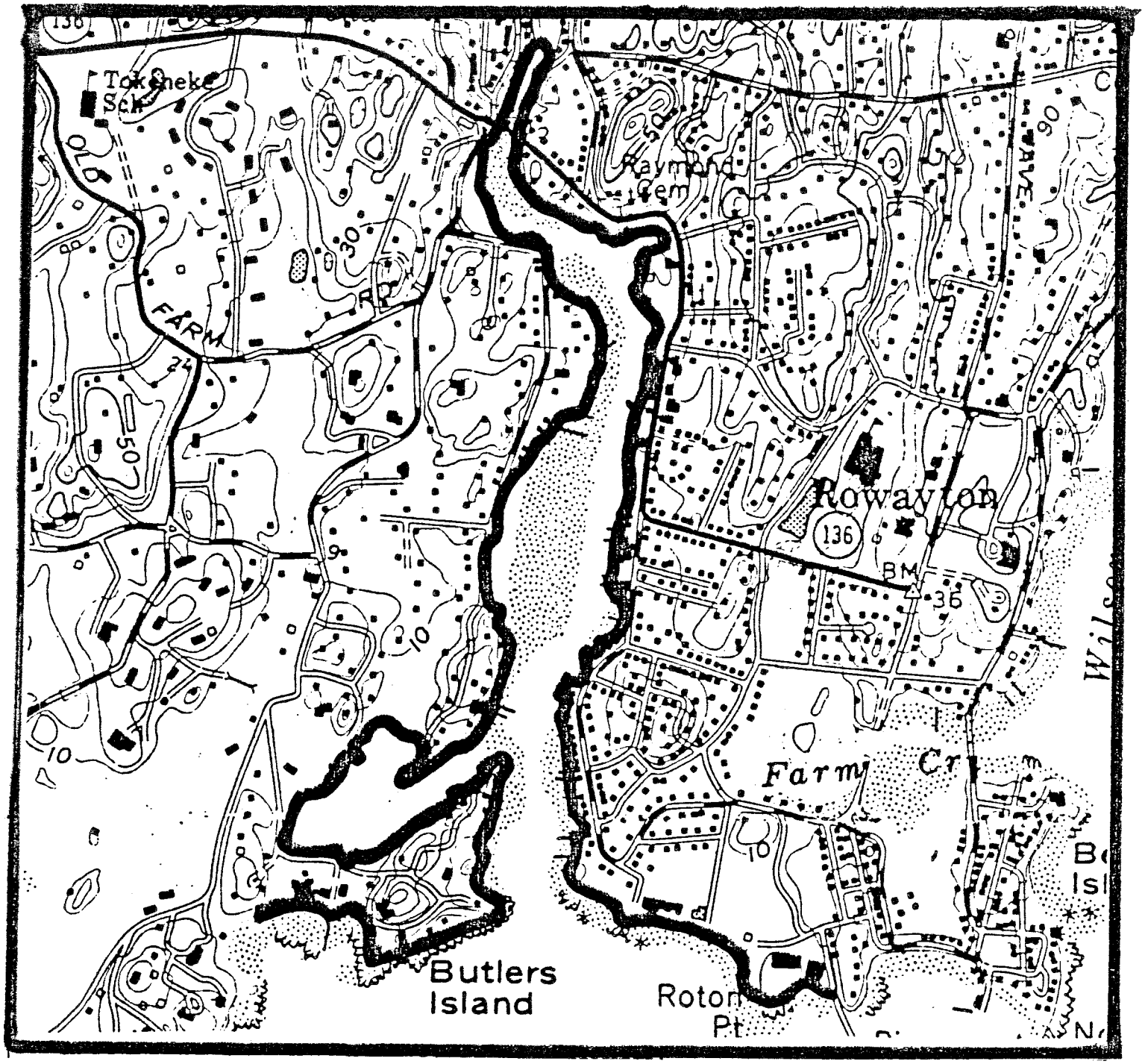
ENVIRONMENTAL REVIEW TEAM REPORT



FIVE MILE RIVER ESTUARY

NORWALK & DARIEN, CONNECTICUT

KING'S MARK RESOURCE CONSERVATION AND DEVELOPMENT AREA, INC.

FIVE MILE RIVER ESTUARY

DARIEN AND NORWALK, CONNECTICUT

Environmental Review Team Report

Prepared by the King's Mark Environmental Review Team
of the King's Mark Resource Conservation
and Development Area, Inc.

Wallingford, Connecticut

for the

Five Mile River Commission

MARCH 1987

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* Ronald Rozsa, Coastal Biologist
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* Paul Stacey, Environmental Analyst
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* Linda Gunn, Marine Fishery Biologist
  Department of Environmental Protection - Marine Fisheries Unit

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Finally, special thanks to Mr. Frank Raymond and Robert McNell of the Five Mile River Commission for their cooperation and assistance during this environmental review.

EXECUTIVE SUMMARY

Introduction

The Five Mile River Commission (FMRC), composed of two members each from the Town of Darien and the City of Norwalk, requested that the King's Mark Environmental Review Team conduct an environmental assessement of the Five Mile River Estuary. The study area is located along Norwalk's and Darien's coastal zone (p. 1).

The estuary and existing 100-foot wide federally-maintained navigation channel presently serves approximately 525 boats, predominately pleasure craft. The Environmental Review Team was asked to evaluate possible alternatives to widening this channel an additional 50 feet on the Darien side of the estuary as one measure to help resolve their navigation and mooring encroachment problems. The new channel would be approximately 4,950 feet long north from the mouth of the estuary and at a depth of eight feet. The expense of the dredging is proposed to be underwritten by the boatyards and marine service businesses, and the dredged material will be deposited in the Western Long Island Sound Dumping Area off Lloyd's Neck Point, New York. The newly dredged channel will then be made available to the boatyards for the rental of moorings (p. 1).

The FMRC requested King's Mark to: (1) inventory and assess existing environmental conditions of the estuary; (2) provide a general review of the potential environmental impacts of the proposed dredging as related to shellfish, marine fisheries, waterfowl, water quality, and existing salt marsh communities; (3) assess the proposed dredging in terms of its consistency with the Connecticut Coastal Management Act (CCMA); and (4) identify coastal planning guidelines and areas needing further research or information. Below is a summary of the Team's findings (p. 4).

General Description of the Environment

Average width of the estuary is 500 feet. To the east of the channel in the central reach, the waters have been dredged to accommodate a series of marina facilities and moorings. In the southern reach, the shore is of an engineered type, namely a combination of bulkheads, seawalls and groins. The northern reach contains a natural shoreline and intertidal zone. Fringes of tidal wetlands and more intertidal flats occur here. The Darien shoreline is mostly natural, although sections have been altered through the construction of seawalls, retaining walls, bulkheads, and several elevated pile and timber walkways cross the mudflat. As a result, little to no dredging has been conducted on the Darien side of the estuary, and the intertidal zones have remained relatively intact. A more or less continuous zone of intertidal flat/tidal wetland is found along the entire western shore. An extensive area of wetland and intertidal flat is located in the central reach of the estuary. The upland land use on the western shore is entirely residential (p. 2).

* *

COASTAL GEOLOGICAL CHARACTERISTICS

Geology

The predominant bedrock underlying the study area is a medium- to coarse-grained, poorly-foliated grey to buff granitic gneiss. Numerous outcrops of this bedrock are visible along the lower Darien shore of the estuary where they form a precipitous shoreline. Overlying the bedrock are till and glaciofluvial deposits. These unconsolidated sediments form a veneer of varying thicknesses over the bedrock (p. 6).

Coastal Geologic History

During the maximum extent of the last Pleistocene Ice Age, the Wisconsin Glaciation, tremendous volumes of water were locked up in great ice sheets. As a result, sea level stood as much as 440 feet lower than present with much of the continental shelf exposed as dry land. As the climate warmed and the great ice sheets began to retreat and diminish in size, water returned to the oceans and sea level began to rise. One consequence of the rapid rate of rise in sea level was that in most cases, salt marshes could not form. Salt marshes could not grow vertically at a rate fast enough to keep up with the rapid sea level rise. About 3,000 years B.P., sea level rise slowed to a rate that allowed for tidal wetlands to form and maintain themselves (p. 7).

Recent studies indicate that the rate of sea level rise is increasing due to a variety of oceanographic and meterological events. If the rate of sea level rise does substantially increase, shoreline erosion, coastal flooding and wetland loss will all increase (p. 9).

Coastal Processes

Historically, the Five Mile River was a shallow estuary and certain areas were dredged to enhance navigation. The proposed widening of the navigation channel will increase the channel cross-section below the tidal prism. Not only will this further increase the sedimentation rate in the estuary but it also creates a greater volume of sluggish water. Depending upon the type and extent of pollutants entering the estuary from septic systems and marine discharges from boats, together with organic loadings, there is the potential to contribute to a reduction in quality of the water and subtidal habitat (p. 10).

* *

COASTAL RESOURCES

Coastal Environments

There are six coastal resources as defined in the Coastal Management Act found along or seaward of the shore. These are: (1) general resources; (2) tidal wetland; (3) intertidal flat; (4) shellfish concentration areas; (5) developed shorefront (the engineered shore areas located along the Norwalk shore in the central reach); and (6) coastal waters (estuarine embayment) (p. 12).

The proposed channel expansion will destroy a significant area of intertidal flat and reduce the value of these flats to the estuary in terms of productivity and pollution filtration functions. With regard to the latter, elimination of additional tidal flat could contribute to water quality degradation even if the number of boats is not increased. Potential impacts such as these need to be more carefully researched and evaluated (p. 18).

