STREAMSIDE MANAGEMENT ZONE
Statutes and Ordinances

Criteria and Institutional Arrangements
Serving Water Quality Objectives on
State and Private Forest Lands.

Improvement of streamside management for the enhancement of water quality will be required in many areas as water quality programs are developed under Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). The "Streamside Management Zone-Statutes and Ordinances," is a cooperative Forest Service-Environmental Protection Agency effort which identifies major State and local laws applying to streamside zone management on State and private forest lands.

The effectiveness of State and local regulatory controls on water quality management is evaluated. Examples of existing laws, ordinances and regulations highlighted in this report can provide guidance to State and areawide water quality management agencies.

We suggest that where applicable, this report be used to develop silviculture nonpoint source pollution controls relating to streamside management in planning and implementing State and local water quality management programs.

Merna Hurd, Director
Water Planning Division
Environmental Protection Agency

Philip A. Archibald, Director
Area Planning and Development Unit
Forest Service

THIS STREAMSIDE MANAGEMENT ZONE STUDY

was conducted through an

INTERAGENCY AGREEMENT

between the

U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE

and the

U.S. ENVIRONMENTAL PROTECTION AGENCY

MARCH 1978

CONTENTS

CHAPTER		Page No.
I.	SUMMARY	3
II.	CONCLUSIONS	5
III.	RECOMMENDATIONS	7
IV.	INTRODUCTION	10
V.	PROCEDURES	13
VI.	RESULTS OF STUDY	15
	A. TRENDS	15
	B. ANALYSIS RESULTS	15
	C. STREAMSIDE ZONE MANAGEMENT LITERATURE REVIEW	27
	REFERENCES	28
VII.	EXAMPLES	30

I. SUMMARY

The Environmental Protection Agency (EPA) entered into an agreement with the U.S. Forest Service (USFS) to complete a survey of streamside management zone laws, ordinances, and regulations in the 50 states, in some counties, and in some local jurisdictions.

This survey was completed by the USFS State and Private Forestry, with cooperation from all levels of the organization.

The survey and analysis were compiled and documented using information collected from all 50 states. Two hundred and nine individual cases were inventoried. Indirectly, many of these laws addressed the streamside management zone situation. However, no laws were found dealing only with streamside zone management relative to water quality.

State laws comprised 118, or 56.4% of the cases, county laws 48 cases, or 23.0%, city ordinances 31 cases, or 14.8%, planning districts 5 cases, or 2.4%. For two cases, no information was collected as to the type of institution which legislated the act.

Thirty-one percent of the sampled laws have been enacted since 1970.

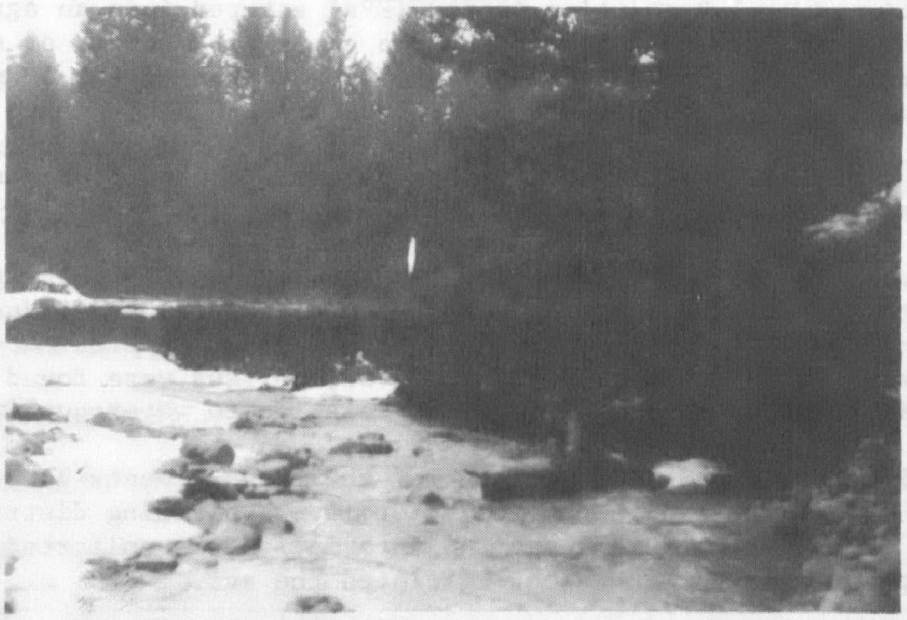
Seventy percent of the laws surveyed addressed streamside zones in the legislation.

Specific pollutants were not addressed in half the laws surveyed.

State Forestry organizations administered four percent of the laws surveyed.

Forty-five percent of the laws surveyed contained monitoring as a part of the law.

A literature search was completed, and limited information was found specific to streamside zone management.



A severely eroding streambank where vegetation is trees and grass - photo by USFS in Rocky Mountain area of USA.

A dynamically stable streambank system that contains a varied community of plant life - photo by USFS in Rocky Mountain area of USA.

II. CONCLUSIONS

The following conclusions were reached from the nationwide survey of information, statutes, and ordinances applying to streamside management zones on state and private forest lands.

A. There were no laws that addressed only streamside zones specifically for the purpose of water quality.

B. Streamside management laws, ordinances, and regulations are often administered by state agencies other than the State Water Quality Agency.

C. In relation to the total entities sampled that have legislative authority, there are not very many laws, ordinances, and regulations that specifically address water quality.

D. It appears that water quality concerns are tacked onto legislation dealing with other primary purposes because it may be the politically astute thing to do.

E. General publics have not been made aware of the social, environmental, and economic consequences of water quality problems.

A road constructed in unstable landforms adjacent to a body of water with resultant mass wasting into the water - photo by USFS in Rocky Mountain area of USA.

The stability of the streambank was breached with the poor stream crossing making sediment available for the stream - photo by USFS in Northwest area of USA.

III. RECOMMENDATIONS

Recommendations are promulgated to improve streamside management zone legislation for protection or enhancement of the water and land resources in the nation. Hopefully, these recommendations can be used by entities to stimulate new legislation and to gain additional knowledge. Also, there may be opportunities to improve existing legislation.

The recommendations are:

A. Additional knowledge is needed to formulate more effective legislation.

   1. Pollution production coefficients should be obtained related to:

      a. Specific land uses in a given range of physical environments.

      b. Intensity of specific uses.

      c. Management practices within a specific use.

      d. Multiple use relationships.

      e. Physical environmental features functioning both independently and as an interactive part of a total hydrological response unit.*

   2. The evaluation of the social, economic, and environmental effects of pollutants should be done collectively, rather than individually.

