v. District Court¹³⁴ the Supreme Court upheld the Colorado court's opinion that the McCarran Amendment¹³⁵ gave consent to join the United States in the adjudication of water rights. The Supreme Court interpreted "river systems," as referred to in the McCarran Amendment, as being one within particular State jurisdiction and not applying to the entire river.¹³⁶ In a companion case,¹³⁷ the Supreme Court found that the federal government was subject to state adjudication procedures. Again, the Supreme Court held that monthly proceedings for

adjudication constituted a "general adjudication" in the sense of the McCarran Amendment.

The companion case illustrates the scope of water rights claimed by the United States. It covers water rights in the White River, Arapaho, Routt, and Grand Mesa National Forest; Naval Oil Shale reserves, and lands owned and administered by the Bureau of Land Management.

The government claims for water included direct water rights, storage rights, transportation rights and well rights. These waters were to meet present and future needs of the reserved lands. The uses made of the water were to be for timber production, recreation, domestic use, agriculture, stock watering, conservation and management of fish and wildlife resources, fire fighting and other uses.

With respect to the fish and wildlife habitat protection, conservation and management the federal government made a further claim. That was the

right to the maintenance of such continuous, uninterrupted flows of water and such minimum stream and lake levels as are sufficient in quantity and quality to: (a) Insure the continued nutrition, growth, conservation, and reproduction of those species of fish which inhabited such waters on the applicable reservation dates, or those species of fish which are thereafter introduced. (b) Attain and preserve the recreational, scenic, and esthetic conditions existing on the applicable reservation dates, to preserve those conditions which are thereafter caused to exist.¹³⁹

The federal determination of the minimum flows required to attain the requirements in (a) above were determined on the basis of

two seasons, spawning and the rest of the year.¹⁴⁰ During the spawning season, the government sought the right to the quantity of water, unappropriated as of the reservation date, the lesser of either:

- (1) the natural flow of such unappropriated water remaining in the stream or,
- (2) that flow which corresponds to the fortieth percentile of a flow duration curve, or its statistical, synthetic or empirical equivalent. A flow, historically equalled or exceeded 40% of the time.

During the non-spawning season the government claimed the right to the lesser quantity of either:

- (1) the natural flow of such unappropriated water remaining in the stream or,
- (2) that flow which corresponds to the eightieth percentile on a flow duration curve or its equivalent. Eightieth percentile being the flow historically equalled or exceeded 80% of the time.

The preceding discussion illustrates how the application of the reservation doctrine may aid in the preservation of instream values. The denial of these claims would no doubt have an adverse effect on fish and wildlife resources.

To reduce the conflict between the state and federal governments the National Water Commission has recommended the filing of federal claims in state courts.¹⁴¹ The Commission recommends that this filing should be done in conformity with State law, and that the federal agencies should establish the quantity of uses. Furthermore, provisions should be made for the establishment of minimum stream flows in streams crossing federal lands so as to preserve the instream

values. The Commission recommends the minimum flows be limited to unappropriated waters and should be filed for with the state water courts.

4. Sanctioned Standards and Criteria

Once goals are translated into policy, and the policies enacted into laws, these laws may or may not lead to the creation of sanctioned standards and criteria (see Figure 7). Standards are necessary in that they "provide for uniformity and consistency in planning."¹⁴² Prior to August of 1973, the principles and standards used by federal agencies stressed primarily market or monetary considerations. With the approval of the new principles and standards, as recommended by the Water Resources Council, explicit consideration was given to the objective of environmental quality. Thus, providing an opportunity to improve the quality of the environment during the formulation of water resource plans.¹⁴³

Sanctioned standards and criteria are found in three areas: (1) traditional water law; (2) pollution control laws and (3) water conservation and protection laws. We shall discuss, herein, the presence or absence of standards and criteria in each of these three areas.

Traditional Water Laws: The basic rule applied to early riparian water rights was that every riparian had the right to have water flow past his land, undiminished in quantity and unimpaired in quality. Whether or not the riparian made use of the water, he could

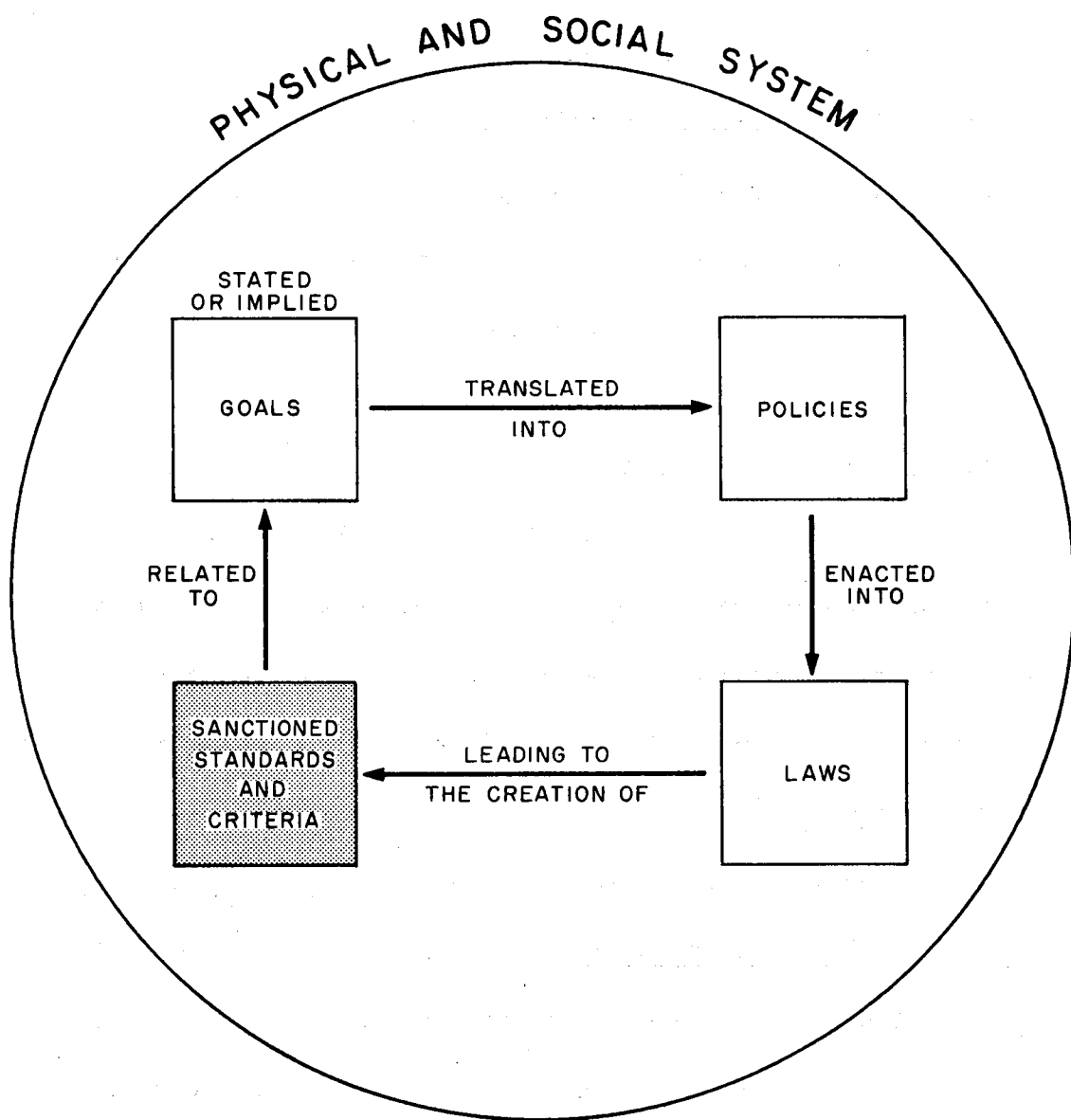


Figure 7

easily determine standards and criteria associated with the water. In making judicial decisions, the courts could base their decisions in part upon the changes that occurred to the standard.

The modified American riparian doctrine stated that every riparian had the right to make "reasonable use" of the waters. As such, a riparian land owner could make reasonable use of the waters that could lead to a diminishing in quantity, as well as, an impairment of the quality. Old standards no longer applied. The new standard established under the reasonable use concept concerned the impact of water use upon other riparians and the general public. The implication of the reasonable use concept was that the public had a right to a minimum acceptable standard of water quality. This minimum standard of water quality applied to consumptive and non-consumptive uses of the water.

This point may be illustrated by the case of Namekagon Hydro Co. v. Federal Power Commission.¹⁴⁴ In this case, the Federal Power Commission denied the license application of the Namekagon Hydro Company to construct a dam and hydroelectric project on the Namekagon River in Wisconsin. The courts found that man's intrusions into the free-flowing rivers in Wisconsin had greatly reduced the miles of free-flowing rivers remaining. Furthermore, the construction of the proposed dam would have had an adverse impact upon the small mouth black bass fishing population. The river also provided

esthetic pleasures to both residents and tourists of the state of Wisconsin.

Based upon the recreational and esthetic values of the stream, the courts affirmed the action of the Federal Power Commission in denying the permit. The court agreed that the Federal Power Commission was within its powers to determine that the recreational and esthetic values of the stream were of greater public benefit than the use of the river for waterpower development.

The appropriation doctrine has also led to the establishment of certain sanctioned standards and criteria. For the most part, the appropriation doctrine vests the power to establish standards and criteria in a state water administrative body, frequently termed the state engineer. The law may either give the water administration body the right to acquire water rights for the people of the state, or to administer the use of water resources or both. For example, a recent Colorado law gives the Colorado Water Conservation Board the power to appropriate or acquire "such waters of natural streams or lakes as may be required to preserve the natural environment to a reasonable degree."¹⁴⁵ Standards and criteria must then be established by the Board to define the reasonable degree.

The standards established by the administrative body must be consistent with the intent of the law. Failure of the administrative body to establish standards or standards consistent with the law may result in court action to limit the administrative bodies actions.

The case of Fellhauer v. People¹⁴⁶ illustrates the problem associated with inconsistent standards. In 1966, the State Engineer of Colorado attempted to halt ground water use that was having an adverse impact upon the Arkansas River. The State Engineer was acting under a statute that gave him the power to administer the laws of the state relative to the distribution of the surface waters of the state including the ground waters tributary to the surface waters.¹⁴⁷

Concerning the State Engineer's actions, the court found that he had acted "without any written rules or regulations and without any prescribed guidelines." The court also noted that prior to regulating the use of the water resources consistent and reasonable standards must be established. The establishment of consistent standards, the court reasoned, would prevent arbitrary and discriminatory actions on the part of the State Engineer.

Pollution Control Laws: The establishment of water pollution control laws has led to the establishment of numerous standards to protect the quality of our Nation's waters.¹⁴⁸ The standards established apply to both flow and discharges into the waters. Although not discussed in detail in this report, water pollution control standards have been useful in preventing the destruction of fishery resources. The standards and criteria established may be present either in the laws themselves or in the directives issued by a water pollution control agency or both. It is not always easy to establish these standards

since they may vary from stream to stream, depending on the local conditions.

The establishment of sediment standards, for one, has resulted due to the adverse impacts upon the fish and plant life.¹⁴⁹ It is not our intent to describe standards established by the federal and state governments in the pollution control field. Maryland's sediment control program will illustrate the establishment of standards to protect water quality. This is not to imply that all states follow this pattern, for each state will vary the way in which it establishes standards.

In 1970, the Maryland General Assembly established a Statewide Sediment Control Act.¹⁵⁰ Under the act the secretary of the Department of Natural Resources was directed to adopt criteria and procedures to be used by the counties and local soil conservation districts to implement soil and shore erosion control programs. The Department of Water Resources, being designated to implement and administer the sediment control program, established as one of its objectives the protection of Maryland's water resources and associated wildlife, fish, and aquatic life, from damage due to sediment pollution.¹⁵¹ A handbook was also adopted concerning standards and specifications for soil erosion and sediment control.

State highway departments have also been actively establishing standards to prevent pollution of streams resulting from the construction of highways. These standards usually deal with erosion control

prevention and criteria that contractors must comply with when constructing highway projects that involve streams.

Conservation Laws: Conservation laws that are intended to protect and preserve the natural water environments also result in the establishment of standards and criteria. An example of the establishment of these standards may be found in the state wild and scenic rivers acts, which are discussed in detail in Chapter IV. The North Carolina Natural and Scenic Rivers Act of 1971¹⁵² explicitly defines in the law the criteria for the inclusion of any river into the natural and scenic rivers system. These specific criteria include: river segment length, boundaries, water quality, water flow, and public access.¹⁵³

In contrast to the North Carolina act, the Iowa Scenic Rivers System¹⁵⁴ stresses administrative determination of the standards and criteria. The law states that a natural river is one which has been designated by the State Conservation Commission for inclusion into the system. Therefore, the Commission is responsible for determining the appropriate standards and criteria.

The preceding discussion of sanctioned standards and criteria is not an exhaustive study of these standards nor of the relationship of the standards to the stated or implied goals of society. Nor have we discussed the effectiveness of the standards to carry out the substantive provisions of the law. Some reference is made in the body of the report to standards and criteria that have been developed; however,

this area requires additional research. Chapter IV deals primarily with the body of law developed to protect and preserve the water and aquatic environments.

Part B. Water Uses and Values

1. Trends in Water Use and Associated Values

The purpose of this section is to examine the changing patterns of water resource use, and the economic values of water in various uses. It is beyond the scope of this report to provide a detailed account of every water use and its value. Rather, what follows is a broad overview of the trends in water use and values. 155

Concerns over the quantity of usable water available and pressure on the existing supplies has resulted in the United States due to our increasing population and the industrialization of our economy. For the most part, in premodern times man was not faced with water shortages since he lived in the water abundant areas of the nation. In the water short areas, man could correct the problem by moving to the water or by moving the water to the shortage areas. As the population grew, man became unable to solve all of his water needs by simple transport relocations.

On a world wide basis, population has been growing exponentially and the rate of growth is also increasing. The world population in 1650 was about .5 billion and was growing at a rate of .3 per cent per year. In 1970, the population was 3.6 billion and was growing at

a rate of 2.1 percent per year.¹⁵⁶ The problem with respect to water is that the ever growing population must be served by a relatively static quantity of water, yet per capita consumption continues to expand. As Wright has pointed out concerning water use in the United States:

The whole nation required only 40 billion gallons daily in 1900. We used 360 billion gallons a day last year (1965). On a per capita basis this comes out at 526 gallons per person in 1900, and 1,893 gallons per person in 1960. Unless we mend our ways, this figure will double by 1980...¹⁵⁷

The First National Assessment of the Water Resources concluded that from a national perspective, water resources are "statistically abundant."¹⁵⁸ The report goes on to note that distributional problems do exist. These problems are both spatial and temporal in nature. For example, the precipitation for the 48 contiguous States averages about 30 inches a year, which would be adequate to meet our needs if evenly distributed in both time and location. However, this average varies from over 100 inches annually in coast regions of the Pacific Northwest to less than four inches in parts of the Southwest.¹⁵⁹ Additionally, certain portions of the country are subject to alternating droughts and floods.

Both the National Water Commission and the Water Resources Council are of the opinion that few water "requirements" exist. The requirements include only those areas that are necessary to sustain and preserve man, his property, i.e., fire-control, and other necessary social and natural environments. Since man is an animal

with many wants, however, many "demands" for water and water-related services do exist.

The National Water Commission's most recent report analyzed water uses from three points of view. Water uses were classified as: (1) intake uses; (2) onsite uses; and (3) instream or flow uses.

For our purposes, however, we have examined water uses according to the two broad categories of (1) withdrawal uses and (2) non-withdrawal uses.

The term withdrawal use is synonymous to "intake use" or "water requirement". The main criterion for a withdrawal use is that the water must be taken from its surface or ground water source and transported to the place of use.¹⁶⁰ Examples of withdrawal water uses include water for domestic, agricultural, and industrial purposes.

Water that performs a function without being diverted from its source or channel is termed non-withdrawal use. Non-withdrawal uses are further divided into onsite and instream uses. Onsite uses are those in which the water is consumed by swamps, wetlands, evaporation from bodies of water, natural vegetation, unirrigated crops, and fish and wildlife.¹⁶¹ These on-site uses may take place when the water is present in a body of water, or when water is being used to improve natural conditions such as wetlands improvement.¹⁶²

Instream or flow uses include navigation, sport fishing habitat, fresh water sweetening of saline estuaries, hydroelectric power, waste dillution and some fish, wildlife and recreational uses.

Water uses may be measured in two ways, by the amount of water withdrawn and by the amount consumed. As mentioned previously, withdrawal use takes water from its course and conveys it to the place of use and is available for future use or reuse at a later time or place. The term "water consumed" or consumptive use refers to water used in such a manner that it becomes unavailable for future use or reuse because it has either evaporated, transpired, been incorporated into products and crops or consumed by man and other animals. The following pages will examine the use and value of water in the three categories mentioned above.

Withdrawal Water Uses and Values: The National Commission has concluded that total withdrawals and consumptive use of water is on the increase. From 1900 to 1970 total water withdrawals have risen from 40 billion gallons per day (bgd) to about 370 bgd, respectively. (See Table 1). In the period from 1960 to 1970, the withdrawals have gone from 270 bgd to 370 bgd, an increase of approximately 37 percent.

Equally as significant as the increase in the total withdrawals, is the increase in the total consumptive use of water (see Table 2). As a nation we now have consumptive use of water that amounts to 88 bgd. This is contrasted with a total consumptive use of water in 1960 that amounted to 61 bgd, or an increase of about 44 percent from 1960 to 1970.

Table 1. Water withdrawals for selected years and purposes, U.S. and Puerto Rico
(billion gallons per day).

Year	Total Water Withdrawals	% Change in Total Water Withdrawals	Irrigation	Public Water Utilities	Rural Domestic	Industrial & Miscel.	Steam Electric Utilities
1900	40	1900-1910 (+65%)	20	3	2.0	10	5
1910	66	1910-1920 (+39%)	39	5	2.2	14	6
1920	92	1920-1930 (+20%)	56	6	2.4	18	9
1930	110	1930-1940 (+24%)	60	8	2.9	21	18
1940	136	1940-1950 (+47%)	71	10	3.1	29	23
1950	200	1950-1960 (+35%)	110	14	3.6	37	40
1955	240		110	17	3.6	39	72
1960	270	1960-1970 (+37%)	110	21	3.6	38	100
1965	310		120	24	4.0	46	130
1970	370		130	27	4.5	47	170

Source: WATER POLICIES FOR THE FUTURE, Final report by the National Water Commission, Wash., D.C., June 1973, p. 7, and ESTIMATED USE OF WATER IN THE UNITED STATES IN 1970, C. R. Murray and E. B. Reeves, U.S. Geological Survey Circular 676, Wash., D.C., 1972, p. 10.

Table 2. Recent trends in consumptive use of water in the U.S., including Puerto Rico (intake uses only).

Year	Total Consumptive Use		Irrigation		Public Water Supply		Rural-Domestic		Self-supplied Industrial and Miscellaneous		Steam Electric Utilization	
	BGD	% change	BGD	% change	BGD	% change	BGD	% change	BGD	% change	BGD	% change
1960	61	1960-65 (+26%)	52	1960-65 (+27%)	3.5	1960-65 (+49%)	2.8	1960-65 (+14%)	3.0	1960-65 (+27%)	.22	+86%
1965	77	1965-70 (+14%)	66	1965-70 (+11%)	5.2	1965-70 (+13%)	3.2	1965-70 (+6%)	3.8	1965-70 (+39%)	.41	+153%
1970	88		73		5.9		3.4		5.3		1.04	
		% inc. 1960-70 +44%		% inc. 1960-70 +40%		% inc. 1960-70 +69%		% inc. 1960-70 +21%		% inc. 1960-70 +76%		% inc. 1960-70 +373%

Source: WATER POLICIES FOR THE FUTURE, Final report of the National Water Commission, Wash., D.C., June 1973, p. 7.

For the purpose of this report withdrawal water uses will follow the classification used by the Geological Survey. The four principal withdrawal uses are: (1) public supply (for domestic, commercial, and industrial uses); (2) irrigation; (3) self-supplied industrial (including thermoelectric power generation); and (4) rural uses (domestic and animal). Each of these uses will be examined in turn.

Public Supplies: Public water supplies are used for such things as domestic use, fire fighting, washing, watering parks and in swimming pools. Commerce and industry also make a substantial use of public supplies; in 1970 commercial-industrial use amounted to one-third of the total public supply.¹⁶³

Referring to Table 1, water withdrawals for public supplies have increased from 3 bgd in 1900 to 27 bgd in 1970. From 1960 to 1970 the withdrawals increased by 6 bgd, an increase of approximately 26 percent. This increase in withdrawals is accompanied by an increase in the consumptive use of water. (See Table 2). Although not large in absolute terms (5.9 bgd), the percent increase from 1960 to 1970 was 69 percent.

The amount of urban water use will depend on several factors. Urban water use will be greater in the dry climate areas than in cool climates. The use will also vary according to the standard of living, whether the water is metered, water quality, the physical condition of the distribution system and its management.

Trying to place an economic value on public supplies is complicated since in most cases no final marketable product results from its use, and no market as such is present for handling water sales and transfers. Also, only small amounts are necessary to provide for man's physical needs, although he may have many demands. It seems intuitively reasonable that drinking water would have the highest economic value relative to other public uses.

A recent study has attempted to specify some values for municipal water use.¹⁶⁴ The authors of this report estimated that the value of water for lawn sprinkling in the East was \$16.30 per acre-foot. In the West, the same use produced a value of \$62.00 per acre-foot. In-house water use for both the East and the West was valued at \$101 per acre-foot, the high value representing man's reliance on water to sustain life.

Crop Irrigation: Prior to 1960, irrigation was the largest withdrawal use of water. In 1960, irrigation withdrawals were 110 bgd and rose to 130 bgd in 1970, an increase of approximately 17 percent. At the present time, irrigation withdrawals account for about 35 percent of total withdrawals, and about 83 percent of the total water consumed.¹⁶⁵

The consumptive use of irrigation water was approximately 73 bgd in 1970. The conveyance loss during the same period amounted to 22 bgd. There has been a trend towards decreasing this loss due in part to the increased reliance on ground water. By using ground

water, a shorter distance is required to transport the water from its source to the place of use, as compared to surface water.¹⁶⁶

It is difficult to cite a general figure for the value of water in irrigation uses. The value depends on the environmental conditions, the type and value of crops produced, the nature of the soil, and the efficiency of employing the water.

The Young and Gray study indicated that the long run value for irrigation water in the West, from a private point of view, ranged from \$15 to \$40, with the average at \$20 per acre-foot. When these figures were adjusted to the national point of view the values estimated ranged from \$5 to \$20 per acre-foot.¹⁶⁷ One of their conclusions, based on these estimates, was that there is "substantial excess irrigation capacity at present,"¹⁶⁸ and therefore, it would not be economically desirable for further investment in irrigation development at this time.

Industrial: Industrial water withdrawals amount to over one-half of the total withdrawals made in the United States. In 1970, self-supplied industrial withdrawals amount to approximately 210 bgd, an increase of 23 percent over the 1960 figure.¹⁶⁹ These industrial withdrawals include 54 bgd of saline water. Over 80 percent of the total industrial withdrawals were made in the eastern portion of the United States.

The consumptive use of self-supplied industrial water is relatively small, however, the rate of consumptive use is increasing.

(See Table 2). The consumptive use grew by 39 percent from 1960 to 1965. This increase in consumptive use will tend to have a significant impact on the quality of water, and the time patterns of the availability of return flows.

The value of water in industrial uses is dependent on the type of use to which the water is put and the geographic location of the activity. The two most general uses are for cooling processing. As may be seen in Table 3, the average cost for cooling water, by regions, varies from \$2.49 per acre-foot to \$4.19 per acre-foot. Table 4 shows the value of water in industrial cooling for various uses. For the most part, these values are grouped around the \$3.00 per acre-foot figure. Cooling in sugar beet processing commanded the highest value per acre-foot, ranging from \$7.82 to \$8.96.

Table 5 shows the value of water in various industrial uses. Based on these select industries the value of water varies from a low of \$3.26 in the minerals industries to a high of \$37.15 for flume water through clarifier.

Thermoelectric Power: Table 1 shows that the water used by thermoelectric plants to generate electricity amounted to 170 bgd in 1970, which is an increase of about 33 percent over the 140 bgd used in 1965. This category is usually separated from other industrial uses, since the withdrawal figures are so high. The significant point to note is that the rate of increase in usage by thermoelectric power

Table 3. Calculation of average cost for cooling water, by region.

Region	Wet-Bulb Temperature ($^{\circ}$ F)	Relative Rating Factor	Average Cost Mills/1000 gallons	Average Cost \$/Acre-foot	Degree of Recirculation (%)
1	65.75	.60	7.65	2.49	27
2	69.37	.75	8.66	2.82	71
3	73.64	.90	9.62	3.13	58
4	75.60	1.00	10.30	3.36	4
5	76.05	1.10	10.85	3.54	3 1/2
6	77.80	1.41	12.85	4.19	4

Source: ECONOMIC VALUE OF WATER: CONCEPTS AND EMPIRICAL ESTIMATES, R. A. Young and S. L. Gray. National Technical Information Service, Springfield, VA. Accession No. PB 210 356, 1972, p. 172.

Table 4. Value per acre-foot of water in industrial cooling recirculation cost.

Use	\$/1000 gallons	Value/Acre-Foot
Cooling for thermal power generation. Low cost coal used in power generation.	.00730	2.378
Cooling for thermal power generation. Medium cost coal used in power generation.	.00776	2.529
Cooling for thermal power generation. High cost coal used in power generation.	.00821	2.675
Cooling for thermal power generation, east region.	.0113	3.682
Cooling for thermal power generation, west region.	.0081	2.639
Cooling for thermal power generation, (Arkansas, Louisiana, Oklahoma and Texas)	.0107	3.486
Cooling for thermal power generation (West south central region)	.0062	2.020
Cooling in petroleum industry	.0171	5.572
Cooling in beet sugar processing	.0240-.0275	7.82-8.96

Source: ECONOMIC VALUE OF WATER: CONCEPTS AND EMPIRICAL ESTIMATES, R. A. Young and S. L. Gray. National Technical Information Service, Springfield, VA. Accession No. PB 210 356, 1972, p. 173.

Table 5. Costs of recycling and value of water in processing uses.

Industry	Location	Cost of Recycling/ (\$/1000 gallons)	Value (\$/Acre-Foot)
Steel	Sparrows Point, Maryland	.04	13.03
Steel	Fontana, California	.015	4.89
Mineral Industry	Arizona	.01 to .02	3.26 to 6.52
Paper	General	.08/1000	26.06
Sugar Beet	Great Plains, Intermountain		
Flume water through clarifier		.114	37.15
Chemical	Monterey, Mexico	.07	22.81

Source: ECONOMIC VALUE OF WATER: CONCEPTS AND EMPIRICAL ESTIMATES, R. A. Young and S. L. Gray. National Technical Information Service, Springfield, VA. Accession No. PB 210 356, 1972, p. 176.

plants make self-supplied industrial use the fastest growing of the major withdrawal uses."¹⁷⁰

Another distinguishing feature that separates power from other industrial uses is the fact that in 1970 only 1.04 bgd of the water withdrawn is consumed. This represents an increase of 373 percent over the 1960 figure. This can be explained, for the most part, by the increase in electric power generation over the past ten years.

Rural Uses of Water: The final category of withdrawal uses examined is that of rural uses. These uses provide for the needs of man and animals in the rural setting. In absolute terms the withdrawals are small. In 1970 only 4.5 bgd were being withdrawn for rural use. This represents an increase of about 13 percent over the 1965 figure.

The consumptive use of rural water is high. Of the 4.5 bgd being withdrawn, about 3.4 were being consumed. (See Table 2). This high consumptive use is based in part on the failure of the users to control the amounts of water being applied. No doubt the consumptive use could be reduced by the proper management of the resource.

The overall picture for withdrawal uses is as follows. The total water withdrawals of 1970 of 370 bgd represent an increase of 19 percent over the 1965 figure, and a 37 percent increase over the 1960 figures. It is noteworthy that an estimated 86 percent of the withdrawals took place in the 17 Western United States.¹⁷¹ These withdrawals represent a one percent increase over the 1965 figure. On a

per capita basis, consumption of water in the West is 16 times greater than in the East.¹⁷²

These high withdrawal and consumptive use figures for the West are one of the primary reasons for the supply-versus-demand problems in this region. For example, as more water is demanded for withdrawal uses less water is available for fish and wildlife preservation, recreation opportunities and general scenic pleasure. Given the figures presented above, it does not appear that the trend towards higher withdrawals is going to be reversed in the near future. Thus, more emphasis will likely have to be placed on water laws to ensure adequate water supplies for fish and wildlife preservation and recreational demands of our nation.

Nonwithdrawal Uses and Values: Only limited data are available concerning important onsite and flow uses of water.¹⁷³ Only general estimates are available concerning nonwithdrawal uses such as navigation and hydroelectric power.¹⁷⁴ The non-withdrawal uses, where the data are most limited, concern the use of water for esthetic, recreational, and fish and wildlife uses. Most of the attempts to determine water use in these areas have resorted to indirect techniques. These uses will be reviewed in the light of the available data.

Navigation: From 1950 to 1970 there has been a fourfold increase in water borne traffic on the Nation's inland waterways.¹⁷⁵ Navigation has little effect on the large rivers of the nation. The only requirement

for adequate navigation is that there be a sufficient quantity of water in the channel at the proper time. Navigation may affect the quality of water if it results in the discharge of materials into the water, but as mentioned earlier in this report, we have not concerned ourselves with water quality problems per se.

The present method of valuing water used in navigation is to determine the economic cost of transporting goods by means of water and deduct the least cost alternative mode of transportation. The savings will indicate the value of water in navigation uses.¹⁷⁶

Most of the studies indicate that in the larger waterways water has a positive economic value. The ability to transport longer distances and with larger loads will provide this savings. However, in the smaller rivers where the distances are shorter and the loads smaller the economic value of the water may be zero or in some cases negative.¹⁷⁷ Waterborne transportation on these smaller rivers may provide a useful social and economic purpose if it provides alternative modes of transport and competition for other carriers.

Hydroelectric Power: Although hydroelectric power generation has increased 28 percent since 1965,¹⁷⁸ it still accounts for less than one-sixth of the total power production for the United States.¹⁷⁹ At the present time it is estimated that the cumulative water withdrawal for hydroelectric power is 2,800 bgd.¹⁸⁰

The consumptive use of water for hydroelectric power is relatively minor. Consumptive use results when water is evaporated from

the holding reservoirs. Estimates indicate that the evaporative loss is 11 bgd.¹⁸¹

The value of water for hydroelectric power is normally calculated by determining the difference between the cost of producing power by hydroelectric means and the cost of the least-cost alternative.¹⁸² The National Water Commissions most recent report indicated that in no case would the value of water in hydroelectric power production exceed \$1.00 per acre-foot on a regional basis. When capital costs and operating costs were used the value for hydroelectric power fell as low as 14¢ per acre-foot. When the construction costs were ignored, the values for the water ranged from \$3.92 to 43¢ per acre-foot.¹⁸³

Recreation: Water based recreation is dependent upon a number of variables. The recreational use of the water will increase or decrease depending upon the depth of the water, the shape of the body of water, the salinity, color, temperature, the type of flora, turbidity of the water and the location of the water with respect to population centers. Seasonal factors also enter into the determination. Present estimates indicate that about one-fourth of all outdoor recreation is dependent upon water in some manner.

The Water Resources Council reported that in 1965 swimming, fishing, boating, water skiing, and ice skating accounted for 2.8 billion activity days, and that this figure would increase to 7.7 billion by the year 2000.¹⁸⁴ Much of this activity is and will be carried on

within publicly administered recreation areas. Table 6 indicates the projected participation in the major water-based recreation activities. As may be noted in the table, water-based recreation in 1965 accounted for 23% of all recreation, and the projected increase is to 26% by the year 2000.

Based on the Water Resources Council's estimates the major water-based recreational activities will increase by approximately 60% between 1965 and 1980, and by approximately 170% from 1965 to 2000.

The estimates also indicate that over the past years there has been an upward increase in the total surface area of water in the United States. This was due in part to the increased development of irrigation reservoirs, flood control dams and dams for hydroelectric power. As of 1965 there were approximately 41.5 million surface acres of inland water in the coterminous United States.¹⁸⁵ Much of this is available for recreational use and enjoyment. However, under many of the present state laws access to these water bodies may be limited by the nature of the water laws, property rights and liability laws.

It is also significant that as the surface area for recreation use is increased, the free-flowing form is declining. At the present time there exists approximately 3 million miles of free-flowing streams in the United States. However, many of these streams are too small to provide significant recreational opportunities. The Water Resources

Table 6. Projected participation in major water-based recreation activities (million of activity days).

Activity	1965	1980	2000
Swimming	1615	2676	4697
Fishing	577	738	1020
Boating (all types)	465	774	1353
Water Skiing	73	146	296
Ice Skating	108	183	325
Total of Major Water-based activities	2838	4517	7691
Total of 25 Recreation Activities Including the above	12288	18343	29774
Water-Based as % of total	23%	25%	26%

Source: THE NATION'S WATER RESOURCES. The First National Assessment of the Water Resources Council, Washington, D.C., 1968, p. 4-6-2.

Council found that there were only 725 streams in the United States that have a minimum flow of 550 cfs, which is considered the minimum desirable rate for most types of scenic river recreation activities.

Much of the current water use and development activities are taking place on these 725 streams. With major water developments taking place on the streams and commercial construction adjacent to them, their value as recreational resources declines. The decline in the supply is placed in direct conflict with the increased demand for their use.

It is a difficult task to place an economic value on recreation activities. Young and Gray cite three reasons for the problem of estimating the economic value.¹⁸⁶ First, the product of water used for recreational activities is ordinarily not priced within the market, and as a result a "synthetic imputation" procedure is required to estimate the value. Secondly, there are a number of other resources other than the water that add to the value of the recreation experience, and this requires additional imputational steps to derive the value of water. Finally, many recreational uses are of the instream variety and do not make a consumptive use of water. Therefore it is difficult in a physical sense to measure the quantity of water "used".

Given the above problems, several attempts have been made to value the water in recreational uses. Young and Gray cite one case where water used at the Winton Woods Reservoir, a Corps of

Engineers project ten minutes from downtown Cincinnati, for recreational purposes. The conclusion of their findings was that if the volume of the reservoir were approximately 4,600 acre-feet, then "the estimated average value of water in the reservoir is about \$150 per acre-foot."¹⁸⁷

The values per surface area of water used for recreation may vary from \$142 to \$3,700 per surface acre. However, the average range of values appears to be in the neighborhood of from \$3 to \$5 per acre-foot.¹⁸⁸ The higher values for recreational water will be found in locations that are close to the large population centers where the facilities are more highly developed. Under these conditions the value of the water may well exceed \$150 per acre-foot. In the areas where it is less developed and far from population centers the value may be worth only pennies.¹⁸⁹

Based on the increasing demands for recreation opportunities and the decrease in the free flowing streams available for recreation is it becoming increasingly necessary and justifiable to maintain a minimum pool in lakes and reservoirs and a minimum flow in streams for recreational purposes.¹⁹⁰ Two methods may be used to ensure adequate supplies remain for recreational and esthetic purposes; they are legal and economic means. This report will center upon the efforts made in the legal field.¹⁹¹

Fish and Wildlife: Another significant nonwithdrawal use of water is for the preservation and enhancement of fish and wildlife

resources. In 1965, fresh water fish harvested commercially in the United States amounted to approximately 3.5 billion pounds. This harvest represented a value to fishermen of roughly \$215,200,000.¹⁹² This represents roughly 3 percent of the world production.

In 1960, sport fishing and hunting account for approximately 700 million man-days of recreational opportunity. (See Table 7) The 1965 National Survey of Fishing and Hunting showed that the avid hunter and fisherman spent about \$4 billion and traveled in excess of 31 million miles to partake in 709 million recreation days.¹⁹³ Based on the estimates of the Water Resources Council this figure should grow to 1050 million man-days by the year 1980.

2. Water Use Efficiency

One area of water use that has been receiving more attention in recent years concerns the lack of efficiency in the use of water resources. Water is inefficiently used in many ways. For example, it may be wasted due to evaporation, lost during conveyance to agricultural, municipal and industrial users and wasted by inefficient and improper application. Much of what is considered to be wasted is regained as the water moves through the hydrological cycle. However, this water becomes available at a different time and in a different place.

By applying more efficient water management techniques additional supplies of water could be made available. This will, in some

Table 7. Major findings of the 1955, 1960, 1965 and 1970 National Surveys of Fishing and Hunting.

Major findings	1955	1960	1965	1970
	Thousands	Thousands	Thousands	Thousands
Number of fishermen and hunters -----	24,917	30,435	32,881	36,277
Number of fishermen -----	20,813	25,323	28,348	33,158
Fresh-water -----	18,420	21,677	23,962	29,363
Salt-water -----	4,557	6,292	8,305	9,460
Number of hunters -----	11,784	14,637	13,583	14,336
Small-game -----	9,822	12,105	10,576	11,671
Big-game -----	4,414	6,277	6,566	7,774
Waterfowl -----	1,986	1,955	1,650	2,894
Expenditures of fishermen and hunters -----	\$2,850,979	\$3,852,116	\$4,046,440	\$7,101,531
Expenditures of fishermen -----	1,914,292	2,690,872	2,925,304	4,958,883
Fresh-water -----	1,425,353	2,064,680	2,125,652	3,734,178
Salt-water -----	488,939	626,191	799,656	1,224,705
Expenditures of hunters -----	936,687	1,161,242	1,121,135	2,142,648
Small-game -----	494,033	726,118	615,234	945,634
Big-game -----	323,909	345,694	418,764	952,563
Waterfowl -----	118,745	89,431	87,136	244,451
Number of recreation days spent fishing and hunting -----	566,870	658,308	708,578	909,876
Fishing -----	397,447	465,769	522,759	706,187
Fresh-water -----	338,826	385,167	426,922	592,494
Salt-water -----	58,621	80,602	95,837	113,694
Hunting -----	169,423	192,539	185,819	203,689
Small-game -----	118,630	138,192	128,448	124,041
Big-game -----	30,834	39,190	43,845	54,536
Waterfowl -----	19,959	15,158	13,526	25,113
Passenger-miles traveled by automobile for fishing and hunting --	23,982,730	26,447,562	30,447,130	37,829,515
Fishing -----	17,910,434	18,834,947	22,111,249	28,722,782
Fresh-water -----	15,006,433	15,430,001	17,972,943	23,263,506
Salt-water -----	2,904,001	3,404,945	4,138,307	5,459,276
Hunting -----	6,072,296	7,612,615	8,365,881	9,106,734
Small-game -----	3,094,974	3,962,020	4,010,499	3,958,723
Big-game -----	2,222,373	2,998,178	3,718,767	3,934,818
Waterfowl -----	754,949	652,417	636,615	1,213,193

Source: 1970 NATIONAL SURVEY OF FISHING AND HUNTING, United States Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Resource Publication 95, Wash., D.C., USGPO, 1970, p. 93.

cases, reduce the pressure on limited supplies and more water will be available for withdrawal and instream uses. For example, in the United States impounded water is contained in approximately 1300 lakes and reservoirs each with an average capacity of about 5,000 acre-feet or more. Their combined water surface area is in excess of 11 million acres.¹⁹⁴ There are also numerous smaller farm ponds, storage tanks and holding reservoirs to provide water to municipal, industrial and agricultural users. One study has estimated the water loss annually from impoundments in the seventeen western States to be 15.6 million acre-feet, an amount equal to the total water storage capacity of California.¹⁹⁵ In the more humid areas of the United States, it has been estimated that the reduction of evaporation loss could be equivalent to increasing the catchment area by 10 percent.¹⁹⁶

At the present time, there appears no practical economic means to control the evaporation from large bodies of water. Retardation of evaporation from small farm ponds and holding reservoirs may be possible in some areas depending upon the cost of alternative sources of water.¹⁹⁷

As pointed out earlier, the conveyance loss for irrigation water in the United States amounted to approximately 22 bgd. This loss is dependent to a large extent upon the types of soils involved and the efficiency with which the water is applied to the land. There have been several studies made to show the possibilities for increasing the efficiency in the application of irrigation waters.¹⁹⁸ One study

illustrates how the imposition of pumping restrictions in Utah increased the average efficiency by 12.4 percent from 1959 to 1961.¹⁹⁹ Another indicated that the conveyance loss in Oregon for agriculture was approximately 1,244,000 acre-feet annually, sufficient to irrigate 370 thousand additional acres. The study indicated additionally that the loss of water once it is applied was as high as 60 percent of the total applications.²⁰⁰

The most frequently mentioned means of reducing conveyance losses in agriculture water use are canal lining and phreatophyte control. It has been estimated that by 1980, 1.85 million acre-feet of water annually could be saved in the west by the lining of canals, using closed conduits for the transportation of water, and by providing other means of seepage control on our irrigation systems.

A significant amount of water may be made available by control of "nonutilitarian" water consuming plants called phreatophytes. It has been estimated the amount of water consumed by these plants ranges from 20-25 million acre-feet per year in the seventeen western states.²⁰¹ From a fish, wildlife, recreation and esthetic point of view these plants may not be "nonutilitarian". They may provide useful habitat to some species of fish and wildlife²⁰² and their removal could reduce the esthetic qualities of some rivers.

There is also a significant loss in the conveyance of water to municipal and domestic water users. These losses result from breakages and leakages in the distribution network. Estimates are that

approximately 10 percent of the water delivered to municipal and domestic users is lost due to leaks and breakages.

There are indications that waste results in the use of water within homes. For example, in Kingston, New York in 1958 universal metering resulted in a 27 percent reduction in average use from 5.56 mgd in 1957 to approximately 4.0 mgd for the years 1960-1963.²⁰³ This indicates, in part, that people were using water beyond their needs, and that there was additional room for improving in-house efficiency in the use of water resources.

Agricultural waste water has been defined legally as "those waters which, after having been diverted from sources of supply for use, have escaped from conduits or from structures in course of distribution or from irrigated lands after application to the soil."²⁰⁴ In most of the 17 Western States, waste water is considered to be the quantity of water that is applied in excess of what may be beneficially used, while taking into account a certain amount of loss that is inevitable.²⁰⁵

Proper management and efficient utilization of water is one method by which to increase the supply of water. However, this management and the desire for efficient use must be weighed against the effects on the fish, wildlife, recreation and esthetic resources. Cement lined canals will improve the efficiency of the application of irrigation water, but it may also destroy some related esthetic pleasures and values.

3. Water Use Interrelationships

Water, as with all other resources, may involve numerous alternative relationships among the various uses to which it may be applied. Specifically, water resource uses may involve competitive, complementary, and supplementary relationships among its various uses.

The competitive uses, sometimes referred to as conflicting uses, are those in which the use of the resource in one manner precludes its use or reduces its output in other alternatives. For example, if water is employed in agricultural purposes, it can not be made available at the same time and place for municipal or recreational uses. Therefore, there must be a trade-off to determine the use of the water.

These conflicts arise in three areas. First, there are conflicts among the present uses of water. These conflicts result among different types of uses (irrigation, industry, municipal, recreation, etc.), among different geographic locations, and finally conflicts result among individual users within any type of use in a given location.²⁰⁶

A second form of conflict may result between the present and future uses and users of the water. For the most part, the development of a hydroelectric plant on a river will prevent the river from being used in the future as a wild and scenic river. Therefore, a

decision must be made as to whether the stream of benefits resulting from the use of the water resource in the present are greater than the benefits to be obtained in the future.

This argument of present versus future uses of water may also be placed in the context of development versus preservation. It is usually stated that the present development of a resource precludes its availability in the future. This problem becomes critical when viewed from the point of irreplaceable natural environments, such as scenic and wild rivers. Krutilla has contended that, under the present system of private market allocations, we are not likely to preserve the socially optimal amount of these natural environments. In fact, the amount that is considered optimal may be increasing over time.²⁰⁷

Finally, conflicts result between the use of resources to develop additional water supplies and the alternative uses of other resources that are foregone when resources are directed into the water development field. For example, it would be economically as well as socially undesirable to allocate large amounts of resources toward producing insignificant quantities of water, when we are faced with other pressing social problems. Every policy aimed toward developing or preserving water resources must consider the alternatives foregone by the development.

Conflicts, though a serious problem, are in many respects both necessary and desirable. Once an area of conflict is identified, policies may be implemented to resolve the conflict. In developing

policy, we are required to examine all of the factors involved and consideration must be given to the various alternatives open to resolving the conflict. Conflict becomes destructive only when it leads to the elimination of alternatives and a reduction in choice.

A second relationship that may exist between two or more productive use of the water resources is that of complementarity. This relationship implies that the increased output of one productive use leads to an increased output of the other. A simple example of the complementarity relationship is that between navigation and pleasure boating. Additional quantities of water made available for navigation purposes may create additional opportunities for boating. This relationship will hold as long as one use does not become dominant. As navigation is increased to a high density level, it may become competitive with the use of the water for pleasure boating.

Supplementary relationships exist when the increased output from one water use has little or no effect upon other uses. For example, consider water stored for power generation and used to maintain a minimum flow to sustain fish and wildlife habitat. If water can be taken into a reservoir and released to generate power and at the same time maintain the fishery and wildlife, at its original level resource, then a supplementary relationship exists.

Where a new demand or conflict exists, the policies must be directed towards determining the effects of the trade-offs in alternative uses. Too often policies of the past have been determined solely

by the historically dominant use of the water. For example, the domestic, municipal and industrial uses have traditionally had a preference over the recreational and esthetic use of the resource. In viewing a developmental benefit, we must be cognizant of the preservation benefits foregone. When we are aware of both of the benefits, then a policy for conducting the trade-offs may be developed.

ENDNOTES

¹ See A. R. Dickerman, G. E. Radosevich and K. C. Nobe, Foundations of Reclamation Policies: An Historical Review of Changing Goals and Objectives, NRE-8 Department of Economics, Colorado State University, January 1970, in which the pre-WWII period is subdivided into five major eras.

² Toward Balanced Growth: Quantity with Quality. Report of the National Goals Research Staff, Wash., DC. July 4, 1970, p. 62.

³ Beatrice H. Holmes, A History of Federal Water Resource Programs, 1800-1960. Miscellaneous Pub. No. 1233, U.S. Dept. of Agriculture, Economic Research Service, June 1972, pp. 3-5.

⁴ The President's Water Resources Policy Commission, Report of the Commission, Vol. 3, Water Resources Law, Wash., D.C., 1950, pp. 74-75.

⁵ Ibid., p. 87.

⁶ History of Federal Water Resources Programs, supra, p. 3.

⁷ Otto Eckstein, Water Resource Development: The Economics of Project Evaluation. Harvard Univ. Press, Cambridge, 1958, p. 110.

⁸ Act of March 2, 1848, 9 Stat. 352; Act of September 28, 1850, 9 Stat. 519.

⁹ History of Federal Water Resources Programs, supra, p. 4; Water Resource Programs, supra, p. 4; Water Resource Development, supra, p. 112; Water Resources Law, supra, p. 127.

¹⁰ History of Federal Water Resources Programs, supra, p. 5.

¹¹ Act of August 30, 1890, sec. 1, 26 Stat. 371, 391, 43 U.S.C. 945; also see: Vol. 3, Water Resources Law, supra, p. 151.

¹² Act of July 26, 1866, c. 262, sec. 9, 14 Stat. 251, 253.

¹³ Act of July 9, 1870, 30 U.S.C. 62, 43 U.S.C. 661.

- ¹⁴ 19 Stat. 377, as amended, 43 U.S.C., sec. 431 (1964).
- ¹⁵ Water Resources Law, supra, pp. 262-264.
- ¹⁶ Ibid.
- ¹⁷ Act of Sept. 19, 1890, sec. 7, 26 Stat. 426, 454, River and Harbor Act of 1890.
- ¹⁸ Foundation of Reclamation Policies: . . ., supra, Appendix I, p. 80, Toward Balanced Growth: Quantity with Quality, supra, p. 62.
- ¹⁹ Judson King, The Conservation Fight, Public Affairs Press, Wash., D.C., 1959, p. 11.
- ²⁰ History of Federal Water Resources Programs, supra, p. 5; also David C. Coyle, Conservation: An American Story of Conflict and Accomplishment. Rutgers Univ. Press, New Brunswick, 1959, pp. vii, 5, 61, 55, 81.
- ²¹ Preliminary Report of the Inland Waterways Commission, Sen. Doc. 325, 60th Cong., 1st session (1908). Also see: A History of Federal Water Resources Programs, supra, p. 6.
- ²² The Conservation Fight, supra, pp. 14-15.
- ²³ Report of the National Conservation Commission, February, 1909, 60th Cong., 2nd session, Senate Document 676.
- ²⁴ Ibid., p. 47.
- ²⁵ Ibid., p. 175.
- ²⁶ Final Report of the National Waterways Commission, Senate Dec. 469, 62nd Congress, 2nd Session, 1912, p. 7.
- ²⁷ John D. Hicks, The Republican Ascendancy. Harper and Brothers, New York City, 1960, pp. 64-68.
- ²⁸ A History of Federal Water Resources Programs, supra, p. 11; also see: Ray L. Wilbur, The Hoover Policies, Charles Scribner's Sons, New York City, 1937, and The Conservation Fight, supra.

²⁹Sec. 203a, 48 Stat. 195, 202; A History of Federal Water Resources Programs, supra, p. 13.

³⁰Created by Executive Order No. 6777, June 30, 1934.

³¹A History of Federal Water Resources Programs, supra, p. 13.

³²National Resources Board, A Report on National Planning and Public Works in Relation to Natural Resources and Including Land Use and Water Resources with Findings and Recommendations, Wash., D.C., December 1, 1934, p. 255.

³³Ibid., p. 27.

³⁴Paul K. Conklin, FDR and the Origins of the Welfare State. Thomas Y. Crowell Co., New York City, 1967, pp. 47-49, 54-58.

³⁵Reorganization Plan No. 1 of 1939, sec. 4, 6, effective July 1, 1939, 4 F.R. 2727, 2728, 53 Stat. 1423, 1424, 5 U.S.C. 133.

³⁶Ex. Order No. 8248, September 8, 1939, 4 F.R. 3864, 3865.

³⁷Act of June 26, 1943, sec. 101, 57 Stat. 169, 170. Also Appendix I of Foundations of Reclamation Policies...., supra, p. 80.

³⁸A History of Federal Water Resources Programs, supra, p. 23.

³⁹A History of Federal Water Resources Programs, supra, p. 25. Foundations of Reclamation Policies..., supra, Chapter VI, pp. 51-75 and Appendix I, p. 80.

⁴⁰Act of August 4, 1939, sec. 9(a), 53, Stat. 1187, 1193, 43 U.S.C. 485h (a).

⁴¹Act of August 14, 1946, sec. 2, 60 Stat. 1080, 16 U.S.C. 662.

⁴²Foundations of Federal Reclamation Policies:..., supra, p. 52.

⁴³Task Force Report on Natural Resources, in Appendix 1, 1st Hoover Commission Report, Appendix L, pp. 1-4, 1949.

⁴⁴1st Hoover Commission Report, pp. 27-29, 1949.

⁴⁵ In compliance with Executive Order No. 10095, January 3, 1950, 15 F.R. 17.

⁴⁶ A Water Policy for the American People. The Report of the President's Water Resources Policy Commission, Volume 1, December 1950, Wash., D.C., p. 41. For other commission reports see: Volume 2: The Rivers in America's Future, and Volume 3: Water Resources Law.

⁴⁷ Ibid., p. 37.

⁴⁸ Ibid., p. 41.

⁴⁹ Ibid., p. 53.

⁵⁰ Water Resources Policy. A Report by the Presidential Advisory Committee on Water Resources Policy, Wash., D.C., December 22, 1955, p. 1.

⁵¹ Public Law 89-80, 89th Cong. S. 21, July 22, 1964.

⁵² Ibid., at Section 2.

⁵³ Public Law 91-190.

⁵⁴ William S. Butcher, "Water Resources, Optimization and Social Change", In Conflicts in Water Resource Planning, ed. by Earnest F. Gloyna and William S. Butcher. Center for Research in Water Resources, University of Texas at Austin, 1972, p. 95-96.

⁵⁵ Supra, p. 167.

⁵⁶ Charles F. Luce, "A Search for Goals in Water Resources Planning." Chairman of the National Water Commission, In Conflicts in Water Resources Planning, supra, pp. 9-10.

⁵⁷ Ibid., p. 8.

⁵⁸ Water Policies for the Future. Final Report to the President and the Congress of the United States by the National Water Commission. Wash., D.C., June 1973, p. 1.

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ Jack Kirshleifer, James C. DeHaven and Jerome W. Millman, Water Supply: Economics, Technology, and Policy. The University of Chicago Press, Chicago, 1960, p. 31.

⁶² See: A. Myrick Freeman III, Robert H. Haveman and Allen V. Kneese, The Economics of Environmental Policy, John Wiley and Sons, Inc., N.Y., 1973, pp. 115-123; Allen V. Kneese and Blair T. Bower, Managing Water Quality: Economics, Technology, Institutions, John Hopkins Press, Baltimore, 1968.

⁶³ Public Law 91-190, January 1, 1970.

⁶⁴ Ibid., at sec. 101(a).

⁶⁵ 16 U.S.C. secs. 4601-4 to 4601-11.

⁶⁶ Water Policies for the Future, op. cit., p. ix.

⁶⁷ Ibid., p. 203.

⁶⁸ See: Irving Fox, "Policy Problems in the Field of Water Resources," in Allen V. Kneese and Stephen C. Smith, eds., Water Research, John Hopkins Press, Baltimore, 1966, pp. 271-278.

⁶⁹ Richard L. Dewsnup, Dallin W. Jensen and Robert W. Swenson, editors, A Summary-Digest of State Water Laws (cited here after as: Summary-Digest (State)), The National Water Commission, Arlington, Va., 1973, p. 3.

⁷⁰ Embrey v. Owen, 6 Ex. 353 (1851) Cited in: Short Course on Legal Aspects and Responsibilities for Allocation of Water Resources, Idaho Water Resources Research Institute, Moscow, Idaho, June 18-20, 1969.

⁷¹ Riparian refers to that belonging or relating to the bank of a river. An owner's land may be riparian to a river out to the boundary of the watershed of that river. However, land merely adjoining riparian land is not riparian to the river. Arid land beyond the watershed of a stream cannot be riparian to that stream, even though it may adjoin land that is riparian and may be owned by the same person. See, for example, Bathgate v. Irvine 126 Cal. 135, 58 P. 442; Town of Gordonville v. Zinn 129 Va. 542, 106 S.E. 508, 513.

⁷² e.g., Amory v. Commonwealth, 321 Mass. 240, 72 N.E. 2d 546 (1947); Lockwood Co. v. Lawrence, 77 Me. 297 (1885); Hermansen v. city of Lake Geneva, 272 Wis. 293, 75 N.W. 2d 439 (1956); and Cox v. Howell, 108 Tenn. 130, 65 S.W. 868 (1901).

⁷³ Frank J. Trelease, Cases and Materials on Water Law, West Publishing Co., St. Paul, 1967, p. 1.

⁷⁴ See eg., Stein v. Burden, 24 Ala. 130 (1854).

⁷⁵ Restatement (Second) of Torts, Ch. 41, Topic 3, Scope Note (Tent. Draft No. 17, 74-76, 1971).

⁷⁶ Cases and Materials on Water Law, supra, p. 1.

⁷⁷ For additional comments on the transfer of riparian rights see: "Water Law and Private Decision-Making: A Critique," Milliman, II Journal of Law and Economics, 41, 55 (1959); and Legal and Economic Aspects of Water Rights in Minnesota, Wisconsin, Indiana and Ohio: Evaluation of Findings, Trelease, (Phase Report #22) United States Department of Agriculture, 1961, pp. 116-118.

⁷⁸ Restatement (Second) of Torts, Ch. 41, Topic 3, Scope Note (Tent. Draft No. 17, 74-76, 1971).

⁷⁹ Smith v. Agawan Canal Co., 84 Mass. (2 Allen) 355 (1861).

⁸⁰ See, for example, Mass. Stat. 1872 c. 117; L.N.Y. 1873 c. 754; L.N.H. 1901 c. 255.

⁸¹ Dutton v. Aurora, 114 ILL. 138, 28 N.E. 461 (1885); Greenville v. Greenville Water Works Co., 125 Ala. 625, 27 So. 764 (1900).

⁸² See, for example, Buddington v. Bradley, 10 Conn. 213 (1834); non-use may result in a loss of riparian rights in some situations, See: State v. American Fruit Growers, 135 Wash. 156, 237 P. 498 (1925).

⁸³ See, for example, N.Y. Conservation Law, 450, 451 (McKinney 1967); N.H. Rec. Stat. Ann., 482:-73 (Replacement Ed. 1968).

⁸⁴ See: "State Legal Structures and Institutional Arrangements for Water Resource Development," George E. Radosevich. Presented to the Western States Seminar on State Water Planning--How Can the Public Participate? Boise Idaho, January 12, 1970.

⁸⁵ Irwin v. Phillips, 5 Cal. 140 (1855) appears to be the first case establishing the doctrine of prior appropriation.

⁸⁶ A principle that dominates the statutory and case law history of the west. Wells A. Hutchins, Water Rights Laws, in the Nineteen Western States, completed by Harold H. Ellis and J. Peter Debranl, Vol. 1, Miscellaneous Publication No. 1206, U.S. Dept. of Agric., Wash., 1971, p. 14.

⁸⁷ Reagle v. Square S. Land Cattle Co., 733 Colo. 392, 276 P. 2d 235 (1954); City and County of Denver v. Northern Colorado Conservation District, 130 Colo. 375, 276 P. 2d 992.

⁸⁸ e.g., McPhail v. Forney, 4 Wyo. 556, 561, 35 P. 773 (1894); Sherlock v. Greaves, 106 Mont. 206, 216, 76 P. 2d 87 (1938); State ex. re. State Game Commission v. Red River Valley Co., 51 N. Mex. 207, 182 P. 2d 421 (1945). The ideal behind the requirement of a diversion is to segregate the claimed water from that which is unclaimed so that a claim of ownership may be attended by a sense of what is claimed. For this reason, so-called "in place" appropriations, i.e., those that leave the water in the stream, are not approved.

⁸⁹ The term beneficial use has never been defined in specific terms. Usually what is "reasonable" is beneficial. Trelease suggests that "reasonableness" be determined by weighing the benefits of one use against those of another use. To facilitate this, he suggests placing a dollar value on each use and simply comparing the totals. The New Mexico case of Young and Norton v. Hinderlider, 15 N. Mex. 666, 110 P. 1045 (1910) is a classic famous example of this approach. Also see: Trelease, Frank J., "Policies for Water Law: Property Rights, Economic Forces and Public Regulation," Natural Resources Journal, Vol. 5, No. 1, pp. 1-47 (May 1965).

⁹⁰ e.g., First Security of Blackfoot v. State, 49 Idaho 740, 291 P. 1064 (1930) Laurance v. Brown, 94 Oreg. 387, 185 P. 761 (1919); Jensen v. Birch Creek Ranch Co., 76 Utah 356, 289 P. 1097 (1930); In re Alpowa Creek, 129 Wash. 9, 224 P. 29 (1924). Also see: Water Rights Laws in the Nineteen Western States, supra, pp. 254-269.

⁹¹ e.g., Miller v. Bay Cities Water Co., 157 Cal. 256, 107 P. 115 (1910); Coffin v. Left Hand Ditch Co., 6 Colo. 443, (1882). The Montana courts have been less definite in allowing a transfer if there is land that could use the water. Galliger v. McNulty, 80 Mont. 339, 260 P. 401 (1927).

⁹² Owens v. Snider, 52 Okla. 772, 153 P. 833 (1915). In contrast to the riparian right which is not limited to a definite quantity. Wallace v. Weitman, 52 Wash. 2d 585, 328 P. 2d 157 (1958).

⁹³ The property right is a usufructuary right--or the right of enjoying a thing, the property of which is vested in another and to draw from the same all the profit, utility, and advantage which it may produce, provided it be without altering the substance of the thing. Black's Law Dictionary, 4th ed. (Rev.) 1968.

⁹⁴ See: Water Rights Laws in the Nineteen Western States, supra, pp. 546-569.

⁹⁵ Alaska Const., art VIII, sec. 13; Ariz. Const., art. XVII, secs. 1 and 2; Colo. Const., art. XVII, secs. 5 and 6; Idaho Const. art. IV, sec. 3; Mont. Const., art. IX; Nev. Rev. Stat., sec. 533030; N. Mex. Const., art. XVI; Utah Const., art. XVII, sec. 1; Wyo. Const., art. VIII, secs. 1 and 3.

⁹⁶ Water Rights Laws in the Nineteen Western States, supra, p. 3. Those states having the combined doctrines include: Calif., Kansas, Nebraska, N. Dakota, Oklahoma, Oregon, S. Dakota, Tex., Wash., and Miss. in the east.

⁹⁷ e.g., Colo. Constitution, Art. XVI, sec. 5; and Kans. Stat. Ann., sec. 82a-703 (1969).

⁹⁸ Which may exclude sources of artificial origin. Fourzan v. Curtis, 43 Ariz. 140, 29 P. 2d 722 (1934).

⁹⁹ Colo. Rev. Stats., 148-2-1.

¹⁰⁰ 81 Fed. 73 (C.C.D. Nev. 1897).

¹⁰¹ Colorado removed the diversion requirement to acquire a water right in 1973. S.B. 97 amending C.R.S. 148-21-3 (5), (6) and (7).

¹⁰² Charles J. Meyers and A. Dan Tarlock, Water Resources Management, The Foundation Press, Inc., N.Y., 1971, p. 204.

¹⁰³ Ibid., pp. 204-205. Also see Trelease, "Preferences to the Use of Water," 27 Rocky Mt. L. Rev. 133, 134-43 (1955).

¹⁰⁴ "Preferences to the Use of Water," supra, p. 158.

¹⁰⁵ For a summary of the appropriation states preference statutes see: Water Rights Laws in the Nineteen Western States, supra, pp. 419-425.

¹⁰⁶ Colo. Const. Art. XVI, sec. 6. Similar wording is present in the Oregon Water Code of 1909, sec. 116-601.

¹⁰⁷ e.g., Idaho Const., Art. XV, sec. 3; Nebr. Const., Art. XV, sec. 6; Utah Code Ann. sec. 73-3-21 (1968).

¹⁰⁸ Wyo. Stat. Ann. sec. 41-3 (1957).

¹⁰⁹ Ariz. Rev. Stat., sec. 45-147 (A) (Supp. 1970).

¹¹⁰ Ariz. Rev. Stat., sec. 45-147 (B) (Supp. 1970).

¹¹¹ Kans. Stat. Ann., sec. 82a-707 (b) (1969). Also see: Kansas Water Law, Earl B. Shurtz, Kansas Water Resources Board, Topeka, 1967, p. 27.

¹¹² North Dakota Century Code, sec. 61-01-01.1 (1971 Supp.).

¹¹³ Tex. Rev. Civ. Stat. Ann., Art. 7471 (Supp. 1970). Also see: Wells A. Hutchins, The Texas Law of Water Rights, The Texas Legislature and Texas Board of Water Engineers, Austin, 1961, p. 212-213; Water Resource Management, supra, p. 755.

¹¹⁴ Water Resource Management, supra, pp. 156-184; E. H. Hanks, "Peace West of the 98th Meridian--A Solution to Federal-State Conflicts over Western Water," 23 Rutgers Law Review 33 (1968); R. J. Moses, "Federal-State Water Problems," 47 Den. Law Journal (1970), pp. 194-212; F. J. Trelease, Federal-State Relations in Water Law, National Water Commission, Legal Study No. 5, Sept. 7, 1971; Public Land Law Review Commission, One Third of the Nation's Resources, pp. 141-45 (1970); F. J. Trelease, "Government Ownership and Trusteeship of Water," 45 Calif. Law Rev. 638 (1957); Note, "Federal-State Conflicts over the Control of Western Waters," 60 Colum. Law Rev. 967 (1960); Water Policies for the Future, supra, pp. 464-471; A Summary-Digest of State Water Laws, supra, pp. 70-71.

¹¹⁵ "Federal-State Water Problems," supra, p. 197.

¹¹⁶ Act of July 26, 1866, ch. 262, sec. 9, 14 Stat. 253.

¹¹⁷ Act of July 9, 1870, ch. 235, sec. 17, 16 Stat. 218.

¹¹⁸ Ch. 107, 19 Stat. 377. (1877), as amended, 43 U.S.C. sec. 321 (1964). The court ruled in F.P.C. v. Oregon, 349 U.S. 435 (1955) that the Desert Land Act did not apply to reserved lands.

¹¹⁹ See E. Morreale, "Federal-State Conflicts over Western Waters--A Decade of Attempted Clarifying Legislation," 20 Rutgers L. Rev. 423 (1966).

¹²⁰ Water Policies for the Future, supra, p. 464.

¹²¹ "Federal-State Water Problems," supra, pp. 207-208. Also see Public Land Law Review Commission, One Third of the Nation's Resources, 141-49, (1970).

¹²² Federal-State Relations in Water Law, supra, p. 119.

¹²³ 174 U.S. 690 (1899).

¹²⁴ Id. at 703 (dictum).

¹²⁵ Based on California Oregon Power Co. v. Beaver Portland Cement Co., 295 U.S. 142, 163-164 (1935).

¹²⁶ 349 U.S. 435, 75 S. Ct. 832, 99 L. Ed. 1215 (1955).

¹²⁷ "Federal-State Water Problems," supra, p. 199.

¹²⁸ 349 U.S. 435, 447 (1955).

¹²⁹ Id. at 448.

¹³⁰ 373 U.S. 546, 83 S. Ct. 1468, 10 L. Ed. 2d. 542, decree entered 376 U.S. 340, 84 S. Ct. 755, 11 L. Ed. 2d. 757.

¹³¹ 373 U.S. 546, 598 (1963).

¹³² C. E. Corker and C. F. Wheatley, Jr. Study of the Development, Management and Use of Water Resources on the Public Lands, Vol. I, Public Land Law Review Commission, Wash., D.C., 1969, p. 116.

¹³³ Civ. No. C-153-61 (D. Utah, 1963) unreported.

¹³⁴ 2 ERC 1339, U.S. S. Ct. No. 87 (1971).

¹³⁵ Act of July 10, 1952, 43 U.S.C. sec. 666.

¹³⁶ 2 ERC 1340.

¹³⁷ U.S. v. Dist. Ct., U.S. S. Ct., No. 812 (1971) 2 ERC 1341.

¹³⁸ Statement of Claim of the U.S., in the matter of the application for water rights of the U.S., in Water Division No. 5, State of Colorado Filed Dec. 31, 1971, pp. 1-2.

¹³⁹ Application for information of reserved water rights in the White River National Forest. In the matter of the Application for water rights of the U.S. in water division 5, State of Colorado, 1971, pp. 2-3.

¹⁴⁰ Ibid., p. 3.

¹⁴¹ Water Policies for the Future, supra, pp. 465-6, Recommendation No. 13-4.

¹⁴² Gary D. Cobb, "Evolving Water Policies in the United States," 55 Am. J. Agr. Econ., December, 1973, p. 1005.

¹⁴³ Ibid., p. 1007.

¹⁴⁴ 216 F. 2d 509, 1954.

¹⁴⁵ Colo. Rev. Stat., sec. 148-21-3(7), as amended 1973.

¹⁴⁶ 167 Colo. 321, 447 P. 2d 986 (1969).

¹⁴⁷ Colo. Rev. Stat., 148-11-22 (1963).

¹⁴⁸ For more detailed reference to pollution control laws see: Water Resource Management, supra, pp. 635-744; and Waters and Water Rights: Eastern, Western and Federal, Clark, R. E., ed., The Allen Smith Co., Indianapolis, Ind., Vol. III (1967).

¹⁴⁹ For a discussion of sediment effects and standards see: A. J. Cordone and D. W. Kelley, The Influences of Inorganic Sediment on the Aquatic Life of Streams, California Department of Fish and Game, 1960.

¹⁵⁰ Chapter 245, of the Acts of 1970.

¹⁵¹ The Maryland Sediment Control Program, Maryland Department of Water Resources, Baltimore, p. 8, (un-dated).

¹⁵² Gen. Stat. N.C., Secs., 113A-30 to 113A-43.

¹⁵³ Gen. Stat. N.C., Secs., 113A-35.

¹⁵⁴ Iowa Code Ann., Secs. 108A.1 to 108A.7.

¹⁵⁵ For more detailed references of water uses see: Estimated Use of Water in the United States in 1970, by C. R. Murray and E. B. Reeves, U.S. Geological Survey Circular 676, Wash., D.C., 1972; Future Water Demands--The impact of Technological Change, Public Policies, and Changing Market Conditions on the use patterns of selected sectors of the United States economy: 1970-1990, Resources for the Future, Inc., Rept. NWC-EES-71-001, Wash., D.C., 1971; Estimated Use of Water in the United States, 1960, by K. A. MacKichan and J. C. Kammerer, U.S. Geological Survey Circular 456, Wash., D.C., 1961; Water Use in the United States, 1900-1980, by W. L. Picton, U.S. Dept. Commerce, Business and Defense Services Center, Port Washington, N.Y., 1970.

¹⁵⁶ The Limits to Growth, by Donella H. Meadows, D. L. Meadow, J. Randers and William W. Behrens III, Universe Books, N.Y., 1972, p. 34.

¹⁵⁷ The Coming Water Famine, by Jim Wright, Coward-McCann, Inc., N.Y., 1966, p. 19.

¹⁵⁸ The Nation's Water Resources, The First National Assessment of the Water Resources Council, Wash., D.C., p. 3-1.

¹⁵⁹ Water Policies For the Future, supra, p. 4.

¹⁶⁰ Estimated Use of Water in the United States in 1970, supra, p. 3.

¹⁶¹ Water Policies for the Future, supra, p. 6.

¹⁶² Estimated Use of Water in the United States in 1970, supra, p. 10.

¹⁶³ Estimated Use of Water in the United States in 1970, supra, p. 4.

¹⁶⁴ Economic Value of Water: Concepts and Empirical Estimates, by R. A. Young and S. L. Gray. National Technical Information Service, Springfield, Va., Assession No. PB 210 356, 1972; techniques for estimating urban demand may be found in Economics of Water Resources Planning, L. D. Jones and R. R. Lee, McGraw-Hill Book Co., N.Y., 1971, pp. 312-321.

¹⁶⁵ Water Policies for the Future, supra, p. 42.

¹⁶⁶ Use of Water in the United States in 1970, supra, p. 4.

- ¹⁶⁷ Economic Value of Water, supra, p. 308.
- ¹⁶⁸ Ibid., p. 115.
- ¹⁶⁹ Use of Water in the United States in 1970, supra, p. 5.
- ¹⁷⁰ Ibid., p. 6.
- ¹⁷¹ Ibid., p. 8.
- ¹⁷² Ibid., p. 9.
- ¹⁷³ Water Policies for the Future, supra, p. 6.
- ¹⁷⁴ Navigation data may be found in: Corps of Engineers (1972). Waterborne Commerce of the United States, Calendar Year 1970, Part 5, National Summaries. U.S. Army Engineer District, New Orleans, La. For hydro. power see: Federal Power Commission (1968). Hydroelectric Power Resources of the United States, developed and undeveloped, January 1, 1968: FPC P-36.
- ¹⁷⁵ Water Policies for the Future, supra, p. 8.
- ¹⁷⁶ For more details on navigation uses see: Water Resources Development, supra, pp. 160-191.
- ¹⁷⁷ Water Policies for the Future, supra, p. 45.
- ¹⁷⁸ Estimated Use of Water in the United States in 1970, supra, p. 8.
- ¹⁷⁹ Water Policies for the Future, supra, p. 45.
- ¹⁸⁰ Estimated Use of Water in the United States in 1970, supra, p. 8.
- ¹⁸¹ Ibid.
- ¹⁸² For more details on hydroelectric values see: Water Resource Development, supra, pp. 237-258.
- ¹⁸³ Water Policies for the Future, supra, p. 45.
- ¹⁸⁴ The Nation's Water Resources, supra, p. 4-6-1.
- ¹⁸⁵ The Nation's Water Resources, supra, p. 4-6-2.

¹⁸⁶ Economic Value of Water, supra, p. 221. For more detailed analysis also see: Economics of Water Resources Planning, supra, pp. 395-420.

¹⁸⁷ Ibid., p. 238.

¹⁸⁸ Ibid., p. 241.

¹⁸⁹ Ibid., p. 317.

¹⁹⁰ Ibid.

¹⁹¹ For a discussion of economic alternatives to provide recreational opportunities through the market see: "Preserving the Wilderness--Public interest or special interest?", by E. G. Dolan in Current Issues of Economic Policy, editors, L. G. Reynolds, G. D. Green and D. R. Lewis, R. D. Irwin, Inc., Homewood, Ill. 1973, pp. 231-243.

¹⁹² The Nation's Water Resources, supra, p. 4-7-1.

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¹⁹⁴ World-Wide Survey of Experiments and Results on the Prevention of Evaporation Losses from Reservoirs, International Commission on Irrigation and Drainage. New Delhi, India, 1967, p. 5.

¹⁹⁵ J. S. Myers, "Evaporation from the 17 Western States," U.S. Geol. Survey Prof. Paper 272-D, 1962.

¹⁹⁶ "Proceedings National Water Resources Symposium," U.S. Senate Doc. 3587, 1961.

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¹⁹⁸ e.g., see: J. W. Turelle, "Agronomic Concepts of Irrigation for Increasing Efficiencies of Water in Short Supply." Water for Peace, Vol. 3, Wash., D.C., pp. 544-553.

¹⁹⁹ J. M. Bagley, "Effects of competition on efficiency of water use," Journal of the Irrigation and Drainage Division, Proceedings of the American Society of Civil Engineers, Vol. 91, IR1, March 1965, pp. 69-77.

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²⁰¹ T. W. Robinson, "Phreatophytes and their relation to water in western United States. Transaction, Am. Geophysical Union, Vol. 33, No. 1, February 1952. Also see: T. E. A. Van Hylchama, "Effect of soil salinity on the loss of water from vegetated fallow soil." Proceedings of the Wageningen Symposium, International Ass. of Scientific Hydrology, June 1966, pp. 635-44. Also see Interbasin Transfers of Water, supra, pp. 130-131.

²⁰² R. H. Gilluly, "Wildlife versus Irrigation," Science News, Vol. 99, March 13, 1971.

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²⁰⁴ W. A. Hutchins, Selected Problems in the Law of Water Rights in the West, U.S. Dept. of Agric., Misc. Pub. No. 148, 1942, p. 23.

²⁰⁵ For statements on waste water see: Cal. Const., art. XIV, sec. 3; Kan. Stat. Ann. sec. 42-302 (1964); Nev. Rev. Stat., sec. 533.070 (Supp. 1967); and Tex. Civ. Stat., Art. 7602 (Vernon, 1948).

²⁰⁶ Jack Hirshleifer, James C. DeHaven, and Jerome W. Milliman. Water Supply: Economics, Technology, and Policy. The University of Chicago Press, Chicago, 1960, pp. 30-31.

²⁰⁷ See: J. V. Krutilla, "Conservation Reconsidered," American Economic Review, Vol. LVII, No. 4, September, 1967, pp. 776-786, and A. C. Fisher, J. V. Krutilla, and C. J. Cicchetti, "The Economics of Environmental Preservation: A Theoretical and Empirical Analysis," American Economic Review, Vol. LXII, No. 4, September 1972, pp. 605-619.

CHAPTER III

ENVIRONMENTAL PARAMETERS

Part A. Ecological Considerations

An essential step toward establishing successful protective laws to preserve the recreational and esthetic values, and fishery and wildlife resources of the aquatic environment is to define those environmental factors upon which these values and resources depend. This part will present and discuss some of the more important of the environmental factors which affect the overall productivity of the aquatic areas of interest: natural streams, and lakes and reservoirs.

Reservoirs are essentially lakes built by man, and while the purpose may originally have been very specific, such as storage of irrigation water, contemporary demands for recreation are so great that virtually all reservoirs are now recognized as possessing recreational and esthetic values or potential.

In this discussion of the ecology of the aquatic resources, and later, of the intrusions by man into them, emphasis is placed upon their fisheries. This is not only because the fisheries literature is extensive, but because the conditions which encourage fish production are ordinarily the same conditions which we associate with environmental quality, the natural conditions. While this is not true in all

cases, we tend to think of a high quality environment as a natural environment, possessing high esthetic and recreational values, and also productive fisheries. We are, therefore, to a considerable degree, considering productivity of the fishery resource as an important index of environmental quality. Optimization of the fishery resource of the areas we are discussing will usually go hand in hand with the recreational and esthetic values of those areas.

1. Natural Streams

Physical and biological factors of the stream ecosystem function together in a dynamic manner through time and thus determine the productivity and the carrying capacity of the system. As a habitat for aquatic organisms, the stream presents a highly variable and yet specialized set of conditions. We will examine those physical and biological components which influence the productivity of cold water streams. Although emphasis here is on cold water streams, many of these environmental factors apply equally well to the productivity of warm water streams.

a. Streamflow

An important physical factor of the stream ecosystem is its flow regime. Much research has been done on stream flows in an effort to determine the optimum and minimum flow requirements for maintaining the fisheries resource or for maintaining the biota of streams.

Stream flow is influenced by several abiotic factors including velocity and depth. Stream-dwelling organisms have adapted to the flowing water environment, and most have rather narrow preferences for flow velocities. Thus, velocity plays an important role in the species composition, characteristics and overall productivity of the lotic biota.

Streamflow also determines depth and width in a stream channel of a given configuration. As with velocity, most lotic species in some of their life habits are limited in their preference of depth of water. Stream width is an important consideration in terms of fish reproduction areas, food production, water temperatures, and satisfying spatial requirements.¹

Migration. Fish studies have shown that streamflows can affect the upstream and downstream migrations of adult and juvenile fish of many species.² Flows may cause migrations to commence, create barriers at high or low flows, cause delays, and change the speed of travel. The relationship of streamflows to the initiation of fish migrations varies between species and between streams for the same species.

It has been found that most salmon migrations occur at times of the year when seasonally high flows can be expected. Studies of pink salmon migration in British Columbia by Pritchard³ found a positive correlation between numbers of fish migrating from the sea to the stream each day and the maximum daily water height in the stream

and the daily rainfall in the area. Sockeye salmon migration on the Fraser River system has been shown by Andrew and Green⁴ to vary with discharge flows. Low spring and summer flows delay the spawning run causing migration to take place over an extended period of time and at a later average date. Thus, fish in the last part of the run often failed to arrive on the spawning area or arrived too late for efficient spawning.

Reduced flows can cause undesirable delays in fish migrations. The delays can be as important in their effect on fish migrations as a physical barrier. Brett found⁵ that delays due to reduced stream flows cause stress, and the premature use of energy reserves by adult salmonids caused death in some and reduced reproductive success in others. The rate of downstream migration of juvenile fish can be greatly influenced by the amount and velocity of streamflows. Reduced streamflow velocities in the Fraser River system have been cited as a possible reason for reduced survival of downstream migrating sockeye and pink salmon smolts.⁶

Streamflow is thus an extremely important physical factor to anadromous species of fish. The stimulus provided by stream currents appears absolutely essential to the migration of many species. A migrant may be placed in a time delay and stress situation by either high or low streamflows.