Applicable Coastal Use and Resource Policies

Policies regarding dredging encourage the maintenance and enhancement of existing federally-maintained navigation channels and discourages the dredging of new federally-maintained navigation channels, basins or anchorages. In addition, the need for future dredging is to be reduced by requiring that new or expanded navigation channels, basins and anchorages take advantage of existing or authorized water depths, circulation and siltation patterns (p. 20).

Potential Adverse Impacts of Proposed Dredging on Coastal Resources

Potential adverse impacts of dredging include: (1) degradation of water quality through increased sedimentation; (2) degradation of existing circulation patterns; (3) degradation or destruction of essential wildlife, finfish or shellfish habitat through significant alterations of the natural components of the habitat; and (4) degradation of tidal wetlands (p. 20-21).

* *

MARINE RESOURCES

Existing Water Quality

During the field review (September 24, 1986), visual quality of the water was good. it was reasonably clear and free of offensive odors. Casual inspection of storm sewers in the Norwalk commercial district revealed sizeable catchments that were not filled with sediments indicating periodic cleaning. There was evidence of hydrocarbon contamination in the form of an oily sheen throughout the area, most likely originating from boat operation and marina activities, although highway runoff will also contribute petroleum hydrocarbons during rainstorms. This type of pollution is common in high-density boating areas and urban drainages (p. 22).

No recent water quality surveys of the Five Mile River Estuary were located. The estuary is currently classified as SB by the DEP which identifies the designated uses as providing habitat for marine fish, shellfish and wildlife, recreational, industrial and other legitimate uses including navigation. Violations of the Class SB criteria could only be identified through specific field evaluations (p. 23).

Sources of Pollution

The Five Mile River corridor does not have many point sources discharging to it from industries or sewage treatment plants. Point sources that do discharge to the river include a filtrate backwash discharge from a water

supply treatment plant located at the New Canaan Reservoir and a scrubber discharge from an incinerator near the New Canaan landfill (p. 25).

A substantial portion of nutrients, oxygen-demanding substances and other contaminants entering the Five Mile River corridor appear to be of non-point origin such as urban runoff and landfills. Other non-point loadings which should receive consideration are those relative to boating activity and marina operation (p. 25-26).

Impacts of Water Degradation on Marine Resources

Generally, water quality impacts can be categorized into two groups. The first encompasses the range of conditions that are caused by changes in productivity and dissolved oxygen levels. The pollutants of concern are nutrients and oxygen-demanding substances. The second group of impacts are those caused by the presence of toxic substances. These may disrupt the functional structure of the ecosystem in several ways (p. 28).

Although not directly related to water quality, a third group of impacts which is of concern is destruction of the physical habitat including increased siltation or turbidity (p. 29).

Potential Impact of Dredging on Water Quality

Environmental effects of dredging may include alteration of physical habitat, increased turbidity, remobilization of contaminants associated with sediments and alterations in hydraulic regimes governing flow, flushing salinity and deposition of solids and associated contaminants. Impacts may be felt both at the dredged site and at the disposal site.

Longer term water quality impacts may occur if contaminated sediments are exposed but not removed from the area by the dredging process. As benthic organisms recolonize the substrate, they may accumulate the toxins and be impacted directly or introduce them to other organisms which prey on them. Oxygen-demanding substances and nutrients may also be released during dredging. Generally, this would cause only a short-term impact and would not be likely to create a persistent imbalance (p. 30-31).

Changes in the hydraulics of the system may have water quality implications. A wider, deeper channel could alter the degree and location of saltwater intrusion from Long Island Sound. This could cause changes in the biology of the system since the range of salinity tolerance of the resident species may be exceeded. Similarly, the chemistry of the estuary will be altered which determines distribution and availability of contaminants. Movement of contaminants out of the estuary may be slowed (or enhanced) if the changed configuration of the estuary reduces (increases) the flushing action of the tides and/or the river transport mechanisms. These concepts are complex and cannot be predicted without detailed field evaluations but should be considered prior to dredging (p. 31).

Marine Fisheries

Salt marshes and intertidal flats are extremely valuable components of marine ecosystems and provide critical nursery areas and feeding grounds to a variety of important finfish species (p. 32).

Of the fish that inhabit this type of estuarine environment, the cunner, windowpane flounder, killifish,, sheepshead minnow, silversides, sticklebacks, tomcod and white perch are year-round residents. All of these species may complete their entire life cycle in inshore estuarine environments (p. 32-33).

The mouth of the Five Mile River Estuary is fished by boat-based recreational fishermen. Because extensive shoreline development in the project area has precluded public access, there is little opportunity for shore-based anglers. Winter flounder, blackfish, bluefish and striped bass are the primary species sought by recreational anglers in the Five Mile River Estuary (p. 34-35).

Shellfish Resources

The Five Mile River Estuary supports a diverse population of shellfish. Molluscan shellfish occurring in the area include the American oyster (Crassostrea virginica) and soft-shell clam (Mya arenaria). Hard clams (Mercenaria mercenaria), and moon snails are also known to inhabit this estuary. These shellfish beds provide a major food source for finfish (p. 35).

The Department of Health Services has closed the Five Mile River Estuary and all of its trubutaries to shellfishing for direct consumption effective 1964. Areas are closed to shellfishing because of proximity to sewage treatment plants, direct exposure to sewage discharges or chemical contaminants, or if coliform organisms (used as an indicator of more harmful pathogens) exceed 70 total coliforms per 100 ml of water or if more than 10 percent of the water samples exceed 230 coliforms per 100 ml (p. 23 & 25).

Potential Impacts of Dredging to the Marine Resources

The bottom community of the estuary is critical, not only for it's yield of shellfish but also as a major element of the ecosystem stability and supply of forage fishery resources. Substrate suitable for shellfish and finfish habitat will be removed by dredging and biological productivity decreased accordingly. Demersal finfish are especially dependent on intertidal flats for feeding grounds and will be most affected by this loss of habitat (p. 36).

* *

COASTAL MANAGEMENT

Connecticut's Coastal Management Program

The policies and goals of the CCMA are primarily implemented through three mechanisms: (1) Municipal Coastal Programs (MCP); (2) Coastal Site Plan Review (CSPR); (3) State and Federal Consistency (p. 38).

Coastal Management Review Requirements

As the proposed dredging affects areas below the mean high water mark, local CSPR is not required except insofar as the proposed activities may affect land-side uses, such as parking, boating support facilities, etc. The permit requirements of the DEP and the Army Corps of Engineers will, in this case, be the primary forum through which coastal management issues are evaluated. These reviews will include, however, the requirement that the project be consistent with the MCP's of both Darien and Norwalk (p. 39).

Evaluation of Coastal Management Consistency

The proposal to dredge the Five Mile River Estuary must be consistent with all of the coastal policies and plans. Any potential adverse impacts must be eliminated or mitigated to the maximum extent possible. The project must be evaluated by weighing the incremental loss of environmental habitat as well as the incremental gain of recreational boating space (p. 44).

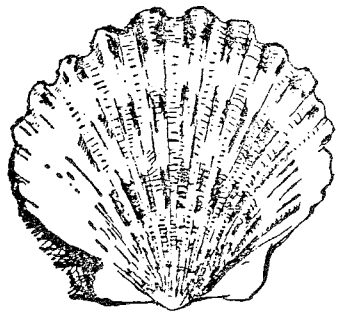
The proposal to dredge a new portion of the Five Mile River Estuary and widen the channel an additional 50 feet does not appear to be consistent with the CCMA, given the potential impacts to coastal resources. The proposed dredging is strongly discouraged by a variety of policies in the CCMA (p. 45).

Evaluation of Alternatives

As part of its evaluation of alternatives to dredging proposal, the ERT encourages that the FMRC consider the following measures as means to improve and legitimize the allocation of mooring space in the Five Mile River Estuary: (1) eliminate all illegal moorings from the navigation channel; (2) eliminate all moorings from the navigation channel and redistribute boats in a manner which takes maximum advantage of existing water depths outside the channel; (3) eliminate all moorings from the navigational channel and redistribute these moorings into areas which do not contain or affect intertidal areas; and (4) designate the navigation channel as a federal anchorage area (p. 46-47).

We strongly advise resolution of the problems facing the FMRC by obtaining and evaluating the above information within the context of a comprehensive harbor management plan developed under the authority of the Harbor Management Act (p. 50).

Should the FMRC choose not to pursue a comprehensive planning effort under existing harbor management legislation, all proposals to resolve the current problem must nevertheless be well supported in order to evaluate them for consistency with the CCMA (p. 50).



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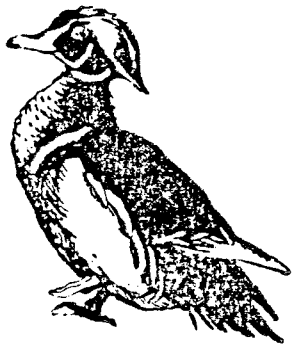


INTRODUCTION

The Five Mile River Commission (FMRC), composed of two members each from the Town of Darien and the City of Norwalk, requested that an environmental review be conducted on the Five Mile River Estuary. The study area is located along Norwalk's and Darien's coastal zone (Figure 1).