B. Legislation could be made more effective by including the following features:

   1. Include a variable streamside zone responsive to physical and vegetative conditions in relation to specific land uses or a combination of land uses.

   2. Include specific authority and responsibility for administration and enforcement.

   3. Be definitive as to type of pollutants and allowable levels of pollutants.

*Hydrological response unit - Unit of land that responds more or less uniformly to a given climate.

4. Land use restrictions should be defined in relation to different conditions within a hydrological response unit.

5. Monitoring should be specified, with explicit guidelines as to methods, frequency, and responsibilities.

6. Legislation should provide for the preparation of a management plan.

7. Provide for flexibility and a mechanism for up-dating.

8. Include bonding, penalties, taxing, or other mechanisms to restore hydrologic conditions.

C. Provide adequate funding and personnel to administer the legislation.

1. Minimum funding and personnel should be specified in the law.

2. Funding mechanism should be identified.

D. Legislation should be coordinated with upstream and downstream laws and regulations to provide continuity within a hydrologic system, such as within a river basin or municipal watershed.

E. Determinations should be made as to the relative effectiveness of voluntary actions, information programs, and other alternatives to enforcement.

F. More information relating to sample clauses and criteria are found in Chapter VII.

Severe streambank erosion into the field where vegetation is a shallow-rooted monoculture - photo by SCS in Southeastern area of USA.

A dynamically stable streambank system supporting a diverse community of vegetation - photo by SCS in Southeastern area of USA.

IV. INTRODUCTION

The Streamside Management Zone (SMZ) Study on state and private forested lands was initiated by the Environmental Protection Agency (EPA) and undertaken by the U.S. Forest Service (USFS) to provide information and trends in state and local laws and ordinances applying to streamside zone management.

This publication must not be construed by the reader to be complete in terms of all existing statutes nationwide. Rather, the study included a reasonable sampling of those statutes affecting streamside zones within the time constraints of the EPA-USFS agreement. However, it is obvious that the study data have provided information on streamside management zone laws and ordinances that have not been compiled and analyzed before.

The primary purpose was to survey the various state and local laws, ordinances, and regulations and evaluate their effectiveness in protecting and/or enhancing water quality. The results of the study would lead to providing guidelines to state and local 208 agencies for streamside management and to various interest groups.

The study was executed by the USFS Area Planning and Development, Washington Office, with field offices throughout the U.S. providing the inventory data input and interpretation. A Washington Office team, made up of people throughout the U.S., was appointed to analyze the data and prepare a report.

The study was designed to be of sufficient scope to determine how existing statutes regulate streamside use related to improvement of water quality. State laws were examined from all fifty states. In addition, a minimum of three counties per state, three cities per state, and several major planning entities within the states were to be surveyed.

This information includes the purpose of the law or regulation, the criteria set by the law or regulation to define the streamside zone, if there is one, and the management uses expressly allowed or disallowed in the streamside zone. The information also includes effects of vegetation management on the streamside zone in relationship to the natural setting. The data were analyzed both nationwide and on a regional basis.

A streamside management zone literature search was accomplished by the Moscow, Idaho Forestry Sciences Laboratory of the Intermountain Forest and Range Experiment Station (USFS) for this survey.

This literature search was done on Forestry Abstracts from 1972 to present and on the Bibliography of Agriculture Abstracts from 1970 to present. The keywords used in the search were water and water

quality, buffer strip(s), streamside zone(s), impact(s), and management practice(s). No information was found in this search relative to streamside zone management.

A literature review from small libraries of material at Bozeman and Missoula, Montana and Upper Darby, Pennsylvania found only five publications on streamside zone management.

Bank erosion occurring where field vegetation abuts stream - photo by SCS in Southeastern area of USA.

V. PROCEDURES

A study plan was drafted, reviewed by a group of USFS and EPA people in Washington, D. C., and approved as the procedural document to conduct the SMZ Study. The various phases of the study were:

1. Organize the study and set objectives.

2. Inventory states, counties, cities, and planning districts.

3. Analyze inventory data.

4. Evaluation.

5. Report.

Phase One of the SMZ Study was accomplished at the Washington Office (Headquarters) level, with participation as necessary from field personnel. A plan of work, including a detailed work outline, was developed.

Study objectives, scope, and inventory procedures, including data, were agreed upon. Staffing, time schedules, cost estimates, and work assignments were made; and commitments to do the work were agreed upon.

The inventory of all 50 states, along with some entities of local (county, city, other) government, was completed by USFS State and Private field staff people throughout the organization. Each law or ordinance inventoried was documented[1/] on a data collection form, a data analysis form, and a vegetative analysis form. Phase Three of the study was completed at the field level and analyzed. Phases Four and Five of the SMZ Study were accomplished by the Washington Office team.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS). The following questions were addressed, based on the sample cases:

1. How many laws, ordinances, or regulations have vegetation management specifically addressed in the legislation?

2. What is the relationship between management of vegetation and the effectiveness of laws and ordinances?

[1/] See laws and ordinances in appendix.

3. What is the apparent influence of vegetation management on water quality?

4. How many laws, ordinances, or regulations have streamside zones specifically addressed in the legislation?

5. Are pollutants specifically addressed in the laws, ordinances, or regulations?

6. What pollutants were specifically addressed in the legislation?

7. How many laws, ordinances, or regulations specifically addressed timber harvesting?

8. What agencies administer the laws, ordinances, or regulations?

9. Is there a relationship in the sample between enforcement and whether or not laws, ordinances, or regulations are adhered to?

10. Does width of streamside management zones have any effect on whether or not laws, ordinances, or regulations are adhered to?

11. Is monitoring for effectiveness part of the laws, ordinances, or regulations sampled?

12. What types of streams, by percent, were defined by the laws, ordinances, or regulations?

A table also was constructed, describing the characteristics of all laws and ordinances in the survey by categories of state, county, municipal, planning district, and others.

VI. RESULTS OF STUDY

A. Trends

The following trends in state and local laws and ordinances that affect water quality were identified:

1. Institutional approaches to water quality laws (direct or indirect) differ drastically by geographic areas of the United States. These differences are much more evident when comparing the West with the rest of the country.

2. Pollutant levels from non-point sources have not been adequately quantified in such a way as to become standards for inclusion in legislation.

3. In defining streamside zones, there are trade-offs between ease of administration and water quality enhancement. Most zones defined do not vary with slope, soil types, vegetation, type of land use, or other parameters having a direct effect on water quality. However, some of the western timber harvesting ordinances did provide for on-the-ground adjustment of the width of streamside zones.

4. Primary purpose water quality laws, ordinances, or regulations by and large have not been initiated by legislative authorities.

There were no streamside management zone laws, ordinances, or regulations which dealt directly and primarily with water quality. Most legislation, which has some direct or inferred water quality purpose, appears to be a result of adding on clauses to other primary purpose laws, ordinances, or regulations.