Spawning. Streamflows play a significant role in the spawning activities of stream-dwelling fishes. Virtually all have adapted this

important phase of their life cycle to some range of water velocity and depth. Streamflow velocity is a factor in salmon and trout redd construction, fertilization of the eggs, and in percolation rates of water through spawning gravels for supplying oxygen to the eggs. Andrew and Green⁷ suggest that salmon appear to select gravels with an adequate oxygen supply by sensing a current or upswelling of flow through the gravels. An adequate intragravel environment for successful incubation can usually be maintained if the surface flow does not drop below that which existed at the time of egg deposition.⁸

A number of studies have been conducted to quantify the water velocity and depth preferences of spawning trout and salmon. While most of the studies quoted refer to sea run anadromous fishes the same principles apply to inland streams. These studies have demonstrated that steelhead and salmon have a rather narrow tolerance to velocity and depth when choosing spawning areas. For instance, it has been found that most anadromous salmonids select spawning sites with flow velocities between 1.0 and 2.5 feet per second when measured 0.4 feet from the stream bottom.⁹ Juvenile fish in streams must have sufficient water depth for intrastream movement during their rearing period and a flow adequate to support an uninterrupted seaward migration. A minimum stream depth of 0.1 to 0.2 foot is required throughout the year to accommodate this movement of young fish.

From these studies of the depth and velocity preferences of spawning steelhead salmon, it has been shown that the discharge of a river can determine the amount of spawning area available and that this area does not necessarily increase proportionately with increased flow. In a study of chinook salmon on the American River, it was found that two peaks of available area existed, one at a discharge of 2700 cubic feet per second and a larger one at 500 cfs.¹⁰ At a discharge of 2700 cfs., the center portion of the stream was too high and fast for spawning but the water level was high enough to allow the use of lateral flood plain gravels for spawning activities. As the flow approached 500 cfs., conditions of velocity and depths in the center portion of the stream made this larger area suitable for spawning.

Thus, the discharge flow for a particular stream can be a determining factor in the spawning success or failure of fish populations. Velocity and depth are the principal components of the discharge for spawning. Too high or too low a discharge can result in velocities or depths outside the tolerance range for spawning. Although increased spawning area might be expected with increased flows, it is not always a steady increase.

Food Production. Streamflows influence the fish food species composition and total stream production. Aquatic insects are a major source of food for resident trout in streams. Hooper¹¹ states that a stream's carrying capacity for fishes may be directly dependent on its food production capability. In a study on a California stream, Gard¹²

reported that drift organisms represented about 50 percent of the trout summer diet. Drift organisms accounted for 78 percent of the summer food for brown trout and 39 percent of the brook trout summer food in sections of the stream studied. Lotic organisms tend to drift downstream in varying degrees depending on species and environmental influences. Streamflow represents one of these environmental influences although its true significance on the production of stream bottom organisms is not well understood.

Each species of aquatic insect has its own life cycle and environmental requirements. As is true with the stream-dwelling fishes, the bottom fauna is well adapted to the current environment, and many aquatic insects have developed specialized structures and living habits which take advantage of this environment in different manners.

Needham and Usinger¹³ found positive correlations between insect distribution and depth and current velocities. The production of fish food organisms in streams is highest in the relatively shallow riffle or rapid flow areas which in some streams are located outside of the main stream channel. A study of flows and aquatic food production in Oregon found that peak insect production on riffle areas studied occurred at flow velocities of about 2.0 feet per second.¹⁴ Studies by Somme¹⁵ have shown that low stream flow affects the food production in winter through the formation of anchor ice, which can also be directly damaging to fish and fish eggs present at the time.

The welfare of stream fishes is dependent upon the food supply available, thus minimum streamflows must protect aquatic food organisms at all periods of the year. A flow regime which does not provide for good invertebrate production, will not support high fish populations. Therefore, it has been determined that an optimum streamflow based on fish food production would be that flow which covers the greatest amount of riffle area and still provides large sections of the riffle with water velocities of about 2.0 feet per second.

Although many studies have been done relating streamflows and other biotic factors to the abundance and distribution of bottom fauna, further study is needed. Measurement of drift organisms may be a promising method of meaningfully relating flows to the important factor of aquatic food availability. Evaluation of drift rates with various streamflows could yield information on the relative productivity of various flow regimes.

Stream Rearing Capacity. The studies of Pearson, et al.¹⁶ on streams in Oregon point up the significance of discharge flow and velocity to the rearing capacity of a stream. They concluded the most important factor determining the juvenile coho salmon carrying capacity of a stream is the summer streamflow and that increases in populations were also velocity related. Each stream and each pool in a stream has a definite rearing capacity which is influenced by food production and the spatial requirements of fish which in turn are affected by streamflow velocity.

Most stream fish exhibit a strong territorial orientation. Their associated spatial requirements have a relationship to stream velocities. Kalleberg¹⁷ found that juvenile brown trout and salmon occupy and defend territories which become smaller with increasing flow velocities. With increased flow velocities and subsequent reduction in the area of individual territories, juvenile fish which were previously without territories, could now occupy and defend an area of their own. Thus, within limits, the resident salmonid carrying capacity of streams can be increased or reduced by velocity alone.

Minimum Stream Flow. As stated previously, the task of determining the optimum or minimum flow requirements of streams is being pursued by many governmental and private agencies. The increasing amount of water being diverted from streams or captured in reservoirs has made the ecological consequences of such actions more apparent and the value of the remaining streams greater. As a result, increasing attention is being given to the ecological impact of water development projects and other activities on watersheds.

A number of states have taken legislative action in order to preserve and protect instream values of water. These actions take the form of general statutes for setting minimum streamflows in some states (e.g., Florida, Iowa, Mississippi, New Jersey, and Washington) and wild and scenic rivers legislation or similar laws that preserve designated streams or reaches thereof from development in others (e.g., Idaho, Montana, Oklahoma, Oregon, Washington,

Tennessee, and Wisconsin). An explanation of these statutes and protective legislation relative to minimum stream flows will be covered in detail later in this report.

Present approaches to the determination of minimum stream-flows frequently fail to relate physical stream data to actual discharge needs of the biotic community. Minimum flow recommendations are thus often based on a judgmental decision on some arbitrarily chosen portion of the mean or low flow of the stream. Greater emphasis should be placed on quantifying such water flow needs of the biotic community. Quantified evaluation of the relationship between stream-flows and the ecology of the stream and its esthetics can provide a rational basis for evaluating and recommending flows which will optimize the biological productivity of streams.

Many of the studies on flows and stream ecology referred to the previously represent meaningful steps toward determining realistic discharge recommendations. These and other related studies have quantified such factors as riffle food productivity, spawning flow velocity, rearing pool velocity and some have attempted to place numerical values on flow in relation to spawning, food production and shelter.^{18, 19} Although complex and time consuming, this method appears most promising for optimum or minimum flow determination.

The importance of a proper streamflow regime to the overall productivity of the stream environment cannot be overemphasized, for

it pervades and determines every other important physical and biological factor in the stream ecosystem.

b. Substrate Requirements

The substratum of the stream is an important physical factor which affects the overall productivity of the running water environment. It provides important habitat for invertebrate production, reproductive areas and some protective cover requirements for stream-dwelling fishes. Some interrelationships between the substrata and invertebrate production and reproductive areas of fishes will be discussed here with cover requirements being discussed later.

Food Production. The streambed is a product of the flow regime of the stream.²⁰ In those streams where the flow increases considerably at times, as during natural freshets, the lighter bed materials are swept away, and a particular type of substratum is maintained. The production of fish food organisms can be greatly affected by the occurrence or absence of freshets and the resultant effects on the substrate of the stream.

The relationship between stream organisms and the particular substrates which they inhabit is an exceptionally complex aspect of stream ecology. Many species of animal and plant life are confined to one or very few types of substratum, either because they need a special surface to which to attach or because they need the shelter of streambed obstacles. Sprules²¹ has investigated the relative

productivity of common substrate types found in trout streams. In general, sand was found to be the poorest habitat; gravel, rubble in pools and rubble in rapid currents supported increasing biomasses. The fact that rubble supports more organisms than does sand substrata appears to correlate with the amount of available living space and with the greater probability that organic matter will lodge among stones and provide food for the streambottom organisms.²² As stated previously, in streams with a pool and riffle structure, the fauna is considerably denser on the latter due to the complex interaction of local factors such as flow velocity and depth.

Differences of invertebrate biomass production in streams or reaches of the same stream may be due to the interaction of factors such as differences in the uniformity of gradient and the subsequent vulnerability to flooding, differences in the proportions of various types of substratum, and difference in vegetation on the banks, which supplies food to the stream biota.²³

The food web in the aquatic ecosystem depends upon living plants and animals and upon detritus, the non-living particulate in the water. The detrital segment of the food chain results from falling leaves and twigs from stream bank vegetation, as well as from the break down of plants and animals produced in the water. Thus, streambank vegetation has the important role of providing a significant portion of the food of aquatic organisms.

Reproduction. Many of the fishes of running water are somewhat restricted in their choice of breeding sites and if suitable substrate is not available they simply fail to breed. Some species require large stones, some silt-free gravel, or other clean sand, and others require flooded terrestrial vegetation and in years when the stream does not overflow these riparian lands the fish cannot breed.²⁴

The substrata for resident trout spawning areas must consist of gravel of such size and composition that fish can excavate redds or nests in which their eggs can be deposited, fertilized, and hatched. Brown trout prefer gravel ranging from 0.25 to 3.0 inches in diameter and brook trout spawn over gravel ranging in size from coarse sand to stones three to four inches in diameter and both locate their nests at the edge of pools which have a good vertical flow of water through the gravel for oxygenation of the deposited eggs.²⁵

Stream sedimentation significantly influences the survival and abundance of trout. Sediment filling the interstices within the spawning gravels reduces the permeability thus decreasing the survival of the eggs. Trout and salmon are dependent upon gravels which are relatively free of fine materials. The silt-cleansing action of freshets is important to the life cycle of these and many other species of fish. For this reason the erosion of soils into stream channels must be checked to prevent unnecessary destruction of fish habitat.

Stream meanders with alternating pool and riffle areas are characteristic of the natural sinuosity of rivers and streams. This

meandering shape allows the energy of flowing water to be evenly attenuated throughout the length of the stream. Even in relatively straight sections of a stream the main current is rarely straight for it meanders back and forth within the channel.²⁶ Therefore, a stream tends to assume the meandering shape which involves the least amount of work and allows the streamflow to reach an equilibrium state with the channel structure.

Stream meanders increase the holding capacity of a stream and thus reduce the severity of floods. During flooding conditions, a meandering stream that is relatively slow-flowing can maintain much more water than a straight section of stream, and, thus, it alleviates flood effects through the retention of water.

c. Cover

The importance of cover to stream productivity has been recognized and studied by many investigators.^{27,28,29,30,31} Their studies have shown that stream "improvement", including artificial cover, can lead to an increase in number and size of trout in a given section of stream.

Cover protects fish from predators and allows them to conserve energy, as prime shelter areas have flow velocities less than 1.0 fps.³² In large streams the importance of protective shelter is evidenced by the congregation of fish near obstructions, in bays and along the banks, or anywhere else that offers protection. Cover utilized by

stream-dwelling fish populations may take the form of physical cover such as undercut stream banks and streambed obstructions or biological cover such as riparian and streambed vegetation. Saunders and Smith³³ increased the number of artificial cover areas in a small stream and found the brook trout population over age one nearly doubled. A study on Trout Creek in Montana by Boussu³⁴ demonstrated that removal of undercut stream banks and riparian brush cover caused a decrease in the number and weight of resident trout, with decreases being greatest for large fish. Butler and Hawthorne³⁵ report that brown, brook and rainbow trout make use of shade as overhead cover. All three species showed a significant preference for the shaded areas of large overhead cover.

Relationships between physical parameters and fish populations in trout stream pools have been investigated by Lewis.³⁶ Nineteen pools were studied on a 6.2 mile section of a Montana stream. Of the physical parameters studied, current velocity and total cover were found to be the most important factors affecting fish populations. Deep, slow pools with extensive natural cover had the most stable trout populations with brown trout showing greater stability than rainbow trout. From his study, Lewis surmised that the value of cover is probably related to security and photonegative response of trout which cause them to seek areas with overhead cover. These and other studies suggest the recognition of cover, both in the stream and on the banks, as important to stream-dwelling fish populations.

d. Temperature

Temperature is a critical ecological factor controlling a stream's productivity. A natural cold-water stream in a temperate climate has a definite seasonal temperature regime, but it rarely becomes very warm. The protection provided by the shade of riparian trees and other vegetation is an important factor, and such streams are usually spring-fed. For stream fishes, temperature is an important factor which limits both geographical distribution and local occurrences of species within a watercourse.³⁷

Differences of a few degrees in water temperatures are often critical to the livelihood of stream organisms. The brook trout, for instance, cannot long sustain temperatures above 25.3°C ; ³⁸ for the rainbow trout this upper tolerance limit is 24.5°C . Clearing of riparian vegetation and the subsequent exposure of streams to the sun have caused water temperatures to rise above these tolerance limits of trout in many areas. This situation is known to have occurred in the Appalachians, where trout are now limited almost entirely to the high, still-forested areas.

The timing and extent of temperature changes are also important. Most stream organisms have definite breeding seasons, and their life cycles are geared to fit into the annual cycle of temperature change. Although the warm-water fishes can tolerate winter temperatures, the water must warm up early enough and high enough to allow them to breed at the proper time. Similarly, for cold-water fishes,

temperatures must fall below 14.4°C at some time of the year, or in some accessible area, to allow trout to breed, as this is the upper limit for successful reproduction.³⁹

e. Wetlands

Floodplains and wetlands are an integral part of any stream.⁴⁰ In many areas these marshy areas along streams and rivers are well developed and of great value to these aquatic ecosystems. The productivity and diversity of the main stream channel is dependent on the health or naturalness of the marsh of the flood plain. During high flows, considerable sediment is deposited over the floodplain which in turn furnishes nutrients for the vegetation and the food web it supports. This flooding also creates floodplain ponds which provide excellent breeding and nursery areas for numerous species of fish and other organisms.

These floodplains and marshes harbor a great diversity of animals. Organisms use these shallow water areas in various seasons to complete part of their life cycles. Large numbers of birds and mammals use the floodplains as feeding grounds. Many extensive floodplain marshes, glades, and forests form an integral part of important flyways for waterfowl and other migratory birds. These relatively impenetrable areas provide necessary habitat for certain kinds of bird rookeries found nowhere else.

A dynamic equilibrium exists between the stream and marsh ecosystem; their respective water tables, infiltration rates and discharge properties interact to provide, preserve and supplement the water requirements of each other. They have surface and groundwater storage capacity to even out peak flows and augment low flows. Marshes trap sediments from the erosion of the watershed and prevent them from entering the stream, thus improving water quality and alleviating the deleterious effects of sediment on stream-dwelling organisms. Because they are areas of intense microbial activity, marshes often aid in reducing the effects of water pollution, particularly that type involving such nutrients as phosphates and nitrates. Therefore, marshlands act both as physical filters for sediment and biological filters for excess nutrients.

The floodplain is also an important part of the stream ecosystem during flooding conditions. It absorbs a great amount of water and retains sediment that would otherwise wash into the stream channel and reduce the water carrying capacity of the stream. A stream generally meanders back and forth across its floodplain, thus, it is important that this area be maintained in order to allow the natural shifts in stream structure to occur.⁴¹

It is these natural conditions together with shape of the channel of a stream, the roughness of its bed, the diversity of patterns of its current, and its interrelationship with the vegetation on its immediate

banks that produces a set of conditions to which the stream ecosystem evolved over time.

There are numerous other important physical and biological factors which affect the productivity of the stream ecosystem. Coverage of all these factors is beyond the scope of this report. Instead, the attempt here has been to point out some of the more important factors toward which laws and administrative acts protecting the aquatic environment must be aimed.

In the following section some additional physical and biological factors affecting the productivity of lakes and reservoirs will be discussed to complete the preliminary material for the subsequent section on the types and extent of man-made intrusions on natural streams, lakes, and recreation reservoirs.

2. Lakes and Reservoirs

Lakes and reservoirs vary greatly in their productivity. Many of the physical and biological factors which affect the productivity of streams apply also to the productivity in lakes and reservoirs. Adequate habitats for invertebrate production, spawning areas for reproduction and protective cover are as important to lake and reservoir-dwelling fishes as they are for stream-dwelling species. Whereas flow was stressed as an important controlling factor in stream productivity, in lakes and reservoirs the somewhat related factor of water level fluctuation has a profound effect on productivity. This

section will discuss some of the effects of water level fluctuations, the importance of littoral areas to the overall productivity of lakes and reservoirs, and some of the downstream effects of reservoir operation on floral and faunal communities.

a. Lake and Reservoir Level Fluctuation

Fluctuation of water levels within lakes or reservoirs may occur due to natural or man-made causes. Withdrawals of water for irrigation, domestic and industrial purposes or inputs due to natural runoff can create significant changes in water levels. As a result of these natural and man-made causes, water levels may fluctuate on a daily or a seasonal basis. The amount of horizontal fluctuation, which is particularly important ecologically, varies with the size and shape of the impoundment.

The area and depth of lakes and reservoirs are primary factors in determining their relative productivity. In general, large areas and great depths are associated with lower productivity.⁴² Relative to the production of any species of fish, there is an optimum size for a lake or reservoir and water level fluctuations can have a profound effect on this factor.

Although the environmental effects will vary with the amount, rate, and pattern of releases and inputs, water level fluctuations will affect the flora and fauna, may interfere with recreation, and be

esthetically undesirable. But, by no means are all the effects of water level fluctuations negative, as will be discussed.

Water level fluctuations can be detrimental to the littoral and riparian flora of lakes and reservoirs. The vegetation which cannot tolerate inundation will be replaced in places by more tolerant vegetation, a change which may be important if the new species are less desirable than the old. Production of essential aquatic plants in littoral areas is only possible when fluctuations in water levels is slight.⁴³

Fluctuations mean a changed habitat for wildlife and other fauna, with perhaps a critical loss for some species and a gain for others. With the change of habitat will come a change of the organisms within the affected ecosystem. A study on Scandinavian subarctic lakes showed that a very high proportion of the bottom-dwelling fauna is eliminated when the water level is fluctuating.⁴⁴ Ultimately, an altered, very sparse bottom fauna consisting of a few species develops in the zone where fluctuation occurs. Fluctuations in the water level of lake and reservoir littoral areas may destroy the conditions for the reproduction of fish and other organisms and reduce the area of their summer feeding grounds.

From climate and water temperature data, the period of fish spawning can be predicted, but the spawning period varies for different fishes and reservoirs may have several species. The operation pattern of most reservoirs will allow the water level to be maintained

during the spawning season or quickly dropped to a favorable level. Spawning of some warm and cold-water game fish species normally takes place at shallow depths close to shore. A drop in levels exposing the eggs during this period would kill the hatch. Therefore, levels should be kept steady during the spawning season of important game fish.

Lowering of lake levels in late winter months to provide a catch basin for the heavy spring runoff may strand fur bearing mammals between ice and water.⁴⁵ Rapidly rising waters in the spring can be detrimental to the breeding of aquatic birds. Within lakes and reservoirs containing cold-water fisheries, stabilization of lake levels and control of run-off is especially desirable from the fish and game point of view.

Lake and reservoir fluctuations also affect recreational and esthetic experiences of the users. Generally, drawdowns impair the quantity and quality of recreational opportunities. Level fluctuations make it difficult or impossible to move boats across exposed mud flats and fishing from the shoreline may be severely restricted. Such esthetic and accessibility factors should be considered in the timing and extent of man-made fluctuation in lakes and reservoirs. From the foregoing, the adverse effects of water level fluctuation may depend more on timing and duration of the fluctuation than upon the degree as measured in vertical feet.

The preceding is not to imply that all level fluctuations are necessarily detrimental. Lowering of the water level of a lake with the accompanying reduction in water volume and surface area affects all parts of an aquatic habitat and all components of the animal and plant communities that inhabit the water. Availability of plant nutrients in the bottom soils can be increased by proper management of water levels. Aeration of bottom sediments helps to keep nutrients in the food chain. Exposure allows rapid and complete oxidation of the bottom sediments while increasing the process of decomposition which releases fertilizing substances to these soils. Lantz⁴⁶ reports good success in vegetation control and subsequent improvement in fish productivity using level fluctuation methods. There is also evidence to show that level reductions may be responsible for the spreading of certain kinds of plants, as they gain a root hold in parts of the lake when the level is down that would ordinarily be too deep for them.⁴⁷

Regulation of water levels can be a valuable tool in fisheries management. This appears to be a particularly useful management technique for warm-water species. The fact that warm-water fishes vary in their responses to biological adversity and prosperity is the key to the effectiveness of water level fluctuations in fisheries management.⁴⁸ Reductions in water levels crowd fish so they are forced from protection of rooted vegetation and shallow water debris into the open water of the lake where they are subject to predation from larger fish and other predators. This materially reduces the

population of smaller fishes without greatly reducing numbers of the larger ones. Level manipulation is less effective for cold-water fishes in lakes and reservoirs, as these fish tend to remain in the deeper waters.

Controlled level fluctuation can be used to advantage in the feeding of fish and wildlife. The water level may be reduced somewhat prior to waterfowl migration and feed grains planted in wildlife sanctuaries around the periphery of lakes and reservoirs. Water levels are then raised to flood the planted areas to ensure a food crop for the migrating waterfowl and other wildlife. When the supply of fish food is low, an increase in lake or reservoir level may provide a new supply of food from the newly inundated areas.

Employed without discretion, water level fluctuation may be deleterious to the overall productivity and recreational potential of lakes and reservoirs. On the other hand, with sound application, it may be one of the most effective tools in fishery and wildlife management.

b. Littoral Areas

Littoral or marsh areas play an important role in the ecology and productivity of lakes and reservoirs. The littoral zone extends from the shoreline lakeward to the limit of rooted aquatic plants.⁴⁹

Due to the influence of the sun's rays, the littoral area is generally the most productive zone in lakes and reservoirs. Littoral areas

provide important habitats for the feeding and reproduction of numerous species of fish, mammals, and aquatic birds which inhabit these waters. They have great capacity for taking up water during wet periods, providing a biological filter for removal of silt and nutrients and gradually releasing clear water during periods of drought. For these reasons, streams and lakes that originate or pass through extensive littoral or marsh areas show less turbidity and have a more constant flow than those which are dependent on immediate surface runoff.⁵⁰

c. Downstream Effects Caused by Water Impoundments

The effects of water impoundments are not confined to the impoundment itself, but extend to the biota of lower streams, lakes, and estuaries, as well as adjoining riparian communities and to the general esthetic values of the watershed. Elimination of flooding has had major adverse effects on many marshes, estuaries, and on riparian vegetation which are dependent on periodic flooding. For example, reduced flows below large dams on the Trinity River in California have had a profound effect on the ecology of the watershed. Prior to reservoir development, annual freshets washed away accumulated sediments, cleansing the salmon spawning gravel beds and retarding the growth of streambottom and riparian vegetation. Following construction of the dams, the river has become a delta for the deposition of sediment from uncontrolled tributaries.⁵¹

Dams act as barriers to the upstream migration of anadromous fish. Various techniques have been used to mitigate the effects of the barrier such as fish hatcheries below the dam and ladders to transport fish over and around the dam. However, fish ladders are sometimes unsuccessful. The fish may fail to use the passes if they are not stimulated to enter or leap at the right place. They are attracted to the point of greatest discharge or impact of falling water, and they often try futilely to leap over obstacles they cannot clear while ignoring passes that they could more easily negotiate because the correct stimulus is absent.⁵²

If the fish are successfully transported over the dam, the young downstream migrants sometimes are unable to find their way back through the nearly still waters of the reservoir. Many downstream migrants normally travel near the bottom, as this habit takes them safely over waterfalls and through natural lakes. In an impoundment the deepest water is usually just upstream of the dam and there is no bottom slope leading up to the outflow, therefore, young fish tend to get stranded in the area just upstream of the dam.⁵³ Where the impoundment includes hydroelectric generating facilities, there can be significant fingerling mortality in downstream passage through the turbines.⁵⁴

Knowledge of the potential environmental impacts of releases is critical for the proper operation of a reservoir. Reservoirs, as with lakes, develop temperature stratification during the summer months

with a sun-warmed surface layer, the epilimnion, and a colder, hypolimnion layer below. Releases from the cold hypolimnion layer can shock the fishery below reservoirs, eliminating or preventing reproduction. In some cases, it can maintain a good cold water fishery below reservoirs. These temperature effects may be mitigated by the use of variable level discharges from the dam, or with a discharge of mixed water to achieve optimum temperature.

Water flowing over spillways can cause a gas bubble disease in fish called "nitrogen narcosis". Nitrogen gas from air dissolves in the falling water producing a supersaturated condition of the gas within the water below the dam. This dissolved gas is extracted from the water by the fish and enters their blood and tissues. Lower water pressure or higher temperatures cause the dissolved nitrogen gas to return to a gaseous state which produces bubbles that can block the blood vessels of fish.⁵⁵

Controlled reservoirs have various types of annual cycles of water releases. These cycles may be only remotely related to cycles of rainfall and runoff and perhaps not at all to the life history of fishes. Alterations in the timing and magnitude of flows have a great potential for causing environmental disruptions below reservoirs where particular patterns are important to the flora and fauna. Reservoir operators must be cognizant of these requirements if some semblance of a natural state is to be maintained below reservoirs.

Part B. Man-made Intrusions on Streams, Lakes and Reservoirs

1. General Effects of Alterations in Streams, Lakes and Reservoirs

In the previous sections of this report some important physical and biological factors have been discussed relative to their effects on the productivity, and hence, the recreational and esthetic potential of streams, lakes, and reservoirs. This chapter will discuss some of the ways in which man-made intrusions have in the past, and continue presently, to alter these ecosystems.

Man has now acquired the knowledge and technology that enable him to alter or completely destroy in a short period of time what has developed over a great many years. Unfortunately, he rarely considers his inability to repair or duplicate it. Nonetheless, in this second half of a century in which man probably has done more to alter his environment than in any previous millenium of history, man is at last beginning to appreciate some of the adverse consequences of his actions.

Any human interference with a water course is likely to alter the important environmental factors discussed previously such that reproduction of certain organisms is restricted and completely eliminated for others. The problem is that many times extinction occurs quite unnoticed with no mass death but the species simply disappears. Human activities have profoundly affected streams and lakes in all

parts of the world, to such an extent that it is now extremely difficult to find a stream which has not been altered in some way.⁵⁶

Man-made alterations brought about in watersheds by highway construction, logging, impoundment of streams, channelizing for flood control and drainage, dredge and fill activities and other disturbances of stream channels can greatly alter the pattern of movement and the quality and quantity of the water within the watershed. In extreme cases of alteration, streams have been set back to the primitive stages of ecological succession. The biological response to this adverse treatment is one of lowered productivity in and around the stream environment.

Erosion and subsequent silt deposition is one of the most serious consequences of these man-made alterations within watersheds. It is often unspectacular and may go unnoticed from one year to the next, but the damage is often widespread and permanent. Increased sediment loads in streams and lakes can have detrimental effects on fish, their habitat, and their food. Sediment can also affect local economies that rely on water-oriented recreational uses, as turbid water conditions can seriously disrupt sport fishing. The downstream effects of sediment can be serious as alterations on one relatively small area can have an impact for miles downstream.

Silt-laden waters will not normally affect adult fishes.⁵⁷ However, turbid water conditions during the spawning period of many species, particularly trout, can cause egg mortality of over 90

percent.⁵⁸ Sediments filling the spawning gravel interstices can limit oxygen that is vital for egg and embryo development. It may also restrict the ability of newly hatched fry to move out of the gravel. Aquatic insects which are dependent on the crevices between rocks for their livelihood will be eliminated or displaced. Thus, the food supply for fish is drastically cut, and the capacity of the stream to support a good population of fish declines. Cordone and Kelley⁵⁹ state that sedimentation is probably one of the most important factors limiting the natural reproduction of salmonids in streams.

Water turbidity causes decreased production within aquatic plant communities. Decreased light penetration caused by suspended material limits the growth of phytoplankton and other aquatic plants which are of importance as a basic food for aquatic animals and as a producer of oxygen through photosynthetic processes for stream reaeration.

The increasing activity of man on watersheds is resulting in obviously increased erosion and sediment deposition. Man's failure to recognize that even small amounts of sediment may be harmful may well result in gradual destruction of the majority of our streams. In their comprehensive study on the effects of organic sediment on streams, Cordone and Kelley,⁶⁰ conclude that almost all the trout streams in North America will be seriously affected unless steps are taken to control and reduce erosion.

A good stream fishery is generally characterized by a combination of riffles and deep pools, undercut banks, and streamside vegetation that shades portions of the stream. These features offer protective cover, spawning, and feeding areas and aid in maintaining proper water temperatures for the stream fishery. Alterations which result in the removal of any of these factors will either reduce or displace the fish fauna.⁶¹ The magnitude to which the fishery will be affected will vary by stream and to the severity of the alteration to the environment. The distribution of many, possibly most, stream-dwelling species has been changed in some way by man-made alterations. It is probable that plants and animals which are now characteristic of cool shaded headwater areas once had enormously greater distribution.⁶²

2. Highway Construction, Mining, Flood Control

a. Environmental Impacts

One of the undesirable consequences of much new construction activity is the deterioration or elimination of fish and wildlife habitat which occurs if steps are not taken to prevent it. The steadily increasing rate of highway construction in recent years, coupled with the very serious and obvious damage to many of our nation's finest streams by this activity, has made it a major concern to resource managers and citizens alike.

Highway construction and maintenance near bodies of water can have significant impact upon fishery resources. For engineering and economic reasons, roadways frequently follow and cross stream courses. In order to reduce the number of bridges and highway miles and also prevent subsequent flooding of the roadbed during high stream flows, natural meandering stream courses are often converted into straight, riprapped ditches, with a substantial loss of pools and riffles conducive to trout and salmon production. Streamside vegetation is often stripped, causing serious soil erosion and undesirable increases in water temperatures, both of which may be deleterious to the fish and invertebrate populations of the stream as discussed previously. Heavy construction equipment operation in or near streambeds can rapidly cause enormous siltation problems. Compaction and disruption of streambed gravels from this activity destroys important habitat for the stream fauna.

Movement of large quantities of raw earth and rock are basic elements of road construction. Lacking precautionary measures, some portion of this material winds up in the streambed, blanketing out fish food-producing and spawning areas. Frequently, gravels to be used for road construction are taken from the streambed to the detriment of stream life. The effects of these activities, in terms of reduced fish production, are normally widespread and long-lasting.⁶³

The federal government and some states have taken legal and administrative steps toward alleviating some of the adverse

environmental consequences of highway construction activities. Legal devices such as the federal National Environmental Protection Act, state stream protection laws, and inter-agency agreements such as memoranda of understanding between highway and conservation departments have provided significant progress in bringing the goals of these potentially opposing groups closer together. Details of these and the many other legal and administrative devices which states and the federal government are using to protect aquatic areas from highway construction and other man-made intrusions are covered in a subsequent section.

b. Examples of Stream Alterations Due to Highway Construction Activities

Some statistics on the amount of stream destruction due to highway construction in selected states will illustrate the problem specifically.

Early in 1967, the Idaho Fish and Game Department initiated a two-year, statewide survey⁶⁴ to (1) inventory the extent of stream channel alterations and (2) determine the effect of alterations upon stream productivity.

In the physical inventory phase of the project, 1,138 stream miles, including portions of 45 different streams located throughout the state, were surveyed. Of this total, 434 miles or 38 percent of the surveyed streams had been physically altered. Recorded were 1,424 alterations or an average of 1.25 alterations per stream mile,

and with an average length of 1,935 feet. One stream, 21 miles in length, was 100 percent altered, while others ranged from 4 to 89 percent. Over 60 percent of the channel alterations were associated with road construction, 19 percent with flood control, 13 percent with mining, 6 percent with railroad construction, and 2 percent with agriculture and other miscellaneous activities. Tables 1 and 2 summarize the data.

As a second part of this study, comparative sampling was done in 29 different streams to determine what a channel alteration would do to the fish production. Equal sections in close proximity to each other were sampled in undisturbed and altered areas of the stream, and the game fish counted and weighed from each for comparison. Undisturbed areas outproduced the altered areas, ranging from 1.5 to 112 times greater poundage of game fish. In some instances, the altered areas produced no game fish whatever. Unaltered areas contained seven times more catchable size trout and ten times more whitefish than the altered areas. The average for the 29 streams combined was 8 times greater fish production from undisturbed stream areas. In other words, stream channel disturbance, on the average, reduced the productivity of the affected area by 87 percent.

Other studies in Idaho waters show similar adverse impacts on fish production due to stream alterations. Areas on Yankee Fork of the Salmon River, dredge-mined 30 years ago, still produce 97 percent less pounds of game fish than undisturbed areas of the same

Table 1. Stream channel alterations on 45 Idaho streams.
From Irizarry, 1969.⁶⁴

Alteration	Miles	Percent of Total
Road bed encroachment	238.2	55
Channel relocation	89.0	20
Mining	55.1	13
Channel clearance	49.0	11
Riprapping	3.0	1
TOTAL	434.3	

Table 2. Activities associated with stream alterations in Idaho.
From Irizarry, 1969.⁶⁴

Alteration	Miles	Percent of Total
Road construction	263.4	60.6
Flood control	83.7	19.3
Mining	55.1	12.7
Railroad construction	24.5	5.6
Agriculture, misc.	7.6	1.8
TOTAL	434.3	

stream. On the Portneuf River, a channel change associated with the building of the railroad in 1882 still remains 83 percent below the productivity of the undisturbed channel after an 86 year recovery period. Likewise, the construction in 1891 of a railroad on the South Fork of the Coeur d'Alene River resulted in a 99 percent reduction in productivity even after 77 years of recovery.⁶⁵

According to Casey⁶⁶, the fish population of Seigel Creek, Idaho, prior to operation of a placer dredge, was approximately the same in sections above, below, and within the area to be dredged. Population studies made at the end of about two months of operation showed no fish in the dredged section and a dominant rough fish population below. Comparative sampling above the dredged area showed that species composition had remained about the same during this period.

During 1961-62, thirteen Montana streams were inventoried to determine the amount of man-made stream channel alteration, the activity which led to the alteration, and the type of alteration.⁶⁷ Standing crop estimates of the fish populations were censused in both natural and altered channels of the streams surveyed. This study showed that channel relocation and shortening of 137 miles of natural streambed to 69 miles of inferior, man-made channels resulted in the greatest loss of fishing water in the 13 streams inventoried (Table 3). Lacking meanders, undercut banks, and the normal alteration of pools and riffles, the man-made channels had little resemblance to the former stream environment.

Table 3. Summary of lost and relocated stream miles due to man-made alterations in 13 Montana streams and rivers. From Peters and Alvord, 1962.⁶⁷

	Miles of		
	Natural meandering stream channel lost	Relocated stream channel replacing natural meander- ing stream channel	Reduction in stream length (miles)
Little Big Horn River	52.9	16.5	36.4
St. Regis River	6.3	5.4	0.9
Ninemile Creek	0.9	0.7	0.2
Sheep Creek	3.6	2.0	1.6
Otter Creek	6.7	2.9	3.8
Belt Creek	8.6	7.2	1.4
Beaver Creek	3.5	2.0	1.5
West Gallatin River	4.4	4.1	0.3
Rocky Creek	9.3	5.3	4.0
Big Hole River	17.3	4.4	12.9
Boulder River	2.1	1.5	0.6
Prickley Pear Creek	19.2	16.0	3.2
Ashley Creek	2.8	1.4	1.4
Total	137.6	69.4	68.2

A total of 250 miles of 768 miles of stream length studied was found to be altered from their natural condition (Table 4). Of the thirteen streams, 12 had more than 20 percent of their length altered. Channel relocation accounted for 55 percent of the alterations, with riprapping, 26 percent; diking, 16 percent; channel clearance, 3 percent. Within 768 miles of stream channel, 1,987 individual alterations were found, or an average of approximately three alterations per stream mile. Channel alterations due to agricultural activities accounted for the greatest miles of alteration followed in order by railroad construction, road construction, and urban and industrial development (Table 5).

Peters and Alvord found that the standing crop of game fish was several times more abundant in natural meandering channels than in altered channels. Where the total number of trout and whitefish made up 62 percent of the standing crop in the unaltered channels, they made up only 32 percent in the altered. Trout were over five times and whitefish nearly ten times more abundant in the natural as compared to altered channels. In each stream studied, there was also a greater total weight of fish in the natural channel than in the altered.

A recent report⁶⁸ has been published by the State of Montana on channel changes designed to restore fish habitat. This report presents an evaluation of two meander channels constructed to regain length of stream lost in eight channel changes in the Clark Fork River

Table 4. The length of stream channel altered and the number of alterations by type in 13 Montana streams or rivers.
From Peters and Alvord, 1962.⁶⁷

River or Stream	Channel Relocation		Riprapping		Channel Clearance		Diking		Total			
	Miles altered	No. of alter- ations	Miles altered	No. of alter- ations	Miles altered	No. of alter- ations	Miles altered	No. of alter- ations	Miles altered	No. of alter- ations	No. of stream miles	Per cent altered
Little Big Horn R.	16.5(36.4) ¹	68	6.2	95	1.4	13	3.4	15	63.9	191	120.0	53
St. Regis R.	5.4(0.9)	23	17.9	88	0.0	0	1.2	10	25.4	121	37.1	68
Ninemile Cr.	0.7(0.2)	6	1.7	53	0.0	0	2.4	22	5.0	81	23.9	21
Sheep Cr.	2.0(1.6)	15	0.1	9	0.1	1	0.0	0	3.8	25	12.4	31
Otter Cr.	2.9(3.8)	23	0.7	18	0.5	9	0.1	3	8.0	53	34.5	23
Belt Cr.	7.2(1.4)	36	3.4	55	0.3	2	8.8	66	21.1	159	81.0	26
Beaver Cr.	2.0(1.5)	6	1.2	30	0.2	7	0.5	23	5.4	66	49.5	11
West Gallatin R.	4.1(0.3)	20	9.5	143	0.7	13	5.6	88	20.2	264	85.9	23
Rocky Cr.	5.3(4.0)	31	1.3	62	0.2	3	0.8	12	11.6	108	18.4	63
Big Hole R.	4.4(12.9)	56	11.0	107	0.8	13	17.0	219	46.1	395	147.6	31
Boulder R.	1.5(0.6)	14	7.9	246	1.0	21	1.4	27	12.4	308	86.3	14
Prickley Pear Cr.	16.0(3.2)	21	1.0	72	0.9	31	0.1	7	21.2	131	41.0	51
Ashley Cr.	1.4(1.4)	8	1.9	73	2.1	3	0.1	1	6.9	85	30.2	23
Total	69.4(68.2)	327	63.8	1051	8.2	116	41.4	493	251.0	1987	767.8	33

¹Number in parenthesis refers to miles of stream channel lost as a result of the channel relocations.

Table 5. The length of stream channel altered, the number of alterations, and the party responsible for the alterations in 13 Montana streams or rivers. From Peters and Alvord, 1962.⁶⁷

River or Stream	Railroad Construction		Road Construction		Urban and Industrial Development		Agricultural Activities		Total			
	Miles ¹ altered	No. of alter- ations	Miles ¹ altered	No. of alter- ations	Miles ¹ altered	No. of alter- ations	Miles ¹ altered	No. of alter- ations	Miles ¹ altered	No. of alter- ations	No. of stream miles	Per cent altered
Little Big Horn R.	39.8	48	2.9	22	2.0	7	19.2	114	63.9	191	120.0	53
St. Regis R.	13.0	54	10.7	60	1.6	6	0.1	1	25.4	121	37.1	68
Ninemile Cr.	0.1	5	0.6	24	1.9	4	2.4	48	5.0	81	23.9	21
Sheep Cr.	0.0	0	3.8	25	0.0	0	0.0	0	3.8	25	12.4	31
Otter Cr.	0.0	0	4.6	41	0.1	1	3.3	11	8.0	53	34.5	23
Belt Cr.	1.2	10	9.3	74	4.4	28	6.2	47	21.1	159	81.0	26
Beaver Cr.	1.5	3	2.7	25	0.2	10	1.0	28	5.4	66	49.5	11
West Gallatin R.	0.8	6	11.8	98	0.7	26	6.9	134	20.2	264	85.9	23
Rocky Cr.	3.6	7	1.6	22	1.0	26	5.4	53	11.6	108	18.4	63
Big Hole R.	3.8	21	6.1	50	1.3	12	34.9	312	46.1	395	147.6	31
Boulder R.	2.5	26	3.1	49	1.9	18	4.9	215	12.4	308	86.3	14
Prickley Pear Cr.	3.6	26	0.4	7	14.6	24	2.6	74	21.2	131	41.0	51
Ashley Cr.	0.8	9	0.7	35	1.3	3	4.1	38	6.9	85	30.2	23
Total	70.7	215	58.3	532	31.0	165	91.0	1075	251.0	1987	767.8	33

¹ Includes miles of stream channel lost as a result of the channel relocations.

due to the construction of Interstate Highway I-90 west of Drummond, Montana. The following significant conclusions were reached from the study:

- (1) the meander channels constructed do provide hydraulic, topographic and fish habitat characteristics similar to those found in natural meanders,
- (2) fish of the same size, species, and quantities found in similar natural meanders of the river were also found in the constructed meander channels three years after construction.
- (3) the methods and criteria used in the design of the meander channel were adequate to provide habitat for the trout and whitefish native to this section of the river.

A study in Wyoming⁶⁹ covering channel alteration losses for the ten year period 1956-66, reports that on a statewide basis, Wyoming has not suffered too severely in trout stream habitat loss. The study was limited to channel changes caused primarily by road building, mining, and flood control projects and does not include losses due to siltation and dewatering, both of which, it is estimated, have caused considerable additional damage to streams in the state.

A statewide inventory of all Wyoming streams indicates that 18.5 miles of trout stream have suffered to a minor degree, 2.46 miles have been moderately changed, and 15.4 miles have been severely damaged.⁷⁰ Although some damage has been done to downstream habitat from these projects, it is reported that many of these waters had deteriorated for many years due to irrigation and livestock use.

3. Channelization

a. Environmental Impacts

The general term "channelization" is often used to refer to a broad spectrum of man-made alterations in and around stream and river beds. These alterations may include such activities as channel relocation, clearing and snagging, diking and dredging. Depending on the responsible agency these alteration activities may take on varying definitions. For instance, clearing and snagging to some means simply removal of trees and debris from the channel, including trees on the immediate bank which are weak, dead or undercut and probably will fall into the channel in the near future. To other agencies clearing and snagging includes a much broader spectrum of activities such as removal of gravel bars, pools and riffles from the stream channel as well as deforestation of the immediate banks for some distance.⁷¹ The common end product of such channelization activities is a straight flume-like channel denuded of vegetation with enlargement in width and/or depth to approximate a trapezoidal cross section.

The effects of channelization activities upon watersheds in many areas of the United States are covered in abundant literature.^{72, 73, 74} A study on channel modifications has recently been published by Arthur D. Little, Inc. and the Philadelphia Academy of Natural Sciences for the Council on Environmental Quality entitled "Report on Channel Modifications."⁷⁵ For those interested in a detailed study of

the many aspects of this important area of man-made alterations to stream channels, this publication is highly recommended.

Alterations to the natural stream ecosystem that are severe enough to disturb its functioning or structure will create changes within the system. Most stream perturbations, depending on the type and extent of the perturbation, affect the kinds and numbers of species, and the relative sizes of populations.⁷⁶

Channelization and associated alteration such as dredging, that disturb and remove solid substrates, that create eroding sediments and unstable river beds, and decrease the light penetration into the water affect the overall productivity of the watershed. For example, some kinds of fish food organisms such as stoneflies, mayflies, and some species of caddisflies require firm substrates in order to live. If they are removed, which often happens when rocks and rubble are dredged out of a stream, the populations of these insects will be eliminated or greatly reduced.

Channelization may cause a shift in relative sizes of populations of aquatic communities with the more tolerant becoming very common. Continued perturbations over an extended period may bring about the elimination of those species with narrow ranges of tolerance and perhaps an increase in species that thrive in the perturbed conditions.

Natural vegetation of the watershed and streambanks is extremely important in controlling excessive water temperatures,

furnishing detrital food for the various aquatic organisms in the stream, and regulating flow and nutrients entering the stream.

Clearing of bankside vegetation during channelization operations can cause an increase in stream temperatures which brings about a change in the biota of a stream. For example, increased summer temperatures may eliminate stoneflies which in turn affects the fish populations. Increases in stream temperatures may also occur if the depth of water is decreased by increasing the width of the channel.⁷⁷

Streambank vegetation also provides bank stabilization thereby retarding erosion and sediments from entering the stream. It provides a natural buffer zone for deposition of silt from flash floods before it enters the stream and also absorbs nutrients from the waters that traverse the floodplain. Leopold⁷⁸ has shown that cutting down of trees and other vegetation bordering a stream may increase the sediment load eight times that which existed prior to the clear cutting of vegetation. Once within the streambed, these sediment loads are generally unstable, continually shifting, making the streambed an unsuitable habitat for aquatic life.

Dredging of streams often produces channels with trapezoidal cross-sections which increase the laminar flow of water and destroy important turbulence created by the pool-riffle sequence. As discussed in a previous section on streamflow, current is one of the most important density independent factors in determining the ability of fish and other aquatic organisms to live in a given area. It is the

elimination of highly productive areas such as meanders and the straightening of channels that inevitably lead to a swifter and more uniform rate of water flow, which in turn affects the habitat for aquatic life and their subsequent productivity.

Downstream habitats and aquatic life are often adversely affected by upstream channelization projects.⁷⁹ The effects of channelization activities on these downstream areas may be to increase sediment deposits, increase assimilation of nutrients, and increase flash flooding in these areas.

The main effect of channelization is the movement of sediment loads downstream which affect aquatic life. Sediment erosion may be produced by dredging, by removal of streamside vegetation creating erosion of stream banks, and by aggradation due to change in the slope of the stream. These sediments are transferred downstream where they tend to destroy the roughness of the streambed which greatly reduces the diversity of habitats for aquatic life. Sediment deposition can also create a shifting, unstable bed load. Productivity is to a large extent dependent upon the type and stability of the streambed thus shifting sediments can be devastating to aquatic communities.

Increased flow velocities and decreased retention times within channelized areas may increase the nutrients and toxic substances transferred downstream. This can cause a shift in the species composition to those that can tolerate such an increased concentration of nutrients and toxic substances.

The straightening of stream channels and draining of wetlands produce swifter currents and increased runoff which, in turn, may produce downstream flooding if these areas do not have the capacity to contain the water. These flash floods dislodge many organisms and carry them downstream, thus disrupting the ecosystem of the upstream and downstream areas.

b. Scope of Channel Modification Activities

The recent study on channel modifications by Arthur D. Little, Inc. for the Council on Environmental Quality, referenced previously, gives additional evidence of the tremendous scope of channel modification activities throughout the United States.⁸⁰

Water course alterations by individuals and groups of individuals in the private sector began well before the turn of this century in the name of internal improvements to remove what was considered excessive water out of the way of urban and rural development. This has resulted in uncounted thousands of miles of man-made water-course alterations many of which, due to natural restoring forces, now resemble natural streams.

Federal involvement in channel modifications has been more recent than that of private and non-federal public involvement, although the Corps of Engineers' authority for navigation improvements dates to the early 19th century. Prior to the Reclamation Act

of 1902, the forerunner to the Bureau of Reclamation had authority to channelize the streams and floodplains of the 17 western states.

The magnitude of the overall federal program of channel modifications for flood control is discussed in a report published by the Water Resources Council.⁸¹ Summarizing flood control efforts of federal agencies, this report divides activities between "downstream" work of the Corps of Engineers, Bureau of Reclamation and Tennessee Valley Authority, and "upstream" works of the Soil Conservation Service. It identifies existing downstream programs as providing 8,352 miles of levees and floodwalls and 5,076 miles of channel improvements. Existing upstream programs of the SCS have provided 3,200 miles of channel improvements that have been constructed.

The CEQ study on channel modifications summarizes the channelization work of the two principal federal agencies involved in this activity, the Corps of Engineers and Soil Conservation Service.⁸² It states:

...federal or federally-assisted projects have, since the early 1940's occasioned the planning for and development, improvement or modification of about 34,240 miles of waterways in 1,630 projects administered by programs of the Corps of Engineers and Soil Conservation Service...

The combined activity of Corps and SCS assistance on 1630 projects divides between 28,343 miles of channel alterations and 5,897 miles of floodplain alteration by levee work. About 50 percent of the activity of both types has been or will be carried out in five states, about 75 percent in ten states and about 80 percent in 15 states. Channel alteration work is most heavily concentrated in eight southern states (65 percent of channel

work), and levee work in California, Illinois and Florida (51 percent of levee work). The five mid-continent States of Illinois, Indiana, North Dakota, Ohio and Kansas rank among the first 15 in channel alteration activity. The remaining 20 percent of both types of activity in 35 States is widely distributed.

For 889 Corps-assisted projects, 47 percent is channel improvement work and 53 percent levee work. Together, 6,180 miles or 56 percent are completed, 3,896 miles or 35 percent are under construction and 1,001 miles or nine percent are planned, for a total of 11,077 miles. Ten States in the South and Midwest, plus California, account for 73 percent of the projects, 70 percent of their channel mileage and 76 percent of their levee work. The median size of the 889 projects is slightly under four miles, 67 percent are under five miles and 82 percent are under ten miles.

For 558 approved SCS-assisted projects that involve channel alteration (there is virtually no levee work), 4,209 miles or 25 percent were completed by 1971, and 12,426 miles or 75 percent remained to be completed. Eight States in the South, plus Delaware and Maryland, account for 80 percent of completed work and 74 percent of approved remaining work. The median size of projects is slightly under 18 miles, 24 percent are under five miles and 38.7 percent under ten miles. Recently reported data suggest that 792 miles on 59 approved projects were completed in 1971 and 1972.

For 183 SCS projects involving 6,518 miles of channeling, applications are pending. The same ten States account for 70 percent of pending work as for approved work. Size distribution is very similar, with a slight trend toward smaller dimensions, as 44.6 percent of projects are under ten miles in size.

c. Examples of Alterations Due to Channelization Activities

The effects of stream channelization in altering the standing crop of fish has been reported in a number of studies conducted throughout the United States. A study by Belusz⁸³ on the Blackwater River of Missouri indicates that channelization has caused this river

to become wider and shallower and its streambed gradient much steeper. Belusz states that in an unchannelized section of the river the standing crop of fish was 565 pounds per acre, whereas in the channelized area it was only 131 and 449 pounds per acre in two different study stations. He found that the fish became smaller, and the weight of the fish was less in the channelized as opposed to the unchannelized areas.

In their study of a tributary of Clark Fork on the Columbia River in Montana, Whitney and Bailey⁸⁴ found similar results. Within the channelized area they found that this activity had a particularly severe effect on larger fish. The number and weight of large size fish greater than 6 inches in length were significantly reduced. This in turn greatly affects the rate of production in the area.

In another Montana study, Elser⁸⁵ reported that in a section of the Little Prickly Pear Creek, trout were 78 percent more abundant in the unaltered stream section than they were in the channelized portion. Non-trout species represented 30 percent of the total number, and 58 percent of the total weight of fish in the unaltered sections; in the channelized sections non-trout species were absent.

Channelization activities on the Wild Rice Creek Watershed in North Dakota have had detrimental effects on the waterfowl populations of the area. A special report on the watershed by the Bureau of Sport Fisheries and Wildlife⁸⁶ states:

In summary both quality and quantity of wildlife habitat within the Wild Rice Creek Watershed have been progressively reduced as the project has developed, especially waterfowl habitats. The beneficial effects have been overwhelmed by destruction of habitats due to channelization and farm drains. The full extent of the wildlife habitat losses within the project area has not been realized because the farm drainage is still in progress and work plan supplements proposing additional channelization continue to be submitted.

The New Mexico Department of Game and Fish, reporting on the Middle Rio Grande Project,⁸⁷ states that loss of waterfowl habitat due to channelization work in this area has been severe. More than 8,000 acres of former waterfowl habitat has been lost during the past 25 years as a result of draining of marshes and channelizing the river. Much of this loss is the direct result of channelization activities in the Middle Rio Grande Project. Feeding areas for waterfowl and hunting areas for the public have been greatly diminished and waterfowl management areas established are insufficient to provide migrating waterfowl with needed habitat.

In a study of two Illinois rivers, the Vermilion and Embarras Rivers, Smith⁸⁸ reported that channelization of the rivers resulted in the destruction of their natural pool-riffle sequence and replacement of a hard streambed containing a diversity of materials and structures with one composed primarily of mud. The previous natural channel has been straightened and the water now has a uniform flow and depth. Much of the streambank has been removed during the channelization process, thus removing important protective shade and cover. Over

a period of 70 years, he found that 20 species of fish have been eliminated from the Vermilion and Embarras Rivers.

A study of streams in Champaign County, Illinois,⁸⁹ found that dredging of the streams over a sixty year period had eliminated many of the pools essential for fish production and caused an increase in siltation which was accompanied by a decrease in aquatic vegetation. These long term dredging operations have reduced the variety of fish species from 90 in 1929 to 74 in 1959.

The effects of channelization activities on the Missouri River in Nebraska have been studied by Morris et al.⁹⁰ Field investigations were conducted on 255 miles of the Missouri River that forms most of the eastern boundary of Nebraska. The upper 52 miles of the study area were unaltered while the remaining 203 miles were partially or completely channelized. The channelized sections of the river lack the numerous chutes and quiet, weedy sloughs which were characteristic of the unchannelized river. Brush piles and associated pools were also eliminated by channelization.

Channelization of this section of the Missouri River has reduced both the size and variety of aquatic habitat by destroying key productive areas. The study estimates that the stabilized areas supporting benthic organisms has been reduced 67 percent by channelization. Much of the reduction in benthic area was produced by elimination of comparatively productive chutes and associated slack water areas. Comparison with unaltered areas showed that the average standing

crop of drift organisms was 8 grams per acre-foot in the channelized areas, whereas in the unaltered areas it was 68 grams per acre-foot.

In Wild Rice River in Minnesota it has been reported⁹¹ that approximately 8.7 miles of river habitat have been eliminated by the cutting out of oxbows from the main channel during channelization operations. Extensive erosion of sediments was found in the altered areas. At the Ada, Minnesota station the substrate was composed mainly of fine sands and gravels with few stabilized substrates. Diversity and productivity of flora and fauna within the altered areas were severely depressed when compared with upstream control stations. The report goes on to state, "This reduction in aquatic life, diversity, and production was probably due to a number of factors but mainly to the shifting beds of sand and gravel. Also important was the elimination of riffles, fallen timbers and undercut banks, deep pools, weed beds, and oxbows."

Channelization activities in the Kings River project in California have severely damaged the riverine habitat for aquatic life. Heavy earth-moving equipment has eliminated deep pools and undercut banks which formerly provided ideal habitat for trout and other game species. Heavy siltation is reported to be occurring which will eliminate the following year's crop of young fish. As a result of extensive instream bulldozing approximately 10 miles of river in the Centerville bottoms area of the project have been converted from a productive, meandering

pool-riffle type stream to a flat bottom, trapezoidal ditch with degraded esthetic and aquatic life value.⁹²

The director of the Missouri Department of Conservation, Carl R. Noren, in a personal communication, reports that Missouri has over 1,000 miles of small streams that have been channelized. In addition, 553 miles of the Missouri River have been canalized for navigation purposes over its entire reach in the state. Sample segments of the Missouri River have suffered habitat losses as high as 80 percent and the overall loss is estimated to be over 60 percent. A quantitative study of these losses is being conducted within the state.

The adverse impacts of channelization on North Carolina Coastal Plain streams has been studied by Tarplee, et al.⁹³ on 28 natural streams and 46 channelized streams. Their study indicates that the greatest single factor affecting a fish population appears to be the amount of stream cover. Natural streams were found to have three times the average carrying capacity per surface acre of channelized streams. The average poundage of game fish per surface acre was over 400 percent greater in the natural as compared to the channelized stream.

In this study, as was found in others discussed earlier, the size of fish was adversely affected by channelization activities. Average size of fish in the channelized streams was found to be smaller than was the average size of fish in natural streams. The investigators state that this was possibly due to a reduction of macrobenthic

invertebrates which occurred as a result of alteration of the stream-bed and the flow regimen of the stream. Relative to this, they state, "In an ecosystem where the components of lower trophic levels are reduced, it follows that the biomass of consumers in higher trophic levels, will be reduced."

Using species diversity as an indicator of stream quality, the authors found that channelization reduced the overall quality of the streams by 27.5 percent. Species diversity also varied directly with the amount of stream cover. To determine the rate of stream recovery following channelization, species diversity with respect to time since channelization was plotted. For the particular areas covered in this study, it was found that the fish populations in a channelized stream may recover to natural levels in approximately 15 years provided no further alterations of the streambed, bank, forest canopy, or aquatic vegetation occur.⁹⁴

4. Wetlands Drainage

a. Environmental Impacts

Natural wetlands encompass a large series of plant and animal associations, varying from intermittent potholes with relatively simple ecosystems to very complex ecosystems of river bottom hardwood forests. However, they are all characterized by having water tables which are fairly close to the surface of the ground.⁹⁵

Plants and animals that inhabit wetlands have adapted their life cycles to the inundations and releases of water within these areas. When the interconnecting stream or river floods these wetlands, fish and other organisms are permitted entrance to spawn or lay eggs in the floodplain ponds created. Recurrent floods again join these ponds with the stream system permitting the newly hatched juveniles an exit to the main channel and the cycle for breeding adults to begin again.

Channelization usually results in some amount of wetland drainage as a direct or indirect consequence of this streambed alteration activity. The draining of wetlands has a profound effect on the plant and animal life forming these unique ecosystems. The plant life is adapted to various water regimes and when the areas are drained the species die and are replaced by species that thrive under less moist conditions. Since these plants serve as a nesting and food habitat of waterfowl, these bird species are eliminated along with the aquatic vegetation. Many animal species are dependent on the wetlands for cover and food and are unable to survive in competition with upland species which replace them.

A secondary effect of the drainage of wetlands is their use by man. For example, they may be planted with various agricultural crops, or used for stock grazing purposes. These uses increase the erosion of sediments, and, through runoff, add to the nutrients of the stream.

The water table of the wetlands and the stream are interconnected, so any alterations which affect the water table of one will affect that of the other. The drainage of wetlands creates a lowering of the water table because the streambed is lower and the channel is shorter, resulting in faster runoff and shorter retention times.

Channel straightening speeds the runoff and reduces the amount of ground water recharge which would normally occur in a slower-flowing stream. Tributary channels to collect runoff from the floodplain prevent normal groundwater recharge through the soil. Thus, recharge of the ground water system is eliminated when the floodplain is drained by channel dredging and straightening activities.

The recharge of a stream by ground water is essential to the stream ecosystem during drought periods. If there is not sufficient ground water to maintain the flow of a stream during such periods the stream may become a series of intermittent pools and there may be considerable change in both diversity and productivity of aquatic life. The lowering of the water table may also cause surface streams to shift to underground streams, thus reducing the surface stream habitat for aquatic life.

b. Scope of Wetland Drainage Activities

Extensive drainage of wetlands in the northern prairies area of the U. S. has been reported in a 1970 study by the National Academy of Sciences. From a wetland inventory of this region conducted in

1964, biologists of the Bureau of Sport Fisheries and Wildlife estimated the original wetlands acreage at 5.4 million acres; of this amount approximately 50 percent or 2.7 million acres remain. Losses have been due to a combination of man-made and natural causes, but wetland drainage for agricultural purposes is stated as the principal cause.⁹⁶

The northern Great Plains region, with its relative abundance of prime aquatic habitat, provided necessary reproductive areas for many species of migratory waterfowl. In the late 1930's a decline in the continental waterfowl population occurred because of the widespread drought and as a result of wetland drainage in this area.⁹⁷

A survey of subsidized agricultural drainage in relation to waterfowl habitat losses was conducted by the Bureau of Sport Fisheries and Wildlife in Minnesota, North and South Dakota.⁹⁸ From 1954 to 1958 the study found that a minimum of 50,410 waterfowl habitat areas, totaling 60,440 acres, were drained with federal assistance. Continued data on subsidized drainage from 1959 to 1966 in the tri-state region indicated that approximately 31,032 additional acres of habitat were eliminated.

The rate of federally subsidized drainage in this region was considerably reduced after 1962 when Public Law 87-732 was passed, followed by the Reuss Amendment to the Agricultural Appropriations Act in 1963. Public Law 87-732 (considered in greater detail in another section of this report) required that all drainage requests in

the northern prairie region be referred to the Bureau of Sport Fisheries and Wildlife for a prior determination of their wildlife value. Following this review the Bureau, or a state, was given an opportunity to buy areas of importance, and if the landowner refused to sell, he was not eligible for drainage assistance during the ensuing 5 years.⁹⁹

The Reuss Amendment to the Agricultural Appropriations Act prohibited use of Agricultural Conservation Funds for the drainage of wetland classes III, IV, and V. This classification of prairie wetlands, from class I (transitory type of field depression that holds water for a few days or weeks in the spring) to class V (marshes that retain some water even in time of drought),¹⁰⁰ was developed by the Bureau of Sport Fisheries and Wildlife.

The extent of private drainage in Minnesota, North Dakota and South Dakota has also been studied by the Bureau of Sport Fisheries and Wildlife in wetland classes III, IV, and V. Biologists surveyed a 25 percent sample of areas in these classes in every section of land in the three states using the most recent aerial photographs. This wetlands survey is the base upon which subsequent reductions of waterfowl habitat in the tri-state area has been calculated in an annual inventory since 1964. Using 4.6 percent of the 1964 inventory indicated that approximately 125,000 acres of the best waterfowl habitat had been drained in the four year period from 1965 through 1968.

Privately constructed farm drainage systems accounted for the greatest losses of wetland during this period.¹⁰¹

A report published by the Water Resources Council¹⁰² indicates the overall involvement of federal agencies in the drainage of wetlands. This report states:

The 1959 Census of Agriculture, Volume IV, Drainage of Agricultural Lands, presents data for 8,461 drainage projects, each of which consists of 500 acres or more of agricultural land. Drainage measures in these enterprises range from the minimum requirement for agriculture to completely adequate drainage systems. Approximately 92 million acres of land in 39 states have been drained for agricultural purposes. It is estimated that another 39 million acres of land have been drained by individual farmers and by groups of farmers in enterprises with less than 500 acres of agricultural land.

Improvements reported in the 1959 census include approximately 189,000 miles of open ditches, 58,500 miles of tile drains, 9,800 miles of levees and dikes, and 3,400 pumping units. These improvements represent an investment of approximately \$1.3 billion. About one-third of the total investment, or \$42 million annually, was spent in the decade 1950-1959.

Destruction and degradation of wetlands in the northern prairies and other areas of the U.S. has historically contributed to the downward trend of the North American waterfowl population.¹⁰³ From the preceding section on channelization and its contribution to the drainage of wetlands, in addition to the continued drainage for agricultural purposes, it would appear that this trend will continue lacking vigorous corrective actions to preserve these valuable habitats.

c. Examples of Wetlands Drainage

The adverse environmental impacts of wetlands drainage have been reported in many states. To better illustrate this problem a few examples are presented.

A report on the Caw Caw Swamp by the North Carolina Wildlife Resources Commission¹⁰⁴ states that, subsequent to drainage of the 1,000 acre swamp within the 23,700 acre watershed, virtually all waterfowl habitat has been destroyed. Otter, mink and alligator which had previously inhabited the swamp were eliminated. Following drainage, upland species of wildlife replaced those species which were once common in the wetland areas.

Channelization and drainage of the Caw Caw Swamp lowered the water table approximately 6 feet below the natural channel. A secondary effect of lowering the water table was the disappearance of flowing water in a number of the tributary surface drainage streams. The entire volume of flowing surface water dropped through the streambed and flowed to the dredged channel as a ground water flow. This disappearance of the surface stream resulted in the drying up of the old surface channel and the decimation of the aquatic life that formerly inhabited it.

Florida's Kissimmee River watershed drainage is a prime example of the detrimental effects of channelization and drainage to fish and wildlife resources, and also directly to man. In the 1960's, the Kissimmee River was channelized and shortened from its original

102 mile length to 58 miles in order to control floods in the watershed. Extensive marshlands, more than 30,000 acres, were also drained. Prior to alteration the Kissimmee River and surrounding wetlands provided a variety of habitats for game birds and animals, as well as a freshwater sport fishery. Following channelization, the migratory waterfowl population of the drainage has almost totally disappeared. A variety of fish and wildlife species, once abundant in the area, have also been eliminated.¹⁰⁵

Channelization of the Kissimmee River and subsequent drainage of adjacent wetlands has created an equally serious problem for the human population of southern Florida. The river, which begins south of Orlando, flows into Lake Okeechobee which is the principal water reservoir for southern Florida. Elimination of wetlands and their biological filtering action, combined with increased agricultural activity on the drained lands, have caused large amounts of nutrients to flow, unpurified, into Lake Okeechobee. The increased concentration of nutrients has greatly accelerated the rate of eutrophication of this important body of water. Experts agree that restoration of the original length of the river with its associated wetlands is vital to south Florida's heavily used water supplies. Cost of returning the Kissimmee to its original meandering, marshy condition has been estimated at \$88 million dollars.¹⁰⁶

Summary. In this chapter we have considered those ecological aspects of water resources which are particularly important to

environmental quality broadly, and more specifically to the recreational values of water resources. We have related the discussion especially to the naturalness of the environment, and to the fishery productivity, because these are so directly related to environmental quality. We tend to think of a natural environment as a high quality environment, and associate the natural environment with high esthetic appeal and recreational value.

First we discussed the importance of such ecological aspects as streamflow, the substrate, cover, temperature, and water level fluctuations, then the manner in which intrusions by man have affected them. Selected examples and statistics were presented to indicate the scope of such man-made intrusions, and the degree to which they have affected environmental quality. In many cases the adverse effects were striking, indicating that controls over such intrusions were urgently needed.

Succeeding chapters will deal with the legal and administrative controls which have been developed at both state and federal levels to maintain the quality of the nation's water resources for their esthetic, recreational, and fish and wildlife values.

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CHAPTER IV

KEY WATER LAW PRINCIPLES

Water law as an institution has become firmly entrenched in the United States. As a consequence of its evolutionary nature from the early rudimentary concepts devised to meet the needs of water users in the mid-1800's, several principles have emerged and have been identified as having an imperative role in the impact of the law on fish and wildlife. Two such principles are discussed in this part of Chapter IV. These principles are the diversion and beneficial use provisions and minimum flow and lake level requirements.

The extent of the beneficial or detrimental effects of these principles upon aquatic and wildlife environments depends first upon which doctrine of water law is applied by the state, and secondly the manner in which the principles are incorporated into the statutory law and interpreted by the administrative and judicial bodies. Their application under the riparian and appropriation doctrine varies, partly due to the basic philosophy of the doctrines and partly due to the geo-climatic conditions and social demands upon the land, water and fish and wildlife resources.

1. Beneficial Use and Diversion Requirements

The beneficial use concept is an integral part of both the riparian and appropriation doctrines. The beneficial use concept is inherently and implicitly contained within the riparian doctrine of "reasonable use". Under the "reasonable use" theory, emphasis is placed on a full and beneficial use of the advantages of the stream or lake, and each riparian proprietor has a privilege to make a reasonable use of water for any purpose, provided only that such use does not cause harm to the reasonable use of others.¹ Many of the riparian states have made the beneficial use concept explicit by defining beneficial use through statutory modifications in their water laws. The beneficial use requirement in the appropriation states has historically been an essential element and has been explicitly defined in the state water laws.

The beneficial use concept is of key importance to this project since the defining of beneficial use will determine the extent to which water may be used for non-market purposes. These non-market uses include the fish, wildlife, recreation and esthetic uses of water. This section will examine the degree to which the non-market uses have been recognized in both the riparian and appropriation doctrines and judicial interpretations of the beneficial use concept.

a. The Riparian Doctrine

As noted previously, the beneficial use concept is inherently and implicitly contained within the American riparian doctrine of "reasonable use".² As to whether or not a specific use will be considered reasonable is a question of fact and depends upon the circumstances of the use.³ Waite has pointed out that viewing public uses as being more beneficial to society than another use (private) is counter to the decided cases. As such, the courts have emphasized "present competing uses and circumstances relatively immediate to their exercise, rather than primarily their benefit to society at large"⁴ in determining reasonable and/or beneficial use.

Many of the riparian states have made the reasonable beneficial use concept explicit through statutory modifications. Examples of these statutory modifications are illustrated in the states of Delaware, Florida and Minnesota.

For the most part, the nature and extent of riparian rights in Delaware are rather vague since the courts have not been frequently called upon to define these rights judicially.⁵ However, Delaware has recognized that due to the rapid economic growth of the state its water and air resources must be "protected, conserved, and controlled to assure their reasonable and beneficial use in the interests of the people of the State..."⁶ Delaware law further recognizes that the development, utilization, and control of the water resources are "vital to the people in order to assure adequate supplies for domestic,

industrial, power, agricultural, recreational, and other beneficial uses."⁷ These "other beneficial uses" include, but are not limited to, wildlife and aquatic life.⁸

Delaware law specifies that water resources "can best be utilized, conserved, and protected if utilization thereof is restricted to beneficial uses"⁹ and managed and controlled by the appropriate state agencies. To achieve this goal, the legislation establishes a definite program for the conservation and protection of the state's recreational, wildlife and aquatic resources.¹⁰

The state of Florida is illustrative of another riparian state that has explicitly defined the beneficial use concept through statutory modification of the traditional riparian doctrine. Under the Florida Water Resources Act of 1972,¹¹ the Department of Natural Resources is directed to formulate a state water use plan that gives due consideration to "the attainment of maximum reasonable-beneficial use of water..."¹² The Florida Water Resources Act defines "reasonable-beneficial use" as being "the use of water in such quantity as is necessary for economic and efficient utilization, for a purpose and in a manner which is both reasonable and consistent with the public interest."¹³

Under the Act, those uses which are referred to as being "reasonable-beneficial uses" include the use of water for the protection and procreation of fish and wildlife. Additionally, waters may be

used for "irrigation, mining, power development and domestic, municipal and industrial uses..."¹⁴

Whereas Florida's Water Resources Act stresses the attainment of a "reasonable-beneficial use" of water, the state of Minnesota has sought to use and manage water resources toward the goal of a "beneficial public purpose". As in the state of Delaware, the Minnesota statutes list specific uses which are considered beneficial. Under the Minnesota statute, "beneficial public purpose" includes, but is not limited to, any or all of the following uses of water:

- (a) Water supply for municipal, industrial, agricultural, or other purposes;
- (b) Recharge of underground water strata;
- (c) Retention of water to prevent or reduce downstream flooding, thereby minimizing erosion and resultant property damage;
- (d) Entrapment and retention of nutrients...;
- (e) Recreational activities such as swimming, boating, fishing, and hunting;
- (f) Public navigation other than for recreational purposes;
- (g) Wildlife habitat such as fish spawning and rearing areas, waterfowl nesting and feeding areas, and areas for the rearing, feeding, and protection of other wildlife;
- (h) Areas designated as scientific and natural areas ...¹⁵
(Emphasis supplied).

This is a rather extensive list of beneficial uses, one which includes both the economic and non-market uses of water. As noted above, specific recognition is made concerning the recreational, and fish and wildlife uses of water.

The statutory enactments of the riparian states shows that in some cases non-market uses of water are also recognized as beneficial uses of water. Although consideration is given to non-market

uses, primary emphasis is still given to the uses of water to sustain the life of man and animals, and which will provide man with a recognizable economic return. This may change in the future, but the process will be slow and perhaps lacking in many cases.

b. The Appropriation Doctrine

The beneficial use requirement has been an essential element of the appropriation doctrine since its origin. As applied in the appropriation states, the beneficial use concept has two key elements. The first element concerns the type of use and the second element concerns the method of use. If the type of use is found to be beneficial, a valid appropriation of water may be obtained. A determination must also be made as to whether or not the method of use is reasonably beneficial, that is, whether or not the water is applied in a reasonably efficient and/or nonwasteful manner.¹⁶

A "reasonably efficient manner" implies that unnecessary water waste should be avoided. Therefore, beneficial use has come to be viewed as the antithesis of physical waste of water.¹⁷ The courts have, throughout the appropriation doctrine history, held that wasteful water practices are unjustifiable.¹⁸ The type of waste that the courts have been most directly concerned with are those of "unreasonable waste."¹⁹ The determination as to what constitutes an "unreasonable waste" has not been given precise definition, but rather depends

upon each situation at issue. This is well illustrated in a Colorado case where the court stated that:

The term 'beneficial use' is not defined in the constitution. What is beneficial use, after all, is a question of fact and depends upon the circumstances in each case.²⁰

The lack of a specific definition as to what constitutes "unreasonable waste" has resulted in varying court interpretations on the matter. For example, the courts held in two situations that a conveyance loss of 67 per cent²¹ and 50 per cent²² of the water diverted to be an unreasonable amount. Conversely, case law in other states have held losses in excess of 70 per cent not to be an unreasonable waste.²³ Several states have attempted to reduce the amount of waste by specifying the maximum percentage loss²⁴ allowed and the maximum amount of water that may be applied per acre to specific crops.²⁵

Given this background information concerning beneficial use, the following is a brief survey of the beneficial use concept as expressed in the constitutions, statutes and court decisions of some of the appropriation states. Primary emphasis is placed on the recognition or lack of recognition of the non-market uses of water, such as fish, wildlife, recreation and esthetic uses.

The beneficial use concept has been expressed in the constitutions of eleven of the Western States.²⁶ For example, the Colorado Constitution merely states that: "The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be

denied."²⁷ The only uses recognized in the Colorado Constitution, with respect to preferences, are those of domestic, agricultural and manufacturing.

The Alaska Constitution, although not defining beneficial use in any detail, does allow for the appropriation of water for fish and wildlife purposes. Citing Article VIII, sec. 13 in its entirety:

All surface and subsurface water are reserved to the people for common use, except mineral and medicinal waters, subject to appropriation. Priority of appropriation shall give prior right. Except for public water supply, an appropriation of water shall be limited to stated purposes and subject to preferences among beneficial uses, concurrent or otherwise, as prescribed by law, and to the general reservation of fish and wildlife.

Defining and specifying the beneficial uses of water in detail has been left to the state legislatures and the courts.

Legislative Statements

Ten of the western states water statutes contain the statement that "beneficial use shall be the basis, the measure, and the limit to the right to the use of water."²⁸ For the most part, the beneficial uses that have been stressed in the past are for economic uses. Most of the state statutes include, but are not limited, to some of the following beneficial uses: domestic,²⁹ agricultural,³⁰ watering livestock,³¹ irrigation,³² municipal,³³ industrial,³⁴ generation of electric power,³⁵ navigation,³⁶ stream flow regulation,³⁷ and railway use.³⁸

Our research indicates that at least seventeen of the fifty states have statutes that recognize the non-market uses of water as being beneficial. Ten of the nineteen western states have, in their statutes, reference to the non-market uses of water as being beneficial.³⁹ At least seven of the eastern riparian states recognize that the non-market uses of water may be considered beneficial.⁴⁰

The non-market uses of water generally include the use of water for recreation, fish and wildlife. The states approach the definition of beneficial use for non-market purposes in different ways. Some prefer to specify only one or a few of the non-market purposes. For example, the Nevada laws state that the waters from any stream or underground source may be used for recreation, which is a beneficial use.⁴¹

Some states are vague in their definition of beneficial use, and as such do not necessarily limit the use to entirely economic uses. The South Dakota statutes define "beneficial use" generally as: "any use of water that is reasonable and useful and beneficial to the appropriator, and at the same time is consistent with the interests of the public in the best utilization of water supplies."⁴² Statutes such as this do not specifically exclude or include the use of water for non-economic purposes. It will most likely be up to the courts to interpret phrases such as "reasonable and useful" and "best utilization" for fish and wildlife. To be declared beneficial uses, the appropriation would have to meet all of the other legal requirements as well to show

that this use was in the public interest. Defining "the public interest" is no simple problem. As one author has noted, even asking the question as to what public interest is "invites the sort of smile reserved for small children and benign idiots."⁴³

Other states define beneficial use more specifically with respect to the non-economic uses. A recent amendment to the Colorado statutes has made certain changes which was intended to provide more protection for and recognition of the non-market uses of water.⁴⁴

This revision states that:

Beneficial use is the use of that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made and, without limiting the generality of the foregoing, shall include the impoundment of water for recreational purposes, including fishery or wildlife. For the benefit and enjoyment of present and future generations, 'beneficial use' shall also include the appropriation by the state of Colorado in the manner prescribed by law of such minimum flows between specific points or levels for and on natural streams and lakes as are required to preserve the natural environment to a reasonable degree.⁴⁵

Two points in the above statute should be noted. First, according to this amendment the water need not be diverted to make a valid appropriation to a beneficial use. Thus, water could be appropriated by the state and left in the stream. Second, for a private individual or entity to appropriate water for recreation and fish and wildlife uses the water must be impounded. The waters impounded thus become unavailable for instream fish and wildlife uses.⁴⁶

The Texas Water Code, in addition to the traditional economic uses, specifies several non-market uses for which water may be appropriated. These uses include recreation and pleasure,⁴⁷ public parks,⁴⁸ and game preserves.⁴⁹ Beneficial use is defined in Texas as, "the amount of water which is economically necessary for a purpose authorized by this chapter, when reasonable intelligence and reasonable diligence are used in applying the water to that purpose."⁵⁰

Montana's laws also provide for a large number of beneficial uses. Included in the list of non-market beneficial uses are: fish, recreation and wildlife.⁵¹ Again, this law does not limit the non-economic uses to those mentioned above.

Evidently the inclusion of the non-economic beneficial uses in the statutes has caused little or no problem in the administration of water rights. No current literature was found, nor was any mention made in response to our letters, that the recognition of non-economic beneficial uses had resulted in any legal or administrative problems. In fact, the inclusion of non-economic uses is helpful if it will provide for increased flexibility in the use of the water resource.

In many instances it has been up to the courts to determine what constitutes a reasonable beneficial use of water. In certain situations, the courts have noted that the non-market use of water constitutes a valid appropriation or use of water, but that the use fails to meet certain other requirements. Some of the court decisions dealing with

the recognition or non-recognition of the non-market uses of water will be discussed below.

Perhaps no case can illustrate better the problem of defining beneficial use with respect to non-market uses of water than Empire Water and Power Co. v Cascade Town Co. In this case, the Cascade Town Company had for years operated a resort along the banks of Cascade Creek in Colorado. One of the resort's chief attractions was a waterfall on the creek. The mist and spray from the falls provided water for vegetation along the banks of the stream.

The defendant, Empire Water and Power, intended to impound and divert water from above the falls for the purpose of generating power. The result of this impoundment would be to turn the canyon into a dry gulch and destroy the falls and related vegetation.