The estuary and existing 100-foot wide federally-maintained channel presently serves approximately 525 boats, predominately pleasure craft. Close to 200 of these are moored in the federally-maintained channel. These moorings restrict navigation and safety, especially during low tide. Many of these moorings are rented by local boatyards to boat owners contrary to federal regulations. Future maintenance of the estuary is contingent upon the right of the general public to use the area on equal terms. The rental of unauthorized private moorings or the private control of portions of the existing 100-foot navigable channel denies the public use of this area on an equal basis. Thus, the FMRC has been directed by the Army Corps of Engineers (the Corps) to develop a Harbor Management Plan acceptable to them, the Department of Transportation (DOT), and the Department of Environmental Protection (DEP) if federal maintenance of the estuary is to be continued.

The Five Mile River Commission is proposing to alleviate the situation by dredging a 50-foot wide strip west of the existing channel. The new channel would be approximately 4,950 feet long north from the mouth of the Five Mile River Estuary and at a depth of eight feet. The expense of the dredging is proposed to be underwritten by the boatyards and marine service businesses, and the dredged material will be deposited in the Western Long Island Sound Dumping Area off Lloyd's Neck Point, New York (approximately 6 to 7 miles from the Five Mile River Estuary). The newly dredged channel will then be made available to

the boatyards for the rental of moorings.

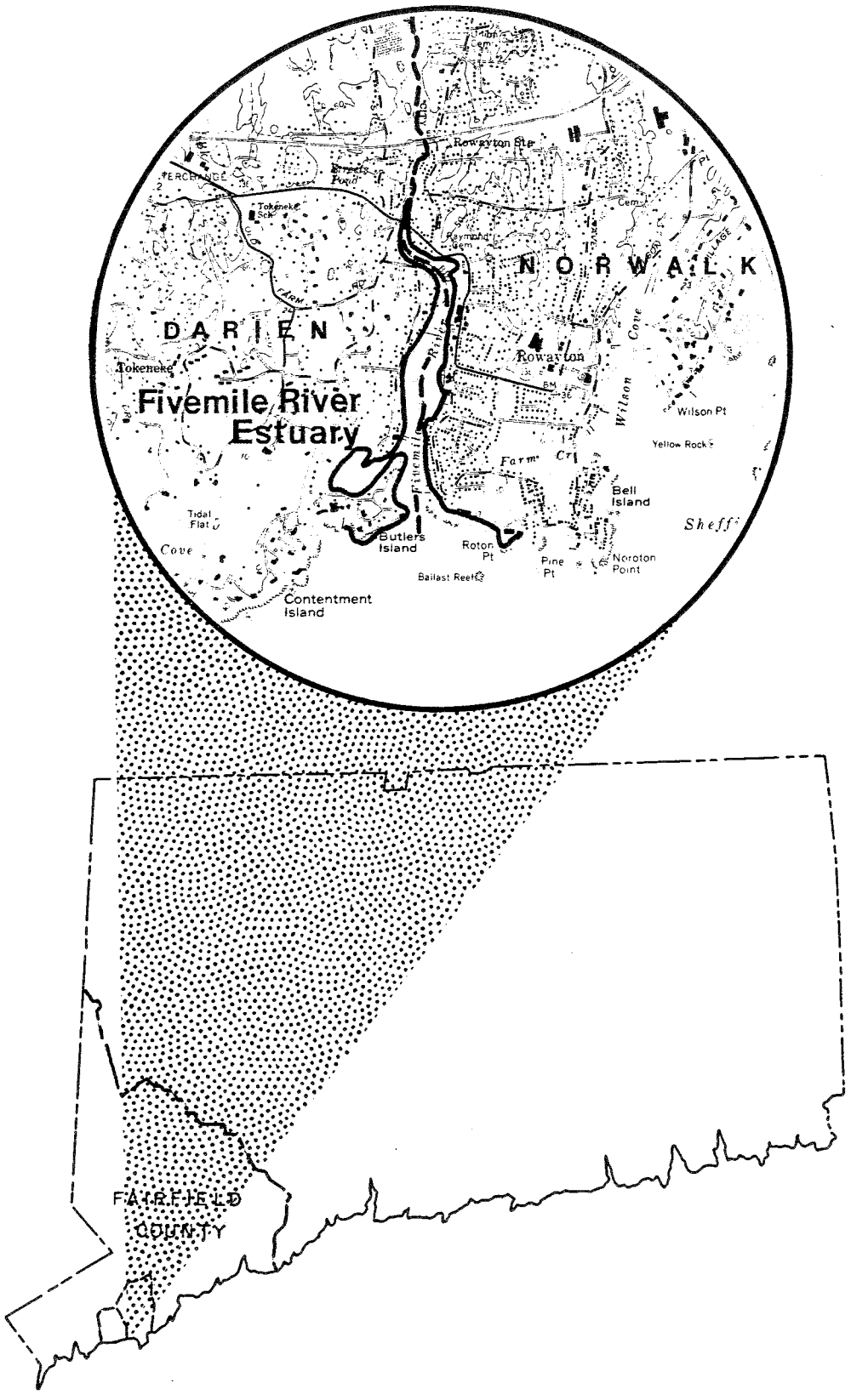
GENERAL DESCRIPTION OF THE ENVIRONMENT

The Five Mile River Estuary is located on the border of Darien and Norwalk and extends from Butlers Island to Route 136 for a distance of one mile. Average width of the estuary is 500 feet. A 100-foot federal navigation channel more or less bisects the estuary. To the east of the channel in the central reach, the waters have been dredged to accommodate a series of marina facilities and moorings. The shoreline here is highly engineered and is composed primarily of bulkheads. The associated land use is mostly marine commercial. In the southern reach, the shore is of an engineered type, namely a combination of bulkheads, seawalls and groins. Between the groins are narrow zones of sand beach, and the intertidal/subtidal zones are mostly composed of coarse textured sediments such as sands. Residential development is the primary upland use in this area. The northern reach contains a natural shoreline and intertidal zone. Fringes of tidal wetlands and more extensive zones of fine-textured intertidal flats occur here. As in the southern reach, the associated land use on the uplands is principally residential.

The Darien shoreline on the west side of the estuary is markedly different from the Norwalk shoreline. This shore is mostly natural, although sections have been altered through the construction of seawalls, retaining walls and bulkheads. Several elevated pile and timber walkways cross the mudflat to provide access to deeper water for boating purposes. As a result, little to no dredging has been conducted on the Darien side of the estuary, and the intertidal zones have remained relatively intact. A more or less continuous zone of intertidal flat/tidal wetland is found along the entire western shore.

Figure 1

LOCATION OF STUDY SITE



An extensive area of wetland and intertidal flat is located in the central reach of the estuary. The upland land use on the western shore is entirely residential.

The mean and spring tidal ranges for Long Island Sound adjacent to the estuary are 7.1 and 8.2 feet, respectively. Water quality in the estuary is classified as SB.

GOALS OF ENVIRONMENTAL REVIEW

The primary concern of this project was the potential environmental impact on the estuarine environment caused by the proposed dredging. Specifically, the FMRC requested the ERT to:

(1) Inventory and assess existing environmental conditions of the estuary;

(2) Provide a general review of the potential environmental impacts of the proposed dredging as related to shellfish, marine fisheries, waterfowl, water quality, and existing salt marsh communities;

(3) Assess the proposed dredging in terms of its consistency with the Connecticut Coastal Management Act (CCMA); and

(4) Identify coastal planning guidelines and areas needing further research or information.

THE ERT PROCESS

Through the efforts of the FMRC and the King's Mark Environmental Review Team, this environmental review and report was prepared. This ERT report is not a "Harbor Management Plan" for the the Five Mile River Estuary. Rather, it is an inventory and assessment of existing environmental conditions and offers coastal management guidelines. The information contained herein may be utilized in the development of a comprehensive "Harbor Management Plan."

The review process consisted of four phases:

(1) Inventory of the estuary's coastal resources (collection of data);

(2) Assessment of these resources (analysis of data);

(3) Identification of resource problem areas; and

(4) Presentation of coastal planning guidelines.

The data collection phase involved both literature and field research. The ERT field review took place on September 24, 1986. The Team members toured the estuary by boat. Field review and observation of the estuary proved to be a most valuable component of this phase. The emphasis of the field review was on the exchange of ideas, concerns or alternatives. Mapped data or technical reports were also perused and specific information concerning the study area was collected. Inspecting estuarine conditions allowed Team members to check and confirm mapped information and identify other resources.

Once the Team members had assimilated an adequate data base, it was then necessary to analyze and interpret their findings. The results of this analyses enabled Team members to arrive at an informed assessment of the estuary's natural resource development opportunities and limitations. Individual Team members then prepared and submitted their reports to the ERT Coordinator for compilation into the final ERT report.

COASTAL GEOLOGICAL CHARACTERISTICS

consists of looser, more friable sediments. It was not seen in the study area.

Glaciofluvial deposits predominate in the Five Mile River valley from approximately 0.4 miles south of the Route 136 bridge northward. These stratified sands and gravels were deposited by glacial melt waters either as outwash in front of the glacier or as ice-contact drift adjacent to the ice. Deposits in the Five Mile River vicinity are mapped as ice-contact drift with a reported thickness of 28 feet in a borehole just south of the Route 136 bridge.