B. Analysis Results

1. Procedures

Information on the data collection form (included in the appendix) was coded according to positive or negative responses in relation to each data item. This coding required that a judgment be made according to the information presented, and resulted in one uniform set of information in relation to each law or ordinance inventoried. Each law or ordinance inventoried is referred to in the analysis as a "case." Altogether nationwide, there were 209 cases collected for analysis.

Table No. 1 displays the number and percent of cases by institution and EPA Region of the country. Figure 1 shows the EPA Regions of the country.

Coding was done under the close supervision of the team leader to insure uniform interpretation of the data collected. If information was not available, either because it had not been collected or could not be interpreted, it was designated as "no information" and coded accordingly.

After the data were coded, they were processed in the SPSS. This program (SPSS) was used to obtain frequency counts of all data items, and provided limited statistical analysis of possible relationships between data items.

2. Reliability

Most questions on the data collection form were open-ended; and respondents were not required to choose a response to each question. This resulted in discretionary reporting of data items and some items often being ignored. Also, negative replies, either as to where laws or ordinances existed or to individual questions, often were not recorded. Thus, personal bias and subjective reporting were inherent in the information from the beginning.

When data were coded into the SPSS System, each portion of each question had to be coded as a positive response, negative response, or "no information." As many questions were positive in relation to many aspects of the question, replications were common. For example, laws and ordinances were coded as to whether or not they related to five purposes. Some fulfilled many purposes, and a positive response to more than one aspect of the same question was recorded. This replication adversely affected the statistical reliability in relating one question to another because those with most replications would carry more weight than those with few replications. For these reasons, reliability is very weak, and findings should be viewed only as indicators of the characteristics of laws and ordinances sampled.

3. Results

The characteristics of the laws and ordinances sampled are described in Table No. 2. There were 209 cases analyzed, with over half collected in the western U.S.A. State laws comprised 118, or 56.4% of the cases, county laws 48 cases or 23.0%, city ordinances 31 cases or 14.8%, planning districts 5 cases or 2.4%. For two cases, no information was collected as to the type of institution which legislated the act.

TABLE NO. 1 NUMBER AND PERCENT OF CASES: INSTITUTION BY EPA REGION

REGION	INSTITUTION					
	STATE	COUNTY	CITY	PLANNING DISTRICT	OTHER	NO INFORMATION
I	7/3.3%	0/0.0%	4/1.9%	0/0.0%	0/0.0%	0/0.0%
II	5/2.4%	0/0.0%	1/0.5%	0/0.0%	0/0.0%	0/0.0%
III	8/3.8%	3/1.4%	3/1.4%	0/0.0%	0/0.0%	0/0.0%
IV	7/3.3%	4/1.9%	0/0.0%	0/0.0%	0/0.0%	1/0.5%
V	20/9.6%	8/3.8%	0/0.0%	0/0.0%	0/0.0%	0/0.0%
VI	7/3.3%	1/0.5%	0/0.0%	0/0.0%	0/0.0%	0/0.0%
VII	6/2.9%	1/0.5%	4/1.9%	0/0.0%	3/1.4%	0/0.0%
VIII	18/8.6%	9/4.3%	8/3.8%	2/1.0%	1/0.5%	1/0.5%
IX	24/11.5%	13/6.3%	5/2.4%	3/1.4%	1/0.5%	0/0.0%
X	16/7.7%	9/4.3%	6/2.9%	0/0.0%	0/0.0%	0/0.0%
TOTAL	118/56.4%	48/23.0%	31/14.8%	5/2.4%	5/2.4%	2/1.0%

Total 209 Cases 100%

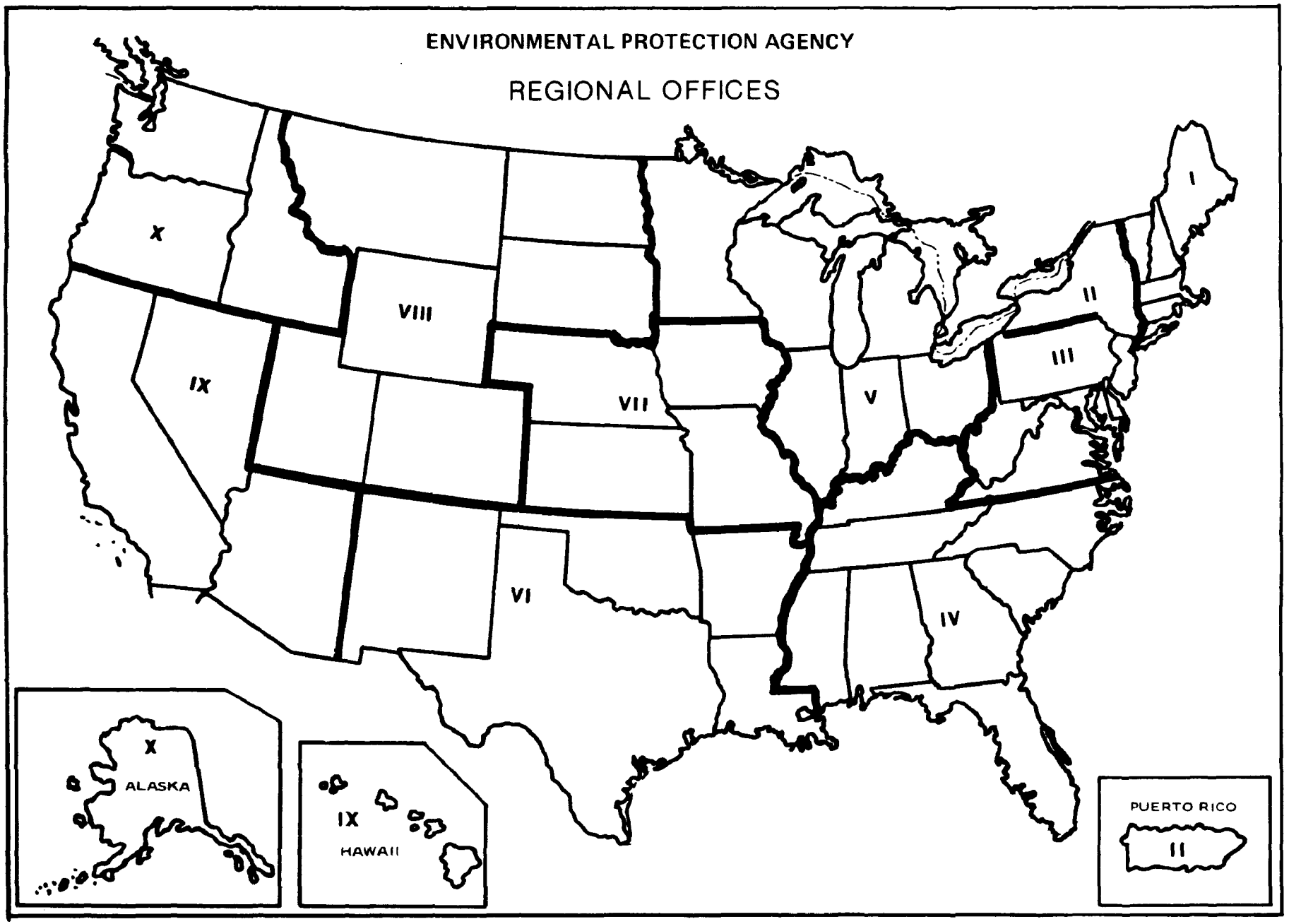


Figure 1.--EPA Regions.

