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Cumulative Impact of Incremental Development on the Maine Coast : A Working Paper Prepared for Maine Department of Environmental Protection and Committee on Coastal Development and Conservation

Land Use Consultants, Inc.

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CUMULATIVE IMPACT
OF INCREMENTAL DEVELOPMENT
ON THE MAINE COAST

A WORKING PAPER
Prepared for
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
and
COMMITTEE ON COASTAL DEVELOPMENT AND CONSERVATION

Land Use Consultants, Inc.

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LAND PLANNERS ENGINEERS SURVEYORS

DECEMBER 1977

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December 30, 1977

77538P

Mr. Henry E. Warren, Commissioner
Maine Department of Environmental Protection
State House
Augusta, Maine 04333

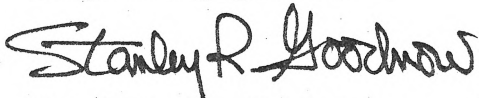
Dear Commissioner Warren:

We are pleased to submit herewith the final report for the study of the Cumulative Impact of Incremental Development on the Maine Coast.

As this report is to be used as a working paper by the Governor's Committee on Coastal Development and Conservation, its format has been designed to enable easy identification of individual findings and conclusions. My associates and I will be available to discuss the report upon request.

We would like to express our appreciation to the Department of Environmental Protection and the State Planning Office for their cooperation and assistance during this project.

Very truly yours,



Stanley R. Goodnow
President

SRG/b

Enc.

PREFACE

Because of the volume of material, the Appendices containing Technical Reports, List of Persons Contacted, Bibliography, and Statistical Appendix have not been included in the copies of this report to be submitted to the Committee on Coastal Development and Conservation. The Appendices are available upon request from the State Planning Office.

TABLE OF CONTENTS

SECTION I	- STATEMENT OF THE PROBLEM	
I.	CONTEXT OF REPORT	I - 1
II.	OBJECTIVES FOR CUMULATIVE IMPACT STUDY	I - 2
III.	THE CUMULATIVE IMPACT PROBLEM	I - 2
IV.	SCOPE OF THE CUMULATIVE IMPACT STUDY	I - 4
V.	DIFFICULTY OF FACTUAL DOCUMENTATION	I - 5
VI.	FORMAT OF REPORT	I - 6
VII.	PROJECT STAFF MEMBERS	I - 7
SECTION II	- SUMMARY OF DEVELOPMENT TRENDS	
I.	INTRODUCTION	II - 1
II.	RESIDENTIAL DEVELOPMENT TREND	II - 1
III.	COMMERCIAL DEVELOPMENT TREND	II - 5
IV.	INDUSTRIAL DEVELOPMENT TREND	II - 6
V.	RECREATION DEVELOPMENT TREND	II - 8
VI.	RESOURCE DEVELOPMENT TREND	II - 9
SECTION III	- CUMULATIVE IMPACT OF DEVELOPMENT TRENDS	
I.	INTRODUCTION	III - 1
II.	CUMULATIVE IMPACT UPON LAND USE AND AESTHETICS	III - 1
	A. RESIDENTIAL DEVELOPMENT	III - 1
	B. COMMERCIAL DEVELOPMENT	III - 4
	C. INDUSTRIAL DEVELOPMENT	III - 5
	D. RECREATIONAL DEVELOPMENT	III - 6
	E. RESOURCE DEVELOPMENT	III - 6
III.	CUMULATIVE IMPACT UPON PUBLIC UTILITIES AND SERVICES	III - 7
IV.	CUMULATIVE IMPACT UPON NATURAL RESOURCES	III - 8
	A. GEOLOGY AND HYDROLOGY	III - 8
	B. WATER QUALITY	III - 9
	C. AIR QUALITY	III - 10
	D. AQUACULTURE	III - 10
	E. WILDLIFE AND FISHERIES	III - 10
V.	CUMULATIVE IMPACT UPON SOCIO-ECONOMIC FACTORS	III - 11
	A. INTRODUCTION	III - 11
	B. POPULATION CHARACTERISTICS	III - 12
	C. HOUSING CHARACTERISTICS	III - 13
	D. ECONOMIC CHARACTERISTICS	III - 14
	E. MUNICIPAL GOVERNMENT CHARACTERISTICS	III - 15

SECTION IV	- PROBABLE DEVELOPMENT TRENDS AND IMPACTS	
I.	INTRODUCTION	IV - 1
II.	PROBABLE TRENDS IN RESIDENTIAL DEVELOPMENT	IV - 1
	A. IN AREAS SERVED BY WATER AND SEWERAGE FACILITIES	IV - 1
	B. IN AREAS WHERE WATER AND SEWERS ARE UNAVAILABLE OR INFEASIBLE	IV - 2
III.	PROBABLE TRENDS IN COMMERCIAL AND INDUSTRIAL DEVELOPMENT	IV - 2
	A. COMMERCIAL DEVELOPMENT SUBJECT TO REVIEW BY D.E.P.	IV - 2
	B. SMALL DEVELOPMENTS SUBJECT ONLY TO LOCAL REVIEW	IV - 3
	C. LIGHT INDUSTRIAL DEVELOPMENT	IV - 3
	D. GENERAL TRENDS IN COMMERCIAL AND INDUSTRIAL DEVELOPMENT	IV - 4
IV.	PROBABLE IMPACTS UPON PUBLIC UTILITIES AND SERVICES	IV - 5
V.	PROBABLE IMPACTS UPON NATURAL RESOURCES	IV - 6
VI.	PROBABLE IMPACTS UPON WATER QUALITY	IV - 7
	A. TIDAL WATERS	IV - 7
	B. RIVERS AND STREAMS	IV - 8
	C. LAKES AND PONDS	IV - 8
	D. GROUNDWATER	IV - 8
VII.	PROBABLE IMPACT UPON AIR QUALITY	IV - 8
VIII.	PROBABLE IMPACT UPON AQUACULTURE	IV - 8
IX.	PROBABLE IMPACT UPON BIOLOGIC RESOURCES	IV - 9
X.	PROBABLE IMPACT UPON AESTHETICS	IV - 9

SECTION V	- THE ABILITY OF REGULATIONS TO DEAL WITH CUMULATIVE IMPACTS	
I.	MUNICIPAL REGULATIONS	V - 1
	A. INTRODUCTION	V - 1
	B. PORTLAND	V - 2
	C. SOUTH PORTLAND	V - 2
	D. YORK	V - 3
	E. SCARBOROUGH	V - 4
	F. ROCKLAND - ELLSWORTH	V - 5
	G. JONESPORT - BEALS	V - 5
II.	STATE LAWS	V - 5
	A. INTRODUCTION	V - 5

	B.	WATER POLLUTION CONTROL LAW	V - 6
	C.	AIR POLLUTION CONTROL LAW	V - 6
	D.	SITE LOCATION OF DEVELOPMENT LAW	V - 7
	E.	ALTERATION OF COASTAL WETLANDS ACT	V - 7
	F.	GREAT PONDS LAWS	V - 8
	G.	PLANNING AND ZONING ENABLING LEGISLATION	V - 8
	H.	SUBDIVISION LAW	V - 9
	I.	MANDATORY SHORELAND ZONING AND SUBDIVISION ACT	V - 9
	J.	MINIMUM LOT SIZE LAW	V - 9
	K.	STATE PLUMBING CODE, PART II	V - 10
III.		LEGISLATION IN OTHER STATES	V - 10
	A.	INTRODUCTION	V - 10
	B.	CALIFORNIA	V - 11
	C.	DELAWARE	V - 12
	D.	OREGON	V - 13
	E.	FLORIDA	V - 14
	F.	MASSACHUSETTS	V - 14
	G.	WASHINGTON	V - 15
	H.	NEW JERSEY	V - 16
	I.	CONCLUSION	V - 17
SECTION VI		- MAJOR FINDINGS AND RECOMMENDATIONS	
	I.	DOMINANCE OF ECONOMIC FORCES	VI - 1
	II.	MUNICIPAL PLANNING AND REGULATIONS	VI - 1
	III.	STATE LEGISLATION	VI - 4
	IV.	STATE-LEVEL PROGRAMS	VI - 9
	V.	INTER-GOVERNMENTAL COORDINATION AND INTEGRATION	VI - 10
	VI.	AESTHETIC VALUES	VI - 12
	VII.	ECONOMIC DEVELOPMENT	VI - 14

APPENDICES

TECHNICAL REPORTS

LAND USE	TR I - 1
FISHERIES, WILDLIFE AND MARINE RESOURCES	TR II - 1
AESTHETICS	TR III - 1
PUBLIC UTILITIES, GEOLOGY, HYDROLOGY, WATER QUALITY, AIR QUALITY, AQUACULTURE	TR IV - 1
THE ROLE OF REGIONAL INSTITUTIONS IN FACILITATING ASSESSMENT OF THE CUMULATIVE IMPACT OF DEVELOPMENT IN COASTAL REGIONS	TR V - 1
LIST OF PERSONS CONTACTED	A - 1
BIBLIOGRAPHY	A - 6

STATISTICAL APPENDIX

LAND USE	I 1 - 6
RESOURCES	II 1 - 4
UTILITIES	III 1 - 9
GOVERNMENT	IV 1 - 7
POPULATION	V 1 - 16
HOUSING	VI 1 - 5
ECONOMY	VII 1 - 16
TRANSPORTATION	VIII 1 - 5
COMMUNITY PROFILES	IX 1 - 8c

TABLES

1.	Percent Change in Population and Housing	II - 1
2.	Percent Change in Retail Sales	II - 5
3.	Percent Change in Industrial Activity	II - 7
4.	Summary of Planning and Regulatory Activity	V - 1
5.	Development Statistics for York, Maine	TR I - 7
6.	Development Statistics for Scarborough, Maine	TR I - 14
7.	Commercial/Industrial Development Statistics for the Portland/South Portland Study Area	TR I - 15
8.	Residential Development Statistics for the Portland/South Portland Study Area	TR I - 30
9.	Development Statistics for Rockland, Maine	TR I - 36
10.	Development Statistics for Ellsworth, Maine	TR I - 44
11.	Development Statistics for the Jonesport/ Beals Study Area	TR I - 54
12.	Fishery Resource Evaluation of Selected Water Bodies	TR II - 2
13.	Registered Beaver Harvest, 1971-1976	TR II - 9
14.	Registered Deer Kill, 1960-1976; Average Annual Deer Kill Density, 1968-1972	TR II - 10
15.	Cause and Effect Relationships: Development as a Function of Utilities, Roads and Aquaculture	TR IV - 30
16.	Cause and Effect Relationships: Utilities, Roads and Aquaculture as a Function of Development	TR IV - 31

SECTION I

STATEMENT OF THE PROBLEM

I. CONTEXT OF REPORT

This study of the cumulative impacts of incremental development in Maine's coastal areas has been performed by Land Use Consultants, Inc., for the Maine Department of Environmental Protection. It was one of six special studies carried out by the Governor's Committee on Coastal Development and Conservation. The other five concurrent studies addressed State policies relative to:

1. Optimizing use of Maine ports.
2. Maximizing benefits derived from tourism.
3. Encouraging growth of the commercial fishing industry.
4. Siting heavy industrial facilities.
5. Distributing resource planning and management information to municipalities.

The Committee's goal in initiating these studies was to submit to the Governor policies for achieving a pattern of coastal resource use that will provide the following benefits for the people of Maine:

1. Economic expansion in an orderly fashion compatible with traditional activities.
2. A clustering of development so that the character of coastal communities will be maintained.
3. An increase in social well-being, including improved community stability, the wider availability and higher quality of basic services, increased opportunity for access to coastal land and waters, and general improvement in the standard of living.
4. Maintenance of environmental quality, including the protection of open space, agricultural, and forest land.
5. Protection of those aspects of the coast that make it a unique resource, particularly its aesthetic values.

6. The management of the renewable resources of the coast on an optimum sustained yield basis.

II. OBJECTIVES FOR CUMULATIVE IMPACT STUDY

These specific objectives were established by the Committee for the cumulative impact study:

1. Assess the cumulative impact of incremental development and projected trends in development on:
 - a. Socio-economic conditions of the area.
 - b. Open space, particularly agricultural and forestry land uses.
 - c. The natural environment; eg. wildlife and its habitat, marine resources, great ponds, etc.
 - d. Aesthetics of the area.
2. Recommend ways and means and alternatives thereto for courses of action that should be taken at State, regional, county and municipal levels to establish governmental mechanisms that will influence trends and patterns of development in the coastal area to:
 - a. Insure that natural resources, ecological balances and aesthetic qualities of the Maine coastal area are protected, conserved, restored, and if possible, improved.
 - b. Provide means for the cumulative effects and impact of development to be dealt with in a manner that protects local, regional and State interests.
 - c. Afford maximum opportunity for the maintenance and expansion of commercial, residential, industrial, and recreational activities in the coastal area in a manner that is consistent with the objectives stated.

III. THE CUMULATIVE IMPACT PROBLEM

At the outset, it is necessary to define the cumulative impact problem. Cumulative impacts are those impacts that

are realized when the incremental effects of individual development activities add up to the point where certain thresholds of tolerance are broached. Cumulative impacts can take many forms:

1. Residential development on lands adjacent to prime clam flats can reach the point where runoff and waste water effluent pollute the flats so severely that the clams are no longer edible and the flats must be closed.
2. Commercial development in a given area can reach the point where traffic arteries are no longer able to accomodate the increased volume of traffic and the roads must be reconstructed.
3. Industrial development in a given area can reach the point where air emissions or waste water effluent exceed the assimilative capacity of the airshed or watershed and output must be curtailed or production processes changed.
4. Recreational development in a given area can reach the point where the volume of use damages the inherent natural beauty of the area which attracted the development in the first place.
5. Agricultural fertilization and manure disposal within a pond's watershed can reach a point that causes an acceleration of the pond's eutrophication processes--water quality and habitat for fish are destroyed.

The common problem caused by adverse cumulative impacts is that corrective action is not always possible. Even when it is possible, action taken after tolerance thresholds have been exceeded--not in advance so as to prevent the problem from arising--are usually much more costly. A prime example is sewerage and water supply facilities: these are almost always more expensive when constructed after cumulative development activities have jeopardized environmental quality.

Solutions to cumulative impact problems are not easy but extreme positions should be avoided. Maine is highly endowed with varied natural beauty; it is also hard pressed to build a viable economic base. But it is no solution to the problem of adverse cumulative impacts to take the view "let's get the jobs, build the economic base, and worry about the problems later." Nor is the view: "let's stop growth and the problems won't arise," particularly helpful. Neither of these extreme solutions will work; they are mutually exclusive; they are overly simplistic.

Maine's public policy goals are to allocate and to manage our land and water resources to meet the physical, environmental and economic needs of our society. If this goal is to be realized, Maine's growth management institutions, its laws, its planning implementation, and its enforcement mechanisms must be revised to bring about a synergistic approach for identifying the thresholds of adverse cumulative impacts and for implementing the controls needed to avoid, whenever possible, crossing the thresholds leading to adverse cumulative impacts.