The defendants claimed that the use of the water was not within the beneficial use limits, as stated in the state constitution. The Colorado Federal District court did not accept the defendant's narrow interpretation. It stated that:⁵²

Places such as described here, favored by climatic conditions, improved by the work of man, and designed to promote health by affording rest and relaxation are assuredly beneficial.

The District court held, however, that Colorado had rejected the Common-law rule and therefore the landowner did not have the right to have the stream run in its natural way without diminution. They

ruled, therefore, that the complainant was not entitled to a continuance of the falls solely for their scenic beauty.

The Eighth Circuit Court, on appeal, reversed the decision of the District court since it had considered only the artistic value of the falls, and did not inquire into the effectiveness of the use of the water in the way adopted as compared with the customary methods of irrigation and remanded the case for a decree consistent with its decision. Thus, the type of use test may have been met, but not the method of use. The Circuit court expressed its preference for the efficient over the esthetic use of water by concluding:⁵³

It may be that if the attention of the lawmakers had been directed to such natural objects of great beauty they would have sought to preserve them, but we think the dominant idea was utility, liberally and not narrowly regarded, and we are constrained to follow it.

The final decree was issued by the U.S. District Court for Colorado on October 15, 1915 enjoining the Empire Water and Power Company from interfering with the natural flow, except for the right to divert one-half of a second-foot from the south branch of the Cascade Creek from September through June of each year. The net effect of the decree was not only to preserve the foliage, but to retain the esthetic value as well.

The court in Colorado River Water Conservation District v Rocky Mountain Power Co. ruled in favor of the power company which challenged claims made by the conservation district that water to the extent necessary for preservation and propagation of fish was to be

preserved and kept in the stream and not diverted.⁵⁴ The district's claim was based on powers allegedly conferred by the relevant statute which reads as follows: "To file upon and hold for use of the public sufficient water of any natural stream to maintain a constant stream flow in the amount necessary to preserve fish."⁵⁵

The power company asserted that the purported appropriation did not constitute a valid appropriation on the grounds that no appropriation could be claimed without an actual diversion. They further argued that the district's claim to a certain minimum flow was not in compliance with state law. In holding for the power company the court cited City and County of Denver v Northern Colorado Water Conservancy District⁵⁶ as being one of several cases defining the essential requirements of an appropriation: ". . . the rule is elementary that the first essential of an appropriation is the actual diversion of the water with the intent to apply it to a beneficial use."⁵⁷ The court further cited the case of Board of County Commissioners v Rocky Mountain Water Company, which found the following:⁵⁸

It should be observed further that as the act of diversion and the act of applying the water diverted to a beneficial use, whether performed by the same or different persons, are both necessary to constitute an appropriation, so the continued existence of the appropriation depends on the continuance of both, diversion and beneficial application. (Emphasis added.)

The court thus concluded that under the state laws, at that time, water could not be appropriated for a minimum water flow. The

appropriator was required to divert a portion of the water from the natural course of the stream if it was to be used for piscatorial purposes.

It would appear from an examination of the preceding Colorado cases cited that the courts have never clearly rejected the use of water for recreation, fish and wildlife and esthetic uses. What they do illustrate is that to make a valid appropriation for those uses the appropriator must comply with all of the legal requirements to perfect his right. The courts of Colorado have found the use of water to irrigate lawns and gardens⁵⁹ and for irrigating trees, shrubs, grasses and other plant life grown in city parks⁶⁰ to be a beneficial use of the water. These uses met both the beneficial use and diversion requirements.

A unique case concerning the right to appropriate water for waterfowl habitat was handed down in Utah in 1917.⁶¹ The court denied an appropriation of water for the purpose of providing a waterfowl habitat on public domain lands on which the appropriator had no possessory rights.

The appropriation was to have been for the irrigation of lands for the production of food for wild waterfowl on unsurveyed lands of the public domain. Furthermore, the lands were unclosed and untilled.

The court made the following statement concerning the case:

The vital question, then, to be determined is, Can an appropriation of water be made under the laws of this state for the irrigation of unsurveyed, uninclosed, unoccupied public domain of the United States for the sale production of food for wild waterfowl, which, when propagated and raised, must, of necessity, be as accessible to capture, destruction, and appropriation to use, by any other person who may see fit to hunt upon the land, as to the person who went through the form of making an appropriation?

The court answered this question by stating that:

To our minds it is utterly unconceivable that a valid appropriation of water can be made under the laws of this state, when the beneficial use of which, after the appropriation is made, will belong equally to every human being who seeks to enjoy it. Furthermore, if the beneficial use for which the appropriation is made cannot, in the nature of things, belong to the appropriator, of what validity is the appropriation?

Thus, since the appropriator(s) could not be identified, a water right could not be granted. An additional problem noted by the court was the fact that the waterfowl in question were ferae naturae. If it had been domestic fowl which could possibly be subject to private ownership, then a valid appropriation might have been possible.

The court did not deny that the use proposed was a valid one.

For the court stated that:

We are not disposed to hold that any use of water tending to supply man or domestic animals with food is not beneficial.

However, the beneficial use which was the subject of this case, the court held,

must be one that insures to the exclusive benefit of the appropriator and subject to his complete dominion and control.

This requirement for "complete dominion and control" does not appear to be a reasonable restriction to place upon the appropriation of water for recreational, and fish and wildlife purposes.⁶² If the use contemplated is in the public interest, and the water is available, then the use should be allowed. It would serve no useful purpose to subject this right to the exclusive control of the beneficiaries.

The problems with respect to defining beneficial use have subjected the concept to much criticism. As Ohrenschall and Imhoff have stated, the standard of beneficial use "originated and developed in, and correspondingly became infected with a socio-psychological (as well as an ethical) milieu of environmental exploitation by private interests, aided and abetted by public representatives."⁶³ The concept may have been intended to reduce waste and inefficiency, but it has served as a crude tool in attempting to achieve this objective.⁶⁴

Beneficial use, in the opinion of Ohrenschall and Imhoff, is said to be "deficient in that it seeks to prevent physical waste of water of one order at the expense of promoting environmental waste of more serious orders."⁶⁵ As pointed out earlier, the legislatures and courts have been reluctant to consider non-market uses of water as beneficial uses. It would appear that what needs to be done is to re-define and update the beneficial use concept so as to take into account the non-market uses, which include in part the physical and

psychological needs for recreation and esthetics and the desire to maintain fish and wildlife at certain acceptable levels.⁶⁶

Once it can be established that in-stream uses are accepted as beneficial, the next issue focuses upon who can acquire the waters in the stream and in what amounts. Where state law does not recognize the use of water for fish propagation and preservation and maintenance of fish and wildlife habitat as beneficial and reasonable, a direct conflict occurs with the concepts of minimum flows and lake levels.

2. Minimum Flows and Lake Levels

Minimum water level legislation is rapidly gaining influence throughout the United States. This report emphasizes the importance of legislation to preserve and maintain acceptable minimum flows in rivers and streams and minimum water levels in lakes. Policies directed at preserving the natural water environment for fish and wildlife resources can be effective only to the extent that there is an acceptable and sufficient amount of water available for use by the wildlife and fishery resources.

Fishery resources are so directly linked to the aquatic environment that the necessity of minimum water level legislation is readily apparent for the preservation of these resources. Drastic water reductions in the aquatic ecosystem have great effects not only on the fish themselves but also on the food chain on which they depend.

Also, many of the important sport fishes spawn in shallow water areas which are most likely to be affected by reservoir draw-downs and streamflow reduction.

There is also an economic inefficiency produced by not adopting minimum water level legislation. For example, although all fifty states in the United States provide for stocking fish and maintaining fish habitat by a designated state fish and game agency, only thirty-five of the states have established minimum water levels for impounded water.⁶⁷ With no correlation between stocking fish and minimum water level enactments, many state stocking programs could be economically futile.

There are many obstacles impeding minimum streamflow and lake level legislation in the United States due to the previously established legal systems of water rights. Constraints in each of the two main systems of water law are examined below. Many of these constraints are applicable to more than one system of law.

With the increasing populations and demands on water in riparian jurisdictions, it is exceedingly difficult to provide equitable amounts of water to all potential uses and users. Instream values are becoming more and more important, but at the same time other needs are becoming more and more pressing.⁶⁸

Another important consideration is compensation for impairment of water rights. This is important since most minimum flow legislation is directed towards public usage of the waters that are thus

enhanced. Rights of riparian owners may be infringed upon by: (1) restricting their reasonable uses to provide minimum streamflow, and (2) providing access for the public use of the water. Whenever any of these rights are violated by the state for public use, they may be subject to compensation depending on whether the state acquired the rights by eminent domain or by police power.

One noteworthy feature of the traditional common law doctrine is that riparians do have rights to streamflows which are undiminished in quantity and quality (subject to reasonable uses by other riparians). In this manner, the riparian system has always enjoyed minimum water level rights, so riparian jurisdictions have a head start in minimum flow and lake level legislation.

Just as in the riparian system, the appropriation system has the problems of increased demands on water and the need for compensation to prior appropriators. In addition, two further issues, discussed previously, have arisen: beneficial use and diversion requirements. These two issues stem from the basic definition of an appropriation: that there must be a diversion from the stream and an application of the water to a beneficial use.

In addition to the beneficial use issue mentioned earlier, diversion requirements have been a major limitation to minimum stream flow and lake level enactments in the appropriation states. Since minimum flow requirements are associated with instream uses no

diversions are necessary. This concept of non-diversion is in direct conflict with the traditional approach of the appropriation doctrine.

Examples of Minimum Streamflow and Lake Level Legislation

Minimum stream flow and lake level legislation is rapidly gaining influence all across the United States. Following is a summary of important proposed and enacted legislation both at the federal and state level.

Federal Legislation

Historically, federal legislation has dealt with minimum flows primarily in relation to navigation in navigable streams under the commerce clause. Streamflows were to be preserved in order that water bodies would be capable of supporting customary navigation practices. The concept of navigability also included the concept of public access on navigable waters and therefore allowed for public fishing and recreation.

There has been relatively little actually done at the Federal level concerning minimum water levels, although there are some proposed alternatives for modifying present management and administration procedures on public lands. Most of these proposed alternatives would require Congressional action. For example, it has been proposed that Federal agencies be granted the authority to appropriate unappropriated waters for the purpose of properly managing fish and

wildlife.⁶⁹ In this manner, Federal agencies could better establish and maintain minimum streamflows and reservoir levels. On the other hand, legal complications will arise in those cases where the Federal government cannot appropriate water away from the states.

Another proposed modification would affect the water management procedures of the Forest Service by incorporating a water needs inventory program.⁷⁰ One category in the inventory would include:

Flows necessary for fish habitat protection, such as minimum streamflow or lake level requirements to maintain fish life, including fish ladders and regulated-flow spawning channels, but only when diversions are anticipated which could result in less than minimum acceptable flows.⁷¹

This system is designed to show different needs and possible requirements for water resource planning in National Forest Systems.

State Legislation: Minimum Flows and Lake Levels

Seventeen states now have enabling legislation to establish minimum flows in rivers so as to protect the public interest in these waters. Some of this legislation is quite general; the Kansas law requires the water administration agency, in developing a water plan, to only consider augmenting stream flows for the support of aquatic and other wildlife,⁷² while Virginia requires only the maintenance of stream flows sufficient to protect the aquatic life and other public interests.⁷³

There are five general approaches taken by the various states in establishing minimum flows: first, through legislation prescribing a

minimum flow to be maintained at all times in the streams; second, legislation authorizing a state body to appropriate water in the interest of the public; third, legislation which allows for the removal of waters from appropriation to maintain the minimum flow; fourth, state law may require permits before water can be diverted from the stream so as to protect the minimum flow; and finally, states may prohibit additional diversions where the action will be harmful to instream uses, thus maintaining a minimum flow. An example of each of these approaches follows.

In line with the first procedure, the State of Washington has required the Department of Water Resources to establish minimum water flows (and lake levels) for streams and other public waters for the "purposes of protecting fish, game, birds or other wildlife resources, or recreational or esthetic values of said public waters whenever it appears to be in the public interest to establish the same."⁷⁴ Requests for minimum flows may be made by the Departments of Fisheries, Game Commission or Water Pollution Control Commission. Before these minimum flows are established, however, the Department of Water Resources is required to hold a public hearing on the proposed minimums.⁷⁵ The law does not apply to waters stored artificially in reservoirs. However, "in the granting of storage permits by the department of water resources in the future, full recognition shall be given to downstream minimum flows, if any there may be, which have theretofore been established hereunder."⁷⁶

The necessity of a minimum flow was also brought out in Washington's "Water Resource Act of 1971."⁷⁷ The quality of natural environment was to be protected and enhanced as follows:

Perennial rivers and streams of the state shall be retained with base flows necessary to provide for preservation of wildlife, fish, scenic, esthetic and other environmental values, and navigational values.⁷⁸

In keeping with the legislative requirements for the establishment of minimum flows, these were established for the Cedar River. The flows established are to be "maintained undiminished" from a gaging station at Renton, Washington to the mouth of the Cedar River.⁷⁹ Waters are to be maintained at levels which do not fall below specific quantities. The minimum flows established are for designated time periods throughout the year.⁸⁰

Another example of the establishment of specific flows is found in Wisconsin. As mentioned earlier, the operators of impoundments on navigable waters must allow the passage of at least 25 percent of the natural low flow of water of a stream at all times.⁸¹

The Florida Water Resources Act of 1972⁸² provides for the establishment of both minimum stream flows and minimum lake levels. Each section of a water management district or the water management district as a whole is required to establish these minimum standards.

Minimum flows are to be established for all surface water courses. "The minimum flow for a given watercourse shall be the

limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area."⁸³ These minimum flows may be calculated so as to reflect seasonal variations.

The second general procedure followed is state appropriation of water to maintain a minimum flow. For example, prior to the enactment of new legislation, a state agency in Colorado could not appropriate water to maintain a minimum flow.⁸⁴ A water conservation district, acting under a state statute enabling it to "file upon and hold for the use of the public sufficient water of any natural stream to maintain a constant stream flow in the amount necessary to preserve fish..."⁸⁵ filed to have its right adjudicated for a minimum flow in three streams. The Colorado courts in Colorado River Water Conservation Dist. v. Rocky Mountain Power Co.⁸⁶ held that to obtain a right to water, both a beneficial use and an actual diversion must be shown. In this case, the conservancy district was not allowed to appropriate the minimum flow since no actual diversion was made.

In April of 1973 the state legislature amended the law. "Appropriation" now is defined as the application of water to a beneficial use, and does not require a diversion.⁸⁷ "Beneficial use", as mentioned earlier, was re-defined so as to include "the appropriation by the State of Colorado in the manner prescribed by the law of such minimum flows between specific points or levels for and on natural streams and lakes as are required to preserve the natural environment to a reasonable degree."⁸⁸

Under the revised law the Colorado Water Conservation Board is empowered to appropriate, in accordance with sections 5 and 6 of article XVI of the state constitution, or acquire, "such waters of natural streams and lakes as may be required to preserve the natural environment to a reasonable degree. Prior to the initiation of any such appropriation, however, the board shall request recommendations from the Division of Wildlife and the Division of Parks and Outdoor Recreation."⁸⁹ This new statute will most likely be tested in the courts. The Water Conservation Board is presently appropriating waters which should lead to the anticipated court action.

Similar legislation exists in Montana whereby the State Fish and Game Department may file on water in order to sustain the trout fishery.

The law states that:

...unappropriated water of the streams and portions of streams hereafter named shall be subject to appropriation by the fish and game commission of the state of Montana in such amounts only as may be necessary to maintain stream flows necessary for the preservation of fish and wildlife habitat. Such uses shall have a priority of right over other uses until the district court in which lies the major portions of such stream or streams shall determine that such waters are needed for a use determined by said court to be more beneficial to the public. The unappropriated water of other streams and rivers not named herein may be set aside in the future for appropriation by the fish and game commission upon consideration and recommendation of the water resources board, fish and game commission, state soil conservation committee, the state board of health and approval of the legislature.⁹⁰

There are 12 rivers or portions of rivers mentioned in the act.⁹¹ Appropriations and withdrawals are not forever foreclosed on these rivers. The law does, however, protect the minimum flow from reductions, unless the applicant can convince the district court that the proposed use is more beneficial than the maintenance of the fishery.

The Idaho water law places emphasis upon the establishment of minimum stream flows to preserve aquatic life, and develop and protect water recreation facilities.⁹² To maintain these minimum flows, the Idaho Water Resource Board has the power to appropriate, store, or use the waters of any stream, or body of water for specific water projects.⁹³

The third general method employed by the states to maintain a minimum flow is by removing waters from appropriation. The state may be allowed to set aside and reserve certain waters for future use or under circumstance when sound information is lacking to make proper policy decisions.⁹⁴ Regardless of the reason, the effect is to provide a minimum flow useful in preserving fish, wildlife, recreation and esthetic values. In Oregon, for example, the State Water Resources Board has the authority in keeping with the state water policy and public interest to remove waters from appropriation. The unappropriated water withdrawn may be used for all or any use.⁹⁵

Prior to withdrawing waters from appropriation a public hearing must be held.⁹⁶ The orders withdrawing waters must specify the

waters which are withdrawn, the reason and duration of the withdrawal.⁹⁷ In Oregon, the waters of specific creeks, streams and lakes have been withdrawn from appropriation.⁹⁸ The purpose of the withdrawal has been for "maintaining and perpetuating the recreational and scenic resources of Oregon."⁹⁹ The withdrawals have also been made to "maintain, increase, and perpetuate game fish and game fish propagation within Oregon."¹⁰⁰ Water withdrawn, for the most part, may not be diverted or interrupted for any purpose whatsoever," except to protect fish life.¹⁰¹ Exceptions are made for municipal, domestic and stock uses.

A fourth general procedure adopted by some states has been to require permits before water can be diverted from a stream in order to protect the minimum flow.¹⁰² Under Iowa law, for example, a permit must be obtained for uses that deplete water and the permit must insure the protection of the average minimum flow of the stream.¹⁰³ "Depleting use" has been defined as any use which "might impair rights of lower or surrounding users or might impair the natural resources of the State or might injure the public welfare if not controlled."¹⁰⁴ In the past, the Iowa Water Commissioner has required permits of all regulated uses regardless of whether it is depleting or not.¹⁰⁵

The act gives a detailed definition of "average minimum flow."¹⁰⁶ The determination of this average minimum flow is a complex problem. The standard adopted for stream flows by the commission was

that level "equaled or exceeded by the stream involved 84% of the time between April and September in the past years determined to be most representative of normal conditions." Provisions were made for determining minimum flows on particular streams possessing special characteristics.

Individual users might not deplete the flow below the average, but accumulated effects of several users acting together could deplete the flow below the average. Therefore, the state adopted the concept of a summation flow. This called for sharing arrangements among users. These have worked well in periods of low flow to preserve the protected level.¹⁰⁷

The fifth procedure employed by various states is to limit appropriations when they will prove detrimental to the instream values. In Utah, for example, the state engineer may reject applications to divert water that will have an unreasonable adverse impact on the recreational and/or environmental values of the water course.¹⁰⁸

In Alaska, the water code provides that applications for the appropriation of water are considered as having been simultaneously filed with the department of fish and game.¹⁰⁹ The fish and game department may submit objections to the approval.¹¹⁰ The commissioner of the Alaska Department of Natural Resources is required to consider a number of items in denying or approving a permit. One of the factors to be considered is the effect of the proposed appropriation

on the fish and game resources and on public recreation opportunities.¹¹¹

In California, determination of the amount of water available for appropriation for beneficial uses must be based in part on the amounts needed for recreation and the preservation and enhancement of fish and wildlife resources. The Department of Fish and Game, being notified of applications for a permit to appropriate waters, "shall recommend the amounts of water, if any, required for the preservation and enhancement of fish and wildlife resources."¹¹²

Minimum flow legislation as enacted in the several states is hindered by the necessity of complete and accurate data. Such legislation commonly requires a determination on the part of state resource agencies as to what is a necessary level to be maintained to preserve the desired values. In many cases, this information may be lacking or difficult to obtain for specific water bodies. Furthermore, minimum flow legislation cannot be relied upon under all circumstances. For example, in the summer of 1973, the minimum flow requirements in Oregon were suspended due to state wide water shortages. It appears that domestic, municipal, agricultural, and in some cases industrial demands will be met when widespread drought occurs. Therefore, minimum flow laws may be relied upon primarily under "normal" circumstances.

It appears that a large number of states have the authority to regulate the level of water for impounded waters.¹¹³ It has been

pointed out by Tarlock and Meyers that the statutes establishing minimum lake levels are often ambiguous and incomplete and result in a varying pattern of lakes subject to regulation.¹¹⁴

The minimum lake level controls aid the littoral owners in two ways. First, the statutory procedure clearly defines the owner's common law rights. Secondly, the statutes protect the littoral owner from damages caused by alternating lake levels.

Attempts to protect the fishery resource are illustrated by the establishment of minimum lake levels in Illinois. In this state, the Department of Transportation may establish regulations regarding lake levels. Once the levels are established, water may not be drawn down below the minimum standard. The standard is established "in order to retain enough water in such streams to preserve the health of the community."¹¹⁵

Other states require that before draining, lowering or diverting water from lakes or ponds a permit must be obtained. For example, in Nebraska no person is allowed to reduce the supply of water in a natural or perennial lake "if the area exceeds twenty acres at low water stage or if the lake is of such depth and character as to have more economic importance for fish culture, hunting or other purpose than the bed of said lake would have for agricultural purposes."¹¹⁶ Persons must obtain a permit from the Department of Water Resources before any lowering of lake levels may take place.

Penalties have been established in some states for persons failing to obtain a permit from the appropriate state agency prior to draining or attempting to drain certain specified lakes.¹¹⁷ Persons found guilty of these violations may be subject to fines, imprisonment or both.¹¹⁸

In determining the water level at which lakes are to be maintained, the states have applied differing standards. Some states base the level on the "natural ordinary high water level,"¹¹⁹ and others define the standard according to the "average normal water level,"¹²⁰ or the "normal height and level."¹²¹

The statutes in many cases require the state regulatory body to consider lake levels over a broad time period. In Mississippi for example, the Board of Water Commissioners is required to determine and establish "average minimum lake levels," for certain lakes. The "average minimum lake level" is determined on the basis of "the average of the minimum lake level during each of the five (5) lowest years in the period of the preceding twenty (20) consecutive years."¹²² Water may be diverted below this level under certain circumstances, e.g., domestic and municipal uses.¹²³

In Wisconsin, the Department of Natural Resources has the authority to designate the "maximum level of water that may be impounded and the lowest level of water that may be maintained by any dam heretofore or hereafter constructed and maintained and which will affect the level and flow of navigable waters."¹²⁴ To achieve the

protection of navigable waters, the Wisconsin law requires that every person, firm or corporation operating a dam on any navigable stream "shall pass at all times at least 25% of the natural low flow of water of such stream, " (emphasis supplied) unless otherwise provided by law.¹²⁵ This requirement does not apply to any water control project where the waters are discharged directly into a lake, millpond, storage pond or cranberry marsh. Furthermore, the law does not apply to those cases where the Department of Natural Resources finds that the minimum discharge is not required for the protection and maintenance of fish life. Persons violating the act are subject to fines not to exceed \$1, 000.

The Wisconsin procedure illustrates one method by which lake levels may be regulated to provide minimum flows in streams for the preservation of the fish life. The law in this case is directed more towards the maintenance of minimum stream flows than lake levels. The courts have, however, sought to maintain lake levels under certain specific circumstances. In Lakeside Irr. Co. v. Kirby,¹²⁶ for example, the Court of Appeals found that the littoral owner of part of the bed of a natural lake, valuable with water on it and worthless without water has the right to have the natural level maintained, unless altered by another littoral owner for proper uses.

In this case, appellee (plaintiff) owned 700 acres, 552 of which were covered by waters of a lake. The plaintiff contended that the area was valuable as a hunting and fishing preserve when the lake was

maintained at its normal level. However, it was claimed to be worthless when the water was lowered excessively. The court held that "appellee is entitled to the enjoyment and use of his land with the opportunities, advantages, and benefits thereto occurring by reason of a portion thereof being covered by a natural lake, subject only to riparian rights of others, and even if it was sought to irrigate riparian lands therefrom, which is not the case, the use for such purpose would have to be reasonable one."¹²⁷

Mr. Hutchins has pointed out that the preservation of the water environment and surrounding areas must possess tangible value and that mere esthetic enjoyment is not sufficient.¹²⁸ He cites Biggs v. Leffingwell¹²⁹ where the courts ruled that waters, though necessary, should not be maintained to "satisfy a mere artistic desire to see unappropriated and waste water flow by appellee's survey on its way to the sea."

Lake levels have been maintained by the courts with occasional adverse impact on the public interests. For example, in In Re Marting Lakes Project,¹³⁰ a recreational development grew up around a state-owned artificial lake. Summer recreational demands of the littoral owners were in conflict with the state of Michigan's conservation program, which required water downstream for waterfowl habitat and fish propagation. The littoral owners had the lake level fixed to meet their needs. The state attorney general challenged their decision and the jurisdiction of the county board of supervisors. The court ruled that

navigable waters were those navigable for commerce purposes and not navigable for flotation or fishing and held the lake to be non-navigable in the commerce sense and therefore under county control.

Appropriation doctrine states may be faced with a problem peculiar to the philosophy of the doctrine. This situation arises in those states whose constitutional or statutory declarations of the doctrine provides that all unappropriated waters are available for appropriation subject to a demonstration of beneficial use by the applicant and no evidence of impairment of existing rights. In many such states where the state is trustee over water for the public, the state agency responsible for distribution of water and administration of the water laws, does not have authority to appropriate or acquire waters in its name on behalf of the public. To effectively establish minimum lake levels, a state agency must be able to obtain water, either appropriated or unappropriated. If all of the waters are appropriated then the state agency should be provided powers to purchase water from present users to maintain the minimum level.

The major problem encountered in obtaining the needed waters is illustrated in the case of John Martin Dam on the Arkansas River in Colorado. The project was authorized by Congress in the Flood Control Act of June 22, 1936. Construction was begun in the fall of 1939 and the dam was completed in October of 1948. No provisions were made at that time for the establishment of minimum recreation pools.

The dam, upon completion, provided some 402,100 acre-feet of storage capacity for irrigation and 281,150 acre-feet were reserved for flood control. Upon call, the reservoir may be completely drained of water to meet irrigation needs.

At least five times, (in 1960, 1961, 1962, 1964, and 1968) the reservoir was completely drained of water. This situation has resulted in a large expense in terms of the expenditures made by the Game, Fish and Parks Department to re-stock the reservoir. Thousands of fish were stocked in the reservoir only to be lost when the reservoir was drained. Attempts have been made by the State Division of Wildlife to purchase appropriated water to serve as a minimum recreation pool. In each instance, however, the cost of water and the legal complications of delivering purchased water were so excessive that they were unable to complete the needed purchase.

The Corps of Engineer's Management practices have been cited as a contributing factor in the minimum pool problem. It was felt that they dumped water from the reservoir when it wasn't needed for irrigation and could have been retained with adequate space left for flood storage.

Minimum Flows: Recommendations of the National Water Commission

The National Water Commission in its final report, addressed itself to the minimum flow problem at length. It acknowledged the widely recognized fact that in the appropriation states, a water user

may divert water out of a stream for traditional economic purposes with little or no regard for the instream or non-market values. As a result, there is no way, under the traditional appropriation doctrine, to maintain enough water in the stream to preserve the fishery resource or recreational and esthetic values whenever diversion demands are equal to or exceed supply levels.

In the East, under the riparian doctrine, the problems center around the balance between public and private uses of the water. This conflict may be resolved and riparian rights protected "if eastern state laws continue to recognize private riparian rights but only to the extent of a minimum flow of reasonable quality adequate to serve reasonable riparian (private) needs and interests."¹³¹

The National Water Commission has concluded that:

Public rights should be secured through State Legislation authorizing administrative withdrawal or public reservation of sufficient unappropriated water needed for minimum streamflows in order to maintain scenic values, water quality, fishery resources and the natural stream environment in those watercourses or parts thereof, that have primary value for these purposes.¹³²

Specifically concerning the riparian states, the Commission is of the opinion that a delegated state agency should be able to establish and maintain minimum flows in streams and minimum water levels in lakes. These minimum flows and levels would promote the public health, safety and welfare, and protect the fish, wildlife, recreational, esthetic, and ecological values.¹³³

The Commission report notes that at least five of the riparian states now have legislation to enable the establishment of minimum streamflows and lake levels; these states are Florida, Iowa, Mississippi, New Jersey and Washington.¹³⁴ The report notes that various criteria are applied in these states to determine the minimum flows. The one uniform feature present in all of these laws is the ability of an administrative agency to deny permits for withdrawals that would impair the established minimum flows.¹³⁵

The Commission has recommended the establishment of minimum flows and lake levels on two bases:¹³⁶

- (1) "Flows which should be preserved under average conditions of supply, " [which the Commission termed as "desirable flows"] and,
- (2) "Flows which must be preserved under all conditions"; [these being termed as essential flows.]

"Desirable flows" are those which would be more subject to alteration, depending in part on the seasons and the specific location of the flows. These "desirable flows" support values and uses that the public could forego in times of shortage. "Essential flows" support values and uses that are so valuable that they should be maintained and preserved regardless of the circumstances.

The Commission's report does not specify in detail all of the factors to be recognized in establishing minimum flows. These factors will be dependent upon the specific body of water to be protected and the specific geographical conditions. However, the Commission does recommend that "minimum flows be established on the

basis of an assessment of flows required to protect instream values."¹³⁷ This procedure differs from some of the states that have based their levels on some historic level of flow. Although the historic flow level must be considered, the entire historic low flow may not be necessary to preserve instream values.

The Commission recommends the use of boards or panels to determine specifically what values are to be protected and under what circumstances. It recommends that the decision-making process follow an approach similar to that established by the National Environmental Policy Act of 1969.

The Commission also stressed the importance of enforcement. It was their belief that both public officials and private parties should be allowed to bring actions against violators. Concerning private parties, the Commission felt that since minimum flows and lake levels should be precisely fixed, with clear and definite rules for allocation in times of shortage, the private plaintiff should have recourse to the courts in the first instance.¹³⁸ The allocation procedures recommended by the Commission in times of shortage are broken down into two classes. 1) Those uses adopted after the establishment of the minimum flow system and 2) uses existing prior to the establishment of the minimum flows. The Commission recommends that a priority system should be established among post-enactment users which is similar to the priority system established under the appropriation

doctrine. The Commission recognizes that when this system is not feasible, a proportional sharing among post-enactment users may be employed.

If the curtailment of post-enactment user's requirements is insufficient to satisfy preenactment users' needs, then adjustments may be made in the "desirable" minimum flow. It is the Commission's belief that since the "desirable" minimum flow supports and protects amenities, "it follows that amenities can share the burden of the short supply."¹³⁹ Still there would no adjustment of the "essential" minimum flow.

The Commission notes that this procedure differs from many state laws which attempt to curtail all diversion in times of shortage to preserve the minimum flows. The Commission notes that:

It is hard to justify halting all withdrawals in order to protect all public values associated with instream uses. For example, it may be more desirable to protect a valuable industrial withdrawal during a 2 or 3 month drought than to preserve a level of flow providing a beautiful view or public recreation.¹⁴⁰

This dual classification of minimum flows proposed by the Commission may well act as a safeguard to private investment, but it implies little additional protection for the non-market instream public values. The "essential" flows of the Commission appear to include only a protection for human health and safety. Fish, wildlife recreation and esthetics would, it appears, be classified as "desirable" but not "essential" values. The minimum flows associated with these

non-market values are subject to change in times of shortage when water is most critical to these values. The Commission report indicates that fish, wildlife, recreation and esthetics might be protected so as to prevent "irreversible damage to the ecosystem."¹⁴¹

The Commission recommends the establishment of minimum flows at the two levels - those which are desirable under average conditions and those which are essential under all conditions.¹⁴² Based mainly on the costs involved in collecting the information required to establish and operate such a system, the Commission does not recommend immediate enactment of minimum flow laws in all states not presently having such legislation.¹⁴³ It did recommend that the States examine their water situation at this time to determine if such legislation is necessary.

Much of the Commission's discussion of minimum flows deals with provisions to be included in a permit system for riparian states. Many of the concepts - desirable and essential flows - could be incorporated into the administration of water in the appropriation states. Legislation might be enacted to allow the state engineer or other water administrative body to appropriate an "essential" minimum flow for the people of the state. This "essential" flow might be established in order to protect the fish, wildlife, recreation and esthetic values.

Having examined a few of the crucial water law principles and their impact upon the aquatic and terrestrial environment, the report now turns toward an examination of the conservation laws that have

interfaced with the operation of water laws either to enhance or degrade the natural environments. These laws exist at both the state and federal level.

ENDNOTES

¹ Under the reasonable use doctrine, the riparian has interests "in only so much of the stream as he can put to beneficial use" - subject to the rights of other riparians. 6A American Law of Property, sec. 28.56 (1954).

² For a discussion of beneficial use in riparian states, especially Wisconsin and Indiana, see: G. Graham Waite, "Beneficial Use of Water in a Riparian Jurisdiction," 1969, Wis. L. Rev. 864 - 883.

³ Dilling v. Murray, 6 Ind. 324 (1855); Apfelbacher v. State, 167 Wis. 233, 167 N.W. 244 (1918); Cited in "Beneficial Use of Water in a Riparian Jurisdiction," *supra*, at note 59.

⁴ "Beneficial Use of Water in a Riparian Jurisdiction," *supra*, p. 879.

⁵ A Summary-Digest of State Water Laws, *supra*, p. 185.

⁶ Del. Code Ann., sec. 7-6001(a).

⁷ Del. Code Ann., sec. 7-6001(b)(1).

⁸ Del. Code Ann., sec. 7-6001(b)(4).

⁹ Del. Code Ann., sec. 7-6001(b)(6).

¹⁰ Del. Code Ann., sec. 7-6001(c)(3).

¹¹ Laws of Florida, Chapt. 72-299 (1972). For an analysis of the Florida Water Resources Act of 1972 see: "An Analysis of the Florida Water Resources Act of 1972" by Geraghty and Miller, Inc., Consulting Ground-water Geologists, Jacksonville, Florida, June 1, 1972, 7pp.

¹² Florida Stat., sec. 373-036 (1972 Suppl).

¹³ Florida Stat., sec. 373-019 (1972 Suppl).

¹⁴ Florida Stat., sec. 373-036 (1972 Supp.).

¹⁵ Minn. Stat. 1972, sec. 105.37, Subd. 6(a) to (h).

¹⁶ A Summary-Digest of State Water Laws, supra, p. 34. Hutchins pointed out that "reasonable beneficial use" implies that "not only must the use be beneficial to the appropriator, but it must be reasonable in relation to use by others who have access to the same source of supply." Selected Problems in the Law of Water Rights in the West, supra, p. 317.

¹⁷ Finney County Water Users' Ass'n. v. Graham Ditch Co., 1 Fed. 2d 650 (D. Colo. 1924).

¹⁸ See, e.g., Combs v. Agricultural Ditch Co., 17 Colo. 146, 28 P. 966 (1892); Union Mill & Min. Co. v. Dangbery, 81 F. 73, (C. C. D. Nev. 1897); Washington v. Oregon, 297 U.S. 517 (1936); and Twin Falls Land & Water Co. v. Twin Falls Canal Co., 7 Fed. Supp. 238 (D. Idaho 1933).

¹⁹ Bennett v. Salem, 192 Oreg. 531, 235 P. 2d 772 (1951).

²⁰ Denver v. Sheriff, 105 Colo. 193, 204, 96 P. 2d 836, 842 (1939).

²¹ Doherty v. Pratt, 34 Nev. 343, 124 P. 574 (1912).

²² Basinger v. Taylor, 36 Idaho 591, 211 P. 1085 (1922).

²³ State ex. rel. Cary v. Cochran, 292 N.W. 239 (Neb. 1940)--77 percent loss; and Corpus Christi v. City of Pleasanton, 154 Tex. 289, 276 S.W. 2d 798 (1955)--losses of from 63 to 74 percent.

²⁴ For example, Nevada laws provide for a maximum allowable loss of 20 percent for artesian water; California law provides for a 10 percent allowable loss of artesian water in irrigation. For a useful discussion of the waste problem see: D. Haber and S. W. Bergen (eds.), The Law of Water Allocation in the Eastern United States, The Ronald Press Co., New York, 1958, pp. 95-118.

²⁵ In the Western states, a "duty of water" principle has been incorporated into many state statutes which in general is defined as "that measure of water, which, by careful management and use, without wastage, is reasonably required to be applied...to produce therefrom a maximum amount of such crops as ordinarily are grown thereon." Farmers Highline Canal and Reservoir Co. v. City of Golden, 129 Colo. 575, at 584, 272 P. 2d 629 at 634 (1954). The "duty" varies considerably between states: South Dakota and Wyoming set the duty at 1 c.f.s./70 acres; North Dakota requires 2 acre feet/acre; Nebraska and California duty limits are 1 c.f.s./70 acres, no more than 3 acre feet/acre.

²⁶ Alaska Const., art. VIII, sec. 13; Ariz. Const., art. XVII, sec. 2; Cal. Const., art. XIV, sec. 3; Colo. Const., art. XVI, sec. 6; Idaho Const., art. XV, secs. 1 and 3; Mont. Const., art. III, sec. 15; Nebr. Const., art. XV, secs. 5 and 6; N.M. Const., art. XVI, secs. 1, 2 and 3; Tex. Const., art. XVI, sec. 59(a); Utah Const., art. XVII, sec. 1; and Wyo. Const., art. VIII, sec. 3.

²⁷ Colo. Const., art. XVI, sec. 6.

²⁸ "Water Rights Laws", supra, p. 439. Those states being: Ariz. Rev. Stat., Ann. sec. 45-101(b) (1956); Nev. Rev. Stat., sec. 533.035 (Supp. 1969); N. Dak. Cent. Code Ann., sec. 61-01-02 (Supp. 1969); Okla. Stat. Ann., tit. 82, sec. 1-A (1970); Oreg. Rev. Stat., sec. 540.610 (Supp. 1969); S. Dak. Comp. Laws Ann., sec. 46-1-8 (1967); Tex. Rev. Civ. Stat. Ann., art. 7542 (1954); Utah Code Ann., sec. 73-1-3 (1967); Wyo. Stat. Ann., sec. 41-2 (1957).

²⁹ i.e., Ariz. Rev. Stat., sec. 45.141(A).

³⁰ i.e., Rev. Code Mont., 89-101-2(4)

³¹ i.e., Nev. Rev. Stat., 533.490.

³² i.e., Vernon's Tex. Code Ann., Water Code, 5.023(a)(3).

³³ i.e., Wash. Rev. Code, 90.14.031(2).

³⁴ i.e., Cal. Water Code, secs. 1242, 1243, 1257 (1970).

³⁵ i.e., Tex. Water Rights Comm'n, "Rules, Regulations, and Modes of Procedure," rule 115.1(y) (1970).

³⁶ i.e., Oreg. Rev. Stat., secs. 537.170(3)(a) (1969) and 543.225(3)(a) (1965).

³⁷ Kans. Stat. Ann., sec. 82a-927(1).

³⁸ Wyo. Stat., sec. 41-3 (1957).

³⁹ Alaska Stat., sec. 4615.260(3); Ariz. Rev. Stat., sec. 45-141(A); Colo. Rev. Stat. 148.21-3(7); Kan. Gen. Stat., sec. 82a-1407; Rev. Code Mont., 89-3301; Nev. Rev. Stat. 533.030; N.D. Century Code sec. 61-04-02; Ore. Rev. Stat., sec. 536.400; Vernons Tex. Code Ann., Water Code, 5.023(A); and Wash. Rev. Code sec. 90.14.031.

⁴⁰ Del. Code, sec. 6001(b)(1); Florida Stat., sec. 373; Ga. Code Ann., sec. 17-505; Ind. Stat. Ann., sec. 27-1407(5); Minn. Stat., sec. 105.37, Subd. 6; Laws of N.Y., E.C.L., sec. 15-0105.4; Ohio Rev. Code Ann., sec. 1525.01(D); and Va. Code Ann., sec. 62.1-10(b).

⁴¹ Nev. Rev. Stat., sec. 533.030.

⁴² S.D.C.L., 46-1-6(6).

⁴³ "The Public Sector and the Public Interest" by Peter O. Steiner, The Analysis and Evaluation of Public Expenditures: The PPB System, 91st Cong., 1st Sess. Joint Committee Print, Vol. 1, U.S.G.P.O., 1969, p. 42.

⁴⁴ Senate Bill No. 97, Approved April 23, 1973.

⁴⁵ Colo. Rev. Stat., 148-21-3(7) (1973).

⁴⁶ Provision is made for public appropriation to preserve the natural environment. More is said on this point in the section on minimum stream flows.

⁴⁷ V.T.C.A., Water Code, 5.023(a)(7).

⁴⁸ V.T.C.A., Water Code, 5.023(a)(9).

⁴⁹ V.T.C.A., Water Code, 5.023(a)(10).

⁵⁰ V.T.C.A., Water Code, 5.002(3).

⁵¹ R.C.M., sec. 89-3402(6) (1971 supp.).

⁵² Cascade Town Co. v. Empire Water and Power Co., 181 Fed. 1011, 1017-18 (D. Colo. 1910). For a brief discussion of this case see: H. L. Bickley, "Does art and recreation contribute 'beneficial uses' of public waters?", 95 Central Law Journal, 195-197.

⁵³ Empire Water and Power Co. v. Cascade Town Co., 205 Fed. 123, at 129 (8th Cir. 1913). For an additional discussion concerning the Empire cases see: Constance Hanver, "Water for Recreation: A Plea for Recognition," 44 Den. Law Journal 288-299 (1967). In an 1899 case the California courts held that: "We feel that where water is so precious it should not be used for mere matters of taste and fancy (artificial ponds and fountains) while those who need it for useful purposes go without." Los Angeles v. Pomeroy, 124 Cal. 597, 650.

⁵⁴ 158 Colo. 136, 406 P. 2d 798 (1965). For a review see: J. R. Gordon, "Water Law: A State Cannot Appropriate a Minimum Flow of Water in a Natural Stream for Preservation of Fish," 27 Montana Law Review 1966, pp. 211-216.

⁵⁵ C.R.S., 1963. 150-7-5(10).

⁵⁶ 130 Colo. 375, 276 P. 2d 992 (1954).

⁵⁷ 130 Colo. 375, at 386, 276 P. 2d 992, at 998 (1954).

⁵⁸ 102 Colo. 351, 79 P. 2d 373.

⁵⁹ Denver v Sheriff, 105 Colo. 193, 209, 96 P. 2d 836, 844 (1939).

⁶⁰ Denver v Brown, 56 Colo. 216, at 230-231, 138 P. 44, at 49 (1913). Also see: Faden v Hubbell, 93 Colo. 358, 28 P. 2d 247 (1933) where it is stated: ". . . that water diverted and employed for the propagation of fish is devoted to a useful purpose. . ." (Emphasis added) 93 Colo. 216, 368.

⁶¹ Lake Shore Duck Club v Lake View Duck Club, 50 Utah 76, 166 P. 306 (1917).

⁶² See: "Preservation of Scenic Rivers," *supra*, p. 75.

⁶³ J. C. Ohrenschall and E. A. Imhoff, "Water Law's Double Environment: How Water Law Doctrines Impede the Attainment of Environmental Enhancement Goals," V Land and Water Law Review, 271 (1970).

⁶⁴ Charles J. Meyers, A Historical and Functional Analysis of Appropriation Law, National Water Commission Legal Study No. 1, NWC-L-71-006, 1971, p. 8.

⁶⁵ "Water Law's Double Environment: . . .," *supra*, p. 273.

⁶⁶ Ibid., p. 287.

⁶⁷ Jon A. Kusler, Survey: Lake Protection and Rehabilitation Legislation in the United States, University of Wisconsin, Madison, March, 1972.

⁶⁸ M. S. Heath, "Water Management Legislation in the Eastern United States," Land and Water Law Rev. 1:209-22.

⁶⁹Department of Fishery and Wildlife Biology, Colorado State University. Fish and Wildlife Resources on the Public Lands. Public Land Law Review Commission, 1969.

⁷⁰Forest Service Inventory Procedures. Short Course on Legal Aspects and Responsibilities for Allocation of Water Resources. Division of Continuing Education, University of Idaho, 1969.

⁷¹Ibid.

⁷²Kan. Stat. Ann., sec. 82a-907.

⁷³Code of Virginia, sec. 10-17.1(5); and Ore. Rev. Stat. 536.310(7).

⁷⁴Wash. Rev. Code, 90.22.010 (Supp. 1972). (Cited hereafter by section number only). Also see Water Policies for the Future, supra, p. 273.

⁷⁵90.22.020.

⁷⁶90.22.010.

⁷⁷90.54.010 through 90.54.910.

⁷⁸90.54.020(3)(a).

⁷⁹Wash. Admin. Code, 173-30-030.

⁸⁰Wash. Admin. Code, 173-30-040(1)-(9).

⁸¹Wis. Nat. Res. Laws, 31.34.

⁸²Laws of Florida, Ch. 72-299.

⁸³Water Resource Act Amendments, Ch. 72-299, sec. 29 (West, 1973).

⁸⁴See J. R. Gordon. "Water Law: A State Cannot "Appropriate" a Minimum Flow of Water in a Natural Stream for Preservation of Fish." 27 Mont. Law Rev. (1966), pp. 211-216.

⁸⁵Colo. Rev. Stat., sec. 150-7-5(10) (1963).

⁸⁶406 P. 2d 798 (Colo. 1965).

⁸⁷Colo. Rev. Stat., sec. 148-21-3(6), as amended 1973.

- ⁸⁸ Colo. Rev. Stat., sec. 148-21-3(7), as amended 1973.
- ⁸⁹ Colo. Rev. Stat., 148-21-2(3) (1973).
- ⁹⁰ Rev. Code Mont. 89-801(2). (Cum. Supp. 1971).
- ⁹¹ Rev. Code Mont., 89-801(2)(a)-(1). (Cum. Supp. 1971).
- ⁹² Idaho Code, sec. 42-1734(c)(ir).
- ⁹³ Idaho Code, sec. 42-1734(h).
- ⁹⁴ e.g., Wash. Rev. Code, 90.54.050. Also see Utah Code Ann. (1953), secs. 73-6-1 and 73-6-2 concerning the removal of waters from appropriation. Removals in Utah are based on the Governors and State Engineers protection of the public welfare.
- ⁹⁵ Ore. Rev. Stat., 536.410(1).
- ⁹⁶ Ore. Rev. Stat., 536.410(2).
- ⁹⁷ Ore. Rev. Stat., 536.410(3).
- ⁹⁸ Ore. Rev. Stat., 538.110 through 538.300.
- ⁹⁹ Ore. Rev. Stat., 538.110.
- ¹⁰⁰ Ore. Rev. Stat., 538.140, 538.190.
- ¹⁰¹ Ore. Rev. Stat., 538.150, 538.170, 538.220, 538.251, 538.270.
- ¹⁰² See N.J. Stat. Ann., secs. 58:1-2 et seq.; and Minnesota Stat. (1971), secs. 105.37 et seq.
- ¹⁰³ 25 Iowa Code Ann., sec. 455A.22.
- ¹⁰⁴ 25 Iowa Code Ann., sec. 455A.1. Also see: A Summary Digest of State Water Laws, supra, p. 306.
- ¹⁰⁵ N. W. Hines, A Decade of Experience Under the Iowa Water Permit System, Monograph No. 8, College of Law, Univ. of Iowa, 1966, p. 29.
- ¹⁰⁶ 25 Iowa Code Ann., sec. 455A.1.

¹⁰⁷ See: A Summary Digest of State Water Laws, supra, pp. 306-307.

¹⁰⁸ Utah Code Ann. (1953), sec. 73-3-8.

¹⁰⁹ Alaska Rev. Code., sec. 46.15.040.

¹¹⁰ Alaska Rev. Code, sec. 46.15.070.

¹¹¹ Alaska Rev. Code., sec. 46.15.080.

¹¹² Calif. Water Codes, sec. 1253 (West. Cum. Pocket Port 1973).

¹¹³ Survey: Lake Protection and Rehabilitation Legislation in the United States, supra, p. 15-39.

¹¹⁴ Water Resource Management, supra, p. 765. Also pp. 765-767 concerning "Lake Level Statutes."

¹¹⁵ Illinois Laws Relating to Waterways. Department of Transportation, Division of Waterways, 1979, p. 92. Also. Ill. Rev. Stat., Ch. 19, par. 52-78.

¹¹⁶ Neb. Rev. Stat., sec. 46-801 (1960).

¹¹⁷ e.g., N.D. Cent. Code. 61-15-08 (Supp. 1969).

¹¹⁸ e.g., Miss. Code. Ann., sec. 5956-04(a) (Cum. Supp. 1972).

¹¹⁹ Minn. Stat. Ann., sec. 105.43.

¹²⁰ Ind. Stat. Ann. 27-627-628, applying the standard to "all natural and artificial lakes."

¹²¹ Mich. Stat. Ann., secs. 11.300(2)(a)

¹²² Miss. Code Ann., sec. 5956-02(j) (Cum. Supp. 1972).

¹²³ Miss. Code Ann., sec. 5956-04(d) (Cum. Supp. 1972).

¹²⁴ Wis. Natural Resource Laws, sec. 31.02. Publication 702-71, Department of Natural Resources, Madison, 1969-1970.

¹²⁵ Wis. Natural Resource Laws, sec. 31.34.

¹²⁶ 166 S.W. 715 (Tex. Civ. App., 1914). Cited in The Texas Law of Water Rights, supra, pp. 393-394.

¹²⁷ Lakeside Irr. Co. v. Kirby, 166 S.W. 715. Cited in The Texas Law of Water Rights, supra, p. 393.

¹²⁸ Texas Law of Water Rights, supra, p. 393-394.

¹²⁹ 62 Tex. Civ. App. 665, 132 S.W. 902 (1910).

¹³⁰ 381 Mich. 180, 160 N.W. 2d 909 (1968). Discussed in Water Resource Management, supra, p. 766.

¹³¹ Water Policies for the Future, supra, p. 272.

¹³² Ibid., at p. 279, Recommendation No. 7-40.

¹³³ Ibid., at pp. 281, 282, and 287.

¹³⁴ Ibid., at p. 287.

¹³⁵ Ibid.

¹³⁶ Ibid.

¹³⁷ Ibid., at p. 288.

¹³⁸ Ibid., at p. 289.

¹³⁹ Ibid., p. 291.

¹⁴⁰ Ibid.

¹⁴¹ Ibid.

¹⁴² Ibid.

¹⁴³ Ibid., at p. 293.

CHAPTER V

STATE CONSERVATION LAWS

In a traditional sense, one may feel that state water laws should be sufficient to direct the use of water resources so that fish and wildlife will not be adversely affected. In the foregoing chapters, we discussed the direct relationships of water law to the fish and wildlife and the habitat, identifying both constraints and facilitators to protection and preservation of the biota. In Chapters V and VI emphasis will be placed upon those conservation laws which have a direct or indirect impact upon fish and wildlife and their environment. These laws focus their attention not upon the water resource, but upon correlative activities engaged in the use of the resource and upon the fish and wildlife themselves.

The issue of jurisdiction is of paramount importance in an examination and analysis of any specialized field of law. The law, by definition extends only to the authority or ability of its maker to enforce it. Under the federated states system and national government that exist in the United States, jurisdiction is basically at two levels: state and federal.

The constitution sets out the authority and powers of each level, either by delegation or reservation. The states may enact laws to

their own liking without constraint from their neighboring states. The federal government, through Congress, adopts legislation having nationwide jurisdiction.

1. Scenic and Wild Rivers

Our research has located 21 states that have enacted scenic and wild rivers legislation to preserve and protect the water environment of those states for present and future generations. In addition to these states, the State of Wyoming has authorized stream preservation feasibility studies to determine which streams have potential value for inclusion in future legislation. Table 1 in this section lists those states that have enacted some type of legislation, and the citation as to the location of the law in the state statutes.

These 21 states have realized the importance of maintaining and protecting natural condition of streams within their jurisdiction. Five of the nineteen western states have adopted acts of this nature. They are: California, Idaho, Oklahoma, Oregon and South Dakota. The remaining sixteen states are located in the east, and they are: Georgia, Indiana, Iowa, Kentucky, Louisiana, Maryland, Maine, Massachusetts, Michigan, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, West Virginia, and Wisconsin. It is our belief that these laws arise, not due to any particular geographic features, rather they are the result of the awareness of the state legislatures and the people of the

Table 1. Citations to those states having Wild and Scenic Rivers Acts.

STATE	STATUTE
1. California	"California Wild and Scenic Rivers Act, " Public Resources Code, Secs. 5093.50 to 5093.64 (1972).
2. Georgia	"Georgia Scenic Rivers Act of 1969, " Georgia Code Annotated Chapter 17-9.
3. Idaho	Idaho Code, sections 67-4301 thru 67.4312.
4. Indiana	"Natural, Scenic and Recreational River System, " P.L. No. 124, April 24, 1973, Indiana Code 1971, 13-2 Chapt. 26.
5. Iowa	"Scenic Rivers System, " Iowa Code Annotated, Vol. 7, Cumulative Annual Pocket Part, 1972, secs. 108A.1 thru 108.7.
6. Kentucky	"Kentucky Wild Rivers Act, " Kentucky Rev. Stat. secs. 146.200 to 146.990 (1972).
7. Louisiana	"Natural and Scenic Rivers System, " Louisiana Revised Statutes, Sections 1841 thru 1849 (1970).
8. Maryland	Section 66C of Maryland Code.
9. Maine	"Scenic Water Ways, " 12 M. R. S. A., Secs. 501 et seq.
10. Massachusetts	"Scenic and Recreational Rivers and Streams, " Annotated Laws of Massachusetts, Chap. 13-26, section 17B (1971).
11. Michigan	"Natural Rivers Act, " Michigan Code Laws Annotated, Secs. 281.761 to 281.776 (1970).
12. Minnesota	"Wild and Scenic Rivers, " Laws of Minnesota, Chapter 271, secs. 104.31 to 104.40 (1973).
13. North Carolina	"Natural and Scenic Rivers System, " Vol. 3A, The General Statutes of North Carolina 1971 Cumulative Supplement, Article 3, Secs. 113A-30 to 113A-43 (1971).

Table 1 (cont.)

STATE	STATUTE
14. Ohio	"Wild, Scenic, and Recreational River Areas, " Ohio Rev. Code, secs. 1501.16 to 1501.20, as amended.
15. Oklahoma	"Scenic Rivers Act, " Oklahoma Statutes Ann., Cumulative Pocket Part 1972-1973, Title 82, Chapter 21, secs. 1451 to 1459.
16. Oregon	"Scenic Waterways, " Oregon Revised Statutes, secs. 390.805 to 390.990 (1970).
17. Pennsylvania	"Pennsylvania Scenic Rivers Act, " Act of the Pennsylvania General Assembly No. 283, December 5, 1972.
18. South Dakota	"Wild, Scenic and Recreational Rivers, " South Dakota Compiled Laws, 1967, annotated 1972 Pocket Supplement, secs. 46-17A-3 to 46-17A-21.
19. Tennessee	"Scenic Rivers, " Tennessee Statutes, secs. 11-1401 to 11-1417 (1968).
20. West Virginia	"Natural Streams Preservation Act, " W. Virginia Natural Resources Laws, Article 5B, secs. 20-58-1 to 20-58-17 (1969).
21. Wisconsin	Wild Rivers, Wisconsin Natural Resources Laws, 1969-1970, Chapter 30, sec. 30.26. Wolf River preservation Wisconsin Natural Resources Laws, 1969-1970, Chapter 30, sec. 30.251.
22. Wyoming	"Stream Preservation Feasibility Study, " Wyoming Stat., secs. 41-1.12 to 41-1.22 (Cum. Supp. 1973).

state as to the importance of retaining streams and portions of streams in a free-flowing and natural condition.

The major impetus for the state acts appears to have been due to the passage of the federal Wild and Scenic Rivers Act of 1968, which is discussed in Chapter VI. For the most part, the rivers covered under the state acts are independent of those covered by federal legislation. The advantage of a dual system of federal and state legislation is that it expands the coverage over the decreasing number of free-flowing streams.

In analyzing the different state laws, we felt that the following features should be included: (1) The law should identify specific rivers to be covered by the law. (2) Public hearings should be provided for prior to the placing of a river into a state system. (3) Actions to be prohibited in the established areas should be made clear. (4) The law should provide for the re-classification of rivers based on changing environmental conditions. (5) Provision should be made for the addition of new rivers into the system. (6) Penalties should be specified for the violation of provisions within the Act.

Following is a survey of the significant features of the wild and scenic rivers acts of each of the states listed above.

California

On December 20, 1972, Governor Ronald Reagan signed into effect the California wild and scenic rivers act.¹ The law is intended

to preserve the natural state of "certain rivers which possess extraordinary scenic, recreational, fishery or wildlife values."²

Five rivers or parts of rivers were designated as components of the system. They are the Klamath, Trinity, Smith, Eel, and American Rivers in Northern California.³ Under this new law, water may be used for local domestic use, but the construction of dams, reservoirs and other water impoundments is prohibited.⁴

Flood control structures may be built on the Eel River, however no dams are to be planned or built for a period of 12 years. After that time, the effectiveness of the law is to be reevaluated.⁵

Under the law, the Secretary of the Resources Agency is directed to study and classify each section of the above mentioned rivers as to whether they are "wild, " "scenic, " or "recreational" and develop plans for their administration. Public hearings would be held in each county through which the rivers flow prior to the adoption of any of the administrative plans.⁶

Georgia

In 1969 the Georgia legislature passed the Georgia Scenic Rivers Act.⁷ Under this law "scenic rivers" are defined as those "rivers or sections of rivers of the State of Georgia which have valuable scenic, recreational or natural characteristics"⁸ worth preserving for present and future generations.

Under this law, the State Council for the Preservation of Natural Areas⁹ is directed to conduct a study and submit a report to the Governor and General Assembly on sections of two rivers.¹⁰ The rivers initially included are the Suwanee River,¹¹ and the Chattooga River.¹² At the discretion of the Preservation Council, they may submit to the Governor and General Assembly lists of additional rivers to be included in the scenic rivers system of the state.¹³ As of March 13, 1974, no new rivers had been added to the Georgia system.

"Each scenic river together with the land lying within its authorized boundary"¹⁴ is to be classified into one of three categories. Those rivers that are accessible primarily by trails and whose shorelines are "undeveloped and unused" are to be classified as natural river areas.¹⁵ Free-flowing rivers that may be accessible by road, "with shorelines mostly undeveloped and unused" are to be classified as pastoral river areas.¹⁶ The third class of rivers are those that are free-flowing, accessible by road and have limited development along the shoreline. These rivers will be classified as recreational river areas.¹⁷

Once a river becomes incorporated into the state scenic river system, "no dam, reservoir or other structure impeding the natural flow of the waterway shall be constructed, operated or maintained" unless the structure is allowed by consent of the General Assembly.¹⁸ Additionally, the State Council for the Preservation of Natural Areas

is authorized by the act to acquire lands lying within the designated boundary of a scenic river.¹⁹ The law does not specify what activities may take place on these lands. If the area in which the lands were acquired was classified as a recreational river area, then limited development might be allowed. Classification as a natural area would imply that no development could take place.

The law is rather vague with respect to the amount of development that may be allowed once an area has been classified as a pastoral or recreational area. The State Council for the Preservation of Natural Areas does not administer the areas once they are established, rather they recommend a state agency to administer them.²⁰ Then the designated agency and the state legislature are required to set the limits and conditions for further development.

Idaho

The predominant philosophy of the state of Idaho with respect to water resources has been that of utilizing the resource for economic development purposes. However, the state has recently passed legislation that allows the Governor to appropriate, in trust, for the people of the state certain specific scenic lakes so as to preserve them in their present condition.²¹

Additionally, the 1971 legislature authorized the State Park Department to appropriate, in trust, certain natural springs on the basis of their scenic beauty and recreational value.²²

Iowa

In 1970, the state of Iowa enacted legislation to create a scenic rivers system.²³ Under this act the State Conservation Commission is authorized to designate a river or parts of a river as a natural river.²⁴ Under the law these rivers should possess "outstanding water conservation, scenic, fish, wildlife, historic, or recreational values which should be preserved."²⁵ The area designated as a natural river area also includes those lands adjacent to the river which are "necessary to preserve, protect, and manage the natural character of the river."²⁶

Under the act, the State Conservation Commission is required to hold a public hearing "in the county seat of any county in which the natural river flows" before the area may be designated as a natural river.²⁷

The Commission is also required to "prepare and maintain a plan for the establishment, development, management, use, and administration of natural river areas" as a part of the state's overall water and recreation program.²⁸

Political subdivisions of the state are authorized under the law to zone or place other controls upon lands adjacent to the specified natural rivers. This zoning must provide adequate protection to the river so as to insure the purpose for which the river is designated or protected.²⁹ Once the zoning ordinances are established, for which the commission sets guidelines and standards, the political subdivision

"may request the assistance of the commission in obtaining compliance with the ordinance."³⁰

The designation of a river in the state act does not preclude it from becoming a part of the national wild and scenic rivers system. If a river would become part of the federal system, the commission is authorized to "enter into written cooperative agreements for joint federal-state administration" of the river or rivers.³¹

Since the passage of the act, parts of the Upper Iowa River have been added to the system. The State of Iowa is currently in the process of acquiring fee title to lands along the included portions of the Upper Iowa.

Indiana

One of the most recent wild and scenic rivers acts was passed by the General Assembly of the State of Indiana on April 24, 1973.³² Section 2 of the act sets forth the state's policy with respect to the need and importance of these natural water areas. This policy is stated in its entirety:

Chapter 26, Sec. 2. As part of the continuing growth of the population and the development of the economy of the State of Indiana, it is necessary and desirable that rivers of unusual natural, scenic or recreational significance be set aside and preserved for the benefit of present and future generations before they have been destroyed; for once destroyed, they cannot be wholly restored. It is essential to the people of the State of Indiana that they retain the opportunities to maintain close contact with such natural, scenic and recreational rivers and to benefit from the scientific, aesthetic, cultural, recreational, scenic, and spiritual values they possess. It is, therefore, the

public policy of the State of Indiana that a natural, scenic and recreational river system be established and maintained; that such areas be designated, acquired and preserved by the state; and that other agencies, organizations, and individuals, both public and private, be encouraged to set aside adjacent lands for the common benefit of the people of present and future generations.

Under the Indiana law, as is the case with several of the other states, there are three classifications of waters in the act. "Natural rivers" are defined as those rivers which are "free of impoundments, is generally unpolluted, undeveloped, and inaccessible."³³ A "scenic river" is one which is "free of impoundments, accessible in several places, and with minimal pollution and shore line developments."³⁴ "Recreational rivers" are classified as those which would not fit into one of the above two categories, "but which still maintains scenic or recreational characteristics of unusual and significant value."³⁵

Under the law, the director of the Department of Natural Resources may study and submit to the Indiana Department of Natural Resources Commission proposals for inclusion of rivers which may fall into one of the three categories of rivers.³⁶ Reports recommending additions of rivers into the system are required to evaluate nine factors. Factors to be considered include such items as the length of the segment of the river, condition of vegetation, scenic view, physical modification of stream course, human developments on the stream, and unique or special features of the area.³⁷

Based upon the studies and recommendations of the director, the resources commission may designate a river for inclusion into the

scenic river system.³⁸ Before a final decision is made, a public hearing must be held of which the adjoining or abutting land owners are notified. The hearing will take place in the county which contains the largest section of the considered river.³⁹

Any program for the use and/or development of the water and related land resources of rivers in a scenic rivers system "which may change the character of a river or destroy its scenic values, " must be subject to a full review and evaluation.⁴⁰ Before any plans are approved by the commission, the environmental impact of the project must be determined in accordance with IC 1971, 13-1-10. If in the judgement of the commission, the proposed use or development "may" alter the original classification of a river in the system, then the approval of the commission will not be granted.⁴¹

The law makes it clear that once a river is placed into the system "it will become an administrative responsibility of the director."⁴² This requires the director to "prepare and maintain a plan for the establishment, development, management, use and administration" of rivers within the scenic rivers system.

In carrying out his duties, the director is authorized by the law "to acquire...land in fee title or any other interest in land including water use easements, scenic easements, and land use easements."⁴³ Since the rivers may not be stated owned, the General Assembly "encourages riparian owners to grant easements to the director..."⁴⁴

The act also authorized the director to obtain financial aid from federal and local governments, private groups and individuals for the purpose of land acquisition.⁴⁵ These funds may be obtained by appropriation, donation or any other means. The Department of Natural Resources is also authorized to expend funds under this law for the development of public recreation facilities.⁴⁶

Following the enactment of the Indiana Natural, Scenic, and Recreational River Act, Purdue University conducted a study for the Department of Natural Resources to establish criteria for rivers to be included in the system. As of March 13, 1974, the portion of the Blue River flowing through Harrison and Crawford counties was the only river officially added to the system. Conversations with officials of the Department of Natural Resources indicate that the general public is in support of adding additional rivers to the system.

Kentucky

The Kentucky "Wild Rivers System" was established by the state legislature in 1972.⁴⁷ The intent of the legislation was to:

...afford the citizens of the commonwealth an opportunity to enjoy natural streams, to attract out-of-state visitors, to assure the well-being of our tourist industry, to preserve some streams or portions thereof in their free-flowing condition because their natural, scenic, scientific, and aesthetic values outweigh their value for water development and control purposes now and in the future. For aesthetic, as well as ecological reasons, the foremost priority shall be to preserve the unique primitive character of those streams in Kentucky which still retain a large portion of their natural and scenic beauty, and to prevent future infringement on that beauty by impoundments or

other manmade works. Since the stream areas are to be maintained in a natural state, they will also serve as areas for the perpetuation of Kentucky's wild fauna and flora.⁴⁸

Five streams or segments of streams were initially included in the wild rivers system. They are: (1) the Cumberland River; (2) the Red River; (3) the Rockcastle River; (4) the Green River; and (5) the Big South Fork of the Cumberland River.⁴⁹ These five rivers and any rivers that are subsequently added to the system must meet certain criteria.

First, the streams must be essentially free-flowing, "with shorelines and scenic vistas essentially primitive and unchanged, " free from man's intrusions and pleasing to the eye. The waters must not be polluted beyond correction. The area may provide high quality fish and wildlife habitat, and an opportunity for scientific study. It shall provide a wilderness type recreation. Finally, the overall pristine state of the area shall be maintained.⁵⁰

Boundaries for the established streams shall be made by June 16, 1974. These boundaries must be established in such a manner as to include "at least the visual horizon from the stream, but not more than two thousand five hundred (2, 500) feet from the center of the stream." These boundaries must also include access points to the river.⁵¹

The wild rivers system is administered by the Department of Natural Resources.⁵² The commissioner of the Department of Natural Resources is required from time to time to submit to the

governor and general assembly proposals for additions to the system.⁵³

Other agencies or citizen groups may also submit proposals for additions to the system. Final authority for the inclusion of a river into the system rests with the Kentucky general assembly.⁵⁴

The commissioner of the Department of Natural Resources is authorized by the law to "adopt any rules or regulations necessary for the preservation and enhancement of the stream areas...and for control of recreational, educational, scientific and other uses of these areas in a manner that shall not impair them."⁵⁵ In establishing these rules and regulations "primary emphasis shall be given to protecting aesthetic, scenic, historic, archaeologic, and scientific features of the area."⁵⁶

The commissioner has the authority to "acquire by purchase, exercise of the rights of eminent domain, grant, gift, devise or otherwise, the fee simple title to, a scenic easement on, or any acceptable lesser interest in any lands, and by lease or conveyance, contract for the right to use and occupy any lands."⁵⁷ This land acquisition would not apply to municipal or county areas that provide adequate protection to the wild river areas.⁵⁸

The law makes it very clear what land use practices will be allowed within the wild rivers area.⁵⁹ "No new roads or buildings shall be constructed." No utility lines or pipelines are allowed without the permission of the commissioner. There shall be no mining, and only regulated timber cutting. All land disturbances, such as

dredging, are prohibited. Access should be only by foot and other non-mechanical modes of transportation.

Nothing in the legislation will prevent these rivers from becoming a part of the national wild and scenic rivers system. The commissioner is in fact encouraged to assist in federal studies for the inclusion of Kentucky streams in the national wild and scenic rivers system.⁶⁰

Kentucky appears to be the only state with a wild and scenic rivers act that provides for a "wild rivers system fund." This fund consists of "all revenues derived from privileges, concessions, contracts, or otherwise, all moneys received by gifts, contributions, donations and grants from public or private sources."⁶¹ This fund is intended to aid in the administration and help to meet other expenses for the purposes of the "Wild Rivers System."

The attorney general, at the request of the commissioner of natural resources, may bring an action for the recovery of the penalties as provided in the law.⁶² Any person who violates one of the provisions of the law "shall be liable to a civil penalty of not more than \$1,000 for said violation and in addition may be enjoined from continuing said violation."⁶³ Each day for which the violation continues is a separate offense.

Louisiana

In 1970, the Louisiana Legislature adopted a Natural and Scenic Rivers System.⁶⁴ Under this law a "natural and scenic river" is defined as "a river, stream or bayou or segment thereof that is in a free-flowing condition, that has not been channelized, cleared and snagged within the past twenty-five years, realigned, inundated, or otherwise altered and has a shoreline covered by native vegetation and has no or few man-made structures along its banks."⁶⁵

The natural and scenic rivers system of the state is administered by the Louisiana Wildlife and Fisheries Commission.⁶⁶ Management of the system is directed towards the "purposes of preserving, protecting, developing, reclaiming and enhancing the wilderness qualities, scenic beauties and ecological regimen of certain free-flowing streams..."⁶⁷ Other purposes specified in the law are those of "preserving aesthetic, scenic, recreational, fish, wildlife, ecological, archaeological, geological, botanical, and other natural and physical features and resources found along these streams..."⁶⁸

Under the law, all local, state and federal agencies are directed to give consideration to esthetic values as well as monetary values of water areas. The law further stipulates that "no agency of the state government shall authorize or concur in plans of local or federal agencies that would detrimentally affect, whether directly or indirectly, a natural or scenic river or upon which the full and equal

consideration of the stream's potential as a natural or scenic area with aesthetic values has not been discussed and evaluated..."⁶⁹

In the original law 31 rivers, creeks, and bayous were specified as "instantaneous natural and scenic rivers." An "instantaneous natural and scenic river" is defined in the law as "those rivers, streams or bayous, or segments thereof, included in the Louisiana Natural and Scenic Rivers System at its inception..."⁷⁰

The Wildlife and Fisheries Commission does not have complete and unlimited control over rivers which are included in the system. Any agency which had been granted previous jurisdiction over any of the rivers in the system retains that control. However, these agencies are directed by the law to cooperate with the Commission to see that the purposes for which the system was created are maintained.⁷¹

The law stipulates that it is not intended to:

restrict the normal activities of riparian landowners within the boundaries of their own property unless a mutual agreement has been entered into with the system administrator. Non-state adjacent landowners to a river in the system are encouraged by the law to grant to the system administrator scenic easements and surface easements to aid in achieving the purposes set forth in the law.⁷³

Maryland

As of March 13, 1974, the State of Maryland did not have an established wild and scenic rivers system. However, the state's

environmental concern is displayed in article 66C of the Maryland Code.

With respect to water resources, article 66C provides, among other things, for the establishment of the Department of Chesapeake Bay Affairs, which protects inland water fish, provides for shore erosion control, and provides for the inauguration of a scenic rivers program.⁷⁴ No doubt in the near future this enabling legislation will be expanded into a more formal program.

Maine

The state of Maine has set aside certain watercourses that are to be preserved from development. This system is administered by the State Soil Conservation Commission.⁷⁵

Massachusetts

On October 6, 1971 the state legislature of Massachusetts approved legislation that established a system of scenic and recreational rivers and streams within the state.⁷⁶ Administration of the system is under the jurisdiction of the Water Resources Commission.⁷⁷

Under the act, a scenic and recreational river or stream is defined as those "rivers and streams of the commonwealth or portions thereof, and such contiguous land not to exceed one hundred yards on either side of the natural bank of such river as the commissioner reasonably deems it necessary to protect by any such order."⁷⁸

The commissioner of the Water Resources Commission is directed by the law to promote the public safety, health and welfare, and protect public and private property, wildlife, fisheries, and irreplaceable wild, scenic and recreational rivers by establishing rules and regulations "restricting or prohibiting dredging, filling, removing or otherwise altering, or polluting the scenic and recreational rivers and streams of the commonwealth." The commissioner must notify "each assessed owner of any land on the banks of any river or stream" before it is classified as a scenic or recreational river.

Once the system is established and "recorded in the registry of deeds for the county wherein said river or stream is located" penalties are established for the violation of the commissioner's rules and regulations. The law states that "any person who violates any such order shall be punished by a fine of not less than ten dollars nor more than one hundred dollars, or by imprisonment for not more than six months, or both," with the superior court having jurisdiction to restrain violators.

If a riparian land owner feels that the orders of the commissioner "unreasonably restricts the use of his property as to deprive him of the practical uses thereof and which constitutes an unreasonable exercise of the police power so as to become the equivalent of a taking without compensation," then he may appeal the ruling to the superior court. "If the court finds the order to be unreasonable," it

may rule that the orders do not apply to the landowner. The Department of Water Resources is empowered by the law to "take the fee or any lesser interest in land in the name of the commonwealth by eminent domain" those lands that have been exempted from the system by the superior court.

The law is held not to "prohibit, restrict or impair the exercise or performance of the Powers and duties conferred or imposed by law on the department of public works, the state reclamation board or any mosquito control or other project operating under" chapter 252 of the Massachusetts laws.

Michigan

In 1970, the Michigan legislature enacted a Natural Rivers Act within the State.⁷⁹ Under this law, the Department of Natural Resources is empowered to designate a river, or portions thereof, as a natural river area for the purpose of preserving and enhancing its values for water conservation, its free-flowing condition, and its fishing, wildlife, boating, scenic, esthetic, ecological, historic and recreational values and uses. The natural rivers areas also include the adjoining or related regions that may be necessary to meet the purposes of the act. To comply with the purposes of the act the Department is directed to prepare a comprehensive long-range plan for the natural rivers system.

Minnesota

On May 16, 1973, the state of Minnesota established its Wild and Scenic Rivers system.⁸⁰ The policy of the State of Minnesota is that "certain of Minnesota's rivers and their adjacent land possess outstanding scenic, recreational, natural, historical, scientific and similar values."⁸¹ The state feels that it is in the "interests of present and future generations to retain these values," and, therefore, the state established policies to preserve and protect these waters.

Under the new law, the commissioner of natural resources is responsible for the administration of the system, and his duties include "developing criteria for classification and designation of rivers, designating rivers for inclusion within the system, and management of the components of the system including promulgation of regulations with respect thereto."⁸²

The commissioner is further directed by the law to "prepare a management plan, with no unreasonable restrictions upon compatible, pre-existing, economic uses of particular tracts of land to preserve and enhance the values that cause the river to be proposed for inclusion in the system."⁸³ If a river is included within the system it will be classified as either wild, scenic or recreational.

Wild rivers are "rivers that exist in a free-flowing state, with excellent water quality, and with adjacent lands that are essentially primitive."⁸⁴ A free-flowing river is one that has few impoundments,

diversions or realignments upon it. The presence of minor structures are not sufficient to bar it from inclusion within the system.⁸⁵

Scenic rivers must "exist in a free-flowing state" and be accompanied by lands that are for the most part undeveloped.⁸⁶ The third class of rivers are the recreational rivers and they "may have undergone some impoundment or diversion...but that are still capable of being managed so as to further the purposes" set forth in the act.⁸⁷

Once the commissioner determines that a river should be included with the wild and scenic rivers system, he is required to notify "local governmental bodies, shoreland owners, conservation and outdoor recreation groups, and the general public." Once the notice is given to the above mentioned parties, a public hearing will be held in the "county seat of each county which contains a portion of the designated area," and the hearing will be not less than sixty days after the notice.⁸⁸

After the public hearing or hearings are completed, the commissioner may place the river or segment of it into the system.⁸⁹

Local governments are then required to adopt or amend their "ordinances and land use district maps to the extent necessary to comply with the standards and criteria of the commissioner and the management plan."⁹⁰ Failure on the local government's part to make these changes within six months empowers the commissioner to make the needed changes.

In order to comply with the purposes of the act, the commissioner of Administration "may acquire the title, scenic easements, or other interests in land, by purchase, grant, gift, devise, exchange, lease, or other lawful means."⁹¹ Various other state agencies and governmental units are directed to comply with the law, and no state lands within the system may be transferred if in so doing it would prove inconsistent with the commissioner of natural resources plan.⁹²

Nothing in the law is to be taken as precluding it from being placed in the federal wild and scenic rivers system. The commissioner is authorized to seek financial and technical assistance from the federal government, and enter into cooperative agreements with the federal government for joint administration of a Minnesota river in the federal system.⁹³

North Carolina

Effective July 1, 1971, the State of North Carolina established a "Natural and Scenic Rivers Act."⁹⁴ In establishing the law, the state felt that there was a "necessity for a rational balance between the conduct of man and the preservation of the natural beauty along the many rivers of the State."⁹⁵ To achieve this balance, certain rivers were to be maintained in their free-flowing state with protection given the waters and adjacent lands. The law emphasizes that uses of water under this act "constitutes a beneficial public purpose."

The types of rivers that are eligible under the North Carolina statute are as follows.⁹⁶

Class I. Natural river areas. "Those free-flowing rivers or segments of rivers and adjacent lands existing in a natural condition. Those rivers that are free of man-made impoundments and generally inaccessible except by trail, with the lands within the boundaries essentially primitive and the waters essentially unpolluted."

Class II. Scenic river areas. "Those rivers or segments of rivers that are largely free of impoundments, with the lands within the boundaries largely primitive and largely undeveloped, but accessible in places by roads."

The North Carolina statute is very specific with respect to the criteria that must be met for the inclusion of a river or portion of one into the system. Under the law the following five criteria must be present:⁹⁷

- (1) River segment length-not less than one mile.
- (2) Boundaries -- "of the system shall be the visual horizon or such distance from each shoreline as may be determined to be necessary by the Director (of the Department of Conservation and Development), but shall not be less than 20 feet. Provided, that this shall not be construed to authorize the Director to acquire, except by donation or gift, more than 320 acres of land per mile for inclusion within the boundaries.
- (3) Water Quality -- "shall not be less than that required for Class "C" waters, "as established by the North Carolina Board of Water and Air Resources."
- (4) Water flow -- "shall be sufficient to assure a continuous flow and shall not be subjected to withdrawal or regulation to the extent of substantially altering the natural ecology of the stream.
- (5) Public access -- "shall be limited, but may be permitted to the extent deemed proper by the Director, and in keeping with the property interests acquired by the Department and the purpose of this Article."