TABLE NO. 2 DESCRIPTION OF LAWS, ORDINANCES, REGULATIONS SAMPLED OCT - NOV 1977

INSTITUTION	SAMPLE CASES	GENERAL TYPE OF LAW*								DATE OF ENACTMENT AFTER 1970
		FOREST PRACTICE	WILD & SCENIC RIVERS	FLOODPLAIN MANAGEMENT	FISH & GAME	COASTAL ZONE MGMT.	STREAM CHANNEL PROTECTION	WATER QUALITY	OTHER	
STATE	118/56.4%	8/3.8%	10/4.8%	16/7.7%	3/1.4%	6/2.9%	3/1.4%	39/18.7%	26/12.4%	64/30.6%
COUNTY	48/23.0%	4/1.9%	0/0.0%	17/8.1%	1/0.5%	0/0.0%	7/3.3%	15/7.2%	19/9.1%	27/13.0%
CITY	31/14.8%	1/0.5%	0/0.0%	15/7.2%	0/0.0%	0/0.0%	1/0.5%	11/5.2%	10/4.8%	17/8.2%
PLANNING DISTRICT	5/2.4%	1/0.5%	0/0.0%	0/0.0%	0/0.0%	0/0.0%	0/0.0%	3/1.4%	3/1.4%	5/2.4%
OTHER	5/2.4%	0/0.0%	0/0.0%	0/0.0%	1/0.5%	0/0.0%	0/0.0%	0/0.0%	1/0.5%	1/0.5%
NO INFORMATION	2/1.0%									
TOTAL	209/100.0%	14/6.7%	10/4.8%	48/23.0%	5/2.4%	6/2.9%	11/5.2%	68/32.5%	59/28.2%	

* 12 CASES DUPLICATED

LEGEND: 118/ = Number cases with positive response.
56.4% = Percentage of cases with positive response based on 209 total.

TABLE NO. 2 DESCRIPTION OF LAWS, ORDINANCES, REGULATIONS SAMPLED OCT - NOV 1977 (CONTINUED)

	PURPOSES*					ADMINISTRATION*				
INSTITUTION	WATER QUALITY	FLOOD PREVENTION	OPEN SPACES & ESTHETICS	WILDLIFE HABITAT	OTHER	STATE FORESTRY AGENCY	STATE WATER QUALITY AGENCY	OTHER STATE AGENCY	COUNTY	OTHER
STATE	53/25.3%	20/9.5%	17/8.1%	18/8.6%	50/23.9%	9/4.3%	16/7.7%	67/32.0%	2/1.0%	11/5.3%
COUNTY	16/7.7%	18/8.6%	9/4.3%	8/3.8%	21/10.0%	0/0.0%	0/0.0%	0/0.0%	25/12.0%	23/11.0%
CITY	14/6.7%	16/7.7%	9/4.3%	4/1.9%	10/4.8%	0/0.0%	0/0.0%	0/0.0%	3/1.4%	26/12.4%
PLANNING DISTRICT	4/1.9%	0/0.0%	0/0.0%	0/0.0%	4/1.9%	0/0.0%	0/0.0	0/0.0%	0/0.0%	5/2.4%
OTHER	0/0.0%	0/0.0%	0/0.0%	1/0.5%	1/0.5%	0/0.0%	0/0.0%	0/0.0%	0/0.0%	2/0.9%
NO INFORMATION						24 CASES				
TOTAL	87/41.6%	54/25.8%	35/16.7%	31/14.8%	86/41.1%	9/4.3%	16/7.7%	67/32.0%	30/14.4%	67/32.0%

* 84 CASES DUPLICATED

* 3 CASES DUPLICATED

TABLE NO. 2 DESCRIPTION OF LAWS, ORDINANCES, REGULATIONS SAMPLED OCT - NOV 1977 (CONTINUED)

INSTITUTION	COMPARISON OF OBSERVATION VS MEASURE. IN MONITORING (%)	USES ALLOWED*				CRITERIA			
		TIMBER HARVEST	GRAZING	RECREATION	HUNTING	DISTANCE FROM STREAM	SLOPE	WATERSHED	OTHER
STATE	80.2	70/33.5%	58/27.8%	60/28.7%	58/27.8%	37/17.7%	3/1.4%	5/2.4%	12/5.7%
COUNTY	92.5	32/15.3%	29/13.9%	29/13.9%	28/13.4%	25/12.0%	1/0.5%	3/1.4%	6/2.9%
CITY	100.0	18/8.6%	19/9.1%	24/11.5%	18/8.6%	14/6.7%	1/0.5%	1/0.5%	5/2.4%
PLANNING DISTRICT	100.0	4/1.9%	2/0.9%	2/0.9%	2/0.9%	2/0.9%	0/0.0%	0/0.0%	2/0.9%
OTHER	0.0	1/0.5%	1/0.5%	1/0.5%	1/0.5%	0/0.0%	0/0.0%	0/0.0%	1/0.5%
NO INFORMATION		82 CASES				29 CASES			
TOTAL		125/59.8%	109/52.2%	116/55.5%	107/51.2%	78/37.3%	5/2.4%	9/4.3%	26/12.4%

* 248 CASES DUPLICATED

TABLE NO. 2 DESCRIPTION OF LAWS, ORDINANCES, REGULATIONS SAMPLED OCT - NOV 1977 (CONTINUED)