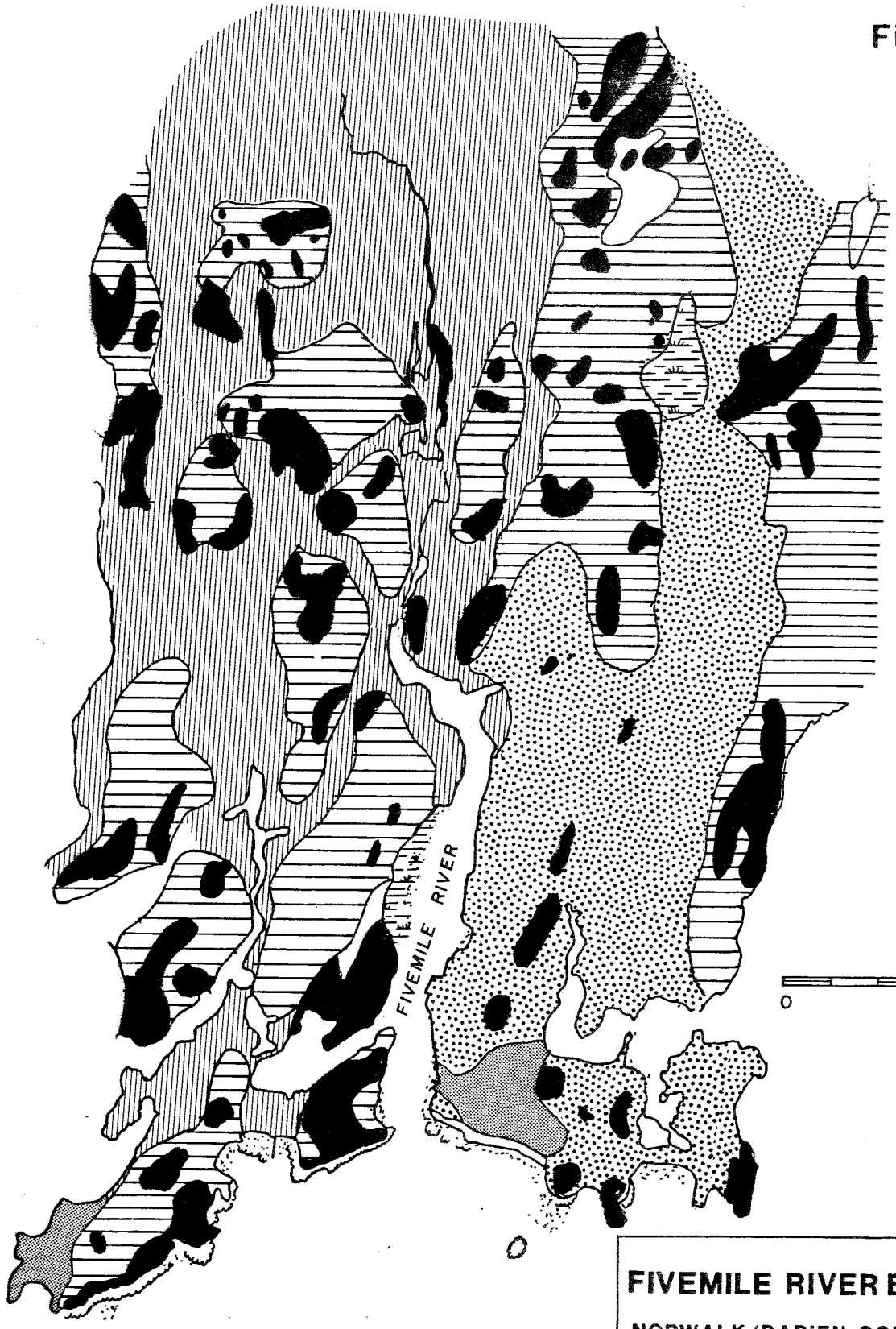
Observations made in the field confirm that the bed of the estuary in the vicinity of Pinkney Park consists of sand and gravel with well-rounded cobbles 2 to 3 inches in diameter.

Coastal Geologic History

During the maximum extent of the last Pleistocene Ice Age, the Wisconsin Glaciation, tremendous volumes of water were locked up in great ice sheets thousands of feet thick. Similar ice sheets covered much of Europe and Scandinavia. As a result of this, sea level stood as much as 440 feet lower than present with much of the continental shelf exposed as dry land. Rivers cut deeply into the exposed surface of the land as they wound their way to the sea.

As the climate warmed and the great ice sheets began to retreat and diminish in size, water returned to the oceans and sea level began to rise. The Connecticut coast was submerged by the rising water at the rate of 0.6 feet per century from 7,000 to 3,000 years B.P. (Before Present) slowing to 0.3 feet per century from 3,000 years B.P. until present. The rising waters drowned many of the coastal river valleys and extended estuarine conditions considerable distances inland.

Figure 2



FIVEMILE RIVER ESTUARY

NORWALK/DARIEN, CONNECTICUT

COASTAL GEOLOGY

ARTIFICIAL FILL

TILL

BEDROCK OUTCROPS

GLACIOFLUVIAL DEPOSITS

King's Mark Environmental Review Team

One consequence of the rapid rate of rise prior to 3,000 years B.P. was that in most cases, salt marshes could not form. Salt marshes could not grow vertically at a rate fast enough to keep up with the rapid sea level rise. About 3,000 years B.P., sea level rise slowed to a rate that allowed for tidal wetlands to form and maintain themselves.

Recent studies indicate that the rate of sea level rise is increasing due to a variety of oceanographic and meterological events. If the rate of sea level rise does substantially increase, shoreline erosion, coastal flooding and wetland loss will all increase.

Coastal Processes

The Five Mile River is a drowned river valley with tidal and saline conditions extending up to the Route 136 bridge. At the time of the field review (September 24, 1986), salinities in the estuary were about 26 parts per thousand with Long Island Sound at 28 parts per thousand. This is indicative of the overwhelming influence of Long Island Sound waters on the chemistry of the estuary.

During times of high freshwater discharge a salinity gradient will probably exist, with salinities decreasing with increasing distance upstream.

Tides are semi-diurnal having a mean range of 7.1 feet and a spring range of 8.2 feet in South Norwalk. Stamford, west of Darien, has a mean range of 7.2 feet and a spring range of 8.3 feet.

The volume of water between the high and low tide limits that is exchanged with Long Island Sound during one flood or ebb period is called the tidal prism. Water quality and bottom geometry in an estuary are directly related to the size of the tidal prism.

Water quality is affected by the volume of the tidal prism in relation to the total volume of the estuary at high tide. When the total volume is greater than the tidal prism, the difference is the volume of water that remains in the estuary at low tide. This residual water is gradually renewed over a period of time much longer than a tidal cycle.

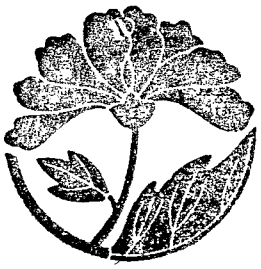
Tidal channel configuration develops towards a dynamic equilibrium with the tidal prism and the load of sediment that it transports. Moving water has the capability of transporting sediment, with the size of the sediment transported depending on the velocity of the flow. It is during periods of low current velocity, such as slack tide, that fine sediments settle out of suspension.

The trapping efficiency of an estuary is dependent on its volumetric capacity in relation to the rate of sedimentation and the energy available to transport the sediment supplied. Transport processes act to establish equilibriums between supply and energy by either trapping or by-passing sediment. As sediment accumulates, volumetric capacity and, hence water depth below an equilibrium depth is reduced, causing current velocity and scour to increase in order to maintain the equilibrium depth.

Dredging increases the cross-sectional area of the estuary, but since it is done below the low tide limit, it does not change the tidal prism. If the tidal prism stays constant, but the channeled cross-sectional area is increased, current velocity decreases, sedimentation increases and the channel will shoal.

Historically, the Five Mile River was a shallow estuary and certain areas were dredged to enhance navigation. The proposed widening of the navigation channel will increase the channel cross-section below the tidal prism. Not only will this further increase the sedimentation rate in the estuary but it also creates a greater volume of sluggish water. Depending upon the type and

extent of pollutants entering the estuary from septic systems and marine discharges from boats, together with the organic loadings, there is the potential to contribute to a reduction in quality of the water and subtidal habitat.



COASTAL RESOURCES

COASTAL RESOURCES

There are six coastal resources as defined in the Coastal Management Act found along or seaward of the shore. These are: (1) general resources; (2) tidal wetland; (3) intertidal flat; (4) shellfish concentration areas; (5) developed shorefront (the engineered shore areas located along the Norwalk shore in the central reach); and (6) coastal waters (estuarine embayment). Selected coastal resources are shown in Figure 3. Several of these resources are explained in greater detail below.

Tidal Wetlands

A description of the tidal wetlands which occur in this estuary have been described by Niering and Steever[1] (1972). Along the Norwalk shoreline, tidal wetlands are confined to the northern reach and occur principally as narrow zones. In contrast, tidal wetlands occur along most of the Darien shore as a zone or form small pocket wetlands in the northern reach. The exception to this is the large wetland that has developed in the central reach. It is mostly of the low marsh type and supports principally Salt-water Cord-grass (Spartina alterniflora) (Figure 4).

The significance, floristic composition and productivity of this wetland are described in the report by Niering and Steever.

Intertidal Flats

The dominant coastal resource in the estuary is fine-textured intertidal flats. For the most part, dredging activities along Norwalk's shoreline have

[1]Niering, W. A. and Steever, E. Z. 1972. A preliminary ecological analysis of the Five Mile River, Fairfield Co., Connecticut. Unpublished report.

replaced historic flats with subtidal habitat except in the northern reach. Extensive intertidal flats occur between the Darien shore or its wetlands and the navigation channel (Figure 5).