IV. SCOPE OF THE CUMULATIVE IMPACT STUDY

With the foregoing in mind the Cumulative Impact Study was designed to identify: development trends, the cumulative impacts arising from development activities, and to recommend ways and means of coping with cumulative impacts at State, regional and municipal levels. These procedures were utilized:

1. The trends and patterns of residential, commercial, light industrial, recreational, and resource development activities within the coastal area were identified. Three time periods were intended to be used to enable an assessment of the effectiveness of the State and local regulations that were enacted around 1970. Those time periods were: 1960-1970, 1970-1976, and the future. Because of an absence of data at State, regional and local levels it was virtually impossible to perform the trend analysis contemplated for such specific periods. General trends were identifiable, however.
2. Because of the difficulty of examining the entire coastal area within the three month period available for this work, six different sample study areas were selected as being representative of the various types of development activities that have occurred along the coast as a whole. Those sample study areas and the reasons for their selection were:

- | | |
|-----------------------------|---|
| York | - High seasonal population increase |
| Scarborough | - High rate of increase in permanent population |
| Portland and South Portland | - Commercial port, industrial, distributive, transportation, and financial center |

- Rockland - Expansion of light industrial activities, moderate population loss
- Ellsworth - Tourism and commercial development
- Jonesport and Beals - Coastal villages dependent upon traditional marine harvesting activities

3. An assessment was made of the impact of development within these sample study areas upon: land use, natural resources, environmental quality, aesthetic quality, socio-economic conditions and public infrastructure with emphasis upon population changes, municipal budget changes, and municipal services and facilities.
4. Indicators of growth were identified and discussed in relation to the need to monitor growth inducing actions and potential cumulative effects. It should be noted that cause and effect relationships are extremely complex and seldom exist in direct one-to-one relationships. However, this analysis sought to identify some of the indicators of growth and to predict some of the consequences that logically follow once basic development decisions or development inducing decisions have been made.
5. Existing State and local laws and regulations were evaluated as to their effectiveness in dealing with the phenomena of cumulative impacts resulting from incremental development.
6. Alternative institutional mechanisms were evaluated to determine how adverse cumulative impacts might be managed with greater effectiveness.
7. Policies and programs were recommended that would enable institutional, planning, and regulatory mechanisms to bring about more effective means of guiding development activities along the coast.

V. DIFFICULTY OF FACTUAL DOCUMENTATION

Throughout the course of this study considerable effort was devoted to identifying and obtaining existing data that would enable trend analysis and identification of cumulative impacts on the basis of factual recorded data. We found that very little data now exists in a form useful to such

an analysis. Such data that does exist is unbelievably fragmented and discontinuous.

1. Data maintained by municipal agencies was often incomplete or lacking. Often such data has been discarded because its utility was not perceived. Consequently it was most difficult to compile comparative data as to land use patterns, capital outlays and operating expenditures.
2. Data compiled by regional planning commissions was either too broad in coverage (without breakdown by municipalities) or was too recent to be useful for trend analysis prior to the 1970's. (Most regional planning commissions came into being around 1968)
3. Data compiled by State agencies was usually in raw form, and had not been compiled in a format that would permit trend analysis as to water quality and other environmental impacts. Also, the scope of such data was often too broad to be useful.

This lack of an organized data base and consistent analysis by State, regional and local agencies was a major obstacle to this study. Historical data was so fragmented or lacking that it was impossible to identify and document specific trends in development and cumulative impacts within the distinct time periods 1960-1970 and 1970-1976. Consequently, it also was impossible to identify and document the specific effects of the Site Location Law, Wetlands Laws, municipal zoning, municipal subdivision regulations, etc.

The time and budget allocated for this study neither anticipated nor permitted the extensive research and time needed to construct historical baseline data that could serve as a basis for trend analysis. Therefore, as much useful data was obtained as could be located in the time available. Using that data as a guide it was necessary to rely upon inductive reasoning, prior experience and professional judgments in order to define development trends, cumulative impacts and probable future trends.

VI. FORMAT OF REPORT

This report is intended as a working paper for use by the Committee on Coastal Development and Conservation in deciding upon the recommendations it will present to the Governor. Consequently, the report is in a summary format

with individual points itemized to enable easy extraction by the Committee. A more detailed analysis is contained in the Technical Reports that are contained in the Appendices.

VII. PROJECT STAFF MEMBERS

Land Use Consultants' staff for this study consisted of the following Key personnel:

Stanley R. Goodnow, A.I.P., A.S.C.P. Team leader,
land use impacts and institutional mechanisms.

Robert G. Gerber, P.E., Geologist. Impacts upon
physical resources, hydrology and public
facilities.

Orlando, E. Delogu, M.S., J.D. Existing legislation
and regulations, recommended legislation,
institutional mechanisms.

Carl E. Veazie, B.A., M.B.A. Socio-economic impacts.

David J. Brownlie, B.S. Biologic and land use impacts.

Avis M. Baird, Administrative assistance and technical
support.

SECTION II

SUMMARY OF DEVELOPMENT TRENDS

I. INTRODUCTION

This section contains a summary of development trends for the periods 1960-1970 and 1970-1975 for each of the following categories of development: residential, commercial, light industrial, recreational and resource development. Each type of development is discussed in relation to the most significant factors causing that particular type of development activity.

II. RESIDENTIAL DEVELOPMENT TREND

A. TREND

During the 1960-1975 period, residential development occurred at increasing rates within each of the study areas. Rates of growth in population and housing units were as shown in the following table.

Table 1

Percent Change in Population and Housing

<u>Study Area</u>	<u>Population</u>		<u>Housing Units</u>		<u>%Single Family</u>	
	<u>1960-1970</u>	<u>1970-1975</u>	<u>1960-1970</u>	<u>1970-1975</u>	<u>1960</u>	<u>1975</u>
York	22%	20%	3%	29%	29%	54%
Scarborough	22	35	7	32	88	74
Portland/ South Portland	-7	0	-2	5	43	43
Rockland	-3	-5	2	5	64	59
Ellsworth	4	15	9	17	81	67
Jonesport/Beals	-10	8	-2	10	79	79

Sources: U.S. Census of Population (revised); U.S. Census of Housing

Four specific trends are identifiable: 1) a predominance of single-family houses on individual lots scattered along the shoreline and along public roads, 2) linear subdivision designs, 3) conversion of seasonal camps and cottages into year round permanent housing; and 4) an increase in the proportion of multi-family dwelling units.

B. CAUSAL FACTORS

1. Predominance of Single Family Homes in Rural Areas

This type of development phenomenon is common to all except the most densely populated areas with very limited available developable land area, such as the City of Portland. Some of the more prominent factors perpetuating roadside strip development are:

- a. Low cost vacant land is more readily available in rural areas, and the road provides ease of access.
- b. Developers reduce their individual house lot development costs in areas where utilities are not available. The costs for water supply and sewerage facilities can then be delayed until all or a large number of the proposed houses have been built, at which time these costs will be borne by the homeowner and/or the town.
- c. A widespread desire for "country living" on the part of the buying public.
- d. Federal subsidy programs have stimulated residential development in two ways. First, until just recently, there had been no requirement that subsidies be dependent upon the availability of public water supplies and sewerage facilities. Second, in many cases, subsidies have brought the monthly cost of homeownership down to a level lower than monthly rent payments.

2. Linear Subdivision Design

Residential subdivisions tend to be designed in grid or linear patterns even though they may involve the construction of costly new streets. The rigidity of municipal zoning ordinances and planning boards is as responsible for this trend as are market forces.

- a. Linear subdivisions are usually simple to design and construct. Therefore, design and engineering costs, if not construction costs, can be kept low.
- b. Few if any incentives exist to encourage developers to design subdivisions that make more efficient use of land and open space.
- c. Large lot sizes are encouraged, if not required, by many municipalities. Clustering by its very nature utilizes smaller lots so that the remaining land can be retained as open space or conservation areas for steep slopes, drainages, wetlands, etc.
- d. Planning boards generally tend to view cluster developments as a device used by the developer to increase densities in excess of those otherwise permitted, not as a means of conserving open space.
- e. Developers, faced with the realities of time and carrying costs, have found that planning boards tend to favor linear designs and generally approve them more readily than clustered development proposals.
- f. Towns are reluctant to accept responsibility for open spaces associated with private residential developments and developers do not want the long-run responsibility for maintaining open space. Administration of common open space by homeowners associations is generally regarded as cumbersome and difficult on a consistent basis.
- g. Clustered development is dependent upon the use of common water supply and sewerage disposal systems where public facilities are unavailable. A lack of effective legal and administrative devices make such common facilities difficult to maintain over time.

3. Conversion of Seasonal to Permanent Housing

This is a phenomenon common to the entire coastal area. It is brought about by several causes:

- a. Increasing property taxes, particularly for shoreland property, are causing many people to dispose of either their year round or seasonal home. Faced with this choice many decide to

winterize the summer camp and enjoy its amenities on a year round basis. If they should sell the summer place, chances are it will be bought by persons who will winterize it for year round use. An alternative strategy is to winterize and rent the cottage during the winter to earn money to offset taxes and maintenance costs.

- b. Persons retiring to coastal communities often purchase and winterize seasonal property for year round use.
- c. A general lack of available housing has resulted in the conversion of seasonal homes as a means of meeting the housing demands.

4. Increase in Multi-Family Housing

Many municipalities are experiencing a slow but noticeable trend in the increasing proportion of multi-family residential construction in both urban and rural areas.

- a. Multi-family housing is invariably owned by a single entity with dwelling units leased to the occupants. Even condominium forms of ownership utilize some form of management organization with responsibility for maintenance of common facilities such as open space and common water supply and sewerage facilities. For these reasons, multi-family housing is not constrained in the same manner as clustered subdivisions where such responsibilities are often fragmented.
- b. Economies of scale are possible in the construction of multi-family housing. The per unit cost of land and buildings is usually less than that incurred with single family housing. Therefore, the cost of multi-family housing is within the reach of more families than could afford the purchase, ownership and maintenance of a single family home.
- c. Rent subsidy programs for low income and elderly housing have made multi-family housing profitable for the developer and affordable for the occupant.
- d. The increasing availability of public water supply and sewerage facilities, particularly along the urban fringe, has opened up new areas suitable for multi-family residential development.

- e. The limited quantity of close-in available land in areas such as Portland has served to raise the cost of such land and thus to focus residential development away from single family development and toward multi-family use of the remaining undeveloped land. The re-development of previously occupied land follows a similar pattern.
- f. A relatively new market for multi-family units of small size and without maintenance responsibilities has been generated by three market segments: middle aged couples whose housing needs change after their children have grown and established their own places of residence; single individuals and separated or divorced couples that now require small, but separate housing; young married couples that cannot afford to buy with the rise in housing and mortgage costs.

III. COMMERCIAL DEVELOPMENT TREND

A. TREND

Commercial development has increased markedly in certain municipalities such as South Portland, Scarborough and Ellsworth.

The following table shows the relative change in commercial activity.

Table 2

Percent Change in Retail Sales
(adjusted for inflation)

<u>Study Area</u>	<u>1963-1972</u>
York	NA
Scarborough	122%
South Portland	204
Portland	-3
Rockland	32
Ellsworth	88
Jonesport/Beals	50

Source: U.S. Census of Business; C. Veazie

The trend is away from congested downtown areas and toward locations that have access to and from high volume traffic arteries. Sought after locations must also have proximity to local population concentrations and will usually be accessible to regional populations via interstate highways.

B. CAUSAL FACTORS

1. Commercial development has followed the residential flight to suburban areas. As population spread out, new patterns of commercial activity developed. Multiple centers of activity have replaced the single downtown shopping area. This trend began in the mid 1950's and has continued at an accelerating rate. It will continue as long as the private automobile remains the principal mode of personal transportation or until access and parking in downtown areas is as convenient as in suburban locations.
2. Suburbanization has occurred because of the almost universal ownership of private automobiles. The great majority of people are no longer dependent upon fixed route public transportation. When combined with the existence of the interstate highway system, these factors provide people fast and convenient access to a much wider area. This makes possible regional shopping centers with market areas well in excess of 100 miles.

IV. INDUSTRIAL DEVELOPMENT TREND

A. TREND

Industrial development during the overall study period shows an increase in both production and employment but in recent years there has been a slight decline. The following table illustrates the pattern of industrial development.

Table 3

Percent Change in Industrial Activity
(adjusted for inflation)

<u>Study Area</u>	<u>Value of Manufactured Product</u>		<u>Manufacturing Employment</u>	
	<u>1960- 1970</u>	<u>1970- 1975</u>	<u>1960- 1970</u>	<u>1970- 1975</u>
York	-75%	na	-64%	na
Scarborough	167	31%	208	42%
South Portland	265	-26	139	-27
Portland	21	-16	-8	-15
Rockland	117	6	16	-9
Ellsworth	138	-38	15	-39
Jonesport/Beals	-76	-62	-67	-40

Source: Census of Maine Manufacturers; Maine Department of Manpower Affairs; State Development Office; C. Veazie

Overall industrial activity increased between 1960 and 1970 but declined between 1970 and 1975. The factors responsible for this recent declining trend are not clear but seem attributable to changes in nationwide economic and population patterns coupled with Maine's geographic and transportation disadvantages.

B. CAUSAL FACTORS

1. The general population shift away from the northern tier of states to the southwest and the sun belt states has relocated market concentrations. Maine obviously finds itself more distant from these areas of population and economic growth.
2. New sources of power and new transportation modes have supplanted Maine's historic attractions of inexpensive hydro-electric power and good harbors for waterborne commerce. Manufacturing can now take place closer to

both sources of raw materials and markets. Certain Maine ports may experience accelerated activity related to oil or natural gas development on the continental shelf, but these opportunities are yet to be realized to any substantial degree.

3. Manufacturing processes are more capital intensive and require fewer workers to produce the same product.
4. New industrial activities consist of light industries that are often spin-off plants from other industrial facilities within the Greater Boston area. These facilities are attracted to Maine by low cost available land in suburban areas, an ample supply of low cost non-union labor, and the increasing availability of industrial parks with utilities and access to major transportation arteries.

V. RECREATION DEVELOPMENT TREND

Trends in recreation development have taken two major forms: 1) the provision and expansion of public recreation facilities by public agencies at the Federal, State and local levels; and 2) commercial facilities providing food, lodging, amusements, and other services. Trends in commercial recreation facilities are being addressed in a concurrent study on Tourism performed by the Department of Conservation, therefore, they are not addressed in this report.

The demand for public recreation facilities has increased throughout the period, although some leveling off has been reported since 1975. The capacity of public parks has been unable to keep pace with usage with the result that many facilities are filled during peak periods throughout the summer season. A revised Statewide Comprehensive Outdoor Recreation Program has been recently released by the Department of Conservation and contains data documenting trends in the development and use of public recreation facilities.

The factors that generate recreational demands and the use of recreation facilities have been well documented in numerous reports and studies in Maine as well as elsewhere. They include increased population levels, greater personal mobility made possible by the private automobile, improved highway transportation facilities, increased leisure time, and higher personal incomes.

VI. RESOURCE DEVELOPMENT TREND

A. INTRODUCTION

For the purpose of this study, resource development activities have been defined to include forestry, agriculture and aquaculture. Commercial fisheries, except aquaculture, were not covered in this study as they are being addressed in a concurrent study sponsored by the Committee on Coastal Development and Conservation.

B. FORESTRY

Within the area defined as coastal Maine there is little commercial forestry. Unfortunately, forest production data are available only by county. Data pertaining to the timber harvested in each county represented by the six study areas are contained in the Statistical Appendix. It was not possible, on the basis of available published data, to determine what proportion of that production was derived from the coastal area.

C. AGRICULTURE

Agricultural data, as with forestry data, are aggregated on a county and district basis. Thus there are no readily available data to determine agricultural trends within the coastal area specifically.