	VARIABLE WIDTH					CONSTANT WIDTH		
INSTITUTION	UPSLOPE PRACTICE (LU)	SLOPE	FIRST FLOODPLAIN	25 - 100 YEAR FLOOD	OTHER	<100M	100M TO KM	>KM
STATE	1/0.5%	6/2.9%	6/2.9%	10/4.8%	28/13.4%	9/4.3%	5/2.4%	0/0.0%
COUNTY	2/0.9%	4/1.9%	4/1.9%	10/4.8%	13/6.2%	9/4.3%	1/0.5%	0/0.0%
CITY	1/0.5%	2/0.9%	5/2.4%	7/3.3%	10/4.8%	8/3.8%	0/0.0%	0/0.0%
PLANNING DISTRICT	1/0.5%	1/0.5%	1/0.5%	0/0.0%	3/1.4%	0/0.0%	0/0.0%	0/0.0%
OTHER	0/0.0%	0/0.0%	0/0.0%	0/0.0%	0/0.0%	0/0.0%	0/0.0%	0/0.0%
NO INFORMATION	91 CASES					177 CASES		
TOTAL	5/2.4%	13/6.2%	16/7.7%	27/12.9%	54/25.8%	26/12.4%	6/2.9%	0/0.0%

Table No. 2 is divided into eight sections. These are: General Type of Law, Purpose of Law, Administration of the Law, Monitoring of the Law, Uses Allowed in the Zone, Criteria of the Zone, Variable Width of the Zone, and Constant Width of the Zone. Each section is subdivided into columns showing the general breakdown of the section heading, and the rows show the institution which initiated the law. Data used in each section were obtained from the same population. Therefore, if a case is multi-purpose, it will appear in several sections.

Significant aspects of laws and ordinances indicate 30.6% of them have been enacted since 1970. Most laws are water quality acts.

Some relationships between data items were analyzed to answer specific questions related to the purpose of the survey.

Question 1. How many laws, ordinances, or regulations have vegetation management specifically addressed as part of the legislation?

Answer: Of the total cases, 97 (46.4%) addressed vegetation management, 48 (23.0%) did not, and 64 (30.6%) had no information.

Question 2. What is the relationship between management of vegetation and the effectiveness of laws and ordinances?

Answer: In 57% of the cases where vegetation was reported as managed, objectives also were reported as achieved. In 29% of the cases, vegetation also was reported as managed, but objectives were reported as not achieved. Statistically, 36 chances out of 100, vegetation management is related to achievement of objectives in this sample.

Question 3. What is the apparent influence of vegetation management on water quality?

Answer: Of the 97 cases where vegetation management is specifically addressed (Question 1), 39% have a high influence on water quality, 33% a moderate influence, 21% a low influence, and 7% no influence. The terms, "High," "Moderate," and "Low" indicate a judgment of those administering the acts and ordinances on the apparent influence of vegetation management on water quality.

Question 4. How many laws, ordinances, or regulations have streamside zones specifically addressed in the legislation?

Answer: 142 of the 209 cases sampled, or 70%.

Question 5. Are pollutants specifically addressed in the laws, ordinances, or regulations?

Answer: Total cases where pollutants were addressed are 21.2%. In 50.5% of the cases, specific pollutants were not addressed and, in 28.3% of the cases, there was no information.

Question 6. What pollutants were specifically addressed in the legislation?

Answer: The following tabulation indicates the major pollutants identified in the laws, ordinances, and regulations were organic and sediment.

	Positive Response	Negative Response	No Information	Total
		---- percent ----		
Organic	28.7	43.5	27.8	100
Temperature	13.9	57.9	28.2	100
Sediment	45.9	25.8	28.3	100
Visual	16.7	55.0	28.3	100
Chemical	16.7	54.5	28.8	100
Other	5.3	66.0	28.7	100

Question 7. How many laws, ordinances, or regulations specifically addressed timber harvesting?

Answer: Timber harvesting is specifically allowed in 125 cases, 59.8%; it is prohibited in 14 cases, 6.7%. No information on this question was available in 70 cases, 33.5%.

Question 8. What agencies administer the laws, ordinances, or regulations?

Answer:

	Positive Response	Negative Response	No Information	Total
		---- percent ----		
State Forestry	4.3	84.2	11.5	100
Water Quality	7.7	80.8	11.5	100
Other State	32.0	56.5	11.5	100
County	14.4	74.1	11.5	100
Other	32.0	56.5	11.5	100

(There are 3 cases where laws, ordinances, or regulations were administered by more than one agency.)

Question 9. Is there a relationship in the sample between enforcement and whether or not laws, ordinances, or regulations are adhered to?

Answer: Statistically, it was found there was no relation between enforcement and whether or not ordinances or regulations were adhered to. Relationships were entirely random, with up to 98% of the cases lacking information on this question.

Question 10. Does width of streamside management zones have any effect on whether or not laws, ordinances, or regulations are adhered to?

Answer: No.

Question 11. Is monitoring for effectiveness part of the laws, ordinances, or regulations sampled?

Answer: In 45.5% of the cases, monitoring was part of the law, ordinance, or regulation. In 26.8%, monitoring was not included; and in 27.8%, no information was available on this question.

Question 12. What types of streams, by percent, were defined by the laws, ordinances, or regulations?

Answer: Of the total cases, streams are defined by name in 14 (6.7%), by size or volume in 7 (3.3%), as perennial in 88 (42.1%), as intermittent in 68 (32.5%), and by other in 45 (21.5%). The percentages may not add up to 100% because streams may have been defined by more than one element. The following tabulation shows these percentages by EPA Region.

Number and Percentage of Cases Streams Defined

Region	By Name	By Size or Volume	As Perennial	As Intermittent	By Other
I	0/0.0%	1/0.5%	5/2.4%	5/2.4%	0/0.0%
II	0/0.0%	0/0.0%	2/1.0%	2/1.0%	4/1.9%
III	0/0.0%	1/0.5%	5/2.4%	4/1.9%	4/1.9%
IV	1/0.5%	0/0.0%	1/0.5%	1/0.5%	2/1.0%
V	4/1.9%	1/0.5%	18/8.6%	14/6.7%	8/3.8%
VI	0/0.0%	0/0.0%	1/0.5%	1/0.5%	1/0.5%
VII	0/0.0%	0/0.0%	2/1.0%	1/0.5%	3/1.4%
VIII	4/1.9%	0/0.0%	8/3.8%	3/1.4%	9/4.3%
IX	2/1.0%	1/0.5%	28/13.4%	26/12.4%	7/3.3%
X	3/1.4%	3/1.4%	18/8.6%	11/5.3%	7/3.3%

(There were 29 cases with no information.)

C. Streamside Zone Management Literature Review

A streamside management zone literature search was accomplished by the Moscow, Idaho Forestry Sciences Laboratory of the Intermountain Forest and Range Experiment Station, USFS.

The literature searched was Forestry Abstracts from 1972 to present and the Bibliography of Agriculture Abstracts from 1970 to present. The keywords used in the search were water and water quality, buffer strip(s), streamside zone(s), impact(s), and management practice(s). No information was found in this search on streamside zone management.

A literature review from small libraries of material at Bozeman and Missoula, Montana and Upper Darby, Pennsylvania found only five publications on streamside zone management.