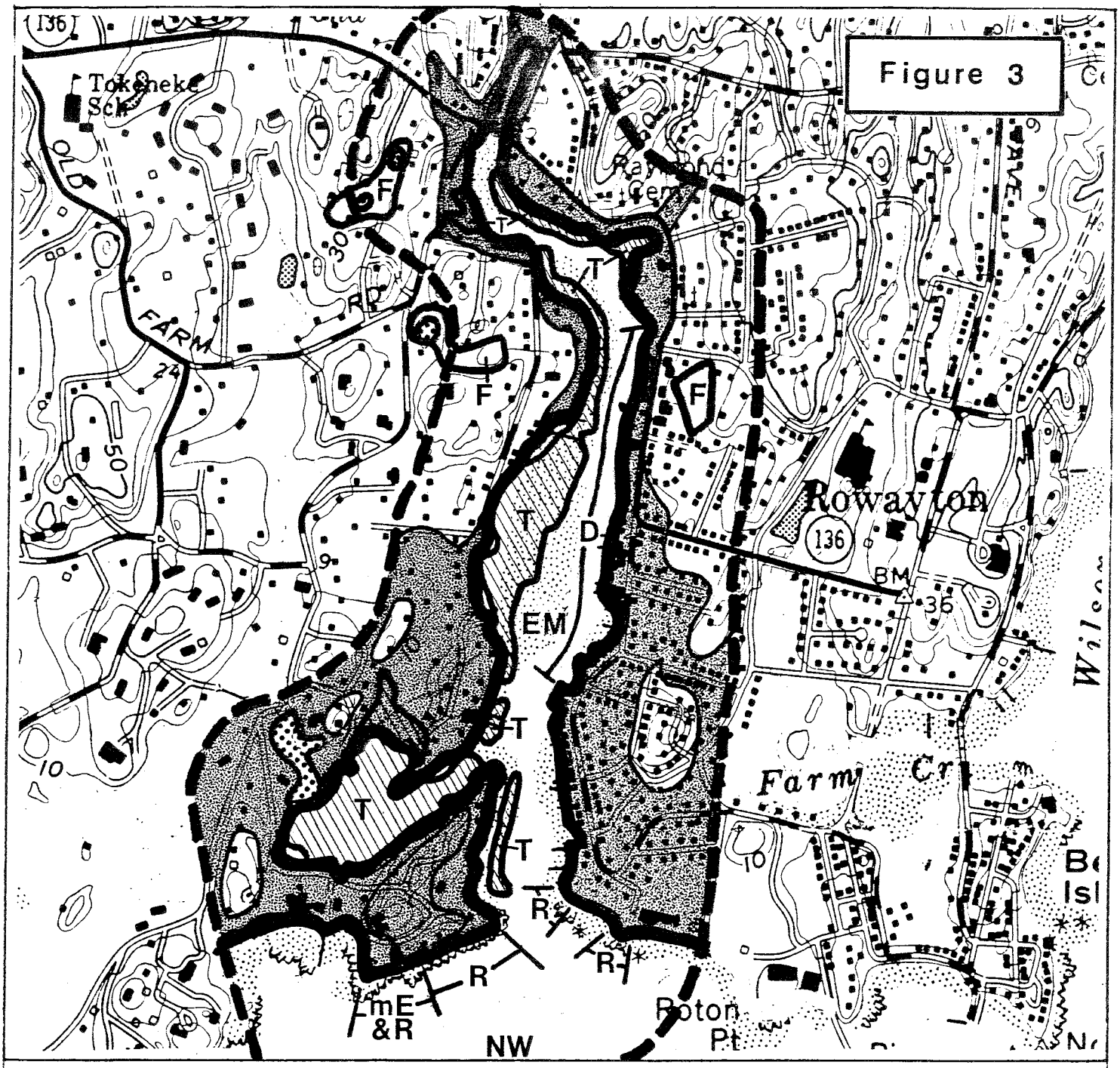
Since the ERT is not equipped to do oceanographic sampling of estuaries, no direct studies of intertidal or subtidal environments were made. As a rule, any application to conduct dredging of new areas along Connecticut's coast is accompanied by an assessment of the project's potential impacts on coastal resources, including but not limited to intertidal flats and subtidal habitat. Such an analysis should include an assessment of substrate texture, habitat health, species composition and biological productivity.

The proposed widening of the navigation channel by 50 feet would directly destroy approximately 2.25 acres of intertidal flat, and through the processes of slope readjustment and scour, would indirectly affect an indeterminate area located outside the navigation channel. Also, any increase in boating activity would further contribute to the loss of the mudflat outside the navigation channel.

Although no direct studies were conducted on the flats, given the general health of the estuary and the absence of discharges from commercial and industrial sources and sewage treatment plants, it is expected that a study of the flats would show that they are productive.

Shellfish

The entire estuary may contain significant concentrations of shellfish. (Figure 6) (see also Marine Resources chapter). We recommend that the FMRC contact Mr. John Volk of the Aquaculture Division of the Connecticut Department of Agriculture to determine the value of the estuary in terms of shellfish resources.



approximate boundary of STUDY AREA

mE modified BLUFFS AND ESCARPMENTS

R ROCKY SHOREFRONTS

COASTAL 'FLOOD' HAZARD AREA

F FRESHWATER WETLANDS AND UNDESIGNATED TIDAL WETLANDS

SHORELANDS

D DEVELOPED SHOREFRONT

WATER

T REGULATED TIDAL WETLANDS

INTERTIDAL FLATS

EM ESTUARINE EMBAYMENTS

NW NEARSHORE WATERS

FIVEMILE RIVER ESTUARY

NORWALK/DARIEN, CONNECTICUT

COASTAL RESOURCES

King's Mark Environmental Review Team

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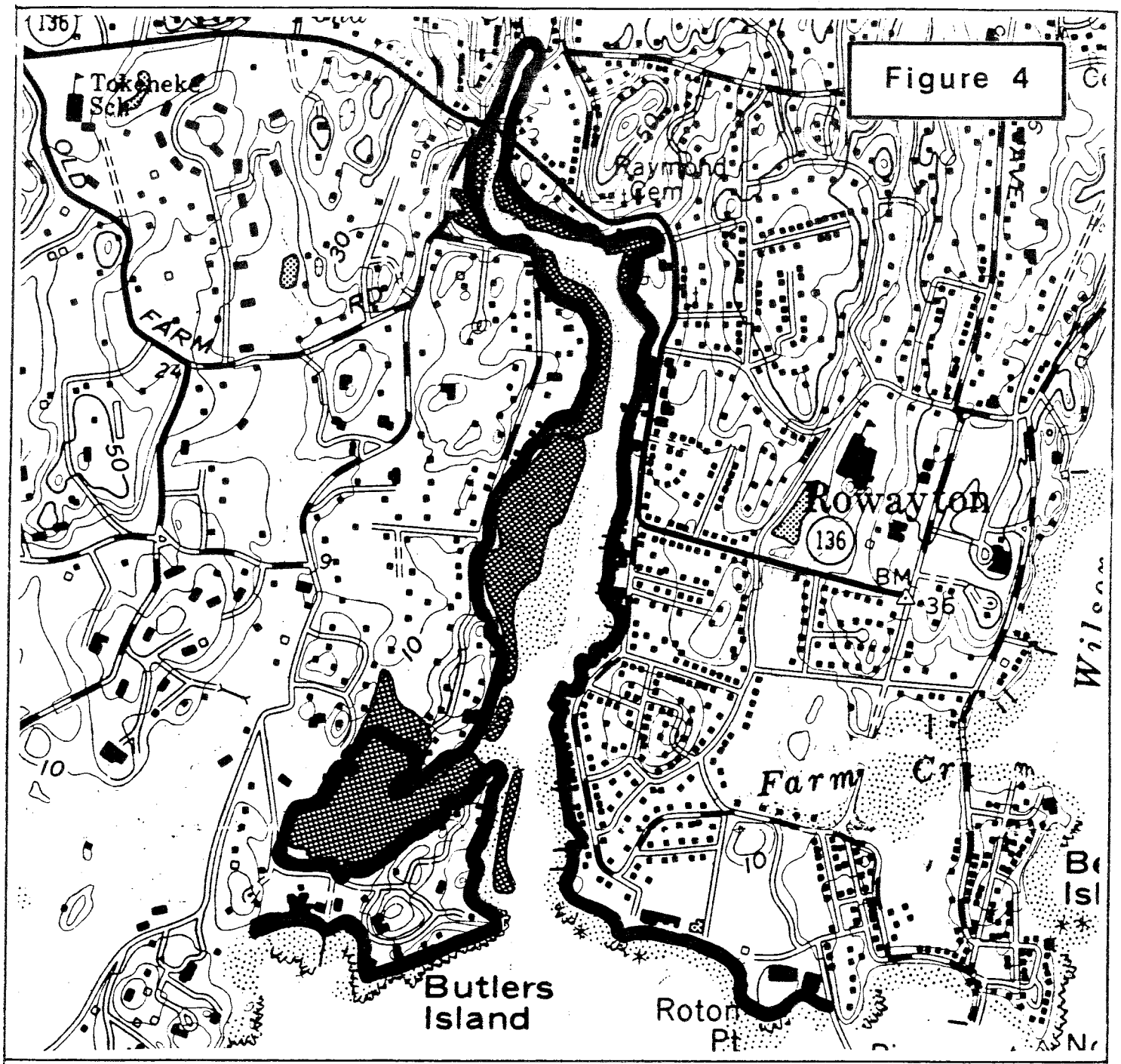