Because of the importance of agricultural land to land use activities, Land Use Consultants used aerial photographs to identify the trend in agricultural lands in York and Scarborough during the study period. Between 1962 and 1975 the number of agricultural fields in York declined from 213 to 186. Of the total loss of 27 fields, 3 were abandoned and 24 were developed for other uses.

In Scarborough, between 1957 and 1972 the number of fields declined from 363 to 322. Of the total loss of 41 fields, 6 were abandoned and 35 were developed for other uses.

The causal factor in the conversion of agricultural land to other uses is quite simple; good agricultural property is also relatively inexpensive to develop for other uses.

D. AQUACULTURE

A definite trend has been established in aquacultural development in estuarine areas. Presently there are fifteen to twenty aquaculture activities along the coast from Kittery to Passamaquoddy Bay. Marine species being raised include: oysters, scallops, coho salmon, lobsters, and mussels.

Aquaculture is still in its infancy and must be considered an experimental activity. Its success and the extent of development may well depend upon a variety of tax, technical, market development, financing, and management training considerations. In addition, some aquaculture species simply cannot adjust to Maine's climatic extremes unless temperatures are modified through such means as utilizing hot water effluent from power plants.

E. RESOURCE EXTRACTION

Sand and gravel are necessary to nearly all construction activities. The demand for borrow has intensified the utilization of existing gravel pits as well as the search to identify and open up additional sources. During the last twenty years, the number of gravel pit operations has increased from 52 to 108 within the six study areas included in this report. As gravel sources near urban areas are depleted, competition for gravel deposits in outlying areas becomes more intense and more costly to develop due to increased transportation costs. This trend will continue in the future.

SECTION III

CUMULATIVE IMPACT OF DEVELOPMENT TRENDS

I. INTRODUCTION

Cause and effect relationships are seldom, if ever, identifiable in direct one to one relationships. Every development affects land use, public infrastructure, and the natural environment to some extent. Except in unusual situations, a single development seldom will have an impact of such significance as to require immediate and adaptive responses by the public sector. Significant impacts are the result of the cumulative aggregate effects of a succession of individual developments. Since cumulative effects arise over time, they frequently are not recognized until certain thresholds have been crossed and observable problems arise. Unfortunately, by that time the corrective actions necessary to overcome or to mitigate adverse cumulative impacts are expensive and difficult to accomplish.

Development is not necessarily detrimental. The construction of new housing fills a vital social need. Development of natural resources provides the basic raw materials necessary to industrial activity. Industrial growth creates the goods and services that are the basis of a healthy and expansive economy. Economic growth provides jobs and incomes for the new increment of people that enter the labor market each year. Recreational facilities, whether public or commercial, provide the recreation opportunities that are important to a healthy society. Often recreational facilities provide a necessary cultural link between our society, its origins and its natural heritage. However, the cumulative impacts that exceed certain thresholds almost always have adverse effects.

This section summarizes the general relationships between development and cumulative impacts that have occurred during the fifteen year period included in this study. The Statistical Appendices and Technical Reports provide a detailed analysis of development trends and identifiable cumulative effects in each of the study areas included in this report.

II. CUMULATIVE IMPACT UPON LAND USE AND AESTHETICS

A. CUMULATIVE IMPACT OF RESIDENTIAL DEVELOPMENT

1. Single Family

- a. Single family residential development absorbs

land at a rapid rate due to required lot sizes. Where such development is dependent upon domestic wells and subsurface sewage disposal, the rate of absorption of land is highest.

- b. Scattered linear residential development along existing roads has resulted in a narrow strip of residential development extending radially into rural areas from downtown concentrations.
- c. Single family development has resulted in rapid strip development along coastal shorelines. Many narrow very long "spaghetti lots" have been created that contain sufficient land area to avoid regulatory review by D.E.P. but cause all the problems of strip development.
- d. Subdivisions have been designed in linear patterns usually without regard to protection of fragile natural areas.
- e. Rural communities have adopted large minimum lot sizes as a means of slowing residential growth, with the result of intensifying strip development and precluding economies of scale in the provision of municipal facilities and services.
- f. In areas where development has occurred with individual subsurface sewage disposal systems, densities often are too high for soil conditions resulting in the need for public sewerage facilities to overcome pollution problems.
- g. Extension of sewer service to outlying residential areas to overcome pollution problems has been costly in relation to revenues such service can generate. Consequently, a new round of residential growth has occurred as allowable densities have been increased and additional land has become available for fill in development.
- h. Inadequate storm water control has resulted in occasional flooding within residential areas, and in increased runoff and soil erosion.
- i. Rural residential development has resulted in increased traffic loads on rural roads thus necessitating road widening and realignment.
- j. Single family development is economically dependent upon easily developable land. Consequently, there has been a loss of aquifer recharge areas, potential sources of gravel, and agricultural land to single family residential development.

2. Multi-family

- a. Rising costs of land and construction have resulted in more intensive multi-family developments, particularly in larger cities.
- b. Multi-family developments accelerate the need for water supply and sewerage facilities, increased road capacities and improved storm drainage facilities.
- c. Usually located on the periphery of settled areas, multi-family developments serve to increase the scattering of residential development.
- d. As public facilities are extended, fill-in development has been stimulated along these routes resulting in conflicting land use patterns as new housing is intermixed with older suburban and rural uses.
- e. In areas with limited undeveloped land, such as Portland, land availability and land costs have resulted in redevelopment in urban areas at higher than previous densities.

3. Seasonal Housing

- a. The trend to winterize seasonal housing for year round occupancy has resulted in more intensive use of shoreland areas. This has required municipalities to provide sewerage and often water supply facilities to overcome environmental problems due to increased volumes of sewerage and runoff. Road improvements also have been necessitated by increased traffic loads and the need to maintain such roads on a year round basis. The extension of such facilities to rugged and irregular coastal areas is extremely costly.
- b. Conversion of seasonal housing places a greater demand on all public facilities and services, e.g. schools, police, fire protection, etc.
- c. As the trend to year round residential use of shorelands becomes apparent, an attraction is created for further residential construction along shorelines.

B. CUMULATIVE IMPACT OF COMMERCIAL DEVELOPMENT

1. The scattering of commercial development has resulted in strip development at major traffic intersections and along arteries with the highest traffic volumes.
2. Land use conflicts have been created by encroachment of commercial facilities within formerly residential areas. In many municipalities these conflicts have been severe particularly during the transition period. The rate of transition has often been fairly rapid due to the higher land values for commercial rather than residential use, and the tendency for homeowners to sell out for the purpose of moving to a more congenial residential area.
3. Utilities extended to serve commercial areas have opened additional land for fill-in developments, thus accelerating the rate of strip commercial development.
4. The absence of turning lanes or frontage roads, and haphazard and random points of ingress and egress to commercial facilities, have created hazardous driving conditions along most commercial strips.
5. Traffic congestion in some strip commercial areas has caused a shift to shopping center construction with greater setbacks from highways and improved design of ingress and egress to offstreet parking.
6. Commercial strip developments have frequently generated traffic volumes in excess of the capacity of access roads to the point where congestion and safety hazards have necessitated costly road reconstruction.
7. Competition for location and position have created visual blight, a confusion of competing commercial signs, overhead utility poles and lines, traffic control facilities, through traffic, and local traffic seeking ingress and egress to commercial facilities.
8. Insensitive architectural design and the absence of landscaping to buffer commercial facilities and make them appear visually more pleasing have added to the visual blight along major traffic arteries.
9. Commercial areas that absorb large amounts of land for paved parking lots, alter the land's drainage characteristics. Storm drainage problems due to increased and accelerated runoff are not uncommon.

10. Some municipalities have taken the position that problems created along State highways are the State's problem. Consequently these municipalities have not addressed many of the problems which can arise from inadequately designed commercial facilities, and which should be controlled by local land use measures.
11. A lack of coordinated planning and forethought by State and local bodies has resulted in situations where major facilities have been constructed in locations where the overburdening of public facilities either already exist or is likely to exist. There has been little inclination to deny the right to develop until adequate access and support facilities are provided.
12. The remarkable sameness of many commercial facilities has resulted in a loss of diversity and distinctive character in the coastal landscape.

C. CUMULATIVE IMPACT OF INDUSTRIAL DEVELOPMENT

Many of the cumulative impacts arising from industrial development are similar to those resulting from commercial development. Additional impacts from industrial development activities are listed below:

1. The trend for industries to disperse to locations where land is inexpensive and in proximity to major transportation links has resulted in an inevitable transition of land near major highway networks from agricultural and open space to industrial uses.
2. Utilities often have been extended to potential industrial sites to attract industrial development. As sewerage facilities generate development, such extensions have caused further, and often non-industrial, development activity in nearby areas.
3. Increased volumes of automobile and truck traffic to and from industrial facilities have often exceeded highway capacity with the result that costly road construction becomes necessary.
4. The shift in industrial activities away from commercial waterfronts has opened up opportunities for commercial and recreational redevelopment along urban waterfronts.
5. The shift of both the place of residence and the place of work from urban to scattered suburban locations has changed travel patterns and development

opportunities in ways that have been little considered by most municipalities in their land use planning and regulatory activities.

D. CUMULATIVE IMPACT OF RECREATIONAL DEVELOPMENT

1. Recreational facilities, such as beaches, have often generated traffic to the point that commercial, and sometimes residential, development has been attracted to roads leading to significant recreation attractions.
2. The intensive development of commercial facilities in close proximity to recreational areas often causes a decline in the aesthetic character and enjoyment of these recreational areas.
3. The utilization of many public recreation facilities has reached the point of overcrowding resulting in deterioration of the scenic environment and the recreational experience.
4. The acquisition and development of public parks has been opposed by residents of some coastal municipalities. This opposition is attributable to the impacts resulting from traffic and the removal of otherwise valuable shorelands from the tax rolls.

E. CUMULATIVE IMPACT OF RESOURCE DEVELOPMENT

1. Sand and gravel resources are being depleted at a rapid rate due to the need for these materials in all types of construction and development activities. In many coastal areas the future use of these limited resources is being foreclosed by residential and other development activities.
2. Gravel pit and quarry operations generate noise, heavy truck traffic and unsightliness. Consequently, opposition has arisen to the development of new mineral sources in many areas along the coast.
3. The lack of requirements to restore and reclaim closed gravel pits, particularly those less than five acres in size, has resulted in the abandonment of many old pits without regard to their safety or visual appearance.
4. Heavy truck traffic on inadequately constructed access roads to pits and quarries has broken the pavement in many such areas.

5. Inadequate control of runoff from pits has resulted in severe sedimentation problems in certain water courses and ponds.
6. Excavating into the ground water table has the potential of adversely affecting ground water quality.
7. Aquacultural activities have the potential of adverse visual appearance in coves and estuaries and may conflict with navigation and boating activities.
8. Forestry operations have increased runoff, sedimentation, and have adversely impacted water quality when inadequate erosion control methods are used or when cutting takes place too close to streams and roads. Harvesting operations have an adverse visual impact when insufficient buffers along roads and water bodies are not maintained.

III. CUMULATIVE IMPACT UPON PUBLIC UTILITIES AND SERVICES

A. CUMULATIVE IMPACT UPON PUBLIC UTILITIES

1. Water Supply

Residential, commercial and industrial development all result in extensions of water mains, increased consumption and, in some instances, the need to develop additional sources of supply. Aquifer recharge areas have been susceptible to loss because they are easily developable.

2. Sanitary Sewers

Sewer construction has followed overdevelopment with septic systems. The existence of sewers generates additional development and higher densities of land use. Sewers have been constructed to guide the location of industrial facilities, but have not been used as a means of directing residential growth.

3. Storm Sewers

Prior to 1970, there was little concern for storm water management. This resulted in frequent storm flooding and the subsequent construction of drainage systems. Since 1970 the Site Location Law and Subdivision Regulations have improved onsite drainage facilities, but diversion of storm water often causes off-site storm drainage problems due to increased runoff.

4. Electricity

The increased number of users coupled with increased consumption per user has generated a need for increased capacity and thus more distribution lines, transmission, substations, switchyards and power plants. Overhead distribution and transmission lines cause aesthetic degradation.

5. Telephone

The increase in the number of telephone customers is proportionally greater than the increase in population or housing units, due to the increase in business telephones. In South Portland, the increase in telephone customers is more than double the population increase.

6. Roads

New subdivisions increase street mileage considerably and most notably in rural areas. In Scarborough street mileage increased 51% between 1964 and 1971, and 14% between 1971 and 1977. In York the increase was 24% between 1956 and 1973.

7. Solid Waste Facilities

There have been dramatic increases in the volume of solid wastes and the costs of its disposal. Volumes and costs in Portland between 1960 and 1970 rose from 12,800 tons and 5% of the public works budget to 20,528 tons and 10% of the public works budget. During the same period population increased only 10%. All municipalities are faced with a similar situation.

Few sites suitable for sanitary land fills exist in coastal areas. Towns often do not consider the suitability of alternative sites but concentrate on utilization of the one easiest to obtain (usually that means the site least expensive to obtain and not necessarily least expensive to operate).

IV. CUMULATIVE IMPACT UPON NATURAL RESOURCES

A. CUMULATIVE IMPACT UPON GEOLOGY AND HYDROLOGY

1. Gravel Pits

There has been a dramatic increase in the use of sand and gravel. In Scarborough, the number of pits increased from 19 to 51 between 1956 and 1970. Many

potentially valuable sources were developed for residential and other uses. Pit operations and heavy truck traffic affect neighboring land uses. Most pits are less than 5 acres in size, therefore escape requirements for regrading and revegetation. Potential erosion and sedimentation from pits is an environmental problem. Abandoned pits sometimes pose safety problems to youngsters in the neighborhood who are unaware of the dangers of slides and cave-ins.

2. Shoreline Erosion

Development on dunes, headlands and bluffs has accelerated soil erosion. Property owners face existing and potential property losses as shorelines erode. Rockland, Jonesport, Beals have experienced significant shoreland erosion.

3. Streambank Erosion

Increased runoff from development can accelerate streambank erosion and increase sediment loads.

4. Hydrology

A most significant impact is increased runoff from developed areas. Extensive impervious surfaces (blacktopped parking lots for example) increase both the speed and volume of runoff, resulting in increased erosion and sedimentation. Ten year recurrence peak runoff flow in Card Brook in Ellsworth increased from 410 cubic feet per second in 1957 to 556 cfs in 1976 as a result of residential and commercial development in the watershed.

B. CUMULATIVE IMPACT UPON WATER QUALITY

1. Tidal Water

Twenty percent of Maine's clam flats are closed due to pollution from development. Every town studied has closed clam flats at some time in recent years. Increased runoff, effluent discharges, dredging and fill are the main causes. The extensiveness of closed areas has required the building of depuration facilities that clean clams from certain designated closed flats so that they can be marketed. The building of sewage treatment facilities has enabled some clam flats to be reopened, but in some developed areas flats remain polluted by surface runoff. In

York, York Harbor and the Cape Neddick River estuary, flats have been re-opened to depuration clam harvesting. Scarborough has the most productive clam flats in the State. They have been closed completely since 1971 except in a few depuration areas.

2. Rivers and Streams

Development has increased coliform counts in streams throughout the study area, but absence of data precludes an estimate of the extent or trend in stream degradation.

3. Lakes and Ponds

Development and agricultural practices within watersheds as well as on shorelands, accelerate lake eutrophication. Little data exist to enable an analysis of these processes in Maine lakes.

4. Ground Water

Developments affect groundwater indirectly where there is depletion of water levels due to increased well digging. In coastal areas such wells may cause salt water encroachment. Ground water pollution has also been caused by salt applied to roads during winters and by dump and gravel pit operations.