Under the law, the Department of Conservation and Development is the agency responsible for the administration and control of the natural and scenic rivers system.⁹⁸ The Director of the Department is required "from time to time" to submit to the Governor and General Assembly his proposals for additions of rivers into the system. The proposal must state the category of the river as set forth in G.S. 113A-34, and indicate why the river should be included in the system.⁹⁹ The Board of Conservation and Development may establish reasonable regulations for carrying out the provisions of the act.¹⁰⁰

The Department of Administration is authorized to acquire "on behalf of the State of North Carolina, lands in fee title or a lesser interest in land, preferably 'scenic easements'."¹⁰¹ In acquiring real property the Department of Administration is authorized to exercise the power of eminent domain in accordance with the appropriate state statutes.¹⁰²

The North Carolina statute has two significant features that are not often found in other state wild and scenic rivers acts. First, the law provides for the up-grading of a scenic river to the classification as a natural river area, based on the judgment of the Director of the Department of Conservation and Development.¹⁰³ Secondly, "the contribution or donation of a 'scenic easement,' right-of-way or any other easement or interest on land to the State... shall be deemed a

contribution to the State..."¹⁰⁴ It may thus be claimed as a charitable deduction for income tax purposes.

Anyone who "violates, fails, neglects or refuses to obey any provision of the law or regulations of the Director "may be compelled to comply with or obey the same by injunction, mandamus, or other appropriate remedy."¹⁰⁵ Violators of the law are "guilty of a misdemeanor and may be punished by a fine of not more than fifty dollars (\$50.00) for each violation, and each day such person shall fail to comply, where feasible, after having been officially notified by the Department shall constitute a separate offense subject to the foregoing penalty."¹⁰⁶

As with most of the states already mentioned, nothing in this law will preclude it from being incorporated into the federal wild and scenic rivers system. "Provided, that such agreements relating to water and land use are not less restrictive than the requirements of the Article."¹⁰⁷

The "Natural and Scenic Rivers Act of 1971" is strengthened by the addition of a constitutional amendment that was adopted by the vote of the people in a general election held November 7, 1972. This new amendment, dealing with the conservation of natural resources, states that: "the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry, and to this end it shall be a proper function of the State of North Carolina and its political subdivisions to acquire and preserve park, recreational, and scenic

areas, to control and limit the pollution of our air and water, to control excessive noise, and in every other appropriate way to preserve as a part of the common heritage of this State its forests, wetlands, estuaries, beaches, historical sites, openlands, and places of beauty."¹⁰⁸

Initially, six rivers were suggested for study as possible additions to the North Carolina system. However, due to political and other reasons none of the six rivers were added to the system. As of March 13, 1974 (personal communication), the only river officially included and covered under the Natural and Scenic Rivers Act is a portion of the New River.

Ohio

In Ohio the Director of Natural Resources is empowered to

create, supervise, operate, protect, and maintain wild, scenic, and recreational river areas under the state's scenic rivers act.¹⁰⁹ The Director may propose for establishment as a wild, scenic, or recreational river area those river areas that in his judgment possess water conservation, scenic, fish, wildlife, historic, or outdoor recreation values which should be preserved...¹¹⁰

Public notice must be given when the Director intends to declare an area a wild, scenic, or recreational river area. Thirty days after final written notice, the Director "shall enter a declaration in his journal that the area is a wild, scenic, or recreational river area."¹¹¹

Lands adjacent to the designated rivers may not be more than one thousand feet from the "normal waterlines of the watercourse unless

an additional width is necessary to preserve water conservation, scenic, fish, wildlife, historic, or outdoor recreation values."¹¹²

The following classification scheme is followed in Ohio.¹¹³

Wild river areas are defined as: "those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted, representing vestiges of primitive America." The scenic river areas are those rivers "free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped but accessible in places by roads." Recreational river areas "are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past."

Once an area has been designated as a wild, scenic or recreational river area, no state department, agency or political subdivision may "build or enlarge any highway, road, or structure or modify or cause to modify the channel of any watercourse within" the designated area without obtaining approval from the Director.¹¹⁴

The director of Natural Resources also has the power to appoint an advisory council for each wild, scenic, or recreational river area. This council is composed of not more than ten members, who represent local governments and interests in the area. The council may make recommendations to the director concerning the management and administration of the area.¹¹⁵

Oklahoma

Effective March 17, 1969, Oklahoma enacted a Scenic Rivers Act that is similar to the Federal Wild and Scenic Rivers Act.¹¹⁶

The Oklahoma Legislature found "that some of the free-flowing streams and rivers of Oklahoma possess such unique natural scenic beauty, water conservation, fish, wildlife and outdoor recreational values of present and future benefit to the people of the state that it is the policy of the Legislature to preserve these areas for the benefit of the people of Oklahoma."¹¹⁷

The law specifies three scenic river areas that are to be included initially under the act. They are:¹¹⁸

- (1) The Flint Creek and the Illinois River above the 650-foot elevation level of Tenkiller Reservoir in Cherokee, Adair and Delaware Counties.
- (2) The Barren Fork Creek in Adair and Cherokee Counties from the present alignment of Highway 59 West to the Illinois River.
- (3) The Upper Mountain Fork River above the 600-foot elevation level of Broken Bow Reservoir in McCurtain and LeFlore Counties.

Once a river becomes designated as a "scenic river area" it is to be preserved in a free-flowing condition and "shall not be impounded by any large dam or structure except as may be allowed by the Legislature."¹¹⁹ Municipalities located in the "immediate vicinity" of one of the designated areas may construct structures for municipal or domestic water supplies, as long as these structures do not "significantly interfere with the preservation of the stream as a scenic free-flowing stream."

Under the law, the Oklahoma Industrial Development and Park Department and the Oklahoma Wildlife Conservation Commission are empowered to "acquire, develop and maintain public access points, easements or park areas in 'scenic river areas'." The law further provides that these acquisitions may be made by private treaty only, and "the use of the power of eminent domain for these purposes is specifically prohibited."¹²⁰

The Oklahoma law specifically prohibits littering in the scenic river areas. The penalties established for littering are up to two hundred fifty dollars (\$250.00) fine and/or up to thirty (30) days in the county jail. Furthermore any interested party, game ranger, or personnel of the Wildlife Conservation Commission or Industrial Development and Park Departments may file a complaint against a party for littering.¹²¹

Prior to any area being designated as a "scenic river area" the Industrial Development and Park Commission is required to "give reasonable notice in newspapers of general circulation in every county in which land and streams are situated that would be affected by the proposed area".¹²² The commission is then required to present their plans at a meeting in each county affected. Following the public hearing the merits of the proposed scenic areas are evaluated by State legislative committee hearing and then debated on the floor of the legislature prior to the enactment of the legislation.¹²³

Oregon

The Oregon Scenic Waterways System was established by initiative petition approved by the people of Oregon on November 3, 1970 and became effective December 3, 1970.¹²⁴ In the law, it is recognized that "the policy of permitting construction of dams and other impoundment facilities at appropriate sections of the rivers of Oregon needs to be complemented by a policy that would preserve other selected rivers or sections thereof in a free-flowing condition and would protect and preserve the natural setting and water quality of such rivers and fulfill other conservation purposes."¹²⁵

Under law six (6), rivers, or segments of rivers with their adjacent land, were designated as scenic waterways. They are the Rogue River, the Illinois River, the Deschutes River, the Minam River, the South Fork Owyhee River and the John Day River.¹²⁶ For these waters and any additional waters added to the system, the "highest and best uses of the waters within scenic waterways are recreation, fish and wildlife uses."¹²⁷ Furthermore, "no dam, or reservoir, or other water impoundment facility shall be constructed on waters within scenic waterways."¹²⁸ This does not apply, however, to the Fish Commission and the Game Commission if they are constructing facilities that facilitate the passage or propagation of fish.¹²⁹ The State Engineer is responsible for the enforcement and administration of provisions with section 390.835.¹³⁰

Except for the duties of the State Engineer under the act, the State Highway Commission is directed to administer the act.¹³¹ In administering the act, the Highway Commission is required to give primary emphasis to "protecting the esthetic, scenic, fish and wildlife, scientific and recreational features" of each area. The Commission is also responsible for adopting rules and regulations for the management of the waterways, and the rules will be the outgrowth of coordinated effort between the Commission, Board of Forestry, State Department of Agriculture and State Water Resources Board.¹³²

In establishing rules and regulations, it must be insured that (1) no roads, railroads or utilities be constructed within a scenic waterway without commission approval;¹³³ (2) forest crops must be harvested so as to preserve the natural beauty of the waterway;¹³⁴ pollution must be controlled;¹³⁵ no mining will be allowed without commission approval;¹³⁶ and no commercial, business or industrial structures will be allowed unless the commission approves them.¹³⁷ Structures that are allowed must be in "harmony with the natural beauty of scenic waterway."

The Commission, upon the receipt of a written request to place a structure within a scenic waterway, must determine if the act would substantially impair the natural beauty of the area. If it would not, then the commission may allow the activity. If the commission feels that the act would impair the scenic waterway substantially, then "no steps shall be taken to carry out such proposal until at least one year

after the original notice to the commission."¹³⁸ During this one year moratorium, the commission and land owner may either alter the plan so as not to impair the natural beauty of the scenic waterway,¹³⁹ or the commission may acquire by "purchase, gift or exchange, the land involved . . . for the purpose of preserving the natural beauty of the scenic waterway."¹⁴⁰ Any agreements that are reached are subject to termination "upon at least one year's written notice by either the commission or the owner."¹⁴¹ The act also allows the commission to "institute condemnation proceedings and by condemnation acquire related adjacent land to a scenic waterway."¹⁴²

The commission is also directed to undertake necessary studies and submit periodic reports to the Governor, with concurrence of the State Water Resources Board, of additional rivers to be included within the system.¹⁴³ In preparing these reports, the commission is directed to seek the aid and assistance of any appropriate persons or agencies as may be necessary.

Three criteria are necessary for any report recommending the addition of a river into the scenic waterways system. They are as follows:

(1) The river or segment of river is relatively free-flowing and the scene as viewed from the river and related adjacent land is pleasing, whether primitive or rural-pastoral, or these conditions are restorable.

(2) The river or segment of river and its setting possess natural and recreation values of outstanding quality.¹⁴⁵

(3) The river or segment of river and its setting are large enough to sustain substantial recreation use and to accommodate existing uses without undue impairment of the natural values of the resource or quality of the recreation experience.

The final decision as to whether or not the river recommended for addition to the system is approved is with the state legislature. If the Legislative Assembly by joint resolution disapproves the recommendation, then it shall not become effective.

The commission may gain jurisdiction over any public land within or adjacent to a scenic waterway, by consent of the governing body having jurisdiction and it may be done with or without compensation. Lands so transferred become part of the state recreational lands and are subject to administration as a part of the scenic waterway system. The commission is also empowered to exchange land within scenic waterway areas for property outside the waterway. The lands should be of "approximately equal fair market value," and if they are not, compensation may be made to the appropriate parties.

Penalties for the violation of certain laws to protect the scenic water ways are set forth in 390.990 of the Oregon statutes. Fines are set at a maximum of \$500, and imprisonment may be for not more than six months for the violation of certain acts.

Pennsylvania

On December 5, 1972 the State of Pennsylvania enacted the "Pennsylvania Scenic Rivers Act." The system was established to

"assure the people of this generation and their descendents the opportunity to refresh their spirits with the aesthetic and recreational qualities of unspoiled streams."¹⁴⁴

Rivers that are included in the Pennsylvania Scenic Rivers system must first be recommended by the Department of Environmental Resources. Any river that is included in the system will be classified as either one of the following: wild river areas,¹⁴⁵ scenic river areas,¹⁴⁶ recreational rivers,¹⁴⁷ or modified recreational rivers. Modified recreational rivers are defined as:¹⁴⁸

those rivers or sections of rivers in which the flow may be regulated by control devices located upstream. Low dams are permitted in the reach so long as they do not increase the river beyond bank-full width. These reaches are used for human activities which do not substantially interfere with public use of the streams or the enjoyment of their surroundings.

Before a river may be included in the system, the Department of Environmental Resources must hold a public hearing on the matter.¹⁴⁹ Once a river is included in the system, the Department may acquire scenic easements within the boundaries of the system.¹⁵⁰ To obtain these easements the Department has the power of condemnation in accordance with the provisions of the "Eminent Domain Code."¹⁵¹

The Pennsylvania act makes no mention of any rivers initially included in the system. As of March 13, 1974 (per telephone conversation) no rivers had been added to the system; however, the Department has formulated guidelines to follow when examining potential

rivers. Penalty provisions have not been set forth in the Pennsylvania act, as is the case in certain other states.

South Dakota

South Dakota has legislation that makes possible the establishment of a scenic and wild rivers system. The policy of the state with respect to those areas that "possess such unique natural scenic beauty, water conservation, fish, wildlife and outdoor recreational values of present and future benefit to the people of the state" is that these areas be preserved "for the benefit of the people of South Dakota."¹⁵² In keeping with this policy, "there shall be designated certain 'wild, scenic and recreational river areas' to be preserved as a part of South Dakota's diminishing resource of free-flowing rivers and streams."¹⁵³

Under this law, a "wild river area" is defined as a "river or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and with waters which are unpolluted, and the public use and access areas adjacent to the rivers or sections of rivers."¹⁵⁴

A second class of rivers, the "scenic river areas," are ones that are "free of impoundments, with shorelines or watersheds still largely primitive but which are accessible in places by roads, and the public use and access areas adjacent to the rivers or sections of rivers."¹⁵⁵

The third class of rivers are the "recreational river areas." These are rivers or segments of rivers that are "readily accessible by road, that may have some development along their shorelines and that may have undergone some impoundment or diversion in the past, and the public areas adjacent to the rivers or sections of rivers."¹⁵⁶

Under the law, the South Dakota Water Projects Formulation and Finance Committee is directed to designate certain rivers according to the classification mentioned above.¹⁵⁷ In making this decision, the Committee is required to co-operate with the Game, Fish and Parks Commission. Once a river is included in the system, "no development shall occur which is detrimental to the natural and scenic beauty of the designated river."¹⁵⁸

The law that established the wild, scenic and recreational rivers system did not specify any particular rivers that were to be considered or placed initially into the system, and as of March 13, 1974, no rivers had been added to this system. As noted previously, several of the states have specified certain rivers in the initial legislation.

Tennessee

In 1968, Tennessee enacted its Scenic Rivers Act.¹⁵⁹ The classification of rivers in the Tennessee system differs slightly from those of the states mentioned previously in this report. Rivers in the Tennessee scenic rivers system are classified as being (1) Class I--

Natural Rivers; (2) Class II--Pastoral Rivers and (3) III--Partially developed river areas. These classes of rivers are defined as follows:¹⁶⁰

Class I--Natural River Areas

Those free-flowing rivers or sections of rivers with shorelines and scenic vistas unchanged, or essentially unchanged, by man, with no extensive paralleling roads closer than one (1) mile (except in river gorges where there must be no extensive paralleling roads within the gorge or within one quarter ($\frac{1}{4}$) mile back from the gorge rim), and with only a limited number of crossing roads or spur roads existing at the time of designation as a state scenic river. Additional access would be limited to trails. Water would be kept unpolluted. Lands adjacent to these rivers that are not already in state or public ownership should be protected by acquisition of fee title or by conservation easements to the full extent necessary to preserve a true natural environment. These river areas should be managed in accordance with the concepts embodied in the national Wilderness Act...

Under the present law, five (5) rivers or segments or rivers were initially classified as Class I rivers. They are the Blackburn River, Conasauga River, Roaring River, Spring Creek and Hatchie River, which was classified as a swamp river.¹⁶¹

Class II--Pastoral River Areas

Those free-flowing rivers or section of rivers the lands adjacent to which are partially or predominantly used for agriculture and other dispersed human activities which do not substantially interfere with public use and enjoyment of the rivers and their shores. Water would be kept unpolluted. Lands adjacent to any such river would remain primarily in the type of use existing at the time of designation as a state scenic river or else be allowed to revert to natural conditions. Scenic values should be preserved by acquisition of conservation easements, zoning and similar means, and by acquisition of fee title of areas set aside for access, camping and recreation.

The law includes six (6) rivers or parts of rivers as Class II rivers. These rivers or parts of them are: Blackburn fork, Buffalo River, Collins River, Harpeth River, Roaring River and Spring Creek.¹⁶²

Class III--Partially Developed River Areas

Those rivers or sections of rivers in areas affected by the works of man, but which still possess actual or potential scenic values. Included would be rivers with some housing or other building developments near their shorelines, rivers with parallel roads or railroads, rivers with some impoundments, and rivers polluted, for example, by strip-mine run-off. These rivers would be managed to prevent further loss of scenic values, to improve the scenic aspects of their surroundings, and to restore the quality of their waters.

Four (4) rivers are designated as Class III Developed River areas. These rivers or parts of them are: French Broad River, Harpeth River, Tuckahoe Creek, and Hiwassee River.¹⁶³

The original act included larger segments of the Buffalo and Harpeth Rivers, however, their segment lengths were reduced. Part of the reduction was the result of public misunderstanding concerning the land acquisitions that were proposed. The Hatchie River was added to the system in 1970, and is classified as a swamp river. As of March 13, 1974, these above mentioned rivers are the only ones in the system.

The scenic river system of the state of Tennessee is administered by the Department of Conservation, which is aided by the Game and Fish Commission.¹⁶⁴ The Commissioner of the Department of

Conservation is directed to make and enforce regulations to protect the scenic river areas. The Commissioner is also directed to study and "from time to time" submit to the governor and general assembly his recommendations for rivers to be added to the system. The law specifically allows for "other agencies or . . . citizen groups working independently or with the conservation department" to submit proposals for additions to the system.¹⁶⁵

General guidelines are established in the law for the management of the three classes of rivers within the scenic rivers system. Class I rivers should generally be managed so as to: (1) best maintain a wilderness type area; (2) allow camping and access only at designated public access areas; and (3) allow for public use only within prescribed public use easements or public access areas.¹⁶⁶ Class II areas would be managed so as to maintain the scenic values of the river and at the same time preserve the "right of riparian land-owners to use the river for customary agricultural and other rural purposes."¹⁶⁷ Finally, Class III rivers should be managed in such a manner as to maintain and enhance the scenic values and at the same time, preserve the use of the river for agricultural, residential, recreational, commercial, and industrial purposes.¹⁶⁸

The law also provides for the reclassification of rivers to a higher status. If the Commissioner of Conservation feels a Class II or III river has been restored, he may recommend its reclassification

to the general assembly. Furthermore, no river may be managed in such a manner as to require its reclassification to a lower level.¹⁶⁹

The Commissioner of Conservation is also directed by the law to determine the boundaries of the system within two years after the establishment of a scenic river. For a Class I river, the boundary must include the entire vista from the river and its banks.¹⁷⁰ For the Class II and Class III rivers, "the boundary shall include the vista from the river and shall be at least fifty but not more than four hundred and fifty feet from the usual banks of the river on each side."¹⁷¹

In acquiring land within the boundaries of the scenic river area,¹⁷² the Commissioner of the Department of Conservation may exercise the power of eminent domain in accordance with the provisions of the appropriate state statutes.¹⁷³ For example, eminent domain may not be applied on Class II and III rivers where the area is "less than seven river miles in either direction from another public use easement or public access area ..."

Land uses allowed within the reaches of any scenic river area are specifically set forth in the act. No new roads buildings or mining is allowed in the Class I area. Some timber cutting is allowed in the Class I area.¹⁷⁴ In the Class II and III areas, present agricultural practices are allowed, and farm-use buildings may be constructed. "Public access through new road construction ... shall be allowed, provided there is no other such access within seven (7) river miles in either direction."¹⁷⁵

The law additionally authorized the Commissioner to cooperate with other state agencies,¹⁷⁶ and the federal government¹⁷⁷ to maintain and enhance the values of the scenic river areas. The commissioner may also seek the assistance of federal and local government agencies to aid his actions.¹⁷⁸

Under the penalty section of the law, it is stated that anyone who "violates, fails, neglects, or refuses" to comply with the provisions of the act or regulations of the Commissioner "may be compelled to comply with or obey the same by injunction, mandamus or other appropriate remedy . . ."¹⁷⁹ Fines established for the failure to comply with the orders and regulations related to the scenic rivers system may not be more than fifty dollars for each day of violation.¹⁸⁰

West Virginia

On March 8, 1969, the West Virginia legislature passed the state's "Natural Streams Preservation Act."¹⁸¹ Although not entitled a scenic and wild rivers act, as are most of the statutes, it serves basically the same function.

The policy of the state of West Virginia with respect to its natural streams is to "secure for the citizens of West Virginia of present and future generations the benefits of an enduring resource of free-flowing streams possessing outstanding scenic, recreational, geological, fish and wildlife, botanical, historical, archeological, or other scientific or cultural values."¹⁸²

To implement this policy, the legislature designated certain streams as being "protected streams." These streams are to be managed in such a way "as will leave them unimpaired for future use and enjoyment as free-flowing streams, and so as to provide for the protection and the preservation of these streams in their natural character."¹⁸³

Three streams or parts of streams were originally selected as "protected streams." They are the Greenbrier River, Anthony Creek and the Cranberry River.¹⁸⁴ As of March 13, 1974, these were still the only rivers within the system, although, there have been unsuccessful attempts to add additional rivers. Supervision of the administration and enforcement of the provisions set forth in the stream preservation act is the responsibility of the Chief of the Division of Water Resources of the Department of Natural Resources.¹⁸⁵ The State Water Resources Board has the "authority to promulgate rules and regulations . . . to implement and make effective the powers, duties and responsibilities vested in the board and the chief by the provisions of this article . . ."¹⁸⁶ The Board is further authorized to make any necessary investigations, inspections and inquiries to ensure that the provisions of the law are complied with.¹⁸⁷

Under the law, it is considered unlawful for any person to modify any protected stream or part of it without first obtaining a permit from the Department of Natural Resources.¹⁸⁸ The term "person" is taken to mean "any public or private corporation, institution,

association, firm or company organized or existing under the laws of this state or any other state or country; State of West Virginia; governmental agencies; political subdivision; county court; municipal corporations; industries; sanitary district; public service district; partnership; trust; estate; person or individual; group of persons or individuals acting individually or as a group; or any other legal entity whatever."¹⁸⁹

The law prescribes that no permit shall be issued unless the actions taken under the permit:" (a) will not materially alter or affect the free-flowing characteristics of a substantial part of a protected stream or streams; (b) is necessary to prevent an undue hardship; and (c) meets with the approval of the chief."¹⁹⁰ Prior to issuing a permit, a public hearing must be held. The hearing takes place in the county in which the proposed modification is to be made. The chief of the Division of Water Resources of the Department of Natural Resources will make the determination as to whether or not the permit should be issued.¹⁹¹

Once a permit is issued, the law provides for field inspections of the work to ensure that it is being done in a proper manner.¹⁹² If the work is not being done in compliance with the permit, it becomes subject to revocation or suspension.

Any person who is adversely affected by an order by the chief or aggrieved by the failure of the chief to comply within the specified time limits as set forth in section 20-5B-8 of the law, may appeal to

the Water Resources Board.¹⁹³ Specific guidelines are established for judicial review of the Boards decision.¹⁹⁴ Any person who fails or refuses to comply with the provisions of the law or orders of the chief are guilty of a misdemeanor. Punishment for a first offense is by a fine of not less than twenty-five dollars nor more than one-hundred dollars. Subsequent offenses may lead to fines as high as one-thousand dollars or by imprisonment for a period not to exceed six months, or by both.¹⁹⁵

Wisconsin

Wisconsin has an established wild rivers system in the state.¹⁹⁶ The intent of the legislation is to "afford the people of this state an opportunity to enjoy natural streams, to attract out-of-state visitors and assure the well-being of our tourist industry, it is in the interest of this state to preserve some rivers in a free-flowing condition and to protect them from development..."¹⁹⁷

The wild rivers act includes three rivers or portions of rivers within the state of Wisconsin. The wild rivers established by the legislation are the Pike, Pine and Popple rivers.¹⁹⁸ Special provision is made to preserve the Wolf River, although it is not included under the wild rivers act.¹⁹⁹ These rivers are to be managed so as to preserve, protect and enhance their natural beauty, recreational and other values.

The Department of Natural Resources is the agency directed to provide the leadership in establishing a management policy for the rivers in the system.²⁰⁰ Additionally, the department is directed to consult with other state agencies and planning committees,²⁰¹ collaborate with county and town boards to develop an acceptable program for the system,²⁰² administer the management program,²⁰³ seek the aid of the federal government and private concerns to implement land use practices,²⁰⁴ and act as the co-ordinator under this subsection.²⁰⁵

Wyoming

Although Wyoming has not formally established a scenic rivers system, the legislature has established a "Stream Preservation Feasibility Study."²⁰⁶ The purpose of this study is to "determine methods and criteria for preserving the scenic and recreational quality of Wyoming rivers and streams."²⁰⁷ A 14-member committee was established to conduct the study. Members of the committee represent the recreation commission, game and fish commission, department of economic planning and development, department of agriculture, state engineer, commissioner of public lands, department of health and social services, travel commission, two members of the state senate and state house, and two members appointed from the public at large.²⁰⁸

The duties of this commission are as follows:²⁰⁹

1. Make preliminary surveys to define the character, quality recreational, scenic, historical, aesthetic, fish and wildlife potential, and any other values to be considered in preserving streams for public use and benefit.
2. Plan a state scenic and recreational stream preservation system.
3. Evaluate and describe the potential of any streams which might be identified as meeting the criteria of the preservation system.
4. Prepare a report on the proposed preservation system on or before October 1, 1974.
5. Prepare and submit to the legislature any recommendations for a stream preservation system on or before January 1, 1975.

The study committee is required to seek public input while conducting the study and to hold public hearings on the matter. The act further encourages all federal, state, county and local governmental units to cooperate with the committee.

In summary, state wild and scenic river acts have provided a legislative base to protect and preserve recognized "vestiges of rivers primeval." However, from discussions with state agency personnel, it was concluded that thus far the acts have been effective only for those rivers included in the initial legislation enactment. The potential of the state wild and scenic river acts has yet to be realized.

2. Stream Preservation and Encroachment Laws

The preceding discussion of state wild and scenic rivers acts illustrated one method adopted by the states to protect the streams and related habitat from destruction. These acts provide blanket

coverage for the streams involved. They are intended to limit and regulate all or many of the activities that take place on the streams and surrounding lands that remain in essentially a natural condition. However, many of the nation's streams have already been affected by man's activities. Thus arises the need for legislation to regulate activities on developed streams.

Legislation adopted in many states to prevent or regulate further degradation and/or intrusions in water courses and lakes are the stream preservation and encroachment laws. These laws provide broad coverage regulating activities that may take place in the stream bed or lake.

One feature that distinguishes a stream preservation law from dredging and filling or channelization laws is that the stream preservation law is frequently directed towards limiting or controlling highway construction that may take place in or bordering the stream. Also, stream preservation laws are not as broad as a wild and scenic rivers act, since they are limited primarily to activities that take place in the stream bed. The following discussion will examine stream preservation laws as developed in New York, Montana and Colorado.

In many cases it becomes difficult to distinguish between a stream protection, a channelization, and dredging and filling law. All three deal with slightly different problems. However, the end result or goal to be achieved is essentially the same, that is, the desire to

maintain the stream and its related fish and wildlife, recreation, and esthetic values in a state approximating natural conditions.

Stream Preservation Laws

One of the earliest and most significant stream preservation laws enacted was in Montana. In early 1960, a conflict arose between the Montana Fish and Game Department and the road builders over the adverse impact of highway construction on trout streams.²¹⁰

Through the efforts of the Fish and Game Department, and civic organization like the Junior Chamber of Commerce and the Montana Wildlife Federation a stream preservation law was enacted on a temporary basis in 1963.²¹¹ It was permanently enacted in 1965. In contrast to the 1963 bill which passed by a narrow margin, the 1965 bill passed through the legislature with only one dissenting vote.²¹²

The Montana Stream Preservation Law, as it presently exists, holds that:

It is hereby declared to be the policy of the state of Montana that its fish and wildlife resources and particularly the fishing waters within the state are to be protected and preserved to the end that they be available for all time, without change, in their natural existing state except as may be necessary and appropriate after due consideration of all factors involved.²¹³

Under the law,

any agency of state, government, county, municipality, or other subdivision of the state of Montana... shall not construct, modify, operate, maintain, or fail to maintain, any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing

shape and form of any stream or its banks or tributaries by any type or form of construction without first causing notice of such planned construction to be served upon the Montana Fish and Game Commission...²¹⁴

Thirty days after the commission receives a request for a stream alteration, the commission must determine whether or not the project will "adversely affect any fish or game habitat."²¹⁵ If adverse effects will be caused, the commission may make recommendations to eliminate or reduce them.

If the applicant refuses to modify the plans in accordance with the commission's recommendation, a request is made for an arbitration board. The district judge of the district in which the project is located then appoints a three member board to act as an arbitration committee.²¹⁶

This control over stream alterations does not apply to irrigation districts projects or irrigation systems.²¹⁷ Thus, diversion works may be placed, constructed or altered within the stream and need not obtain commission approval.

The commission does not have control over the federal agencies. However, the state fish and game department is directed by the law to report to the commission "acts and omissions on the part of the government of the United States and its agencies within the state of Montana which do, will or might affect adversely the fish and wildlife resources..."²¹⁸ The commission will then notify the involved federal agency of the objections to their actions. These records are

available to the public, and would serve as an incentive to the federal agency to correct its actions.

Failure to comply with the provisions of the act may cause one to be guilty of a misdemeanor and, if convicted, to be fined "not less than one hundred fifty dollars and not more than five hundred dollars."²¹⁹ The act further provides for the restoration of the stream to return it as near its original condition as possible or to comply with recommendations of the Commission which will mitigate the damage done.²²⁰

Sound physical data was in part responsible for the passage of the act.²²¹ During the first six years of the act, several proposed road alignments were moved to prevent stream damage, extra bridges were constructed to limit intrusions, and channel work was limited to the time of year when spawning was not present.²²²

The act has been effective in Montana in two ways. Firstly, it allows for alterations in highway projects during the pre-construction phase, thereby eliminating possible adverse impacts. Secondly, it has brought about closer cooperation between the fish and game department and the highway department. Based on our field survey, it appears that some of this cooperation may have been due to the personalities involved.

Not long after the final enactment of the Montana Stream Preservation Law, the state of New York became concerned with stream destruction caused from dredging gravel, alteration of the stream beds

to accommodate highways, and misuse by riparian landowners and enacted a stream protection law in 1965. The effect of this law is similar to the Montana statute.²²³

Under New York law, no person is allowed to "change, modify or disturb the course channel or bed" of a stream, or to "remove any sand, gravel, or other materials" from within or near the stream, without first obtaining a permit allowing the work.²²⁴ The law applies to any surface watercourse greater than 10 acres at mean low water level which has been designated as class AA through C(t) for water quality standards.²²⁵ Small lakes and streams that are "in the course of a stream" are also covered by the act, regardless of their classification as to water quality.²²⁶

The New York law is more comprehensive than the Montana law. It covers the three broad areas of stream disturbances, dredging and filling in navigable waters and dams and locks. Requests for permits to conduct activities within the streams are filed with the Department of Conservation. After reviewing the request, the Department may approve, reject or limit the permit with restrictions. The permit may indicate areas of streams to be altered, construction methods and limit the amount of material that may be removed from the stream.²²⁷

The permit issues must set forth measures to:

Minimize the disturbance of a stream and...prevent unreasonable erosion of soil increased turbidity of waters, irregular variations in velocity, temperature and level of waters, the loss of fish and aquatic wildlife and the destruction of natural habitat thereof, and the danger of flood or pollution.²²⁸ (Emphasis added.)

The Department has the option of holding public hearings in connection with a permit application. Also, no permit is required of public corporations that have entered into a written memorandum of understanding with the Department.²²⁹ However, the memorandum must be established "so as to afford proper protection to the public beneficial uses of such water courses."²³⁰

The New York Stream Protection Law also exempts state departments and state public corporations from the permit requirement. These agencies "may" enter into a written memorandum of understanding with the department of environmental conservation. Furthermore, the memorandum "may establish procedures for review... of the plans for such projects and for written recommendations by the Commissioner with respect thereto."²³¹ A further exemption is allowed for "emergency work" that is necessary to "protect the health, safety and well-being of any person or to prevent damage to personal or real property, although the department must be notified 48 hours after the commencement of the work and within 48 hours after its completion!"²³²

Not only does the law apply to alteration, but no person is allowed to construct any dam or structure across a natural stream, nor be allowed to build a dock, pier, wharf or other structure, temporarily or permanent, used as a landing place.²³³ The procedures for obtaining a permit are similar to those for stream alterations.²³⁴ There are several exemptions from the permit requirements, including structures where the drainage area does not exceed one-square

mile (subject to other requirements), farm ponds that, for example, are used for the propagation of fish and maintenance of wildlife, docks, piers and wharfs of a city with a population over 175, 000, and docks, piers, and wharfs extending into navigable waters for a distance of less than 40 feet or to a depth of water less than four feet.²³⁵

"Marshes, estuaries, tidal marshes and wetlands that are adjacent to and contiguous at any point to navigable waters" are also protected from excavation or filling by the permit system.²³⁶ In granting a permit, the requirements for which are similar to that for stream alterations, the Department is directed to protect the navigable waters and associated resources, including the fish and aquatic environment.²³⁷

The stream protection law directs the inspection, when in the interest of public safety, of dams and other structures impounding waters and also docks, piers and wharfs extending into such waters.²³⁸ The Department, after notice and hearing, may direct any person or local public corporation to either remove or erect, reconstruct or repair the structure according to Department directives. If a party fails to remove the structure, the Department may have an agency remove the structure, and the cost of such action is assessed against the real-property and becomes a lien against the property to the same extent as any tax levy.²³⁹

The Department may also inspect for the presence of illegal fills, excavations or alterations of streams, which pose a hazard to public

safety or endanger, among other things, the fish and wildlife resource. After notification and hearing, the department may direct that the illegal act be corrected, and if it is not corrected in a reasonable time, the department may order the correction and assess the cost against the lands and enforce collection in the same manner as with tax liens.²⁴⁰

The law is very clear on the point that permit requirements for stream alteration, dams and other structures, and dredging or filling in navigable waters, are not covered under one permit. A permit issued for one purpose will not imply that it is for any other purpose. There are three separate and distinct procedures to be followed, and three different permits.²⁴¹

It was not long after the passage of the Montana and New York stream protection bills that the State of Colorado enacted a stream protection law. As early as 1968, the state legislature of Colorado noted the need for better cooperation between the State Game, Fish and Parks division and the State Highway Department. A state report indicated that:

In order to protect the wildlife resources of the state, to as great a degree as possible, early participation of the Game, Fish and Parks Division in designing and planning of highway construction and similar programs is imperative. Therefore, the committee recommends that the General Assembly consider legislation to require that the division participate in the initial planning of highways and other public facilities affecting wildlife and other aspects of outdoor recreation.²⁴²

This recommendation was acted upon, and in 1969 the legislature passed a stream protection law.²⁴³ The law was stimulated by the Montana law, and is similar in some respects. As was the case in Montana, opposition to the law came from the State Highway Department. The Department's view was that the bill was unnecessary, for in the past due consideration had been given to the impact of highway construction upon the streams and coordination had been made on voluntary basis with the Game, Fish and Parks Division.

Due to the influence of the highway department and associated groups, such as the county commissioners, certain concessions were made to ensure the passage of the bill. The major concession was to remove "political subdivisions of the state from requirements under the law."²⁴⁴ Unlike Montana the stream preservation law did not receive the wide spread support of the state legislature. Seven votes were cast in opposition to the bill in the House, and eight in the Senate. The bill did receive a majority vote and was enacted.

As the law now stands,

No agency of the state--shall obstruct, damage, diminish, destroy, change, modify or vary the natural existing shape and form of any stream or its bank or tributaries by any type of construction without first notifying the game, fish, and parks commission of such planned construction.²⁴⁵

As may be noted above, this act only applies to an "agency of the state" and does not include private individuals, counties or municipalities. This is not the case with the New York law and the Montana law which give wider coverage of state bodies.

After the commission receives notice of proposed alterations, it will determine whether or not the project will have an adverse effect upon the fish and wildlife resources, and fishing waters within the state.²⁴⁶ If the plan will adversely affect the stream involved, the commission will notify the applicant and propose recommendations or alternatives to diminish or eliminate the adverse effect.²⁴⁷

Within fifteen days after the applicant receives the notice, it must notify the commission as to whether or not it "refuses to modify its plans in accordance with such recommendations or alternatives."²⁴⁸ If the applicant refuses the recommendations, the Commission may recommend the matter be arbitrated. If it so desires, the Commission will notify the governor in writing within ten days. No further activity on the project will take place until the governor issues "a written notice which shall be binding on all parties concerned, and there shall be no judicial review thereof."²⁴⁹

This procedure differs from that of Montana where a three man committee is selected to arbitrate the matter. As in Montana, the act in no way applies to any irrigation project.²⁵⁰

The preceding enactments reviewed illustrate examples of legislation termed "stream preservation" laws. Three states have passed what are referred to as "stream alteration" laws. They are Idaho, Utah and Vermont.²⁵¹ These laws may also act as a stream preservation or channelization acts.

In Idaho, it is the state policy to protect all stream channels and their environment against "alteration for the protection of fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, and water quality."²⁵² (emphasis supplied). To achieve this goal, no applicant²⁵³ is allowed to engage in any project or activity which will alter a stream channel without applying for and receiving a permit from the Department of Water Administration.²⁵⁴

Upon receipt of the application the director of the Department of Water Administration is required to examine the application, and to consult with any state agency having an interest in the stream channel to "determine the likely effect of the proposed stream channel alteration upon the fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, and water quality values of the stream."²⁵⁵

Within 20 days after receipt of copies of the proposed alteration, the other agencies involved are directed to notify the director as to whether the proposed alteration will have an "unreasonably" detrimental effect upon the stream, and these agencies may recommend alternative actions to the director.

Based upon the investigation of the director and the recommendations of the agencies, the director will notify the applicant as to the decision. The applicant must then notify the director within 20 days if he refuses to modify the plans or that he requests a hearing on the matter. After a hearing, the director "shall enter his findings in writing approving the application and plans in whole or in part, or upon

condition, or rejecting said application and plans for such proposed stream channel alteration."²⁵⁶ The applicant or any person appearing at the hearing has the right to have the decision of the director reviewed by the district court in the county where the proposed alteration is to take place.

Several exemptions are made under the law. No permit is required to clean, maintain, construct in, or repair any stream channel, diversion structure, canal, ditch or lateral. Also, obstructions may be removed from a stream channel, if they interfere, or are likely to, with the use or delivery of water under an existing water right.²⁵⁷

The act does not apply to any existing, proposed, or future reservoir projects. No portion of any continuous waterway system which will float commercial tug and barge vehicles to ports handling trans-oceanic traffic is subject to the permit requirement.²⁵⁸

Provisions of the act may be waived in the case of an emergency when action is necessary to "protect life or property including growing crops." However, the stream work that is done under these conditions must be limited only to that work necessary to safeguard life or property during the emergency period.²⁵⁹

Anyone who fails to comply with the provisions of the act is guilty of a misdemeanor and upon conviction subject to a fine of not less than \$150 nor more than \$500. Any stream alteration conducted without a permit is to be considered a public nuisance, and the director has the authority to seek a temporary injunction from the district

court to restrain any further alteration.²⁶⁰ The court may then order that the stream channel be restored to "as near its original condition as possible" or to effect such measures so as to mitigate the damages.²⁶¹

Under the Utah Natural Streams Relocation Act it is "unlawful for any state agency, county, city, corporation or person in any manner to relocate any natural stream channel or to alter or change the beds and banks of any natural stream for any purpose other than to divert, conserve and store water for beneficial uses to prevent erosion or flooding without first obtaining the written approval of the state engineer."²⁶²

Those parties desiring to relocate, alter or change the beds and banks of any natural stream must file in writing an application with the state engineer. The application must indicate, among other things, the location, nature and type of relocation, alteration or change, methods employed, and the purpose of the proposed work.²⁶³ This approval is not necessary for emergency situations involving "immediate, potential or actual injury or damage" to persons or property.²⁶⁴

The state engineer, upon the receipt of an application, is directed, "without undue delay, " to conduct necessary studies and investigations to determine whether the proposed relocation, alteration or change will: (1) impair vested water rights, or (2) will unreasonably affect any recreational use or the natural stream environment, or (3) will endanger aquatic wildlife.²⁶⁵ If the project will not

have an adverse effect on the aforementioned items, then the application will be approved. Otherwise, it shall be rejected. The state engineer may approve the application, in whole or in part, or upon any reasonable terms and recommendations that will provide for the protection of the specified water values.

None of the costs incurred by the applicant resulting from compliance with the provisions of the law are to be considered reimbursable upon the division of water rights.²⁶⁶ The act specifies that "any officer or employee of any state agency, county, city or corporation, or any person" that violates the provisions of the act, except as specifically excluded, is guilty of a misdemeanor.²⁶⁷

The Vermont Stream Alteration Act²⁶⁸ provides that no person²⁶⁹ or municipality shall "change, alter or modify the course, current or cross-section of any stream with a drainage area greater than ten square miles within or along the boundaries of this state by use of construction equipment or similar mechanical devices, either by fill of ten cubic yards or more or by excavation of ten cubic yards or more where the excavation material is used for commercial purposes, unless authorized by the water resources department."²⁷⁰ (emphasis supplied). This law, as in the other states mentioned, does not apply to stream bank stabilization measures applied for the protection of lives and property.

Any person or municipality desiring to change or diminish the course, current or cross section of a stream must apply in writing to

the Vermont Water Resources Department for its approval. A copy of the application is also filed with the fish and game department, which will investigate and certify to the water resources department as to the effect the proposed action will have upon the fish life.²⁷¹

The Department of Water Resources will examine the application to determine if the proposed change will (1) adversely affect the public safety, or (2) cause damage to fish life or wildlife, or (3) adversely affect riparian rights and (4) ensure that the application is consistent with the "public good."²⁷² If the Department feels that the application will have an adverse effect upon the above mentioned values, then the application shall be denied.

Appeals to the actions of the Department may be made by the affected party, within 30 days after having been notified of the department's decision, to the water resources board. The board is required to hold a hearing, and based on the evidence presented, issue an order affirming, reversing or modifying the department's decision. This order is binding upon the department.²⁷³ The board's order may be appealed by the person or municipality aggrieved to the county court for the county which the proposed change will take place.²⁷⁴

Any person or municipality that violates a provision of the act shall be fined not less than \$50 nor more than \$1,000. Each violation and each day of continuing violation is considered to be a separate and distinct offense.²⁷⁵

The degree to which fills and encroachments will be allowed by a state depends on status of the waters, with respect to being, navigable²⁷⁶ or non-navigable.²⁷⁷ For the most part, the states are able to exercise a large degree of control over private fills in navigable waters. A recent Supreme Court case in Washington found that the placing of fills in navigable waters "constituted an obstruction to navigation" and ordered that they be removed.²⁷⁸

The idea that the states own the lands under navigable waters provided the means by which the states could sell the land to private individuals, and subsequently a degree of public rights in those waters. The practice has long been that the riparian owner could build wharves, piers and other structures in navigable waters in aid of navigation.²⁷⁹

Many of the states have adopted the public trust concept with respect to the lands underlying navigable waters.²⁸⁰ In these instances the public right is treated much like a property right, where the state can enforce its public trust responsibility.²⁸¹

The private individual may claim a superior right to the public in navigable waters. However, the courts appear to hold consistently in favor of the public right which may place restrictions on the private right to use property as one chooses.²⁸² If the state fails to adopt legislation to control the encroachments into the waters, then the courts may follow the Washington Supreme Court and halt these actions.

Public rights would appear to predominate in the navigable water cases. The degree of control which the states have over non-navigable waters or where lands are submerged and privately owned is less clear than the case for navigable waters. There have been attempts to expand state control into non-navigable waters based on their police power. As Ausness points out, "most regulation of dredge and fill operations has been limited to coastal wetland areas and the scope of such legislation has generally been restricted to the protection of marine fisheries and similar ecological considerations."²⁸³

The general rule concerning the beds of streams underlying non-navigable waters is that they are subject to private ownership, and the public has no rights to the use of the water.²⁸⁴ With respect to lakes and the lake beds some of the states have allowed only for the use by littorals and their licenses.²⁸⁵

There are two general approaches followed by the states in determining the rights of the private individual to dredge or fill a portion of his riparian waters. These approaches are referred to as: (1) the common law view, and (2) the civil law or common use approach. The common law view holds that the riparian owner is restricted to the use of that water which is immediately over the portion of the bed he owns, and that any invasion of this water or bed by the public is considered to be a trespass.²⁸⁶ The civil law or common use approach allows the riparian owner of the bed to use the surface

of the entire lake for purposes such as fishing and boating so long as he does not unreasonably interfere with the rights of other riparians.²⁸⁷

The civil law approach has been broadly interpreted in some of the states. In Arkansas, for example, a land owner may straighten out or modify a natural channel on his property, as long as the natural and general course of the water is not changed, and the altered channel has the capacity to carry water.²⁸⁸

The following states reviewed illustrate some of the steps taken to regulate dredging and filling within the states.

Illinois

In Illinois, the Department of Transportation appears to have the broadest powers relating to general water administration. The Department has jurisdiction and supervision over all of the rivers and lakes of the State, where the state or the people may have a right or interest. The Department is required to insure that no encroachment takes place or is used by private interests except as provided for by law, and only after permission has been obtained from the Department.²⁸⁹

The law states that:

It shall be unlawful for any person, persons, corporations, counties, cities, municipalities, or other agency to make any fill, deposit, or encroachment in, deposit or placement of felled or trimmed woody plant upon or along the bank, or erect any bridge, over any of the streams of this State, until plans, profiles and specifications and other data which may be required, have been first filed with the

said Department of Transportation of this State and written permit received therefor.²⁹⁰ (Emphasis supplied.)

In Illinois, a city or village has the authority to dredge or fill non-navigable water bodies in order to "properly lay out, establish, open, alter, widen, extend, grade, pave or otherwise improve streets."²⁹¹ No requirement is mentioned that a permit must be obtained from the Department of Transportation.

Maine

Maine presently has two laws to protect the lakes and streams of the state from the adverse effects of dredging and filling. The first is known as the Great Ponds Act.

Under this act, a "great pond" includes any "inland body of water which in its natural state has a surface area in excess of 10 acres, and any body of water artificially formed or increased which has a surface area in excess of 30 acres, the shore of which is owned by 2 or more persons, firms, corporations or other legal entities."²⁹² Prior to July 1, 1972, the Great Ponds Act was administered by the Department of Forestry. It is now under the direction of the Department of Environmental Protection.²⁹³

The Great Ponds Act requires that permits be obtained for the construction and maintenance of causeways, bridges, marinas, wharves and other structures, or for filling or dredging in, on, over or abutting any great pond. No permit will be issued for any activity which will:

- (1) Unreasonably interfere with existing recreational, navigational, scenic, and aesthetic uses.
- (2) Unreasonably interfere with or harm the natural environs of the great pond or tributary river or stream.
- (3) Cause unreasonable soil erosion.
- (4) Interfere with natural flow of any waters.
- (5) Create or cause to be created unreasonable noise or traffic of any nature.
- (6) Harm any fish or wildlife habitat.
- (7) Lower the quality of any waters.

Any individual person, firm, corporation, municipality, state agency or other legal entity who dredges, erects, or maintains, any causeway, bridge, marina, wharf, dock or other permanent structure, or fills in, on, over or abutting a great pond without a permit is subject to a fine of not less than \$200 or more than \$100 for each day of violation. If a violation does occur, the Attorney General of Maine may institute proceedings to enjoin further violations and may compel the restoration of the affected area to its condition prior to the violation.

Tributaries, rivers, and streams are mentioned in the law, but this applies only to where the proposed alteration of a Great Pond might affect these natural watercourses. Protection of streams is provided for in the Fish and Game "bulldozing statute."

This law is brief, and is stated as follows:

Whoever bulldozes, causes to be bulldozed, fills or dredges between the banks of a river, stream or brook capable of floating watercraft, without first obtaining permission . . . , shall be guilty of a misdemeanor and upon conviction shall be punished by a fine of not less than \$100 nor more than \$1000. This section shall not apply to river, stream or brook crossings in connection with public works projects which shall alter not more than 200 feet of shore nor to private crossings or dam projects which shall not alter more than 100 feet of shore.²⁹⁴ (Emphasis supplied).

Concerning the Great Ponds Act, the Department of Inland Fisheries and Game is of the opinion that the law has been a good law.²⁹⁵ The Department has adopted a "hard line" approach toward their recommendations made for permits. The Department, among other things, has recommended the following general rules: (1) No permanent structures or facilities in the water, (2) no dredging or fillings, and (3) discourage cutting of shoreline vegetation.²⁹⁶

The Department has recommended several changes concerning the law. These recommendations include better education of the public, adequate staffing of the Department of Environmental Protection, firm treatment of violators, and requiring contractors to be familiar with the law when their work is likely to involve water encroachments.²⁹⁷

Stream Encroachment Laws

The earliest attempts to control stream and channel encroachments began in the 1800's with the passage of state laws requiring railroads to provide for the flow and drainage of waters.²⁹⁸ These laws required that railroads be built in such a manner as not to restrict the usefulness of the waters or watercourse, and in some instances encroachment legislation required that the watercourse be maintained in its original or previous condition.²⁹⁹

From these early beginnings, legislation to control encroachments into streams and channels expanded in terms of the types of

intrusions prohibited and regulated, and the number of states adopting stream encroachment legislation. The subsequent discussion deals with specific state attempts to halt or limit stream encroachments.

Illinois

Illinois was the first state to adopt general stream encroachment legislation on a statewide level.³⁰⁰ Under the current Illinois legislation, the Department of Public Works and Buildings has general supervision over every body of water within the State where the State or the people of the State have any rights or interests. In carrying out this supervision, the Department of Public Works and Buildings is directed by law to "jealously guard the shores and waters of the State so that the true and natural conditions thereof may not be wrongfully and improperly changed to the detriment and injury of the State of Illinois."³⁰¹

As the law now reads:³⁰²

It is unlawful to make any fill or deposit of rock, earth, sand, or other material, or any refuse matter of any kind or description or build or commence the building of any wharf, pier, dolphin, boom, weir, breakwater, bulkhead, jetty, causeway, harbor, or mooring facilities for watercraft, or build or commence the building of any other structure, or do any work of any kind whatsoever in any of the public bodies of water within the State of Illinois, without first submitting the plans profiles, and specifications therefor, and such other data and information as may be required, to the Department of Public Works and Buildings of the State and receiving a permit therefor...

The Department of Public Works and Buildings is required to make a careful investigation of every body of water within the state and

determine the extent to which the waters have been wrongfully encroached upon by private interests or individuals. Where cases of wrongful encroachment are found, the Department is required to commence appropriate action to recover full compensation for the damages caused.³⁰³

Michigan

On January 9, 1973, Michigan enacted the "Inland Lakes and Streams Act of 1972."³⁰⁴ Under this new act, a permit is required from the Department of Natural Resources if a person³⁰⁵ intends, among other things, to: (1) dredge or fill bottomland;³⁰⁶ (2) construct, enlarge, extend, remove or place a structure on bottomland; (3) erect, maintain or operate a marina; (4) create, enlarge or diminish an inland lake or stream;³⁰⁷ (5) structurally interfere with the natural flow of an inland lake or stream; (6) construct, dredge, commence, extend or enlarge an artificial water body where the purpose is ultimate connection with an existing inland lake or stream; or (7) connect any natural or artificially constructed waterway with an existing inland lake or stream for any purpose.³⁰⁸

The act specifies several situations under which a permit is not required.³⁰⁹ For one, it does not include projects constructed under P. L. 83-566, as amended.³¹⁰ Neither does it not cover seasonal structures that are erected to facilitate private noncommercial recreational uses of water, as long as it does not "unreasonably" interfere with the use of the water by others or interfere with the water flow.³¹¹

The Department, upon receiving an application for a permit, must grant or deny the permit within 60 days, or within 90 days if a public hearing is held.³¹² A hearing is to be held by the Department upon written request by the applicant, a riparian owner, or other involved parties.³¹³ The Department will issue the permit if it finds that the project involved will not adversely affect the public trust or riparian rights. The Department in making its determination must consider the effect upon the inland lakes and streams and the uses of all such waters including uses for recreation, fish and wildlife, aesthetics, local government, agriculture, commerce and industry.³¹⁴ Permits will not be issued if the proposed project will adversely affect the waters or other natural resources of the state.

The Department may commence a civil action in the circuit court of the county in which a violation occurs to obtain compliance with the provisions of the act. Actions may also be taken by the Department to order the removal of an unauthorized structure, and to compel the party involved to restore the affected area to its prior condition.³¹⁵ Persons violating the provisions of the act are guilty of a misdemeanor.³¹⁶

The "Michigan Water Resources Commission Act," designates that the commission has "control over the alterations of natural or present water courses of all rivers and streams in the state..."³¹⁷

The Act also states that no person shall . . . "fill or grade or permit the filling or grading for any purposes other than agricultural,

of lands in the flood plains, stream bed or channel of any stream" . . . unless the "filling, grading or other activity is permitted "by the commission or by permit from the Department of Natural Resources."³¹⁸ In total this act and the "Inland Lakes and Streams Act" gives a wide range of coverage to control dredging and filling operations in lakes and streams.

Oregon

Oregon has recently modified and amended its statutes concerning the regulation of dredging and filling operations.³¹⁹ In so doing, Oregon has recognized that the unregulated removal of material from the beds and banks of waters, and the unregulated filling in these waters may have an adverse effect upon public health and welfare, navigation, fishery and recreational uses of the waters of the state.³²⁰ To protect these waters, the Division of State Lands has been given the authority to implement control over the removal of material from the beds and banks or filling of the state's waters.³²¹

A permit must be obtained from the Division of State Lands before removals³²² or fills³²³ may be made in any waters of the state. The application must indicate the nature and amount of material removed or filled, the location, the methods employed and the times during which the activity will take place. Removals or fills which occur at locations not more than one mile apart may be combined into one application.³²⁴ The application must be accompanied by a fee

that ranges from \$250 for a fill by a commercial operator to no charge if the work proposed involves the placement of riprap along a stream-bank.³²⁵ The permit, if issued, must be renewed annually if the activity is to continue. At the time of renewal, the director may require the permittee to show that his actions are "consistent with the protection, conservation and best use of the water resources. . ."³²⁶

The Director of the Division of State Lands shall issue a permit to remove materials from waters if he determines that the actions proposed will not be "inconsistent with the protection, conservation and best use of the water resources. . ."³²⁷ In making his determination on applications for fills, the director is required to consider the following:³²⁸

- (1) Whether the proposed fill will "unreasonably" interfere with the preservation of waters for navigation, fishing and public recreation;
- (2) Whether the proposed fill conforms to sound conservation policies, and will not interfere with public health and safety;
- (3) Whether the fill will conform with existing public uses;
- (4) Whether the fill conforms with existing zoning regulations.

In granting a permit, the Director may impose "such conditions as he considers necessary" to carry out the purposes of the law. In formulating these conditions, he may consult with, among others, the State Game Director, the State Fisheries Director and the State Marine Director.³²⁹ Provisions are made under special circumstances for the granting of a temporary permit.³³⁰ Also, the director, by rule, may make exceptions to removals and fills of a "limited" nature if no "substantial" harm could result.³³¹

An applicant whose permit has been denied or who objects to the conditions may, within 10 days of denial, request a hearing from the Director. After the hearing, the Director is required to rescind, affirm or modify the initial order. Appeals from this hearing may be made to the Court of Appeals.³³²

If the Director determines that actions are being taken without a permit, he may "investigate, hold hearings, make orders and take action" to correct the problem.³³³ The Director, after his studies, will notify the person or governmental body concerning his orders. The party affected by such an order or rule may appeal to the circuit court.³³⁴

Any violation of the act or of any rule or order of the director may be enjoined in a civil abatement proceeding. At such a proceeding, the "director may seek and the court may award a sum of money sufficient to compensate the public for any destruction or infringement of any public right of navigation, fishery or recreation resulting from such violation."³³⁵

If any person or governmental body, through his or its negligence, removes any material from the beds or banks of a waterbody, without a permit, the Director in legal action "may seek and the court may award double a sum of money sufficient to compensate the public" for the harm caused to navigation, fishery or recreation rights resulting from the violation.³³⁶ If the parties involved in the violation acted intentionally, then, an award treble the sum of money sufficient

to compensate the public for the destruction or infringement upon the navigation, fishery, and recreational rights may be made.³³⁷

These acts reviewed are but a few of the laws under which the states operate to protect the streams from encroachments, and dredging and filling. Other states, not herein reviewed, have laws to prohibit structures within streams³³⁸ or prohibit obstructions (broadly defined) which will affect physical nature of the stream bed or channel without a permit.³³⁹ Some of the states have also enacted legislation to protect certain designated rivers³⁴⁰ or rivers or streams where public funds have been expended³⁴¹ from construction, excavation or other alterations. This protection may also be afforded to certain specified lakes.³⁴² Other state encroachment laws provide broad coverage relating to any change which will effect the course, current or cross-section of nontidal streams or bodies of water.³⁴³

Beuchert's 1965 report on "State Regulation of Channel Encroachments" identified six major defects or weaknesses in state stream encroachment legislation:³⁴⁴

1. State laws are permissive rather than mandatory;
2. There is a lack of clarity in the legislation;
3. The laws do not provide flexibility of remedies to the agencies;
4. There is a lack of public awareness concerning the legislation;
5. The legislation does not cover the entire floodway, only the channels;

6. Some statutes do not provide for the establishment of encroachment lines.

The laws mentioned herein are by no means inclusive. Additional dredging and filling controls will be discussed later on with reference to marsh, estuary and wetland regulation. The next section will examine a particular type of stream encroachment, that caused by highway construction. Therein, we shall examine some of the attempts by state governments to protect or limit the intrusion of highways into waterbodies, so as to preserve the fish and wildlife habitat, recreation and aesthetic values.

3. Highway Construction Laws

Over the past few years there has been a growing concern over the impact of highways on the environment in general and on the aquatic environment in particular.³⁴⁵ This section reviews some of the laws, policies and programs adopted by selected state highway departments to protect the water environment and related fish and wildlife values. Chapter VI deals with federal regulations under which the various state highway departments must operate in order to obtain federal-aid funds. In Chapter VII, the section entitled, "Agency Internal Policies," state highway Action Plans are discussed.

Complete information concerning state highway department rules and regulations adopted for the protection of the water environment was exceedingly difficult to obtain. Most of the departments' requirements are found in "Special Provisions" publications of the agencies.

It requires a great deal of time to locate the information dealing with fish and wildlife protection. Herein we will review the policies of only certain states, to illustrate the protection afforded the water environments.

In general, most of the state highway departments have specific regulations to cover erosion control work. These regulations cover the type of erosion control materials to be used to prevent erosion, the construction methods adopted to limit erosion, and other provisions to protect the stream generally from pollution resulting from the construction of highways.

Many of the state highway departments have adopted specific regulations to limit the frequent fording of flowing streams by construction equipment.³⁴⁶ Limitations placed on the highway departments in connection with intrusions into stream channels were discussed in part in the preceding section of this report. What follows are specific actions taken by selected highway departments to protect the water environment.

California

The California Department of Public Works and the Division of Highways has a system of Circular Letters and Departmental Directives that set forth the requirements of the Division of Highways with respect to highway construction and its impact on the environment. To the best of our knowledge these Letters and Directives are not available

in a published form, but they may be obtained upon request from the Department of Public Works. This study will examine the direction and intent of these directives with respect to the protection afforded the water environment.

In 1966, the Division of Highways set forth certain directives relating to cooperation and coordination with the Department of Fish and Game.³⁴⁷ In this letter, along with its enclosures, the Division of Highways noted that Section 1600 of the Fish and Game Code provided for the protection and conservation of the fish and wildlife resources. This directive specified that "it is accordingly necessary that personnel engaged in highway planning, design, construction, and maintenance activities recognize this objective and work with this State agency in the furtherance of fish and wildlife conservation, compatible with the Division's engineering and fiscal limitations in this field."

As projects proceed, the letter notes that in keeping with Circular letter 65-86, "meetings and conferences should be held as needed with Fish and Game to insure that fish and wildlife impact has been thoroughly considered." The report indicates that the following factors shall be included in the Submittals of Preliminary Reports:

1. A description of measures planned as project expenditures to minimize effect of proposed construction on fish and wildlife resources.
2. A description of any measures proposed by State Department of Fish and Game to accomplish this purpose which differ from those proposed by the District.

3. To the extent that measures proposed by the District and Department of Fish and Game differ, an explanation of factors considered by the District in arriving at its proposal.

The Letter specified the importance of a prompt determination of the problems associated with fish and game impacts. The policy of the highway department was to coordinate with Regional Managers of the Department of Fish and Game as early as possible "so as to not delay scheduled design preparation," this early coordination being beneficial to both departments.

The Division of Highway's directives were in response to statutes in California Fish and Game Code. Section 1505 of the Fish and Game Code, in response to a serious loss of salmon and trout habitat, provided for the management, protection, and control of any activities within or marginal to spawning areas of State-owned lands in designated areas of certain rivers.

In an attempt to preserve and protect the coastal zone environment of the State of California the Department of Public Works recognized that:

The California Coastal Zone is a unique and irreplaceable natural resource with a limited capacity for use and development. The permanent protection of the natural and scenic resources of the California Coastal Zone is a paramount concern to present and future residents of the State and Nation.³⁴⁸

The policy of the Department of Public Works with respect to the Coastal Zone is one of providing the "optimal transportation service

consistent with local and regional total planning and with the objective of conserving the coastal resource."³⁴⁹

Facilities constructed within the coastal zone were to be coordinated and planned with local and regional agencies to:

1. Encourage and support human uses which are dependent upon the coastal zone's natural resources.
2. Enhance and preserve environmental qualities or amenities while minimizing disruption to stable ecological systems and harmonizing, as nearly as possible, with natural forms.
3. Maintain the maximum number of options possible for future generations.
4. Assist in preserving unique scientific, recreational and educational opportunities.
5. Emphasize safe business and recreational highway user enjoyment of the coastal resources rather than speed of vehicular movement.³⁵⁰

The Standard Specifications of the Department of Public Works for 1971 notes that "mechanized equipment shall not be operated in the stream channels of such live streams except as may be necessary to construct crossings or barriers and fills at channel changes."³⁵¹

The Department of Public Works is also required to submit to the Fish and Game Department general plans

of any project which will divert, obstruct or change the natural flow or bed of any river, stream or lake...or will use material from the stream beds...³⁵² The Department of Public Works and the Fish and Game Departments are directed to establish procedures for the review of proposed modifications and consideration of alternative conditions designed to protect existing fish and game resources.³⁵³

Connecticut

In response to a Bureau of Public Roads Instructional Memorandum the Connecticut Highway Department issued guidelines for the

protection of streams and other waters.³⁵⁴ The guidelines set forth in the memorandum were to apply to all future projects whether or not there was federal participation. The memorandum lists six principal considerations to be followed in state highway planning:

- (1) The physical positioning or location of highways so as to minimize harmful effects due to silting, rolling, washing or contamination.
- (2) The inclusion of specifications in contracts to control contractor's activities so as to keep harmful effects on streams and other waters to a practical minimum.
- (3) The incorporation in highway designs of devices to minimize the escape of harmful materials into streams.
- (4) Including provisions in contracts for the performance of corrective work to safeguard streams and other waters when the need for such work becomes apparent only during construction and is beyond provisions made in the design.
- (5) Making certain that easements, rights or other rights-of-way in connection with control are recognized and provisions for their acquisition made in an orderly and timely manner.
- (6) Comply with Federal requirements that the subject safeguards be reported in connection with Federal-aid projects.

In response to Bureau of Public Roads Instructional Memorandum 21-5-63, the Connecticut Highway Department issued directives for the coordination of designs with the Board of Fisheries and Game.³⁵⁵ Coordination was to be effected in the following manner.

- (1) On non-expressway projects having a major involvement with the Board of Fisheries and Game, the Design Development Section will undertake coordination at the time of the baseline study. The Planning Division will normally undertake coordination on a preliminary basis on all expressway projects.
- (2) On projects not having major involvement and requiring a public hearing, coordination will be accomplished during the period of preparation for the hearing.
- (3) On all other projects, coordination shall be effected after the connections resulting from the Joint Field Inspection have been made.

Corrective measures recommended by the Board of Fisheries and Game are to be brought to the attention of the designer. There is no mention that the designer must comply with the recommendations. It would appear that they may or may not be adopted. An additional aspect still unclear is whether or not coordination is effected early enough on projects "having a major involvement."

Maine

In Maine, a highway contractor is directed to exercise care in the work on streams. He must exercise every reasonable precaution throughout the construction process to prevent siltation of rivers, streams, estuaries and other waters as well as tidal marshland.³⁵⁶

Furthermore, construction operations in water and water areas are to be restricted to those areas where channel changes are shown on the plans and to those areas which must be entered for the construction of temporary or permanent structures. Upon completion of the work, all waters and water areas are to be promptly cleared of all falsework, piling, debris or other obstructions placed there in the construction process.

Frequent fording of live streams with construction equipment will not be permitted during the construction process. Temporary bridges or other structures are required wherever stream crossings are necessary. Additionally, special attention must be given to protecting all trees adjacent to any construction work or project.³⁵⁷

In 1969, the State of Maine established the "Scenic Highway Board."³⁵⁸ The purpose of the act was to establish a system of scenic highways in the State of Maine, and to preserve the scenic values along the scenic highway system.³⁵⁹ The Board includes, in part, the Chairman of the State Highway Commission, the Director of Parks and Recreation, the Commissioner of Sea and Shore Fisheries, the Commissioner of Agriculture, the Commissioner of Inland Fisheries and Game, the Forest Commissioner, the Commissioner of the Department of Economic Development and the Director of State Planning.³⁶⁰

The Board is directed by law to adopt procedures, rules and regulations for the designation and development of the scenic highway system. Factors to be considered by the Board in establishing scenic highways include:³⁶¹

1. Procedures to evaluate the scenic quality of proposed routes.
2. Safety aspects of proposed routes.
3. Procedures to direct motorists to and from scenic highways.
4. The economic implications of designating a route as a scenic highway.
5. Preservation of scenic values in the highway corridor.
6. Compatibility with other conservation plans.

No road may be designated as a "Scenic Highway" until 30 days following a public hearing on the matter.³⁶² The Board may recommend location for rest areas, picnic areas, scenic overlooks and

other developments to enhance the scenic value and use of the highway corridor. These recommendations are not binding upon the state agencies responsible for their implementation.³⁶³

New Hampshire

"Prior to 1963, coordination between the Fish and Game Department and New Hampshire's Department of Public Works and Highways was strictly on an informal basis. In most cases, the damage was done to wildlife before it was noticed and the remedy was 'too little too late'. "³⁶⁴ In 1963, the New Hampshire Fish and Game Department and the Department of Public Works and Highways adopted procedures for cooperation and coordination in adopting plans for highway projects which would adversely affect fish and wildlife resources.

The New Hampshire Department of Public Works and Highways, in addition to Federal-Aid highway requirements, submits proposals on all state-financed projects to the Fish and Game Department for review. As yet, there is still no control over local town road construction projects.

The State of New Hampshire has established a training program for highway field engineers. This program is intended to inform the engineers of possible adverse effects upon the fish and wildlife resources resulting from highway construction. Instruction is given by

members of the Fish and Game Department concerning various aspects of conservation and improvement of fish and wildlife resources and habitat.

The New Hampshire Department of Public Works and Highway's Special Provisions requires that "whenever an appreciable number of crossings of live streams are necessary, temporary culverts or bridges shall be constructed to allow equipment to cross such streams without fording them."³⁶⁵ Disturbances outside the limits of the construction project, as stated, are permitted only when necessary and ordered. All waterways must be cleared as soon as possible of obstructions placed in the water during the construction operation and not a part of the finished work. Additional measures must be taken by the highway contractor to limit erosion. These measures include:³⁶⁶ limiting the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations; incorporation of erosion control features into the project; and the reseeding of areas to limit later erosion.

General Observations

Based in part upon the information received from the various highway departments, and upon our field trips to the selected states some general observations may be made. For one, it appears that state highway departments are becoming more environmentally aware of their impacts upon the water environment. They have made

attempts to limit unnecessary highway intrusions into streams.

Where channel changes are required they have attempted to leave places for fish life to live so as to improve the prospect of recovery to prealteration conditions. For example, in Montana, boulders were placed in a stream bed following construction to provide for fish habitat. In New York, the highway department agreed to the construction of bridges to keep the highway from intruding into the Beaverkill River.

In the past, highway departments lacked trained personnel in the field of environmental and natural resources. At this time, fish and wildlife specialists have been added to the staffs of numerous highway departments, and the departments are receiving additional aid from the fish and game agencies.

The highway departments, regardless of their recent attempts to limit the damage caused by highway construction, are still construction-oriented agencies. Construction projects are approved or disapproved largely on economic grounds. Thus, the majority of highway projects are formulated on the basis of constructing roads between two points in a manner that will produce a least-cost solution. State highway officials have indicated that much of the current environmental legislation has resulted in increased highway construction costs and delayed project completion dates.

Highway officials complain of the lack of cooperation and communication with fish and game agencies. Fish and game agencies in

turn level the same charge against highway officials. Highway departments indicate that they need better data and statistical information from the fish and game agencies to enable them to provide the necessary protection for the fishery resources. Fish and game departments contend that they have not received timely notification on proposed projects, and thus, they feel that their inputs in many cases are too little or to no avail.

The conflicts between the state fish and game departments and the highway departments appear to have resulted due to three problem areas. First, in many cases, there is a lack of legislation defining the interrelated activities of the two agencies to facilitate coordination between the two parties.

Secondly, laws that exist may be criticized on the grounds that they are poorly worded and contain ill defined standards. Laws of this nature do little to promote cooperation and understanding between the parties involved.

Thirdly, conflicts arise due to the personalities of the individuals involved and a lack of understanding by the individuals as to the goals and policies of the conflicting agencies. Some of these problems can be eliminated by improved communication channels.

This section has provided an overview of the actions taken by the state highway agencies in California, Connecticut, Maine and New Hampshire. A complete review of all states was limited by the

absence of complete and up to date information. Additional information on highway policies with respect to the social, economic, and environmental factors is discussed in Chapter VII.

4. Regulation of Dam Construction

Dams act as barriers to both upstream and downstream migration of anadromous fish. The manner and timing of water releases from an impoundment into a stream may also adversely affect the fish life and aquatic habitat. This section reviews some of the steps taken by various states to protect fishery resources from the adverse impacts that may result from the construction of dams or other impoundments within a stream.

Of the fifty states, forty-nine have state legislation to regulate or control the construction of dams.³⁶⁷ Most of the legislation deals with regulation over the construction and maintenance of dams. In general, before a person may construct, repair, alter, or remove a dam or other impoundment he must obtain approval from the appropriate state agency.³⁶⁸

One of the primary concerns of the state authorities is that dams be constructed in a safe manner. For example, North Carolina has a dam safety law that governs the construction and maintenance of dams on intrastate streams. Before a person may construct, alter, repair or remove a dam he must seek the approval of the Department of Water and Air Resources.³⁶⁹ Among other concerns, the Board of Water

Resources must insure the safety of such construction.³⁷⁰ Once the dams are built, the Board must inspect the structure at least once every 5 years to insure its safety.³⁷¹ Dam safety legislation such as this is prevalent in many other states.³⁷²

Prior to being able to construct a dam or other impoundment, several of the states require that a permit be obtained from the appropriate state agency.³⁷³ In authorizing a permit the state agency may consider a wide range of factors, such as construction and maintenance procedures, safety of the structure, effect on downstream uses and effect of the dam on the fish and wildlife resources.

We are concerned primarily with those measures taken to preserve and protect the fishery and wildlife resources. Several of the states have legislation to require the construction of fishways or fish ladders in dams constructed on state streams.³⁷⁴ The following examples illustrate the manner in which some of the states have offered protection for the fish and wildlife values.

In Alaska, every dam, impoundment or other obstruction built in a stream which is inhabited by salmon or other fish must be provided with sufficient fishways to facilitate fish migration. These fishways are required only when the Department of Fish and Game considers them necessary.³⁷⁵ The Commissioner of the Fish and Game Department may require the submission of plans, prior to authorizing any proposed construction, for the adequate protection of the fish and game resources.³⁷⁶

Special provisions are made for those cases where fishways are impracticable due to economic and engineering considerations. Under these circumstances, the Commissioner of the Fish and Game Department may require that the contractor pay compensation for the loss of fish and wildlife resources, or he may be required to construct a hatchery to replace the fish that are lost due to the construction.³⁷⁷

In California, "adequate provisions shall be made for the protection of migratory fishes" in flood control and water conservation projects.³⁷⁸ The law limits this protection to those projects where it is practical in engineering and economic terms. Designs for the fish and wildlife protection structures and facilities are to be prepared by the California Department of Fish and Game in cooperation with the United States Fish and Wildlife Service.

Except as otherwise provided,³⁷⁹ it is unlawful for any "person, municipal corporation, political subdivision or governmental agency to construct or maintain any dam or artificial obstruction across any stream" in the state of Oregon that is frequented by anadromous or food fish without "providing a passageway for such fish over the dam or artificial obstruction as near the main channel as practicable."³⁸⁰

The State Fisheries Director is authorized to inspect all dams and obstructions in those waters frequented by anadromous and food fish. If there are not sufficient passageways for fish the Director may instruct the owner to provide free passage within a reasonable time.³⁸¹

The Fish Commission may require the placement of adequate screening devices over the inlet of watercourses to prevent fish from entering a watercourse.³⁸² Inadequate screening devices may be ordered removed by the Commissioner following an investigation and hearing.³⁸³

Inadequate fishways may also be condemned by the Commissioner.³⁸⁴ Where necessary, the Commissioner may improve or rebuild fishways as long as it does not interfere with the primary purpose of the dam or obstruction.³⁸⁵

In those cases where fish ladders or fishways are impracticable, the Commissioner may require the dam owner to: (1) convey to the state a site for a fish hatchery; (2) erect a hatchery in accordance with plans furnished by the Fish Commission and (3) furnish necessary water and light for the operation of the hatchery.³⁸⁶ Dams are exempt from the provision that were built before February 18, 1921 and those for which permits were issued prior to 1955.³⁸⁷

Persons owning dams may appeal to the State Water Resources Board from Commission orders requiring the construction of fishways or hatchery facilities if they would prove to be detrimental to the public interest.³⁸⁸ The Board will hold a hearing on the appeal.³⁸⁹ The Board, after the hearing, may approve the requirement of a fishway or hatchery facilities, subject to certain conditions, or disapprove the requirements.³⁹⁰

The Fish Commission may maintain a suit in equity for an injunction to enjoin and restrain persons from violating provision of the act.³⁹¹ The circuit court of the county in which the violation occurs has the authority to entertain the suit in those cases where the waters flow through two or more counties.³⁹² Persons violating the act are guilty of a misdemeanor.³⁹³

The Washington Legislature has indicated that "multiple-purpose impoundment structures are to be preferred over single-purpose structures." Also, due consideration is to be given to "means and methods for protection of fishery resources in the planning for and construction of water impoundment structures and other artificial obstructions."³⁹⁴

In Washington the superior courts may require the construction of fish ladders and other devices to protect fish and game fish in certain lakes.³⁹⁵ The cost of such devices is apportioned among the persons whose property abuts on the lake. Devices are installed under the supervision of the Board of County Commissioners with the approval of the Department of Game and the supervisors of water resources of the State of Washington.

As mentioned previously in this report, the Department of Natural Resources in Wisconsin has the authority to regulate lake levels and the flow of water in all navigable waterways. The Department is further authorized to supervise the construction, operation, maintenance and equipment of any or all dams in navigable waters.³⁹⁶

The Department may issue permits to construct, operate and maintain dams within the state.³⁹⁷ The Department is authorized to order and require, among other things, that dams constructed be equipped with "good and sufficient fishway or fishways."³⁹⁸ In lieu of the requirement to install fishways the owner may enter into an agreement with the Department of Natural Resources to pay for or to supply the state annually with quantities of game fish for stocking purposes as agreed to by the owner and the Department.

The Department is directed to hold a hearing on applications for a permit to construct, operate and maintain a dam.³⁹⁹ Based upon information presented at the hearing, the Department shall consider the effect of the project on the ecological, esthetic, economic and recreational values. Furthermore, the enjoyment of natural scenic beauty and environmental quality are declared to be public rights to be considered along with other public rights and the economic need of electric power for the full development of agricultural and industrial activity and other useful purposes in the area to be served.⁴⁰⁰

The law goes on to point out that:

In considering public rights to the recreational use and natural scenic beauty of the river, the department shall investigate the potentialities of the lake and lake shore created by the flowage and shall weigh the recreational use and scenic beauty thereof against the known recreational use and scenic beauty of the river in its natural state. . . ; if it appears that the river in its natural state offers greater recreational facilities and scenic value for a larger number of people than can by proper control of the flowage level be obtained from the use of the lake and lake shore and that the remaining

sections of the river and other rivers in the area in their natural state provide an insufficient amount of recreational facilities and scenic beauty, and if it further appears that the economic need of electric power is less than the value of the recreational and scenic beauty advantages of such river in its natural state, the department shall so find and the permit be denied.⁴⁰¹

Other states have prescribed that fish and wildlife be considered in the construction of dams and in the release of sufficient water to maintain fish life. An Arkansas permit issued for the construction of water storage facilities is issued on the condition that sufficient water will be released each day to protect the fish and wildlife resources.⁴⁰²

In New York, the Department of Environmental Protection must be notified and grant approval for certain impoundments. In granting this approval the Department must consider the effect of the project on public navigation, the safety of the structure and the impact on in-stream values.⁴⁰³

In Vermont the Fish and Game Commission is required to review proposals. For dams impounding more than 500,000 cubic feet of water the Commission must insure that the proposed project will not have an adverse impact upon the propagation and preservation of the salmon fisheries.⁴⁰⁴ The economic benefits to recreation and the effect on environmental values of the proposed dam must also be considered.

Other states have exempted storage projects from certain restrictions if the project's purpose is for fish production and preservation. In Delaware, for example, an impoundment may be constructed

for ponds not larger than 60,000 square feet, for purposes of "conservation, recreation, propagation and protection of fish or wildlife, watering of stock or fire protection," without regard to the minimum flow requirements of the state.⁴⁰⁵

In Indiana the Flood Control and Water Resources Commission is authorized to regulate the maintenance of dams. This control does not extend to dams built for the sole purpose, among other things, of recreation or providing a refuge for fish and wildlife. Dams constructed for these purposes must not be more than 20 feet in height or impound more than 100 acre-feet of water.⁴⁰⁶

From this review of legislation on dam construction, it is apparent this area of activity affecting the aquatic environment has received considerable and varied attention by the majority of states. This, of course, is primarily due to clearly identifiable and definable physical features controlled. However, the degree of interrelationship between various state agencies involved is indicative of the desired relationship that should exist in other areas of environmental quality control.

5. Marsh, Estuary and Wetland Regulation

This section will outline legislative measures adopted by states to protect marshes, wetlands and estuaries from adverse impacts of man. First, the discussion will deal with some measures designed to protect inland wetland areas. Second, measures adopted to protect both wetlands and estuaries in the coastal zone areas are analyzed.

Although the discussion is broken down into two areas, inland and coastal zone protection, some states have laws that are all encompassing so as to include both inland and coastal protection. Such cases will be made clear in the discussion of the various laws.