This research indicates that temperature and debris can be changed drastically by streamside zone management. (1), (2)

Dykstra and Froehlich indicate that types of management can affect longevity of buffer strips. (4)

Streeby indicates that the desirability of applying buffer strips to streamsides is dependent on three classes of factors: physical-biotic, outside cultural factors, and management objectives. (5)

Campbell indicates in his research that streamside vegetation may require selective clearcutting rather than complete removal of riparian plants to maintain a biological balance, and thus prevent thermal pollution, channel erosion, and destruction of aquatic and wildlife habitats. (3)

The authors' efforts in this literature review indicate a trend revealing very limited published results of research applicable to streamside zones. The search was limited and dealt with most likely sources, due to time and economic constraints.

REFERENCES

1. Brown, George W.
   1970. Water temperatures in small streams as influenced by environmental factors and logging. Oregon State Univ., "Forest Land Uses and Stream Environment," p. 175-181.

2. Burwell, Dave
   1970. Prevention of debris accumulation in streams by uphill felling. Oregon State Univ., "Forest Land Uses and Stream Environment," p. 118-120.

3. Campbell, C. J.
   1970. Ecological implications of riparian vegetation management. J. Soil & Water Conserv. 25(2): 45-52.

4. Dykstra, Dennis P., and Henry A. Froehlich
   1976. Stream protection: What does it cost? Pacific Logging Congr. Handbook, Vol. XXXVI.

5. Streeby, Larry
   1970. Buffer strips--some considerations in the decision to leave. Oregon State Univ., "Forests Land Uses and Stream Environment," p. 194-198.

Severe bank erosion occurring along field section where vegetation is a shallow-rooted monoculture - photo by SCS in Southeastern area of USA.

A dynamically stable streambank with tree vegetation - photo by SCS in Southeastern area of USA.

VII. EXAMPLES OF CLAUSES FROM EXISTING LAWS, ORDINANCES, AND REGULATIONS

State and local laws, ordinances, and regulations collected in the survey were evaluated for their apparent effectiveness in protecting or enhancing water quality. Specific clauses were selected to illustrate examples of streamside zone management from a water quality standpoint at the State and local level. These clauses may be useful to legislators and local administrators in developing new or amending legislation and ordinances.

The following are general criteria that should apply to all laws and ordinances.

1. Responsive to physical environment to which they are to be applied--for example, a snowfall environment vs. a rainfall environment.

2. Must be practical.

3. Economically compatible to the resource.

4. Should set standards.

5. Must be implementable.

6. Should not exclude urban or developed areas.

7. Type of stream should be defined.

8. Should provide for periodic review of streamside zone effectiveness.

9. Uses allowed or disallowed should be specified.

The following are specific criteria that should apply to all laws and ordinances with examples of clauses from existing legislation.

A. Streamside Zone Width

1. Criteria

   a. Streamside width should vary with slope and/or variations in vegetative cover.

   b. The width should be defined in the law, ordinance, or regulation.

   c. Provide for on-the-ground adjustment.

d. Should establish a minimum width.

e. The edge of the stream from which the streamside zone width is measured should be defined.

2. Examples

a. "(h) RIPARIAN CORRIDOR: Those areas which fall into any of the following four categories:

1. An area extending 50 feet (measured horizontally) to each side of a perennial stream. Distance shall be measured from the mean rainy season (bankfull) flowline:

2. An area extending 30 feet (measured horizontally) to each side of an intermittent stream. Distance shall be measured from the mean rainy season (bankfull) flowline;

3. An area extending 30 feet from the high water mark of a marsh or natural body of standing water; or

4. An area designated as riparian woodland on land cover maps prepared by the Office of Watershed Management. The boundary shall be defined as the outer limit of the occurrence of riparian vegetation and may extend farther than the above-specified distances. This boundary may be determined by the Planning Director after consultation with the Watershed Manager."

b. "Section 10,702. STREAMSIDE BUFFER STRIP. Construction of truck roads, tractor trails and landings shall only be permitted when it is clearly shown that there is a protective strip between the proposed construction and the stream having sufficient filter capacity to effectively remove waterborne sediment to prevent any serious risk that construction and use of said facilities will cause significant degradation of water quality. Where it is determined that the filter capacity of the protective strip is insufficient, additional erosion control may include, but is not limited to, any or all of the following:

1. Increased width of the protective strip;

2. Decreased interval between waterbreaks;

3. Treatment of the travelled surface to protect soil from erosion;

4. Treatment of fill slopes to protect soil from erosion which may include installation of down drains;

5. Installation of slope obstructions between the toe of the fill and the stream;

6. Seeding or planting of disturbed areas where bare soil is exposed to protect the soil from erosion.

If, in the opinion of the Planning Commission, an adequate protective strip cannot be provided, then the truck road, tractor trail, and/or landing shall not be approved."

c. "Section 10208. "Watercourse." "Watercourse" shall mean one of the natural or artificial channels which convey surface water delineated on that certain map, with accompanying listing approved and adopted by the Board of Supervisors and on file in the Office of Engineer identified as _____. There shall be included in the watercourse an area extending laterally outward fifty (50) feet beyond the top of the banks on either side of such channel, except that the watercourse of the _____ from the southern boundary of the County to _____ shall include an area extending laterally outward one hundred (100) feet beyond the top of the banks on either side of its channel. A watercourse shall not include any property situated within the boundaries of any incorporated city. Top of the bank shall mean the upper elevation of land which confines waters flowing in a watercourse to their channel in their normal course of winter flow."

d. "Section 6.00. Protection of Streams and Meadows.

1. No trees will be cut and no yarding equipment shall be allowed within one hundred (100) feet slope distance from the edge of a stream channel or a perennial or intermittent stream, except where the timber harvesting permit allows selected cutting for the purpose of sanitation.

2. No yarding equipment shall be allowed in a meadow.

3. No tree shall be felled into a perennial or intermittent stream, or into a meadow or lake.

4. Trees shall be felled in such direction as to avoid destruction of streamside vegetation.

5. Logging debris shall be kept out of all live and intermittent streams. Any debris so deposited shall be removed immediately.

6. The traversing of perennial or intermittent streams by skid trails shall be avoided wherever possible. Unavoidable stream crossings may not be undertaken unless individually and specifically approved in the timber harvesting permit. Such approval shall be based on the adequacy of the bridging technique proposed at each such crossing and on the adequacy of the measures to be taken to prevent sedimentation of the stream. In no event shall log culverts, or any like method requiring the placing of rock and earthen material into the stream or streambed, be considered adequate bridging techniques. This does not preclude the installation of properly installed metal culverts.