C. CUMULATIVE IMPACT UPON AIR QUALITY

Concentration of air pollutants increases with the density of development. Ambient air quality in Portland and Rockland have on occasion exceeded state standards. Southern Maine is impacted more by drift from industrialized states to the south and southwest than by local emissions. However, industrial emissions in some areas of Maine are a problem particularly when combined with emissions from other development activities.

D. CUMULATIVE IMPACT UPON AQUACULTURE

Increased runoff, temperature change, dredging, fill, sedimentation and addition of pollutants may result in upsetting the natural balance in estuaries to the detriment of aquaculture, as well as naturally occurring marine life feeding and incubation processes.

E. CUMULATIVE IMPACT UPON WILDLIFE AND FISHERIES

No data was available from which quantified values could

be derived to determine the extent of wildlife loss resulting from development activities.

1. Cumulative Impact Upon Wildlife

Nearly all development activities that permanently alter natural vegetation result in a reduction of wildlife habitat and wildlife populations. These losses are subsequently increased as more intensive hunting pressure concentrates into progressively smaller areas and accelerates the decline in the population of game species. On the other hand, certain other activities, such as forestry and abandonment of fields result in increased wildlife populations. The new vegetative growth provides cover and food sources for many upland species such as deer, grouse and woodcock.

2. Cumulative Impact Upon Fisheries

Development has had adverse impacts upon fisheries populations where protective measures have been inadequate. Construction of dams has eliminated coldwater and anadromous fish populations due to increased temperatures, decreased flows and inadequate fishways. Oil spills and other discharges have been damaging to wildlife and shellfish populations in certain areas. Development activities near saltmarshes and shellfish areas, as in Scarborough, have resulted in pollution due to waste discharges, urban runoff and sedimentation. During recent years, there has been a gradual improvement in some coastal areas due to the construction of pollution control facilities.

V. CUMULATIVE IMPACT UPON SOCIO-ECONOMIC FACTORS

A. INTRODUCTION

Specific impacts of development activities upon municipal socio-economic factors, bonded indebtedness, operating costs, and tax rates were not possible to identify due to two factors. These impacts are seldom identifiable in direct cause and effect relationships in that few municipal facilities and services are attributable to any single type or sequence of development activity. Additionally, the time available for this study did not enable the research necessary to correlate socio-economic impacts with development trends. The following discussion, therefore, pertains to the aggregate effect of population changes and development activities within each of the sample study areas.

The Community Profiles contained in the Statistical Appendix have been tabulated to show the relative values for changes in development activity and socio-economic characteristics during the periods included in this study.

B. CUMULATIVE IMPACT UPON POPULATION CHARACTERISTICS

1. Total Population

Since 1960 the total population of Scarborough and York has increased at a rapid rate (65% and 46% respectively), while Ellsworth and Beals have risen moderately, South Portland has remained constant, and Portland, Jonesport, and Rockland have declined.

2. Seasonal Population

By far the greatest peak seasonal (summer) population occurs in York, where increases of nearly 300% over year round population are usual. Significant seasonal increments also occur in Ellsworth, Scarborough and Portland.

3. Population Density

The only communities with a population density exceeding 1000 per square mile are Portland and South Portland. Those towns with densities above 100 are Rockland, Scarborough, Beals and York.

4. Migration

All the coastal towns except Scarborough and York experienced net out-migration of people between 1960 and 1970. Since 1970, only South Portland and Rockland have continued to experience net out-migration. During the latter period, the heaviest net in-migration occurred in Scarborough, York and Ellsworth.

5. School Enrollment

Elementary school enrollment rose significantly between 1963 and 1977 in Beals, Scarborough, and York, while it declined considerably in Rockland, Portland, Jonesport, and South Portland. High school enrollment increased in all communities except Rockland and Portland.

6. Incomes

Per capita income has risen the fastest between 1969 and 1974 in Jonesport and Scarborough, and the slowest in Portland, South Portland and Beals. However, by far the highest income levels occur now in Scarborough and York, and the lowest in Jonesport and Beals.

7. Employment

Total employment covered by the Employment Security Law rose most rapidly during the last five years in York and Ellsworth, and declined in Rockland. Five of the communities now have employment exceeding 1000 persons, while three (York, Jonesport and Beals) have less. Portland, Rockland and Ellsworth must accomodate large numbers of commuters who come from surrounding towns to places of work within. South Portland, Scarborough, York, Jonesport and Beals experience the opposite phenomona. Many of their residents work in nearby communities.

The most typical employment category in Portland, South Portland, Rockland, Scarborough, and Ellsworth is wholesale and retail trade. In Beals it is resource industries (fishing). In York and Jonesport it is manufacturing, but the manufacturing places of employment are located in other municipalities.

8. Unemployment

The unemployment rates for males in 1970 was the lowest in Beals and Jonesport, and highest in Rockland and Ellsworth. By far the highest rate of female unemployment occurred in Beals and Rockland, and the lowest in Scarborough, South Portland and Portland.

C. CUMULATIVE IMPACT UPON HOUSING CHARACTERISTICS

1. Housing Type

The percentage of single-family units declined between 1960 and 1970 in all communities except Portland, where these structures now form only 37% of the housing stock. Multi-family units are most significant in Portland, South Portland, and Rockland, while mobile homes are most numerous in Scarborough, Ellsworth, York and Rockland.

The greatest relative increases in new year-round housing since 1970 have taken place in Scarborough,

York and Ellsworth. A majority of the new units in York, Scarborough, Ellsworth and Rockland are single-family homes, while Portland and South Portland have concentrated on apartment units, and Jonesport and Beals on mobile homes.

D. CUMULATIVE IMPACT UPON ECONOMIC CHARACTERISTICS

1. Agriculture

The value of crops sold in the coastal counties has fallen (in constant collars) since 1959. At the same time, the value of livestock products sold (mainly poultry, eggs, and milk) has risen considerably in all but Hancock County. The greatest relative increases have occurred in York and Washington Counties.

2. Forestry

The amount of hardwood timber cut in Knox County rose tremendously since 1960, while Washington, Hancock and York Counties suffered losses. Softwood timber cutting rose in Washington, Knox and Hancock, and declined in Cumberland and York Counties. Pulpwood production increased in Washington and Knox, and declined in York, Hancock and Cumberland.

3. Fisheries

The pounds of finfish landed decreased in all coastal counties except York since 1960. Shellfish landings, on the other hand, rose considerably in all areas during that period.

4. Mineral Production

Mineral production along the coast has been limited to copper and zinc in Hancock County, peat in Washington, limestone in Knox, and sand and gravel in many areas.

5. Manufacturing

Manufacturing production since 1960 has risen most rapidly (in constant dollars) in Scarborough, South Portland, and Rockland. Ellsworth also enjoyed moderate gains, while Portland remained stable and Jonesport suffered a substantial loss. Average gross wages are now highest in Portland and South Portland.

Since 1960, the greatest increases in wages have taken place in Portland, Rockland and Ellsworth. Employment in manufacturing plants increased fastest in Scarborough and South Portland, remained stable in Rockland, and declined in Jonesport, Ellsworth and Portland. Beals, Jonesport, and York have practically no employment in manufacturing.

Foods are the principal manufactured products of Beals, Jonesport, Ellsworth and Rockland. Textiles also are important in Ellsworth, printing in Rockland, and shoes and foods in Scarborough. Portland has significant employment in a number of industrial categories, while South Portland specializes mainly in electrical equipment and machinery.

6. Wholesale Trade

Wholesale trade rose significantly (in constant dollars) between 1963 and 1972 in Ellsworth, South Portland, Rockland, and Portland. However, most of it is still concentrated in Portland and South Portland. Employment in wholesale firms increased most rapidly in Rockland, South Portland, and Ellsworth. It remained constant in Portland.

7. Retail Sales

Retail sales increased (in constant dollars) in all communities except Portland between 1963 and 1972, but the fastest rises occurred in South Portland and Ellsworth. Employment in retailing also increased most rapidly in South Portland, while it was stable in Portland and rose considerably in Ellsworth and Rockland.

8. Selected Service Receipts

Receipts of selected services (hotels and motels, business and repair services, amusements, etc.) rose considerably (in constant dollars) in all coastal towns except Rockland between 1963 and 1972. Employment in these services also increased in all communities except Rockland.

E. CUMULATIVE IMPACT UPON MUNICIPAL GOVERNMENT CHARACTERISTICS

1. Real Property

The equalized state valuation of real property (at 100% of estimated market value) rose fastest (over

100% in constant dollars since 1960) in Beals, Scarborough, and York. Moderate increases also took place in Ellsworth, South Portland, Jonesport, and Rockland, while Portland suffered a decline.

2. Property Taxes

Property taxes assessed by the eight municipalities rose fastest (since 1960) in the rapidly growing communities of Scarborough and York, more moderately in Beals, Jonesport and South Portland, and relatively little (in constant dollars) in Ellsworth, Portland, and Rockland. Portland and South Portland now have the greatest local tax burden (8% of personal income) followed by Ellsworth, York, Rockland, Scarborough, Jonesport and Beals.

3. Municipal Debt

Total municipal debt increased most rapidly since 1960 in Scarborough and Rockland. More moderate increases occurred in Portland and South Portland, while there were declines in Ellsworth and York. Per capita municipal debt now is highest (\$585 and \$421, respectively) in Portland and South Portland, and lowest (less than \$50) in Jonesport, York, Ellsworth, and Beals. Rockland and Scarborough have per capita debts of \$259 and \$215, respectively.

4. Operating Expenditures

General operating expenditures rose (in constant dollars between 1957 and 1976) the fastest in the rapidly growing communities of Scarborough (316%) and Ellsworth (204%). More moderate increases took place in South Portland (126%), Portland (101%), and Rockland (43%). There are no available 1957 data for York, Jonesport or Beals. Operating expenditures for education rose less rapidly than non-educational expenditures in all recorded communities except Portland.

Operating expenditures for education represent far higher shares (over 60%) of the total budgets in the rapidly growing communities of Scarborough, York, and Ellsworth as well as in Beals, where the level of other municipal services is minimal. In the older, more static cities of Portland, South Portland and Rockland, on the other hand, expenditures for non-educational services constitute over half of their total budgets. In Portland, above-average increases were recorded between 1957 and 1976 in interest on debt, housing and urban renewal, education, and health.

Below average increases occurred in highway, public welfare, hospital, police and fire protection, sewerage and sanitation, park and recreation, and general control (administration accounts). In South Portland and Rockland, the greatest relative increases took place in debt service and general control, while police, fire protection and park and recreation accounts also rose in Rockland. In rapidly-growing Scarborough, expenditures for debt service, police, and general control increased the fastest. In Ellsworth, expenditures for education rose faster than those for any other function.

A direct comparison among most municipalities is difficult because of the lack of a uniform accounting system.

5. Capital Outlays

Municipal capital outlays rose most rapidly (in constant dollars since 1957) in Rockland (300%) and Ellsworth (35%) while declines were registered in Scarborough and Portland. (There are no comparable figures for South Portland and York, because most municipal annual reports do not segregate capital outlays from operating expenditures.) In Portland, the only community for which complete data exist, the greatest rises in capital outlays were for housing, urban renewal, and schools. In Rockland, there have been substantial recent outlays for sewers and an industrial park. Both Scarborough and York have expanded their outlays for highways and general public buildings, while Ellsworth is now building extensive sewers. Beals and Jonesport have incurred only minimal expenditures for new structures or equipment.

SECTION IV

PROBABLE DEVELOPMENT TRENDS AND IMPACTS

I. INTRODUCTION

In assessing probable trends it is important to note that the State Planning Office has projected a total population increase for Maine of two percent between 1975 and 1982. However, municipalities within the Coastal Zone are projected to increase in population by six percent within that same seven year period. In projecting probable development trends, it has been assumed that institutional mechanisms will remain substantially unchanged.

II. PROBABLE TRENDS IN RESIDENTIAL DEVELOPMENT

A. IN AREAS SERVED BY WATER AND SEWERAGE FACILITIES

1. Increased Multi-Family Development Served By Utilities

- a. There will be a continuation of residential sprawl and scattered development. Developers will continue to seek inexpensive and easily developable land. As suitable rural and suburban sites become increasingly scarce, developers will refocus upon sites where utilities exist or to which they can be extended.
- b. Pressures to extend water and sewerage facilities in order to open additional areas for development will become more intense. These pressures will conflict with municipal policies to extend sewerage facilities only when absolutely necessary and to do so primarily to rectify pollution problems arising from existing development.

The result will be that developers will be required to provide minimal improvements with the costs being borne by the developer and/or the homeowner or tenant. To realize economies of scale in residential development and to offset these costs, developers can be expected to seek zoning changes to enable higher densities of development.

- c. Absence of pre-planned utility extensions in coordination with municipal planning and zoning, will result in potentially large increases in public investment for expanded water supply

systems, waste disposal facilities, storm drainage facilities, and street improvements, particularly in areas where these facilities are already at or near capacity.

- d. As capacity requirements increase, so will the need to develop additional sewage treatment capacity and water supply sources. Many aquifers and surface water bodies will be found to have been developed for other uses and their potential use as public water supplies will have been foregone. Consequently, it will be necessary to develop sources at increasingly greater distances from existing service areas.
- e. As distant water supply sources are developed and connected to existing distribution facilities, new service areas will be available for development at higher densities than otherwise anticipated. These development opportunities will generate a new cycle of development activity.

B. IN AREAS WHERE WATER AND SEWERS ARE UNAVAILABLE OR INFEASIBLE

1. Large lot zoning will be used as a means of avoiding the potential need for water supply and sewerage facilities occasioned by malfunctioning sewerage systems and inadequate or substandard well water. In effect, there will be an accelerated use of large lot sizes and density controls as a substitute for public water supply and sewerage facilities.
2. Scattered strip development will continue along existing roads. Developers will resort to the use of long narrow lots as a means of meeting minimum lot size requirements and avoiding the costly construction of new streets and storm drainage facilities.
3. Intensified development of rural road frontage will necessitate road widening and storm drainage improvements on State highways and town roads.

III. PROBABLE FUTURE TRENDS IN COMMERCIAL AND INDUSTRIAL DEVELOPMENT

A. COMMERCIAL DEVELOPMENTS SUBJECT TO REVIEW BY DEP

1. There will be a gradual improvement in the design of interior layout and parking facilities.

2. Improved traffic control measures will be required such as turning lanes, defined points of ingress and egress, and other devices designed to facilitate the movement of both local and through traffic.
3. Needed off-site improvements usually will be delayed until adverse cumulative impacts have arisen.
4. Increased enforcement by DEP will result in greater compliance with State requirements.

B. SMALL COMMERCIAL DEVELOPMENTS SUBJECT ONLY TO LOCAL REVIEW

1. Where adequate design criteria exist in local ordinances that are enforced there will be improvements in set-backs from public rights of way, defined points of ingress and egress, commercial signing and lighting, and in parking lot circulation.
2. Where inadequate land use controls exist there will be no change from the present trend of haphazard development that will be located without regard to cumulative impacts and long run municipal costs, but that will minimize developers short-run out of pocket costs.
3. Each individual development will continue to be viewed in isolation without adequate consideration of its incremental effects in relation to pre-existing development.