Inland Wetland Protection

Destruction to inland wetland areas is primarily the result of uncontrolled dredging and filling. Dredging and filling may be done for numerous reasons, but the major reasons are for the improvement of navigation, commercial and residential development, highway construction, agricultural development and garbage dumps. Regulation in most of the states has been directed towards controlling dredging and filling activities in the wetlands by requiring a permit from a specified state agency. Some states have broad legislation that requires notice be given on every project that affects wetlands or other wildlife habitat.⁴⁰⁷

Four states (Connecticut, Massachusetts, Ohio and Rhode Island) have been examined concerning their approach to preventing unnecessary destruction of inland wetlands. They are considered to be representative of legislative policy measures taken in some of the other states to prevent wetland destruction.

Connecticut

The Connecticut Inland Wetlands and Water Courses Act adopted on May 19, 1972, provides for the preservation, protection,

maintenance, and use of the inland wetlands and water courses of the state.⁴⁰⁸ The law emphasizes local regulation to achieve the goals of the act rather than state regulation.⁴⁰⁹ By January 1, 1974, if the municipalities have failed to provide the needed protection, the Department of Environmental Protection may take action to protect these areas.⁴¹⁰ By June 30, 1974, the Department must establish licensing procedures for all unregulated municipalities.⁴¹¹ This act is in the pattern of the federal/state relationship under most all federal environmental laws.⁴¹²

"Wetlands" included under the Act are those lands, including submerged lands, not previously regulated, consisting of soil types poorly drained, alluvial, and flood plains.⁴¹³ "Water courses" include rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other water bodies, natural or artificial, public or private, which are located within the state.⁴¹⁴ The law specifies that a municipality may authorize or establish an "Inland Wetlands Agency" to promulgate such regulations as may be necessary to protect the wetlands and watercourses within their jurisdiction.⁴¹⁵ These agencies may establish boundaries for the wetlands areas, but no regulation or boundary may be established until after a public hearing has been held.⁴¹⁶ Once municipal regulations become effective, no operation or use involving removal or depositing, or any polluting shall be conducted upon an inland wetland without a permit.⁴¹⁷

Application for a permit must be made to the appropriate inland wetlands agency.

In granting, denying or limiting a permit the agency must consider several factors. These include, but are not limited to: (1) the environmental impact of the proposed action; (2) alternatives to the action; (3) the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; (4) irreversible and irretrievable commitments of resources; (5) the character, degree, injury or interference with the health, safety and reasonable use of property and (6) the suitability or unsuitability of the activity within the area.⁴¹⁸ Failure of the permittee to comply with the provisions of a permit may, after a hearing, result in the suspension or revocation of the permit.⁴¹⁹ Persons aggrieved by a regulation or decision made under the Act may appeal to the court of common pleas in the county where the affected land is located.⁴²⁰ Persons violating, assisting or taking part in a violation of any provision of the Act and regulations promulgated under the Act, shall be subject to a fine not to exceed \$1, 000 for each offense.

There is one unique feature in the Connecticut law that differs from the general rule with respect to the restoration of damaged lands. The general rule adopted by most states is that the violator will restore the lands to or near their original condition. In Connecticut, all moneys collected from violators are to be used by the

Commissioner of Environmental Protection to restore affected wetlands and water courses to the condition prior to violation.⁴²¹

The Commissioner, districts or municipalities may also purchase lands or an interest in lands, and enter into agreements with land owners to carry out the provisions of the Act.⁴²² Owners of wetlands and water courses who have been denied a license under the Act, shall, upon written notice, be entitled to reevaluation of such property to reflect the fair market value thereof in light of the restriction placed upon it by the denial of such license or permit.⁴²³

Massachusetts

Massachusetts has recently amended its inland wetlands act.⁴²⁴ Under the law, the Commissioner of Natural Resources, with the approval of the Board of Natural Resources, shall from time to time adopt, amend or repeal orders regulating, restricting or prohibiting the dredging, filling or otherwise altering inland wetlands.⁴²⁵ The Commissioner is also directed to establish channel encroachment lines.

In establishing such orders and regulations, the commissioner is required to hold a public hearing prior to adoption. Upon adoption, the commissioner is required to notify, among others, each assessed owner of land affected by such orders.

Owners may petition the superior court in equity to determine whether such orders restrict the use of their property so as to deprive

them of practical uses and therefore constitute an unreasonable exercise of police power. If the court finds the order to be unreasonable, it shall enter a finding that such order shall not apply to the petitioner's land. The department may, upon such a finding, take the fee or any lesser interest in such land in the name of the commonwealth by eminent domain. Eminent domain procedures are subject to the approval of the Board of Natural Resources, the governor and the executive council.

Orders established under the act are not intended to prohibit, restrict or regulate the use or improvement of land or water for agricultural purposes. Nor are the orders intended to affect the powers and duties of the Department of Public Health, Department of Public Works, Metropolitan District Commission, Division of Fisheries and Game, Aeronautics Commission, State Reclamation Board, or any mosquito program.

Ohio

The Ohio Department of Natural Resources has recently issued a statement concerning the Department policy with respect to wetlands.⁴²⁶ The policy of the Department is to "preserve the wetland ecosystem of Ohio, to protect them from any alteration which would result in their partial or complete destruction, and to restore wetlands wherever possible." These wetlands include marshes, swamps, bogs and other low-lying areas that are partially covered during

non-flood waters. The policy statement recognizes that these areas serve as habitat for fish and wildlife, aid in the purification of waters, act as nursery for terrestrial and aquatic species, and have unique recreational and esthetic values. Furthermore, these areas are recognized as being vulnerable and fragile areas.

The Department, recognizing the wetland values and man's dependence on them, will "use its utmost influence to preserve and protect wetlands from damaging misuses." The Department policy, therefore, is to "minimize alterations in the natural flow of water that nourishes wetlands and to protect wetlands from alteration by dredging or filling, . . ." construction activities, and general pollution. "Whenever possible, based on a consideration of all factors, the Department will restore wetland areas that have been severely altered or destroyed through improper land use." This policy is to be applied "to the extent of its authority in all program activities, plans, research, technical assistance, cost-sharing projects with local agencies and the dissemination of Departmental information."

Rhode Island

In 1971, the state of Rhode Island added a "Fresh Water Wetlands Act" to protect swamps, marshes and other fresh water wetlands.⁴²⁷ The Act recognized that these water areas were essential to reducing flood damage, providing for wildlife habitat, recreational areas, and general well-being of the public. The Act is intended to

preserve and regulate the swamps, marshes and wetlands from "random, unnecessary, and/or undesirable drainage, excavation, filling, encroachment" and other disturbances.⁴²⁸

Under the Act, "no person, firm, industry, company, corporation, city, town, municipal or state agency, fire district, club, non-profit agency, or other individual or group, may excavate; drain; fill;... divert; dike; dam or otherwise alter the character of any fresh water wetlands without the approval of the Director of the Department of Natural Resources." Approval must also be obtained from the town or city council within whose borders the proposed project lies.⁴²⁹

The Director must notify interested parties concerning all applications for approval of projects. If the Director receives written objections to an application, a public hearing must be scheduled. If no public hearing is required or after hearing, the Director shall make his decision on the application.

Permits are granted for a period of one year. New hearings may be required if, in the Director's judgment, the original intent of the permit is altered or if the applicant has failed to abide by the terms of the original permit.⁴³⁰

In those cases where a violation of the law has taken place, the Director has the power to order the "complete restoration" of the area by the person or agency involved.⁴³¹ Failure on the part of the person or agency to restore the area shall empower the Director to have the work done and hold the violator responsible for the cost.

Coastal Zone Protection: Estuaries and Wetlands

In 1967, the Fish and Wildlife Service in the U. S. Department of the Interior estimated that, over a twenty year span, approximately seven percent of the estuarine area of the United States, had been lost due to dredging and filling. This represents a loss of approximately 570, 000 acres in 26 states of major importance for basic fish and wildlife habitat (see Table 2, this chapter). The area lost due to dredging and filling was done primarily for the purpose of improving navigation. Other purposes were for commercial and housing developments, highway construction, oil exploration, mining, marinas, military bases, garbage dumps, and beach erosion.⁴³²

Many coastal states have enacted legislation and programs directed toward preserving these estuarine areas from further physical alteration. Heath has identified four types of legislative controls employed by the states that go beyond the routine protection given estuaries and wetlands.⁴³³ They are: (1) permits required prior to any dredging, filling or alteration of or in coastal wetlands (eg. Alabama, Connecticut, Delaware, Maryland, Massachusetts, Maine, New Hampshire, New Jersey, New York, North Carolina, Oregon, Rhode Island, and Washington);⁴³⁴ (2) bulkhead lines required to control leasing (Texas) or dredging and filling (Florida);⁴³⁵ (3) interim permit controls over dredging and filling (California);⁴³⁶ and (4) county zoning (Delaware).

Table 2. Loss of important fish and wildlife estuarine habitat.

State	Total Area	Basic Area of Important Habitat	Area of Basic Habitat Lost by Dredging and Filling	Percent Loss of Habitat
Alabama	530,000	132,800	2,000	1.5
Alaska	11,022,800	573,800	1,100	.2
California	552,100	381,900	255,800	67.0
Connecticut	31,600	20,300	2,100	10.3
Delaware	395,500	152,400	8,500	5.6
Florida	1,051,200	796,200	59,700	7.5
Georgia	170,800	125,000	800	.6
Louisiana	3,545,100	2,076,900	65,400	3.1
Maine	39,400	15,300	1,000	6.5
Maryland	1,406,100	376,300	1,000	.3
Massachusetts	207,000	31,000	2,000	6.5
Michigan*	151,700	151,700	3,500	2.3
Mississippi	251,200	76,300	1,700	2.2
N. Hampshire	12,400	10,000	1,000	10.0
N. Jersey	778,400	411,300	53,900	13.1
N. York	376,600	132,500	19,800	15.0
N. York (Gr. Lakes)	48,900	48,900	600	1.2
N. Carolina	2,206,600	793,700	8,000	1.0
Ohio*	37,200	37,200	100	.3
Oregon	57,600	20,200	700	3.5
Pennsylvania	5,000	5,000	100	2.0
Rhode Island	94,700	14,700	900	6.1
S. Carolina	427,900	269,400	4,300	1.6
Texas	1,344,000	828,100	68,100	8.2
Virginia	1,670,000	428,100	2,400	.6
Washington	193,800	95,500	4,300	4.5
Wisconsin*	<u>10,600</u>	<u>10,600</u>	<u>0</u>	<u>0.0</u>
Total	26,618,200	7,988,100	568,800	7.1

*In Great Lakes Only: shoals (areas less than 6 feet deep) were considered estuaries.

Source: HEARINGS ON ESTUARINE AREAS BEFORE THE SUBCOMMITTEE ON FISHERIES AND WILDLIFE CONSERVATION OF THE HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES, 90th Cong., 1st Sess., p. 30 (1967).

As of 1970, several of the states have programs whereby estuarine areas may be acquired by a state agency.⁴³⁷ In Connecticut, the Board of Fisheries and Game has attempted to acquire as much as possible of the remaining 14,800 acres of non-private tidal marshes. Similar attempts have been made in Delaware, where funding for the conservation and protection of estuaries has ranged from \$50,000 to \$300,000 annually. The state of Maine has acquired over twenty miles of ocean front, with wetland purchases for waterfowl habitat amounting to about \$20,000 annually. Other acquisition programs have been carried out in the states of California, Florida, Maryland, New Hampshire, New Jersey, North Carolina, and Rhode Island. Heath has pointed out that the regulatory and acquisition programs, for the most part, have been hampered by insufficient levels of funding.⁴³⁸

The estuarine protection legislation for the states of Maine, Maryland, Massachusetts, New Hampshire, New York, and Washington will be discussed in some detail in the following pages. These are representative of some of the attempts made to protect these areas.

Maine

In addition to its general water pollution control legislation, Maine's principal protection for estuarine areas is: a 1967 coastal wetlands alteration law,⁴³⁹ and the Army Corps of Engineers control over the alteration of coastal wetlands. Under the 1967 law, no person, agency or municipality may fill, dredge, or otherwise alter any

coastal wetland without a valid permit.⁴⁴⁰ Application for permits are made with the municipal officers in the municipality affected and with the Wetlands Control Board.⁴⁴¹ The municipal officers are required to hold a public hearing on the application within 30 days of receipt of the application. This period may be extended to 120 days during the winter.

Upon the approval of the municipality and the Wetlands Control Board, the permit will be issued. Permits may be conditioned upon the applicant amending his proposal to take appropriate measures to protect the public interest. The permit may be denied if the opinion of either body is that it "would adversely affect the value or enjoyment of the property of abutting owners, or would be damaging to the conservation of public or private water supplies or of wildlife or fresh-water, estuarine or marine fisheries."⁴⁴² (emphasis supplied).

Permits issued under this act expire three years from the date of issuance. Appeals may be made to the Superior Court if the permit is denied or if the applicant feels that the conditional permit will deprive the owner of the reasonable use of property or result in a taking without compensation.⁴³⁴

Certain exemptions are provided for under the act. For example, the Wetlands Control Board may exempt certain activities or waive procedural requirements, as long as it will not be inconsistent with the purposes of the law.⁴⁴⁴ Furthermore, the act does not "prohibit the normal maintenance or repair of installations and

facilities of any utility...abutting or crossing said wetlands, provided no water course is substantially altered.⁴⁴⁵

Persons violating the law are subject to a fine not to exceed \$500 per violation. The Superior Court has the jurisdiction to restrain continuing violations and to order the restoration of the affected area to as near its original condition as possible.⁴⁴⁶

The wetlands statute of Maine has come under court review in at least one case.⁴⁴⁷ The court was faced with the question as to whether the state, through the exercise of police power, could prevent a riparian from filling wetlands that he owned. Conforming to the prevailing opinion that police power is not justified, the court stated that: "between the public interest in braking and eventually stopping the insidious despoliation of our natural resources which for so long have been taken for granted, on the one hand, and the protection of appellant's property right on the other, the issue is cast."⁴⁴⁸ The court recognized the appellant's land to be a part of a valuable natural resource of the State of Maine and plays an important role in the conservation and development of aquatic and marine life, game birds and waterfowl" the protection of which is sought by section 4702 of the Act. However, the appellants' land, in the absence of the fill, has no commercial value whatever.

The court also noted that the wetlands involved, of which the appellant's holdings are but a minute part, is of statewide concern. Thus, "the cost of its preservation should be publicly borne. To leave

appellants with commercially valueless land in upholding the restriction presently imposed, is, to charge them with more than their just share of the cost of this state-wide conservation program, granting fully its commendable purpose."⁴⁴⁹ The court held that: "The application of the Wetlands restriction in the terms of the denial of appellants; proposal to fill, and enjoining them from so doing deprives them of the reasonable use of their property and within section 4704 is both an unreasonable exercise of police power and equivalent to taking within constitutional considerations."⁴⁵⁰

Maryland

Following an extensive study done at the University of Maryland,⁴⁵¹ the state passed a wetlands statute in 1970.⁴⁵² The act expressly recognizes the economic, ecological, recreational, and esthetic value of wetlands, and realizes that these areas could be destroyed due to unregulated landfilling by riparians.⁴⁵³

The act is discussed here only with reference to one unique feature of the law. The Maryland act distinguishes between two types of wetlands: public and private.⁴⁵⁴ Public wetlands are those below the mean high tide. Private wetlands are other lands bordering on or lying beneath tidal waters, which are subject to regular or periodic tidal action and which support aquatic growth. The Department of Natural Resources is authorized to develop roles relative to dredging and filling in private wetlands.

The public wetlands may not be filled without a permit from the Board of Public Works. In granting, denying or limiting any permit, the Secretary of Natural Resources must consider the effect of the work on public health, marine fisheries, wildlife, economic benefits, and the public policy of the law.⁴⁵⁵ A public hearing will be held on all permit applications and a decision shall be made 30 days after the hearing. Failure to hold a hearing and/or make a decision within 30 days constitutes automatic approval of the application for a permit.

According to the law, four uses are allowed on private wetlands. They are: (1) conservation of soil, (2) trapping, hunting and fishing; (3) exercise of riparian rights to make improvements on lands bounding navigable waters to preserve access and protect the shore; and (4) reclamation of fast land owned by a natural person and lost during his ownership of the land by erosion or avulsion to the extent of provable preexisting boundaries.⁴⁵⁶

A cease and desist order has been issued on at least one occasion by the Department of Natural Resources to halt an unlicensed dredging operation.⁴⁵⁷ The work was being conducted on both public and private wetlands. The Department charged that the operation was being conducted without a permit as required under the act, and without a permit as required by state sediment control law and the U. S. Army Corps of Engineers.

Massachusetts

Massachusetts has two laws that protect estuarine and coastal wetlands from the adverse effects of alteration.⁴⁵⁸ As specified by these laws, broad protection is given to those waters and water areas subject to tidal action. "No person⁴⁵⁹ may remove, fill, dredge or alter any bank, beach, dune, flat, marsh, meadow or swamp bordering on the ocean or on any estuary, creek, river, stream, pond, or lake or any land under said waters or any land subject to tidal action..." without making written notice to the Conservation Commission, Board of Selectmen or Mayor and the Departments of Natural Resources and Public Works.⁴⁶⁰ The Conservation Commission, Selectmen or Mayor, upon receiving notification from the Department of Natural Resources of an application, shall hold a public hearing. Following the hearing, the Commission, Selectmen or Mayor will determine if the proposed work to be done is in an area significant to water supplies, flood control, storm damage and pollution prevention, or to the protection of fisheries. If their findings are positive, conditions may be imposed upon the permittee.

Persons aggrieved by orders issued after a hearing, or parties affected, may appeal to the Commissioner of Natural Resources. This officer in turn may amend or modify the orders of the Conservation Commission, Board of Selectmen or Mayor. A right of appeal exists under the statute.

In those areas where work is being done under a permit, a sign must be displayed indicating the Department of Natural Resources File Number. The Department of Public Works shall enforce the provisions of this Act. The Act exempts mosquito control work, and agricultural work. Persons violating the Act are subject to fine, imprisonment or both.

The "Coastal Wetlands Act of 1965" provides that the Commissioner of Natural Resources

may from time to time, for the purpose of promoting the public safety, health and welfare, and protecting public and private property, wildlife and marine fisheries, adopt, amend, modify or repeal orders regulating, restricting or prohibiting dredging, filling, removing or otherwise altering, or polluting coastal wetlands.⁴⁶¹ In this section of the Act, the term 'coastal wetlands' shall mean any bank, marsh, swamp, meadow, flat or other low land subject to tidal action or coastal storm flowage and such contiguous land as the commissioner deems necessary to affect by any such order in carrying out the purposes of this section.

The Act provides that, after a public hearing, the Commissioner can establish regulations on the use of particular coastal wetlands and adjacent uplands.

New Hampshire

Dredging and filling operations in tidal wetlands are regulated in New Hampshire through legislation enacted in 1970.⁴⁶² This Act provides for the regulation of dredge and fill operation in fresh waters as well as salt waters. Specifically, the New Hampshire law states that for the "public good and welfare" the submerged lands under tidal and

fresh waters and wetlands (saltwater and freshwater) are to be protected from despoliation and unregulated alteration. The law specified a policy that

unregulated alteration will adversely affect the value of such areas as sources of nutrients for finfish, crustacea, shellfish, and wildlife of significant value, will damage or destroy habitats and reproduction areas for plants, fish and wildlife importance, will eliminate, depreciate or obstruct the commerce, recreation and aesthetic enjoyment of the public, will be detrimental to adequate ground water levels, will adversely affect stream channels..., and lead to increased flood damage and otherwise adversely affect the public interests.⁴⁶³

To promote this policy, no person may "excavate, remove, fill or dredge any bank, flat, marsh, or swamp in and adjacent to any waters of the state" without making written notice to the Water Resources Board at least 30 days prior to such activity.⁴⁶⁴ "Person" is defined as "any person, firm, partnership, association, corporation, company, organization or legal entity of any kind."⁴⁶⁵ The Board is required to hold a hearing on the proposed activity. In addition to the applicant, and other interested parties, the New Hampshire Fish and Game Department will be notified of the hearing.⁴⁶⁶

The Board may deny the petition or require certain protective measures be taken to prevent damage to the areas involved.⁴⁶⁷ Any party to or participating in the action before the board may appeal the action to the superior court.⁴⁶⁸ The state, through these proceedings, may acquire a perpetual negative easement, such that the lands may not be excavated or otherwise altered. Provisions are also made for

the state to acquire the land by purchase. The marine fisheries fund, the fish and game fund or unappropriated money in the treasury may be used to acquire this land, if such "expenditure will be of substantial benefit to marine fisheries or to fish and wildlife."⁴⁶⁹

The public hearing requirement does not apply in all cases. Specific exemptions are made for minor projects and improvements of the shoreline of waters covered by the act. For these projects, full authority for the issuance of permits may be delegated to the board.⁴⁷⁰

All state, county and local law enforcement officers are directed to watch for and report violations of the act.⁴⁷¹ Persons violating the act are liable for the removal of the fills or other structures. Fines for violations may be assessed up to \$1,000 per incident.⁴⁷²

New York

Effective June 22, 1973, the State of New York enacted a Tidal Wetlands Act to provide for an inventory of such lands and controlling their alteration.⁴⁷³ Since 1966, New York has had the authority to control dredging, filling, channelization and other physical alterations of navigable waters under its Stream Protection Act. This law, however, excluded Nassau and Suffolk counties where the majority of the tidal wetlands are located. In these counties, "development had gone unchecked for three centuries with devastating losses to fish and wildlife habitat. Encroaching urban growth made tidal wetlands more valuable for fill and housing than for the vital environment functions

they fulfill."⁴⁷⁴ The Tidal Wetlands Act is intended to provide protection for these environmental functions.

Under the law, the Commissioner of Environmental Conservation is required to make an inventory of all tidal wetlands in the state of New York.⁴⁷⁵ A tentative tidal wetlands boundary map will be prepared by the Commissioner and a public hearing will be held to provide persons the opportunity to prepare deletions or additions to the map.⁴⁷⁶ Based on the hearing testimony, other pertinent data, and after considering the rights of affected property owners, the Commissioner shall establish the final bounds for each wetland.⁴⁷⁷ Persons aggrieved by the establishment for such boundaries may seek judicial review.⁴⁷⁸

Prior to the effective date of regulations adopted by the Commissioner, no person may alter any tidal wetland or areas adjacent to them, unless a permit has been obtained.⁴⁷⁹ Persons able to show a hardship cause by this moratorium may petition the Commissioner for a review of the application of the moratorium.⁴⁸⁰

If the Commissioner, after a hearing, finds that the proposed alteration will not be contrary to the provisions of the act, then the activity may continue. Permission may be revoked, however, if the terms are violated and "the permission ends upon completion of the inventory for the area in which the affected wetlands are located."⁴⁸¹ The issuance of a hardship permit does not eliminate the requirement

to obtain other required permits. Aggrieved persons may seek judicial review concerning the granting or denial of hardship permits.⁴⁸²

Upon completion of the inventory, the Commissioner is required to adopt land-use regulations to cover the inventoried wetlands. In establishing these regulations, the Commissioner shall consider but not be limited to the following: (1) the public policy of the Act; (2) the present and potential value of these lands for marine food production; (3) the value as wildlife habitat; (4) the value for flood and storm control; and (5) the recreational, educational, and research value of the area.⁴⁸³

Once the inventory is completed, certain activities in the area are subject to regulations. These regulated activities are as follows:⁴⁸⁴

1. Any form of draining, dredging, excavating, and removal either directly or indirectly, of soil, mud, sand, shells, gravel or other aggregate;
2. Any form of dumping, filling, or depositing, either directly or indirectly, of any soil, stones, sand, gravel, mud, rubbish or fill of any kind;
3. The erection of any structures or roads;
4. The driving of any pilings or placing of any other obstructions; and
5. Any other activities within or immediately adjacent to inventoried wetlands which may substantially impair or alter the natural conditions of the tidal wetland area.

Activities, substantially affecting tidal wetlands, resulting from dredging or filling in navigable waters or reconstruction or repair of certain dams and docks must comply with the Act.⁴⁸⁵

Removing or depositing of the natural products of the wetland for recreational or commercial fishing, hunting or trapping is excluded from the regulation of the Act.⁴⁸⁶ In addition, the activities, orders and regulations of the Department of Health with respect to matters of public health are excluded.⁴⁸⁷ The Commissioner also may, after a public hearing, require the modification of mosquito control projects that have adverse effect on tidal wetlands.⁴⁸⁸

Any person⁴⁸⁹ proposing or causing to be conducted an activity regulated under the Act upon an inventoried tidal wetland must apply for a permit with the commissioner.⁴⁹⁰ A public hearing must be held on all applications in the county where the affected wetland is situated. At the hearing, any person or persons may appear and be heard.⁴⁹¹

When granting, denying or limiting a permit, the Commissioner must consider the compatibility of the activity with reference to the public health and welfare, marine fisheries, shellfisheries, wildlife, flood, hurricane and storm dangers, and established land-use regulations.⁴⁹² The Commissioner may also impose certain limitations and conditions on the permit to comply with the public policy of the act. A bond may be required to insure compliance with the established conditions and limitations.⁴⁹³

Persons aggrieved by the issuance, denial, suspension, or revocation of a permit may seek judicial review pursuant to article 78 of the Civil Practice Law and Rules in the Supreme Court in the county where the affected tidal wetlands are located. The court may either set aside the order or require the Commissioner to acquire the tidal wetlands under the power of eminent domain.⁴⁹⁴

Persons violating the Act shall be guilty of a misdemeanor and upon conviction, shall be fined not less than \$500 nor more than \$1,000 for the first violation, and for subsequent violations, not less than \$1,000 nor more than \$2,000. The violator also is liable to the state for the full cost of restoring the affected area to its original condition.⁴⁹⁵ The attorney general is responsible for prosecuting persons who violate the Act.⁴⁹⁶

Washington

The 1971 "Shoreline Management Act"⁴⁹⁷ of Washington gives broad coverage to estuaries, as well as to other water environments. It appears that estuaries are classified within the bounds of "shoreline of statewide significance."⁴⁹⁸ The Act basically covers all of the water areas of the state including reservoirs, and their associated wetlands.⁴⁹⁹

The Shoreline Management Act established a cooperative program for shoreline management between local governments and the state, where the local governments have the primary responsibility

for initiating and administering the regulatory program. The Department of Ecology operates in a supportive and review capacity to insure compliance with the provisions of the establishment of guidelines consistent with the act.⁵⁰⁰ The Department is also responsible for the establishment of guidelines consistent with the act.⁵⁰¹ The public has the opportunity to present statements and views on the proposed guidelines.⁵⁰²

Local governments are responsible for an inventory of and the development of a master program for these shorelines.⁵⁰³ Failure on their part to carry out these requirements, will result in reverting to the Department the responsibility for carrying out these functions.⁵⁰⁴ The inventory was to be completed within 18 months after June 1, 1971.⁵⁰⁵ Eighteen months after the adoption of the department's guidelines, the local master program must have been adopted.⁵⁰⁶ Specific procedures are specified for the Department's approval of or adoption of alternatives to the local governments' proposal.⁵⁰⁷ The master programs are to include, when appropriate, the following elements or considerations: (1) economic development; (2) public access; (3) recreation; (4) circulation; (5) uses; (6) conservation; e.g. scenic vistas, esthetics, and vital estuarine areas for fisheries and wildlife protection; and (7) historic, cultural and other aspects.⁵⁰⁸

The Shore Line Management Act specifies that no development⁵⁰⁹ may be undertaken except that which is consistent with the

Act and, after adoption or approval, as appropriate, of the applicable guidelines, regulations or master program.⁵¹⁰ The provisions of the Act are applicable to all agencies of state government, counties, and public and municipal corporations.⁵¹¹

No substantial development may be undertaken on shorelines of the state without first obtaining a permit from the government entity having administrative jurisdiction.⁵¹² Permits issued must be consistent with the policy of the Act, guidelines and regulations of the Department of Ecology and the master programs.⁵¹³ The Department of Ecology may appeal the issuance of permits if in their opinion these permits are inconsistent with the provisions of the Shore Line Management Act. Persons aggrieved by the granting or denial of a permit may seek review from the Shorelines Hearings Board.⁵¹⁴ Appeal is also granted for state and local governmental agencies.

The attorney general or attorney for the local governments may bring injunctive, declaratory or other actions to insure compliance with the Act.⁵¹⁵ Persons found to have willfully violated the Act or related provisions shall be guilty of a gross misdemeanor. Fines may range from \$25 to \$1,000, imprisonment in the county jail for up to 90 days, or both a fine and imprisonment.⁵¹⁶ The violator is also liable for all damage to public or private property..., including the cost of restoring the affected area to its condition prior to violation.⁵¹⁷

The Department of Ecology and local governments may acquire lands and easements within the shorelines of the state. This

acquisition may be made by purchase, lease, gift, grant, contribution or appropriation from public or private agencies or individuals.⁵¹⁸

The Shore Line Management Act requires the removal of structures or fills that were placed in navigable waters prior to December 4, 1969. However, the Act does not apply to state or local governments in their efforts to abate a nuisance or to abate pollution.⁵¹⁹

Final guidelines were established for the Act by the Department of Ecology on June 20, 1972.⁵²⁰ The guidelines deal with four areas. The first section provides assistance in the development and implementation of the master program.⁵²¹ In part, the guidelines classify shorelines into four distinct environments (natural, conservancy, rural and urban) which in turn provides the framework for the implementation of policies and regulations.

Section two of the guidelines defines those natural systems to which the Shoreline Management Act applies.⁵²² It highlights some of the features of those systems which are subject to damage from human activity. The natural systems identified are: (1) marine beaches, (2) spits and bars, (3) dunes, (4) islands, (5) estuaries, (6) marshes, bogs and swamps, (7) lakes, (8) rivers, streams and creeks, (9) flood plains, (10) Puget Sound; and (11) the Pacific Ocean.

Section three of the guidelines examines specific uses or groups of uses, broadly defined, that must be considered in the development of local regulations.⁵²³ Twenty-one uses or groups of uses are discussed. In establishing guidelines for these various uses, frequent

mention is made of the fact that special attention should be given to features such as the effect of the proposed use on aquatic life and wild-life habitat and propagation,⁵²⁴ the esthetic quality of the area and scenic views,⁵²⁵ the recreational experience,⁵²⁶ and archeological and historic sites.⁵²⁷

Summary

The estuarine legislation, discussed previously, would appear on the surface to provide adequate protection for estuarine areas. However, there may be some limitations to making them effective. As mentioned earlier, the states may be hampered by inadequate funds to implement the legislation and acquisition programs to the highest degree. Second, the states that appear to have some of the most comprehensive legislation are those that have already suffered some of the largest losses in fish and wildlife habitat. The legislation will not be able to regain lands previously lost. The optimum goal for the legislation should be to retard any further destruction of these lands.

6. State Environmental Policy and Protection Acts

The establishment of the National Environmental Policy Act of 1969,⁵²⁸ discussed later in this report, has acted as a stimulus to promote state environmental policy and protection acts. At this time approximately 20 states have adopted broad environmental protection legislation and/or constitutional amendments (see Table 3).

Table 3. Citations to state environmental policy and protection acts.

State	Title of Act	Citation
California	California Environmental Quality Act of 1970	Calif. Public Res. Code, Secs. 21000 et seq. ER-State Air Laws, 321:0201
Connecticut	Connecticut Environmental Protection Act	Public Act No. 872, Laws of 1971 ER-State Air Laws, 331:0051
Delaware	Environmental Protection Act of 1973	Title 7, Del. Code, Secs. 6001 et seq.
Florida	Florida Environmental Protection Act of 1971	ER-State Air Laws, 346:0121
Idaho	Idaho Environmental Protection and Health Act of 1972	Idaho Code, Secs. 39-115 to 118 ER-State Air Laws, 361:0101
Illinois	The Environmental Protection Act of 1970	Ill. Ann. State Ch. 111 1/2, as amended 1973
Indiana	Indiana Environmental Management Act	Title 13, Inc. Code, Art. 7. ER-State Air Laws, 371:0201
Maryland	Maryland Environmental Policy Act	Act 41, Ann. Code Maryland, Sec. 447-51 ER-State Laws, 401:0201
Massachusetts	Massachusetts Environmental Protection Law	Ch. 12, Mass. Gen. Laws, Sec. 11 D. ER- State Air Laws, 406:0301
Michigan	Thomas J. Anderson, Gordon Roackwell Environmental Protection Act of 1970	Mich. C.L.A., Secs. 691.1201 to 1207. ER-State Air Laws, 411:0201
Minnesota	Environmental Policy Act Minnesota Environmental Rights Act	Minn. Stat., 116D.01 et seq. Minn. Sess. Laws of 1971, Ch. 952.
Montana	Montana Environmental Policy Act of 1971	Rev. Code Mont., secs. 69-6501 to 69-6517 ER-State Water Laws 831:0201
Nebraska	Environmental Protection Act of 1973	Neb. Rev. Stat., Secs. 81-1501 to 81-1532
New Mexico	Environmental Quality Act Environmental Protection Act	N.M. Stat. Ann., Secs. 12-20-1 to 12-20-7 ER-State Air Laws 456:0651
New York	New York Environmental Conservation Law	New York Environmental Conservation Law, Article 1, General Provisions; Article 3, Department of Environmental Conservation; Article 5, State Environmental Board; Article 7, Council of Environmental Advisors; Article 17, Water Pollution Control; and Article 71, Enforcement; Laws of 1972, Chapter 664; Effective September 1, 1972; amended by Chapters 242, 400, 779, and 801, Laws of 1973)
North Carolina	North Carolina Environmental Policy Act of 1971	Gen. Stat. N.C., Ch. 113A ER-State Water Laws 866:0201
Ohio	Ohio Environmental Protection Agency	Ohio Rev. Code, Secs. 3745.01 to .09
Washington	State Environmental Policy Act of 1971	Wash. Rev. Code, Secs. 43.21c.010 to 43.21c.900
Wisconsin	Wisconsin Environmental Impact Law	ER-State Air Laws, 551:0201
Wyoming	Wyoming Environmental Quality Act	Enrolled Act No. 107, 42d Sess., 1973. ER-State Air Laws 956:0201

Each state act varies in specific features, but in general the goals of the acts and amendments are to preserve and protect the natural environments for present and future generations and provide for some right of the citizens to pursue this goal.

State Environmental Policies

Policies may be either expressed in state constitutions or legislative enactments. They provide the guidelines necessary to give purpose and direction to the area under control or regulation.

In Illinois, as in at least eight other states,⁵²⁹ the public is given the constitutional right to a healthful environment. (See Table 4) The Illinois constitution provides that: "the public policy of the State and the duty of each person is to provide and maintain a healthful environment for the benefit of this and future generations."⁵³⁰ "Each individual has a right to a healthful environment."⁵³¹ As such, each individual may enforce his right against any party, public or private.

In 1972, Montana amended its constitution to provide, according to one leading environmental law specialist⁵³² perhaps the broadest recognition of citizen's environmental rights. The amendment provides:

ARTICLE II Declaration of Rights

Section 3. INALIENABLE RIGHTS. All persons are born free and have certain inalienable rights. They include the right to a clean and healthful environment and the rights of pursuing life's basic necessities, enjoying and defending their lives and liberties, acquiring, possessing and protecting property, and seeking their safety, health and

Table 4. State constitutional provisions regarding the environment.

State	Citation	Effective Date
Florida	Constitution, Article II, Section 7	1968
Illinois	Constitution, Article XI, Section 1 & 2	1970
Michigan	Constitution, Article 4, Section 52	1964
Montana	Constitution, Article II, Section 3, Article IX, sections 1-4	1972
New York	Constitution, Article XIV, Section 4	1970
North Carolina	Constitution, Article XIV, Section 5	1972
Pennsylvania	Constitution, Article 1, Section 28	1971
Rhode Island	Constitution, Article 1, Section 17	1970
Virginia	Constitution, Article XIV, Section 2	1971

happiness in all lawful ways. In enjoying these rights, all persons recognize corresponding responsibilities.

ARTICLE IX Environment and Natural Resources

Section 1. PROTECTION AND IMPROVEMENT. (1) The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations.

(2) The legislature shall provide for the administration and enforcement of this duty.

(3) The legislature shall provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources.⁵³³

The implication from such an amendment is that citizens in Montana have always had inalienable environmental rights and can personally pursue the protection and enhancement of the environment, to include preservation of fish and wildlife and their habitat.

This same recognition of the right to a healthful environment, expressed in the Montana Constitution, is expressed in the Maryland Environmental Policy Act. The policy of the State being that "each person has a fundamental and inalienable right to a healthful environment, and each person has a responsibility to contribute to the protection, preservation, and enhancement of the environment."⁵³⁴ The policy of the State is also to give most thoughtful consideration to economic, ecological, developmental, recreational, historic, architectural, esthetic, and other values.⁵³⁵ The Act recognizes that "adverse environmental effects of proposed actions can be anticipated, minimized, and often eliminated if environmental evaluations are made a part of the decision-making process of the State."⁵³⁶

The Minnesota Environmental Rights Act has also declared that "each person is entitled by right to the protection, preservation, and enhancement of air, water, land, and other natural resources located within the state and that each person has responsibility to contribute to the protection, preservation, and enhancement thereof."⁵³⁷

Illustrative of other policy statements in state environmental acts are the California, Connecticut and Delaware Acts. The California "Environmental Quality Act of 1970"⁵³⁸ establishes state policy with respect to the environment. This policy being, in part to:⁵³⁹

- (a) Develop and maintain a high-quality environment now and in the future, and take all action necessary to protect, rehabilitate, and enhance the environmental quality of the state.
- (c) Prevent the elimination of fish or wildlife species due to man's activities, insure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history.
- (e) Create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations.

The "Connecticut Environmental Protection Act of 1971" points out the fact that "the growing population and expanding economy of the state have had a profound impact on the life-sustaining natural environment."⁵⁴⁰ Given this fact, the policy of the State of Connecticut is to "conserve, improve, and protect its natural resources and environment and to control air, land and water pollution in order to enhance the health, safety, and welfare of the people of the state."⁵⁴¹

The "Delaware Environmental Protection Act of 1973" also recognized the impact of growth on the environment. In view of the rapid growth of population and other economic activities, "the land, water and air resources of the state must be protected, conserved and controlled to assure their reasonable and beneficial use in the interests of the people of the state."⁵⁴²

Implementation of Policy

To implement the state policies, with respect to environmental protection, the states have established various environmental agencies and departments. Below are discussed some of the reorganizations made to implement the policies.

To implement the policies set forth in the Connecticut Environmental Protection Act a Department of Environmental Protection, under the direction of a Commissioner of Environmental Protection, was established.⁵⁴³ The Commissioner is directed to carry out the State's environmental policies, that is, to (1) promote and coordinate management of water, land and air resources to assure their protection and proper utilization; (2) provide for the protection and management of plants, trees, fish, shellfish, wildlife and other animal life of all types, including the preservation of endangered species; (3) provide for the protection, enhancement and management of natural areas; and (4) control other forms of pollution.⁵⁴⁴

In Delaware, the Secretary of the Department of Natural Resources and Environmental Control is responsible for the enforcement of the provisions of the Delaware Environmental Protection Act.⁵⁴⁵ The Act also established a seven member Environmental Appeals Board, appointed by the Governor with the advice and consent of the Senate.⁵⁴⁶ Persons whose interests have been substantially affected by the actions of the Secretary may appeal to the Board. The Board has the power to affirm, modify, or reverse the actions of the Secretary.⁵⁴⁷

The Board's decision may be appealed to the Superior Court. The Superior Court then has the power to affirm, reverse or modify the Board's decision.⁵⁴⁸

In Florida, the Department of Legal Affairs, any political subdivision or municipality of the state, or a citizen of the state may maintain an action for injunctive relief under the Environmental Protection Act of 1971.⁵⁴⁹ In suits filed under the Act the Department of Legal Affairs may intervene to represent the interests of the state.⁵⁵⁰

In Illinois, administration of the "Environmental Protection Act" is under the direction of the Illinois Environmental Protection Agency. The Agency is established in the Executive Branch, under the direction of a Director, who is appointed by the Governor with the advice and consent of the Senate.⁵⁵¹ The Agency has the duty to investigate violations of the Act, conduct programs of continuing surveillance, and administer a permit system.

In Massachusetts a Division of Environmental Protection within the Department of the Attorney General was established.⁵⁵² The Attorney General has the power to prevent or remedy damage to the environment caused by a person, corporate body or political agency.

The Minnesota Environmental Quality Council is an eleven member agency established to deal with many environmental problems.⁵⁵³ Its duties include, in part: the determination of those environmental problems of interdepartmental concern to state government; review of programs of state agencies that significantly affect the environment; and review of environmental regulations and criteria for granting and denying permits by state agencies.⁵⁵⁴ The Council is also required to prescribe guidelines and regulations setting forth those instances in which environmental impact statements are required to be prepared for new and existing actions.⁵⁵⁵

The Minnesota Environmental Policy Act requires that consideration be given to the preservation of natural habitat. This protection includes habitats for "rare and endangered species of plants, wildlife, and fish, and provide for the wise use of our remaining areas of natural habitation, including necessary protective measures where appropriate."⁵⁵⁶

To promote its environmental policies the State of New Mexico has established an Environmental Improvement Agency.⁵⁵⁷ Along with the creation of the Environmental Improvement Agency, an Environmental Improvement Board was established. This Board is made up

of five members appointed by the Governor with the advice and consent of the Senate.⁵⁵⁸ The Board promulgates all regulations applying to persons and entities outside of the Agency.⁵⁵⁹ Both the Board and the Agency are responsible for environmental management and consumer protection programs.⁵⁶⁰

The Washington "State Environmental Policy Act of 1971" notes that it is the "responsibility of the state of Washington and all agencies of the state to use all practicable means, consistent with other essential considerations of state policy, " to improve and coordinate plans for the improvement of the environment.⁵⁶¹ The Act specifically notes that each generation is a "trustee of the environment for succeeding generations, "⁵⁶² and that the environment should be maintained to insure "diversity and variety of individual choice."⁵⁶³

The Montana consitutional amendment was adopted in 1972, stating that the legislature shall provide the administrative and enforcement means and remedies to insure the clean and healthful environment declared in the amendment. However, under the 1971 Montana Environmental Policy Act, certain administrative structures have already been established.

The Montana Environmental Policy Act established a thirteen member Environmental Quality Council.⁵⁶⁴ Among its many duties, the Council is directed to "conduct investigations, studies, surveys, research, and analyzes relating to ecological systems and environmental quality."⁵⁶⁵ In making these studies and investigations the

Council is required to review and evaluate various state agency operating programs and activities in the environmental field to identify actual or potential conflicts, both among such activities, and with a general ecologic perspective, and to make recommendations to the legislature to remedy such situations.⁵⁶⁶ This program review extends to state and local governments, and nongovernmental entities or individuals, with particular emphasis concerning their effect on the environment and on the conservation, development and utilization of natural resources.⁵⁶⁷ No enforcement procedures are established under the Act; however, the Council does have the authority to hold hearings, and compel the attendance of witnesses in the conduct of its investigations and studies.⁵⁶⁸

Impact Statements

Many of the state environmental protection and quality acts require the submission of impact statements for proposed projects. A few of the states will be reviewed concerning their impact report requirements.

In California, no State agency, board or commission shall request or expend funds for projects "which may have a significant effect on the environment unless such request of authorization is accompanied by an environmental impact report."⁵⁶⁹ The purpose of the impact report is to "provide public agencies with detailed information about the effect which a proposed project is likely to have on the

environment, " to propose alternatives to projects and list ways to reduce the adverse effects.⁵⁷⁰

The requirements for impact reports also apply to local, as well as state agencies. State agencies that are responsible for "allocating state or federal funds on a project-by-project basis to local agencies for any project which may have a significant effect on the environment," shall require an impact statement from the responsible local government agency.⁵⁷¹

Specific requirements concerning impact reports may be found in the California Administrative Register 73.⁵⁷² This document sets forth proposed guidelines to cover the Environmental Quality Act, including: definitions; application of the Environmental Quality Act to projects; evaluation of projects; exemptions from the Environmental Quality Act; contents of environmental impact reports and the evaluation procedures surrounding impact reports.

The California Environmental Quality Act of 1970 has already undergone court action. The first opportunity for the courts to construe the provisions of the Environmental Quality Act came in the case of Friends of Mammoth v. Board of Supervisors of Mono County.⁵⁷³

The principal legal question in this case was whether or not the California Environmental Quality Act "applies to private activities for which a permit or other similar entitlement is required."⁵⁷⁴ As enacted in 1970, the Environmental Quality Act did not define the term "project." The court, therefore, construed the term to mean that

"before an environmental impact report becomes required the government must have some minimal link with the activity, either by direct proprietary interest or by permitting, regulating, or funding private activity."⁵⁷⁵

Given this definition of a "project," the court concluded that the case in question required the preparation of an impact report. The court stated that "if private activities for which a permit is required were exempted from the operation of the act, projects with admittedly deleterious ecological consequences would be covered only if construction, acquisition or other development were undertaken by the government authority but not if the same authority allowed private enterprise to engage in the identical activity."⁵⁷⁶ Such a situation would prove to be unrealistic.

In response to the Friends of Mammoth decision the California Environmental Quality Act was amended. In 1972, AB 889 was adopted to clarify the act.

In 1973, the court once again was called on to construe the California Environmental Quality Act. In the case of County of Inyo v. Yorty,⁵⁷⁷ the question was whether the City of Los Angeles was "required to file an EIR (Environmental Impact Report) with reference to its continued extraction of subsurface waters from the Owens Valley area" of Inyo County.⁵⁷⁸

The court relied on the Friends of Mammoth case and guidelines promulgated by the California Resources Agency to once again define

the term "project". The court found that Los Angeles' "tapping and extraction of underground water is an 'on going project,' requiring an EIR within the contemplation of section 15070 of the Guidelines."⁵⁷⁹ The court thus concluded that the city's "underground-water extraction constitutes a project within the meaning of CEQA and the filing of an Environmental Impact Report is accordingly required."⁵⁸⁰

In Massachusetts, "no agency, department, board, commission, or authority of the Commonwealth or any authority of any political subdivision thereof shall commence any work, project, or activity which may cause damage to the environment until sixty days after it has published a final environmental impact report...or until sixty days after a public hearing on said report..."⁵⁸¹ (emphasis supplied).

The impact reports are to contain: detailed statements on work proposed and its environmental impact; measures to minimize environmental damages; any unavoidable short or long term environmental consequences that cannot be avoided if the work is performed; and alternatives to the proposed actions and their environmental consequences. All impact reports are to be "commenced during the initial planning and design phase" of a project or activity subjected to this section.

The secretaries of the executive offices are each required to promulgate rules and regulations necessary to carry out the impact report requirements. These rules and regulations must be approved

by the Secretary of Environmental Affairs, and must conform with the requirements of the National Environmental Policy Act.

Funds made available for the purpose of design of or planning or performing of work or projects may be expended on research, preparation and publication of impact reports. Funds may also be transferred or made available to other departments or agencies designated by the Secretary of Environmental Affairs for the purpose of preparing impact reports.

Minnesota's Environmental Policy Act notes that "where there is potential for significant environmental effects resulting from any major governmental action or from any major private action of more than local significance, such action shall be preceded by a detailed statement prepared by the responsible agency" or responsible person.⁵⁸² (emphasis supplied). The impact statement must include:⁵⁸³

- (a) The environmental impact of the proposed action, including any pollution, impairment, or destruction of the air, water land, or other natural resources located within the state;
- (b) Any direct or indirect adverse environmental, economic, and employment effects that cannot be avoided should the proposal be implemented;
- (c) Alternatives to the proposed action;
- (d) The relationship between local short term uses of the environment and the maintenance and enhancement of long term productivity;
- (e) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action;

- (f) The impact on state government of any federal controls associated with proposed action; and
- (g) The multistate responsibilities associated with proposed action.

So long as there are feasible and prudent alternatives to proposed action, no state actions that significantly affect the quality of the environment will be allowed, nor will any permit be issued for natural resources management and development. Economic considerations alone are not sufficient to justify the granting of permits.⁵⁸⁴

Conclusions

This over-view of state environmental protection and quality acts points up the fact certain states are becoming more aware of the impact of public and private actions upon the environment. As such, they are taking positive steps to prevent or minimize the damage to the natural environment.

The state environmental protection acts provide another legal tool with which to protect the fish and wildlife habitats. When used in conjunction with specific legislation on a subject, these acts leave little question as to the goals to be followed. In those states requiring the preparation of impact reports, an interdisciplinary approach is frequently stressed. This affords the agencies affected the opportunity to make their comments on the proposed action.

To effectively prevent or minimize damage to the environment, environmental protection laws, as with other related laws, must be

complied with in spirit and in fact. Failure to meet both requirements results, in many cases, in a paper shuffling exercise.

Having reviewed a rather extensive body of state legislation intended to protect and preserve the fish and wildlife habitats, and water environments, it is necessary to review federal legislation designed to provide protection to these habitats.

ENDNOTES

¹ See: Environmental Reporter Current Developments, vol. 3, No. 36, January 5, 1973, p. 1030.

² California Public Res. Code, sec. 5093.50.

³ California Public Res. Code, sec. 5093.54.

⁴ California Public Res. Code, sec. 5093.57.

⁵ California Public Res. Code, sec. 5093.54(d).

⁶ California Public Resources Code, sec. 5093.59.

⁷ G. C. A., Chapt. 17-901 to 17-905.

⁸ G. C. A., 17-902 (a).

⁹ G. C. A., Chapter 43-12.

¹⁰ G. C. A., 17-904 (b).

¹¹ G. C. A., 17-904 (b) (1).

¹² G. C. A., 17-904 (b) (2).

¹³ G. C. A., 17-904 (a).

¹⁴ G. C. A., 17-904 (c).

¹⁵ G. C. A., 17-904 (c) (1).

¹⁶ G. C. A., 17-904 (c) (2).

¹⁷ G. C. A., 17-904 (c) (3).

¹⁸ G. C. A., 17-905 (a).

¹⁹ G. C. A., 17-905 (b).

²⁰ G. C. A., 17-904 (a).

- ²¹ Idaho Code, Sections 67-4301 to 67-4306.
- ²² Idaho Code, Sections 67-4307 to 67-4312.
- ²³ Iowa Code Annotated, Vol. 7, Cumulative annual Pocket Part, 1972, sections 108A.1 to 108A.2.
- ²⁴ I. C. A., 108A.2.
- ²⁵ I. C. A., 108A.2.
- ²⁶ Ibid.
- ²⁷ I. C. A., 108A.4.
- ²⁸ I. C. A., 108A.5.
- ²⁹ I. C. A., 108A.6.
- ³⁰ Ibid.
- ³¹ I. C. A., 108A.7.
- ³² Indiana Code 1971, 13-2, Chapter 26, Natural, Scenic, and Recreational Rivers Preservation, Public Law No. 124.
- ³³ I. C., 1971, 13-2, Chapt. 26, sec. 3(c).
- ³⁴ I. C., 1971, 13-2, Chapt. 26, sec. 3(d).
- ³⁵ I. C., 1971, 13-2, Chapt. 26, sec. 3(e).
- ³⁶ I. C., 1971, 13-2, Chapt. 26, sec. 4(a).
- ³⁷ I. C., 1971, 13-2, Chapt. 26, sec. 4(b)(1) to (9).
- ³⁸ I. C., 1971, 13-2, Chapt. 26, sec. 5(a).
- ³⁹ I. C., 1971, 13-2, Chapt. 26, sec. 5(b).
- ⁴⁰ I. C., 1971, 13-2, Chapt. 26, sec. 6.
- ⁴¹ I. C., 1971, 13-2, Chapt. 26, sec. 7.
- ⁴² I. C., 1971, 13-2, Chapt. 26, sec. 8.
- ⁴³ Ibid.

- ⁴⁴I.C., 1971, 13-2, Chapt. 26, sec. 10.
- ⁴⁵I.C., 1971, 13-2, Chapt. 26, sec. 8.
- ⁴⁶I.C., 1971, 13-2, Chapt. 26, sec. 11.
- ⁴⁷Kentucky Revised Statutes, Title XII, secs. 146.200 to 146.990.
- ⁴⁸K.R.S., 146.220.
- ⁴⁹K.R.S., 146.240.
- ⁵⁰K.R.S., 146.230.
- ⁵¹K.R.S., 146.250.
- ⁵²K.R.S., 146.270.
- ⁵³K.R.S., 146.260(1).
- ⁵⁴K.R.S., 146.260(2).
- ⁵⁵K.R.S., 146.270.
- ⁵⁶K.R.S., 146.270.
- ⁵⁷K.R.S., 146.280(1).
- ⁵⁸K.R.S., 146.280(3).
- ⁵⁹K.R.S., 146.290.
- ⁶⁰K.R.S., 146.320.
- ⁶¹K.R.S., 146.340.
- ⁶²K.R.S., 146.350.
- ⁶³K.R.S., 146.990.
- ⁶⁴Louisiana Revised Statutes, Chapt. 8, sec. 1841 to 1849.
- ⁶⁵L.R.S., sec. 1841(3).
- ⁶⁶L.R.S., sec. 1842.

- ⁶⁷ L. R. S., sec. 1843.
- ⁶⁸ Ibid.
- ⁶⁹ L. R. S., sec. 1844.
- ⁷⁰ L. R. S., sec. 1841(8).
- ⁷¹ L. R. S., sec. 1849.
- ⁷² L. R. S., sec. 1849.
- ⁷³ L. R. S., sec. 1847.
- ⁷⁴ A Summary-Digest of State Water Laws, *supra*, p. 374.
- ⁷⁵ 12 M. R. S. A., secs. 501 et. seq., also, A Summary-Digest of State Water Laws, *supra*, p. 365.
- ⁷⁶ Annotated Laws of Massachusetts, Chapter 21, 1973, section 17B.
- ⁷⁷ A Summary-Digest of State Water Laws, *supra*, p. 387.
- ⁷⁸ A. L. M., sec. 17B.
- ⁷⁹ Mich. C. L. A., secs. 281.761 to 281.776; also see A Summary-Digest of State Water Laws, *supra*, p. 397.
- ⁸⁰ Laws of Minnesota, 1973, 68th legislature, 1st. Regular Session, Chapt. 271, secs. 104.31 to 104.40.
- ⁸¹ Laws of Minnesota, sec. 2, 104.32.
- ⁸² Laws of Minnesota, 104.34, subdivision 1.
- ⁸³ Laws of Minnesota, 104.35, subdivision 1.
- ⁸⁴ Laws of Minnesota, 104.33, subdivision 2(a).
- ⁸⁵ Ibid.
- ⁸⁶ Laws of Minnesota, 104.33, subdivision 2(b).
- ⁸⁷ Laws of Minnesota, 104.33, subdivision 2(c).
- ⁸⁸ Laws of Minnesota, 104.35, subdivision 2.

⁸⁹Laws of Minnesota, 104.35, subdivision 3.

⁹⁰Laws of Minnesota, 104.36, subdivision 1.

⁹¹Laws of Minnesota, 104.37.

⁹²Laws of Minnesota, 104.38.

⁹³Laws of Minnesota, 104.39.

⁹⁴The General Statute of North Carolina, 1971 Cumulative Supplement, Vol. 3A, Article 3, secs. 113A-30 to 113A-43.

⁹⁵G. S. N. C., sec. 113A-31.

⁹⁶G. S. N. C., sec. 113A-34.

⁹⁷G. S. N. C., sec. 113A-35(1) to (5).

⁹⁸G. S. N. C., sec. 113A-36(a).

⁹⁹G. S. N. C., sec. 113A-36(c).

¹⁰⁰G. S. N. C., sec. 113A-36(d).

¹⁰¹G. S. N. C., sec. 113A-38(a).

¹⁰²G. S. N. C., sec. 113A-38(b).

¹⁰³G. S. N. C., sec. 113A-37.

¹⁰⁴G. S. N. C., sec. 113A-39.

¹⁰⁵G. S. N. C., sec. 113A-42(a).

¹⁰⁶G. S. N. C., sec. 113A-42(b).

¹⁰⁷G. S. N. C., sec. 113A-41.

¹⁰⁸Constitution of North Carolina, Article XIV, Sec. 5.

¹⁰⁹Ohio Rev. Code, sec. 1501.16, as amended.

¹¹⁰Ibid.

¹¹¹Ibid.

- ¹¹² Ibid.
- ¹¹³ Ohio Rev. Code, sec. 1501.161 (A) to (C).
- ¹¹⁴ Ohio Rev. Code, sec. 1501.17.
- ¹¹⁵ Ohio Rev. Code, sec. 1501.19.
- ¹¹⁶ Oklahoma Statutes Annotated, 82 Secs. 1451-1459 (1971).
- ¹¹⁷ O. S. A., 82 Sec. 1452(a).
- ¹¹⁸ O. S. A., 82 Sec. 1452(b).
- ¹¹⁹ O. S. A., 82 Sec. 1453.
- ¹²⁰ O. S. A., 82 Sec. 1454.
- ¹²¹ O. S. A., 82 Sec. 1455.
- ¹²² O. S. A., 82 Sec. 1458.
- ¹²³ Water Policies for the Future, supra, p. 272.
- ¹²⁴ Oregon Revised Statutes, 390.805 to 390.925.
- ¹²⁵ O. R. S., 390.815.
- ¹²⁶ O. R. S., 390.825(1) to (6).
- ¹²⁷ O. R. S., 390.835(1).
- ¹²⁸ Ibid.
- ¹²⁹ O. R. S., 390.835(2).
- ¹³⁰ O. R. S., 390.835(3).
- ¹³¹ O. R. S., 390.845(1).
- ¹³² O. R. S., 390.845(2).
- ¹³³ O. R. S., 390.845(2)(a).
- ¹³⁴ O. R. S., 390.845(2)(b).
- ¹³⁵ O. R. S., 390.845(2)(c).

- ¹³⁶ O. R. S., 390.845(2)(d).
- ¹³⁷ O. R. S., 390.845(2)(e).
- ¹³⁸ O. R. S., 390.845(4)
- ¹³⁹ O. R. S., 390.845(4)(a).
- ¹⁴⁰ O. R. S., 390.845(4)(b).
- ¹⁴¹ O. R. S., 390.845(5).
- ¹⁴² O. R. S., 390.845(6); also see 390.845(7).
- ¹⁴³ O. R. S., 390.855.
- ¹⁴⁴ Act of the Pennsylvania General Assembly No. 283, sec. 2.
(Referred to hereafter by section number only.)
- ¹⁴⁵ Wild rivers being: "rivers that are free of impoundments and generally inaccessible except by trail, with water sheds or shorelines essentially primitive and waters unpolluted," sec. 4(2)(b)(1).
- ¹⁴⁶ Scenic rivers being: "rivers that are free of impoundments, with shorelines or watersheds still largely primitive and undeveloped, but accessible in places by road." sec. 4(2)(b)(2).
- ¹⁴⁷ Recreational rivers being: "rivers that are readily accessible, that may have some development along their shorelines and may have undergone some impoundment or diversion in the past." sec. 4(2)(b)(3).
- ¹⁴⁸ sec. 4(2)(b)(4).
- ¹⁴⁹ sec. 5.
- ¹⁵⁰ sec. 6(a).
- ¹⁵¹ Act of June 22, 1964 (P. L. 84).
- ¹⁵² South Dakota Compiled Laws 1967, Annotated 1972 Pocket Supplement, 46-17A-21.
- ¹⁵³ Ibid.
- ¹⁵⁴ S. D. C. L., 46-17A-3 (12).

¹⁵⁵ S.D.C.L., 46-17A-3 (10).

¹⁵⁶ S.D.C.L., 46-17A-3 (8).

¹⁵⁷ S.D.C.L., 46-17A-20. In July of 1973, the Water Projects Formulation and Finance Committee was abolished and its duties with respect to the scenic rivers system were taken over by the Board of Natural Resource Development.

¹⁵⁸ Ibid.

¹⁵⁹ Tennessee Code Ann. Chapter 14, secs. 11-1401 to 11-1417.

¹⁶⁰ T.C.A., 11-1403.

¹⁶¹ T.C.A., 11-1404.

¹⁶² T.C.A., 11-1404.

¹⁶³ T.C.A., 11-1404.

¹⁶⁴ T.C.A., 11-1406.

¹⁶⁵ T.C.A., 11-1405.

¹⁶⁶ T.C.A., 11-1406 (1).

¹⁶⁷ T.C.A., 11-1406 (2).

¹⁶⁸ T.C.A., 11-1406 (3).

¹⁶⁹ T.C.A., 11-1405.

¹⁷⁰ T.C.A., 11-1408 (1).

¹⁷¹ T.C.A., 11-1408 (2).

¹⁷² T.C.A., 11-1409.

¹⁷³ T.C.A., 11-1410.

¹⁷⁴ T.C.A., 11-1411 (1).

¹⁷⁵ T.C.A., 11-1411 (2).

¹⁷⁶ T.C.A., 11-1413.

- ¹⁷⁷T.C.A., 11-1414.
- ¹⁷⁸T.C.A., 11-1415.
- ¹⁷⁹T.C.A., 11-1417.
- ¹⁸⁰T.C.A., 11-1417.
- ¹⁸¹West Virginia Natural Resource Laws. Article 58, secs. 20-5B-1 to 20-5B-17.
- ¹⁸²W.V.N.R.L., sec. 20-5B-1.
- ¹⁸³W.V.N.R.L., sec. 20-5B-3.
- ¹⁸⁴W.V.N.R.L., sec. 20-5B-4 (a) to (c).
- ¹⁸⁵W.V.N.R.L., sec. 20-5B-5 (a).
- ¹⁸⁶W.V.N.R.L., sec. 20-5B-5 (b).
- ¹⁸⁷W.V.N.R.L., sec. 20-5B-5 (d).
- ¹⁸⁸W.V.N.R.L., sec. 20-5B-6.
- ¹⁸⁹W.V.N.R.L., sec. 20-5B-2 (h).
- ¹⁹⁰W.V.N.R.L., sec. 20-5B-6.
- ¹⁹¹Specific details for the issuance of permits if found in sec. 20-5B-8 (a) to (e).
- ¹⁹²Sec. 20-5B-9.
- ¹⁹³Sec. 20-5B-10.
- ¹⁹⁴Sec. 20-5B-11.
- ¹⁹⁵Sec. 20-5B-14.
- ¹⁹⁶Wisconsin Natural Resources Laws 1969-1970, Chapter 30, sec. 30.26.
- ¹⁹⁷W.N.R.L., 30.26 (1).
- ¹⁹⁸W.N.R.L., 30.26 (2).

¹⁹⁹W.N.R.L., 30.251, and 30.25.

²⁰⁰W.N.R.L., 30.26 (3) (a).

²⁰¹W.N.R.L., 30.26 (3) (b).

²⁰²W.N.R.L., 30.26 (3) (c).

²⁰³W.N.R.L., 30.26 (3) (d).

²⁰⁴W.N.R.L., 30.26 (3) (e).

²⁰⁵W.N.R.L., 30.26 (3) (f).

²⁰⁶Wyo. Stat. secs. 41-1.12 to 41-1.22.

²⁰⁷Wyo. Stat., sec. 41-1.12.

²⁰⁸Ibid.

²⁰⁹Wyo. Stat., sec. 41-1.14.

²¹⁰John C. Peters, Operation since 1963 under Montana's Stream Preservation Law, Montana Fish and Game Dept., Helena, March 1970, p. 2, (unpublished report). Also see: John C. Peters, "Operation under Montana's stream preservation Law of 1965, " Proc. 46th West, Assoc. State Game and Fish Commissioners. 46:313-315.

²¹¹Ibid., p. 3.

²¹²Ibid., p. 4.

²¹³Rev. Code Mont., sec. 26-1501 (1947).

²¹⁴R.C.M., 26-1502 (1947). H.B. 474, 43rd. Leg. Ass. (LC 1206) if passed the law would require: "any person, corporation, firm, partnership, association or other legal entity" to also notify the commission of any stream alteration.

²¹⁵R.C.M., 26-1504 (1947).

²¹⁶R.C.M., 26-1505 (1947). H.B. 474, if passed, would expand this committee to five members, which "shall represent different occupations so as to provide a cross-section of interests in the community."

²¹⁷R.C.M., 26-1407 (1947). H.B. 474, if passed, will repeal this exemption.

²¹⁸R.C.M., 26-1409 (1947).

²¹⁹R.C.M., 26-1409 (1947).

²²⁰R.C.M., 26-1410 (1947).

²²¹The data prior to enactment showed: (1) of 987 stream miles surveyed 36% were altered; (2) 2,401 alteration were noted; (3) altered channels produced one-fifth the game, fish and one-seventh the weight of game fish as did unaltered channels. Operation Since 1963 Under Montana's Stream Preservation Law, supra, p. 3.

²²²Ibid., p. 7.

²²³The New York Stream Preservation Law combined three previous laws: (1) Conservation Law, Sec. 179 requiring permits; (2) Navigation Law, Sec. 31, dredge and fill regulations and (3) Conservation Law, Sec. 948, which regulated dams.

²²⁴McKinneys Conservation Law, Sec. 15-0501.1 (Sept. 1, 1972). (Cited hereafter as ECL sec. 15-0501.1.) Also see: A Summary-Digest of State Water Laws, supra, pp. 534-536.

²²⁵ECL, sec. 15-0501.2 for standards see: Title 5 (Public Health Law) Parts 700-703, Classification Waters of New York State, official compilation of codes rules and regulations. C(T) waters are those defined as: "Best usage of waters: fishing and any other usage except for bathing, as source of water supply for drinking, culinary or food processing purposes" (sec. 701.3).

²²⁶ECL sec. 15-0501.2.

²²⁷ECL sec. 15-0501.3.c.

²²⁸ECL sec. 15-0501.3.c.

²²⁹ECL sec. 15-0501.4.

²³⁰Id.

²³¹ECL 15-0501.5.

²³²ECL 15-0501.6.

²³³ECL 15-0503.

²³⁴ECL 15-0503.3.

²³⁵ECL sec. 15-0503.4.

²³⁶ECL sec. 15-0505.1.

²³⁷ECL sec. 15-0505.1 to 15-0505.5.

²³⁸ECL sec. 15-0507.

²³⁹ECL sec. 15-0507.2 to 15-0507.5.

²⁴⁰ECL sec. 15-0511.

²⁴¹ECL secs. 15-0501.7, 15-0503.33, and 15-0505.5.

²⁴²Report to the Colorado General Assembly, Game, Fish and Parks, Colorado Legislative Council Research Publications, No. 136, November 1968, p. xxiii.

²⁴³Introduced as S.B. No. 40, 47th General Assembly, effective July 1, 1969.

²⁴⁴An amendment the following year would have placed any person or state under its control, however, the amendment failed. S.B. No. 102, 48th General Assembly, LDO No. 71 0558/1.

²⁴⁵Colorado Rev. Stat., 62-14-2 (Supp. 1969).

²⁴⁶Colo. Rev. Stat. 62-14-3 (Supp. 1969).

²⁴⁷Colo. Rev. Stat. 62-14-4.(Supp. 1969).

²⁴⁸Colo. Rev. Stat. 62-14-5(1) (Supp. 1969).

²⁴⁹Colo. Rev. Stat. 62-14-5(2) (Supp. 1969).

²⁵⁰Colo. Rev. Stat. 62-14-6 (Supp. 1969).

²⁵¹Also see Alaska statutes, secs. 16.05.870 through 16.05.900, where the commissioner of the Department of Fish and Game is authorized to specify certain rivers, lakes and streams which are important for fish spawning and migration. Work done on a specified stream requires approval of commissioner to protect the fish and game resources of the state.

- ²⁵² Idaho Code, Sec. 42-3801.
- ²⁵³ Idaho Code, Sec. 42-3802(a). "Applicant" is defined as any "individual partnership, company, corporation, municipality, county, state or federal agency, or other entity proposing to alter a stream channel."
- ²⁵⁴ Idaho Code, Sec. 42-3803(a).
- ²⁵⁵ Idaho Code, Sec. 42-3804.
- ²⁵⁶ Idaho Code, sec. 42-3805.
- ²⁵⁷ Idaho Code, sec. 42-3806.
- ²⁵⁸ Idaho Code, sec. 42-3807.
- ²⁵⁹ Idaho Code, sec. 42-3808.
- ²⁶⁰ Idaho Code, sec. 42-3009.
- ²⁶¹ Idaho Code, sec. 42-3010.
- ²⁶² Utah Code Ann. 73-3-29(1) (Repl. vol. 7B, Supp. 1973). Introduced as H.B. No. 79, 1971 General Session of the Legislature.
- ²⁶³ Utah Code Ann. 73-3-29(2) (Supp. 1973).
- ²⁶⁴ Utah Code Ann. 73-3-29(1) (Supp. 1973).
- ²⁶⁵ Utah Code Ann. sec. 73-3-29(3) (Supp. 1973). Also see: Industrial Developments and the Environment, Special Committee on Environmental Law of the Am. Bar Ass., Aug. 1, 1973, p. 4-26.
- ²⁶⁶ Utah Code Ann. sec. 73-3-29(4) (Supp. 1973).
- ²⁶⁷ Utah Code Ann. sec. 73-3-29(5) (Supp. 1973).
- ²⁶⁸ Vermont Stat. Ann. 10, secs. 1001 through 1025.
- ²⁶⁹ V.S.A. 10, sec. 1002(2). "Person" applies to any individual, partnership, corporation, municipality and state agency.
- ²⁷⁰ V.S.A. 10, sec. 1021.
- ²⁷¹ V.S.A. 10, sec. 1022.

²⁷²V.S.A. 10, sec. 1023(a).

²⁷³V.S.A. 10, sec. 1023(b).

²⁷⁴V.S.A. 10, sec. 1024.

²⁷⁵V.S.A. 10, sec. 1025.

²⁷⁶See: Rex Perschbacher, "Private Fills in Navigable Waters: A Common Law Approach," 60 Calif. Law Rev. (1972), pp. 225-258.

²⁷⁷See: Robert C. Ausness, "A Survey of State Regulation of Dredge and Fill Operations in Nonnavigable Waters," 8 Land and Water Law Rev. (1973), pp. 65-91.

²⁷⁸Wilbour v. Gallagher, 77 Wash. 2d 306, 313, 462 p. 2d 232, 237, (1969), Cert. denied, 400 U.S. 878 (1970). Also discussed in Water Resource Management, supra, pp. 831-845.

²⁷⁹Shively v. Bowlby, 152 U.S. 1, 18-26 (1894); U.S. v. Rio Grande Irr. Co., 174 U.S. 690 (1899); and Prosser v. No. Pac. R.R., 152 U.S. 59 (1894).

²⁸⁰e.g., California, see: People v. Calif. Fish Co., 166 Cal. 576, 138 p. 79 (1913); Wisconsin, see Muench v. Public Serv. Comm'n, 261 Wis. 492, 53 N.W. 2d 514 (1952).

²⁸¹Smith v. Youmans, 96 Wis. 103, 70 N.W. 1115 (1897) and Illinois Cent. R.R. v. Illinois, 146 U.S. 387 (1892).

²⁸²Carpenter v. Board of Comm'rs., 58 N.W. 295 (Minn. 1894).

²⁸³Ausness, supra, p. 67.

²⁸⁴Ibid., at p. 68, note 23. e.g. Lembeck v. Nye, 47 Ohio 336, 24 N.E. 686 (1890); Miller v. Lutheran Conference & Comp. Ass'n, 331 Pa. 241, 200 A. 646 (1938); Beach v. Hagner, 207 Mich. 93, 173 N.W. 487 (1919).

²⁸⁵Ibid., at p. 69, note 28, e.g., Johnson v. Seifert, 257 Minn. 159, 100 N.W. 2d 689 (1960), and Monroe v. State, 111 Utah 1, 175 P. 2d 759 (1946).

²⁸⁶ e.g., Illinois, Leonard v. Pearce, 348 Ill. 518, 181 N.E. 399 (1932); Indiana, Sanders v. DeRose, 207 Ind. 90, 191 N.E. 331 (1934); New Jersey, Walden v. Pines Lake Land Co., 126 N.J. Eq. 249, 8A.2d 581 (Ct. Err. & App. 1939); New York, Mix v. Tice, 164 Misc. 261, 298 N.Y.S. 441 (Sup. Ct. 1937); Ohio, Akron Canal & Hydraulic Co. v. Fontaine, 72 Ohio App. 93, 50 N.E. 2d 897 (1934), Pennsylvania, Smoulther v. Boyd, 209 Pa. 146, 58A 144 (1904); Tennessee, State v. W. Tenn. Land Co., 127 Tenn. 575, 158 S.W. 746 (1913).

²⁸⁷ e.g., Arkansas, Harris v. Brooks, 225 Ark. 436, 283 S.W. 2d 129 (1955); Florida, Duval v. Thomas, 114 S. 2d 791 (Fla. 1959); Michigan, Beach v. Hayner, 207 Mich. 93, 173 N.W. 487 (1919); Minnesota, Johnson v. Seifert, 257 Minn. 159, 100 N.W. 2d 689 (1960); Mississippi, St. Game & Fish Comm'n v. Louisfritz Co., 187 Miss. 539, 193s. 9 (1940); Missouri, Elder v. Delcour, 364 Mo. 835, 269 S.W. 2d 17 (1954); Texas, Taylor Fishing Club v. Hammett, 88 S.W. 2d 127 (Tex. Civil App. 1935); Virginia, Improved Realty Corp. v. Sowers, 195 Va. 317, 78 S.E. 2d 588 (1953); Washington, Snively v. Jaber, 48 Wash. 2d 815, 296 P.2d 1015 (1956).

²⁸⁸ Boone v. Wilson, 125 Ark. 364, 188 S.W. 1160 (1916); Solomon v. Congleton, 245 Ark. 482, 432 S.W. 2d 865.

²⁸⁹ Smith-Hurd Ill. Ann. Stat., Ch. 19, secs. 52, 54 and 65.

²⁹⁰ Smith-Hurd Ill. Ann. Stat., Ch. 19, sec. 65, also see: Ill. Laws Relating to Waterways, 1971, Regulation of Rivers. Lakes and Streams, sec. 23, at p. 92. In Indiana no "person, firm, corporation, board of county commissioners, body of viewers or drainage commissioners" may encroach upon a lake by dredging, filling or altering where the effect will be to cause a "change in the size affecting natural resources, scenic beauty and contour of such lake below water line or shore line," without a permit from the Indiana Department of Conservation. Ind. Stat. Ann. sec. 27-623 (1970).

²⁹¹ Illinois Laws Relating to Waterways, 1971, (Illinois Municipal Coded), sec. 11-87-3, at p. 97.

²⁹² R.S.T. 12, sec. 514, subsec. B, (1971).

²⁹³ The Great Ponds Act, position paper by the Maine Department of Inland Fisheries and Game, Augusta, March 15, 1973, p. 3.

²⁹⁴ R.S.T. 12, sec. 2205 (1971).

²⁹⁵ The Great Ponds Act, op. cit., p. 8.

²⁹⁶ Ibid., at p. 7.

²⁹⁷ Ibid., at pp. 8-9.

²⁹⁸ Edward W. Beuchert, "State Regulation of Channel Encroachments," 4 Nat. Res. Journal (1965), p. 489.

²⁹⁹ e.g., Minn. Stat. Ann., sec. 219.37 (1947); Mont. Rev. Code sec. 72-644 (1947); and Kan. Gen. Stat. Ann. sec. 66-501 (1949). Cited in Beuchert, *supra*, at note 9.

³⁰⁰ Ill. Ann. Stat. Ch. 19, secs. 70-78; Illinois Laws Relating to Waterways, 1971, (Regulation of Rivers, Lakes and Streams), sec. 5 through 29a.

³⁰¹ Illinois Laws Relating to Waterways, 1971, (Regulation of Rivers, Lakes and Streams) sec. 7, at p. 86.

³⁰² Illinois Laws Relating to Waterways, 1971, (Regulation of Rivers, Lakes and Streams) sec. 18, at pp. 89-90.

³⁰³ Illinois Laws Relating to Waterways, 1971, (Regulation of Rivers, Lakes and Streams) sec. 13, at p. 88.

³⁰⁴ Public Act 346, (1972); also see ERCD, Vol. 3, No. 38, Jan. 19, 1973, p. 1117.

³⁰⁵ "Person" is defined as: "any individual, partnership, corporation, association, political subdivision of the state, the department or other instrumentality or agency of the state, political subdivision thereof or other legal entity." Act 346, sec. 2(i).

³⁰⁶ "Bottomland" is defined as: "the land area of any inland lake or stream which lies below the ordinary high-water mark and which may or may not be covered by water." Act 346, sec. 2(a).

³⁰⁷ "Inland lake or stream" means "a natural or artificial lake, pond or impoundment; a river, stream or creek which may or may not be serving as a drain. . .; or any other body of water which has defined banks, a bed and visible evidence of a continued flow. . . it does not include the Great Lakes, Lake St. Clair or a lake or pond which has a surface area of less than 5 acres." Act 346, sec. 2(f).

³⁰⁸ Act 346, sec. 3 (a) through (g).

³⁰⁹ Public Act 346, sec. 4 (a) through (i).

- ³¹⁰Public Act 346, sec. 4 (h).
- ³¹¹Public Act 346, sec. 4 (b).
- ³¹²Public Act 346, sec. 6 (5).
- ³¹³Public Act 346, sec. 6 (2).
- ³¹⁴Public Act 346, sec. 7.
- ³¹⁵Public Act 346, sec. 13 (1).
- ³¹⁶Public Act 346, sec. 13 (2).
- ³¹⁷Act 245, Public Acts of 1929, as amended, sec. 2a (1).
- ³¹⁸Act 245, Public Acts of 1929, as amended, sec. 5b.
- ³¹⁹Enrolled House Bill 2142, chapter 674, Oregon Legislative Assembly, 1973 Regular session; amending ORS 541.605, 541.610, 541.620, 541.625, 541.630, 541.640, 541.650, 541.655 and 541.660.
- ³²⁰ORS 541.610 (1), as amended (1973).
- ³²¹ORS 541.610 (2), as amended (1973). Originally, the State Water Resources Board was also responsible for the control of removals and fills.
- ³²²"Removal" is defined as "the taking of more than 50 cubic yards . . . of material in any waters . . . in any calendar year; or the movement by artificial means of an equivalent amount of material on or within the bed of such waters," ORS 541.605 (6).
- ³²³"Fill" means "the total of deposits by artificial means equal to or exceeding 50 cubic yards or more of material at one location in any waters . . ." ORS 541.605 (5).
- ³²⁴ORS 541.620 (1), as amended (1973).
- ³²⁵ORS 541.620 (3)(a)(A) through (G), as amended (1973).
- ³²⁶ORS 541.620 (4), as amended (1973).
- ³²⁷ORS 541.625 (1), as amended (1973).
- ³²⁸ORS 541.625 (2)(a) through (d), as amended (1973).