7. Whenever a timber operation involves stream crossings, the applicant shall post a bond in an amount determined by the permit-issuing authority to be sufficient to insure against any damages resulting from the stream crossing for a period of five years from the time of the construction of the crossing.

8. The provisions of this Section shall supercede the provisions of Section 7.70 of the Grading Ordinance, and no separate permit shall be required under the Grading Ordinance for work authorized by the timber harvesting permit within a stream environment zone of one hundred (100) year flood plain."

B. Streamside Zone Vegetation Management

1. Criteria

a. Include provisions for vegetation management.

b. Ecologically compatible species should be used in revegetation operations.

c. Specify maximum period of time for vegetative re-establishment.

d. Specify amount and kind of vegetation removed from the streamside zone during vegetative manipulation.

e. Specify vegetative removal procedures from the zone.

f. Specify maximum area of soil exposure and disturbance and erosion control measures in those areas.

g. Provide that a management plan be prepared for any management activity within the zone.

h. Spell out responsibilities of landowner and operator in the management plan.

2. Examples

a. "ARTICLE 6. STREAM AND LAKE PROTECTION. 956. Stream and Lake Protection. The purpose of this Article is to insure the protection of beneficial uses that are derived from the physical form, water quality, and biological capacity of streams and lakes.

It is the further purpose of this Article to minimize erosion of stream and lake banks and beds during the conduct of timber operations.

In order to prevent unreasonable adverse effects on the beneficial uses of streams and lakes, each timber operator shall do the following:

(a) Below the stream and lake transition line the streams will be kept free of slash, debris, side cast and other material from logging operations. Accidental deposits shall be removed as soon as practicable. All operations will conform to agreement made pursuant to Fish and Game Code, where such agreements are required. Trees cut within fifty (50) feet of the stream and lake transition line as measured along the surface of the ground shall be felled as nearly as possible at right angles away from the stream or lake, or in such other manner as to minimize erosion and maintain water quality.

(b) The timber operator shall prevent the discharge of soil, silt, bark, slash, or other organic and earthen material from any logging, construction or associated activity into any stream or lake in quantities deleterious to fish, wildlife or other beneficial uses of water.

(c) When logging skid trails must cross a live stream a prepared crossing shall be used, except as provided by agreement pursuant to the Fish and Game Code.

(d) The timber operator shall not use beds of streams as landings, roads, or skid trails, except at prepared crossings or as provided by agreement pursuant to the Fish and Game Code.

(e) At all road crossings of live streams, install suitable structures of sufficient size to allow for the full surface flow of the stream throughout the entire period of timber operations. All structures shall be placed to allow unrestricted fish passage. Exceptions may be provided through agreements pursuant to the Fish and Game Code.

(f) All temporary stream crossing structures not designed for the normal maximum flow of the stream shall be removed prior to the normal maximum flow of the stream. All temporary structures shall be removed upon completion of logging.

956.1. Protection of Water Quality and Wildlife Habitat. To minimize erosion and protect water quality and fish and wildlife habitat within the stream and lake protection zone, adjacent to perennial streams and lakes, riparian vegetation, residual timber and other soil-protecting and shade-producing vegetation will be protected from unnecessary damage.

Felled trees shall be end-lined to the edge of the stream and lake protection zone and tractors or skidding equipment will not be operated within the zone except on existing roads or where less damage will result from the use of such equipment.

Within the stream and lake protection zone enough trees or shrubs of any species shall be left so that 50 percent or more of the shade-producing canopy before timber operations shall remain after timber operations are completed. When explained and justified the Timber Harvesting Plan may provide for a lesser percentage of remaining shade-producing canopy where it is necessary to achieve stocking standards or if it can reasonably be expected there will not be substantial adverse effects on soil erosion, wildlife, aquatic life, or unreasonable effects on the beneficial uses of water because of one or more of the following conditions.

a. The remaining canopy or streamside shrubs will still provide adequate protection;

b. A stream is oriented with a northerly or easterly facing slope such that the aspect substantially reduces the amount of solar radiation;

c. The depth and narrowness of the canyon at stream level is such that removal of additional percentage of canopy does not adversely affect the water or substantially increase erosion;

d. The combination of inherent temperature, depth, rate of flow and volume of water is such as to prevent significant heating or temperatures higher than normally required for the survival of trout or anadromous fish;

e. The length of stream affected by canopy decrease is less than 200 feet.

Only sanitation salvage cutting may be done in future harvests within the stream and lake protection zone until such time that the canopy has become sufficiently reestablished to prevent substantial adverse effects on soil erosion, wildlife, aquatic life, or the beneficial use of water.

In the event the State Forester disagrees with the judgment exercised by the Registered Professional Forester under this section following an on-the-ground inspection, if requested by either party, and rejects the plan, the person who submitted the plan may appeal to the Board of Forestry as provided in regulations adopted by the Board."

b. "4.30 Information Report. All applicants for timber harvesting permits shall file a report with the permit-issuing authority that states the following plans:

a. Fire fighting and prevention;

b. Slash disposal;

c. Erosion and siltation control;

d. Revegetation and reforestation."

c. "(d) Conditions. The granting of an exception may be conditioned by the requirement of certain measures to ensure compliance with the purpose of this Chapter. Required measures may include, but are not limited to:

1. Maintenance of a protective strip of vegetation between the activity and a stream, marsh, or body of standing water. The strip should have sufficient filter capacity to prevent significant degradation of water quality, and sufficient width to provide value for wildlife habitat, as determined by the Zoning Administrator.

2. Installation and maintenance of waterbreaks.

3. Surface treatment to prevent erosion or slope instabilities.

4. Installation and maintenance of drainage facilities.

5. Seeding or planting of bare soil.

6. Installation and maintenance of a structure between toe of the fill and the high water mark.

7. Installation and maintenance of sediment catch basins."

d. "916.4. Soil Treatment - Stream and Lake Protection Zone. Areas within 150 feet of a stream or lake, as measured along the surface of the ground, with high or extreme Erosion Hazard Ratings, where mineral soil is exposed by timber operations exceeding 800 continuous square feet in size, shall be seeded, planted, or otherwise treated for reduction of soil erosion prior to November 15th of the year of disturbance."

e. "(B) Any land occupier planning to engage in timber harvesting who does not have a district approved erosion and sediment control section in his timber harvesting plan shall either (1) enter into a district cooperative agreement for a conservation plan as explained in Section 8(A), or (2) submit notification to the district office of his proposed timber harvesting plans on _____ Conservation District Timber Harvest Form available at the district office at least ten working days prior to initiating any timber harvesting activities. Such notification shall include, as a minimum, the following information:

1. Name, address, and telephone number of landowner(s) and logging operator(s);

2. Legal description of proposed timber harvesting activities;

3. Description of proposed operation;

4. Plat map of the area showing all water bodies, roads, and erosion control structures;

5. Signatures of the landowner(s) and operator(s) agreeing to conduct all timber harvesting activities, which include the construction and location of all roads, in accordance with the adopted erosion and sediment control guidelines for timber harvest."