C. PROBABLE FUTURE TRENDS IN LIGHT INDUSTRIAL DEVELOPMENT

1. The trend will continue away from heavy manufacturing to light manufacturing activities producing easily transportable components and finished products.
2. There will be a continued scattering of industries among areas with adequate labor supply, low cost land and convenient access to interstate highways and airports. Greater Portland and Southern Maine will continue to be focal points for industrial locations.
3. Industries with special locational requirements, will continue to locate throughout the State where their particular requirements can be met. Such conditions often include being located away from competitors in a one industry municipality, in an area of high unemployment, where suitable raw materials exist, or where there is a favorable political climate ready to offer financial or other incentives.

4. Municipalities pressed for tax dollars, will be tempted to incur costs by offering incentives to industries to locate within their borders. If the industry has no other strong reason for selecting a given location, such inducements may be effective, but in the long-run competition for industries on this basis is self-defeating and results in windfall gains for the industry at the expense of local taxpayers.

D. GENERAL TRENDS IN COMMERCIAL AND INDUSTRIAL DEVELOPMENT

1. The trend toward highway-oriented facilities will continue as will traffic volumes on State and local traffic arteries that funnel commercial and industrial traffic.
2. Land use and public facilities planning relative to changing land use patterns, road and traffic improvements, storm drainage, and the provision of utilities and other public facilities, will continue to be uncoordinated and haphazard. Needed improvements will be made after adverse cumulative impacts have arisen rather than avoided by advance steps to avoid such conditions. Such improvements will be time consuming and costly.
3. There will be continued encroachment of commercial and industrial facilities into residential and agricultural areas.
4. Land use conflicts and external impacts upon neighboring land uses due to commercial and industrial signs, lighting, noise and traffic congestion will become of even greater public concern.
5. There will be increased demand for the extension of water and sewerage facilities to serve commercial and industrial development in outlying areas.
6. Land values along major traffic routes will continue to rise rapidly as will the economic pressures that generate changing land use patterns.
7. The lack of rapid, adaptive responses in downtown areas will continue to make them less competitive commercial centers.
8. A continuation of seemingly haphazard commercial development patterns may erode public confidence in the ability of the regulatory process to control development activities.

IV. PROBABLE IMPACTS UPON PUBLIC UTILITIES AND SERVICES

A. PUBLIC UTILITIES

1. Water Supply

Public water supply is not necessary for rapid residential growth as shown in York and Scarborough. However industrial and commercial growth usually does require it. Although water consumption per customer may drop in the coming years, total water consumption will probably increase slowly. Municipalities are not providing appropriate land use controls in areas that contain presently unused water supplies. This will result in many of these areas being developed by 1990-2000 and their potential as sources of additional water supply will be lost. The cost of water will increase fastest in those areas which experience the fastest growth.

2. Sanitary Sewers

Most large Maine coastal communities have either just completed or will soon complete major sewerage systems including secondary treatment facilities. With the amount of land having soils suitable for subsurface sewage systems decreasing rapidly, and with the shift in FHA policy favoring new construction on public sewage systems, most new industrial, commercial and moderate to high density residential growth will occur on public sewerage systems. There will be intensified demand to extend sewers into areas where this type of growth is likely to occur.

3. Storm Sewers

Minor flooding and construction of underground storm water collection systems have occurred with great frequency in the built-up areas of the study towns. Commercial development has caused the greatest runoff problems. Towns seem to have assumed responsibility for these problems and they respond to them as they occur. More storm water piping will be installed as growth continues and the capacity of downstream pipes is exceeded. These will be costly reconstruction programs.

4. Electricity

The increase in electrical use will probably continue to grow in greater proportion than population increases, particularly in recreational and commercial areas. The

number of transmission and distribution lines will also increase. Two very large power plants will be necessary and probably will be built on the Maine Coast by the year 2000.

5. Telephone

The number of telephone customers will continue to increase in greater proportion than population, particularly in commercial areas.

6. Roads

The suburban and recreational towns will continue to see significant increases in road mileage, particularly since many ordinances require large road frontages and clustering is still not common. The major cities and rural areas will not see big increases as most development will occur along existing roads, but municipalities will face costly road widening projects. Much strip development will continue along State highways, resulting in greater traffic congestion.

7. Solid Waste Facilities

Most larger municipalities have just turned to sanitary landfill methods of solid waste disposal and will probably stay with this until the landfills' capacity is exhausted, which in most cases will be in the period 1990-2000. The rural coastal communities, particularly the peninsula areas, will be slow to solve the problems of solid waste management due to lack of good landfill sites and the high costs of alternatives. The future beyond 2000 is uncertain, but recycling should begin to play a larger role in solid waste management.

V. PROBABLE IMPACTS UPON NATURAL RESOURCES

A. GEOLOGY AND HYDROLOGY

1. Gravel Pits

The number of new pits and expansions of existing pits will continue to increase at a rapid rate, particularly in suburban and rural areas. Most of these pits will be abandoned without rehabilitation.

2. Shoreline Erosion

Natural forces will continue to cause shoreline erosion, but increased development on and near the

shoreline area will accelerate the process by increasing foot traffic on banks and construction on bluff tops which will increase the likelihood of slumps. Construction of bulkheads and other measures to locally retard erosion will result in increased erosion rates on adjacent areas.

3. Streambank Erosion

Streambank erosion will accelerate in areas downstream of urbanized areas due to increased runoff and stream capacity, particularly where underground storm water collection systems discharge to the streams.

4. Slope Stability

With increasing demand for shoreline property, river bank property, and other property on steep slopes with good views, there will be more slope failures endangering property. Slope failures occur largely through natural processes but they are aggravated by excessive runoff and saturation at the top of the slope, and by excavations at the toe of the slope.

5. Hydrology

Increasing development of commercial and high density residential areas will cause increased surface runoff and decreased ground water recharge. In small watersheds downstream flood plain elevations may rise. Municipalities will continue to react to these problems by installation of traditional underground storm sewers which will only aggravate the downstream effects. Water quality will also suffer with increased runoff and aquaculture sites at the heads of estuaries will be adversely affected.

VI. PROBABLE IMPACTS UPON WATER QUALITY

A. TIDAL WATERS

Completion of sewage treatment plants will result in water quality improvements, such that some closed shellfish areas will be opened to harvesting. However, runoff from urban areas into water bodies such as Portland Harbor and the Union River will retard the pollution clean-up effort. Urban runoff will create water quality problems in small estuaries with low flushing rates. Areas such as Jonesport and Beals will continue to deteriorate until sewage treatment is provided.

B. RIVERS AND STREAMS

The treatment of point wastewater discharges will result in significant water quality improvement. However, non-point sources, particularly runoff, will retard efforts to rid rivers and streams of pollution.

C. LAKES AND PONDS

The primary threat to lake water quality is more intensive watershed use for agriculture and secondly, runoff from developed areas. Each lake has a definite assimilative capacity and once this is exceeded, advanced eutrophication results. Some lakes can be expected to become eutrophic, with the attendant loss of fish and other wildlife as well as recreational potential.

D. GROUNDWATER

Although the soil mantle is a fairly good wastewater treatment system, some chemicals (such as nitrates) are not completely absorbed or otherwise removed by soil. Scattered instances of ground water contamination will occur down-gradient of sites where wastewaters with high pollutant concentrations are disposed. The situation will be particularly serious in shallow bedrock areas. As shoreline development continues in coastal shoreline areas where there is no central water supply, saltwater encroachment can be expected in some areas.

VII. PROBABLE IMPACTS UPON AIR QUALITY

The primary air quality problem in Maine is photochemical oxidants received from states to the south and southwest. Particulate standards are violated in several coastal city areas but the causes are not known with certainty. Sulphur dioxide levels have only been a problem on the densely developed Portland peninsula. Air quality problems will continue to be generated primarily by out-of-state activities. However, particulate levels will probably continue to increase in urban areas, especially if more wood or coal is burned for heating. In addition, local problems may be caused by particular industrial facilities experiencing malfunctions or inadequately treating air emissions.

VIII. PROBABLE IMPACTS UPON AQUACULTURE

There are numerous small aquaculture operations scattered

about the coast. Most of these are in relatively clean waters; one is utilizing the warm water discharge of a power plant. Potential aquaculture sites have been delineated along the coast. Aquaculture sites need very clean water with as few unnatural perturbations as possible. Secondary sewage treatment may not be sufficient to clean up polluted waters and make them suitable for aquaculture. Increased runoff produced by development will impair water quality and thus pose a threat to aquaculture.

IX. PROBABLE IMPACT UPON BIOLOGIC RESOURCES

Increased development activities will continue to absorb wildlife habitat and areas of scarce plant species with a reduction in both the quantity and quality of biologic resources.

X. PROBABLE IMPACT UPON AESTHETICS

In the absence of a greater willingness to utilize fee acquisition, easement acquisition, development controls containing aesthetic criteria, and other means to protect the visual environment, there will be a continued decline in the diversity and visual attractiveness of the coastal landscape. The following pressures will continue and may well intensify over time:

1. Increased pressures to encroach upon and develop shorelands will reduce diversity, tend to obstruct views and impose disharmonious elements in those views that remain.
2. The continued escalation of coastal land values will increase the tendency to use shorelands even more intensively.
3. The demand for access will increase due to added populations.
4. Energy demands will create pressure to utilize shoreline areas for electrical generation facilities, oil transmission and support facilities and other heavy industrial uses.
5. In spite of accelerated effort to protect significant historic and architectural structures, there will be continued pressure to replace these buildings with new and more functional facilities if they should be in commercially desirable locations.

SECTION V

THE ABILITY OF REGULATIONS TO DEAL WITH CUMULATIVE IMPACTS

I. MUNICIPAL REGULATIONS

A. INTRODUCTION

The land use control measures of each of the eight municipalities included within the study areas were examined to assess the extent to which those controls recognized and dealt with the cumulative impacts of successive development. Table 4 illustrates the planning and control mechanisms in effect within each municipality.

Table 4

Summary of Planning and Regulatory Activity

Municipality	Regional Planning Commission Member	Planning Board	Comprehensive Plan	Zoning Ordinance	Subdivision Regulations	Housing Code	Building Code	Mobile Home Ordinance	Capital Improvement Program	Conservation Commission
Portland	X	X	X	X	X	X	X	X	X	
South Portland	X	X	X	X	X	X	X	X		X
York	X	X	X	X	X		X	X		X
Scarborough	X	X	X	X	X		X	X		X
Rockland	X	X	X	X	X	X	X	X	X	
Ellsworth	X	X	X	X	X	X	X	X	X	
Jonesport	X	X	X	Shore-land				X	X	
Beals	X	X								

Source: Maine State Planning Office Survey, Jan. 1976, July 1977.

B. PORTLAND

In examining Portland's planning data, reports, and implementing ordinances, one is struck almost immediately with the bulk of it, the comprehensive range of activities that reach back several decades. A series of Land Development Plans reflect changing local attitudes, changing federal and state policies, and of course trends in actual development activity. Zoning and subdivision ordinances (particularly the former) are layered with amendments designed not simply to alter boundary lines but to enable new phenomena, emerging complexities, and more recently perceived harms to be dealt with.

Portland has obviously benefited from the full-time planning effort it has committed itself to. It has benefited too from the high degree of citizen involvement in its planning activities and from its involvement with the Greater Portland Council of Governments. But in spite of these obvious and considerable strengths one is hard put to find in any of the documents and ordinances either a clear perception of cumulative impact, or substantive provision designed to reduce or eliminate the adverse consequences of cumulative development activities.

There are any number of examples of adverse consequences that cumulative development causes which Portland has and will continue to have to deal with. The pile up of commercial developments in and around Exit 8 of the Turnpike continues to this day -- traffic flow is an increasing problem even though several street widening improvements have taken place. Successive residential developments along or near outer Forest, Brighton and Washington Avenues have given rise to sewage collection problems and the need for new school construction at a time when total school enrollment is declining. Downtown resurgence in the form of both major new construction and rehabilitation of old buildings in the Old Port area has also produced traffic flow and parking problems. The continuing conversion of older residential units on the peninsula to doctor's offices or multi-family use exacerbates still further neighborhood parking problems -- so much so in fact that the city recently abandoned its total prohibition of overnight parking on city streets. In other words, the failure to recognize and prevent adverse cumulative impacts means that the problems will either have to be lived with or corrected after the fact.

C. SOUTH PORTLAND

Many of the comments made with respect to Portland apply to South Portland as well. It has a permanent planning

staff and a high degree of citizen involvement in planning activities. It too is a member of the Greater Portland Council of Governments and has for a long time been actively involved in both the planning process and the development of appropriate land use controls.

In South Portland's materials and ordinances one finds few, if any, references to the problems associated with cumulative development. And again one finds a number of actual situations where the failure to anticipate and avoid such problems has quite predictably produced adverse consequences. The proliferation of commercial development in and around the Maine Mall complex has overburdened the road network designed to serve the Mall and parking facilities in the area of the Mall. In addition sewage facilities in the area are presently at or over capacity. All of these problems are likely to get worse before they get better, particularly if commercial development is allowed to continue in this area. Growth on the other side of the Turnpike is at this point all but precluded (largely because of limited sewage capacity). And remedial changes with respect to any or all of these problems will almost certainly be very costly. Finally, the aesthetic character of the area is being lost. Similar traffic flow and parking problems are being encountered as a result of the proliferation of commercial development in the Knightsville area, particularly on the Mill Cove side of the area. Even Waterman Drive originally designed to facilitate traffic flow is becoming more and more heavily developed on both sides. The adverse impact of individually sound but cumulatively harmful commercial development is beginning to be felt here.

D. YORK

The materials examined from the Town of York evidence an increasing concern with land use planning and control measures. The latter are designed to enable the town to cope more readily with rapid permanent population increases and the sharp (some would even say staggering) increase in the number of summer residents and visitors. At the same time the Town is obviously aware of and wishes to preserve not only its historical village character but its rural and coastal amenity which has made it an attractive place in which to both live and vacation.

York is not yet large enough to have a full time planner and/or planning staff. Thus it has relied over the years on a variety of consulting firms to assist it in its thinking. At present the Town is a member of the Southern Maine Regional Planning Commission and is able to call upon

that body as necessary for both technical and planning staff assistance. The materials prepared for the Town in years past by outside consultants are interesting and were probably helpful at the time but they evidence little understanding of the problems associated with and arising from cumulative development activities. More recently, however, revisions of the planning board standards for subdivision review and portions of a proposed residential growth management ordinance contain language which does evidence an awareness of cumulative impact. This language requires that each new development activity be viewed in the context of existing activities before its suitability is determined and required permits granted. The adverse effects of inadequately regulated cumulative development activity is already being felt in the village area particularly during the summer months when the combination of permanent and summer residents and visitors stresses the carrying capacity of police and fire protection services, parking and traffic flow capacity, and sewer and water facilities.

E. SCARBOROUGH

Of the eight coastal municipalities chosen for study none has had the magnitude of permanent population increase that Scarborough has. At the same time Scarborough must cope with a sizeable number of summer residents and visitors. They have a town planner and are members of the Greater Portland Council of Governments.

Review of a variety of planning documents and ordinances reaching back to the late 1950's fails to disclose a full awareness of the adverse consequences which cumulative development can give rise to. Perhaps no one of the eight municipalities examined evidences in more acute fashion the adverse consequences of rapid development. The proliferation of cottages and permanent homes in the Higgins Beach area makes traffic flow and parking all but impossible during the summer months. A succession of strip commercial developments along Route One also gives rise to unsafe and time consuming traffic flows. The continuous subdividing of land for new home construction throughout the town has polluted beach and clam flat areas, exhausted the present capacity of sewers and waste water treatment facilities, and stressed almost all other public services. The remedial costs facing the town for sewer construction alone are significant indeed. Moreover, the attractiveness and aesthetic qualities of coastal areas and rural inland areas of the town have declined in recent years.