- ³²⁹ ORS 541.625 (3), as amended (1973).
- ³³⁰ ORS 541.625 (5), as amended (1973).
- ³³¹ ORS 541.640, as amended (1973).
- ³³² ORS 541.625 (4), as amended (1973).
- ³³³ ORS 541.650 (1), as amended (1973).
- ³³⁴ ORS 541.650 (5), as amended (1973).
- ³³⁵ ORS 541.650 (6), as amended (1973). The director may also institute a suit at law or in equity to abode or restrain threatened or existing nuisances. ORS 541.660 (2) as amended (1973).
- ³³⁶ H. B. 2142, sec. 13(1).
- ³³⁷ H. B. 2142, sec. 13(2).
- ³³⁸ e.g., Pennsylvania Act of June 25, 1913, P. L. 555, as amended; Pa. Stat. Ann. Tit. 32, secs. 681-91 (1949) (obstruction to stream prohibited without permit). See: Bridges, Walls, Fills, Channel Changes, etc., Department of Environmental Reservoirs, Harrisburg, Pa., 1972, pp. 10-14, and p. 8, where it is stated that "a low-flow channel may be required to provide a satisfactory channel to maintain fish life" when channels are relocated.
- ³³⁹ N. J. Stat. Ann. secs. 58:1-26 (1940) (structures within high water mark prohibited without permit).
- ³⁴⁰ Mass. Gen. Laws Ann., Ch. 91, sec. 12.
- ³⁴¹ Mass. Gen. Laws Ann., Ch. 91, sec. 12 A (structures within high water mark prohibited without permit).
- ³⁴² e.g., Lake Tahoe, Nev. Rev. Stat., sec. 445.080(2) (1969); or navigable lakes in general, Wis. Stat. Ann. sec. 30.20(1) (1964); for citations on dredging and filling laws relating to lakes in the 50 states see: Joh. A. Kusler, Survey: Lake Protection and Rehabilitation Legislation in the United States, University of Wisconsin, Madison, March, 1972, pp. 15-39.
- ³⁴³ e.g., Ann. Code of Maryland, sec. 8.05.03.05; also see: Maryland State Department of Natural Resources, Rules and Regulations (08.05.03.01-08.05.03.07), Annapolis, Md., (undated), pp. 21-23.

³⁴⁴ "State Regulation of Channel Encroachments," *supra*, pp. 492-3.

³⁴⁵ See e.g. B. Kelley, The Pavers and Paved, (1971); H. Leavitt, Superhighway-Superhoax, (1970); A. Mowbray, Road to Ruin, (1969).

³⁴⁶ For example see: Arkansas State Highway Department Special Provisions, Job Abatement of Water Pollution, "6-26-70; Indiana State Highway Commission, Standard Specifications, sec. 108.03(2), and Minnesota Department of Highways, Construction Specification 1717, "Air and Water Pollution," December 1971.

³⁴⁷ Department of Public Works, Division of Highways Circular Letter No. 66-275, December 29, 1966.

³⁴⁸ Department of Public Works, Division of Highways, Departmental Directives, 71-29, August 5, 1971.

³⁴⁹ Ibid.

³⁵⁰ Ibid.

³⁵¹ Sec. 7-1. 01L(3).

³⁵² Cal. Fish and Game Code, sec. 1601, as amended 1970, also see Dept. of Public Works, Division of Highways, "Circular Letter" No. 71-18, March 5, 1971.

³⁵³ Cal. Fish and Game Code, sec. 1501.5 as amended 1970.

³⁵⁴ Connecticut Highway Department, Commissioner's Administrative Memorandum No. 37, November 15, 1966. Index No. 2.89.

³⁵⁵ Connecticut Highway Department, Policy and Procedure, Index No. 9.01, Revised July 7, 1967.

³⁵⁶ Maine State Highway Commission's Supplemental Specifications, Special Provision Sec. 107, June 12, 1968.

³⁵⁷ Maine State Highway Commission's Supplemental Specification, Sec. 203.05, April 29, 1971.

³⁵⁸ Maine Rev. Stat., Ch. 3, sec. 231 to 235.

³⁵⁹ Maine Rev. Stat., Ch. 3, sec. 232.

- ³⁶⁰ Maine Rev. Stat., Ch. 3, sec. 233.
- ³⁶¹ Maine Rev. Stat., Ch. 3, sec. 234 (1).
- ³⁶² Maine Rev. Stat., Ch. 3, sec. 234 (2).
- ³⁶³ Maine Rev. Stat., Ch. 3, sec. 234 (3).
- ³⁶⁴ New Hampshire Highways (Reprint), "Serving Roads and Rods in New Hampshire," December, 1968, p. 1.
- ³⁶⁵ Sec. 107 (1969).
- ³⁶⁶ See: New Hampshire Department of Public Works and Highways, Supplemental Specifications, Sec. 1000 "Temporary Project Water Pollution Control (Erosion Control)," June 30, 1970.
- ³⁶⁷ Alabama being the only state with no specific legislative control.
- ³⁶⁸ e.g., Colo. Rev. Stat. Ann., sec. 148-5-5 (1963); Conn. Gen. Stat., secs. 25-110 to 25-118; Fla. Laws, sec. 373.413 (1) (1972 Supp.); Ill. Rev. Stat. Ch. 19, para. 18; Ind. Stat. Ann., sec. 27-1403 (2); 25 Iowa Code Ann., sec. 369.10 (1971); Kan. Stat. Ann., secs. 82a-705, 82a-709; N.J. Stat. Ann., sec. 58:1-26; L.N.Y. Ann., Env. Cons. Law, sec. 15-0503; N.C. Gen. Stat., secs. 143-215.23 to 143-215.37; Okla. Stat. Ann., title 82, secs. 105.9 and 1085.20 (1972); Vt. Stat. Ann. 10, sec. 702; Wyo. Stat. secs. 41-73, 41-74.
- ³⁶⁹ N.C. Gen. Stat. secs. 143-216.26 and 143-216.27.
- ³⁷⁰ N.C. Gen. Stat., sec. 143-215.28.
- ³⁷¹ N.C. Gen. Stat., secs. 143-215.31 and 143-215.32.
- ³⁷² e.g., Conn. Gen. Stat., sec. 25-110 to 25-118; Ind. State. Ann. secs. 37-1803 and 37-1804; Md. Code Ann., art. 96A, sec. 17; Mass. Gen. Laws Ann., ch. 253, sec. 46; Mich. C. L. A., secs. 281.131 to 281.135; Neb. Rev. Stat., 1943, secs. 46-277 and 46-278; 12 N. D. Cent. Code, sec. 61-02-20; Okla. Stat. Ann. tit. 82, sec. 105.27; and 32 Penn Stat. Ann., sec. 685.
- ³⁷³ e.g., 25 Iowa Code Ann., sec. 469.1; Md. Code Ann., art. 96A, secs. 11 and 12; Mich. C. L. A., secs. 281.131 to 281.135; 5 Miss. Code Ann. sec. 5956-20; N. J. Stat. Ann., secs. 58:4-1; Ohio Rev. Code, sec. 1521.06; and Wis. Nat. Res. Laws, sec. 31.05.

³⁷⁴ e.g., Alaska Stat. sec. 16.05.840; Calif. Water Code Ann., sec. 12582; Ga. Stat. sec. 17-101; Ill. Rev. Stat., ch. 19, secs. 50 and 60; 12 Maine Code, secs. 2201 et. seq.; Md. Code Ann., art. 96A, sec. 16; Mass. Stat. ch. 130, sec. 19 and ch. 131 sec. 4; Nev. Rev. Stat., sec. 535.020; N. C. Gen. Stat., sec. 77-3; Ore. Rev. Stat., sec. 509.600 to 509.992; Code of Va. sec. 29-151; Wash. Rev. Code, sec. 90.54.020(5), 90.24.050 and 90.24.060; and Wis. Stat. 31.02(4)(c).

³⁷⁵ Alaska Stat., sec. 16.05.840.

³⁷⁶ Alaska Stat., sec. 16.05.870 to .900.

³⁷⁷ Alaska Stat., sec. 16.05.850.

³⁷⁸ Calif. Water Code Ann., sec. 12582.

³⁷⁹ O. R. S. 498.732, 509, 640, 509, 645.

³⁸⁰ O. R. S. 509.605(1) and 509.605(3).

³⁸¹ O. R. S. 509.605(2).

³⁸² O. R. S. 509.615(1).

³⁸³ O. R. S. 509.615(2).

³⁸⁴ O. R. S. 509.620.

³⁸⁵ O. R. S. 509.625(2).

³⁸⁶ O. R. S. 509.635(1)(a) to (c).

³⁸⁷ O. R. S. 509.635(3)(a) and (b).

³⁸⁸ O. R. S. 509.645(1).

³⁸⁹ O. R. S. 509.645(2).

³⁹⁰ O. R. S. 509.645(3).

³⁹¹ O. R. S. 509.910(1).

³⁹² O. R. S. 509.910(2).

³⁹³ O. R. S. 509.992.

³⁹⁴Rev. Code Wash. sec. 90.54.020(5). (Water Resources Act of 1971).

³⁹⁵R. C. W., 90.24.050.

³⁹⁶Wis. Nat. Res. Laws., sec. 31.02(2).

³⁹⁷Wis. Nat. Res. Laws., sec. 31.04.

³⁹⁸Wis. Nat. Res. Laws., sec. 31.02(4)(c).

³⁹⁹Wis. Nat. Res. Laws., sec. 31.06(1).

⁴⁰⁰Wis. Nat. Res. Laws., sec. 31.06(3), as amended 1971.

⁴⁰¹Ibid.

⁴⁰²Ark. Stat., sec. 21-1301.

⁴⁰³N. Y. Env. Cons. Law, sec. 15-0501 through 15-0515.

⁴⁰⁴10 V. S. A., secs. 701 et seq.

⁴⁰⁵Del. Code Ann., sec. 7-6103(4).

⁴⁰⁶Ind. Stat. Ann., sec. 27-1804.

⁴⁰⁷e.g., Louisiana Rev. Stat. 38:18, Acts of 1956, No. 405, sec. 1.

⁴⁰⁸Conn. Pub. Act No. 155 (1972), as amended by Public Act No. 571 (1973).

⁴⁰⁹Pub. Act No. 155 (1972), as amended, sec. 7 (Referred to hereafter by section number only).

⁴¹⁰Sec. 7 (f) (1).

⁴¹¹Sec. 7 (f) (2).

⁴¹²Federal environmental legislation provides the goals, policies and substance of the law and in most every case, except pre-emption, maintains it is the state's primary responsibility to implement the intent of the act. Failure by the states to carry out the law will lead to Federal action, i.e., Water Pollution Control Act of 1972, and Air Pollution Control Act of 1970.

413 Sec. 4 (15).

414 Sec. 4 (16).

415 Sec. 7(a) through (g).

416 Sec. 8(b).

417 Sec. 8(c).

418 Sec. 6(a) through (f), and sec. 8(c).

419 Sec. 8(d).

420 Sec. 9.

421 Sec. 10.

422 Sec. 11(b).

423 Sec. 12.

424 Mass. Gen. Laws, Ch. 131, sec. 40 A, as amended by Acts of 1972, Ch. 782 (effective July 1, 1973).

425 "Inland wetlands" are defined as "any marsh, meadow or swamp bordering on inland waters or that portion of any bank which touches any inland waters, or any marsh meadow or swamp subject to flooding by fresh water."

426 "Ohio Department of Natural Resources Policy Statement," by William B. Nye, Director, June 19, 1973. Issued under the authority vested in the Director by Ohio Rev. Code, sec. 1501.01.

427 R. I. Gen. Laws Ann., sec. 2-1-18 through 2-1-24 (1971). (Cited hereafter by section number only).

428 Sec. 2-1-18.

429 Sec. 2-1-21.

430 Sec. 2-1-22.

431 Sec. 2-1-23.

⁴³² Hearings on Estuarine Areas before the Subcommittee on Fisheries and Wildlife Conservation of the House Committee on Merchant Marine and Fisheries, 90th Cong., 1st Session, p. 30 (1967).

⁴³³ Milton S. Heath, Jr., "Estuarine Conservation Legislation in the States," V Land and Water Law Rev. (1970), pp. 356-7. "Routine features" are those including Corps of Engineers permit requirements, general pollution control laws, fish and game laws, and controls over the disposal of state lands. This article provides a good summary of state actions and suggests possible legislation for estuarine studies and management.

⁴³⁴ Alabama enrolled Act, S.311 (1973); Conn. Pub. Acts No. 695 (1969); Del. Code secs. 6601 through 6622 (1973) and Del. Code secs. 7001 through 2014 (1971); Maryland Ann. Code Art. 66C, as amended 1973; Mass. Gen. Laws ch. 130, sec. 27A (1965); 12 Me. Rev. Stat. Ann., secs. 4701 through 4709 (Supp. 1972); N.H. Rev. Stat. Ann., sec. 483-A:1 through 483-A:5 (1970); N.J. Stat. Ann., secs. 13:9A-1 through 13:9A-10 (Supp. 1973); N.Y. Env. Cons. Law secs. 25-0101 through 25-0602 (1973); N.C. Gen. Stat. sec. 113-229 (1971 Supp.); O.R.S. secs. 541.605 through 541.660 (1971); R.I. Gen. L. Ann. sec. 11-46.1-1 (1965); RCW sec. 90.58 (1973). Cited in "Estuarine Conservation Legislation in the States," *supra*, at note 17, p. 356.

⁴³⁵ Tex. Rev. Civ. Stat. art. 5415 (e), (f), (1948); Fla. Stat. secs. 253.122-123 (1965).

⁴³⁶ Cal. Gov't Code sec. 7.2 (West, 1966).

⁴³⁷ This material was largely obtained from John O. Ledwigson, "Managing the Environment in the Coastal Zone," Environmental Reporter, Monograph No. 3, May 1, 1970, pp. 6-10; and "Estuarine Conservation Legislation in the States," *supra*.

⁴³⁸ "Estuarine Conservation Legislation in the States," *supra*, p. 358.

⁴³⁹ P.L. 1967, c.348, as amended by P.L. 1969, c.379; P.L. 1971, c.336 effective Sept. 23, 1971, R.S., T. 12, Part 5, c.421; and further amended by P.L. 1973, c.256, 12 Me. Rev. Stat. Ann., secs. 4701 to 4709. Wherein wetland is defined as "any swamp, marsh, bog, beach, flat or other continuous lowland above extreme low water..."

⁴⁴⁰ 12 M. R. S. A. sec. 4701.

⁴⁴¹ The "Board" is composed of the Commissioners of Sea and Shore Fisheries, and of Inland Fisheries and Game, Chairman of the Environmental Improvement Commission, Chairman of the State Highway Commission, Forest Commissioner and Commissioner of Health and Welfare. 12 M. R. S. A. sec. 4706.

⁴⁴² 12 M. R. S. A., sec. 4702. Permits must be filed with the county commissioners if the act occurs in an unorganized township, and activities in two or more municipalities must have concurrent approval of the respective municipalities and must have the concurrent approval of the respective municipal officers. 12 M. R. S. A., sec. 4703.

⁴⁴³ 12 M. R. S. A. sec. 4704.

⁴⁴⁴ 12 M. R. S. A. sec. 4707.

⁴⁴⁵ 12 M. R. S. A. sec. 4708.

⁴⁴⁶ 12 M. R. S. A. sec. 1709, "Violation" is defined as "any filling, dredging, draining, depositing, altering or removal of materials...contrary to the provisions of a valid permit or without a permit...whether the action was willfully undertaken...or only innocently undertaken."

⁴⁴⁷ State of Maine v. Johnson, 265 A.2d 711 (Me. 1970). Cited in Water Resource Management, supra, pp. 777-779.

⁴⁴⁸ Id., at p. 778.

⁴⁴⁹ Ibid.

⁴⁵⁰ Ibid.

⁴⁵¹ Garrett Power, Chesapeake Bay in Legal Perspective, Estuarine Series Study No. 1, U.S. Dept. of the Interior, Federal Water Pollution Control Admin. (1970).

⁴⁵² Md. Ann. Code art. 66C, secs. 718-31 (1970 repl. vol. and 1972 supp.).

⁴⁵³ For a discussion of Maryland wetland problems see: S. M. Salsbury, "Maryland's Wetlands: The Legal Quagmire," 30 Md. L. Rev. 240 (1970).

- ⁴⁵⁴ Md. Ann. Code, art. 66C, sec. 719.
- ⁴⁵⁵ Md. Ann. Code, art. 66C, sec. 727, as amended by H.B. 591, 1973.
- ⁴⁵⁶ Md. Ann. Code, sec. 723, as amended by H.B. 428, 1973.
- ⁴⁵⁷ See: Environmental Reporter Current Developments, Vol. 3, No. 33, Dec. 15, 1972, p. 946.
- ⁴⁵⁸ Mass. Gen. Laws, ch. 131, sec. 40, as amended by Acts of 1972, ch. 784. (Which repealed the "Jones Act," sec. 27A of ch. 130); and Mass. Gen. Laws, ch. 130, sec. 105.
- ⁴⁵⁹ "Person" means any "individual, group of individuals, association, partnership, corporation, company, business organization, trust, estate, the commonwealth or political subdivisions thereof..."
- ⁴⁶⁰ Mass. Gen. Laws, ch. 131, sec. 40.
- ⁴⁶¹ Mass. Gen. Laws, ch. 130, sec. 105.
- ⁴⁶² New Hampshire Revised Stat. Ann., 483-A:1 through 483-A:5 (1970).
- ⁴⁶³ N. H. R. S. A., 483-A:1-b.
- ⁴⁶⁴ N. H. R. S. A., 483-A:2 and 483-A:2-a.
- ⁴⁶⁵ N. H. R. S. A., 483-A:A-a(II).
- ⁴⁶⁶ N. H. R. S. A., 483-A:3.
- ⁴⁶⁷ N. H. R. S. A., 483-A:4(I).
- ⁴⁶⁸ N. H. R. S. A., 483-A:1. "Waters and adjacent areas" are defined as: "Wherever the tide ebbs and flows, ...all lands submerged or flowed by mean high tide as locally determined, ...those areas which border on tidal waters, but not limited to banks, bogs, salt marsh, swamps, meadows, flats or other low lands subject to tidal action whose surface is at an elevation not exceeding $3\frac{1}{2}$ feet above local mean high tide" and capable of growing certain specified plants. Wherever fresh water flows or stands and in all areas above tidal waters not mentioned above, to great ponds or lakes of 10 acres or more in natural areas, and swamps and bogs subject to periodical flooding. N. H. R. S. A. secs. 483-A:1-a(I) and (II). Also see: R. S. A. sec. 482:41-e dimiting activities in "public owned water bodies."

⁴⁶⁹ N. H. R. S. A. 483-A:4(II) and (III).

⁴⁷⁰ N. H. R. S. A. 483-A:4-a(I).

⁴⁷¹ N. H. R. S. A. 483-A:4-b.

⁴⁷² N. H. R. S. A. 483-A:5.

⁴⁷³ Laws of New York, Chapter 790, sections 25-0101 through 25-0602. June 22, 1973.

⁴⁷⁴ "Wetland-A New Public Policy," (Opinion) The New York State Environment, Vol. 3, No. 2, August 1, 1973, p. 2.

⁴⁷⁵ Sec. 25-0201 (1).

⁴⁷⁶ Sec. 25-0201 (3).

⁴⁷⁷ Sec. 25-0201 (4).

⁴⁷⁸ Sec. 25-0201 (5).

⁴⁷⁹ Sec. 25-0202 (1).

⁴⁸⁰ Sec. 25-0202 (2).

⁴⁸¹ Sec. 25-0202 (2).

⁴⁸² Sec. 25-0202 (3).

⁴⁸³ Sec. 25-0302 (1).

⁴⁸⁴ Sec. 25-0401 (2).

⁴⁸⁵ Sec. 25-0402 (6).

⁴⁸⁶ Sec. 25-0402 (3).

⁴⁸⁷ Sec. 25-0402 (4).

⁴⁸⁸ Sec. 25-0402 (5).

⁴⁸⁹ "Person" being defined as "any individual, public or private corporation, political subdivision, government agency, department or bureau of the state, bi-state authority, municipality, industry, co-partnership, association, firm, trust, estate or any other legal entity whatsoever." Sec. 25-0103 (4).

490 Sec. 25-0402 (1).

491 Sec. 25-0402 (2).

492 Sec. 25-0403 (1).

493 Sec. 25-0403 (3).

494 Sec. 25-0404.

495 Sec. 25-0501 (1).

496 Sec. 25-0502.

497 RCW Chapter 90.58, amended July 16, 1973.

498 RCW 90.58.030 (2)(e)(i).

499 "Wetlands" are defined as "those lands extending landward for 200 feet in all directions as measured on horizontal plane from the ordinary high water mark; and all marshes, bogs, swamps, floodways, river deltas, and flood plains associated with the streams, lakes and tidal waters..." RCW 90.58.030 (2)(f).

500 TCW 90.58.050.

501 RCW 90.58.060.

502 RCW 90.58.060 (4).

503 RCW 90.58.070 (1).

504 RCW 90.58.070 (2).

505 RCW 90.58.080 (1).

506 RCW 90.58.080 (2).

507 RCW 90.58.090.

508 RCW 90.58.100 (2)(a) through (h).

509 "Development" is defined as "construction or exterior alteration of structures; dredging; drilling; dumping; filling; removal... bulkheading... or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters overlying lands subject to this chapter..." RCW 90.58.030 (3)(d).

- ⁵¹⁰ R. C. W. 90.58.140 (1).
- ⁵¹¹ R. C. W. 90.58.280.
- ⁵¹² R. C. W. 90.58.140 (2).
- ⁵¹³ R. C. W. 90.58.140 (2)(a)(i) through (iii).
- ⁵¹⁴ R. C. W. 90.58.180 (1).
- ⁵¹⁵ R. C. W. 90.58.210.
- ⁵¹⁶ R. C. W. 90.58.220.
- ⁵¹⁷ R. C. W. 90.58.230.
- ⁵¹⁸ R. C. W. 90.58.240.
- ⁵¹⁹ R. C. W. sec. 90.58.270.
- ⁵²⁰ W. A. C. 173-16-010 through 173-16-200.
- ⁵²¹ W. A. C. 173-16-040 through 173-16-040 (5).
- ⁵²² W. A. C. 173-16-050.
- ⁵²³ W. A. C. 173-16-060 through 173-16-060 (21).
- ⁵²⁴ e.g. see sections 173-16-060 (3)(h); 173-16-060 (5)(b); 173-16-060 (6)(d); 173-16-060 (11)(b); 173-16-060 (12)(a); 173-16-060 (13)(b); and 173-16-060 (14)(d).
- ⁵²⁵ e.g. see sections 173-16-060 (2)(b); 173-16-060 (3)(c); 173-16-060 (5)(b); 173-16-060 (7)(c); 173-16-060 (8)(b); 173-16-060 (9)(b); 173-16-060 (18)(e); and 173-16-060 (19)(b).
- ⁵²⁶ W. A. C. 173-16-060 (21).
- ⁵²⁷ W. A. C. 173-16-060 (20).
- ⁵²⁸ P. L. 91-190, January 1, 1970, 83 Stat. 852, 42 USCA 4321 et seq.
- ⁵²⁹ Florida, Michigan, Montana, New York, North Carolina, Pennsylvania, Rhode Island, Virginia. For a discussion on state constitutional adoptions see: A. W. Reitze, Environmental Law, Vol. 1, 2nd ed., North American, Int'l. 1972.

- ⁵³⁰ Illinois Const., Art. XI, sec. 1.
- ⁵³¹ Ibid., sec. 2.
- ⁵³² Reitze, A. W., Environmental Law, Vol. 1, 2nd Ed., 1973, suppl., p. 8.
- ⁵³³ Montana Const., article II, section 3, article IX, section 1, 2, 3.
- ⁵³⁴ Art. 41 Ann. Code of Maryland, sec. 448(C).
- ⁵³⁵ Art. 41 Ann. Code of Maryland, sec. 448(E).
- ⁵³⁶ Art. 41 Ann. Code of Maryland, sec. 448(G).
- ⁵³⁷ Minn. Stat. Ann. sec. 116B.01, also see: Minn. Stat. Ann. sec. 40.02.
- ⁵³⁸ Calif. Pub. Res. Code, secs. 21000 to 21151.
- ⁵³⁹ Calif. Pub. Res. Code, sec. 21001.
- ⁵⁴⁰ Public Act No. 872, Laws of 1971, sec. 1.
- ⁵⁴¹ Ibid.
- ⁵⁴² Title 7, Del. Code, sec. 6001(b).
- ⁵⁴³ Public Act No. 872, Laws of 1971, sec. 2. Also established a Division of Environmental Quality and a Division of Conservation and Preservation of the Environment in sec. 4 of the Act.
- ⁵⁴⁴ Public Act No. 872, Laws of 1971, sec. 6.
- ⁵⁴⁵ Title 7, Del. Code, sec. 6005.
- ⁵⁴⁶ Title 7, Del. Code, sec. 6007.
- ⁵⁴⁷ Title 7, Del. Code, sec. 6008(a).
- ⁵⁴⁸ Title 7, Del. Code, sec. 6009(b).
- ⁵⁴⁹ Florida Environmental Protection Act of 1971, sec. 2(1).
- ⁵⁵⁰ Florida Environmental Protection Act of 1971, sec. 2(2).

- ⁵⁵¹ Ill. Ann. Stat., ch. 111 1/2, par. 1004.
- ⁵⁵² Chapter 12, Gen. Laws of Mass., sec. 110.
- ⁵⁵³ Minn. Stat., sec. 116C.03.
- ⁵⁵⁴ Minn. Stat. sec. 116C.04.
- ⁵⁵⁵ Minn. Stat., sec. 116D.04, subd. 2.
- ⁵⁵⁶ Minn. Stat., 116D.02, subd. 2(j)
- ⁵⁵⁷ NMSA. sec. 12-12-1 through 12-12-14.
- ⁵⁵⁸ NMSA. sec. 12-12-5A.
- ⁵⁵⁹ NMSA. sec. 12-12-6.
- ⁵⁶⁰ NMSA. secs. 12-12-11 and 12-12-10.
- ⁵⁶¹ Wash. Rev. Code, sec. 43.21C.020(2).
- ⁵⁶² Wash. Rev. Code, sec. 43.21C.020(2)(a).
- ⁵⁶³ Wash. Rev. Code, sec. 43.21C.020(2)(e).
- ⁵⁶⁴ Rev. Code Montana, 69-6508.
- ⁵⁶⁵ Rev. Code Montana, 69-6514(d).
- ⁵⁶⁶ Rev. Code Montana, 69-6514(i).
- ⁵⁶⁷ Rev. Code Montana, 69-6514(4).
- ⁵⁶⁸ Rev. Code Montana, 69-6516.
- ⁵⁶⁹ Pub. Res. Code, sec. 21102. "Significant effect on the environment" meaning: (1) potential to degrade the quality of the environment; (2) individually limited but cumulatively considerable effect; (3) substantial adverse effects on human beings, either directly or indirectly. Pub. Res. Code, sec. 21083(a)-(b).
- ⁵⁷⁰ Pub. Res. Code, sec. 21061.
- ⁵⁷¹ Pub. Res. Code, sec. 21150.
- ⁵⁷² No. 6-B, Title 14 (Resource Agency), February 10, 1973.

⁵⁷³502 P. 2d 1049 8 Cal. 3d 247, 104 Cal. Rptr. 761 (1972).

⁵⁷⁴8 Cal. 3d 252.

⁵⁷⁵8 Cal. 3d 263-264.

⁵⁷⁶8 Cal. 3d 264-265.

⁵⁷⁷32 C.A. 3d 795.

⁵⁷⁸32 C.A. 3d 798.

⁵⁷⁹32 C.A. 3d 808.

⁵⁸⁰32 C.A. 3d 814.

⁵⁸¹Ch. 30 General Laws sec. 62.

⁵⁸²Minn. Stat. sec. 116D.04.

⁵⁸³Minn. Stat. 116D.04, subd. 1.

⁵⁸⁴Minn. Stat., sec. 116D.04, subd. 6.

CHAPTER VI

FEDERAL CONSERVATION LAWS

Introduction

The federal government has frequently provided leadership for conservation legislation in the United States. Oftentimes broad legislation is enacted that articulates the country's policy in a particular field, provides guidelines for state and federal agencies to follow, and makes funding available. The funding is usually to entice states into developing more specific legislation which takes into account the unique features of the state.

Often the federal legislation requires as a condition to funding, the inclusion of not only substantive provisions defining the conservation measures to be employed, but also the necessity of proper enforcement capabilities to preserve the integrity of the legislation. The result is sometimes duplication of the federal legislation at the state level. In other cases, states have taken the initiative and developed their own special laws to protect and enhance the natural values of the state.

Because of the intimacy that exists between the two levels of government, the most relevant federal conservation laws and activities

to this report's topic are described and analyzed for their impact upon environmental quality, and fish and wildlife habitat.

1. The Fish and Wildlife Coordination Act

In the past, it has been the opinion of numerous conservation groups and certain state and federal agencies that fish and wildlife resources have not received adequate recognition and reasonable protection. The Fish and Wildlife Coordination Act now in effect requires that fish and wildlife receive "equal consideration" with other project purposes, provides for the enhancing of the fish and wildlife values, and authorizes compensatory wildlife features where some damage is inevitable.¹

Conservation and protection of the fish and wildlife resources of the United States was recognized as an important problem during the 1930's and several legislative and executive committees were established to study this problem. Formulation of the present Act has occurred over a span of time covering approximately thirty years, specifically, from 1930 to 1958.²

One of the first committees, the Special Committee on Conservation of Wildlife Resources, was appointed on April 17, 1930 under Senate Resolution 246 and directed to "...investigate all matters pertaining to the replacement and conservation of wildlife with the view of determining the most appropriate methods for carrying out such purposes."³ This Committee was later directed in 1934, under House

Resolution No. 237, to study these matters relating to the replacement and conservation of wildlife.⁴ Also, on January 6, 1934, a three-member committee was appointed by President Roosevelt to investigate the national wildlife problem, and to formulate a national plan and policy to provide for the restoration and maintenance of the valuable wildlife resources.⁵

One of the major findings of the committees was that there had been a substantial decline in wildlife resources due to various factors, and that there was no evidence of a comprehensive or coordinated plan to remedy the situation.⁶ To correct this deficiency, the Special Committee of the Senate introduced Senate Bill 2529 during the 73rd Congress, 2d Session. Among other things, the Bill provided that no waters could be impounded by the federal government without an opportunity being afforded for a greater biological use of the water, and adequate provisions made for the migration of fish over the dam.⁷ Senate Bill 2529 was approved, and as the so-called Coordination Act, became law on March 10, 1934.⁸ The passage of the Bill along with other wildlife bills was termed by some as "the dawning of a new day in conservation."⁹

The Coordination Act established the means for closer cooperation between wildlife agencies and those engaged in public works. It was also responsible for the construction of certain fishery mitigative measures such as fish ladders and fish lifts in the Bonneville Dam

across the Columbia River in Oregon, and facilities for the preservation of salmon and other fish below the Grand Coulee Dam in the State of Washington.¹⁰

By 1946 it was recognized by the legislature that the Fish and Wildlife Coordination Act of 1934 was inadequate in many respects.¹¹ One of the basic weaknesses in the original Act was that neither the Bureau of Reclamation nor the Corps of Engineers had any basic authority to use funds for the benefit or development of fish and wildlife resources. While these agencies had authority to expend funds for irrigation and flood control purposes, neither agency could spend money to protect and preserve the fish and wildlife resources of the reservoirs being built.¹² The Coordination Act was therefore amended in 1946 to correct this problem and to provide for more coordination among government agencies and between state fish and game departments.¹³

The amended Act placed into effect a program and facilities for the "planning, maintenance and coordination of wildlife conservation, management and rehabilitation."¹⁴ The amended law provided that any department or agency of the United States, or any agency operating under a federal permit, must first consult with the Fish and Wildlife Service and the head of the state agency exercising administration over the wildlife resources, wherever waters are to be impounded, diverted or otherwise controlled.¹⁵ Consideration of the possible damage to wildlife resources and of means and measures to

prevent such loss was to be made an integral part of any report submitted by any agency of the federal government responsible for the engineering and construction of these projects.

Another main feature of the amended Act was that it gave the construction agency the authority to spend funds in carrying out the provisions of the Act "including the construction of such facilities, buildings, and other improvements, necessary for economical administration..." of the Act.¹⁶ Penalty provisions were also established, whereby, any person violating any rule or regulation promulgated under the Act was guilty of a misdemeanor and upon conviction could be fined up to \$500 or imprisoned for not more than one year, or both.¹⁷

The 1946 amended Act, as was the case with the 1934 Act, had several limitations and deficiencies. In its 1946 form, at least one reviewer considered it to be "a weak reed for fish and wildlife conservation to lean on in the keen and hot competition for land and water resources."¹⁸ One of the major problems encountered with the 1946 Act, was that it did not provide "clear, general authority for the federal agencies who constructed water resource projects to incorporate in project construction and operation plans the needed measures for fish and wildlife conservation."¹⁹ The Act was primarily concerned with measures intended to mitigate the loss of or damage to fish and wildlife resources. It contained no clear authority to permit the development of facilities to take advantage of opportunities

provided by water projects for the enhancement or improvement of fish and wildlife resources.²⁰ Additionally, many projects had been authorized prior to the passage of the 1946 Act and several of these projects had never been investigated from the standpoint of fish and wildlife resources. The federal construction agencies were inclined to interpret that the 1946 Act was not applicable to these projects.

During the early 1950's, there was a recognition of the pressing need for a stronger Coordination Act. Late in 1955, Senator McClellan of Arkansas introduced Senate Bill 2372 to amend the Coordination Act but this Bill remained dormant in the Senate Committee on Interstate and Foreign Commerce. Then in 1956, the International Association of Game, Fish and Conservation Commissioners adopted a resolution calling for the amendment of the Coordination Act.

Subsequently in 1957, bills to amend and strengthen the Coordination Act were introduced by Senator Watkins of Utah (2496) and by several members of the house (H. R. 8631, 12371, and 13138). Two basic conflicts arose over the proposed amendment of the Coordination Act. First, there was the question as to whether or not the fish and wildlife project purposes should be treated as an equal partner, in proportion to their values, in multiple use resource development projects. One of the federal water development agencies, in particular, the Corps of Engineers, was accused of continuing to classify public benefits occurring from wildlife resources as secondary benefits while

claiming that public benefits occurring from flood control and navigation purposes as primary benefits.²¹

H. R. 13138 was enacted and became Public Law No. 85-624 on August 12, 1958.²² Public Law 85-624 has been viewed by various individuals and groups advocating conservation to be one of the most valuable pieces of legislation ever enacted.²³ The main features of the 1958 Act are as follows:

- (1) The law insures that wildlife conservation will receive equal consideration and be coordinated with other project purposes of water resource development. (P. L. 85-624, Sec. 2; 72 Stat. 563).
- (2) The law provides for the withdrawal of public lands for public fishing and shooting purposes. (P. L. 85-624, Sec. 2; 72 Stat. 563).
- (3) The law provides that state fish and game departments and the Fish and Wildlife Service shall plan for the development and improvement of fish and wildlife resources on federal water projects, as well as for the prevention or mitigation of damages.
- (4) Reports submitted to the Congress by federal engineering and construction agencies recommending the authorization of projects must include as an integral part the possible damage to wildlife resources, means and measures to prevent the damage, and a description of the measures proposed for promoting wildlife conservation. (P. L. 85-624, Sec. 2(b)(1); 72 Stat. 564).

- (5) Reports of the engineering and construction agencies, which contemplate the modification or supplementation of plans for previously authorized projects, must include as an integral part of their reports, the recommendations of the Secretary of the Interior on the wildlife aspects of such projects and any reports on this subject prepared by state fish and game departments. (P. L. 85-624, Sec. 2(b)(2); 72 Stat. 564).
- (6) The law gave authority to the federal construction agencies to modify or add to projects and project operations, on behalf of fish and wildlife purposes. (P. L. 85-624, Sec. 2(c); 72 Stat. 564-565).
- (7) Reports submitted to Congress supporting a recommendation for authorization of any new project must include an estimate of the wildlife benefits or losses to be denied, and the costs of providing the wildlife benefits. (P. L. 85-624, Sec. 2(f); 72 Stat. 565).
- (8) The law is not applicable to projects which impound water where the maximum surface area of the impoundment is less than 10 acres. (P. L. 85-624, Sec. 2(h); 72 Stat. 566).
- (9) The law provided the means whereby project lands may be acquired for fish and wildlife purposes by the federal construction agency, along with acquisition of lands for other related purposes. (P. L. 85-624, Sec. 3(c); 72 Stat. 566).

- (10) The law made provisions for the taking over of management by the state fish and game departments of water project lands found to be valuable for the National Migratory Bird Management Program. (P. L. 85-624, Sec. 4, 72 Stat. 567).
- (11) The law added a section to P. L. 566, the Watershed Protection and Flood Prevention Act (16 U. S. C. 1001-1007), which authorized the small watershed program as administered by the Soil Conservation Service of the U. S. Department of Agriculture. The new section provided for surveys and investigations by the Fish and Wildlife Service of the U. S. Department of the Interior and the preparation of a report and recommendations on these projects. (P. L. 85-624, Sec. 3; 72 Stat. 567-568).

The Fish and Wildlife Coordination Act of 1958 received widespread support from conservation groups, sportsman clubs, and state and federal agencies.²⁴ Governors of all 48 states endorsed the objectives of the amended act.

The law also received the unqualified support of the Department of the Interior. The Department of Agriculture and the Department of Defense expressed no objections to the enactment of the law in its revised form. However, these agencies had expressed objections to earlier versions of the law. Specific objections on the part of the Department of the Army were incorporated in the law in its final form.²⁵ The legislative history of Public Law 85-624 is found in Table I of this section.

Table 1. Legislative History of Public Law 85-624 ("The Fish and Wildlife Coordination Act of 1958").

I. Hearings

Hearings were held before the House Subcommittee on Fisheries and Wildlife Conservation by the Committee on Merchant Marine and Fisheries.*

II. House and Senate Reports

House Report No. 2183, to accompany H. R. 13138 (Committee on Merchant Marine and Fisheries)**

Senate Report No. 1981, to accompany H. R. 13138 (Committee on Interstate and Foreign Commerce)***

III. Congressional Record (Vol. 104)

- (1) Introduced in House and referred to the Committee on Merchant Marine Fisheries.
- (2) Amended and passed House, July 21, 1958.
- (3) Referred to Senate Committee on Interstate and Foreign Commerce. July 22, 1958.
- (4) Passed Senate, July 29, 1958.
- (5) Examined and Signed in House and Senate on August 1, 1958.

* U. S. Congress, House, Merchant Marine and Fisheries Committee, "Coordination Act Amendments, Hearings Before Subcommittee on Fisheries and Wildlife Conservation, 85th Cong., 2d session on H. R. 12371, H. R. 8631, and Similar Bills. June 27, 1958. iv+46p. U. S. Government Printing Office, Wash., D. C.

** U. S. Congress, H. R. No. 2183, *supra*.

*** U. S. Congress, Senate, Committee on Interstate and Foreign Commerce "Amending Coordination." Report to Accompany H. R. 13138. July 28, 1958. 22 p. Senate Report 1981 85th Cong., 2d Sess. U. S. Government Printing Office, Wash., D. C.

All federal construction agencies were required to comply with the provisions of the Fish and Wildlife Coordination Act, as amended. How the Act has been implemented, may be seen in part with reference to the procedures established by the Corps of Engineers. Department of the Army regulation No. ER 1105-2-129, of August 15, 1973, prescribes the policies and procedures for preserving and enhancing fish and wildlife resources associated with Corps of Engineers projects.²⁶ This regulation defines the activities and responsibilities of the Corps in the following areas:

1. Coordination
2. Plan Formulation
 - a. Measures for reduction of damage
 - b. Measures for enhancement
 - c. Additions to uncomplete authorized projects.
 - d. Additions to completed projects
 - e. Location of fish and wildlife lands
3. Evaluation
 - a. Evaluation by fish and wildlife agencies
 - b. Damages
 - c. Benefits
4. Cost allocation
5. Cost sharing
6. Operation and maintenance responsibilities and funding
7. Funds for other agencies
8. General plans

One indication of how well the federal construction agencies have complied with the Act is reflected in various cases that have come to the courts concerning the Act. In comparison, there are already numerous judicial interpretations of the National Environmental Policy Act of 1969 whereas, judicial interpretations of the Fish and Wildlife Coordination are limited in number.

One of the most significant court cases dealing with the implementation of the Fish and Wildlife Coordination Act, as amended, is to be found in Zabel v. Tabb.²⁷ Plaintiffs (Zabel) applied for a dredge and fill permit in navigable waters from the Corps of Engineers pursuant to the Rivers and Harbors Act.²⁸ The Corps concluded that the evidence presented "clearly indicates that the work would have a distinctly harmful effect on the fish and wildlife resources in Boca Ciega Bay."²⁹ Therefore, among other reasons, the Corps denied the permit on the basis of its inconsistency with the purposes of the Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. sec. 662).

The District Court, however, granted a summary judgment for the plaintiffs. It concluded that the Fish and Wildlife Coordination Act in conjunction with the Rivers and Harbors Act "does not vest the Secretary of the Army with discretionary authority to deny any application for a dredge and fill permit thereunder where he has found factually that the construction proposed under the application would not interfere with navigation."³⁰ The Court of Appeals then concluded that the Secretary of the Army was entitled if not required, to consider the ecological factors involved in any proposed project. The appellate court therefore reversed the decision of the District Court.³¹

The appellate court questioned whether Congress, for ecological reasons, has the power to prohibit a project on private riparian submerged land in navigable water. The court found that under the

Commerce Clause, the Congress did have this authority, and that it had not given up this power in the Submerged Lands Act (43 U. S. C. A. sec. 1301 et. seq.).³²

Concluding that Congress has this power, Chief Judge Brown questioned whether or not the power had been transmitted to the Secretary of the Army. The court concluded that this power was vested in the Secretary, based in part on the Fish and Wildlife Coordination Act. The court held that "Common sense and reason dictate that it would be incongruous for Congress, in light of the fact that it intends conservation to be considered in private dredge and fill operations, not to direct the only federal agency concerned with licensing such projects both to consult and to take such factors into account."³³

In the above interpretation, the court noted that it was judicially accepted in Udall v. F. P. C.³⁴ The court concluded, based on the Fish and Wildlife Coordination Act together with the National Environmental Policy Act of 1969, that the Secretary of the Interior could deny a permit on conservation grounds.³⁵

It might also be noted that the Coordination Act only requires the construction agency to attempt to mitigate losses by consulting and discussing with the appropriate state and federal agencies. The agency may then recommend mitigation plans to Congress. However, the agency has no authority to provide for mitigation in absence of specific Congressional authorization.³⁶

The Act has been used extensively to preserve fish and wildlife resources at various water projects. The Fish and Wildlife Service has prepared approximately 9,000 reports concerning the impact of proposed water projects on the fish and wildlife resources. Recommendations by the Fish and Wildlife Service have been incorporated into numerous federal and federally-licensed projects. These recommendations include minimum releases of water from reservoirs to maintain and improve downstream fisheries; establishing minimum pools; protective devices and fish ways; fish propagation facilities; and the acquisition and development of hundreds of thousands of acres of project lands for fish and wildlife purposes. Therefore, one can conclude that this Act is a most significant piece of legislation in regard to fish and wildlife resources.

2. Wild and Scenic Rivers Act

The establishment of a national wild and scenic rivers system involves a classic controversy concerning development versus non-development; that is, do the economic benefits from the development (private benefits for the most part) of a river system outweigh the benefits foregone from keeping the river in a natural state? Then, if the preservation benefits are greater, who is to bear the cost of keeping these rivers undeveloped? The basic issue involved is public versus private rights.

The first federal scenic rivers legislation enacted was the Ozark National Scenic Riverways Act of 1964.³⁷ The fact that certain Ozark streams possessed unique features and should be preserved in a natural state, was noted as early as 1952.³⁸ Federal agency recognition of the preservation-recreational use of these waters, and support for the free-flowing stream concept was made in 1954.³⁹ It was not until late 1963 and mid-1964 that bills to establish the Ozark National Scenic Riverways were introduced into Congress. This Act was regarded by some as pioneering legislation.⁴⁰ It insured that certain rivers would be available to present and future generations for outdoor recreation, fish and wildlife purposes.

The bill did not go unopposed prior to enactment. One of the concerns expressed at the hearings questioned whether or not the enactment of such legislation would endanger all property rights along all spring-fed streams,⁴¹ especially, if legislation of this type were applied extensively to streams running through private lands.

The Ozark National Scenic Riverways Act provided for a joint federal-state program to conserve and protect unique scenic and natural values, and to maintain as free-flowing streams the Current River and its major tributary, and the Jackson Fork River, in Missouri.⁴² Since its enactment in 1964, the Park Service has acquired over 51, 000 acres of private land, including 13, 000 acres under easements.⁴³ The Bureau of Outdoor Recreation, as of June of 1971, had spent over \$5, 730, 000 for land acquisition.

During the same time that consideration was being given to the Ozark National Scenic Waterways Act, recommendations were being made by the Outdoor Recreation Resources Review Commission for national wild and scenic rivers legislation.⁴⁴ Based on the recommendations of the Outdoor Recreation Resources Review Commission, a special wild rivers study team was appointed jointly by the Secretaries of the Interior and Agriculture in May of 1963.⁴⁵ This team identified 73 rivers meriting attention for preservation and 22 were studied in detail.

Action towards national wild rivers legislation was stimulated by the President's January 30, 1967 message to Congress renewing his recommendation for the national system. Several bills were introduced at this time. In October of 1968, a revised version of S. 119 passed both houses and was signed into law.⁴⁶

As was the case with Ozark National Scenic Riverways Act, the National Wild and Scenic Rivers Act did not go unopposed.⁴⁷ Much of the opposition to the law came from landowners and private citizens who objected to provisions made for the condemnation of private property. Further concern was expressed over the developmental benefits that would be foregone due to the establishment of a wild and scenic rivers system. On the other hand, as could be expected, conservation and preservation-oriented groups strongly supported the establishment of the system.

The Wild and Scenic Rivers Act⁴⁸ created a National Wild and Scenic Rivers System consisting initially of portions of nine rivers.⁴⁹ In 1972, the System was expanded to include the Lower Saint Croix in Minnesota and Wisconsin.⁵⁰ Appropriations were authorized for the acquisition and development of lands in the Lower Saint Croix in the amount of \$7, 275, 000.⁵¹ Five of the designated rivers are in the West and are on mainly public lands so there was little citizen opposition. The four designated rivers in the Midwest have encountered few land acquisition problems and are now receiving strong local support.⁵² Interestingly, none of the nine rivers selected were in the East.

The Act also made provisions for the consideration of 27 other rivers as possible additions to the system.⁵³ Studies and reports made on these rivers were to be submitted to the President and Congress within ten years from October 2, 1968, except for the Suwannee which was to be completed within two years from October 2, 1968.⁵⁴ One of those mentioned, the Lower Saint Croix, as noted previously has already been incorporated into the system.

Other areas that might be considered must have a free-flowing stream. Furthermore, the adjacent land areas must possess "outstandingly remarkable" scenic, recreational, fish and wildlife, cultural, historic and other similar values.⁵⁵ Studies of these rivers, if requested by the state(s), were to be made jointly by the State and federal agencies.⁵⁶

The Secretary of the Interior, or Secretary of Agriculture when national forest lands are involved, are directed by the Act to study and "from time to time" to submit to the President and Congress proposals for additions to the system. These rivers include those designated initially by the Act, recommended for consideration later or which in their judgment fall within one or more of three categories.⁵⁷

The Act recognizes three types of rivers within the system.⁵⁸ These are: (1) "wild river areas," which represent vestiges of primitive America; (2) "scenic river areas," which are largely primitive, but are accessible in places by roads; (3) "recreational river areas," which may be somewhat developed, are readily accessible by roads and may have undergone some impoundment or diversion in the past.

All federal agencies are directed by law to inform the Secretaries of Interior and Agriculture of any studies or activities which will or may affect any of the rivers proposed for inclusion into the system.⁵⁹ Furthermore, neither the Federal Power Commission nor any other federal agency may license, construct or loan funds for any proposed water project which would have an adverse effect on established or potential wild and scenic rivers.⁶⁰ No licensing or construction may take place on potential rivers for a five-year period following October 2, 1968 unless the river has been removed from consideration by the Secretaries.⁶¹ The time period may be extended for those potential rivers receiving a favorable recommendation.⁶² Public lands

within one-quarter mile of the bank of a potential river are withdrawn from sale, entry or other disposition.⁶³ During the five year time period, or extended period, minerals in the bed, or one-quarter mile from the bed, in any federal lands are withdrawn from appropriation.⁶⁴

The Secretaries and other agencies are directed to review those policies, regulations, contracts, and plans affecting lands bordering upon, or adjacent to proposed rivers. Particular attention must be given to scheduled timber harvesting, road construction, and other activities contrary to the interest of the law.⁶⁵ This review procedure does not apply to or affect any existing rights and privileges relating to federal lands held by private party.⁶⁶

Section 1277 of the Act provides for the acquisition of lands within the designated boundaries of an established wild and scenic river. Acquisition may not exceed 100 acres per mile on both sides of the river. State owned lands may only be acquired by donation. Appropriations authorized by the Act for land acquisition and interests in land may not total more than \$17, 000, 000.⁶⁷

Constraints have been imposed upon the use of the power of condemnation under this Act. Condemnation is limited if 50 per centum or more of the lands are to be acquired are by federal or state governments.⁶⁸ Furthermore, condemnation may not be used if the lands lie within an incorporated city or village which has adequate

zoning regulations to protect the river and at the same time conforms with the purpose and intent of the Act.⁶⁹

The Act is not intended to affect state jurisdiction or responsibility over fish and wildlife resources. State jurisdiction over waters is also unaffected as long as such jurisdiction is not exercised so as to impair the purposes of the Act. Also the Act is not intended to affect or alter provisions of interstate compacts⁷⁰ or access rights of any state with respect to the beds of navigable streams and rivers that are located within the system.⁷¹

The Wild and Scenic Rivers Act does not specifically establish minimum stream flows for the preservation of fishery resources. The Act generally claims a quantity of water necessary to accomplish the purposes of the Act.⁷² As one author has pointed out, this failure to establish a specific quantity of water needed for minimum stream flows will most certainly lead to legal disputes as the demands for water increase.⁷³

Some problems may exist with respect to the adequacy of protection for rivers included in the system. As mentioned previously, water projects, pollution and the like will not be authorized by the Secretaries if the activity invades or unreasonably diminishes the scenic, recreational, and fish and wildlife values of the area. It is possible that one small project could have no damaging effect. However, an accumulation of many of these projects could have a substantial impact upon the area. It remains to be seen how effective the

quality control measures, both up and downstream, can be enforced.

There has also been some concern expressed as to whether the authorized level of funding will be adequate to include additional rivers, many of which are located near high density population areas.

The Act is significant in that it provides blanket coverage for the rivers included and proposed for inclusion. It effectively controls those activities that in the past have been harmful to the waters and associated fish and wildlife resources. Those activities include for example, dredging and filling, channelization and alterations to streams resulting from highway construction. It also provides for the preservation and maintenance of esthetic and recreational values of the area identified.

It should also be noted that this coverage, so far, provides protection for only a limited, though significant, portion of our Nation's waterways. To achieve an optimum level of fish and wildlife habitat maintenance and enhancement nationwide, it must be viewed with reference to other legislative measures adopted to preserve the fish, wildlife, and recreational resources, and esthetic values.

These other forms of legislation to be discussed hereafter, may be more acceptable to the general population in one respect. In examining the hearings, it becomes evident that many people have a certain aversion to removing entire portions of rivers from development and use. They, perhaps, will more readily accept a piecemeal type of legislation in the form of control over dredging, filling,

channelization, etc. Although certain amounts of fish and wildlife resources may be lost in this approach, piecemeal may be more effective if in the long run it will be easier to implement management controls that cover a large amount of the total national water environment.

3. Federal Regulation of Highway Construction

We have found, as others have, that the subject of federal regulations over highway construction is difficult to analyze and interpret. In an attempt to present this information in a logical manner, we have reviewed three sources of information involving highway construction. These areas are: (1) statutes dealing with consideration given to the environment in developing highway projects; (2) the internal directives of the Federal Highway Administration (hereafter referred to as the "FHWA"); and (3) court cases which have defined specific requirements for highway construction.

There are two issues that will also be examined in this section concerning laws and regulations governing highway construction. One deals with the question of public participation in the planning, location and construction of public highways. One thing is clear at the outset, and that is that public roads are just that--"public roads." If the actions of the government are to reflect the "public interest," then the public must have a means of expressing their views on the issue involved. A review of the laws and regulations governing the

requirements for a public hearing indicate that the present procedures are difficult to locate, and once found, difficult to interpret.

The second issue of concern is that of protection afforded the water environment via the laws and regulations governing highway construction. The past record is not good based on the amount of destruction allowed to take place under the existing laws. In 1971, the Highway Research Board issued the following statement:

The present intensive concern is the direct result of recent scientific findings pointing to the conclusion that nature's recuperative powers are being outdistanced by the onslaught of man's technology. Serious studies indicate that man may now be engaged in a race to preserve his environment from quite literal destruction.⁷⁴

In the following pages we will examine those features of the law that are intended to protect and preserve the water environment from the unnecessary adverse effects of highway construction.

Federal Statutes

As early as 1956, public hearings were specifically required under the then existing federal highway laws. The Federal-Aid Highway Act of 1956 stated that any state highway department that submitted plans for a federal-aid highway project must have held public hearings, or at least the opportunity for hearings, and that these hearings were designed to consider the economic effects of the proposed highway.⁷⁵

This law was amended in 1958 but at that time only minor changes were made, the law still stated that the public hearings would

be to consider the economic effects of the proposed highway location.⁷⁶

It was not until 1968 that the act was further amended so as to provide for other than economic effects to be considered in the highway plan.

At this time, the law indicated that the social effects must be considered as well as the economic effects. Furthermore, consideration was to be given to the impact upon the environment and the consistency of the project with the goals and objectives of the community through which the highway passed.⁷⁷

The hearing requirement was further amended by the "Federal-aid Highway Act of 1970." In this amendment, it is stated that:

Such certification shall be accompanied by a report which indicates the consideration given to the economic, social, environmental, and other effects of the plan or highway location or design and various alternatives which were raised during the hearing or which were otherwise considered.⁷⁸

Protection of the water environment was given increased protection in 1966 with the passage of an amended "Federal-aid Highway Act," which gave general protection to parks and historic sites.⁷⁹

This law amended Section 15(a) of title 23 United States Code as follows:

It is hereby declared to be the national policy that . . . the Secretary (of Transportation) shall use maximum effort to preserve Federal, State, and local governments parklands and historic sites and the beauty and historic value of such lands and sites. . . . the Secretary shall not approve under section 105 of this title any program for a project which requires the use for such project of any land from a Federal, State or local government park or historic site unless such program includes all possible planning,

including consideration of alternatives to the use of such land, to minimize any harm to such park or site resulting from such use.⁸⁰

A second law enacted in 1966, the "Department of Transportation Act of 1966,"⁸¹ gives more specific recognition to the protection of water resources, recreation areas and wildlife habitat. Under this Act, Congress declared it was in the best interests of the nation to develop a national transportation policy and program that would provide for fast, safe, efficient, and convenient transportation. Furthermore, it stated that the transportation system should be consistent with other national objectives "including the efficient utilization and conservation of the Nation's resources."⁸² Under section 4(f) of the Act, it is stated that:

The Secretary shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of the lands traversed. After the effective date of this Act, the Secretary shall not approve any program or project which requires the use of any land from a public park, recreation area, wildlife and waterfowl refuge, or historic site unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use.⁸³

It appears that the two laws outlined immediately above laid the basis for the protection of the natural environment prior to the passage of the 1969 National Environmental Protection Act.

Both of these highway Acts were amended and expanded upon in the "Federal-Aid Highway Act of 1968."⁸⁴ Under section 18(a) of the 1968 Act, it is stated that with respect to the preservation of park lands:

It is hereby declared to be the national policy that special effort should be made to preserve the natural beauty of the country side and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. The Secretary of Transportation shall . . . (Develop) transportation plans and programs that include measures to maintain or enhance the natural beauty of the lands traversed.⁸⁵ (Emphasis supplied)

This same act also amended section 4(f) of the Department of Transportation Act of 1966. In this regard, the new legislation stated in part that:

The Secretary shall not approve any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, or any land from an historic site of national, state, or local significance as so determined by such officials unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such project includes all possible planning to minimize harm to such parks, recreation area, wildlife and waterfowl refuge, or historic site resulting from such use.⁸⁶

This careful wording, which displays concern for the impacts of highway construction, seems to be weakened by the wording of a later portion of the law. Under section 23 of the "Federal-Aid Highway Act of 1968," the Secretary of Transportation is directed to construct all routes on the Interstate System within the District of Columbia.

Furthermore, the Act directs the government of the District of

Columbia "not later than 30 days after the date of enactment . . . (to) commence work" on four highways within the District of Columbia.⁸⁷ It would appear that the purpose of public hearings would be to eliminate and prevent some of the hasty construction projects that might lead to possible harm of the environment. The Act was again amended two years later. In the "Federal-Aid Highway Act of 1970"⁸⁸ two significant changes in the law regulating highway construction occurred. First, the Act specified that within 30 days of passage, the Secretary of Transportation would establish guidelines for minimizing possible soil erosion resulting from highway construction.⁸⁹ The second change brought about by the 1970 Act was the requirement that the Secretary establish guidelines to ensure the recognition of adverse environmental effects. This amendment states that:

Not later than July 1, 1972, the Secretary... shall submit to Congress and not later than 90 days after such submission, promulgate guidelines designed to assure that possible adverse economic, social, and environmental effects relating to any proposed project on any Federal-Aid system have been fully considered in developing such project, and that the final decisions on the project are made in the best overall public interest, taking into consideration the need for fast, safe and efficient transportation, public services, and costs of eliminating or minimizing such adverse effects and the following: (1) air, noise, and water pollution; (2) destruction or disruption of man-made and natural resources, aesthetic values, community cohesion and availability of public facilities and services.⁹⁰

Very little information is contained in the Code of Federal Regulations concerning the specific laws governing the United States Department of Transportation's administration of the federal-aid

highway program. In fact, there are less than ten pages that deal with the administration of the program. One statement is made concerning the selection of additional roads for inclusion in the program. The Code states that:

The conservation and development of natural resources, the advancement of economic and social values, and the promotion of desirable land utilization as well as the existing and potential highway traffic and other pertinent criteria are to be considered when selecting highways to be added to a Federal-aid system or when proposing revisions of a previously approved Federal-aid system.⁹¹

Most of the procedures that the FHWA follows are published as internal directives and do not obtain wide circulation, and are conspicuous by their absence in the Federal Register. These internal policies are the topic of discussion for the next chapter.

Administrative Policies

The major administrative procedures of the Federal-aid highway program have recently been analyzed in a comprehensive manner and reported in the literature.⁹² According to this report, one of the major difficulties encountered in trying to analyze the operations of the Federal Highway Administration is that their "published procedures are incomplete, outdated and virtually inaccessible."⁹³ At this time, it appears that the FWHA is attempting to review their procedures to ascertain to what extent the procedures should be promulgated formally and placed in the Federal Register.⁹⁴

For the most part, the operating procedures of the FHWA are found in three sources. First, there are the Federal Highway Administration policy and procedure memorandums (PPM's) which set forth the policy and procedural requirements for the Administration programs.⁹⁵ Secondly, there are the Federal Highway Administration administrative memorandums (AM's) which specify the administrative policies and procedures for the Administration programs.⁹⁶ Finally, there are the Federal Highway Administration instructional memorandums (IM's). These memorandums are issued on an interim basis and set forth the policies and procedures of the Administration until they are replaced by a permanent memorandum or order, such as a policy and procedure memorandum.⁹⁷ Since these operating procedures are not available on a routine circulation basis outside the federal government, state highway departments and various construction agencies, the best method of acquiring them would be to write directly to the Federal Highway Administration. It should be noted, however, that the Department of Transportation has held that these memorandums do not have the legal status of regulations.⁹⁸

In 1963, the Federal Highway Administration issued IM 21-5-63 (May 12, 1963). This memorandum stated that it was the policy of the Bureau of Public Roads that "every effort should be made in the planning, design, and construction of highway projects that cause a minimum of disturbance to and reasonable preservation of the nation's wildlife and related natural resources." This memorandum indicates

that the state fish and game departments would be allowed to participate in the planning of highways, so as to protect the environment from unnecessary damage.⁹⁹

A notable memorandum that was issued by the Bureau of Public Roads concerning the requirements for public hearings was PPM 20-8, dated on August 10, 1956.¹⁰⁰ The original PPM 20-8 was amended in 1959¹⁰¹ and again in 1969.¹⁰² On May 9, 1973, the FHWA published Part 790 (Public Hearing - Corridor and Design) to codify the procedures concerning PPM 20-8, as amended.¹⁰³ This analysis will discuss the memorandums as they were issued to indicate the trend in policy changes. Specifically, citations to the codified Part 790 will be presented along with the citations to the memorandums.

As stated in the 1969 PPM 20-8, the purpose of the memorandum was:

...to the maximum extent practicable, that highway locations and designs reflect and are consistent with Federal, State, and local goals and objectives... (and) to afford full opportunity for effective public participation in the consideration of highway location and design proposals by highway departments before submission to the Federal Highway Administration for approval.¹⁰⁴

PPM 20-8 requires that two public hearings, or the opportunity for public hearings, be held with respect to each federal-aid highway project that "is on a new location;" or that "would essentially change the layout or function of connecting roads or streets."¹⁰⁵

In defining social, economic and environmental effects, these are taken to mean the "direct and indirect benefits or losses to the

community and to highway users."¹⁰⁶ Twenty-three (23) items listed in the 1969 memorandum that were to be considered in establishing the location and design of a highway.¹⁰⁷ Later these twenty-three items were condensed into seven broad areas.¹⁰⁸ Under section 4b(2) of this Instructional Memorandum, "conservation and preservation" were to be considered. Included were the general ecology of the area, man-made and natural resources such as: Park and recreational facilities, wildlife and waterfowl areas, and historic and natural landmarks. Under section 4b(7), Aesthetic and Other Values, it is stated that the visual quality should be studied as relevant to the "view of the road" and "view from the road," and the "joint development and multiple use of space." In addition to seven specific items mentioned in regard to the social, economic and environmental effects additional consideration was to be given to: "(1) identification of the adverse effects, (2) appropriate measures to eliminate or minimize the adverse effects, and (3) the estimated costs of the measures considered."¹⁰⁹

These social, economic and environmental effects must include an analysis of information obtained via public hearings. Additionally, it will include any information that the state highway department has developed or gained from other sources, with the intent of ensuring that all relevant factors are presented concerning highway location.¹¹⁰

The two required public hearings are referred to as a "corridor public hearing" and a "highway design public hearing." The "corridor

hearing" is held before the route location is approved and before a final commitment is made to a specific proposal,¹¹¹ except as provided for in paragraph 6(g).¹¹² It is designed to ensure that the public can express its views concerning the need for and location of a proposed federal-aid highway.¹¹³ At this hearing the public may express its views on any of the proposed alternative routes and the related social economic and environmental impacts.¹¹⁴

The second hearing, "highway design", is held after the route location has been approved, but before the state is committed to a specific design proposal,¹¹⁵ except as provided in paragraph 6(g).¹¹⁶ This hearing provides the public with an opportunity to comment on the specific location and major design features of the federal-aid highway.¹¹⁷ At this hearing, the public may present its views concerning the economic, social, and environmental impact of the proposed design features and the effect of alternative designs.¹¹⁸

The state is required under this memorandum to publish "at least twice in a newspaper having general circulation in the vicinity of the proposed undertaking,"¹¹⁹ and in other media, information concerning the date, time and place of the hearing and a description of the proposal. If there is some doubt as to whether or not a hearing should be held, the division engineer or the state highway department is required to afford the opportunity of a hearing.¹²⁰ Also, a new hearing must be held if supplemental information on the social, economic or

environmental effects relative to the proposal is found. At such a hearing, the corridor hearing may be combined with the design hearing.¹²¹

Section 10d(1) of the memorandum authorizes the division engineer to "approve the route location and authorize design engineering" only after the state highway department has requested route location approval, corridor hearings have been held, and the public hearing transcripts and certificates as required by section 128, title 23, United States Code have been submitted, and other applicable laws and regulations have been met.¹²² Section 10d(2) of the memorandum authorizes the division engineer to "approve the highway design and authorize right-of-way acquisition, approve right-of-way plans, approve construction plans, specifications, and estimates, or authorize construction," only after the route location has been approved, the State highway department has requested design approval, the highway design public hearings have been held, the public hearing transcripts and certificates have been submitted, and all other applicable laws and regulations have been complied with.¹²³

Section 10(d) and section 10(e) seem to be in direct conflict, and illustrate well some of the confusion that has resulted and will continue to cause problems. As noted above, section 10d(2) states that the right-of-way acquisition is dependent upon the occurrence of a highway design hearing or at least the opportunity for hearing. In section 10e of the memorandum, however, it is stated that "the

division engineer, under criteria to be promulgated by the Federal Highway Administrator, may in other appropriate instances authorize the acquisition of right-of-way before a design hearing."¹²⁴ (emphasis supplied). These "appropriate instances" are spelled out in IM 20-1-69 (April 8, 1969), and IM 20-1-69(2) (June 11, 1969).¹²⁵ Under these criteria a full taking of right-of-way may be made before the design hearing if there is "assurance that the entire parcel will be required for the highway right-of-way and the takings are necessary to provide orderly and humane relocation of displacees under the provisions of Section 30, title 23, U. S. C."¹²⁶ Furthermore, whole or partial takings may be made "following the corridor public hearing and the division engineer's approval of the highway location where it is demonstrated that the property owner would suffer undue hardship if acquisition were deferred until after the design public hearing."¹²⁷

Peterson and Kennan noted two problem areas concerning the implementation of PPM 20-8.¹²⁸ The first relates to the lack of precision used in defining terms used in the memorandum. This point has been illustrated in the above discussion of section 10d(2), concerning the acquisition of right-of-way. Secondly, they pointed out that the memorandum is vague concerning those projects which were underway prior to the issuance of the guidelines. As worded, the guidelines seemed to apply only to projects for which location and design approval were made after the effective date.

Some of this prior confusion may have been cleared up recently under Part 790. For pre-September 29, 1972 projects, the "state highway departments shall consider social, economic, and environmental effects before submission of requests for location or design approval..."¹²⁹ Evidently projects having been approved prior to that time do not have to comply with this requirement. For those projects which had received design approval but not plans, specifications and estimates (PS & E) approval, as of September 29, 1972, state highway departments are required to submit additional information to the design engineer indicating the consideration given to environmental, social and economic effects previously covered.¹³⁰

It would appear, however, that the original and amended memorandums, and now the codified Part 790, have not entirely cleared up the problems and confusion in regard to the hearing requirements. In addition, clarification needs to be made with respect to defining terms used in the documents, and the guidelines need to be made more consistent with the wording of other laws and memorandums.

The second significant memorandum issued by the Federal Highway Administration in August 24, 1971 was PPM 90-1. Its purpose was to implement four pieces of federal legislation that were intended to lessen or avoid adverse environmental effects that had resulted from the federal-aid highway program: Section 102(2)(C) of the National Environmental Policy Act of 1969 ("NEPA");¹³¹ section 4(f) of the Department of Transportation Act (also Section 138 of the

Federal-Air Highway Act);¹³² section 106 of the Historic Preservation Act of 1966;¹³³ and section 309 of the Clean Air Act of 1970.¹³⁴

A new concept, "highway section" was presented in PPM 90-1 that was absent in PPM 20-8 or Part 790. It is defined as being: "a substantial length of highway between logical termini (major cross-roads, population centers, major traffic generators, or similar major highway control elements) as normally included in a single location study."¹³⁵ Later on, under section 6, Procedures, some additional guidelines are presented to better define a "highway section." Therein it is stated that:

The highway section included in an environmental statement should be as long as practicable to permit consideration of environmental matters on a broad scope. Piecemealing proposed highway improvements in separate environmental statements should be avoided. If possible, the highway section should be of substantial length that would normally be included in a multi-year highway improvement program.

The memorandum states that an environmental statement or combined environmental section 4(f) statement must be prepared for "each highway section proposed for construction with funds administered by the Federal Highway Administration."¹³⁶ However, for each highway section that had received design approval between January 1, 1970 and February 1, 1971, the impact statement is required only if "in the judgement of the FHWA division engineer, implementation of the National Environmental Policy Act to the fullest extent possible requires preparation and processing of an environmental statement!"¹³⁷

For all practical purposes, the courts seem to have disregarded this part of the memorandum.¹³⁸

Under the directions of the memorandum, the draft environmental statements, when required, including Section 4(f) information, are to be prepared by the highway agency (HA).¹³⁹ The draft statements should be prepared no later than the first required notice of opportunity for a public hearing, as set out in PPM 20-8 (now 23 C. F. R. 790).¹⁴⁰ These draft statements must also be available for review by the public at specified locations.¹⁴¹ A statement need not be prepared "when the anticipated impact of construction and operation of a highway section is determined to be not significant," i. e., not of major importance.¹⁴² Under these later cases, the highway agency will make a negative declaration to that effect. Finally, a new or supplemental environmental statement is required for a highway section "when the proposal being processed introduces a new or changed environmental effect of significance to the quality of environment."¹⁴³

It would appear that for either of the two major memorandums discussed immediately above to be effective, emphasis must be placed on well written laws and a compliance with the laws in the spirit which they were intended to be administered. Highway administrators must be willing to view the projects in a wide scope. Safe and efficient movement of traffic is no longer the sole objective of the highway program. To view the requirements of the law as mere "paper shuffling"

as one official did, does little to improve either the environment or the transportation system.

Although the two memoranda mentioned and stressed previously in this report are most likely the more important administrative procedures outlined as of this date, they were not the earliest effort to attempt to minimize the amount of damage done to the water environment. Many efforts have been directed at limiting the amount of pollution that results in the process of highway construction.¹⁴⁴ We will not deal with these issues in detail since we have limited the nature of our report.

The FHWA has frequently noted the impact of highway construction on the stream habitat in its various reports. A report by the Department of Transportation entitled "Guidelines for Minimizing Possible Soil Erosion From Highway Construction,"¹⁴⁵ though dealing primarily with erosion control, sets forth some views concerning damage to the natural environment due to construction. In the section dealing with construction practices, the report notes that social precautions should be taken in highway construction to prevent track and wheeled vehicles from entering the streams. The report states in part that:

Fording of streams with equipment should be kept to a minimum, and in locations where frequent crossings of streams are contemplated temporary bridges or culverts should be constructed if the sediment created is detrimental to fish and wildlife, water supplies, or irrigation system. Plans by a contractor for work roads showing

the method of construction, erosion control measures, and restoration should be approved by the engineer.¹⁴⁶

The report goes on to state:

Although disturbances by highway construction of streams, lakes or reservoirs should be avoided, drainage structures, channel changes and embankment encroachments are sometimes necessary in building a highway. Specifications or special provisions should include controls for the contractor's operation in performing work in these areas, particularly in conforming with regulation of water resource and fish and wildlife agencies.¹⁴⁷

This report concludes by noting that the result of erosion control measures will be to enhance the beauty of the highway, contribute to the conservation of vital land and water resources, and reduce the pollution in the waterways.¹⁴⁸

We have now examined the federal statutes and the administrative policies of the FHWA. The concluding portion of our discussion of federal highway activities will deal with a select number of judicial decisions that have interpreted the requirements of the federal highway administration with respect to the water environment.

Court Cases

Growing concern for the quality of the environment and the impact of the federal-aid highway projects has brought about an increasing number of lawsuits that challenge proposed highway construction. As of May, 1972 there were approximately sixty-five lawsuits pending that involved the impact of highways upon the environment.¹⁴⁹

A substantial number of important cases have been heard concerning the construction of highways as they affect public park lands.¹⁵⁰ Other cases have dealt with actions to protect historical sites¹⁵¹ and to prevent highway construction through college campuses.¹⁵² Several other cases have dealt with the retroactivity of the National Environmental Policy Act of 1969, as it relates to highway construction.¹⁵³ All of these cases should be reviewed to obtain a thorough understanding of the limitations and requirements of the federal-aid highway program. As stated previously, however, our study is directed primarily to the water environment and the cases that follow are those that have dealt directly with this environment.

Pennsylvania Environmental Council v. Bartlett illustrates the problems highway construction agencies encounter when their construction intrudes into stream beds.¹⁵⁴ The plaintiffs in this case sought to enjoin further work on a planned relocation of Pennsylvania Route 872 and from approving, granting or using any federal funds for the project. In part, the plaintiffs contended that if the action were allowed, it would be in violation of the Department of Transportation Act, 49 U.S.C. secs. 1651-1658 (Supp. 1970), particularly secs. 1651, 1654 and 1657; and the Federal-Aid Highway Act, 23 U.S.C. secs. 101-141 and specifically, sec. 138; 23 C.F.R. Part 1, Appendix 1.¹⁵⁵

The proposed project involved the relocation of the existing Route 872. In May of 1967, notice was given concerning the proposed

relocation. Plans were made available for inspection and interested citizens were afforded the opportunity of a public hearing. No requests for a hearing were received by the District Engineer. Location studies were made by the Pennsylvania Highway Department in late 1967 and early 1968.

The relocation of the highway involved three possible alternatives. They were: (1) to widen the existing route; (2) to install a set of bridges across the First Fork of Sinnemahoning Creek or (3) to extend the road partially into the stream bed of the Creek. The Pennsylvania Highway Department, based on various engineering considerations, chose the third alternative. This alternative would involve a certain amount of filling and channel changing.

Under a 1963 Memorandum of Understanding between the Department of Highways and the Pennsylvania Fish Commission, plans of projects were supposed to be submitted to the Commission. The plans were not submitted until September of 1968. After conferring with the Fish Commission, the Department of Highways made certain changes in the plans and submitted those plans to the Commission for approval in December of 1968. These plans were approved on January 20, 1969.

On February 25, 1969, Dr. C. E. Blakeslee protested in writing the proposed plans due to the damage that would be caused the stream. Conferences were held with the Department of Highways but the plans were not altered due to this conference. The plans were later altered so as to eliminate a proposed 2300-foot channel change. The project

was finally approved by the Secretary of Transportation on November 20, 1969. Final plans were approved on November 24, 1969. The contract was awarded to the defendant contractors on December 29, 1969.¹⁵⁶

In the construction contract, certain provisions were made to prevent damages to the stream, and the surrounding area. Under this agreement, the contractor was required to "(a) seed and stabilize all stream banks upon completion of grading; (b) cross flowing channels with equipment only on dry roadways in order to prevent constant turbulence and siltation; (c) direct flowing water away from excavation area and refrain completely from removing material covered by water; (d) refrain from stream fordings; (e) seed all erodible cut and fill slopes...; and (f) place 80 boulders of 9 to 12 cubic feet each in the stream under observation of representatives of the Fish Commission."¹⁵⁷

Suit was filed on February 2, 1970, after construction had begun, with specific reference to adverse impact on a "good trout stream." As far as being a good trout fishing stream, there is room for doubt, although it was stocked regularly and was viewed as a good "put and take" trout stream. The Fish Commission indicated that they would continue to stock the stream and that "the damage to fisheries resources will be very limited; that the construction of the stream channel through this 4100-foot corridor will be an improvement in

terms of water flow, and, with the placing of boulders, a better fish habitat will result."¹⁵⁸

There were eight issues of law examined by the court in this case. We shall examine only those that pertain to the requirements placed on the Federal Highway Administrator. The plaintiffs contended "that the Secretary of Transportation approved the Pennsylvania Highways Department application filed under 23 U. S. C. sec. 117, relying on various certificates which were submitted to him and did not make an independent and affirmative determination of the effect of this project on the environment."¹⁵⁹ Since this was considered a "secondary highway," the Secretary of Transportation is not required to make an independent study, rather he may delegate that responsibility to the State Highway Department.¹⁶⁰

The court therefore concluded that:

A requirement that the Secretary of Transportation must make independent and affirmative evaluation of all phases of the multitude of State secondary highway projects relative to their impact on the environment not only would place a staggering burden on the Secretary, but also would cause him to duplicate State investigations and determinations. The purpose of the National Environmental Policy Act of 1969 is laudatory and urgently necessary, but I am satisfied that Congress did not intend it to necessitate Secretarial action of the import urged by the plaintiffs.¹⁶¹

With respect to title 23 U. S. C. sec. 138, which requires the examination of "feasible and prudent" alternatives and planning to minimize environmental harm, the plaintiffs contended that a clear-span bridge would be a "feasible and prudent" alternative plan to the

one proposed by the highway department. The court disagreed, holding that the "evidence does not support a finding that the alternative plan . . . is a feasible and prudent one or that the Secretary of Transportation failed to comply with section 138 of title 23 of the United States Code."¹⁶²

The plaintiffs also contended that the provisions of IM 20-5-63 were not complied with in full.¹⁶³ They felt that the program was not submitted to the fish and game agencies "at an early state; notice was not given, and a full opportunity was not provided to make recommendations."¹⁶⁴ The court agreed with none of the contentions, and felt that there had been no violation of the memorandum. The plaintiff's complaint was dismissed on all counts.

The case reappeared in the Court of Appeals in 1971.¹⁶⁵ The question before the court was whether or not the Secretary of Transportation had complied with the provisions of PPM 20-8, sec. 3, defining the two types of hearings required. The notices that were published for a hearing were viewed by the court as meeting the requirement for a "corridor public hearing." The court noted that no "highway design public hearing" was held or notice given of one. However, "interested persons were given notice of the opportunity to request the equivalent of a corridor hearing. In the absence of any such requests it was not necessary to convene a corridor hearing."¹⁶⁶

The court noted that under section 6(a)(1) or (2) of PPM 20-8, two hearings are not required for a secondary road unless it will

carry an average of 750 vehicles a day in the year following its completion.¹⁶⁷ The court found no evidence to indicate, nor was any provided by the plaintiffs, that the road in question would carry the necessary number of vehicles. Therefore, a design public hearing was not required.¹⁶⁸ Furthermore, the court found that there had been appropriate compliance with 23 U.S.C. secs. 117, 128 and with 49 U.S.C. sec. 1651(b)(2).

Two points are made with respect to this case. First, based on the court record, it does not appear that the Fish Commission had made adequate prior tests of the Creek to substantiate the finding that no damage would be created. This is brought out by the fact that no velocity tests of the Creek were ever made. The lack of good physical data may greatly hinder the courts' decision. This fact was brought out in discussions with several state game and fish officials in various states. Also, there seems to be some confusion on the part of fish and game officials as to the type of data necessary in a court case of this nature.

A second issue relates to the specific construction requirements placed on the contractors. In the Barlett case, the construction contract specifically stated that stream fordings were to be refrained from. Construction began on February 2, 1970. On the 9th of April, 1970, the contractors were reprimanded for entering the streambed with construction equipment.¹⁶⁹ This practice may not be an exception. We viewed similar practices during our trip to Montana. It

points up the fact that all parties involved must be constantly aware of encroachments into the water environment, and cannot rely on the mere presence of a law or contract to prevent the damage.