TIDAL WETLANDS

FIVEMILE RIVER ESTUARY

NORWALK/DARIEN, CONNECTICUT

TIDAL WETLANDS

King's Mark Environmental Review Team

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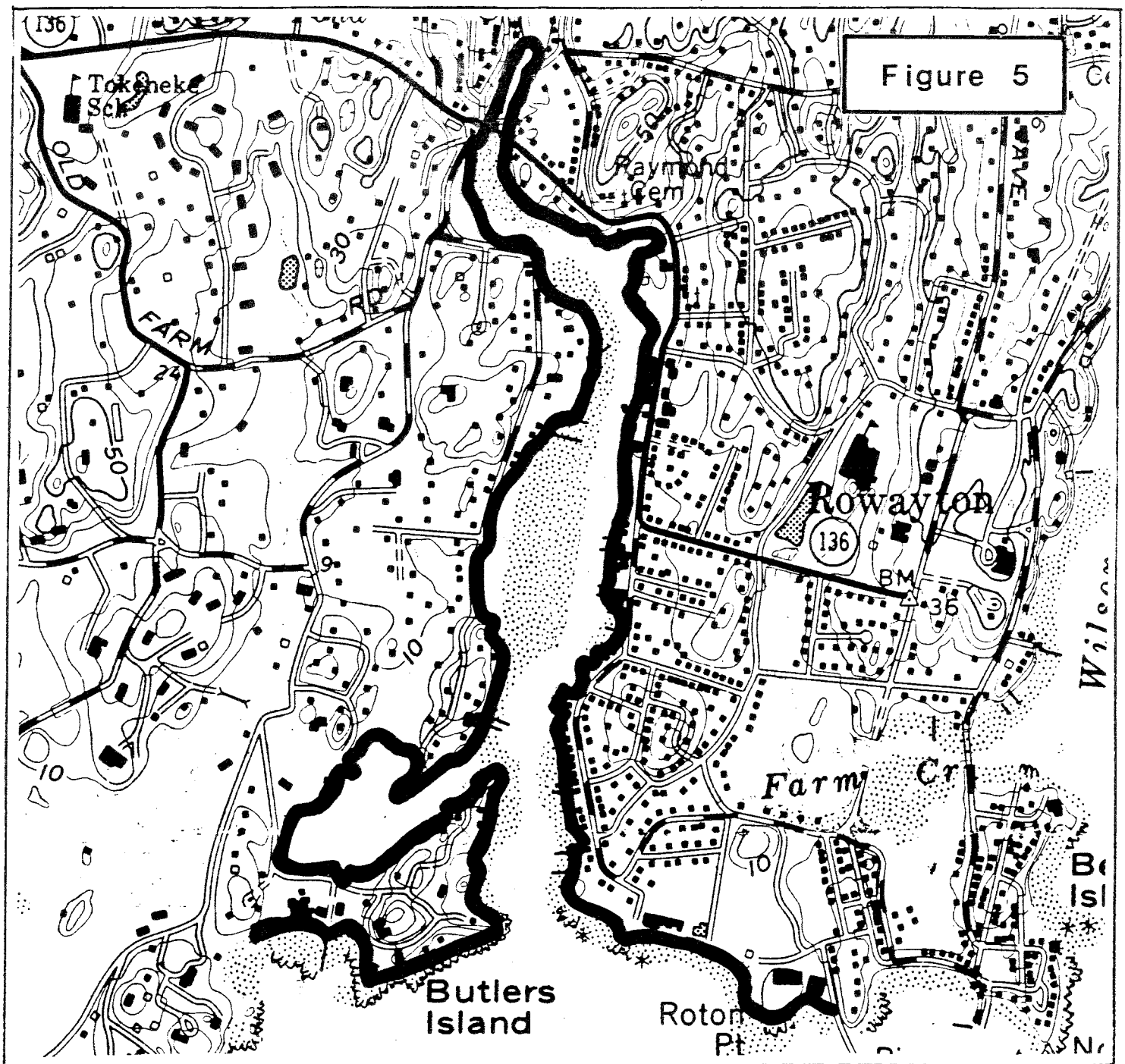
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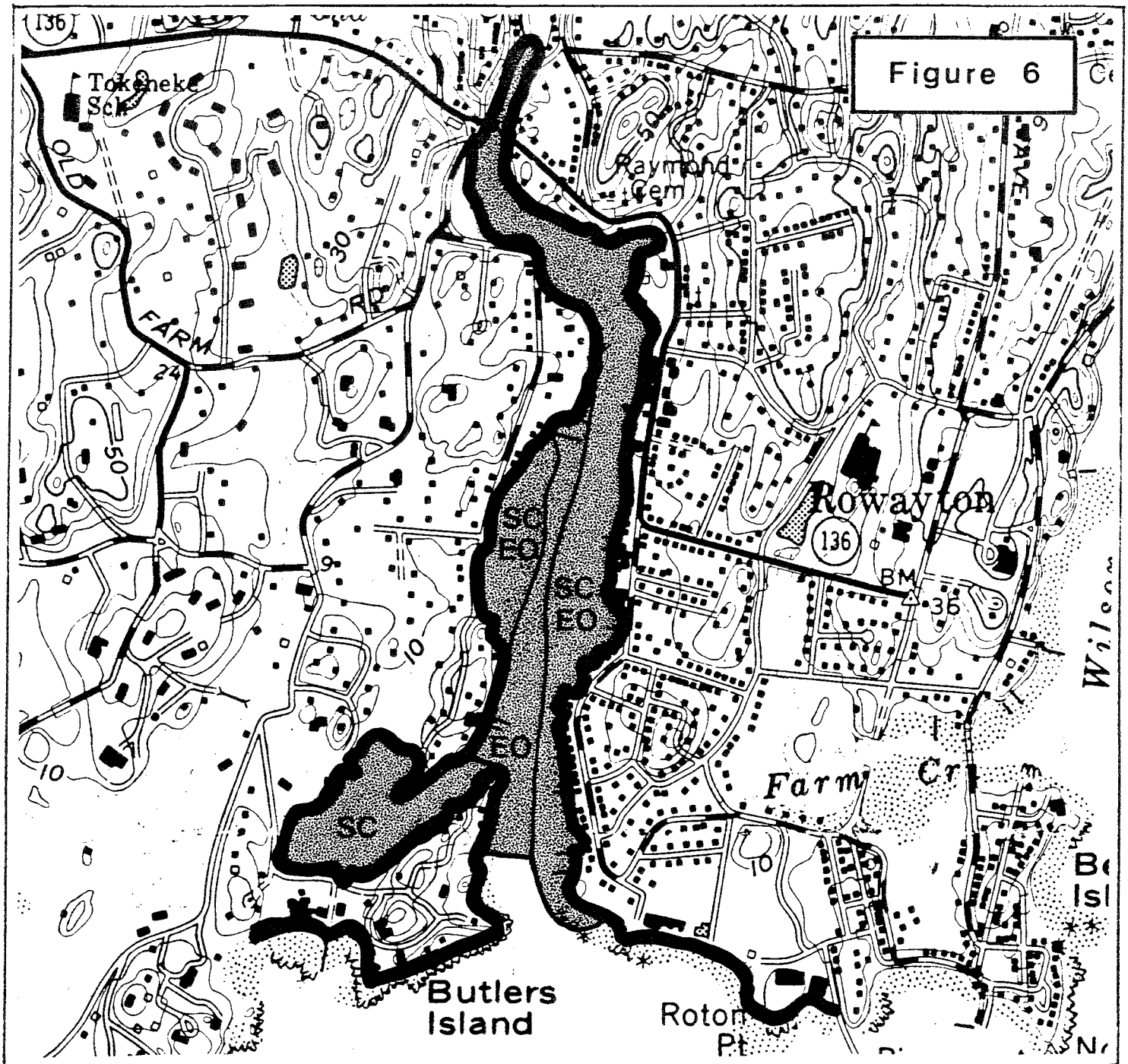

SHELLFISH CONCENTRATION AREAS

SC SOFT CLAM

EO EASTERN OYSTER

FIVEMILE RIVER ESTUARY

NORWALK/DARIEN, CONNECTICUT

SHELLFISH CONCENTRATION AREAS

King's Mark Environmental Review Team

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Summary of Coastal Resources

In summary, the Five Mile River Estuary is a small coastal embayment that has a finite carrying capacity. Based upon reported water quality and type of uses located in and around the estuary, one would anticipate that the intertidal and subtidal resources are generally productive and healthy. The composition, productivity and health of these resources can only be determined through a detailed investigation of the intertidal and subtidal resources. This will be necessary for the determination of potential adverse impacts upon estuarine resources, and such an analysis will be required as a part of the application materials for state and federal permits. The ERT program is not equipped to undertake such detailed investigations.

The proposed channel expansion will destroy a significant area of intertidal flat and reduce the value of these flats to the estuary in terms of productivity and pollution filtration functions. With regard to the latter, elimination of additional tidal flat could contribute to water quality degradation even if the number of boats are not increased. Potential impacts such as these need to be more carefully researched and evaluated.

APPLICABLE COASTAL RESOURCE POLICIES

As described above, the Five Mile River is an estuarine embayment with significant natural coastal resources, a developed shorefront on the Norwalk side of the estuary and a relatively unaltered shorefront on the Darien side. The FMRC must determine the consistency of its proposal with the CCMA policies applicable to the coastal resources, including the general resource policies of CCMA. These policies are summarized below and listed in their entirety as Appendix A to this report.