F. ROCKLAND - ELLSWORTH

From a planning and land use control standpoint these two coastal municipalities are very similar. Neither has full time professional planning assistance. Both belong to regional planning commissions which provide them with technical and planning staff assistance. Rockland's population has declined slightly in recent years -- Ellsworth's has increased slightly. Both experience some influx of summer residents and visitors.

The zoning and subdivision ordinances of both municipalities show no awareness of and thus contain no provisions which would avoid the adverse consequences of cumulative development activities. And both communities have allowed a succession of commercial development activities to give rise to acute parking and traffic flow problems. At this point these problems can only be remedied at great expense. They pose unsightly and unsafe conditions and threaten the continued economic viability of the very activities which have given rise to the problem.

G. JONESPORT - BEALS

These two municipalities also have a great deal in common from a planning and land use control standpoint. Neither has a full time planner (they obviously do not need one). Both belong to the Washington County Regional Planning Commission which can meet their needs for technical and planning staff assistance. Neither community has been or is presently heavily involved in planning or land use control activities (see Table 4).

Jonesport did, however, undertake the preparation of a two-phase Comprehensive Development Plan in the early 1970's relying on a planning consulting firm. These documents contain some references to impacts arising from cumulative development activities, but the whole phenomena must seem foreign in these two relatively sparsely settled municipalities. With the exception of state-mandated shoreland zoning ordinances, no local land use controls exist in either municipality so avoidance of harms associated with cumulative development is not possible.

II. STATE LAWS

A. INTRODUCTION

It was not possible in the limited time available to deal with all Maine laws affecting the environment or that regulate land use and development activity in some way.

The ten laws selected for examination in terms of their ability to address the cumulative impact of development were chosen because of their significance, particularly within the coastal zone.

B. WATER POLLUTION CONTROL LAW

The present water pollution control law recognizes to a greater degree than many other environmental control laws the reality of cumulative impact. Section 414-A specifically says that the Board shall issue a license for the discharge of pollutants only if it finds that the discharge by itself "or in combination with other discharges" will not lower the quality of the receiving water body. The phrase "or in combination with other discharges" appears in several other sections of the act and evidences a recognition of the fact that harmful levels of water pollution may be reached by the activities of a single polluter, but may be reached as a result of the combined discharges of several polluters. The act, however, does not make clear what the Board is to do in circumstances where the existing assimilative capacity of the receiving water body has been completely allocated to an existing group of dischargers and a new, would-be, discharger seeks a discharge license. This applicant may be prepared to use a modern water pollution control technology and may in fact seek a license to discharge an amount both smaller in quantity and less deleterious in quality than existing (and previously licensed) dischargers. A literal reading of the statute would suggest that such an applicant for a waste discharge license would be denied. But the reasonableness of the applicant's proposed treatment and discharges would make it very difficult for the Board to in fact deny his application for a license, particularly in light of judicial decisions which tend to look at each applicant individually and ask whether he has acted reasonably, is proposing the best practicable treatment, etc., and if so, to order the issuance of the requested discharge license.

C. AIR POLLUTION CONTROL LAW

The State's air pollution control law contains language which recognizes cumulative impact. Section 590 dealing with the licensing of air emissions directs the Board to grant an emission license when it finds that the proposed emission "either alone or in conjunction with existing emissions" will not violate applicable ambient air quality standards. But the same comments made above with respect to water are applicable here. The Board would find it difficult not to license a relatively small air emission

that was receiving best practicable treatment merely because a previous group of emitters were polluting up to the allowable level in a given air quality region.

D. SITE LOCATION OF DEVELOPMENT LAW

This act, though one of the most important state level tools for regulating development, does not in any clear or precise way enable the DEP to take into account the cumulative impact that proposed development may have. There is no language similar to that quoted above in the water and air pollution control laws of the State.

Section 481 of the site law, while alluding to some of the problems that developments give rise to, does not even suggest that problems may arise as a result of individually approveable but cumulatively detrimental development activities. Section 482 which defines "development which may substantially effect the environment" contains no language suggesting that a later development in a given area should be added to prior developments in that same area so that its cumulative impact may be analyzed within the context of the site law. And, most importantly, Section 484 of the site law which itemizes the criteria that the Board must use in assessing a development proposal contains no express language that would enable the Board to take into account cumulative impact. An argument could be made that paragraph three dealing with adverse effect on the natural environment could be read expansively so as to enable cumulative impact to be considered. But, in fact, many cumulative impacts do not affect the natural environment at all, but affect school systems, road systems, the capacity of sewerage systems, the capacity of water supply systems, etc.

E. ALTERATION OF COASTAL WETLANDS ACT

Maine's legislation dealing with the alteration of coastal wetlands is found in Title 38. Title 12 authorizes the Board of Environmental Protection to zone wetland areas. Nowhere in either of these two pieces of legislation is the concept of cumulative impact addressed. Indeed, Section 474 of Title 38 suggests that the applicant's proposal to alter a wetland area is to be viewed and determined reasonable or unreasonable on the basis of its interference with existing recreational or navigational uses, its capacity to avoid soil erosion, its ability to avoid interference with the flow of water, its ability to avoid harm to wildlife and marine fisheries, and its ability to avoid lowering the quality of any water.

Presumably, if these stated criteria are met, a permit must be granted. None of the stated criteria suggest that cumulative impact may be a factor in characterizing a proposed alteration unreasonable and thus denying the permit. An argument could be made that such an interpretation is possible but it is a difficult argument, particularly in light of limited Maine case law in this area; specifically, State v. Johnson, 265 Atl. 2d 711 (1970), a case in which the Law Court looked at the individual developer, the individual parcel of land, the reasonableness of the proposed activities viewed quite apart from their cumulative effects.

F. GREAT PONDS LAWS

Here again, there is a total absence of express language enabling the Board of Environmental Protection to take into account cumulative impact either in the great ponds research program or in the issuance of required permits. In Section 380 the extensive statement of findings and purpose omits any reference to the reality that accelerated eutrophication of ponds is seldom if ever caused by single or even several intrusions into the natural shoreland character, but is almost always the product of the combined effects of overdevelopment. In other words, the phenomena that is most threatening to Maine's great ponds is not even mentioned in the findings and purposes provision of the legislation authorizing the Board to undertake a coordinating role as well as basic research into how best to protect these water bodies.

In Section 422 we have a similar situation as exists in the legislation dealing with the alteration of coastal wetlands. Specific criteria for the granting of a permit to alter or build in a great pond or on land abutting a great pond are spelled out. None of these criteria specifically address the phenomena of cumulative impact. Moreover, the reading of the language suggests that each applicant's proposal is to be judged on its own merit. There is no suggestion that the applicant's proposal is in any sense to be judged on the basis of its reasonableness in combination with preexisting alterations or developments in or along the same great pond.

G. PLANNING AND ZONING ENABLING LEGISLATION

The language that defines the comprehensive plan and the comprehensive planning process is certainly broad enough to enable municipalities to examine, measure and presumably prevent the adverse consequences that cumulative development

can give rise to when it is either too rapid in time or in too close a proximity to preexisting developments. To the extent that zoning ordinances may reflect any and all aspects of a comprehensive plan, the worst aspects of cumulative development could be avoided. It would, however, require a sophisticated zoning ordinance which channeled development activities into appropriate areas where that development would be more readily assimilated, and paced over a time frame which would allow a more orderly assimilation of that growth. In other words, adverse cumulative impact may arise from either too much growth in too small an area or too much growth in too short a period of time.

But even though this legislation seemingly allows cumulative impact to be dealt with in both the planning and zoning process, it contains no express reference to the seriousness of cumulative impact and the ways in which it can arise.

H. SUBDIVISION LAW

One must reach for the capacity to take cumulative impact into account in assessing whether a given subdivision should be approved. Paragraph three of Section 4956 contains a lengthy list of guidelines which municipal officials are to consider in reviewing any subdivision for approval. But none of these individual guidelines is couched in language that suggests that the cumulative impact of the subdivision in conjunction with preexisting development may be considered. The more general opening sentence of paragraph three also fails to contain such a suggestion.

I. MANDATORY SHORELAND ZONING AND SUBDIVISION ACT

Maine's mandatory shoreland control legislation fails to make any specific reference to cumulative impact. To the extent that the controls imposed rely on general planning, zoning and subdivision regulation enabling legislation, which as suggested above does allow cumulative impacts to be taken into account, specific reference in the shoreland legislation may not be necessary. However, it is a mistake to rely on these oblique and limited present capabilities to deal with problems associated with cumulative development, particularly in shoreland areas.

J. MINIMUM LOT SIZE LAW

This law pertains to granting permission for development

on lots of less than 20,000 square feet where subsurface sewage disposal is to be utilized. It does not enable cumulative impact to be taken into account in determining either minimum lot size requirements or in situations where approval is sought for lots smaller in size than the 20,000 square feet requirement. The act seems to focus exclusively on the avoidance of harm to lakes, ponds, rivers, streams and tidal waters arising from inadequate subsurface waste disposal. The legislation fails to recognize that a variety of other adverse cumulative impacts may flow from accumulation of development activities on lots which meet or even exceed the minimum requirements. The potential for adverse cumulative impact increases to the extent that developments are approved on even smaller lots.

K. STATE PLUMBING CODE(1973), PART II (1975)

Part II of the Plumbing Code is primarily a technical document designed to insure that the requirements of public health will be met in the installation of public and private subsurface sewage disposal systems. The Code specifies certain subsurface sewage disposal systems for given soil types. The prescribed systems are designed so that if they are constructed and working properly, they should not result in adverse cumulative impacts within the watershed. However, there is no mention of minimum lot sizes in relation to soils and the size of the sewage disposal system. The Code recommends that additional area suitable for subsurface disposal should be available on each lot, but it does not make this a requirement nor does it specify the size of the additional suitable area.

III. LEGISLATION IN OTHER STATES

A. INTRODUCTION

No effort has been made to examine the coastal zone management strategies of all of the states of the United States which border major water bodies. Time and resources simply do not permit an approach this comprehensive. Seven states have been selected for examination in part because they represent significant segments of the coast and in part because they evidence the range of approaches that seem to be common throughout the United States. They are California, Delaware, Oregon, Florida, Massachusetts, Washington and New Jersey.

A point that should be made early is that almost all states are struggling with the problem of balance between state level approaches and control of development activity in the

coastal zone and with approaches which emphasize local and/or regional control. There does not appear to be any single best approach to this balancing of interests. At least none has emerged to date either in the literature or in actual practice. Some states have at least for the moment opted for a high degree of state-level control. Other states are emphasizing regional mechanisms. Almost all retain some measure of local involvement, though few, if any, could be characterized as having capitulated totally to the pressures for autonomous local decision-making.

B. CALIFORNIA

There are several pieces of legislation which give a full picture of California's approach to protection of the coastal zone: The State's Environmental Quality Act (patterned after the National Environmental Policy Act), legislation establishing the Bay Area Conservation and Development Commission (BCDC), Proposition 20 -- The Coastal Zone Act of 1972, and the California Coastal Act of 1976. The combined effect of these four pieces of legislation give California perhaps the most comprehensive capacity of any state to address and control development activity within the coastal zone. It is fair to say that the state, as opposed to local, involvement in these processes is large but not exclusive. It is also clear that the state's requirement for impact statement preparation (which covers both public and private development activities) makes specific reference to the need to consider cumulative impact.

The legislation designed to protect San Francisco Bay also evidences an awareness of the phenomena of cumulative impact. The legislation is designed to enable the BCDC to avoid the adverse consequences flowing from individual development activities (whether public or private) along the periphery of the bay. It is also interesting to note that this regional mechanism has been clothed with considerable power to override inconsistent local land use controls. Though characterized as a sharing of power, the reality is the BCDC retains a veto power within the statutorily defined shoreland area. The broad powers of the BCDC have been judicially sustained.

More recent coastal zone legislation, specifically Proposition 20 and the 1976 Act established: 1) a state policy of protection with respect to the coastal zone, 2) regional commissions designed to exercise control through a permit system, and 3) a process for continuous study and reevaluation of the coastal zone to determine what development activities are appropriate, where and what

control measures are necessary to accommodate that development. The six regional commissions are designed to be phased out over time as local control measures predicated on state standards are certified to be in effect and capable of carrying out state policy with respect to coastal development. At that point in time the state, through its coastal commission, will retain review power over development activities which will be subject initially to local control and review processes. The state has taken a strong hand in establishing public access to the coast; protecting recreation and marine resources; and limiting industrial, particularly heavy industrial development, to existing areas and/or to a limited range of new areas where harm from these activities can be minimized or eliminated.

A number of court cases have sought to test various aspects of this comprehensive approach to coastal zone management. None have succeeded to date.

C. DELAWARE

Delaware's approach to coastal zone management is contained in three pieces of legislation: the Coastal Zone Act, which places certain prohibitions and strict controls upon industrial location within the coastal zone; the Beach Preservation Act, which enables the state to prevent damaging alterations to protective sand dunes; and the Coastal Wetlands Act, which enables the state to control land use within the coastal salt marsh.

The Delaware Coastal Zone Act achieved some national attention when it was initially promulgated because it precluded further development of any new heavy industry within the coastal zone. The state's rationale was that it was possessed of only a relatively small coastal area, portions of that coast were already highly committed to heavy industrial development, and that inland areas existed which could accommodate future new heavy industry thus justifying preclusion of further such development in remaining undeveloped sections of the coast. It is important to note that not all industrial development is precluded within the coastal zone: only such industry as is classed "heavy industry" is prohibited. Other development activities including light industry may expand within the coastal zone if permitted by local land use controls, and if a permit is obtained from the State Planning Office. The State Planning Office's issuance or withholding of a permit is to be predicated on a required environmental impact statement which specifically requires the developer to take into account the cumulative impact of his activity on the area in which it is proposed. Delaware's approach to heavy industry within the coastal zone viz-a-viz inland locations is a close approximation, if in fact it does not constitute, state level zoning for heavy industrial activities.

The state's Beach Preservation Act described the system of barrier dunes as essential and irreplaceable natural resources which are to be protected in a manner which would minimize or prevent substantial change in or alteration of these dunes and beach areas. The legislation purports to regulate and control private as well as public dunes and beaches. The implementing and enforcing unit of government is the State Department of Natural Resources and Environmental Control. A limited range of alterations are permitted to be made on existing structures within these areas with the approval of the state agency. The agency also has the capacity to repair past damage to these dunes and beach areas. Whether these stringent controls can withstand judicial attack characterizing them as a taking remains to be seen. Though rigidly enforced to date, no negative court decisions have yet been handed down. It is interesting to note that there is little if any reliance on local governments to enforce, monitor, or implement this legislation.

The state's Wetlands Act designed to regulate dredging, dumping and filling in wetland areas whether publicly or privately owned, is also administered by the State Department of Natural Resources and Environmental Control. Any activity within these areas requires a permit from the agency. Again, the permit issuing criteria include considerations of cumulative impact.

D. OREGON

Oregon's approach to coastal zone management is contained in the Oregon Land Conservation and Development Act. This legislation leaves primary responsibility for land use planning with the state's cities and counties, but these plans and implementing controls must comply with state determined guidelines. The legislation contains strong incentives to regionalize planning within the state and at the same time retains power at the state level to issue permits for certain statutorily defined activities of statewide significance. In addition to promulgating the guidelines which local and regional planning efforts are to utilize, the state is charged with the responsibility of coordinating and ironing out inconsistencies that arise as a result of local and/or regional comprehensive planning efforts.