Wildlife Preserves v. Volpe¹⁷⁰ involved the construction of a part of an interstate highway, which would traverse Troy Meadows, a fresh water marsh in the Passic River drainage basin. The plaintiffs contended that this highway construction would do irreparable harm to the marsh area. Plaintiffs contended that hearing requirements as set forth under 23 U. S. C. sec. 128, as amended, and PPM 20-8 were not complied with and that no special efforts were made by the defendants under 23 U. S. C. sec. 138 and 49 U. S. C. sec. 1653(f) to preserve wildlife and waterfowl refuges of national significance.

Approval of preliminary designs was given on February 20 and April 16, 1964.

With respect to section 138 and section 1653(f), the court ruled that the project in question had received location and design approval prior to August 13, 1968, the date stated in sub-section (f). Therefore, the project would not come under the provisions of the two acts.

In the court's words:

To suggest otherwise would be to require full retro-active effect to be given to both statutes, thereby affecting every incomplete federally aided highway project, no matter when begun... Neither the legislative history of the Acts nor reason suggests such an onerous interpretation.¹⁷¹

Plaintiffs further contended that the hearing requirements of section 128 were not complied with. The court responded by stating that: "The amended statute which requires the consideration of additional criteria in no way indicates an intended retroactive effect and this court will give it none."¹⁷²

In 1971, the case was heard by the U. S. Court of Appeals.¹⁷³ The plaintiffs contended that the project was illegal. They felt that this was due to the fact that: (1) neither the Secretary of Transportation nor the State of New Jersey had held the public hearings as required by law; (2) and furthermore, the Secretary had not made the findings as required by section 4(f) of the Department of Transportation Act of 1966.

It was undisputed that the New Jersey Department of Transportation did not furnish the Secretary with the certificates as to the environmental effects as was required since August 23, 1968 by 28 U. S. C. sec. 128 (Supp. V, 1970). It was also undisputed that the Secretary did not make the findings concerning a wildlife preserve, which was required since April 1, 1967, by sec. 4(f) of the Department of Transportation Act of 1966, 49 U. S. C. sec. 1653(f), as amended, 49 U. S. C. sec. 1653(f) (Supp. V, 1970).

The court noted that under 6(d)(2) of PPM 20-8 that "it is inapplicable to a project which was approved before its effective date."¹⁷⁴ No evidence was submitted to the court to indicate or suggest that the memorandum was applicable to projects which had

already received design approval. Based on this evidence, the court found that the administrator had been consistent in his application of the statutes and regulations. The district court ruling was found to be proper, and was affirmed.

In a 1972 case, the District Court of Arizona granted a preliminary injunction against the Forest Service's proposed highway construction.¹⁷⁵ The injunction halted further construction of Forest Highway Project FH3-2(2) until the Secretary of Transportation had made the appropriate findings under Section 4(f) of the Department of Transportation Act of 1968 (49 U.S.C.A. sec. 1653(f)). This statute, as noted previously, requires the Secretary to consider the alternatives and impact of highway projects that make use of public lands from significant recreation areas.

The area through which the road was to pass was within a triangle formed by Mormon Lake, Ashurst Lake and Kinickinnick Lake, an area generally known as "The Lakes Area."¹⁷⁶ The proposed highway alignment was to have followed along the east side of Mormon Lake. Plaintiffs contended that it would take land from a prime recreation area. The Forest Service was of the opinion that Mormon Lake is not a "proclaimed" recreation area and therefore the Secretary was not required to make any determination under section 4(f).

Based on evidence submitted, the court ruled that the Forest Service's claim that "no proclaimed recreation areas are involved by the proposed project,"¹⁷⁷ is without merit. Furthermore, "the

statement of the Forest Service reflects a clear abuse of discretion, an error of judgement, a failure to follow the law."¹⁷⁸ Even though 53% of the project had been completed, the court felt that no irreparable injury had been caused the environment. The court noted that completion of the project could cause an irreparable injury to the public interest in protecting the environment and would "subvert the expressed purpose of Congress."¹⁷⁹

In 1973, another case came to the courts involving highway construction at a lake site in Georgia.¹⁸⁰ Plaintiffs filed suit in September of 1972 to enjoin the construction of I-75 in the vicinity of Lake Allatoona. Lake Allatoona is owned and operated by the Corps of Engineers and is used for flood control, hydroelectric power and recreation.

The facts in the case are as follows:

I-75 has been completed in Georgia except for the 24-mile segment in the vicinity of Lake Allatoona. To close this gap, the State and Federal agencies involved studied approximately a dozen possible routes, as well as the alternative of doing nothing at all, to close the gap. The first route selected by the State (Line "F") was submitted to the Secretary of Transportation and rejected. A new route, Line "T", was then selected by the State and an environmental impact study was made. This plan was subsequently submitted to defendant Volpe for his consideration. Having determined that the land and water areas in the Lake Allatoona area were subject to Section 4(f) of the Department of Transportation Act of 1966, Volpe made an extensive study of Route "T", as well as, other possible alternatives. He then concluded, as stated in a written report, that feasible and prudent alternatives for the construction of I-75 did not exist.¹⁸¹

Plaintiffs nonetheless sought to enjoin the construction of I-75. They based their action on the contention that defendants Volpe and Lace had acted in violation of Section 4(f) of 49 U.S.C. sec. 1653(f), as amended, and 23 U.S.C. sec. 138 (Supp. V, 1970). The plaintiffs submitted their own proposed alternatives to that of the Highway Department, but no feasibility studies were made for their plan. The Highway Department's proposed plan would cross a portion of Lake Allatoona and part of the surrounding parklands. The District Court judge noted that the court was not "empowered to substitute its judgment for that of the agency (Department of Transportation), but rather only review the Secretary's findings to determine if all necessary procedural steps were followed and to make certain that the resulting administrative decision was not arbitrary or capricious."¹⁸²

Based on the evidence, the court found that "a careful study was made with regard to the construction of I-75 in this area."¹⁸³ Furthermore, several alternatives were examined, and "as a result of this study, the Secretary determined that feasible and prudent alternatives did not exist."¹⁸⁴ As a result, the court concluded that the Secretary's action did not reflect an error in judgement, and, therefore his actions were affirmed.

In light of these recent judicial interpretations and requirements of the National Environmental Policy Act, increasing attention is being given to the impact of highway construction upon important fish and wildlife habitats, and recreation and esthetic values. Additional

pressures will be placed upon highway administrators to clarify and update their policies and procedures to reflect the growing public concern over highway impacts.

4. Channelization

Recent years have seen a growing interest and concern over the impact of stream channelization and its effect on fish, wildlife, recreation and esthetics. Congressional hearings on the problems of stream channelization cover in excess of 3,700 pages.¹⁸⁵ Also, a recent report dealing with stream channelization was submitted to the Council on Environmental Quality by A. D. Little, Inc.¹⁸⁶ The National Water Commission has concluded that in the past "insufficient weight has been given to the detrimental consequences of channelization, and particularly to losses not readily expressible in monetary terms."¹⁸⁷ Many of these losses have been to the fish and wildlife habitat and the esthetic values of the streams and rivers.

Even with these detailed studies the conclusions with respect to the physical damages caused by stream channelization are not clear. The A. D. Little study was concerned with seven major issues dealing with physical alterations caused by stream channelization: wetland drainage; bottomland hardwood losses; cutoff oxbows and meanders; water table changes, erosion and sedimentation; downstream effects and the impact on esthetic perceptions. After viewing 42 selected channelization projects, the researchers found that "about 25 to 30 of

the selected projects did not significantly illuminate any of the 7 issues."¹⁸⁸ With respect to the impact of channelization on fish and wildlife resources a member of the Academy of Natural Sciences has concluded that, "channelization of natural streams and the productivity of fish and wetland wildlife ecosystems are unequivocally antithetical."¹⁸⁹

In Chapter III, we spelled out some of the adverse impacts resulting from stream channelization. Herein we shall review some of the legislation which authorizes channelization and measures intended to mitigate the adverse effects. The activities of four federal agencies: the Soil Conservation Service, the Corps of Engineers, the Tennessee Valley Authority, and the Bureau of Reclamation, will be discussed with respect to their channelization activities.

Soil Conservation Service

The Soil Conservation Service was developed around early federal efforts to control soil erosion. In 1933, with the passage of the National Industrial Recovery Act, the Soil Erosion Service was established in the Department of the Interior. In 1935, the Soil Conservation Service (SCS) was established in the Department of Agriculture.¹⁹⁰ The Service was established primarily to control and prevent soil erosion, to reduce flood and sedimentation damage, and improve agriculture.

The SCS administers the following eight programs: (1) conservation operations;¹⁹¹ (2) resource conservation and development;¹⁹² (3) Great Plains conservation;¹⁹³ (4) watershed protection and flood prevention planning;¹⁹⁴ (5) watershed protection and flood prevention operations;¹⁹⁵ (6) watershed protection and flood prevention demonstration projects;¹⁹⁶ (7) eleven watershed protection and flood prevention operations;¹⁹⁷ and (8) various surveys and investigations.¹⁹⁸ For our purposes we are concerned primarily with the SCS's operations under Public Law 566.

The basic purpose of PL 566 is stated as follows:

That erosion, floodwater, and sediment damages in the watershed of the rivers and streams of the United States, causing loss of life and damage to property, constitute a menace to the national welfare; and that it is the sense of Congress that the Federal Government should cooperate with States and their political subdivisions, soil or water conservation districts, flood prevention or control districts, and other local public agencies for the purpose of preventing such damages and of furthering the conservation, development, utilization, and disposal of water and thereby of preserving and protecting the Nation's land and water resources.¹⁹⁹

The act authorizes the Secretary of Agriculture, upon application, to assist local organizations in planning and carrying out works of improvement.²⁰⁰ These works must be carried out in watersheds or subwatersheds of 250, 000 acres or less. No one structure may provide more than 25, 000 acre-feet of total capacity and not more than 12, 500 acre-feet of floodwater detention capacity.²⁰¹ Structures

costing more than \$250, 000 or which have a storage capacity exceeding 2, 500 acre-feet must be approved by Congress.

The Watershed Protection and Flood Prevention Act (PL 566) specifies that the Secretary of the Interior is to be notified of proposed works. The Secretary may then make "surveys and investigations and prepare a report with recommendations concerning the conservation and development of wildlife resources."²⁰² Full consideration must be given to the recommendation made by the Secretary of the Interior. Plans for projects must include works for the improvement of wildlife resources, to the extent that they are technically and economically feasible.²⁰³

Since 1954, the SCS has either planned or constructed channelization projects on some 21, 000 miles of streams and rivers with 15 percent of this work being done on "natural streams."²⁰⁴

The statement was made during the Stream Channelization Hearings that the "SCS has been dedicated to environmental improvement throughout its history."²⁰⁵ In May of 1970 the Soil Conservation Service issued Watershed Memorandum No. 102.²⁰⁶ This memorandum pointed out that:

Potential habitat losses caused by project works of improvement must be mitigated as fully as feasible. Mitigation measures are to be included in work plans. The arrangements for installing, operating, and maintaining them must be just as explicit and just as firm as for other structural measures. The sponsors and SCS must take affirmative action to be sure that all planned mitigation measures are installed.

In February of 1971 the Soil Conservation Service issued Watershed Memorandum No. 108.²⁰⁷ This memorandum established the Service's guidelines for reviewing "approved watershed work plans that include stream channel improvement not yet installed and for developing new watershed work plans involving channel improvement."

Memorandum 108 specifies, in part, the following guidelines:

- (1) Channel improvement is to be planned and carried out with minimum losses to fish and wildlife habitat.
- (2) Channel improvement is supplementary to flood water retardation, not an alternative for achieving an adequate level of flood protection.
- (3) Channel improvement is not to be used where its primary purpose is to bring new land into agricultural production.

The Memorandum established a classification system that viewed the impact of the project according to its environmental effect, conformance with the established guidelines and economic justification. Three groups into which projects are divided are: Group 1 (projects that are acceptable), group 2 (projects that are questionable) and group 3 (projects that are unacceptable).

The memorandum has been attacked by conservationists on various grounds. Among other things the wording is unclear, and it still views channelization as a "stream improvement" operation.²⁰⁸ The memorandum has also led to "serious disagreements" between the Bureau of Sport Fisheries and Wildlife and the SCS concerning the classification of projects, particularly with respect to projects to be placed in group 1.²⁰⁹ The Bureau of Sport Fisheries and Wildlife is of the opinion that the review procedure of Watershed Memorandum 108

in no way "substitutes for the review of environmental impacts required by the National Environmental Policy Act."²¹⁰

The following case is illustrative of the attempts made by conservation organizations to halt a major Soil Conservation Service project. A majority of the challenges has resulted due to failures of the Service to comply with the provisions of the National Environmental Policy Act.

The project contested in Natural Resources Defense Council v. Grant²¹¹ was developed to control floods, drainage, and conservation, development, and improvement of agricultural lands within the Chicod Creek Watershed in mideastern North Carolina. Among the structural improvements proposed was approximately 66 miles of channel enlargement or "stream channelization." The plaintiffs obtained a preliminary injunction to halt further work on the project.

The SCS had proposed several mitigation measures to reduce the adverse impact of the project on the fish and wildlife resources. These measures included (1) 73 acres of wildlife wetland preservation area, (2) a 12 acre warmwater impoundment area, (3) 11 channel pools, and (4) 30 swamp drainage control structures.²¹² It was the opinion of the Fish and Wildlife Service, and other conservation groups, that these measures would not "significantly lessen the adverse effects of the project on the ecosystem of the watershed."²¹³

The SCS determined that the project, with the mitigation measures, was not a major federal action significantly affecting the

quality of the human environment and as such they did not file an impact statement as required by National Environmental Policy Act. The court found that the project did constitute a significant action and required the Service to "prepare and file a 'full disclosure' environmental impact statement."²¹⁴ The court restrained and enjoined the SCS from taking any further steps to authorize, finance, or commence construction or installation of the Chicod Creek Watershed Project until the appropriate impact statement had been filed. The plaintiffs were required to post \$75,000 bond for injuries suffered by any parties as a result of this action.

On July 13, 1972 the SCS filed a final environmental impact statement. In subsequent litigation the court found that the final statement misrepresented the effects of the project on the fish habitat and resources.²¹⁵ The statement made no reference to the downstream effects of the project, and many of the conclusions reached by the SCS were unsupported by empirical data.

Furthermore, the final statement was not clear as to the project effects on the fishery resource. The report noted that there would be some effect upon resident and anadromous fish, but failed to specify the effects. The statement declared that "most of the fishery resources within the watershed will not be affected by projects works of improvement or will be mitigated."²¹⁶ The court found this conclusion to be far short of the standards set by the NEPA.

The court ruled that the final statement was not the "full disclosure" statement required by the Court's order of March 16, 1972, and NEPA.²¹⁷ Therefore, a preliminary injunction was granted barring further action on the project pending a full hearing on the merits.

Corps of Engineers

Basic authority for current Corps flood control activities is found in the Flood Control Act of 1936.²¹⁸ This Act declared that flood control was a proper federal activity where the floods would obstruct navigation or otherwise interfere with commerce. The Corps is directed to participate in flood control and the improvement of navigable waterways "if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected."²¹⁹ To achieve this control major drainage and channel improvements may be undertaken.²²⁰

In the interest of flood control, the Corps may allot up to \$2 million per year from flood control appropriations for the straightening of channels in navigable streams and the removal of other obstructions.²²¹ Other expenditures are authorized from appropriations for river and harbors improvements to straighten channels in navigable harbors and waterways to promote flood control and navigation.²²²

The Corps of Engineers has stated with respect to its public works projects that "environmental values will be given full

consideration along with economic, social and technical factors."²²³

They have also strived to examine alternative means to projects and not base their determination on purely engineering solutions.

The Corps has set forth four general environmental objectives, which are as follows:²²⁴

- (1) To preserve unique and important ecological, aesthetic, and cultural values of our national heritage.
- (2) To conserve and use wisely the natural resources of our Nation for the benefit of present and future generations.
- (3) To enhance, maintain, and restore the natural and man-made environment in terms of its productivity, variety, spaciousness, beauty, and other measures of quality.
- (4) To create new opportunities for the American people to use and enjoy their environment.

The following cases discussed are illustrative of court actions taken to halt various Corps of Engineer's channelization projects.

The U. S. District Court in 1971 granted a preliminary injunction to halt the construction of the Corps of Engineer's Cross-Florida Barge Canal. In EDF v. Corps of Engineers the plaintiff conservation groups contended that construction of the canal would cause irreparable damage to unique timber, plant and aquatic life in and along the Oklawaha River.²²⁵ In granting the injunction the Court held that "the public interest in avoiding, if possible, any irreversible damage to the already endangered environment is paramount."²²⁶

The U. S. District Court in the case of EDF v. Corps of Engineers also granted a preliminary injunction barring further construction of the Corp's Tennessee-Tombigbee waterway project. The project as planned would have converted the free-flowing Upper Tombigbee

to a channelized, slack-water system, through impoundments, and would have resulted in approximately 253 miles of channel work.²²⁷

The court held that a failure to grant a preliminary injunction would result in irreparable injury to the plaintiffs for which there is no adequate remedy at law.²²⁸

In 1973, the courts were called upon to resolve a controversy centering around a comprehensive development program for the Trinity River Basin. Part of the program is to provide for a multiple purpose channel 12 by 200 feet extending about 360 miles from the Houston Ship Channel in Galveston Bay to Fort Worth, Texas. Initially, the project would consist of 16 navigation dams and 20 navigation locks with future plans to widen the channel to 250 feet and add duplicate locks with pumping facilities to recirculate the water. The latest cost estimates for the total project to completion is \$1, 356, 000, 000.²²⁹

The specific project dealt with in this case is the Wallisville Project. Among other structures proposed, the project involves the construction of a low dam with a reservoir which, at its initial maximum operating level of four feet, would cover approximately 19, 700 acres.²³⁰ The project would submerge large amounts of woodlands, and marshlands which provide habitat for a variety of fish and wildlife, some of which are considered to be rare and endangered species.²³¹

Plaintiffs point out that the defendant Army Corps of Engineers plan to eliminate 184 of the natural crooks and bends in the Trinity

River. Furthermore, plaintiffs contend that the project will "destroy thousands of acres of bottom-land and hundreds of thousands of trees between Ft. Worth - Dallas and the Gulf of Mexico. Numerous game, fish and other wildlife will lose their habitat and perish."²³²

The Corps contended that:

the land use potential of the area with respect to preserving and enhancing environmental qualities will be maximized. While the project plan calls for widening, deepening, and straightening the Trinity River, it also contemplates leaving the River cutoffs and oxbows in their natural state, which will provide undisturbed spawning, nursery, and foraging areas for the preservation of the species of fish and wildlife native to the river and adjoining land areas...²³³

With respect to the fish and wildlife benefits, the Corps estimates these benefits to be in the neighborhood of \$157,000 annually. The impact statement submitted by the Corps indicates that "many thousands of acres of rice fields, the cultivation of which is permitted by fresh water from the Trinity, furnishes suitable homes to waterfowl."²³⁴ The court cited a Bureau of Sport Fisheries and Wildlife report noting that intensive management of a water area, not water alone, is the "key to making the area attractive to waterfowl."²³⁵

The impact statement submitted by the Corps notes that 85 acres of partially wooded land will be destroyed and some 12,500 acres of high marsh and cypress swamp will be submerged by the project. As a result, some rare and endangered species will be affected, and the survival prospects of other species may be impaired.²³⁶

The court found the Corps impact statement to be deficient in that it must be "written in language that is understandable to non-technical minds and yet contain enough scientific reasoning to alert specialists to particular problems within the field of their expertise."²³⁷ The court concluded that the Corp's statement "lacks the requisite detail and fails to satisfy the full disclosure requirements of the Act" (NEPA).²³⁸

The court held further that:

Alternatives to the present project are inadequately considered, and there is no indication that genuine efforts have been made to mitigate any of the major impacts on the environment resulting from the construction of the project. There is little support in the record for the Corps' failure to defer to the expert judgement of other federal agencies which have expressed opinions with respect to significant environmental impacts.²³⁹

In view of the uncertainty surrounding the character and purpose of the Wallisville Project, the court granted an injunction to halt construction on the overall Trinity Project. The Corps was required to prepare an impact statement that would assess the cumulative impact of the overall Trinity Project in a manner satisfactory to the requirements of the NEPA.²⁴⁰

Tennessee Valley Authority

The Tennessee Valley Authority (TVA) was created by the Tennessee Valley Authority Act of 1933.²⁴¹ The Act states that the TVA was created "for the purpose of maintaining and operating the property now owned by the United States in the vicinity of Muscle Shoals,

Alabama, in the interest of national defense and for agricultural and industrial development, and to improve navigation in the Tennessee River and to control destructive flood waters in the Tennessee River and the Mississippi River Basin." As such, the Authority provides flood control projects similar to those of the Corps and Soil Conservation Service.

Approval is required from the Authority's three member Board before any structure may be constructed, operated, or maintained in or along the Tennessee River or its tributaries.²⁴² For the most part the channelization work done by the agency is in connection with a multi-purpose project or program.²⁴³

The Authority's channelization work is done in connection with navigation improvement, flood control for urban areas and flood relief for agricultural lands. The Authority has indicated that it is striving for the evaluation of water resource projects as established by the Water Resources Council.²⁴⁴

The TVA in the past has done channel work on the Tennessee River from Knoxville, Tennessee to Paducah, Kentucky. Most of this work was done in the mid-1950's. In the past 10 years TVA has done channel work in six communities and aided a seventh.²⁴⁵

For the most part, the TVA has completed its major channelization projects. Only one major channelization project remains.²⁴⁶ This project involves urban channelization where there will be little impact on the fish and wildlife resources.

Bureau of Reclamation

By the turn of the century proponents of irrigation were beginning to agree that the federal government should take a more active part in irrigation development. The ninth National Irrigation Congress, which met in Chicago in 1900, adopted resolutions very similar to the policy prescriptions advocated by Captain H. M. Chittenden which not only had called for government ownership of sites and water rights but also for government construction and operation of irrigation works and for free distribution of water.

In response to the desire to promote development of the West, the Bureau of Reclamation was created as the Reclamation Service to administer the Reclamation Act of 1902.²⁴⁷ The Bureau's activities are now primarily in the 17 continental Western states. Considerable international work has also been undertaken by the Bureau.²⁴⁸

The major amendment to the 1902 Act came with the Reclamation Project Act of 1939.²⁴⁹ The Bureau was allowed by this Act to contract to furnish reclamation water for municipal water supplies or miscellaneous purposes, so long as there was no project impairment for irrigation purposes. It was not until 1956 and 1958 that contracts could be made without regard to the effect upon irrigation and to provide for storage of water for municipal and industrial water.

The Bureau was originally established to provide irrigation water in the arid areas, a goal synonymous with development. Later years

have seen hydroelectric power, flood control, recreation, and conservation of water and fish and wildlife resources recognized as objectives.

The Bureau's activities in the water resources field have resulted more in the development of canals than in channelization projects.²⁵⁰ These canals, intended to provide irrigation waters, seldom follow natural watercourses. As such they may have little effect on fish and wildlife resources in natural streams. Canal projects may, however, have an effect on the esthetic environment and the migration of big game animals.

The A. D. Little report cites two examples where the Bureau's projects have involved a significant amount of channelization.²⁵¹ One of these projects, the Middle Rio Grande Project, has had an adverse impact on the wildlife resources. The fish and wildlife service had indicated that:

Since the mid 1950's the number of species and number of birds nesting on the refuge (Bosque del Apache National Wildlife Refuge) has fallen off greatly. This problem can be attributed directly to the channelization project.²⁵²

Conclusions

The National Water Commission has concluded that "there appears to be a tendency to fully evaluate all benefits that would result from channelization projects, but to underestimate, or even to ignore, some operations and maintenance expenses and damages resulting from lowering of ground water tables, destruction of fish and wildlife

habitat, increasing downstream sedimentation and flood damages, and loss of esthetic values."²⁵³ They have also found the need for direct beneficiaries to assume any costs where they are for the purpose of increasing the value of private lands.

The Commission has recommended that the following measures be taken:²⁵⁴

- (1) All agencies responsible for planning and carrying out channelization projects should broaden and otherwise improve their evaluation procedures.
- (2) All future proposals for channelization projects should be required to indicate the part of the cost thereof that is properly allowable to the purpose of increasing the value of lands in private ownership.
- (3) On considering requests for funds to carry out previously authorized channelization plans, the Appropriations Committees of the Congress should require the submission, by both the agency that would be responsible for the use of the funds and the Council on Environmental Quality, of statements on the probable effects of the proposed undertaking on the downstream flood and sedimentation problems, on ground water levels, on fish and wildlife habitat, and on esthetic and other non-economic values and these Committees should provide for the funding of only those projects for which, in their opinion, the benefits are sufficient to justify both the monetary and nonmonetary costs to the Nation.

5. Federal Regulation of Dams

This section discusses the pertinent Federal regulations concerning the authorization, construction and licensing of construction of dams and other impoundments, as related to the preservation and enhancement of fish, wildlife, recreation and esthetic resources. Judicial interpretations, as they relate to the fish and wildlife resources, recreation and esthetic values, will also be discussed.

Department of the Army

The Rivers and Harbors Act of 1899 (Sec. 9) requires that dams and dikes may not be constructed over or in any part, roadstead, haven, harbor, canal or navigable waters of the United States without the consent of Congress and approval of the Chief of Engineers and the Secretary of the Army.²⁵⁵ However, congressional approval is not required if the dam or dike in the navigable waterway lies wholly within a single state.

As early as 1888, the federal government, through the Secretary of the Army, has discretionary authority to provide "practical and sufficient fishways" on those river and harbor projects found to operate (either by dam, dock or otherwise) as obstructions to the passage of fish.²⁵⁶ This requirement was strengthened in 1938 by legislation which stated that federal investigations and improvements made on rivers, harbors and waterways, which are under the jurisdiction of the Department of the Army, must include a "due regard for wildlife conservation."²⁵⁷ A 1944 law required that water resource development projects that are under the control of the Department of the Army must be used in such a manner so as to be consistent with State laws established for the protection of fish and game resources.²⁵⁸

Concerning existing reservoir facilities, the Secretary of the Army has been granted the authority to make available the reconveyance of mineral lands back to the former owners. With respect to

certain reservoirs in Mississippi,²⁵⁹ the Demopolis lock and dam project on the Tombigbee River²⁶⁰ and the Jim Woodruff Reservoir in Florida and Georgia,²⁶¹ these lands will not be reconveyed if, upon the determination of the Secretaries of the Interior and Army, such lands are needed for park and recreation facilities or necessary for the protection and management of migratory birds and fishing resources. Certain lands associated with the Jim Woodruff Reservoir have been specifically set aside for fish, wildlife and recreational purposes.

In surveying or planning any reservoir projects, the Corps of Engineers is required to give consideration to the inclusion of storage for the regulation of streamflow. Specifically, in considering what is an adequate streamflow, the Corps must consider the needs of navigation, recreation, esthetics and fish and wildlife.²⁶²

Department of the Interior

No less than 23 projects involving the damming of rivers, which authorize the Secretary of the Interior to construct, operate, and maintain certain facilities, have specific provisions which protect fish, wildlife and recreation resources.²⁶³ The Secretary has been given the authority to make "reasonable provisions" in the facilities constructed to provide for the conservation and development of fish and wildlife resources in accordance with the Fish and Wildlife Coordination Act.²⁶⁴

For the most part, the Secretary is authorized to investigate, plan, construct, operate and maintain (1) public recreation facilities associated with the development of a specific project, (2) facilities to conserve the scenery, natural, historic, archeological and wildlife resources and (3) facilities to mitigate loss and improve conditions for the propagation of fish and wildlife resources.²⁶⁵

In some of the projects, fish hatcheries are to be built as a part of the program.²⁶⁶ Also, in some projects, appropriate screening devices and fish ladders are specifically called for in order to promote the preservation and propagation of fish and wildlife resources.²⁶⁷ The general rule appears to be to call for conservation, development and enhancement facilities in general terms. For example the Federal Water Project Recreation Act of 1964 requires that plans for Federal navigation, hydroelectric and other water control projects should include consideration of the opportunities the project affords for outdoor recreation and for fish and wildlife enhancement.²⁶⁸

Certain project authorizations call for a minimum release of water below the dam or diversion work for the benefit of downstream fishlife. The Crooked River Project in Oregon, for example, calls for a minimum release of 10 cubic feet per second from the reservoir during those months when there is no other discharge. However, this minimum flow may be reduced for "brief temporary periods" if the Secretary finds that the release is harmful to the primary project

purposes.²⁶⁹ In the Walla Walla Project, the Secretary is directed to insure the maintenance of a streamflow between Dayton Dam and the mouth of the Walla Walla River that is not less than thirty cubic feet per second. This requirement may be altered in the case of water shortages, other emergencies (not specified), or if the Secretary feels that a lesser flow could still maintain fish life.²⁷⁰ The largest minimum flow called for is in the Central Valley Project of California. In this case, the Secretary is directed to adopt measures to insure the preservation and of fish and wildlife resources, which includes:

the maintenance of the flow of the Trinity River below the diversion point at not less than one hundred and fifty cubic feet per second for the months of July through November and flow of Clear Creek below the diversion point at not less than fifteen cubic feet per second unless the Secretary and the California Fish and Game Commission determine and agree that lesser flows would be adequate for maintenance of fish life and propagation thereof.²⁷¹

Other projects call for the release of a minimum flow but in more general terms.²⁷² For example, the Chief Joseph Dam Project in Washington directs the Secretary to make provisions for "sufficient flows" in rivers below Palmer Lake, as he may determine are necessary for the mitigation of losses or damages to the existing fishery and wildlife resources.²⁷³

The Secretary of the Interior has been authorized to establish one or more salmon-cultural stations on the Columbia River in the states of Oregon, Washington and Idaho.²⁷⁴ The Secretary is further

authorized to investigate the fishery resource on the Columbia River. Furthermore, the Secretary may construct and install devices on the river to improve feeding and spawning conditions for fish, to protect migratory fish from irrigation projects, and to facilitate the migration of fish over obstructions.²⁷⁵ The Secretary is further authorized to improve the fishery resource in the Great Lakes, including facilities to aid the free migration of fish over obstructions.²⁷⁶

As mentioned earlier in the discussion of the Fish and Wildlife Coordination Act, whenever a federal agency or private agency operating under a federal permit impounds, diverts, deepens the channel or stream or modifies water for any purpose, it must consult with the Fish and Wildlife Service, U. S. Department of the Interior and the head of the state agency exercising administrative control over wildlife resources "with a view to the conservation of wildlife resources by preventing loss of and damage to such resources."²⁷⁷ The reports and recommendations of the Secretary of the Interior and state agency are to be made an integral part of reports submitted by federal agencies for the construction of water control projects.²⁷⁸ Facilities to protect the fishery resource would include such items as fishways and fish ladders. The costs of these facilities are to be an integral part of the cost of the project.²⁷⁹

Federal Power Commission

The Federal Power Commission has licensing authority over non-federal hydroelectric projects under the Federal Power Act, as amended.²⁸⁰ Part of its licensing authority extends to the construction, operation and maintenance of dams, and other works, necessary development and improvement of power, in any of the streams or other bodies of water over which Congress has jurisdiction under the commerce clause.

Criteria for determining whether or not to issue a permit cover a broad range of requirements. In issuing a permit, the Commission shall require of the applicant the construction and maintenance of such fishways as may be prescribed by the Secretary of the Interior.²⁸¹

Tennessee Valley Authority (TVA)

The Tennessee Valley Authority, among its many programs, is required specifically to carry out programs for power production, navigation, flood control and water conservation.²⁸² The Act establishing the TVA prohibits the construction, operation and maintenance of dams and other works which would affect navigation, flood control and public lands across, in or along the Tennessee River without the approval of the Board.²⁸³

In operating its dams and reservoirs, the TVA regulates stream flows with the primary concern being for navigation and flood control. Facilities have been made available in some TVA dams to aid in the

migration of fish and wildlife.²⁸⁴ The TVA has an on-going program to determine the impact of its structures upon fish reproduction and other wildlife.

Judicial Interpretation

Two court cases will be examined as they pertain to the construction of dams and the protection afforded to fish and wildlife, Udall v. FPC and Scenic Hudson v. FPC.

Scenic Hudson v. FPC²⁸⁵

This case centered around the development of a hydroelectric project (Storm King) on the Hudson River in the State of New York. The Federal Power Commission in an order dated March 9, 1965 granted a license to the Consolidated Edison Company of New York to construct the project on the west side of the Hudson River at Storm King Mountain in Cornwall, New York. The proposed project, the largest of its kind in the world, would involve the construction of a storage reservoir, a powerhouse and transmission lines. The project would be situated in an area of "unique beauty and major historical significance."²⁸⁶ The petitioners, Scenic Hudson Preservation Conference, objected to the issuance of a license. They were also denied an application for rehearing on May 6, 1965. On the same date, they were denied a motion to expand the supplemental hearings to include, among other things, the feasibility of any type of fish protection devices.

At the original hearings, substantial testimony was presented concerning the danger posed to fish life. Information was provided to the Commission by the Assistant Secretary of the Department of the Interior and the New York State Water Resources Commission concerning the possible damage and loss of eggs and/or young valuable species, even with the construction of screening devices.²⁸⁷ After the close of the hearings, the New York State Joint Legislative Committee on Natural Resources tried to alert the public to the adverse impact of this project. Their studies pointed out that destruction of eggs and larvae would result and that "no screening device presently feasible would adequately protect these early stages of fish life."²⁸⁸

One of the expert witnesses called by Consolidated Edison, Dr. Perlmutter, stated that "the project will not adversely affect the fish resources of the Hudson River provided adequate protective facilities are installed."²⁸⁹ The Commission excluded the question of the adequacy of the protective measures from its hearings. The court, citing the hearings before the House Subcommittee on Fisheries and Wildlife Studying the Hudson River Spawning Grounds, 89th Cong., 1st Sess., May 10, 11, 1965, pointed out the inadequacy of the protective measures:

Practical screening methods are known which could prevent young-of-the-year striped bass and shad from being caught up in the (Storm King) project's pumps, but practical means of protection of eggs and larvae stages have yet to be devised. Furthermore the location of the proposed plant appears from available evidence to be at or very near the crucial spot as to potential for harm to

the overall production of eggs and larvae of the Hudson River striped bass.²⁹⁰

The court pointed out that the Commission must take into account the whole fisheries question before deciding whether or not to license the project. New hearings were commenced on November 14, 1966 and concluded on May 23, 1967. Further hearings were held on the issue of fish protection.

On August 19, 1970 the Commission issued its decision. The Commission concluded that the scenic impact would be minimal with no adverse effect on historic sites and that the fishery resource would be adequately protected. Concerning the fisheries issue, the Commission reviewed all relevant information and found that no specific part of the Hudson River could be "distinguished as a major spawning area."²⁹¹ Nevertheless, the devices to protect the fish were redesigned to afford greater protection.

The Commission concluded that:

...the impact on Hudson fishery would not be substantial. Thus even if none of the fish and eggs at Cornwall survived, the total impact would be small. The evidence, however, is to the effect that no such disaster would befall the Cornwall segment. Eggs, larvae and fish entering the plant would have a survival rate in the area of 80 per cent.²⁹²

Consolidated Edison proposed and the Commission approved the construction of a fish hatchery to compensate for the loss of fish. The court concluded that the Commission had adequately performed its

duties and responsibilities and therefore denied the petitions in all respects.²⁹³

Udall v. FPC²⁹⁴

The case of Udall v. FPC involves a judicial interpretation of section 7(b) of the Federal Power Act, 16 U.S.C. Sec. 800(b). This section requires that the Federal Power Commission in granting a license must, among other things, consider the public interest in preserving reaches of wild rivers, the preservation of anadromous fish for commercial and recreational purposes, and the protection of wildlife.

The project involved the licensing of a hydroelectric power project at High Mountain Sheep on the Snake River. On March 15, 1961 the Secretary of the Interior urged the postponement of licensing until studies were conducted concerning the protection of salmon and other fisheries. The Secretary also urged the consideration of federal construction of the project. On October 8, 1962, the hearing Examiner recommended that Pacific Northwest Power Company receive the license, since federal development would not provide any greater measure of protection to fish passage, navigation, recreation or other values.

The Supreme Court, noting the number of dams already on the Columbia River stated that "the destruction of anadromous fish in our western waters is so notorious that we cannot believe that Congress

through the present Act (Federal Power Act) authorized their ultimate demise."²⁹⁵ Furthermore, the destruction of the fishery resource might necessitate a halt in the so-called "improvement" or "development" of waterways.

The Supreme Court noted that concern over the destruction of the anadromous fish resource led to the enactment of the Anadromous Fish Act of 1965.²⁹⁶ This act authorizes federal-state cooperation for conservation, development and enhancement of the anadromous fish resources and prevention of their depletion due to water resource developments. The Secretary of the Interior is responsible for making recommendations for the conservation and enhancement of this resource.²⁹⁷

The Supreme Court noted that the ecology of a river differs from that of a reservoir built behind a dam. The full impact upon the salmon would not be known until after construction. However, the court had some indication as to the impact based upon a Federal Power Commission Report. The report noted that, among other problems, the water temperatures would greatly differ in the reservoir since waters were received from both the Snake and Salmon Rivers. This would mean that upstream migrants would face differing water temperatures at different times. The velocity of flow in the reservoir "would be very low compared with the free flowing stream... Since the upstream migrants follow water flow and downstream migrants are carried by current, such low velocities offer a further obstacle to

the passage of anadromous fish."²⁹⁸ Also, during the summer months, the oxygen content of the reservoir water could fall to amounts which would be insufficient for salmon. Salmon require an oxygen content of approximately 5 parts per million, "yet the oxygen content at the 250-350 foot level would fall in August to less than 3 parts per million."²⁹⁹

Based on studies done by the Bureau of Commercial Fisheries, the court found that downstream migration occurs mainly at night when turbine loads are lower. Thus, the effect of the dams on the downstream migration of salmon and steelhead could be disastrous.³⁰⁰

The Commission was cognizant of the fact that high dams and reservoirs are a major obstacle to fish passage. The Commission concluded that:

We can hope for the best and we will continue to insist that any licensee building a high dam at a site which presumably involves major fish runs do everything possible within the limits of reasonable expense to preserve the fish runs. But as of now we understandably must assume that the best efforts will be only partly successful and that real damage may and probably will be done to any such fish runs.³⁰¹ (emphasis supplied.)

The Secretary of the Interior also noted that the proposed project would have an adverse impact on important wildlife sanctuaries, which were inhabited by elk, deer, partridge, a variety of small game and used by ducks, geese and other wild fowl during migration.³⁰² Furthermore, there seemed to be no feasible way of mitigating these losses.

The court pointed out that "the need to destroy the river as a waterway, the desirability of its demise, the choices available to satisfy future demands for energy" are all relevant factors, but were largely untouched by the Commission.³⁰³ On remand, these issues must be explored as well as the objections raised by the Secretary of the Interior.

The previous material presented indicates that there are federal features in both statutory and case law to protect fish and wildlife resources from the adverse impact of dam construction. Agencies appear to be complying with these requirements. It would appear, however, that additional emphasis needs to be made in the area of improving the facilities and techniques associated with dam construction. The state of the arts is such that there is no "fool-proof" means of insuring the protection of eggs and larvae from destruction. As these techniques are refined, there exists federal legislation to require and implement their use.

6. National Environmental Policy Act³⁰⁴

With so much having been said and written regarding the National Environmental Policy Act of 1969 (NEPA),³⁰⁵ we will limit our discussion here to a brief summary of the overall objectives of the Act followed by a more indepth look at a particularly important section relative to this study, Section 102(2), encompassing the requirement for environmental impact statements.

The National Environmental Policy Act of 1969 was established in an effort to assess the impacts and alleviate the adverse environmental consequences of federal agency activity. Generally, the Act requires federal agencies to justify their decisions in terms of the effect they will have on the environment. In establishing the Act, Congress did not intend environmental protection as an exclusive goal; rather, it desired a reordering of priorities, so that environmental costs and benefits will assume their proper place along with other considerations.³⁰⁴

In Executive Order 11514, signed into law by the President on March 5, 1970, direction was given to the federal agencies regarding their activities relative to protection of the environment. The order stated, "The Federal Government shall provide the leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals."

NEPA sets forth substantive policy regarding the environment and provides guidelines to be established by federal agencies for the protection of the environment. Under Title I, Declaration of National Environmental Policy, the objective and policies of the Act are spelled out. Section 101 (A) states,

...that it is the continuing policy of the Federal Government...to use all practicable means and measures...in a manner calculated to foster and promote the general

welfare, to create, and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

Section 101(B) imposes an explicit duty on federal officials stating that, "the Federal Government...use all practicable means...to improve and coordinate Federal plans, functions, programs, and resources to the end that...certain specific goals are achieved." The goals, specified generally in the Act, strive to improve the quality of life by protecting the environment from unnecessary abuse by federal agencies and their representatives.

Section 102 sets out specific procedures to regulate the agencies so as to ensure that they comply with the policies and goals established in Section 101 of the Act. Section 102 also enumerates the standards that an agency must follow in the planning of its projects. Section 102 (A) and (B) clarify the type of consideration of environmental values which NEPA requires. In general, all agencies must use a "systematic, interdisciplinary approach to environmental planning and evaluation" in decision making which may have an impact on man's environment." Furthermore, every agency is directed to establish "methods and procedures...which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making..."

To ensure that environmental values are properly considered in the decision making process, Section 102(2) (C) requires that

responsible officials of all federal agencies prepare a "detailed statement" covering the impact of particular actions on the environment, the environmental costs which might be avoided, and alternatives to the proposed action. Failure of federal agencies to either submit these "102 statements" or submission of inadequate reports as prescribed in this section, has set the stage and provided the grounds for legal action against agencies. Provided with the specific guidelines to evaluate an agency's actions, the courts have interpreted the policy and requirements of the Act in a rather strict manner in concurrence with the intent of Congress when it passed the Act.

In addition to the detailed statement of environmental impacts of proposed projects required in Section 102(2) (C), Section 102(2) (D) requires all agencies specifically to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." These requirements of NEPA are aimed toward insuring that agency decision-makers take into proper account varied approaches to a particular project which may alter the environmental impact and the cost benefit balance.

Section 103 of NEPA provides for agency review of their existing statutory authority, administrative regulations, and current policies and procedures in order to discover and, if possible, correct any conflicts which may prohibit full compliance with the purposes and provisions of the Act. Section 104 provides that the Act does not

eliminate any duties already imposed by other "specific statutory obligations." Only when such specific obligations conflict with NEPA do agencies have a right to lessen their compliance with the full letter and spirit of the Act.³⁰⁷ Section 105 states that "The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies." The House conferees report states that this section "does not...obviate the requirement that the Federal agencies conduct their activities in accordance with the provisions of this bill unless to do so would clearly violate their existing statutory obligations."³⁰⁸

Title II of NEPA established the Council on Environmental Quality. The Council, among other purposes, was directed "to gather timely and authoritative information...and to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in Title I..."

In its guidelines issued April 23, 1971,³⁰⁹ the CEQ provided additional direction to federal agencies with regard to the preparation of environmental impact statements. Emphasizing the importance of proper consideration of environmental values as required in Section 102(2) (C), the Council stated, "environmental values are not the only values to be weighed or that the requirement is met by paperwork formalities. It will take imagination and attention to the spirit of the requirement from all agencies...to make the Section 102(C) process

as meaningful as was intended." Thus, the Council has placed the responsibility of preparing adequate impact statements squarely on the federal agencies and, further, that they may not limit their environmental statement approach to merely the guidelines established in the Act. Obviously, these CEQ guidelines have had significant effect upon the results achieved by the "102" statements.

A review of a few significant court cases concerning NEPA in general, and an interpretation of Section 102 in particular, will be presented. This case review will provide an insight into the extent to which the requirements of Section 102 have been applied.

A number of significant court cases have given further interpretation to the detailed requirements of impact statements. In Zabel v. Tabb³¹⁰ the court held that an agency has the responsibility to consider factors outside the immediate legislation under which they operate. In fact, the court was of the view that "...every federal agency shall consider ecological factors when dealing with activities which may have an impact on man's environment."

Judicial interpretation of the "detailed statement" was set forth clearly in EDF v. Corps of Engineers (Gillham Dam). In this case the court stated, "at the very least NEPA is an environmental full disclosure law."³¹¹

In defining full disclosure, the court said a minimum full disclosure should produce a statement that will alert the President, the Council on Environmental Quality, the Congress, and the public to all

known possible environmental consequences of the proposed agency action. The statement should also contain a discussion of environmental consequences brought to the attention of the agency by other agencies, experts, public and private organizations, and the public.

In the case of Sierra Club v. Froehlke, the court held that the impact statement must be written in such a manner as to be understood by laymen. "All features of an impact statement must be written in language that is understandable to non-technical minds and yet contain enough scientific reasoning to alert specialists to particular problems within the field of their expertise."³¹² Full disclosure, in other words, requires revelation of all pertinent facts in a manner which can be understood by decision makers and by those who will be affected by those decisions.

In EDF v. Corps of Engineers (Gillham Dam), the court found that the impact statement prepared by the Corps covering the Cossatot River dam in Arkansas did not "set forth all of the environmental impacts which are known to the defendants by their own investigations or which have been brought to their attention by others."³¹³ A similar concern was expressed by the court in Sierra Club v. Froehlke of the Corps' failure to discuss fully all known environmental consequences of development for navigational purposes of the Trinity River Basin in Texas. Injunctions were issued by the courts in both of the above cases pending submission of new impact statements properly covering the proposed actions.

In Sierra Club v. Froehke, the court also criticized the Corps' failure to properly balance environmental costs against economic benefits. However, the district court stated that much of the problem was due to the failure of the agencies, Congress, and the Council on Environmental Quality to develop a system for quantifying environmental amenities. Lacking such procedures and methods, the court suggested alternative methods of dealing with environmental amenities. It stated: "If such sophisticated techniques are not presently available for use, then interim alternative methods should be explored by Congress to ensure that we do not necessarily jeopardize the intent of NEPA between now and the time that agencies and ultimately the courts are supplied with appropriate standards for evaluating the comparative degrees of costs and benefits."³¹⁴

The case of Texas Committee on Natural Resources v. U.S.³¹⁵ questions the retroactivity of NEPA given the circumstances that "not one federal dollar has been expended toward this project, not one step of actual construction has been undertaken. The only thing that has occurred has been the processing of papers." The court stated that "the Congress authorizes and directs that, to the fullest extent possible; the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, Section 102." The court held that the strong wording of Section 102 of NEPA favored the position of the plaintiffs and found that the FHA was in a position to comply with the

requirements of Section 102, due to the fact that the project had not moved into the construction stages.

In contrast, under the facts of the case Pennsylvania Environmental Council v. Bartlett³¹⁶ the court ruled that NEPA would not be applied retroactively. The court stated that the Act "most likely favors non-retroactivity. For instance, the use by Congress of the phrases 'to use all practicable means and resources' and 'to the fullest extent possible' in Sections 101 and 102...indicate a moderate, flexible, and pragmatic approach..." The court concluded that, "since the contract here in question was awarded and finalized prior to the Acts passage, no violation of the Act occurred on the part of the Secretary of Transportation..."

Perhaps one of the most significant decisions to construe Section 102 of NEPA is that of Calvert Cliffs' Coordinating Committee v. U.S. Atomic Energy Commission.³¹⁷ In this case the court viewed its function "to see that important legislative purposes...are not lost or misdirected in the vast hallways of the federal bureaucracy." The petitioners claimed that the procedures established by the AEC failed to conform to the requirements of NEPA. AEC responded that NEPA "leaves much room for discretion and that the rules" established by them do conform to the requirements of the Act.

The court countered the AEC's arguments by stating, "the policies embodied in the NEPA to be a good deal clearer and more demanding than does the Commission." Therefore, the court held

that the AEC would be required to reconsider their policies and actions in accordance with the NEPA.

Regarding Section 102 of the Act, the Circuit Court, for the first time since its passage into law, made some definite statements as to what is required of the agencies in conforming to this section. The court stated that "the greatest importance of the NEPA is to require the AEC and other agencies to consider environmental issues just as they consider other matters within their mandates." In analyzing this important Section, the court found that no escape clause existed for the agencies. Rather, "the requirement of environmental consideration 'to the fullest extent possible' sets a high standard for the agencies, a standard which must be rigorously enforced..." The court concluded that Section 102 requires a "careful and informed decision making process..."

The court also clarified the interpretation of the phrase "detailed statement accompanying the proposal through the review process" in Section 102. In their decision, the court stated, "The court is not of the opinion that it [detailed statement] is a mere paper passing formality. In fact, the word 'accompany' must be read to indicate a congressional intent that environmental factors, as compiled in the 'detailed statement', be considered through agency review process."

The court, in its concluding remarks, addressed the important area of alternatives stating, "that an agency must . . . consider alternatives to its actions which would reduce environmental damage.

That principle established that consideration of environmental matters must be more than a pro forma ritual. Clearly it is pointless to consider 'environmental' costs without also seriously considering action to avoid them."

Thus, in the Calvert Cliffs' case, the court addressed the sections within the NEPA that appeared to be vague or doubtful. It was concluded that the Act is to be regarded as providing definite and specific guidelines for the agencies to follow, and that the statements required by Section 102 will not be mere paperwork exercises.

In the case Environmental Defense Fund v. TVA³¹⁸ congress had appropriated funds for the project in 1966, and, as of the date of the case, about half of the funds appropriated had been spent. A substantial amount of the project work had been completed and additional segments were nearing completion.

The court held in this case that "Section 102(2)(c) of the NEPA applies to the TVA's Tellico project, even though approval, first appropriations, and construction began before the Act's effective date since each appropriation request after the effective date is a proposal for legislation within the meaning of section 102(2)(c) Consequently, each appropriation request after January 1, 1970, would be required to be accompanied by a detailed environmental impact statement."

The TVA filed an impact statement of the project; however, the court held that the "cost-benefit analysis consists almost entirely of

unsupported conclusions." Thus, the court was not satisfied by the statement filed by the TVA. The court in this case concluded further that 102 statements "are required for ongoing federal actions initiated prior to January 1, 1970." This decision is directly opposed to that handed down in Pennsylvania Environmental Council v. Bartlett discussed earlier in which the court found in favor of the Secretary of Transportation concerning the filing of impact statements due to the fact that the contract was finalized prior to the passage of the Act.

An important issue presently undergoing judicial interpretation is the question of whether Section 101 of NEPA creates judicially enforceable substantive duties and rights or merely sets procedural standards to be complied with by federal agencies. Many of the early cases decided under NEPA declined to grant substantive review of federal agencies' decisions, for example EDF v. Corps of Engineers. Eventually, however, courts began to reconsider this reasoning. On appeal before the Eighth Circuit Court, EDF v. Corps of Engineers was reversed on the question of substantive review of agency action under Section 101 of NEPA. NEPA, the circuit court said, was intended to effect substantive changes in decision-making. Section 101 (b) was cited as requiring agencies to use all practical means, consistent with other essential considerations of national policy to improve and coordinate federal plans, functions, programs, and resources, and to preserve and enhance the environment. In view of this fact the court went on to state: "Given an agency obligation to

carry out the substantive requirements of the Act, we believe the courts have an obligation to review substantive agency decisions on the merits."³¹⁹

In an effort to determine the effectiveness of the National Environmental Policy Act, comments were requested from State Game and Fish Departments as well as State Highway Departments on their individual experiences with this important environmental act. The comments were naturally quite varied with many responding that, as of the date of our inquiry (late 1971), they had not had sufficient experience with the Act to make any meaningful comment. Others responded quite favorably on the Act's effectiveness. One response stated: ". . . we do find the environmental impact statement or 102 Reports most helpful; however, we have not to this date had occasion to try and stop a specific action by using one of those reports." Another response was more precise: "It appears to me that the real benefit derived from the statements is the agency to agency and personal contact obtained through the procedures required under the Environmental Policy Act. I think that without those contacts, the environmental statements would be of little value to use, since they are usually quite general in nature."

Generally, the state agencies contacted expressed the fact that NEPA is a positive step toward alleviating the adverse environmental effects of federal projects.

Some general conclusions can be drawn from the brief review of significant cases involving the courts' interpretation of the NEPA. Firstly, it appears that the Congress in passing the Act intended for it to be applied stringently and the courts have so interpreted it. Secondly, the courts have further delineated the "detailed statement" requirement of Section 102 for any federal agency action which may have a deleterious effect on the environment. The detailed impact statement requirement, as the courts have stated, is to be rigorously applied 'to the fullest extent possible' in order to meet the full spirit of the Act.

We have seen in this study that NEPA has provided the basis for challenging federal action, when their practices prove destructive to the environment. The Congress, as has been noted, did not intend the NEPA to become a "paper-shuffling" exercise.

Based on the wording and congressional intent of the legislation, the courts have enforced NEPA in a strict sense. The general feeling expressed in the court cases is that the agencies can no longer fail to consider or merely mention environmental factors in passing. They are now required to place environmental considerations on an equal footing with all other factors analyzed in developing a project.

For the most part, the states have been receptive to the requirements of the NEPA. As seen in Chapter V, section 6, many states have enacted their own environmental protection laws. True, some

state agencies have considered it a nuisance, but the test of effectiveness lies in the results achieved.

The most significant result is the extensive public and private concern and involvement in environmental protection. The courts have likewise taken a positive interest in seeing that the policies and objectives are being carried out. Perhaps a favorable balance will now be obtained between development and energy production and protection and preservation of an environment.

ENDNOTES

¹ Water Policies for the Future, supra, p. 200.

² For a discussion of the legislative history of the Act see: C. W. Shipley, "The Fish & Wildlife Coordination Act's Application to Wetlands" in Reitze, Environmental Planning: Law of Land and Resources, North American International, Washington, D.C., 1974, pp. 2-49.

³ U. S. Congress, Senate, Special Committee on the Conservation of Wildlife Resources, "Status of Wildlife in the United States," Senate Report No. 1203, 76th Congress, 3d Sess.

⁴ U. S. Congress, House, 1934, "Conservation of Wildlife Hearings," 73 Cong., 2d Sess.

⁵ E. G. Nixon, Franklin D. Roosevelt and Conservation 1911-1945, Vol. One, 1911-1917. General Services Admin. National Archives and Records Service. Franklin D. Roosevelt Library. Hyde Park, N.Y., 1957.

⁶ U. S. Department of Agriculture. "Report of the President's Committee on Wildlife Restoration." U. S. Government Printing Office, Wash., D.C. 1934.

⁷ Senate Bill 2529 ("A bill to promote the conservation of wildlife, fish and game, and for other purposes."), Sec. 3, 73d Cong., 2d Sess.

⁸ 48 Stat. 401, Public Law 73-121.

⁹ Seth Gordon. "Conservation Developments" in Field and Stream. May 1934. Vol. 39(1), p. 40.

¹⁰ U. S. Congress, Senate Report No. 1203, supra.

¹¹ House Comm. on Agriculture, H. R. Rep. No. 1944, 79th Cong., 2d Sess. p. 1.

¹² Clarence Cottam, "Missouri River Basin Development and Its Effects on Fish Wildlife" in the Proceedings of the Thirty-sixth Convention of the International Association of Game, Fish and Conservation Commissioners, Sept. 9, 10, 11, 1946, Hotel St. Paul, Minn., p. 204.

¹³ Public Law 732, 60 Stat. 1080, Aug. 14, 1946.

¹⁴ Supra, note 10.

¹⁵ 60 Stat. 1080.

¹⁶ 60 Stat. 1082.

¹⁷ Id.

¹⁸ Daniel Janzen. "Government Coordination in the Fish and Wildlife Field" in the Proceedings of the Forty-seventh Convention of the International Association of Game, Fish and Conservation Commissioners. Sept. 9 and 10, 1957. p. 15.

¹⁹ Hearings on H. R. 13138 Before the Senate Comm. on Interstate and Foreign Commerce, 85th Cong., 2d Sess., p. 4, (1958).

²⁰ Id.

²¹ Charles Callison. "Report of the Committee on Legislation," in Proceedings of the Forty-seventh Convention of the International Association of Game, Fish and Conservation Commissioners. Sept. 9 and 10, 1957, p. 91.

²² 70 Stat. 563; 16 U.S.C. 661-667e. Also see: Environmental Reporter-Federal Laws, 71:5901; Environmental Law Reporter, 41801; and A Compilation of Federal Laws Relating to Conservation and Development of Our Nation's Fish and Wildlife Resources, Environmental Quality, and Oceanography, (Committee print), U.S. Government Printing Office, January, 1973, pp. 12-19.

²³ Michael Hudoba. "Report From Washington-Wildlife Values Triumph in New Law" in Sports Afield, Vol. 140, No. 5, Nov. 1958, p. 12; and James McBroom: "The Meaning and Promise of the New Fish and Wildlife Coordination Act" in Proceedings of the International Ass. of Fish and Conservation Commissioners. Sept. 11 and 12, 1958, p. 53.

²⁴ Arthur Grahame. "Fish and Wildlife Legislation in Outdoor Life, Vol. 121, No. 1, January 1958, p. 19.

²⁵ U.S. Congress, House, Committee on Merchant Marine and Fisheries, "To amend the Coordination Act." Report to Accompany H. R. 13138. July 16, 1958. House Report 2183, 85th Cong., 2d Sess. U.S. Government Printing Office, Wash., D.C., p. 3.

²⁶ U.S. Department of the Army. Regulation No. 1105-2-129, "Planning--Preservation and Enhancement of Fish and Wildlife Resources," August 15, 1973.

²⁷ 1 ERC 1040 (U.S. Dist. Ct. M.D. Fla. 1969); 430 F. 2d 199, (5th Cir. 1970). Also see: 1 ERC 1449; 401 U.S. 910 (U.S. Sup. Cit. 1971), 2 ERC 1909.

²⁸ 33 U.S.C. sec. 403.

²⁹ 1 ERC 1041.

³⁰ 1 ERC 1045.

³¹ 1 ERC 1454.

³² 1 ERC 1454.

³³ 1 ERC 1456.

³⁴ 387 U.S. 428, 87s.ct. 1712, 18 L. Ed. 2d 869 (1 ERC 1069).

³⁵ 1 ERC 1460.

³⁶ See: Akers v. Resor, 339 F. Supp. 1375 (W.D. Tenn. 1972) 3 ERC 1979 and Cape Henry Bird Club v. Laird (W.D. Virginia 1973) 5 ERC 1283.

³⁷ 78 Stat. 608, Public Law 88-492.

³⁸ See: Don Cullimore, "Hot Cross-trail on the Current," American Forests, January 1962, p. 37.

³⁹ U.S. Cong., Senate Committee on Public Works, "Development of Water and Land Resources of the Arkansas-White and Red River Basins." 85th Cong., 1st Sess., Document No. 13, p. 148.

⁴⁰ U.S. Congress, Senate Committee on Interior and Insular Affairs, "The Ozark National Rivers," Hearings before Subcommittee on Public Lands, 88th Cong., 1st Sess., on S.16, April 8, 9, and May 22, 1963, p. 12.

⁴¹ U.S. Cong., House Committee on Interior and Insular Affairs, "Ozark National Rivers, Missouri," Hearings before Subcommittee on National Parks, 88th Congress, 1st Sess., on H.R. 1803, April 9 and May 6, 1963, pp. 79-82.

⁴²16 U.S.C. sec. 460(m) (Supp. 1966). Also see: Dan Tarlock, "Preservation of Scenic Rivers," 55 Kentucky Law Journal (1967), p. 745 at note 3.

⁴³Total acres acquired are not to exceed 65,000 acres. 78 Stat. 608.

⁴⁴Outdoor Recreation for America. A Report to the President and to the Congress by the Outdoor Recreation Resources Review Commission, January, 1962, Washington, D.C., pp. 6-8.

⁴⁵U.S. Cong., Senate Committee on Interior and Insular Affairs, Wild Rivers System Hearings on S. 1446 and S. 897, 89th Cong., 1st Sess., April 22 and 23, 1965, p. 19.

⁴⁶For a more detailed discussion of the legislative history of proposed bills see: "Preservation of Scenic Rivers," *supra*, pp. 784-797.

⁴⁷For example see: U.S. Cong., House, Hearings, Committee on Interior and Insular Affairs, "National Scenic Rivers System" 90th Cong., 2d Sess., March 7, 8, 18, and 19, 1968, pp. 446-449.

⁴⁸16 U.S.C. 1271-1287, Public Law 90-542, 82 Stat. 906 (October 2, 1968). Found also in: ELR 41421.

⁴⁹16 U.S.C. 1274. These include portions of the Clearwater, Middle Fork in Idaho; Eleven Point in Missouri; Feather in California; Rio Grande in New Mexico; Rogue in Oregon; St. Croix in Minnesota and Wisconsin; Salmon in Idaho; and Wolf in Wisconsin.

⁵⁰16 U.S.C. 1274(9), as amended by Pub. L. 92-560, Oct. 25, 1972, 86 Stat. 1174.

⁵¹Public Law 92-560, sec. 6(a).

⁵²Water Resource Management, *supra*, p. 876.

⁵³16 U.S.C. 1276(a).

⁵⁴16 U.S.C. 1276(b).

⁵⁵16 U.S.C. 1273(b).

⁵⁶16 U.S.C. 1276(c).

⁵⁷16 U. S. C. 1275(a).

⁵⁸16 U. S. C. 1273(b).

⁵⁹16 U. S. C. 1278(c).

⁶⁰16 U. S. C. 1278(a) and (b).

⁶¹16 U. S. C. 1278(b)(i).

⁶²16 U. S. C. 1278(b)(ii). See Sec. 1275(b) for specific review procedures.

⁶³16 U. S. C. 1279(b).

⁶⁴16 U. S. C. 1280(b).

⁶⁵16 U. S. C. 1283(b).

⁶⁶16 U. S. C. 1283(b).

⁶⁷16 U. S. C. 1287.

⁶⁸16 U. S. C. 1277(b).

⁶⁹16 U. S. C. 1277(c).

⁷⁰16 U. S. C. 1284(a)(d) and (e).

⁷¹16 U. S. C. 1284(f). For additional discussions of the Act see: A. D. Tarlock and Roger Tippy, "The Wild and Scenic Rivers Act of 1968." 55 Cornell Law Journal 707 (May, 1970) and Water Resource Management, supra, pp. 876-882.

⁷²16 U. S. C. 1284(c).

⁷³R. C. Turner, Esq., The Preservation of Rivers as Wild and Scenic, " in Environmental Planning: Law of Land and Resources, supra, at p. eight-4.

⁷⁴Highway Research Board. "Federal Environmental Legislation and Regulations as Affecting Highways." Research Results Digest, Digest 25, January 1971, p. 2. Prepared by John C. Vance and David C. Oliver.

⁷⁵"Federal-Aid Highway Act of 1956," P.L. 627, June 29, 1956; 70 Stat. 385: wherein it is stated that: "Any state highway department which submits plans for a Federal-aid highway project involving the bypassing of or going through, any city, town, or village, either incorporated or unincorporated, shall certify to the commissioner of Public Roads that it has had public hearings, or has afforded that opportunity for such hearings, and has considered the economic effects of such a location."

⁷⁶"Federal Aid Highway Act of 1958," P.L. 85-767, sec. 128; 72 Stat. 902, August 27, 1958. Certification now made to the "Secretary."

⁷⁷"Federal-Aid Highway Act of 1968," P.L. 90-495, sec. 128, August 23, 1968; 82 Stat. 828.

⁷⁸84 Stat. 1734; P.L. 91-605, sec. 135(a), December 31, 1970; also see: ELR 41602.

⁷⁹P.L. 89-574, S. 3155, Sept. 13, 1966. "Federal-Aid Highway Act of 1966."

⁸⁰80 Stat. 771.

⁸¹P.L. 89-670, H.R. 15963, October 15, 1966.

⁸²80 Stat. 931; 49 U.S.C. sec. 1651; ELR 41604.

⁸³80 Stat. 934; ELR 41605.

⁸⁴P.L. 90-495, S. 3418, August 23, 1968.

⁸⁵82 Stat. 823, amends section 138 of title 23, U.S.C.; also see ELR 41602.

⁸⁶82 Stat. 824, section 18(b) of P.L. 90-495.

⁸⁷82 Stat. 827. The projects specified in the act were: the Three Sisters Bridge; Potomac River Freeway; Center Leg of the Inner Loop, I-95; and the East Leg of the Inner Loop, I-295.

⁸⁸P.L. 91-605, December 31, 1970.

⁸⁹84 Stat. 1734, sec. 136(a); which amended sec. 109(g) of title 23, U.S.C.

⁹⁰84 Stat. 1734; P.L. 91-605, sec. 136(b) which amended sec. 109(h) of title 23, U.S.C.; also ELR 41601.

⁹¹23 CFT 1.6(c) (Revised June 20, 1973).

⁹²Ronald C. Peterson and Robert M. Kennan, Jr., "The Federal-Aid Highway Program: Administrative Procedures and Judicial Interpretations," 2 ELR 50001-50023, (1972).

⁹³2 ELR 50001.

⁹⁴3 ELR 10088.

⁹⁵23 CFT 1.32(b)(2) (1973).

⁹⁶23 CFT 1.32(b)(3) (1973).

⁹⁷23 CFR 1.32(b)(4) (1973).

⁹⁸"No such direction, policy, rule, procedures, or interpretation contained in a Federal Highway Administration order or memorandum shall be considered a regulation or create any right or privilege not specifically stated therein." 23 C.F.R. sec. 1.32(a) (1973).

⁹⁹The memorandum further directs that the State Highway Department shall "(a) submit programs of proposed Federal-aid highway projects to the State fish and game agencies at an early stage with a request that the fish and game agencies indicate those projects of interest; (b) furnish notice of public hearings, where required by section 128 of title 23, United States Code, to the fish and game agencies; and (c) adopt such other methods as will afford the State fish and game agency full opportunity to study and make recommendations to the State highway department concerning the proposed project prior to its submission by the State to the Secretary."

¹⁰⁰Based upon the legal requirements established and set forth in the preceding section of this report entitled "Federal Statutes".

¹⁰¹PPM 20-8 (1) (June 16, 1959). Also see: ELR 46504.

¹⁰²PPM 20-8 (January 14, 1969). Also see: ELR 46505.

¹⁰³23 C.F.R. Chap. I, Part 790 (June 20, 1973); 3 ELR 46522-46525; and 38 Fed. Reg. 12103 (May 9, 1973). Part 790 is based on PPM 20-8 as amended, and IM 20-3-72 and IM 20-4-72. For an analysis of Part 790 see: 3 ELR 10088-10089 (June 1973).

¹⁰⁴PPM 20-8, par. 1a (Jan. 14, 1969), 23 C.F.R. 790.1(a) (1973), ELR 46506.

¹⁰⁵PPM 20-8, par. 6a (1)-(3). (Jan. 14, 1969), 23 C.F.R. 790.5(a)(1)-(2) (1973).

¹⁰⁶PPM 20-8, par. 4c (Jan. 14, 1969), 23 C.F.R. 790.3(c) (1)-(2) (1973).

¹⁰⁷PPM 20-8, par. 4c (Jan. 14, 1969). Some of the items listed included: (5) recreation and parks; (7) aesthetics; (13) conservation, including soil erosion, sedimentation, wildlife and general ecology; and (14) natural and historic landmarks.

¹⁰⁸IM 20-4-72; ELR 46521; 23 C.F.R. 790.3(c)(1)-(7) (1973). Which combined the effects listed in PPM 20-8 and those of 23 U.S.C. 109(h).

¹⁰⁹IM 20-4-72, sec. 4c, (September 29, 1972); 23 C.F.R. 790.8(b)(2)ii.

¹¹⁰PPM 20-8, par. 9 (January 14, 1969), 23 C.F.R. 790.8(a).

¹¹¹PPM 20-8, par. 4(a)(1) (January 14, 1969), 23 C.F.R. 790.3(a)(1) (1973).

¹¹²PPM 20-8, amended (July 12, 1972), 23 C.F.R. 790.3(a)(1) (1973).

¹¹³PPM 20-8, par. 4(a)(2) (January 14, 1969), 23 C.F.R. 790.3(a)(1) (1973).

¹¹⁴PPM 20-8, par. 4(a)(3) (January 14, 1969), 23 C.F.R. 790.3(a)(3) (1973).

¹¹⁵PPM 20-8, par. 4(b)(1) (January 14, 1969), 23 C.F.R. 790.3(b)(1) (1973).

¹¹⁶PPM 20-8, amended (July 12, 1972), 23 C.F.R. 790.3(b)(1) (1973).

¹¹⁷PPM 20-8, par. 4(b)(2) (January 14, 1969), 23 C.F.R. 790.3(b)(2) (1973).

¹¹⁸PPM 20-8, par. 4(b)(3) (January 14, 1969), 23 C.F.R. 790.3(b)(3) (1973).

¹¹⁹ PPM 20-8, par. 7(a)(1) (January 14, 1969), 23 C.F.R. 790.7(a)(1) (1973).

¹²⁰ PPM 20-8, par. 7(d) (January 14, 1969), 23 C.F.R. 790.6(d) (1973).

¹²¹ PPM 20-8, par. 6(g), amended (July 12, 1972); 23 C.F.R. 790.5(g) (1973).

¹²² 23 C.F.R. 790.9(e)(1) (1973).

¹²³ 23 C.F.R. 790.9(e)(2) (1973).

¹²⁴ 23 C.F.R. 790.9(f) (1973). This section has already been challenged by the National Wildlife Federation: National Wildlife Federation v. Tiemann, Civil Action No. 1270-73 (D.D.C. filed June 25, 1973). Also see: 3 ELR 10109-10110.

¹²⁵ See: 1 ELR 46520-46521.

¹²⁶ IM 20-1-69, sec. 1. (April 8, 1969).

¹²⁷ IM 20-1-69(2), sec. 4. (June 11, 1969).

¹²⁸ 2 ELR 50012-50013.

¹²⁹ 23 C.F.R. 790.8(a) (1973).

¹³⁰ 23 C.F.R. 790.8(b) (1973).

¹³¹ 42 U.S.C. sec. 4321, et seq. (1970), (P.L. 91-190) ELR 41009, ER 71:0101. Which requires all Federal agencies to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement" on the environmental impact of the action; any adverse environmental effects; alternatives to the proposed action; and any irreversible and irretrievable commitments of resources.

¹³² Section 1653(f) of 49 U.S.C. is identical to section 138 of 23 U.S.C. and 4(f) of the Department of Transportation Act as amended in Section 18 of the Federal-Aid Highway Act of 1969.

¹³³16 U.S.C. sec. 470f (1970). Requires that all proposed highway sections that are federally assisted be developed with consideration to affected districts, sites, buildings, structures, or objects that are included in the National Register for Historic Preservation. Furthermore, the Advisory Council on Historic Preservation must be afforded "a reasonable opportunity to comment with regard to the undertaking."

¹³⁴42 U.S.C. sec. 1857h-7 (1970), ELR 41226, ER 71:1101. Section 309 requires the EPA Administrator to "review and comment in writing on the environmental impact of any matter" relating to his duties and responsibilities which is contained in any proposed federal legislation, "newly authorized Federal projects for construction" to which section 102(2)(C) of NEPA applies, or any proposed regulations published by Federal agency.

¹³⁵PPM 90-1, par. 3a, (1971), ELR 46106.

¹³⁶*id.* at par. 5a.

¹³⁷*Id.* at par. 5b. This exemption has come under attack by the National Wildlife Federation, as did Part 790.9(f) C.F.R. National Wildlife Federation v. Tiemann. Civil Action No. 1318-73 (D.D.C., filed June 29, 1973) 3 ELR 10109.

¹³⁸For example see: Morningside-Lenox Park Ass'n v. Volpe, 334 F. Supp. 132, 1 ELR 20629 (N.D.Ga. 1971).

¹³⁹PPM 90-1, par. 6b. The (HA) is normally the appropriate State highway department, or the agency primarily responsible for initiating and carrying forward the planning, design, and construction of the highway.

¹⁴⁰*Id.*, at 5c.

¹⁴¹*Id.*, at 5g.

¹⁴²*Id.*, at 5m.

¹⁴³*Id.*, at 5p(1).

¹⁴⁴e.g., IM 20-3-66 (June 7, 1966), and IM 20-2-67 (May 24, 1967). Issued to implement Executive Order 11258 (November 17, 1965), and revised by Executive Order 11288 (July 2, 1966), both pertaining to pollution control.

¹⁴⁵ Report to Congress July 1, 1967, published by the FHWA as IM 20-6-67.

¹⁴⁶ Ibid., p. 7.

¹⁴⁷ Ibid., pp. 7-8.

¹⁴⁸ Ibid., p. 11.

¹⁴⁹ "The Federal-Aid Highway Program: Administrative Procedures and Judicial Interpretation," *supra*, 2 ELR 50017.

¹⁵⁰ For example see: Citizens to Preserve Overton Park v. Volpe, 1 ERC 1685 (CA6 1970) and 2 ERC 1250 (U. S. Supreme Ct.); Monroe County Conservation Council v. Volpe (USCA, 2d Circuit) 4 ERC 1886; Citizens v. Volpe, (U.S.D.C., NDInd) 3 ERC 1031.

¹⁵¹ James River and Kanawha Canal Parks v. RMA (DC EVa) 5 ERC 1353.

¹⁵² Nolop v. Volpe (DC SD) 3 ERC 1338.

¹⁵³ In some instances it may be applied retroactively, see Named Individual Members of San Antonio Conservation Society v. Texas Highway Department, 446 F. 2d 1013 (5th Cir. 1971); Arlington Coalition on Transportation et. al. v. Volpe, No. 71-2109 (4th Cir. 1972). In other cases the NEPA may not be retroactive, see Ragland v. Mueller (5th Cir. CA), 4 ERC 1198.

¹⁵⁴ 315 F. Supp. 238 (M.D. Pa. 1970), 1 ERC 1271.

¹⁵⁵ 1 ERC 1272.

¹⁵⁶ 1 ERC 1274.

¹⁵⁷ 1 ERC 1275.

¹⁵⁸ Ibid. The court record indicated that no velocity tests were made on the First Fork, and therefore any judgment concerning the construction effect on the fish would be speculative, 1 ERC 1275 at note 5.

¹⁵⁹ 1 ERC 1279.

¹⁶⁰ 23 U.S.C. sec. 117(a): "The Secretary may, upon request of any State highway department, discharge his responsibility relative to the plans, specifications, estimates, surveys, contract awards, design, inspection, and construction of all projects on the Federal-aid secondary system by his receiving and approving a certified statement by the State highway department setting forth that the plans, design, and construction for each such project are in accord with those standards and procedures which (1) were adopted by such State highway department, (2) were applicable to projects in this category, and (3) were approved by him." (emphasis supplied).

¹⁶¹ ₁ ERC 1280.

¹⁶² Ibid.

¹⁶³ State Highway Departments are directed to "(a) submit programs of proposed Federal-aid highway projects to the State fish and game agencies at an early stage with a request that the fish and game agencies indicate those projects of interest (b) furnish notice of public hearings, where required by section 128 of title 23, United States Code, to the fish and game agencies; and (c) adopt such other methods as will afford the State fish and game agency full opportunity to study and make recommendations to the State highway department concerning the proposed project prior to its submission by the State to the Secretary."

¹⁶⁴ ₁ ERC 1281.

¹⁶⁵ Pennsylvania Environmental Council v. Bartlett, (CA 3rd Cir.) No. 19,453, December 1, 1971, 3 ERC 1421.

¹⁶⁶ ₃ ERC 1423.

¹⁶⁷ This view is still expressed in 23 C.F.R. sec. 790.5(a)(3): "with respect to Secondary Road Plan projects which are subject to this part, two hearings are not required on a project covered by paragraph (a)(1) or (2) of this section, unless it will carry an average of 750 vehicles a day in the year following its completion."

¹⁶⁸ ₃ ERC 1424.

¹⁶⁹ ₁ ERC 1275.

¹⁷⁰ U.S. Dist. Ct., Dist. of N.J., No. Civ. 9-70, June 19, 1970; 2 ERC 1094.

¹⁷¹ ₂ ERC 1096.

- ¹⁷²₂ ERC 1097.
- ¹⁷³Wildlife Preserves v. Volpe, (CA 3rd Cir.) June 7, 1971; 2 ERC 1643.
- ¹⁷⁴₂ ERC 1645.
- ¹⁷⁵Arizona Wildlife Federation v. Volpe (DC DA) (1972), 4 ERC 1637.
- ¹⁷⁶₄ ERC 1638.
- ¹⁷⁷₄ ERC 1639.
- ¹⁷⁸₄ ERC 1639. In so saying the courts cited: Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402 (1971) and Named Ind. Mem. of San Antonio Con. Soc. v. Texas Highway Department 446 F. 2d 1013 (1971).
- ¹⁷⁹₄ ERC 1639.
- ¹⁸⁰FAIR v. Volpe, (DC NDGa) No. 17133, March 14, 1973; 5 ERC 1205.
- ¹⁸¹₅ ERC 1207.
- ¹⁸²₅ ERC 1207. Citing Citizens to Preserve Overton Park v. Volpe, 401 U.S. 402 91 S. Ct. 814, 28 L. Ed. 2d 136 (2 ERC 1250).
- ¹⁸³Ibid.
- ¹⁸⁴Ibid.
- ¹⁸⁵_{92d Cong., 1st Session, Stream Channelization, Hearings before a Subcommittee on Government Operations, House of Representatives, parts 1 through 4, May and June 1971, and 93d Cong., 1st Session, parts 5 and 6, March 1973.}
- ¹⁸⁶Report on Channel Modifications, Vols. I and II, Prepared for the Council on Environmental Quality under Contract with Arthur D. Little, Inc., Wash. U.S.G.P.O., March, 1973.
- ¹⁸⁷Water Policies for the Future, *supra*, p. 35.
- ¹⁸⁸_{92d Cong., Stream Channelization, *supra*, p. 3431.}

¹⁸⁹ Statement by Dr. Robin Vannote, 92d Cong., Stream Channelization, supra, p. 3437.

¹⁹⁰ Act of April 27, 1935. PL 74-46; 49 Stat. 163; 16 U. S. C. 590a-590f. Also see A Summary - Digest of the Federal Water Laws and Programs, supra, pp. 36-46 for a discussion of the Soil Conservation Services activities, and Report on Channel Modifications, Vol. I, supra, pp. 35-37.

¹⁹¹ 49 Stat. 163.

¹⁹² 76 Stat. 607, as amended 7 U. S. C. A. 1010 (Bankhead-Jones Farm Tenant Act).

¹⁹³ P. L. 91-118, 83 Stat. 194, as amended, 16 U. S. C. A. 590 p (b)(1).

¹⁹⁴ P. L. 83-566, 68 Stat. 666, as amended, 16 U. S. C. A. 1001 et seq.

¹⁹⁵ 16 U. S. C. A. 1003(b).

¹⁹⁶ 16 U. S. C. A. 590a(1).

¹⁹⁷ 58 Stat. 887, 905; P. L. 78-534; Sec. 13 of Flood Control Act of 1944.

¹⁹⁸ 68 Stat. 666, 668; 16 U. S. C. A. 1006; P. L. 83-566; Sec. 6 of Watershed Protection and Flood Prevention Act of 1954.

¹⁹⁹ Land use elements being added by sec. 201 of the Rural Development Act of 1972, P. L. 92-419, 86 Stat. 657, 667.

²⁰⁰ P. L. 566, sec. 3.

²⁰¹ P. L. sec. 2(2).