In general, it is the policy of the state to preserve, protect, and enhance natural coastal resources. Where feasible, degraded resources should be restored to their natural condition and function. Estuarine embayments such as the Five Mile River are to be managed to assure sustained biological productivity, healthy marine populations, and natural patterns of circulation and basin configuartion. The tidal wetlands of the Five Mile River Estuary are healthy, as are the intertidal flats, and priority must be given to their protection. Modification of these resources should only be allowed if the adverse impacts to them are minimal. Although the existing developed shorefront should be utilized for water-dependent uses as efficiently as possible, such uses must not adversely impact natural coastal resources.

APPLICABLE COASTAL USE POLICIES

The FMRC must also evaluate the project's consistency with applicable coastal use policies of the CCMA. The relevant use policies for the proposal to widen the navigation channel by 50 feet are summarized below and listed as Appendix B to this report.

One of the general development policies of the CCMA requires that use, preservation or development of the coastal area proceeds in a manner consistent with the capability of the land and water resources to support the proposed use, without significantly disrupting either the natural environment or sound economic growth. In addition, a second general development policy requires the resolution of conflicts between competing uses on the shorelands adjacent to marine and tidal waters by giving preference to uses that minimize adverse impacts on natural coastal resources while providing long-term stable economic benefits.

The policies regarding dredging are more specific. They encourage the maintenance and enhancement of existing federally-maintained navigation channels and discourages the dredging of new federally-maintained navigation channels, basins or anchorages. In addition, the need for future dredging is to be reduced by requiring that new or expanded navigation channels, basins and anchorages take advantage of existing or authorized water depths, circulation and siltation patterns.

Recreational and commercial boating is encouraged through the CCMA by promoting additional berthing space in existing harbors and providing for new boating facilities in natural harbors. Within the boating policies, however, protection of sensitive coastal resources is again promoted by requiring, where feasible, that boating uses and facilities minimize disruption or degradation of natural coastal resources, utilize existing altered, developed or redevelopment areas, and utilize ramps and dry storage rather than slips in environmentally sensitive areas.

Finally, in regard to navigation in ports and harbor areas, the policies of the CCMA disallow uses which unreasonably congest navigation channels, or unreasonably preclude boating support facilities elsewhere in the harbor.

POTENTIAL ADVERSE IMPACTS

As previously stated, an application submitted to the Water Resources Unit of the DEP and the Army Corps of Engineers for dredging the Five Mile River Estuary must incorporate all reasonable measures to mitigate any adverse impacts associated with the proposal. "Adverse impacts to coastal resources" are defined in Section 22a-93(15) of the CCMA. The adverse impacts which may result from dredging activity proposed by the FMRC are listed as Appendix C to this report. These potential impacts include:

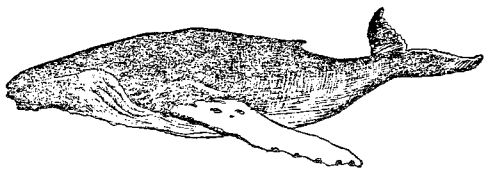
(1) Degradation of water quality through increased sedimentation;

(2) Degradation of existing circulation patterns through the alteration of patterns of tidal exchange or flushing rates, fresh water input, or existing basin characteristics and channel contours;

(3) Degradation or destruction of essential wildlife, finfish or shellfish habitat through significant alterations of the natural components of the habitat; and

(4) Degradation of tidal wetlands, ...through significant alteration of their natural characteristics or function.

More resource information must be generated regarding the subtidal area and river hydrology in order to evaluate the significance or likelihood of these potential adverse impacts. If necessary, alternatives to the dredging or other mitigation measures should be proposed which minimize the impacts of the project on the resources. A project cannot be considered to be consistent with the CCMA if it has not been demonstrated that the adverse impacts have been minimized, and determined that any remaining impacts are acceptable.



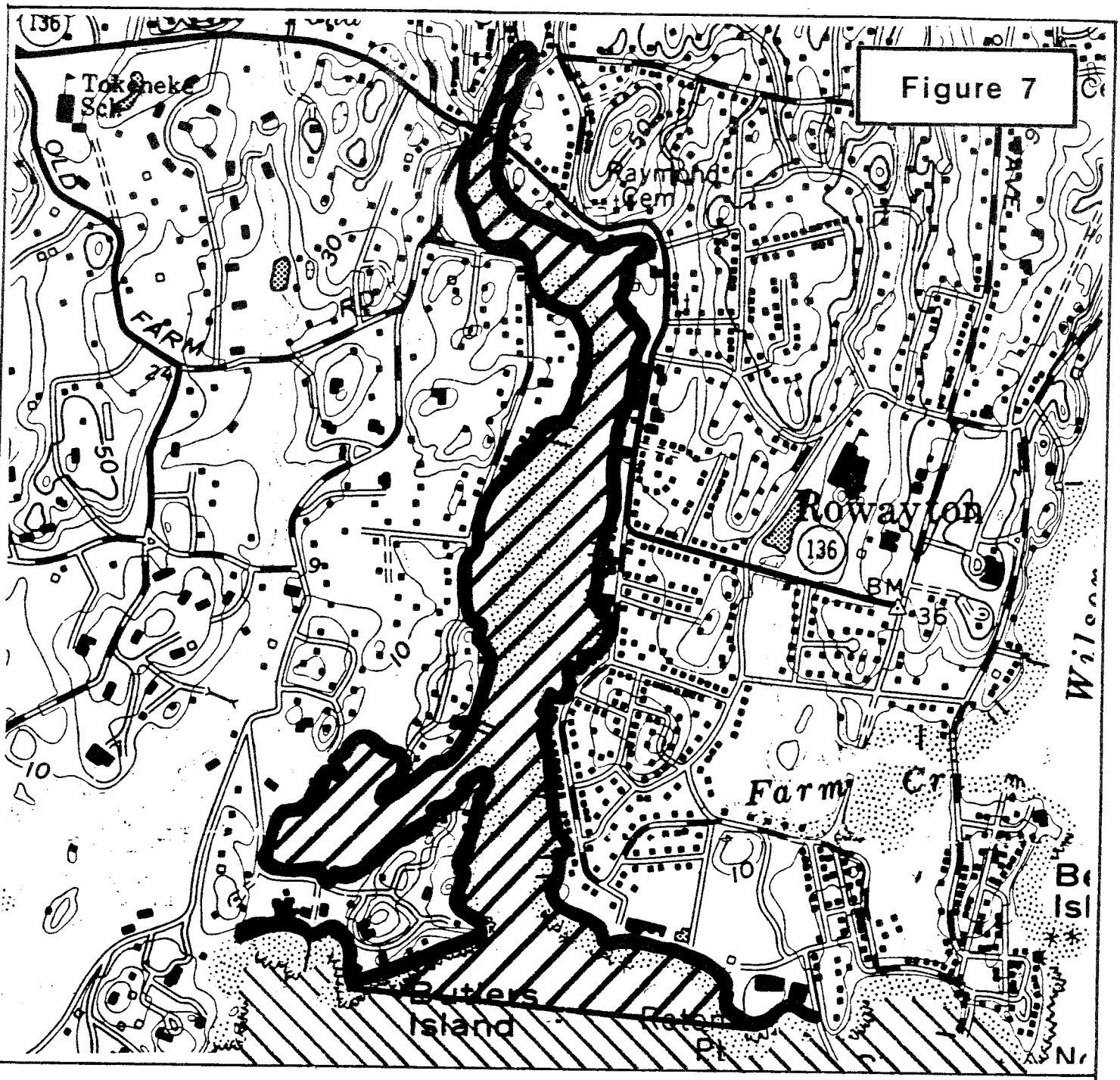
MARINE RESOURCES

Sound in Darien/Norwalk. The annual flow estimate (365 day, 2-year is 25.71 ft^3/sec, a flow which is exceeded 37 percent of the time (South Western Regional Planning Agency, 1980). Most of the basin, approximately 67 percent, is low-to-moderate-density residential. High-density residential, commercial and industrial lands collectively comprise seven percent of the basin while open, pasture and forest provide 19 percent of the surface area land uses (South Western Regional Planning Agency, 1980). A good summary of the physical and biological habitats and conditions surrounding the Five Mile River Estuary is presented by Niering and Steever (1972).

Existing Water Quality

No recent water quality surveys of the Five Mile River Estuary were located. The estuary is currently classified as SB by the DEP which identifies the designated uses as providing habitat for marine fish, shellfish and wildlife, recreational, industrial and other legitimate uses including navigation (Appendix D). Violations of the Class SB criteria could only be identified through specific field evaluations. Attention to dissolved oxygen levels and oil and grease surface scums might reveal some violations of the criteria. Whether toxic substances are impacting the biota of the estuary would also require an extensive field evaluation. Copper and tributyl tin, common antifouling agents, are likely candidates for study because of the intensive use of the estuary by boaters.

The Connecticut Department of Health Services, Preventable Diseases Division, has closed the Five Mile River Estuary and all of its trubutaries to shellfishing for direct consumption effective 1964 (Figure 7). Areas are closed to shellfishing because of proximity to sewage treatment plants, direct exposure to sewage discharges or chemical contaminants, or if coliform



CLOSED

CONDITIONAL

(JULY 1985)

FIVEMILE RIVER ESTUARY

NORWALK/DARIEN, CONNECTICUT

AREAS CLOSED TO SHELLFISHING

King's Mark Environmental Review Team

0 1000'

organisms (used as an indicator of more harmful pathogens) exceed 70 total coliforms per 100 ml of water or if more than 10 percent of the water samples exceed 230 coliforms per 100 ml. Because of the human health implications associated with the consumption of contaminated shellfish, the closure lines are usually conservatively ("on the safe side") drawn. Unpredictable discharge of excreta from recreational boats intensify concern since problems from this source are impossible to montior.