The broad language of the statute does not make specific reference to avoiding harms associated with cumulative impact. It is certainly possible (perhaps even probable) that the guidelines established will take this phenomena into account. Except where activities of statewide significance are involved, most planning, plan implementation and permit issuing responsibilities remain at local (including county) governmental levels.

E. FLORIDA

Florida's approach to coastal zone management is largely contained in the Land and Water Management Act of 1972, though the state's Water Resources Act of 1972 contains some complementary provisions.

The emphasis of the Management Act is on the delineation of critical (fragile) areas so that these areas may be adequately protected by suitable land use controls. A secondary consideration of the act is the control of any development within the coastal zone that is determined to have regional impact. A state level Coastal Coordinating Council is established: and charged with 1) developing a comprehensive state plan for the protection, development and zoning of the coastal zone, 2) undertaking a continuous program of research into problems relating to the coastal zone, 3) reviewing development plans within the coastal zone and 4) providing a clearinghouse for information relative to the coastal zone.

An important point to note is that there is only a limited state level capacity to override development activities that have received local approval. Instead, a carrot approach has been taken -- local receipt of coastal management assistance funds is predicated on the particular local government's recognition of state concerns and consistency with state policy relative to land use, conservation, recreation, open space management, etc. Only in critical areas (also referred to as Tier 1 areas) which include submerged lands, tidal wetlands and open beach areas is the state in a strong position to approve and disapprove proposed alterations and development activities. Some effort has been made to foment regional approaches to bridge the gap between local and state governments. Eleven regional bodies have been established. At this point their powers seem limited to planning, coordinating and related advisory responsibilities. The Florida legislation contains only the most oblique and occasional reference to the avoidance of harms associated with cumulative development.

F. MASSACHUSETTS

Massachusetts' approach to coastal zone management at present is limited to its wetlands legislation which has been revised and expanded several times in recent years and is now referred to as the Coastal Wetlands Protection Act. Massachusetts has also adopted a Conservation Commission Act. The latter groups are charged with conducting research, publishing materials, and coordinating

the activities of state and local bodies to facilitate the protection of natural resources.

The wetlands acts give the state a capacity in conjunction with local units of government to control dredging and filling as well as development activities within fairly broadly defined coastal wetland areas. The state also has some power to zone within these wetland areas. There is some language that suggests that cumulative impact is to be considered in the issuance of required permits. However, it cannot be pretended that this legislation extends to all or even a majority of the land area situated within the coastal zone of the state. The powers contained in the wetlands legislation have been judicially sustained.

G. WASHINGTON

Washington's approach to coastal zone management is contained in three pieces of legislation: The Shoreline Management Act of 1971, the Environmental Policy Act of 1971, and the Environmental Coordination Procedures Act of 1973.

The Shoreline Management Act contains a strong statement of policy reflecting concern for comprehensive planning within the coastal zone, a coordinated approach to development activity, a preference for preserving the natural character of the shoreline, a desire to increase public access to and ownership of shoreland and most important, the fact that statewide interests are to be recognized and preferred over local interests. Broad areas of the state's coast are designated "shorelines of statewide significance". Within these areas state planning and control of development play a more dominant role. In other shoreland areas local and regional planning and land use controls are subject to state approval to ensure that state guidelines and criteria are met and that coordination of these local efforts is achieved. All development activities within the coastal zone with a cost in excess of \$1,000 must obtain a development permit. Permit issuance is administered by the appropriate local level of government subject, however, to review at the state level.

The state Environmental Policy Act is patterned after the National Environmental Policy Act and requires the preparation of an impact statement before any governmental project or private project requiring governmental approval may be commenced. The impact statement requirement makes specific reference to avoiding harms associated with cumulative development activities. The legislation has been judicially sustained.

The Environmental Coordination Procedures Act is intended to facilitate the coordination between state agencies and local planning, land use control and permit issuance responsibilities and is designed to serve as a bridging mechanism between state government and local governments. The act empowers the State Department of Ecology to serve as a permit issuing body. A developer may present a master application to the Department requesting the issuance of all necessary state level permits that the project requires. The agency is then charged with informing all other concerned agencies that the development proposal has been received. It is empowered to conduct appropriate hearings and if all state requirements are met, issue the required permits and licenses. This procedure, however, does not entitle an applicant to avoid any of the provisions of the Shoreline Management Act nor does it preempt local government land use controls or exempt the developer from the need to apply for and obtain required local licenses, permits and approvals.

H. NEW JERSEY

New Jersey's approach to coastal zone management commenced originally under the Wetlands Act, and has more recently been broadened by enactment of the Coastal Area Facility Review Act. The latter and by far the more important piece of legislation, purporting to deal with the entire coastal zone, identifies this area as a unique resource of the state, recognizes the present existence of severe adverse environmental effects resulting from unregulated cumulative development activities of the past and expresses an intent to arrest and avoid these phenomena in the future. The State Department of Environmental Protection is given broad powers to review and approve a wide range of statutorily defined development activities within the coastal zone. The state's permit issuing power does not excuse the developer from compliance with local controls but does have the effect of precluding development that may have received local approval, but that is inconsistent with state plans and controls within the coastal zone. The Act requires developers to prepare environmental impact statements that make specific reference to the cumulative impact of the proposed project. In addition, the state agency is charged with developing long range plans for the optimum utilization of coastal land areas, including the earmarking of areas suitable for various types of recreational, residential and industrial activities. This legislation has been broadly sustained.

I. CONCLUSION

It is clear from the above description of various state approaches to coastal zone management including an analysis of cumulative impact of development, that, though a variety of mechanisms exist, there are some important similarities:

1. A trend towards a higher degree of state involvement in coastal zone land use decision-making is evident.
2. Exclusive or near exclusive reliance on local governmental approaches to planning and plan implementation within the coastal zone is lessening.
3. Even in states that have not yet assumed broad state level responsibility for controlling all development activity within the coastal zone, a concern for control of heavy industry development along the coast is in evidence.
4. A broader use of regional instrumentalities either as interim devices or as permanent mechanisms charged with designing approaches to coastal zone management on a scale larger than would be undertaken by local governments and at the same time smaller than the scale that would emanate from the state level of government is also evident.
5. Except in states that have adopted some form of state level environmental impact statement preparation, the analysis of the impact of cumulative development is not expressly included in the legislation examined. This suggests that impact statement preparation, because it is largely patterned after the federal act (NEPA) which does make specific reference to cumulative impact analysis is an appropriate and desirable type of legislation which more states should consider adopting.
6. Increasing state involvement in the control of development activities within the coastal zone, though perhaps resisted to some extent by local governments within a state, has been broadly sustained in almost all court decisions brought by developers who have sought to test the validity of these stringent controls which impinge on their traditional, profit-oriented development prerogative.

Finally, it should be noted that several states (California, Washington, New Jersey and possibly Delaware) have clearly asserted, in spite of political opposition, that state

interests are to prevail over local interests; that the coastal zone is a unique resource of the entire state; and that state involvement in coastal zone decision-making is likely to increase rather than decrease in the future.

SECTION VI

MAJOR FINDINGS AND RECOMMENDATIONS

I. DOMINANCE OF ECONOMIC FORCES

A. FINDINGS

Economic forces are the most significant factor in shaping coastal (and inland) development patterns.

Neither Federal, State nor municipal planning and land use control measures are the dominant factor in shaping development patterns; they merely modify those determined by the market. Comprehensive plans, zoning ordinances and other development controls that are designed to prohibit and to stand in the way of, rather than guide, new development activities will almost certainly be of only marginal effectiveness in the future as they have in the past.

B. RECOMMENDATIONS

State, regional and municipal growth management policies should be designed to modify development activities by identifying, mitigating and avoiding the harms that arise from adverse cumulative impacts. The most effective way to accomplish this is by strengthening state and municipal laws and regulations with respect to identifying and avoiding cumulative impacts, developing a continuous and long term data base as a means of monitoring cumulative effects of development, designing cumulative impact models that can be applied over a wide variety of situations, and by developing and administering zoning and land use controls on the basis of potential adverse cumulative impacts which can arise from successive development activities.

II. MUNICIPAL PLANNING AND REGULATIONS

A. FINDINGS

The lack of a clear-cut recognition in the State's planning and land use control enabling legislation of the cumulative impacts arising from successive development has left the municipalities unaware of and unprepared to address these problems. While they have the power to deal with these problems, few municipalities have begun to do so. Given the number of examples of adverse consequences flowing from cumulative development in almost all of the coastal municipalities, the need for an awareness of cumulative impacts and improved means of avoiding them is acute.

It must be understood that if the first development is readily capable of being assimilated it does not follow that the tenth, which may be of identical character will also be capable of being assimilated. Indeed, it may be the straw that breaks the camel's back.

Adverse consequences of successive development do in fact exist, are becoming more widespread, and impose a variety of environmental, social and monetary costs. Municipalities are not addressing these problems at a point in time when they can and should be addressed -- before they become acute, before remedial costs are out of sight. Short-run tax advantages can be quickly eaten up by long-run costs associated with correcting or ameliorating (to the extent possible) the adverse consequences of too much development in too small an area in too short a period of time.

Because of the dominance of external economic forces, municipalities have little direct control over the type of development activities they must face; but municipalities can control the conditions under which that development takes place. For example, the demand for housing is attributable to social and economic forces that are beyond a municipality's power to influence. However, the conditions under which new residential development takes place, its location, its compatibility with pre-existing land uses, and the assurance that it will not stress the carrying capacity of the natural environment or of public facilities, is to a considerable degree within the exclusive province of the municipality.

Municipal comprehensive planning, zoning ordinances, and subdivision regulations tend to address each aspect of the community as a separate entity. Little coordination exists among land use plans and the major determinants of land use patterns such as the type, size, timing and location of roads, water supply and sewerage facilities.

B. RECOMMENDATIONS

1. Municipal comprehensive plans should be required to recognize cumulative impacts of development and to set threshold capacities -- the points at which adverse consequences arise. For example, the capacity of land and water resources for various types and levels of use, the capacity of soils for subsurface sewage disposal where public facilities are unavailable or unlikely, the capacity of the public water supply system, the capacity of the sewerage collection and treatment system, the sufficiency of public roads, existing land use patterns, potential sources of

future public water supplies, and the scenic and environmental values of naturally existing resources should all be determined.

2. Municipal land use control ordinances should be more directly related to identified threshold capacities. In addition to establishing regulations pertaining to development activity, land use controls should also identify and appropriately zone sensitive environmental features such as significant watershed and aquifer recharge areas, alternative suitable solid waste disposal sites, areas of high erosion potential and slope stability hazards, large good quality sand and gravel resources, sand dunes, important wildlife habitat areas such as deer yards, and good aquaculture sites, significant historical, archaeological, and scenic areas.
3. To avoid adverse cumulative impacts, municipal plans and regulations should take into account existing and future potential for harm. Municipalities should be required to prepare both short-range and long-range land use plans. Short range plans and zoning should acknowledge and avoid, to the degree possible, existing problems. Long range plans should take into account planned and anticipated increases in population, development, and threshold capacities of public facilities such as water supply and sewerage facilities, roads, solid waste disposal facilities, etc.
4. Both short-range and long-range plans should be updated periodically in coordination with capital improvement programs that have the effect of increasing the capacity of public facilities thereby increasing the ability of the municipality to assimilate higher levels of development than those provided for in short-range plans.
5. Densities for those land uses allowed by municipal ordinances should be established taking into consideration the cost of required public facilities and services. It should be recognized that those who use these facilities must ultimately pay for them through special assessments or taxes. The ability of a town to expand is restricted by economic as well as ecological constraints. A municipality must invest periodically in large capital projects (e.g. new sewage treatment plants, new sewer interceptors, new water storage tanks, new fire stations, new schools, etc). It is a fairly simple matter to determine the point in population growth or utility demand that will result in these incremental expenses. Zoning land in

a manner that provides for timing development to coincide with long range capital improvement plans has been upheld by various courts.

6. To avoid the adverse impacts resulting from the aggregation of small developments, municipalities should adopt Site Plan Review criteria to assure that all developments, large and small, are reviewed and approved only if their incremental effects will not be harmful.
7. Municipal efforts to control adverse cumulative impacts should rely more upon cluster development and the deliberate extension of public works facilities (roads, water, sewers) as a means of guiding the location of future developments. Some mechanism, at either the municipal or regional level, should be provided for review and approval of utility extensions in conformance with municipal and regional comprehensive plans.

III. STATE LEGISLATION

A. FINDINGS

Most of Maine's environmental laws need to be amended to recognize the consequences of adverse cumulative impacts and to enable regulatory boards and agencies to act upon development proposals on the basis of their cumulative effects.

With the exception of the State's water pollution control and air pollution control laws, most environmental and land use control laws either make only oblique reference to the phenomenon of cumulative impacts or avoid discussion of it altogether. The argument that some of these legislative provisions could be interpreted in a way which would allow cumulative impacts to be considered misses the point. Such arguments are often difficult, particularly where the language of the statute contains express criteria for approval that do not include reference to harms resulting from cumulative impacts, and where the language of the statute suggests that the applicant's proposal is to be viewed on its own merit in relation to the statutory criteria. It should also be borne in mind that Maine courts have not generally been receptive to regulatory land use measures which are only arguably authorized as opposed to those which are expressly authorized. It is important to note that it may be difficult at present to implement some of these recommendations due to the state of the art in identifying and quantifying the synergistic effects leading to adverse cumulative impacts.

B. RECOMMENDATIONS

1. Water Pollution Control Law, Title 38, Section 361 et seq.
 - a. Make more explicit that the law includes consideration of cumulative impacts and that such effects are to be considered by the Board of Environmental Protection acting upon applications for waste discharges.
 - b. Enable the Board of Environmental Protection to deny an application for a discharge license if the cumulative effect will be harmful, even after utilization of the best practical treatment. The law should make clear that existing discharges obtain a priority by virtue of being earlier in time.
 - c. Enable the Board to modify or reduce waste discharges licenses of existing discharges, where possible, so that a capacity will be created enabling a later applicant to add his discharge and keep the cumulative effect below harmful levels.
2. Air Pollution Control Law, Title 38, Section 581 et seq.
 - a. Make more explicit that the law includes consideration of cumulative impacts and that the Board of Environmental Protection must consider such effects in acting upon applications for air emissions.
 - b. Enable the Board of Environmental Protection to deny an application for a discharge license if the cumulative effect will be harmful, even after utilization of the best practical treatment. The law should make clear that existing discharges obtain priority by virtue of being earlier in time.
 - c. Enable the Board to modify or reduce waste discharge licenses of existing discharges, where possible, so that a capacity will be created enabling a later applicant to add his discharge and keep the cumulative effect below harmful levels.
3. Site Location of Development Law, Title 38, Section 481 et seq.
 - a. Amend Section 481, 482 and 484 to require the

Board of Environmental Protection to consider cumulative impact in all cases where development proposals seek approval under the site law.

- b. Expressly enable the Board to deny an otherwise reasonable development proposal because the cumulative impact will be detrimental to public wellbeing.
- c. Enable the Board to revise existing licenses and approvals, where possible, so as to make room for a more recent development proposal.
- d. Enable the Board to recommend to municipal governments and State agencies that infrastructure facilities (roads, sewer systems, water systems) should be improved so that development activities may be approved without giving rise to adverse cumulative impacts; and enable the Board to deny development proposals until such improvements are made.