²⁰² P. L. 566, sec. 12(1).

²⁰³ P. L. 566, sec. 12(2).

²⁰⁴ Statement by Norman A. Berg, Associate Administrator, SCS, in Stream Channelization, supra, Part 5, p. 2911.

²⁰⁵ Stream Channelization, supra, Part 5, p. 2902.

- ²⁰⁶ See Stream Channelization, supra, Part 2, pp. 1263-1264.
- ²⁰⁷ See Stream Channelization, supra, Part 1, pp. 386-388.
- ²⁰⁸ For a critical analysis of Memorandum No. 108 see: Stream Channelization, supra, Part 1, pp. 32-3.
- ²⁰⁹ Stream Channelization, supra, Part 5, p. 3249.
- ²¹⁰ Ibid., at p. 3250.
- ²¹¹ 341 F. Supp. 356, 3 ERC 1883 (E. D. N. C., 1972).
- ²¹² 3 ERC 1887.
- ²¹³ Ibid.
- ²¹⁴ 3 ERC 1893.
- ²¹⁵ Natural Resources Defense Council v. Grant, No. 754 Civil, (E. D. N. C., 1973), 5 ERC 1001.
- ²¹⁶ 5 ERC 1005.
- ²¹⁷ 5 ERC 1006.
- ²¹⁸ Act of June 22, 1936, 4 Stat. 1570.
- ²¹⁹ 33 U. S. C. A. 701a, 701b.
- ²²⁰ 33 U. S. C. A. 701a-1.
- ²²¹ 33 U. S. C. A. 701g.
- ²²² 33 U. S. C. A. 603a.
- ²²³ Environmental Guidelines for the Civil Works Program of the Corps of Engineers, Department of the Army, Corps of Engineers, IWR Report 70-5, November, 1970, p. 4.
- ²²⁴ Ibid., pp. 5-6.
- ²²⁵ 2 ERC 1174.
- ²²⁶ 2 ERC 1175.
- ²²⁷ 3 ERC 1086.

- 228³ ERC 1087.
- 229^{Sierra Club v. Froehlke}, (D. C. S. D., Tex. 1973), 5 ERC
1033, 1043.
- 230^{Ibid.}
- 231⁵ ERC 1044.
- 232^{Ibid.}
- 233⁵ ERC 1045.
- 234⁵ ERC 1059.
- 235^{Ibid.}
- 236⁵ ERC 1074.
- 237⁵ ERC 1068. Citing Environmental Defense Fund v. Corps
of Engineers, 348 F. Supp. 916, 933, 4 ERC 1408, (N.D. Miss.
1972).
- 238⁵ ERC 1097.
- 239⁵ ERC 1097-1098.
- 240⁵ ERC 1098.
- 241^{48 Stat. 58, 16 U.S.C.A. 831-831dd.}
- 242^{16 U.S.C.A. 831y-1.}
- 243^{Stream Channelization, supra, Part 2, p. 595.}
- 244^{Ibid., at p. 603.}
- 245^{Ibid., at p. 596.}
- 246^{Ibid., at p. 603.}
- 247<sup>32 Stat. 388. For more detailed discussion of the Bureau's
goals and objectives see: A. R. Dickerman, G. E. Radosevich and
K. C. Nobe, Foundations of Federal Reclamation Policies: An
Historical Review of Changing Goals and Objectives, Dept. of Eco-
nomics, Colorado State University, NRE-8, January, 1970.</sup>

²⁴⁸For example, Helmand Valley Project, Afghanistan and Han River Basin,

²⁴⁹53 Stat. 1187.

²⁵⁰Report on Channel Modifications, supra, p. 39.

²⁵¹Ibid.

²⁵²Report on Channel Modifications, supra, Vol. II, p. 21-31.

²⁵³Water Policies for the Future, supra, p. 35.

²⁵⁴Ibid., at pp. 36-37. Recommendations 2-2 through 2-4.

²⁵⁵30 Stat. 1151, 33 U.S.C.A. 401.

²⁵⁶Act of August 11, 1888, sec. 11, 25 Stat. 400, 425, 33 U.S.C. 608. Also see: A Compilation of Federal Laws Relating to Conservation and Development of Our Nation's Fish and Wildlife Resources, Environmental Quality, and Oceanography, (Committee Print), U.S.G.P.O., January, 1973, p. 302 (Cited hereafter as: A Compilation of Federal Laws).

²⁵⁷Act of June 20, 1938, sec. 1, 52 Stat. 802, 33 U.S.C. 540. Also see A Compilation of Federal Laws, supra, p. 301.

²⁵⁸Act of Dec. 22, 1944, sec. 4, 58 Stat. 889; as amended by 60 Stat. 642; 68 Stat. 1266, 76 Stat. 1195, 78 Stat. 899, and 84 Stat. 1833. Also see A Compilation of Federal Laws, supra, pp. 300-301.

²⁵⁹Act of August 31, 1957, P.L. 85-245, 71 Stat. 563. Also see A Compilation of Federal Laws, supra, p. 305.

²⁶⁰Act of March 29, 1956, P.L. 84-459, 70 Stat. 67. Also see A Compilation of Federal Laws, supra, pp. 305-306.

²⁶¹Act of August 6, 1956, P.L. 84-998, 70 Stat. 1064. Also see A Compilation of Federal Laws, supra, p. 306.

²⁶²86 Stat. 816, 817, 33 U.S.C.A. 1252(b), P.L. 92-500, sec. 102(b)(1). (Federal Water Pollution Control Act).

²⁶³See: A Compilation of Federal Laws, supra, pp. 307-324.

²⁶⁴e.g., 43 U.S.C. sec. 616v(b), 76 Stat. 634. (Baker Reclamation Project, Oregon).

²⁶⁵ e.g., 43 U.S.C. sec. 620g, 70 Stat. 110. (Colorado River Storage Project Act); 43 U.S.C. sec. (c616c (a)), 76 Stat. 391. (Fryingpan-Arkansas Project, Colorado); 43 U.S.C. sec. 616 ccc(a), 79 Stat. 616. (Auburn-Folsom South Unit, Central Valley Project, California).

²⁶⁶ e.g., 16 U.S.C. sec. 835 i, 54 Stat. 1085, as amended 57 Stat. 14. (Columbia Basin Project).

²⁶⁷ e.g., 43 U.S.C. 615 i, 70 Stat. 1059. (Crooked River Project, Oregon); P.L. 87-762, sec. 3, 76 Stat. 761 (Chief Joseph Dam, Washington).

²⁶⁸ 16 U.S.C. 460, P.L. 89-72. Also see A Compilation of Federal Laws, supra, pp. 293-297.

²⁶⁹ 43 U.S.C. sec. 615 i, 70 Stat. 1059.

²⁷⁰ 43 U.S.C. sec. 616tttt (c), 84 Stat. 409.

²⁷¹ Act of August 12, 1955, P.L. 84-386, sec. 2, 69 Stat. 719. (Trinity River Division, Central Valley Project, California).

²⁷² 43 U.S.C. sec. 614c, 70 Stat. 777. (Washoe Project, Nevada-California).

²⁷³ Act of October 9, 1962, P.L. 87-762, sec. 3, 76 Stat. 761. (Orville-Tonasket Unit, Chief Joseph Dam, Washington).

²⁷⁴ Act of May 11, 1938, sec. 1, 52 Stat. 345, as amended 16 U.S.C. 755-760L.

²⁷⁵ 16 U.S.C. sec. 756.

²⁷⁶ 16 U.S.C. sec. 757b.

²⁷⁷ 16 U.S.C. sec. 662(a).

²⁷⁸ 16 U.S.C. sec. 662(b).

²⁷⁹ 16 U.S.C. sec. 662(d).

²⁸⁰ Act of June 10, 1920, P.L. 66-280, 41 Stat. 1063; P.L. 74-333, 49 Stat. 803, 16 U.S.C.A. 791a, et seq.

²⁸¹ 16 U.S.C. sec. 811. Also see: A Compilation of Federal Laws, supra, p. 283.

- 282^{48 Stat. 58, 16 U. S. C. A. 831-831dd.}
- 283^{16 U. S. C. A. 831y-1.}
- 284^{A Summary - Digest of Federal Water Laws and Programs,}
supra, p. 193.
- 285^{1 ERC 1085, 354 F.2d 608, 609 (2d Cir. 1965).}
- 286^{1 ERC 1087.}
- 287^{1 ERC 1095.}
- 288^{Ibid.}
- 289^{1 ERC 1095-1096.}
- 290^{1 ERC 1096.}
- 291^{3 ERC 1241, U. S. Court of Appeals, (2d Cir. 1971).}
- 292^{3 ERC 1241-1242.}
- 293<sup>3 ERC 1245. Petition for writ of certiorari to U. S. Court
of Appeals for 2d Circuit denied, U. S. Supreme Court, No. 71-1219,
June 19, 1972; 4 ERC 1750.</sup>
- 294^{U. S. Sup. Court, June 5, 1967. 1 ERC 1069.}
- 295<sup>1 ERC 1072, the court citing H. R. Rep. No. 1007, 89th
Cong., 1st Sess.; S. Rep. No. 860, 89th Cong., 1st Sess.; Ana-
dromous Fish, Hearings before the Subcommittee on Fisheries and
Wildlife Conservation of the House Committee on Merchant Marine
and Fisheries, 88th Cong., 2d Sess.</sup>
- 296<sup>Act of October 30, 1965, 79 Stat. 1125, 16 U. S. C. Secs.
757a-757f (1964 ed., Supp. II). Also see: A Compilation of Federal
Laws, supra, pp. 196-198.</sup>
- 297^{16 U. S. C. sec. 757b.}
- 298^{1 ERC 1073. Also see 31 F. P. C. at 261.}
- 299^{Ibid.}

³⁰⁰ Ibid. Citing: Collins and Elling, Summary of Progress in Fish-Passage Research 1964, p. 2, in Vol. 1, Fish-Passage Research Program, Review of Progress (U.S. Bureau of Commercial Fisheries 1964).

³⁰¹ 1 ERC 1074. Also see: 31 F.P.C. at 262.

³⁰² Ibid.

³⁰³ 1 ER 1077.

³⁰⁴ National Environmental Protection Act, P.L. 90-190, 83 Stat. 852, 42 U.S.C. 4321, 1970.

³⁰⁵ See: Yarrington, Hugh J. "The National Environmental Policy Act," Environmental Reporter Monograph No. 17, Vol. 4, No. 36, January 4, 1974, Bureau of National Affairs, Inc. Wash., D.C.; Anderson, Frederick R, NEPA in the Courts, Resources for the Future, Inc. 1755 Mass. Ave. NW, Wash., D.C. 20036 (1973).

³⁰⁶ Calvert Cliffs' Coordinating Committee, Inc. v. U.S. Atomic Energy Commission, No. 24839, D.C. Cir., July 23, 1971.

³⁰⁷ Ibid.

³⁰⁸ 115 Congressional Record (Part 29) at 39703.

³⁰⁹ Council on Environmental Quality Guidelines, 36 Federal Register, 7724-7729, April 23, 1971.

³¹⁰ Zabel v. Tabb, 296 F. Supp. 764, (M.D. Fla. 1969) appealed in 5th Cir. 1970, July 16, 1970.

³¹¹ EDF v. Corps of Engineers (Gillham Dam), 2 ERC 1260, at 1267. February 19, 1971.

³¹² Sierra Club v. Froehlke, 5 ERC 1033 at 1067. February 16, 1973.

³¹³ EDF v. Corps of Engineers (Gillham Dam), 2 ERC 1260 at 1267.

³¹⁴ Sierra Club v. Froehlke, 5 ERC 1033 at 1095.

³¹⁵ Texas Committee on Natural Resources v. U.S., F. Supp. (W.D. Texas 1970), February 5, 1970.

³¹⁶ Pennsylvania Environmental Council v. Bartlett, F. Supp.
M.S. Pa. 1970.

³¹⁷ Calvert Cliffs' Coordinating Committee v. U.S. Atomic
Energy Commission, 2 ERC 1779.

³¹⁸ EDF v. TVA, 4 ERC 1850, December 13, 1972.

³¹⁹ EDF v. Corps of Engineers (Gillham Dam), 4 ERC 1721,
1725.

CHAPTER VII

ADMINISTRATIVE LAWS AND PROCEDURES

Administrative agencies, the arms of the national and state executive branches, have proliferated in the field of environmental resources in an effort to implement the policies and laws enacted by legislative bodies and to carry out the requirements to establish sanctioned standards and criteria in select fields. These agencies, in pursuing their functions, are engaged in an administrative process that includes policy formulation, regulation, licensing, rule-making, planning, fact-finding and investigations, negotiations and quasi-judicial decision making. It is beyond the scope of this report to discuss these features of the administrative process.¹ However, our research has identified three areas of significance to environmental quality in the myriad of laws and procedures applied by the "fourth branch of government." These three are: memorandums of understanding between agencies; highway action plans; and the public intervenor statute. Each will be discussed for its relevance to environmental protection and particularly fish and wildlife.

1. Memorandums of Understanding

Various state agencies have developed memorandums of understanding in an attempt to preserve and protect fish and wildlife

resources. The memorandums may be viewed as "gentlemen's agreements," that is, they establish the policies and procedures to be adopted by the agencies entering into the agreement. For the most part, the memorandums we examined have been established between highway departments, and fish and game agencies. These agreements may coexist with specific legislation to protect the fish and wildlife habitats, or they may have been implemented due to the absence of specific legislation to protect the water environment.

Some of the states have adopted the memorandums on a broad basis. Under this situation, the memorandums cover generally the duties and responsibilities of the involved agencies. In other cases, the memorandums are established to cover the duties and responsibilities of the agencies for specific projects or developments.

Memorandums of understanding do not appear to have been published in a form so as to receive wide public circulation. They may, however, be obtained by writing to the parties covered by the memorandum. This requires knowledge of the existence of the memorandum, as well as the parties involved.

What follows is a review of the memorandums of selected states. It should give an indication as to the type of memorandums enacted, the parties involved, and specific features of the reviewed memorandums. The states to be reviewed are: Arizona, California, Connecticut, Minnesota, Montana and New Jersey.

Arizona

Effective December 31, 1963, the Arizona Highway Department and the Arizona Game and Fish Department entered into a memorandum of understanding. This memorandum was generally concerned with the construction of highways and the management of wildlife resources.

The memorandum points out that "the construction of highways can, with coordinated planning and consideration, avoid or reduce damage to wildlife resources and their habitat which may be caused by siltation, pollution, erosion, uncontrolled gravel extraction, formation of barriers to game and fish migrations, and other causes." The desire of both of the departments was to "cooperate to the end that the State's highway program progresses, but without damage, or with a minimum of damage or loss, to the wildlife resources." The memorandum stresses the need for closer cooperation between the staffs of the two departments during the planning stages of highway development.

The agencies involved agreed to notify each other in those cases where construction projects might affect wildlife resources, stream flows or highway facilities. Each agency may comment on proposals made by the other agencies. The Arizona Game and Fish Department is allowed to review proposed State highway projects and to furnish opinions on wildlife populations and problems associated with the

design and construction. If the existing fish and game resources will be adversely affected, the "Game and Fish Department will prepare and the Highway Department will consider reasonable modifications" to protect these resources.

The memorandum specifies that measures and facilities that will improve or enhance the wildlife resources may be included in the planning and construction of highway projects. The measures and facilities are allowed if they will not delay advertisement of projects, impair or interfere with the basic purpose of the highway, and if the costs are borne by sources other than State Highway funds.

All decisions, concerning proposals for correction or modification of highway facilities, must be made by the Highway Commission. Furthermore, proposals must be made with respect to a "desirable end result rather than the means of accomplishing that result."

California

Effective January 19, 1962 the California Department of Public Works and the California Department of Fish and Game entered into a memorandum of understanding. This memorandum was to aid in minimizing the destruction to fish and wildlife habitat caused by highway construction. The memorandum is very similar to the one previously discussed for Arizona. It differs in one respect, in that it stresses protection of the fish habitat to a higher degree.

As was the case in Arizona, the memorandum calls for the establishment of a system whereby proposed highway projects in pre-determined areas will be reviewed for possible effects on fish and wildlife resources. A system will also be established whereby the Fish and Game Department will notify the Department of Public Works of any developments which might affect stream flows or highway facilities.

The memorandum stresses the need for close liaison between the two departments. This liaison is intended to include the exchange of information on methods and results of experiments for the protection of fish and game resources.

The Department of Fish and Game is to propose and the Department of Public Works will consider reasonable modifications in proposed highway projects to protect the fish and wildlife resources. The Special Provisions of the Department of Public Works may be worded so as to call attention to the necessity of complying with certain provisions of the Fish and Game Code.

The California memorandum differs from the Arizona memorandum in that provisions are made for the review of previously constructed projects. The memorandum states that:

The Department of Fish and Game may call to the attention of the Department of Public Works instances of highway construction undertaken by the Department of Public Works prior to the execution of this agreement that have resulted in damage to fish and game populations. The Department of Public Works will investigate all such instances and consult with the Department of Fish and Game relative to

ways to remedy the damage and means to finance corrective measures, if correction is warranted.

As in Arizona, specific allowances are made for emergency highway construction work that might adversely affect the fish and game resources. Proposals for correction or modification of highway facilities to protect the fish and game resources must be approved by the Department of Public Works.

On March 10th of 1969, the California Department of Fish and Game, Department of Water Resources, U.S. Bureau of Reclamation and the U.S. Bureau of Sport Fisheries and Wildlife entered into a memorandum of understanding. This memorandum deals with "Interim Measures to Protect Fish in the Sacramento - San Joaquin River Delta Prior to the Construction of the Peripheral Canal."

The objectives of the memorandum were four-fold. They are as follows:

- I. Improve fish salvage operation at the Tracy Pumping Plant of the Bureau of Reclamation.
- II. Maintain remnant salmon stocks in the San Joaquin River tributaries.
- III. Minimize detrimental effects of flow reversal and low levels of dissolved oxygen on salmon runs of the San Joaquin River.
- IV. Protect striped bass eggs and larvae and provide a water quality suitable for bass migration and spawning.

The memorandum notes the action that has been taken in the past and that to be implemented in the future. Each of the agencies involved

was assigned specific responsibilities in accomplishing the above objectives.

Connecticut

The Connecticut Highway Department, and the Board of Fisheries and Game of the Connecticut Department of Agriculture and Natural Resources entered into a memorandum of understanding on December 13, 1963. The memorandum expresses the need for increased coordination between the two agencies.

Under the memorandum each agency agreed to perform certain actions. The Highway Department agreed to:

- 1) Transmit all highway proposals to the Board of Fisheries and Game for their review and study.
- 2) Notify the Board of Fisheries and Game of all public hearings relating to highway projects.
- 3) Coordinate and cooperate with the Board during the planning, location, design and construction of projects of interest to the Board.
- 4) Review any and all of the Board's recommendations and "work toward a mutually acceptable plan of action and solution."

The Board of Fisheries and Game agreed to comply with the following actions. 1) Promptly review all proposals submitted by the Highway Department. 2) Notify the Department as to whether or not

the proposed project will affect fish and wildlife. If it will, then make recommendations for the elimination of the objectionable condition. The memorandum concludes with re-emphasizing the need for continued cooperation and coordination.

Minnesota

The stated purpose of the Minnesota memorandum of understanding is to "establish a regular procedure on all highway construction projects to give due consideration to the needs of fish and wildlife resources and their natural habitat, and also to public recreational resources. . . ." The memorandum was enacted in March of 1971 between the Highway Department and the Department of Natural Resources of the State of Minnesota. The two agencies agreed "to do everything possible to avoid or reduce harmful effects of any of these resources (lands, minerals, waters, forests, wildlife and recreation) resulting from highway construction."

As we have noted with previous states, the two Minnesota agencies agreed to transfer information relating to their respective projects. The overall purpose of the memorandum is to establish and maintain a close liaison between the two departments.

The Minnesota memorandum is broken down into three main sections: program, location, and design. Under the program section, the Highway Department agreed to furnish copies of all current highway construction programs for regular and Interstate truck routes,

and County and Municipal Federal-Aid Secondary road projects. The Department of Natural Resources agreed to review these programs within a reasonable time to determine their impact on fish, wildlife, public recreational and other natural resources.

During the highway location or reconstruction phase the Road Design Engineer will submit to the Department of Natural Resources information concerning possible effects upon fish, wildlife, public recreational, and other natural resources. The Department of Natural Resources will be informed of the date, time and place of the Location Public Hearing. The Department will provide written comments to the Highway Department Design Engineer describing the impact upon the fish, wildlife, public recreational and other natural resources.

The Department of Natural Resources may make suggestions on preliminary plans to minimize the harm to, or to enhance, the fish, wildlife and other natural environments. These comments may be used at the Public Hearing and are to be considered in the Design Study Report.

With respect to Federal-Aid highway projects, certain information must be submitted prior to receiving federal approval. The memorandum set out five specific items that are required. These are as follows:

- (1) A permit from the Department of Natural Resources in those situations in which a permit is required pursuant to Minnesota Statutes, Chapter 105.
- (2) A statement by the Department of Natural Resources setting forth views as to the significance of the area in question and the effects of the Highway Department proposal.
- (3) A description of the measures planned as project expenditures to minimize the effect of the proposed construction on fish, wildlife, public recreational, and other natural resources.
- (4) A description of any measures proposed by the State Department of Natural Resources to accomplish this purpose which differ from those proposed by the State Highway Department.
- (5) To the extent that measures proposed by the State Highway Department and the State Department of Natural Resources differ, an explanation of the factors considered by the State Highway Department in arriving at its decision.

The Minnesota memorandum differs from the Arizona and California memorandums in at least one aspect. In Minnesota the Department of Natural Resources may offer proposals for desirable end results, as well as, specific plan recommendations wherever possible.

Montana

On the 13th day of January, 1970, the Montana State Highway Commission and the Montana State Fish and Game Commission entered into a memorandum of understanding. This memorandum is concerned with "establishing a procedure by which such isolated or remainder lands may be acquired and made available to the use and occupancy by the Fish and Game Commission."

Isolated or remainder lands are those that result during the acquisition of highway rights-of-way. In many cases, they are severed from other lands and as a result their value is depreciated. Under present law, the Highway Commission is authorized to acquire these remainders or isolated parcels.

The "remainder lands" referred to in the memorandum are only those lands which are appurtenant to highway projects where the Highway Commission has taken fee simple title to the lands. It does not apply to lands acquired by condemnation, unless otherwise specifically agreed to by the two agencies.

The Fish and Game Commission will inspect preliminary highway plans, route designations, or surveys prior to negotiations to acquire highway lands. Concerning those lands considered isolated or so depreciated by acquisition of other lands as to necessitate their acquisition, the following procedures were established.

The Director of Fish and Game is to notify the Highway Preliminary Engineering Department of the remainder tracts that are of interest to the Fish and Game Commission. The Right of Way Division will then be notified as to these tracts of remainder land. As soon as appraisals have been approved, the Fish and Game Commission will be notified as to the estimated cost of the remainder land.

If the Fish and Game Commission is interested in the location and price, it will notify the Highway Right of Way Division to acquire the lands. These lands, when possible, will be acquired at the depreciated value. If the lands are acquired, a perpetual easement of the remainder tracts involved will be granted to Fish and Game. The Fish and Game Commission will compensate the Highway Commission at the designated or depreciated value.

This memorandum does not apply to any water or mineral rights. If these rights are to be acquired, they are to be subject to a separate memorandum.

New Jersey

In 1963, the New Jersey State Highway Commissioner and the Commissioner of the New Jersey Department of Conservation and Economic Development entered into a memorandum of understanding. Both parties recognized that "fish, game and wildlife are natural resources belonging to all the people of the country and the preservation of their habitation must be taken into consideration" during the

planning, designing and construction of Federal-Aid Highway Projects and projects for secondary roads.

To preserve and protect these resources, the State Highway Department agrees to submit to the Department of Conservation and Economic Development, "at early dates, " programs of proposed Federal-Aid and secondary road projects undertaken pursuant to Section 117 of Title 23, United States Code. The Department of Conservation and Economic Development will, at its earliest possible convenience, indicate those projects involving the preservation of fish, game and wildlife in which it is interested. The Highway Department will keep the Department of Conservation informed as to the times and places of public hearings.

The two agencies agreed to adopt such methods as may "afford each department full opportunity to study and make recommendations to each other concerning projects in which it is interested . . ." This will be done prior to the submission of proposed projects to the federal highway officials, and prior to determinations made by the Department of Conservation and Economic Development concerning projects which may in any way affect present or future state highways.

2. Highway Action Plans

Section 109(h), Title 23, United State Code, as contained in Section 136(b) of the Federal-Aid Highway Act of 1970, Public Law 91-605, was designed to insure that each and every state would fully

consider the environmental impact of proposed highway projects. To accomplish this, the Secretary of Transportation was directed to issue guidelines designed to assure that factors of social, economic and environmental significance are fully considered in highway related programs. As a result, the Federal Highway Administration (FHWA) issued Policy and Procedure Memorandum 90-4. This Memorandum required that each state highway agency develop an Action Plan "which describes the organization to be utilized and the processes to be followed in the development of Federal-aid highway projects from initial system planning through design."

The Memorandum specifies that involvement of public and local, state and federal officials and agencies should be sought in developing the Action Plan. The plan must be submitted to the Governor of the State for review and approval. The Federal Highway Administration must also give its approval. Action Plans were to be submitted to the FHWA no later than June 15, 1973. Furthermore, the FHWA indicates in the memorandum, that it will not give location approval on projects after November 1, 1973, unless the state Action Plan has been approved.

PPM 90-4 sets forth ten topics that are to be covered in the Action Plan. These topics are as follows:

- (1) Identification of social, economic, and environmental effects.
- (2) Consideration of alternative courses of action.

- (3) Involvement of other agencies and the public.
- (4) Systematic interdisciplinary approach.
- (5) Decision making process.
- (6) Interrelation of system and project decisions.
- (7) Levels of action by project category.
- (8) Responsibility for implementation.
- (9) Fiscal and other resources.
- (10) Consistency with existing laws and directives.

It should be noted that Section 6(b) of PPM 90-4 specifically requires the Action Plan be consistent with the requirements of previous memorandums and directives. Thus, PPM 90-4 does not supersede any of the previous regulations or add any additional requirements not already imposed.

The purpose of this section is to review selected state Action Plans concerning measures adopted to protect and preserve the fish and wildlife habitat and the recreational and esthetic resources of the selected states. As of January 31, 1974, all of the Action Plans have not received final approval from the FHWA. Therefore, some of the Action Plans reviewed are still in draft form and subject to revision. We were unable to obtain a copy of each state Action Plan due, in some cases, to revisions being made. The following is a review of the Action Plans of the States of Maryland, Montana, Nebraska, New Mexico, and North Carolina.

Maryland

The Maryland Department of Transportation was created by Chapter 526, Act of 1971. The objectives of the Department are to plan, develop and implement transportation programs for all modes of transportation. The head of the Department is the Secretary of Transportation, who is appointed by the Governor with the consent of the Senate.

The Maryland Action Plan was developed to comply with specific federal highway legislation and to be applied to all transportation planning conducted by the Maryland Department of Transportation.² The Plan points out that "socio-economic and environmental analysis will be initiated at the earliest stage of systems planning and carried through to the project completion."³ Planning and Development is responsible for formulating planning and management strategies which reflect integration of all forms of transportation with social, economic and environmental impacts.

The Action Plan points out that the Department of Transportation must obtain certain permits and/or licenses from the Maryland Water Resources Administration prior to altering or operating in state waters. These include: (1) a Channel and/or Flood Plain Modification Permit for any dredging, filling, or development within channels or flood plains;⁴ Waterway Obstruction Permits;⁵ and Wetlands Modification Permits.⁶ The Water Resources Administration and the

Department of Natural Resources are to be involved in transportation projects affecting water resources, beginning with the system planning stage.

With respect to the impact of highway construction upon fish and wildlife resources, the Plan points out that

Major transportation impacts on fish and wildlife sometimes relate to blockage of streams by structures which prevent fish passage (especially harmful to anadromous fish), water quality impacts (runoff, sedimentation, erosion), reduction of natural bottom conditions sometimes as a result of drainage channels, with resulting losses in fish breeding and propagation areas. Wildlife impacts sometimes consist of cutting off wildlife corridors and sources of food supply and mortality related to transportation related accidents.⁷

The Plan notes that some of these problems may be resolved by design alterations. Recommendations are made for the placement of personnel trained in stream and wildlife biology in the State Highway Administration. Furthermore, greater contact is recommended between the State Highway Administration and the Department of Natural Resources as one method of improving fish and wildlife input into the planning process.⁸

Montana

The Department of Highways, headed by the Director of Highways, was created by the Executive Reorganization Act of 1971. The Director is appointed by the Governor with confirmation required by the Senate. The Montana Highway Commission established highway

policy and the Director executes the policy. The policy of the Department of Highways is to:

- (1) Consider economic, social and environmental factors in the planning and design of highway projects.
- (2) Ensure that economic, social and environmental factors are incorporated in the decision making process utilizing a systematic, interdisciplinary approach.
- (3) Take into consideration the need for fast, safe and efficient transportation, public services, and the costs of eliminating or minimizing possible adverse economic, social and environmental effects in highway planning and design.
- (4) View the action plan concept as a positive force which provides the Department the opportunity to better organize and expand its efforts in effective highway planning and design.⁹

The Action Plan developed by Montana is applicable to all Federal Aid projects and other projects which, in the Department's opinion have economic, social and/or environmental impacts which justify planning and design decisions conforming with those highway planning and design procedures.¹⁰ The basic purpose of the plan is to implement highway planning and design in a manner cognizant of and responsive to the economic, social and environmental effects of proposals and projects.¹¹

To better identify and analyze the economic, social and environmental factors resulting from decisions made by the Department of Highways, an impact evaluation organization was established. This organization would serve in a check-and-balance position...as an outsider, to assist the Department in its evaluations.

Briefly, the impact evaluation organization includes an Impact Evaluation Unit, an Impact Evaluation Team, an Impact Evaluation Group and an Impact Evaluation Coordinator. The Impact Evaluation Unit is a permanent group of staff specialists within the Department of Highways. Members include an environmental specialist, an economist, a land use planner, a sociologist, a noise specialist, a water quality specialist, an air quality specialist, and a geologist.¹²

The Impact Evaluation Team is an ad hoc unit of specialists gathered from other agencies, consultants, universities and the Department to study a particular proposal or project.¹³ The team is to serve as a major source of detailed economic, social and environmental input into the planning system.

The Impact Evaluation Group is a permanent interagency body formed to identify and examine economic, social and environmental effects of highway projects. It is made up, in part, by representatives from the Department of Fish and Game, Environmental Quality Council, Department of Natural Resources and Conservation, and the Federal Highway Administration. The Group meets on a regular basis to discuss certain projects or plans.

The Impact Evaluation Coordinator directs the overall impact evaluation organization. The Coordinator reports directly to the Administrator - Engineering Division.¹⁴

A unique feature established in the Action Plan is the development of an Impact Evaluation Notebook. This contains the information

on data collected, studies, consideration, participants, decisions, etc., for each highway proposal or project.

The Plan also established an impact evaluation factors checklist.¹⁵ Those factors to be considered include: (1) Community and regional growth; (2) Conservation and preservation; (3) Public facilities and services; (4) Community cohesion; (5) Displacement of people, businesses and farms; (6) Air, noise, and water pollution; and (7) Esthetics and other values.

The Department of Highway Planning and Design Procedures is structured in a manner to allow agencies and governmental officials indirect influence in the Department's decisions.¹⁶ Direct influence into the decision making process is provided to the Fish and Game Department via the Stream Preservation Law and municipal governments via the Montana By-Pass Law.

Nebraska

The Nebraska Action Plan was prepared by the Nebraska Department of Roads and approved by the Federal Highway Administration on June 13, 1973. The Plan was the result of efforts by a Task Force and three Advisory Groups. Those groups are a Departmental Advisory Group, an Inter-Agency Advisory Group and a Citizens Advisory Group.¹⁷ The Action Plan was written to facilitate increased public participation in highway matters and to insure full

consideration is provided to the possible economic, social and environmental effects of highway programs.

Identification of the economic, social, environmental and engineering effects of proposed projects is the responsibility of the Project Development Division of the Department of Roads. The Division is also responsible for the preparation of certain preliminary studies concerning the economic, social, and environmental impact of projects.

The Plan sets forth 29 specific areas to be studied. For each of the study areas consideration must be given to the immediate and long-range effects of the proposed project. The degree of study required in each study area is indicated by the use of Roman numerals I, II, III or IV. Extensive study is required for each phase if classified as "I", while a "IV" means little or no study required in that area.

For the purpose of our project, the following study areas are most relevant: (1) Fish and Wildlife; (2) Channel work; (3) Conservation lands and unique natural areas; (4) Recreational Areas and 4(f) lands and (5) Esthetics. These five areas are explained in the Action Plan, as follows.

Fish and Wildlife¹⁸

This assessment will be made in conjunction with the Nebraska Game and Parks Commission. Their reference material will be used for initial assessment, and the level of the study will be determined by joint consideration.

- I. Disruption of a significant amount of fish or wild-life, or disturbance of an existing ecosystem, as on a large channel change, or interference with a unique or endangered species either by noise, air or water pollution or by the interference with the breeding or nesting areas.
- II. Minimal interference such as normal right of way taking along an existing roadway where no unusual or significant wildlife area was taken.
- III. Little or no interference, as in disturbance of the existing grassed area in a project where all rebuilding was within the existing right of way.
- IV. No interference.

Channel Work¹⁹

- I. Extensive channel changes may be required due to hydraulic considerations or possible road relocation. Possible upsetting of ecological balance of ecosystems along the river area that require study of environmental considerations. Could involve extensive widening of channel which might also involve extensive ecosystem upsetting. Consideration to be given to possible alternatives to channel change or to mitigating the ecological damage if channel changes are required.
- II. Minor changes may be required on streams where no significant effect on the ecological balance is expected although the study will be conducted on the possible effects. This discussion would be in the negative statement if no significant effects are discovered.
- III. Minor cleanout basically on right of way or minor revision beyond right of way on drainageways that do not carry running water and have no fishing potential at all.
- IV. No channel changes, and any stream or drainage-way revisions limited to cleanout only within the right of way.

Conservation Lands and Unique Natural Areas²⁰

These would be termed as public and private set aside lands devoted to conservation practices such as wet lands for waterfowl, unique natural or biological

areas, game refuges where no hunting is permitted and other set aside lands.

- I. Actual disruption of unique natural area or land areas where conservation practices are active shall be considered. Assessment is to be made of noise, air and water pollution where these areas are near a highway.
- II. Study to assure no adverse effect and no area taken that would disrupt any existing practice or condition.
- III. Facility alongside study to insure no adverse effect or right of way required.
- IV. No such area involved.

Recreational Areas and 4(f) Lands²¹

This would involve studies on public and private recreational areas classified as 4(f) as well as those not meeting 4(f) criteria. 4(f) lands are defined as follows: any public owned parks, recreation areas, historic sites or wildlife or waterfowl refuges of national, state or local significance as determined by federal, state or local officials having jurisdiction over such lands.

Recreational areas not normally meeting 4(f) requirements include private recreational areas such as golf courses, beaches, race tracks or other outdoor recreational areas. Normally admission is charged or fees are required to participate in the recreational activity.

- I. Any right of way involvement or significant effect on the facility from noise pollution or exhaust emission or by a significant change in the location or type of access to the facility. Study to include those alternative measures to provide for minimizing effects if 4(f) or private recreational areas are included in the project.
- II. A study to determine if the proximity (no right of way required) would have detrimental effect on the facility. No 4(f) procedures would be followed if no detrimental effects are found and the study report would be available for examination.
- III. No 4(f) or private recreation areas in the vicinity of the project.

Aesthetics in this usage would refer to the compatibility or acceptability of the proposed highway design with the surrounding area. This could involve the determination of landscaping requirements, the type of structural treatment as in the case of an urban elevated expressway, or highways in or near important recreational areas and could refer to possible joint use concepts and the involvement of additional right of way. The possibility of scenic easements to preserve outstanding views or to preserve areas in their natural state adjacent to the right of way or to preserve the existing environment around constructed rest areas would also be a consideration of aesthetics.

- I. A study of aesthetic requirements of major urban projects, especially where joint use was contemplated or desirable, and major recreational areas both in or adjacent to these areas. Treatment compatible with the historic character of the area, or other special considerations requiring landscaping and/or aesthetic measures not normally associated with highway construction.
- II. The treatment of major projects where aesthetics are normally accomplished as part of the location of rest areas and the aesthetic treatment of such.
- III. The normal landscaping activities with construction projects such as grass plantings and minor tree plantings, but no major landscaping involved.
- IV. No requirements.

In order to accomplish the goals of the Action Plan, an Interdisciplinary Unit was created within the Project Development Division. This Unit originally included an ecologist, economist, noise engineer, geologist, and sociologist.²³ The Unit, in part, is required to make certain studies necessary to determine the degree of involvement of the project or system with ecology.

New Mexico

The New Mexico Action Plan, prepared by the New Mexico State Highway Department, recognizes that highway construction will influence the economic, social, and natural environment in many areas.

Within the planning process the following factors are to be considered:²⁴

1. Noise
2. Air quality
3. Water quality
4. Biological factors
5. Resource conservation
6. Transportation and safety
7. Aesthetics and visual factors
10. Land use
11. Historic and cultural factors
12. Engineering

When highways are being planned, the Game and Fish Department is required to provide the Highway Department with certain information and assistance. This information and assistance would:²⁵

- (1) Provide fish and wildlife inventory data.
- (2) Inform the Highway Department of planned development.
- (3) Advise and assist in the analysis of potential economic, social, and environmental impacts on fish and wildlife of proposed Highway Programs Projects.
- (4) Provide recommendations on means of minimizing adverse effects determined in 3 above.
- (5) Review and comment on Environmental Impact Statements.

Within the Design Division of the Highway Department is located an Environmental Unit. During the alignment and preliminary design stages, the Unit determines those agencies or members of the public that have an interest in the project. The Unit may call a public meeting to develop final resolutions on the project.²⁶ During the system planning and location planning stages the Unit, among other things, interprets data on the project, and coordinates with other sections, agencies or the public to assure that an interdisciplinary approach is being taken.

North Carolina

The transportation policy of the Division of Highways recognizes that social, economic, and environmental factors must be considered in transportation planning. Furthermore, highway facilities are recognized as having a profound impact upon the general quality of life.²⁷

The Action Plan developed by North Carolina, as in the other states, is intended to comply with specific state and federal laws. The policy of the Division of Highways however, is to "extend the intent of the North Carolina Action Plan to the planning and design of major non-federal-aid highway projects..."²⁸

The Action Plan states that "the North Carolina Division of Highways has for many years employed the use of the natural and social sciences in decision making, and has effectively used the

environmental design arts in highway planning and design."²⁹ To further meet the requirements of developing projects on a "systematic interdisciplinary approach," the Division has made several organizational and staffing changes. In-part, an in-house environmental planning section was established, and use is to be made of personnel from other local, state, and federal agencies and consultants in developing projects.

The environmental planning section provides the "basic capability for handling social, economic and environmental effects."³⁰ The responsibilities of the section are as follows:

- (1) the early and continuous identification of the social, economic and environmental effects related to the highway program;
- (2) involvement of the public and other agencies; and
- (3) providing information, advice and evaluation of proposals to the entire Division of Highways.³¹

The Plan identifies four disciplines that are initially represented within the section. These are: (1) The Head of the Section: having a Civil Engineering background; (2) a Community Values Specialist; (3) a Biologist and (4) persons trained in Air and Noise Analysis.³²

The planning of projects will also rely on other state agencies. One of these is the Department of Natural and Economic Resources.

Inputs will be obtained from this department's Office of Fisheries and Wildlife Resources, Office of Earth Resources, and others.

The North Carolina Plan does not make specific mention of the impact of highways on fish and wildlife resources. However, protection would be afforded under the general guidelines for identifying adverse environmental impacts.

Numerous questions have been raised, and will continue to be raised over the Action Plans. Many of the comments and suggestions made by individuals have been incorporated into the Plans. These include suggestions to: better define or define terms used in the Plans; expand the review procedures to small projects; improve the public involvement operations; insure other-agency involvement, and many more suggestions.

These general features of all the Action Plans are considered desirable.

First, the Plans specifically set forth the channels open to the public in making their views known on highway projects. Prior to the Plans, the public found it difficult to know exactly what inputs could be made and when these inputs were allowed.

Secondly, the state highway departments have now made public the means and methods to be employed in considering social, economic and environmental impacts of highways. Prior to the Plans, highway departments may have taken these impacts into account, but

the procedures were known only to the highway related agencies and certain interested parties.

Thirdly, the Action Plans act as a source of information concerning state highway operations and laws as well as federal regulations. Most of the Action Plans reviewed have substantial appendices which contain state and federal laws, regulations and directives.

Most of the Action Plans are not specific concerning the impact of highways on fish and wildlife habitat, although the previous examples have cited cases of specific recognition. In the other cases, fish and wildlife will be recognized in the general planning process, though not specifically mentioned.

Insufficient time has elapsed to determine how effective the plans will be in protecting the environment in general and fish and wildlife habitat in particular. No doubt, as the plans are implemented, certain changes will be required.

3. Public Intervenor -- the Citizen's Spokesman

The majority of this report has concentrated upon the laws and selected procedural aspects affecting the interrelationship between man, water, fish and wildlife and the quality of our environment. Focus has been almost entirely upon the extent of legislative and judicial involvement in specific problem areas created by the use of water and the impact of such use upon aquatic life and habitat. We have also considered private property rights created by the state

water laws, but not directly the nature and enforcement of public rights. Under our system of law individuals may pursue enforcement or protection of private rights created under the laws in the courts. Where an administrative agency is involved, individuals may intervene in the administrative process to protect their private rights. Almost invariably, a right to judicial review is provided from an adverse administrative decision.

The problem arises with respect to protection and enforcement of public rights and to the preservation of an acceptable environmental quality. The public interest is pursued in the courts by district attorneys and attorneys-general for criminal wrongs and in certain cases where the public health, welfare and interest is endangered. Individuals or organizations may also bring actions. Either or both common law or statutory remedies may be employed by groups representing the public interest or the official designated with the authority and responsibility over specific areas. But normally the public lacks representation before administrative agency hearings which may significantly affect the public's rights.

Wisconsin, a state with a tradition of concern for the public interest in the quality of the environment and ecosystems,³³ recognized during the 1966-67 reorganization of the present Department of Natural Resources the need for some means of representing the public's interest within the Department's decision making process. The 1966 Water Resources Act was designed to organize into one single

state agency, "a comprehensive program for the enhancement of the quality management and protection of all waters of the state, ground and surface, public and private."³⁴ A new water resources division entitled the Department of Resources Development was created, abolishing the Committee on Water Pollution and transferring its functions and many of the water-related regulatory functions of the Public Service Commission and State Board of Health to the new Department. In 1967, there occurred further reorganization which centralized almost all of the water resources activities into the new Department of Natural Resources and abolished the old Department of Resources Development and Department of Conservation.³⁵

The premises for independent public representation before the Department's hearings on planned activities and actions comes from the legislative policy and purpose directives of the Department. The following excerpts from section 144.025, Chapter 144, Wisconsin Laws, 1967, set forth the main theme adopted by the State toward natural resources and the public interest:

144.025 DEPARTMENT OF NATURAL
RESOURCES-WATER RESOURCES

(1) Statement of Policy and purpose. The department of natural resources shall serve as the central unit of state government to protect, maintain and improve the quality and management of the waters of the state, ground and surface, public and private. Continued pollution of the waters of the state has aroused widespread public concern. It endangers public health and threatens the general welfare....the purpose of this act is to grant necessary powers and to organize a comprehensive program under a

single protection of all waters of the state, ground and surface, public and private.... In order to achieve the policy objectives of this act, it is the express policy of the state to mobilize governmental effort and resources at all levels, state, federal and local, allocating such effort and resources to accomplish the greatest results for the people of the state.

Subsection (2)(b) of 144.025 further sets out the responsibility of the Department to adopt rules and regulations

setting standards of water quality to be applicable to the waters of the state, recognizing that different standards may be required for different waters of portions thereof. Such standards of quality shall be such as to protect the public interest, which include the protection of the public health and welfare and the present and prospective future use of such waters for public and private water supplies, propagation of fish and aquatic life and wildlife, domestic and recreational purposes and agricultural, commercial, industrial and other legitimate uses. In all cases where the potential uses of water are in conflict, water quality standards shall be interpreted to protect the general public interest.

This act also illustrates the complete development of the non-structural institutional setting described in Chapter I Part B of this report.

To insure that the public interest referred to in the above sections would in fact be represented by an official outside of the Department, the position of public intervenor was established within the attorney general's office.³⁶ The public intervenor is an assistant attorney general whose sole function is to protect the public interest in matters here before the Department of Natural Resources. Without an independent representative, it would be nearly impossible and

humanly improbable for the Department to consider the public interest different than their own.

The public intervenor may formally intervene to protect the public's right in water and other natural resources in the Department's procedure: (1) when requested to do so by an administrator of a division primarily assigned departmental functions, (2) upon request of any committee of the legislature, or (3) his own initiative. The latter provision permits the public intervenor to entertain intervention stimulated by his own opinions of what the public interest is, or by request from individuals and/or groups within the state.

The powers of the public intervenor are broad and liberally defined. He can direct personnel of the Department to make investigations, studies and reports he considers necessary in connection with procedures of the Department, either before or after formal intervention. He may officially intervene in agency proceedings and present evidence, subpoenas and cross-examine witnesses, submit proof and file briefs, and in general perform any other acts granted other parties before administrative proceedings. Finally, he has the right to appeal to the courts for judicial revision of the administrative proceedings and decision.

The real importance of this statute is that it gives the public without question, the right of standing in administrative hearings.³⁷

The intervention of a public representative, a group of individuals, or

a conservation organization, is otherwise denied participation before the courts and administrative proceedings, based upon lack of standing.³⁸

There is no doubt about the uniqueness and importance of creating a public representative before administrative proceedings. No other state to our knowledge has yet enacted a similar provision. Perhaps the only drawback of this public intervenor concept is that the effectiveness of public interest representation depends upon the interest and initiative of the person holding the position, the adequacy of his staff, and the awareness of the public that such proceedings are in progress. The public intervenor, however, does stand as the public's watch dog over natural resources activities in Wisconsin and could very well be the precedent for similar legislation in other states.

ENDNOTES

¹ For an extensive treatment of administrative law see: L. L. Jaffe and N. L. Nathanson, Administrative Law: Case and Materials, 3d Ed., Little, Brown & Co., 1968.

² Action Plan, Maryland Department of Transportation, Baltimore, Maryland, June 15, 1973, p. 1-2.

³ Ibid., at p. II-7 through II-8.

⁴ Ann. Code of Maryland, Art. 96A, secs. 7, 12, 13, 65, 66, 68, 71.

⁵ Ibid., at Art. 96A, Sec. 12.

⁶ Ibid., at Art. 66C, Sec. 718, 732.

⁷ Maryland Action Plan, supra, pp. VIII-23 and 24.

⁸ Ibid., p. VIII-24.

⁹ Montana Action Plan, Department of Highways, Helena, Montana, October 15, 1973, p. 2-3.

¹⁰ Ibid., p. 3-3.

¹¹ Ibid., p. 4-3.

¹² Ibid., pp. 4-32 through 4-33.

¹³ Ibid., pp. 4-34.

¹⁴ Ibid., p. 4-36.

¹⁵ Ibid., p. 5-4.

¹⁶ Ibid., p. 6-7.

¹⁷ Action Plan, Nebraska Department of Roads, State of Nebraska, 1973, p. 3-1.

- ¹⁸ Ibid., p. 7-5.
- ¹⁹ Ibid., p. 7-3.
- ²⁰ Ibid., p. 7-4.
- ²¹ Ibid., pp. 7-10 to 7-11.
- ²² Ibid., p. 7-2.
- ²³ Ibid., p. 8-1.
- ²⁴ Action Plan (Draft), New Mexico State Highway Department, September 14, 1973, pp. I-3 through I-4.
- ²⁵ Ibid., p. IV-13.
- ²⁶ Ibid., p. II-6.
- ²⁷ North Carolina Highway Action Plan, Department of Transportation and Highway Safety, Division of Highways, November, 1973, p. 13.
- ²⁸ Ibid., p. 15.
- ²⁹ Ibid., p. 26.
- ³⁰ Ibid., p. 27.
- ³¹ Ibid.
- ³² Ibid., p. 28.
- ³³ See Muench. P.S.C., 261 Was. 492, 53 NW 2d 514 (1952) Namekagon Hydro. Co. v. F. P. C. 216 F 2d 509 (75h Ar. 1954). For a detailed analysis of Wisconsin water law as relates to public and private interests, see Ellis, H. H. et al., Water-Use Law and Administration in Wisconsin, Dept. of Law, Univ. Ext., Univ. of Wisconsin. Madison. 1970.
- ³⁴ Chapter 614, Section 1, Wisconsin Laws (1965).
- ³⁵ Chapter 75, Section 1, Wis. Laws (1967).
- ³⁶ Chapter 165, Section 165.07, Wis. Laws (1967).

³⁷Discussions with Mr. Maurice Van Susteren, Legal Counsel.
Department of Natural Resources on 22 May 1972.

³⁸See Scenic Hudson Preservation Conference v. F. P. C.,
354 F. 2d 608 (2nd Cir. 1965) and Seeings Club v. Hickel, 433 F. 2d
24 (9th Cir. 1970).

CHAPTER VIII

CONCLUSIONS AND SELECTED FEATURES FOR MODEL LEGISLATION

Water law has had and will continue to have a significant impact upon the quality of our environment and particularly upon the fish and wildlife resources that depend upon natural conditions for their propagation, sustenance, and preservation. The two basic systems of water law found among the states which direct the manner of allocation, distribution, and management of this important resource have evolved from the geo-climatic conditions and socio-economic development needs of the particular state. At the heart of both these doctrines is the water right which defines the conditions of use ownership in the holder and those rights retained by the public.

This country has a tradition of private property ownership and progressive economic development which often ignores the extra-market benefits which the public at large receives from the natural conditions of the ecosystem, the main concern being personal gain and advancement. Provisions found in the multitude of state variations of the water doctrines frequently have a disastrous or degrading effect upon the environment from a public interest point of view. Other features have a positive effect or facilitate the maintenance of an acceptable environmental quality.

In addition to the traditional water laws, we have examined other types of laws directed toward natural resources. Conservation laws and specific regulations, such as those controlling channelization and highway and dam construction, at both state and federal levels, have tended to mitigate some of the adverse effects from the operation of the water laws. Many of these conservation laws promote the maximization of recreational and esthetic values and the protection of natural conditions.

In an effort to pursue selected ecological values, e.g., protection and preservation of fish, wildlife, and aquatic habitat, it is necessary to identify the institutional barriers to implementation of goals and policies promoting these values, and the social trends which contribute to environmental assaults. This report has identified and analyzed these constraints and facilitators in terms of their interactions with the physical and social systems. A preliminary effort has also been made to determine if the constraints or impediments have themselves resulted from a breakdown or a bypass in the evolutionary process of the institutional setting.

The conclusions and recommendations that follow are the efforts of two major disciplines examining a situation in which man and his methods are having a profound effect upon selected ecological values. No effort was made to develop a complete model act for water law and its relationship to environmental quality with particular reference to fish and wildlife habitats. Rather, we have chosen to select particular

features of existing legislation that have or do provide for the protection and preservation of aquatic and terrestrial species and their habitats. Suggested changes or modifications have been made to many of these provisions, to broaden their applications. The conclusions and recommendations resulting from our study are as follows.

1. The majority of state water laws and state and federal water-related laws pertaining to the conservation and/or regulation of natural resources are insufficient and inconsistent in their operation and oftentimes result in agencies pursuing conflicting policies and developing conflicting standards and criteria. In addition, there is a significant lack of uniformity between states having the same system of water law, and between the laws of the states and the federal government. An effort should be made to coordinate state and federal legislation over resources which transcend the artificial political boundaries that our system of governments has created.

2. Three features of state water legislation are particularly significant to the protection and preservation of fish and wildlife in their natural habitats. They are: (a) the water right and who may acquire such right, (b) the concept of beneficial or reasonable use, and (c) the requirement of a diversion in order to exercise the right.

- (a) Regarding the water right, our examination of the state laws indicate that many states cannot appropriate water in the name of the state or a state agency. It is strongly recommended that states, particularly appropriation doctrine states, adopt a constitutional or

legislative provision granting the state the right to appropriate water, or to acquire the right to use of water in the name of the people of the state, for public purposes to include the maintenance of minimum flows and lake levels.

(b) Beneficial use or reasonable use usually is not clearly defined in state water legislation and are often the subject of litigation. We recommend that the concept of beneficial and/or reasonable use should be defined in broad terms for the appropriation or allocation of water as: "any use which has either economic and/or social value." This would permit allocation of water to uses having extra-market values.

For example, in 1973 Colorado amended its water laws to read:

(7) 'Beneficial use' is the use of that amount of water that is reasonable and appropriate under reasonable, efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made and, without limiting the generality of the foregoing, shall include the impoundment of water for recreational purposes, including fisheries or wildlife. For the benefit and enjoyment of present and future generations, 'beneficial use' shall also include the appropriation by the State of Colorado in the manner prescribed by law of such minimum flows between specific points or levels for and on natural streams and lakes as are required to preserve the natural environment to a reasonable degree.¹

This 1973 amendment substituted the word appropriation for the word diversion in the first sentence and added the second sentence to the definition. Clearly the definition should be broader than just the impoundment of water for recreational purposes, fish and wildlife; it should also include in-stream recreational purposes and esthetics as

well as other social extra-market uses and should permit individuals to appropriate or to allocate their appropriations for the maintenance of minimum flows and lake levels as well as for the recreational and esthetic values of natural streams and lakes.

(c) Related to beneficial use is the matter of diversion. Many appropriation doctrine states still require a diversion for the acquisition and maintenance of a water right. It is our recommendation that the diversion requirements be removed to enable not only the state to acquire water rights, as in the case of Colorado, but also private interests, for uses having extra-market values such as maintenance of minimum flow. For example, the 1973 amendment in Colorado removed the diversion requirement by redefining appropriation as "the application of a certain portion of the waters of the state to a beneficial use."² Before the amendment, appropriation was defined as "the diversion of a certain portion of the waters of the state and application of the same to a beneficial use."

3. The preference system that exists among many western appropriation doctrine states and certain eastern riparian states should be re-examined in light of the environmental and energy needs. If a preference system is to be maintained, it is recommended that three categories of users be adopted and ranked: 1) domestic, 2) public, and 3) private. Personal needs and municipal users of water would maintain the traditional, preferred position, but granting the public a preference in the number two position would enable it to

protect the extra-market values for social uses of water where it is felt these uses justify compensating the impaired private interests. In so providing, the public interest, which is at a tactical disadvantage, would be given a legal right to make its case. It would also allow a weighing of the results of the private uses of the resources and their public welfare value against the extra-market public interests. No positions of preference would exist among the private competitors for water. Rather, permits or rights would be granted according to a demonstration of benefits derived which may even be partially or totally publicly oriented.

4. Under the present system of land ownership and water law in most states individuals may prevent access to lakes and natural streams surrounded by private land, or irrigation conveyance systems and reservoirs in which the water becomes the personal property of the water right holder once it is diverted into his system and under his control. State legislation should provide incentives to owners of private water resources to stimulate the leasing of these private or privately controlled bodies of water for public use. The most significant change that could be made through legislative enactment is to remove the liability of the owner of such resources which may result from injuries or damages to members of the public from the public use. This, of course, would not include liability originating from the negligence of the owner or from intentional harm. In conjunction with the access issue, provisions could also be made for the allocation of

water in the name of the public to maintain a minimum level or permanent conservation pool in private reservoirs, since access to a dry reservoir would be meaningless. This should prevent the reservoirs from being completely drained through exercise of the rights which allowed for their initial filling. The reservoir owner could be compensated for the inconvenience and additional costs incurred.

5. Storage water rights permit only one reservoir filling per year, and thus to the right holder, all diverted water should be used in order to maximize the water right and maintain a status of beneficial use. This restriction is in sharp conflict with recreational and esthetic values, and should be eliminated.

6. The concept of a minimum flow for fish and aquatic habitat protection is highly desirable from a biological point of view and it is considered unfortunate that all states do not have such provisions. Minimum flow need not be defined in complex terms but rather there is simply a need for language to provide discretionary authority in the administrative agency which would allow and direct the agency to develop specific standards and criteria that will protect and preserve the unique features of the particular streams and lakes within the state. The law should provide the general direction, leaving the specifics to the agency according to the conditions that need to be protected.

We concur with the recommendations of the National Water Commission that a two-tiered system of minimum flows and lake

levels should be adopted. This system consists of defining those stream flows and lake levels which must be preserved under all conditions, and stream flows and lake levels which should be maintained under average conditions. Furthermore, the law should allow for both public and private appropriation of such minimum flows between specific points or levels for and on natural streams and lakes as are required to maintain and preserve the natural environment to a reasonable degree.

7. In addition to minimum flow legislation, provision should be made to permit the state water resources agency or the fish and game agency, the right to attach the most senior downstream rights for maintenance of a minimum flow in the amounts necessary for that flow. Such a provision would not permit the agency to interfere with the right to use the water by the downstream senior or prior user when he is exercising the right, but would allow the agency to exercise the senior's rights for the amount necessary during the senior's off-use periods. This right of attachment would thus operate as a non-interfering condition to a senior right.

The rationale behind this recommendation is that the agency responsible for maintaining the minimum flow should have statewide jurisdiction, as opposed to granting this right to counties, municipalities, or special districts which could acquire water for these purposes but whose scope of authority would be geographically limited.

Provisions encouraging interstate compacts in this subject would further maximize and coordinate state efforts.

8. In addition to insuring that a proper legislative base is provided for minimum flow and lake levels, there is a need to improve the methods for determining what is a sufficient minimum flow from a biological point of view. Standards and criteria, based upon stream characteristics and aquatic life and habitat, need to be more accurately developed and made available to states and interest groups. A more concerted attempt should be made on both state and federal storage projects to coordinate releases of water to optimize conditions during fish spawning periods.

9. In spite of broad state and federal environmental protection laws, there is still a need for stream preservation legislation to emphasize and legitimize the particular values in the natural conditions of meandering waterways and to serve as an additional authority to the water acts, demonstrating the public's interest and rights in this particular facet of the ecosystem. Several states have enacted commendable laws which can serve as a basis for model legislation in other states.

The states of Montana, Wisconsin, and New York illustrate examples of effective stream preservation laws. In Montana:

Any agency of state, government, county, municipality, or other subdivision of the state of Montana. . . shall not construct, modify, operate, maintain, or fail to maintain, any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or

vary the natural existing shape and form of any stream or its banks or tributaries by any type or form of construction without first causing notice of such planned construction to be served upon the Montana Fish and Game Commission. . . .³

In New York and Wisconsin, the law goes one step further by applying the law to persons. In New York the law states that no person shall "change, modify or disturb the course, channel, or bed of any stream" or to "remove any sand, gravel, or other materials from the bed of such stream or the banks thereof" without first obtaining a permit to do so.⁴ Wisconsin law requires that every person intending to enlarge, change or straighten the course of a navigable stream must first obtain a permit from the Department of Natural Resources.⁵

10. There is a need to encourage uniformity or coordination between state laws where interstate streams exist to insure that the activities in upstream states do not cause unreasonable damage or impose unreasonable external costs to the downstream state which may be implementing a protective program, and conversely, that the productive interest of an upstream state (for example, in migratory fishes) will not be destroyed without merit in the downstream reaches of an adjacent state.

11. Wetlands are important as filters and as habitat for aquatic life. Statutory protection should be enacted where such legislation does not presently exist. We concur with Mr. Heath that, when legislation is not present, two major approaches should be considered:

(a) New legislation should provide for a comprehensive estuarine study to serve as a foundation for a state-wide estuarine plan.

(b) The estuarine legislation should provide for the adoption of a permit system to regulate the dredging and filling activities in the estuarine areas.⁶

When and if these laws are considered, pitfalls associated with previous legislation should be considered.⁷ The laws should be mandatory in nature and not overly permissive. Terms and standards used in the legislation should be clearly defined, not vague or unclear. To give the agencies enforcing the legislation adequate flexibility, multiple and alternative remedies should be stressed. Once the legislation is adopted, conscientious efforts should be made to inform the public concerning the requirements of the law.

12. Oftentimes the passing of legislation satisfies the political and humanitarian interests of the sponsors and then the substance of this legislation lies idle. A constant reevaluation by the states and federal government of the environmentally-oriented legislation will keep an interested citizenry informed of the public and private rights in the environment. Americans have a tendency to be crisis-oriented and, thus, must be reminded or re-informed periodically of both conditions that could exist and the available means which can be taken to prevent such occurrences.

13. Enactments of state environmental legislation and/or constitutional amendments have been a positive step toward recognizing and preserving a desirable quality of life in our surroundings.

However, many acts lack the definition of public rights in the environment and fail to provide the means to protect these rights. Two states have made theoretically significant advances on both these counts. The constitutional amendment in the state of Montana is notable for its inalienable rights provision.⁸ This amendment provides that all persons are born free and have certain inalienable rights. Equally important is the last sentence in Section 3: "In enjoying these rights all persons recognize corresponding responsibilities." The amendment thus recognizes both individual and collective rights and, conversely, that the opportunity cost of such rights is a corresponding responsibility. Perhaps the best summary is Pogo's when he said: "We have recognized the enemy and he is us."

California has incorporated in its state environmental laws a means by which private activities requiring a permit or license from a state agency can at least be reviewed by the state environmental agency. State agencies granting permits or licenses, must comply with the requirement of preparing an impact statement according to state law.

Concerning the legal question as to whether the California Environmental Quality Act (EQA) applies to private actions for which a permit is required, the Supreme Court of California answered in Friends of Mammoth vs. Board of Supervisors of Mono County.⁹ Relying on the close relationships between the EQA and the National Environmental Protection Act (NEPA), the court held that the word

"project" in the EQA includes the "issuance of permits, leases and other entitlements" and that an environmental impact report must be prepared "prior to the decision to grant the conditional use and building permits."¹⁰ The court further said that "before an environmental impact statement becomes required the government must have some minimal link with the activity, either by direct proprietary interest or by permitting, regulating, or funding private activity."¹¹

Furthermore, California's Environmental Quality Act provides a guide to follow in preparing an impact statement, noting that:

All state agencies, boards and commissions shall prepare, or cause to be prepared by contract, and certify the completion of an environmental impact report on any project they propose to carry out or approve which may have a significant effect on the environment. Such a report shall include a detailed statement setting forth the following:

- (a) The environmental impact of the proposed action.
- (b) Any adverse environmental effects which cannot be avoided if the proposal is implemented.
- (c) Mitigation measures proposed to minimize the impact.
- (d) Alternatives to the proposed action.
- (e) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity.
- (f) Any irreversible environmental changes which would be involved in the proposed action should it be implemented.
- (g) The growth-inducing impact of the proposed action.¹²

The California impact statement requirement goes beyond NEPA with the addition of (c) and (g). These two added features are recommended.

14. Frequently, it is difficult for private and public interests to determine the position of agencies and the practices and procedures

they follow. It is recommended that interested persons be granted reasonable access to the internal orders and rules to determine if their rights or the public rights are being impaired.

15. In some cases state agencies and agencies of neighboring states do cooperate and coordinate their activities over related matters. However, instances abound where there is a lack of cooperation between agencies, even though their programs are directly related to one another. It is recommended that state legislation be enacted that would require coordination of state agencies where their activities are so related that the action of one agency may impair or infringe upon the directives and actions of another agency, i.e., a highway department's activities should be coordinated with other state resources agencies and also with the federal resources development and management agencies. As a result of federal legislation in the fields of air, water, noise, and the environment, state and federal agency activities have been brought much closer. However, much needs to be done concerning the actual practice and in pursuing greater cooperation.

16. Continuing with the subject of cooperation, it is highly recommended that memoranda of understanding be employed by state agencies, whether or not legislation requiring cooperation exists. The following memoranda provisions, adopted from California, may serve as a model for other states to follow, especially where there is insufficient or non-existent legislation in fields pertaining to environmental

quality and fish and wildlife protection and in those areas where the legislation lacks specific direction and clarity.

1. The Highway Department will establish a system in cooperation with the Department of Fish and Game based on information furnished by either agency as may be needed whereby proposed highway construction projects in predetermined areas will be reviewed for possible effects on fish and wildlife resources. The predetermined areas will be defined by mutual agreement as those populated by fish or wildlife which might be affected by highway construction. At appropriate stages of planning, information regarding a proposed highway project will be forwarded to the Department of Fish and Game for review. If the Department of Fish and Game desires to comment on the highway proposal, comments will be submitted in writing within thirty days to the District Engineer of the Highway Department in whose territory the highway project is to be constructed.

2. The Department of Fish and Game will also establish a system, in cooperation with the Highway Department, whereby the Department of Fish and Game will notify the Highway Department of any physical developments proposed by the Department of Fish and Game which may affect stream flows or highway facilities. If the Highway Department desires to comment on the Fish and Game proposal, comments will be submitted in writing within thirty days to the Regional Manager of the Department of Fish and Game in whose territory the Fish and Game proposal is to be developed.

3. Establish and encourage close liaison between the field offices of both Departments, in relation to fish and game conservation and highway planning and construction.

4. Exchange and disseminate to appropriate personnel for reference purposes information on methods and results of experiments for the protection of fish and game and the concurrent problem of discharging water, drift and streambed loads in connection with the design and construction of highway facilities.

5. The Department of Fish and Game may review existing State highways constructed by the Highway Department, and proposed State highway projects and may furnish data

and opinions on fish and wildlife populations and problems related thereto in connection with the design and construction of highways.

6. When an existing fish or game resource may be adversely affected by a proposed highway project, the Department of Fish and Game will propose and the Highway Department will consider, subject to the provisions of Article 11 herein, such reasonable modifications in the proposed highway project as would allow for the protection and continuance of the fish or game resource.

7. When requested by the Department of Fish and Game the Highway Department will review for possible inclusion in its Special provisions for a particular highway contract appropriate wording calling the contractor's attention to the necessity for compliance with sections of the Fish and Game Code which prohibit the discharge of materials deleterious to fish and wildlife (including silt and debris) into the waters of the State, prohibit obstruction of streams, and provide for removal of substances causing pollution or obstruction of waters to the detriment of fishlife.

8. The Department of Fish and Game may call to the attention of the Highway Department instances of highway construction undertaken prior to the execution of this agreement that have resulted in damage to fish or game populations. The Highway Department will investigate all such instances and consult with the Department of Fish and Game relative to ways to remedy the damage and means to finance corrective measures, if correction is warranted.

9. Measures or facilities for the improvement or enhancement of fish and wildlife may be included in the planning and construction of highway projects at the request of the Department of Fish and Game provided they will not delay the advertisement of the highway project, or impair or interfere with the primary purposes of the highway project and if the costs are financed by sources other than highway funds.

10. Nothing in this agreement shall prevent the Highway Department from performing work of an emergency nature, provided, however, if such work results in loss to fish or game resources reasonable corrective measures to prevent further loss shall be considered by the Highway

Department after termination of the emergency condition, subject to the limitations of Article 11 herein.

11. Whenever herein there is reference to proposals for correction or modification of highway facilities it is understood that all decisions leading to the final design of such facilities will be made by the Highway Department and that proposals of others will specify a desirable end result rather than the means of accomplishing that result.

17. During the last decade there has been a tremendous increase in both the number of administrative agencies and in the range of the functions that they perform. As a result many of the traditional ways of pursuing public interest and protecting public rights, primarily through the judicial system, have been eliminated or substantially reduced or complicated by procedural matters and the requirements of exhaustion of remedies. It is extremely noteworthy in this study that one state has made a positive effort through legislation which gives the public automatic standing and a spokesman before administrative agency proceedings to pursue and protect the public interest. The Public Intervener Statute of Wisconsin is, in theory, a very important innovation and can serve as a basic model for other states and the federal government. The statute is short in length but extensive in potential. It is as follows:

165.07 Assistant Attorney General--Public Intervenor.

The attorney general shall designate an assistant attorney general on his staff as public intervenor. Written notices of all proceedings under chs. 30, 31 and 144 shall be given to the public intervenor and to the administrators of divisions primarily assigned the departmental functions under chs. 29 and 144 by the agency head responsible for such proceedings. A copy of such notice shall also be given to the scientific areas preservation council. The public

intervenor shall formally intervene in such proceedings when requested to do so by an administrator of a division primarily assigned the departmental functions under chs. 29 or 144. The public intervenor may, on his own initiative or upon request of any committee of the legislature, formally intervene in all such proceedings where such intervention is needed for the protection of "public rights" in water and other natural resources, as provided in chs. 30 and 31 and defined by the supreme court. Personnel of the department of natural resources shall upon the request of the public intervenor make such investigations, studies and reports as he may request in connection with such proceedings, either before or after formal intervention. Personnel of state agencies shall at his request provide information, serve as witnesses in such proceedings and otherwise cooperate in the carrying out of his intervention functions. Formal intervention shall be by filing a statement to that effect with the examiner or other person immediately in charge of the proceeding. Thereupon the public intervenor shall be deemed a party in interest with full power to present evidence, subpoena and cross examine witnesses, submit proof, file briefs or do any other acts appropriate for a party to the proceedings. He may appeal from administrative rulings to the courts and in all administrative proceedings and judicial review proceedings he shall be identified as "public intervenor." This section does not preclude or prevent any division of the department of natural resources, or any other department or independent agency from appearing by its staff as a party in such proceedings.¹³

The only change we recommend in this statute is, in cases where there has not been a reorganization of the resources agencies as occurred in Wisconsin during 1965-67, this act should pertain to all state agencies whose activities directly or indirectly relate to the environment, and not just to the department of natural resources.

It is our hope that consideration of this report by state officials and by lay persons interested in the environment, will inspire the improvement of environmental legislation in many states. The past

ten years have seen the most general public concern over environmental degradation in our history, and the response to this concern through passage of environmental legislation has been massive. Our aim has been to analyze this legislation and identify its strengths and weaknesses, in the hope that we can learn from the experiences of others so that the adoption of strong, effective, and needed legislation will be speeded.

ENDNOTES

¹ CRS 148-21-3 (7).

² CRS 148-21-3 (6).

³ Rev. Code Mont., 26-1502.

⁴ McKinney's Console. L N Y Ann., Environmental Conservation Law, Sec. 15-0501.1 (1972).

⁵ Wis. Stat. Ann., Sec. S 3019 through 30.20.

⁶ M. S. Heath, Jr., "Estuarine Conservation Legislation in the States," 5 Land and Water Review (1970).

⁷ In part, the pitfalls are also associated with channel encroachment legislation. For a discussion of these problems and an example of a model floodway encroachment act, see: E. W. Beuchert, "State Regulation of Channel Encroachments," 4 Natural Resources Journal (January, 1965): 486-521.

⁸ Constitution of the State of Montana, Article 2, Section 3.

⁹ 502 P. 2d 1049; 8 Cal. 3d 247; 2 ELR 20673 (1972).

¹⁰ 8 Cal. 3d, 247 at 263; 2 ELR 20676. With the court citing Greene County Planning Board vs. federal Power Com. (2d Cir. 1972) 455 f. 2d 412, 418-421.)

¹¹ Ibid.

¹² California Public Resources Code, sec. 21100, as amended.

¹³ Wis. Stat. Ann., sec. 165.07.

APPENDIX

Examples of letters to state agencies requesting
information for the study.

COLORADO STATE UNIVERSITY
Fort Collins, Colorado 80521

Economics

To: State legislative councils

Dear Sir:

In collaboration with Dr. G. A. Swanson, Head, Department of Fishery and Wildlife Biology, I am conducting a study of the effects of water law upon environmental quality with particular reference to recreation and aesthetic values and fish and wildlife resources and habitat. In this connection, we would greatly appreciate reports or other information prepared by your agency concerned with this topic. It is intended the interdisciplinary approach to this study and the bibliography and analysis will be of considerable benefit to state and federal agencies.

Specifically, we request research reports or materials in the following areas, regardless of date of publication:

1. state water and land plan or planning
2. state water laws
3. stream preservation
4. channelization of streams
5. water problems
6. protection of fish and wildlife and habitat reports or data of adverse or favorable nature
7. minimum stream flow requirements
8. wild and scenic rivers
9. state and federal cooperation in implementation of federal or state legislated programs, i.e., fish and wildlife, coordination act, Wild and Scenic Rivers, NEPA and environmental protection.
10. any other reports you feel are relevant in this area.

Thanking you in advance for your assistance and cooperation.

Sincerely yours,

George E. Radosevich, J.D.
Project Investigator

GER:sa

COLORADO STATE UNIVERSITY
Fort Collins, Colorado 80521

Economics

To: State Engineers and Water Resource Agencies and
Highway Departments

Dear Sir:

In collaboration with Dr. G. A. Swanson, Head, Department of Fishery and Wildlife Biology, I am conducting a study of the effects of water law upon environmental quality with particular reference to recreation and aesthetics and fish and wildlife and their habitat. In this connection, we would greatly appreciate your cooperation in providing information from your state. The research project is funded by Office of Water Resources Research and copies of the final report will be available. It is intended the interdisciplinary approach to this topic and the bibliography and analysis of material will be of considerable benefit to state and federal agencies.

In particular, we request any information, reports, case and statutory citations or compilations on the following:

1. a compilation of your state water laws (if available)
2. minimum stream flow requirements for any purpose
3. stream preservation policy and law your agency is required to follow:
 - (a) for wildlife and aquatic species and habitat
 - (b) for specific streams under wild river concepts
4. channelization of streams
5. protection of aquatic species and wildlife (in streams, lakes, estuaries, etc.)
6. "102 statements" or equivalent required at the local, state and federal level regarding the allocation of water and its impact
7. the right of the public to use surface waters surrounded by or crossing through private property

8. state and federal cooperation and progress in implementing legislated programs such as Fish and Wildlife Coordination Act, Wild and Scenic Rivers Act, NEPA and environmental protection
9. state authority and practice (if authority exists) of appropriating water in name of the state for environmental purposes
10. state water planning (or conjunctive water and land planning) that seeks to account for fish, wildlife, or other environmental factors
11. state definitions of beneficial use and extent of application to cover recreation, fish and wildlife, and/or aesthetic purposes
12. recent (1972) changes or proposals to change water laws
13. any additional information you feel is relevant within this area concerning your department's operation would prove helpful.

If the information requested above is not available through your department, it will not be necessary to forward the letter on to other departments.

Our study is funded to extend over a two year period, and does provide for visits to representative states which provide examples of successfully coping with these problems or are faced with resolving specific problems of this nature. Should you feel that your state presents a unique legal or physical situation of how water law affects fish and wildlife and their habitat or the environment, please bring this to our attention.

Thanking you in advance for your assistance and cooperation,
I am

Sincerely yours,

George E. Radosevich, J.D.
Project Investigator

GER:sa

COLORADO
STATE UNIVERSITY
Department of Economics

Fort Collins, Colorado 80521

April 10, 1973

To: State agencies which had responded

Gentlemen:

We hope that you will find the enclosed bibliography useful and interesting in your agency's efforts to protect environmental quality. It provides a general inventory of what the states have been doing in this important area. It has resulted from responses of various state officials to our earlier request for pertinent material relating to our research effort.

We recognize that the bibliography is far from complete, and, therefore, we plan to issue a supplementary volume at the conclusion of the project. We would greatly appreciate it, therefore, if you would examine carefully those sections covering your specific areas of interest, and send us any publications which should be included, or pertinent citations if the relevant publication is not available any more.

We are particularly interested in receiving additional publications which relate to the need for better legislative protection of the aquatic environment--reports on such matters as stream channelization, highway intrusions into streams, drainage, dredging and filling and minimum flow provisions. If available, we would like to have more specific examples of success or failure of these laws, and any memoranda of understanding or agreements relating to these subjects. Naturally, we would be glad also to receive any laws which we have missed or other regulations which in your opinion will benefit the general relationship. This would include any new laws that have been passed during the current legislative session, or other drafts that you might want to share.

With sincere thanks for your earlier assistance, I am

Very truly yours,

George E. Radosevich, J.D.
Assistant Professor of
Environmental Law and Economics

GER:sa

COLORADO
STATE Department of Fishery and Wildlife Biology
UNIVERSITY

Fort Collins, Colorado 80521

March 5, 1973

To: State wildlife agencies

Gentlemen:

We hope that you will find the enclosed bibliography useful and interesting in your agency's efforts to protect environmental quality. It provides a general inventory of what the states have been doing in this important area. It has resulted from responses of various state officials to our earlier request for pertinent material relating to our research effort.

We recognize that the bibliography is far from complete, and, therefore, we plan to issue a supplementary volume at the conclusion of the project. We would greatly appreciate it, therefore, if you would examine carefully those sections covering your specific areas of interest, and send us any publications which should be included, or pertinent citations if the relevant publication is not available any more.

We are particularly interested in receiving additional publications which relate to the need for better legislative protection of the aquatic environment -- reports on such matters as stream channelization, highway intrusions into streams, drainage, dredging and filling and minimum flow provisions. If available, we would like to have more specific examples of success or failure of these laws, and any memoranda of understanding or agreements relating to these subjects. Naturally we would be glad also to receive any laws which we have missed or other regulations which in your opinion will benefit the general relationship.

With sincere thanks for your earlier assistance, I am

Very truly yours,

Gustav A. Swanson, Head
Department of Fishery and
Wildlife Biology

GAS/njr

COLORADO STATE UNIVERSITY
Department of Fishery and Wildlife Biology
Fort Collins, Colorado 80521

October 3, 1973

To: State wildlife agencies

Our study of Water Laws in Relation to Environmental Quality is nearing completion, and we wish it to be as current as possible, so would appreciate anything further which you could contribute, especially as listed below. Note that our study is not concerned with water pollution, but rather, with laws regulating physical changes such as stream channel modifications, dredging, filling, sedimentation, water level modifications, etc.

The areas in which we would appreciate new information particularly from the 1973 legislative session are:

1. Any changes to or additions in your basic water law doctrines, e.g. re-defining beneficial use, diversion requirements, changes in access right of the public to private waters, changes in state control of water bodies, etc.

2. Any new laws or changes to existing laws in the water conservation and protection area. For example:

- | | |
|----------------------------------|--|
| a. Wild and Scenic Rivers | f. Memoranda of understanding between |
| b. Minimum Flow Laws | highway departments and fish and |
| c. Environmental Protection Acts | wildlife agencies |
| d. Channelization Acts | g. Stream Protection Acts, i.e., those |
| e. Wetlands control | that limit public or private intrusion |
| | into lakes or streams |

3. Any information about the effectiveness in practice of such laws or regulations.

4. How effective in protecting water resources is the requirement for Environmental Impact Studies under NEPA (the "102 Reports")? Any problems in this connection? We asked you about this before, but nearly two years more experience may have changed the situation.

Our final report which should be available in February 1974 will contain, among others, a section suggesting features of ideal or model laws in this general area. If you would like a copy of the final report, please so indicate in your reply.

With thanks for your cooperation,

Very truly yours,

Gustav A. Swanson, Head
Department of Fishery and
Wildlife Biology

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