C. Responsibility for Administration and Enforcement

1. Criteria

a. Responsibility for administration and enforcement should be specified in the law or ordinance.

b. Responsibility for administration and enforcement should be vested in one agency.

c. Provide for adequate funding and personnel for administration and enforcement.

d. Provision should be made regarding liability for maintenance of the zone and abatement of disturbance within the zone.

2. Examples

a. "(C) Where the supervisors determine that accelerated erosion or sediment damage has occurred or is occurring, they will proceed to seek a voluntary solution to the problem using the following sequence:

1. The supervisors shall, within five working days of the investigation, provide written notification to the land occupier that an apparent violation of this ordinance exists with a copy to the complainant.

2. The supervisors or their designated representative shall, at the earliest possible date, discuss alternative solutions with the land occupier, offer technical assistance in bringing about an acceptable solution, and provide information regarding financial assistance.

3. The supervisors or their designated representative shall specify, in writing, a reasonable length of time to complete the corrective measures.

4. The supervisors or their designated representative shall inform the land occupier that he may use other than district assistance to bring about a satisfactory solution.

(D) If the land occupier disagrees with the results of the supervisors' investigation, he shall be given an opportunity to meet with the supervisors at their next regular monthly meeting to review their decision.

(E) If the supervisors find no reason to reverse their prior decision, they shall, within five working days of the meeting, notify the land occupier in violation by certified mail that he has 20 days to adequately demonstrate to the satisfaction of the supervisors his intention to proceed voluntarily towards correction of the violation, after which time, if there remains no indication of definite action to initiate corrective measures, the supervisors may file a petition with the district court in accordance with Section 76-110, R.C.M. 1947 of the _____ Conservation District Law.

(F) The supervisors shall notify the complainant in writing of their final decision and their prescribed procedure to correct the violation."

b. "(b) Abatement by County or District. If the nuisance is not abated by the owner in accordance with said notice, the Engineer shall so report to the Board and, if so directed by the Board, the Engineer shall abate the nuisance. Such abatement may be accomplished either by County or District work forces or others under contract with the County or District. The owner of the parcel involved shall be liable to the County or District for all costs incurred in such abatement including, but not limited to, reasonable attorney's fee."

c. "Section 10.00 Inspections and Authority to Stop Work

10.10 Inspections

All activities for which a permit is required, or which are regulated by the standards contained in this Ordinance, shall be subject to inspection by the permit-issuing authority.

10.20 Authority to Stop Work

Whenever any timber harvesting or other activity regulated by this Ordinance is being done contrary to the provisions of this Ordinance or the provisions of the permit issued, the permit-issuing authority or the Agency by its executive officer or his designee may issue a written notice to the responsible party to stop work on such timber harvesting or other activity. The notice shall state the nature of the violation.

10.21 A notice to stop work as provided in Section 10.20 shall stay in effect until revoked by the issuing authority, provided, however, that the party

to whom the notice was issued may obtain review of the action by the governing body of the Agency. Such review shall be initiated by a request filed by such party and shall be heard at the next regular meeting of the governing body of the Agency scheduled to be held more than seven (7) days after the filing of such request. Upon such review the governing body shall determine whether or not such timber harvesting or other activity is in violation and shall confirm, modify, or disaffirm the notice. It shall be unlawful for any person to violate any notice to stop work issued pursuant to this section and no work shall be done on the timber harvesting or other activity in question until the violation has been corrected and approval has been obtained from the permit-issuing authority."

D. Description of Pollutants, Allowable Levels and Monitoring

1. Criteria

a. Kinds (types) of pollutants should be specifically addressed in the legislation and ordinances.

b. Maximum allowable levels of pollutants and duration of occurrence should be specified for various streamflow levels.

c. Monitoring of on-the-ground compliance and water pollutant levels, including schedules, should be provided for.

2. Examples

a. "4562.7. Waterway Protection. The purpose of this section is to insure the protection of beneficial uses that are derived from the physical form, water quality, and biological capability of streams. To these ends, in addition to the rules provided for in Section 4562.5, the board shall adopt rules for control of timber operations which will result or threaten to result in unreasonable effects on the beneficial uses of the waters of the state. Such rules shall include rules for:

(a) The disposal of petroleum products, sanitary wastes, refuse and cleaning agents in proper dumps or waste treatment facilities to prevent them from entering streams.

(b) Construction of logging road and tractor trail stream crossings to assure substantially unimpaired flow of water and to assure free passage of fish both upstream and downstream.

(c) Minimizing damage to unmerchantable streamside vegetation, particularly hardwood trees.

(d) Minimizing damage to streambeds or banks resulting from skidding or hauling logs through, across, or into streams, by operating tractors or other heavy equipment in or near streambeds, or by construction of log landings or logging roads in or near the channels of streams.

(e) Control of slash, debris, fill, and side cast earth, resulting from timber operations, which may be carried into streams."

b. "(A) Land occupiers, supervisors, or state and county officials responsible for the maintenance of water quality in the district, may file a complaint against any person alleging that accelerated erosion or sediment damage has occurred or is occurring.

(b) The complaint shall: (1) include the name and address of the complainant; (2) be in writing, signed, notarized, and delivered to the district office; (3) include the date and location of the alleged violation; (4) describe the source, nature, and extent of the accelerated erosion or sediment damage alleged to have occurred or is occurring; and (5) become public record on file at the district office."

c. "Section 10218. Inspection. The Engineer may cause inspections of the work to be made periodically during the course thereof, and shall make a final inspection following completion of the work. The permittee shall assist the Engineer in making such inspections."

d. "(g) Inspection and Compliance. The Planning Director may conduct inspections to ensure compliance with this Chapter.

1. Inspection. The following inspections may be performed by the Planning Director:

   a. A pre-site inspection to determine the suitability of the proposed activity and to develop necessary conditions for an exception.

   b. A final inspection to determine compliance with conditions, plans, and specifications.

   These inspections may take place concurrent to inspections required by any permits necessary for the activities in question.

2. Notification. The permittee shall notify the Planning Director 24 hours prior to start of the authorized work and also 24 hours prior to the time he or she desires a required inspection.

3. Right of Entry. The application for exception constitutes a grant of permission for the County to enter the permit area for the purpose of administering this Chapter from the date of the application to the termination of any erosion control maintenance period. If necessary, the Planning Director shall be supplied with a key or lock combination or permitted to install a County lock."

DATE DUE

HIGHSMITH 45-220

U.S. GOVERNMENT PRINTING OFFICE 1978 796-058 90