4. The Wetlands Act, Title 38, Section 471-478; Title 12, Section 4751-4758

- a. Amend the purposes section of both acts to make the point that harm to wetlands is more frequently the product of cumulative effects than it is the result of a single dredging, filling project, or development activity.
- b. Expressly enable denial of an application to alter wetlands on the basis of adverse cumulative impact.

5. Great Ponds Laws, Title 38, Section 380, et seq. and Section 422

- a. Amend the findings and purposes sections to include reference to the reality that accelerated eutrophication of ponds is seldom if ever caused by a single, or even several, intrusions into natural shoreland, but is almost always a result of the combined effect of over-development and of agricultural practices within the watershed.
- b. Authorize appropriate boards and agencies to undertake basic research into how these water bodies can best be protected.
- c. Expressly enable reviewing agencies to deny an application for development upon shorelands or within watersheds of Great Ponds on the basis of adverse cumulative impacts.

6. Planning and Zoning Enabling Legislation, Title 30, Sections 4961-4964

- a. Amend the definitions section to set forth more detailed requirements for comprehensive plans including assessment of cumulative impacts and requirements that integrate land use plans and capital facilities planning.
- b. Amend the legislation to require comprehensive plans and zoning ordinances to be based upon an assessment of cumulative impacts that might arise from too much growth in too small an area, or from too much growth in too short a period of time. Comprehensive planning and zoning should be based upon an assessment of the capability of natural resources and public infrastructure to assimilate various types of development without giving rise to adverse cumulative impacts.
- c. Include specific authorization to enable more stringent zoning measures to be adopted in circumstances where adverse cumulative impacts are a threat.

7. Subdivision Control Law, Title 30, Section 4956

- a. Amend the opening sentence of paragraph three to read: "When promulgating any subdivision regulations and when reviewing any subdivision for approvals, the planning board, agency or office, or the municipal officers, shall consider the following criteria and before granting approval shall determine that the proposed subdivision either alone or in conjunction with the preexisting developments in the immediate area:" (Underlined material is new, the rest of paragraph three would follow as printed)
- b. Define immediate area in a geographic sense, such as all land within a mile, or in a physical sense, all land within a watershed.
- c. Specify whether subsequent division of an exempt two parcel subdivision is the responsibility of the original or subsequent subdivider.

8. Mandatory Shoreland Zoning and Subdivision Control, Title 12, Section 4811 et seq.

- a. Amend Section 4811, outlining the purposes of

mandatory shoreland controls, to evidence awareness of the problems that cumulative impacts give rise to and that those adverse consequences are intended to be avoided by this legislation.

- b. Amend Section 4812-A, which makes specific reference to harms to be avoided in developing shoreland controls, to include reference to the avoidance of harms that cumulative development activity create.
- c. Enable the State to enforce municipal Shoreland Zoning ordinances in the event of the failure of a municipality to do so.
- d. The guidelines for implementing this legislation should be revised to include in the model ordinance:
 - 1) In Section 11, reference to adverse cumulative impacts as one of the harms to be avoided.
 - 2) In Section 13, a precise definition of cumulative development and adverse consequences that may result.
 - 3) The introductory section should contain language similar to that in 1 above.

9. Minimum Lot Size Law, Title 12, Section 4807-B

- a. Amend to include a purposes section stating that the act is intended to avoid adverse cumulative impacts resulting from development of any lot utilizing subsurface sewage disposal.
- b. Amend the definitions section to include a definition of adverse cumulative impact.
- c. Amend the section dealing with required minimum lot sizes to provide for higher minimums where adverse cumulative impact is likely or is already in evidence. Minimum lot sizes should be prescribed as a function of given soil types.
- d. Amend the section enabling approval of smaller lots to make clear that approval of lots smaller than 20,000 square feet will be given only when there will be no resulting adverse impact from subsurface sewage disposal.

10. State Plumbing Code (1973) Part II (1975),
Promulgated by the Department of Human Services
pursuant to Title 22, Section 42.

- a. Amend to specify minimum lot sizes for given soil types where subsurface sewage disposal is to be utilized.
- b. Amend to specify the additional area of suitable soil required for replacement or enlargement of the subsurface sewage disposal system should it become necessary.

IV. STATE-LEVEL PROGRAMS

A. FINDINGS

There is a need for a continuous and long-term data base for identifying cumulative impacts. Most State agency effort to date has been to collect as much baseline data as possible on as many parameters as possible with the result that very few conclusions can be drawn or trends, let alone cause and effect relationships. For example, the Department of Marine Resources has coded most of its tidal station data but it is still waiting for funds to computerize it.

In addition, there is an apparent lack of coordination among State agencies in cross referencing data and utilizing it to develop techniques that can be applied to avoid cumulative impacts at State, regional and local levels.

B. RECOMMENDATIONS

1. The State should conduct or sponsor scientific research and analysis of highly complex or sensitive environment and development phenomena that regional or municipal bodies cannot cope with on their own. The objectives of such research should be twofold: 1) to develop threshold levels of harm, criteria and standards designed to avoid adverse cumulative impacts, and 2) to develop and calibrate models that could be used to predict when adverse cumulative impacts will arise.
2. The State should develop and coordinate data collection and analytical techniques for monitoring key indicators of cumulative impacts so that the effects of development can be identified before threshold levels of harm are reached.

3. The State should carry out or sponsor highly specialized research and development relative to new and innovative means of managing growth and controlling cumulative impacts. State research and development should focus upon needs common to all regions and municipalities in such matters as cluster development, transferable development rights, and improved means of managing residual open space.
4. The State should establish criteria for the siting of heavy industry along the Coast and for the protection of fragile coastal resources.
5. The State should implement a continuing program of data interpretation and technical assistance to aid regional and municipal agencies in adapting complex technical data to their own needs.
6. State regulatory agencies and the Attorney General's Office should be more aggressive in the enforcement and prosecution of violations of statewide environmental and pollution control legislation.

V. INTER-GOVERNMENTAL COORDINATION AND INTEGRATION

A. FINDINGS

Maine's experience has revealed that coastal zone management, including analysis of cumulative impacts, cannot be undertaken at the State level and simply handed down to municipalities for their implementation or use. Neither can coastal zone management, including the analysis of cumulative impacts of development, be undertaken in any comprehensive fashion by each individual municipality. Municipal resources are too limited; their jurisdictional reach is too short. Many of the development proposals that confront them have regional and some have statewide significance. Regional planning agencies, however, have a perspective and geographic focus greater than that of any single municipality. At the same time, they are close to the citizenry, and are aware of the point of view and of the physical realities that prevail in a subregion of the State.

At present regional planning agencies are the only vehicle whereby municipal problems can be looked at both in relation to the municipality itself and in relation to similar problems within a wider area. The nature of the representation on regional planning boards provides municipalities with the opportunity for localized input and influence upon regional programs. Yet, regional

planning agencies, as now constituted, operate ineffectively. They have limited powers, uncertain funding, and municipalities may join or opt out as they wish. They are not fully a part of State government nor are they part of either county or municipal government.

Consequently, lack of consistency exists in the services being rendered by regional planning agencies to their municipal constituencies. Regional studies are undertaken or discontinued as the result of available funds and federal grants. Because of inadequate funding, regional planning agencies have found it necessary to sell individualized technical services on a fee basis to those towns that are willing and able to pay such fees. There are, in fact, three types of municipalities within each regional planning agency's jurisdiction: 1) municipalities located within the regional district boundaries that do not formally belong and receive no services other than information contained in broad regional studies; 2) municipalities that appropriate annual financial support and which are the focus of regional studies; and 3) municipalities that pay additional fees for specific types of technical assistance. This is unsatisfactory.

B. RECOMMENDATIONS

1. The state should develop fiscal mechanisms to provide regional planning agencies with an adequate and dependable funding base. This could be accomplished in one of three ways.
 - a. Regional planning agencies could be incorporated into State government and supported with State funding. The State could appropriate monies to each regional agency on a per capita basis taking into account the availability of federal funds.
 - b. Regional planning agencies could be merged into county governments. As county planning commissions, these advantages could be realized: dependable funding through county taxing powers, placing inter-municipal planning as close to the citizenry as possible, relating county planning more directly to implementation at county and municipal levels, and providing the powers needed to assure compliance with vital county-wide policies when and if necessary.
 - c. The State could require each of the municipalities within a regional planning district to contribute a fixed amount (probably on a per capita basis) to the budgetary needs of the regional body. Either of the last two alternatives would provide a legitimized local base for regional planning activities.

2. Municipal membership in regional planning agencies should be fixed and stabilized. All municipal governments should be assigned to a regional planning agency without the ability to opt in or out.
3. Each municipality must have equal opportunity and equal access to technical services provided by regional planning agencies. The practice of regional agencies of providing supplemental technical assistance on a fee basis should be reevaluated in relation to its potential for creating an unequal status among member municipalities.
4. The roles of regional planning agencies should be more clearly defined as they relate to state and local efforts to deal with cumulative impacts and with land use allocation and management in general. Regional planning agencies should function as a liason between the state and municipal programs by:
 - a. Interpreting data in a context applicable to regional and local problems and solutions.
 - b. Assisting in maintaining data that would reveal the cumulative nature of development impacts.
 - c. Providing technical assistance and advising municipalities as to alternative means of growth management.
 - d. Developing regional policies and plans that combine State policies with the desires and needs of their constituent municipalities.
 - e. Provide an improved and strengthened means of articulating local and regional concerns about the impact of state policies upon the municipalities.
 - f. Review and approve local land use decisions and capital spending programs that have regional or statewide impact.

VI AESTHETIC VALUES

A. FINDINGS

The adverse cumulative effects of development have already diminished aesthetic values in our coastal areas. There has been a loss of diversity, and unsightly conditions have been created. There often are inadequate buffers between adjoining uses of differing character, and there

is little sensitivity to design considerations evidenced in many developments. In the absence of adequate design considerations, loss of diversity and visual conflicts will continue to alter the traditional visual character of the coast.

In our system of private land ownership, land, particularly coastal land, is seen as an economic commodity rather than a public resource. Thus it is to be expected that private landowners will seek to maximize economic returns by changing the uses to which coastal lands are put. In light of these economic realities public policies are needed at State, regional and local levels to assure that the scenic quality and diversity of our coastal areas are protected.

B. RECOMMENDATIONS

1. There should be an acceleration of efforts by State, regional and municipal agencies to identify, acquire or otherwise protect rare, fragile or sensitive natural, scenic, architectural, archaeological and other cultural resources whose values would be damaged or forfeited by development activities.
2. The State should establish a fund for the acquisition of property, easements, or development rights to preserve high priority scenic and natural areas of state wide significance; and for grants to municipalities for acquisition of properties considered to be of prime local significance.
3. Funding and programs should be accelerated to acquire and provide public access to important scenic view points and other areas of natural and cultural significance.
4. Provision should be made for the inclusion of site selection, site planning and design criteria for all projects subject to the Site Location Act or subject to direct State regulation under other legislative enactments.
5. Local site plan review standards for all developments, whether subject to subdivision review or not, should be created to enable assessment of visual impacts and to assure compliance with aesthetic criteria and performance standards.

6. State research should be undertaken to develop improved criteria and models as means of measuring aesthetic or environmental carrying capacities. For example, techniques for determining the number of shorefront improvements including docks, wharves, boat moorings, etc. that can be undertaken without harm should be refined.
7. An accelerated program of research and development by the State Planning Office should be undertaken to provide economic incentives for landowners and developers to conserve open space and areas of significant scenic and environmental value. Such research and development should include cluster development techniques and incentives, transferable development rights, and other techniques of supplementing regulatory requirements with economic incentives, as a means of protecting natural resources, retaining open space and enhancing visual and functional diversity in the coastal area.

VII. ECONOMIC DEVELOPMENT

A. FINDINGS

Economic development activities by federal, State, regional and local agencies are uncoordinated. Consequently, no mechanisms exist to deal comprehensively with regional economic growth and related impacts.

A positive approach is needed to determine in advance what development activities are desirable in given areas and where and how that development should take place. Economic development efforts should then be coordinated so that opportunities may be identified and development guided to suitable locations.

B. RECOMMENDATIONS

1. The state should take the lead in developing an overall approach to economic development by identifying widespread socio-economic trends, both external and internal, and assess their significance to Maine's economic development opportunities.
2. Within that context technical assistance should be provided to regions and municipalities to help them identify what they have to offer and to develop policies in relation to whether or not they possess the resources and the desire to attract appropriate development activities.

6. State research should be undertaken to develop improved criteria and models as means of measuring aesthetic or environmental carrying capacities. For example, techniques for determining the number of shorefront improvements including docks, wharves, boat moorings, etc. that can be undertaken without harm should be refined.
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A. FINDINGS

Economic development activities by federal, State, regional and local agencies are uncoordinated. Consequently, no mechanisms exist to deal comprehensively with regional economic growth and related impacts.

A positive approach is needed to determine in advance what development activities are desirable in given areas and where and how that development should take place. Economic development efforts should then be coordinated so that opportunities may be identified and development guided to suitable locations.

B. RECOMMENDATIONS

1. The state should take the lead in developing an overall approach to economic development by identifying widespread socio-economic trends, both external and internal, and assess their significance to Maine's economic development opportunities.
2. Within that context technical assistance should be provided to regions and municipalities to help them identify what they have to offer and to develop policies in relation to whether or not they possess the resources and the desire to attract appropriate development activities.

is little sensitivity to design considerations evidenced in many developments. In the absence of adequate design considerations, loss of diversity and visual conflicts will continue to alter the traditional visual character of the coast.

In our system of private land ownership, land, particularly coastal land, is seen as an economic commodity rather than a public resource. Thus it is to be expected that private landowners will seek to maximize economic returns by changing the uses to which coastal lands are put. In light of these economic realities public policies are needed at State, regional and local levels to assure that the scenic quality and diversity of our coastal areas are protected.

B. RECOMMENDATIONS

1. There should be an acceleration of efforts by State, regional and municipal agencies to identify, acquire or otherwise protect rare, fragile or sensitive natural, scenic, architectural, archaeological and other cultural resources whose values would be damaged or forfeited by development activities.
2. The State should establish a fund for the acquisition of property, easements, or development rights to preserve high priority scenic and natural areas of state wide significance; and for grants to municipalities for acquisition of properties considered to be of prime local significance.
3. Funding and programs should be accelerated to acquire and provide public access to important scenic view points and other areas of natural and cultural significance.
4. Provision should be made for the inclusion of site selection, site planning and design criteria for all projects subject to the Site Location Act or subject to direct State regulation under other legislative enactments.
5. Local site plan review standards for all developments, whether subject to subdivision review or not, should be created to enable assessment of visual impacts and to assure compliance with aesthetic criteria and performance standards.

3. Such policies should be based upon an assessment of the locational and operational requirements of various industrial activities and of their probable cumulative effects (assuming adequate control measures to avoid highly adverse impacts) and the type of economic activities that are best suited to Maine's geographic location and to its physical and cultural resources.
4. Consideration should be given to means whereby the benefits and costs of economic development can be prorated geographically throughout an impacted area. If such were the case, municipalities would be more likely to cooperate in economic development activities rather than to compete as is now the case.
5. Community development corporations should be used more widely at regional and local levels as a means of stimulating economic growth consistent with regional and local objectives. The key role of these corporations would be to acquire and hold land for future use and development. By creating a land bank and providing the upfront money for utilities and services, the community development corporation could go a long way toward assuring that development activities are consistent with the community's well-being.
6. State-level zoning of large scale development activities, particularly heavy industry, should be considered.