Sources of Pollution

Point Sources

The Five Mile River corridor does not have many point sources discharging to it from industries or sewage treatment plants. Point sources that do discharge to the River include a filtrate backwash discharge from a water supply treatment plant located at the New Canaan Reservoir and a scrubber discharge from an incinerator near the New Canaan landfill (Figure 8). The sewage treatment plant is the largest of these sources although it averages only about one million gallons per day (mgd) and is in compliance with Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) limits according to recent monitoring reports. A former metal finishing plant located on Keeler Brook is apparently no longer active and sewage formerly treated at a plant on the Five Mile River in Norwalk is now treated at the city plant on Norwalk Harbor.

Nonpoint Sources

A substantial portion of nutrients, oxygen-demanding substances and other contaminants entering the Five Mile River corridor appear to be of non-point origin. The Connecticut 208 program estimated loadings to the area from

non-point sources, but these values should be used cautiously. The intent of the 208 program was to provide only a preliminary comparison among drainage basins using assumed loadings from land use assessments made in other areas. No field verification studies were conducted in the Five Mile River basin. The data are presented here only to provide a basic insight into how land use affects loadings and highlight areas or land uses which might be exerting an impact on the Five Mile River.

Using the 208 estimates for BOD loadings to the Five Mile River, it is apparent that urban runoff contributes the overwhelming (67 percent) portion of oxygen-demanding substances. Point sources, by comparison, were estimated to contribute 22 percent of the BOD load (South Western Regional Planning Agency, 1980). Landfills contributed an estimated 10 percent of the total BOD load. Based on these estimates, the River portion would be expected to violate the five mg/L dissolved oxygen standard on a frequent basis. How this would impact the Five Mile River Estuary is unclear based on these data alone. Loadings of nutrients, heavy metals and pesticides would be expected to exhibit a similar source pattern and be characteristic of urban runoff for the area. Clearly, if maintenance or improvement of water quality is an objective, non-point sources and their control will require attention.

Other non-point loadings which should receive consideration are those relative to boating activity and marina operation. Concern lies primarily with human wastes being dishcarged from boats with no treatment, petroleum products leaking from motors, and antifouling and preservative compounds used on boats and marina structures. Without details specific to boat usage in the estuary, it is not possible to estimate the loading or assess the impact from this source accurately. However, using general loading rates developed by the Environmental Protection Agency (EPA) (1985), it could be expected that the BOD

Figure 8

FIVEMILE RIVER ESTUARY

NORWALK/DARIEN, CONNECTICUT

LEACHATE AND WASTEWATER DISCHARGE SOURCES

King's Mark Environmental Review Team

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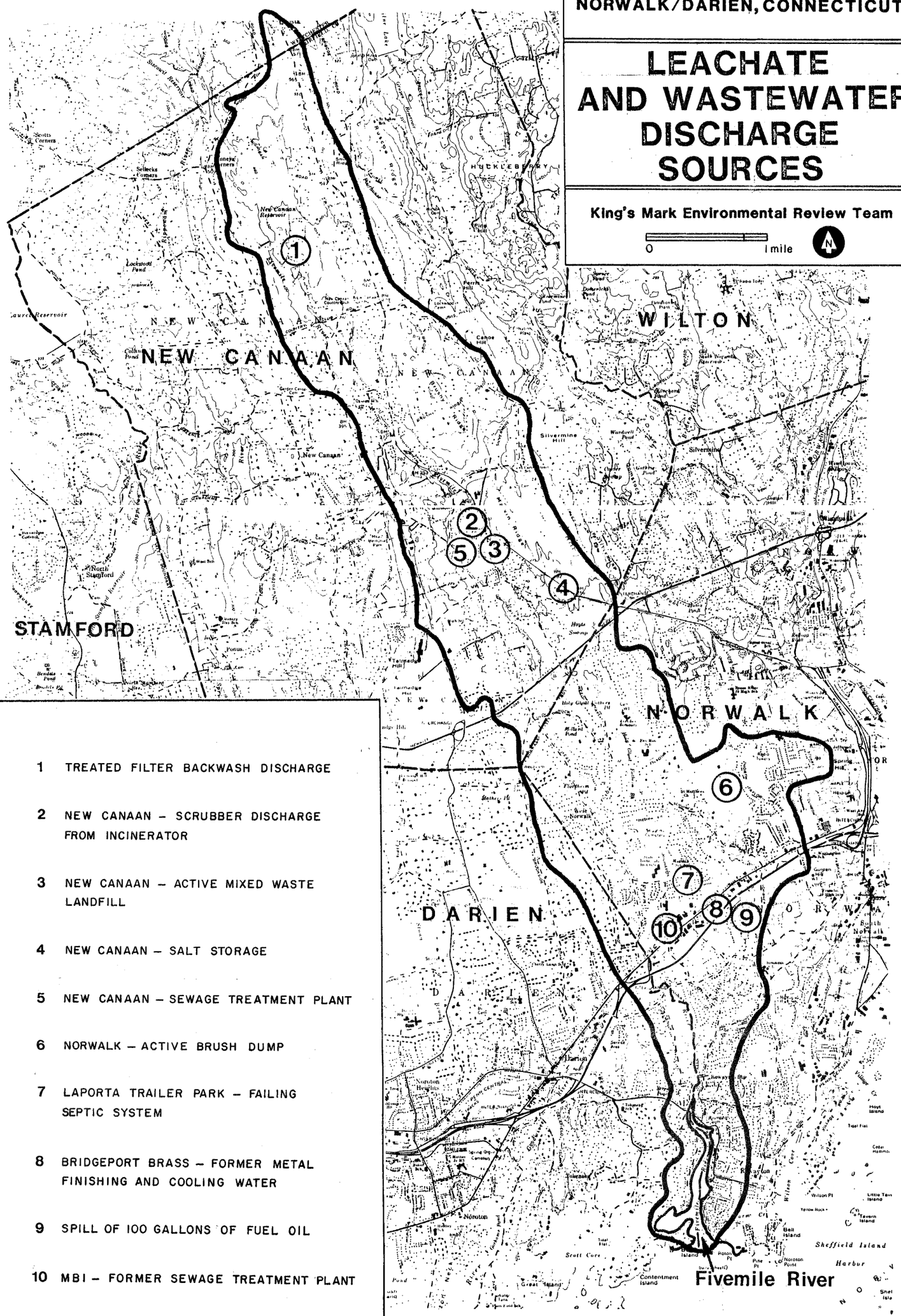


1 TREATED FILTER BACKWASH DISCHARGE

2 NEW CANAAN – SCRUBBER DISCHARGE FROM INCINERATOR

3 NEW CANAAN – ACTIVE MIXED WASTE LANDFILL

4 NEW CANAAN – SALT STORAGE

5 NEW CANAAN – SEWAGE TREATMENT PLANT

6 NORWALK – ACTIVE BRUSH DUMP

7 LAPORTA TRAILER PARK – FAILING SEPTIC SYSTEM

8 BRIDGEPORT BRASS – FORMER METAL FINISHING AND COOLING WATER

9 SPILL OF 100 GALLONS OF FUEL OIL

10 MBI – FORMER SEWAGE TREATMENT PLANT

loading from 1,000 active boats would equate to a one mgd secondary sewage treatment plant. There is added concern with this type of loading because it is untreated and will introduce pathogens at a higher concentration than properly treated wastes. Also, the aesthetics of raw sewage in an area of high recreational usage should be considered. Resolution would require that adequate restroom facilities exist at the marinas, pump-out facilities are provided and used, and that no discharge zones be established in areas of shellfish beds, intensive recreational activity or low flushing. This would probably establish the entire Five Mile River Estuary as a no-discharge zone.

General Impacts of Water Degradation on Marine Resources

While it is not possible to detail or even scratch the surface of this subject while making it relevant to the Five Mile River Estuary, it is important to understand some basic pollution ecology mechanisms that can be related to dredging in the next section. If this project is carried through additional phases, detailed evaluations will require site-specific investigations of the potential impact on living marine resources.

Generally, water quality impacts can be categorized into two groups. The first encompasses the range of conditions that are caused by changes in productivity and dissolved oxygen levels. The pollutants of concern are nutrients and oxygen-demanding substances. Oxygen-demanding substances could, during bacterial or chemical decay, consume available oxygen to a point where the resident biota suffocate or are excluded from use or passage through an area. Excessive nutrient levels can have the same effect as they stimulate vegetative growth which respires during the night or in the daytime if it sinks to depth where sunlight is not suffcient to permit photosynthesis. Vegetation also becomes oxygen-demanding upon death as it decomposes. Excessive nutrients

may also change the character of the food chain, stimulating blooms of algae which may not be suitable food for filtering organisms such as shellfish.

The second group of impacts are those caused by the presence of toxic substances. These may disrupt the functional structure of the ecosystem in several ways. The primary modes include direct exposure resulting in death and sublethal effects which may reduce growth, interfere with reproduction or lessen the ability of an organism to compete and gradually decrease the resource. Behavioral avoidance may also exclude some organisms from an area if they can sense the contaminants and have the ability to move to another area. This can cause overcrowding of alternative habitats or exclusion from key spawning or nursery areas thus reducing stocks in a subtle manner. It should be noted that loss or decreased success of any one species may have ramifications throughout the food web. It is difficult to quantify these complexities.

Although not directly related to water quality, a third group of impacts which is of concern is destruction of the physical habitat including increased siltation or turbidity. Estuarine organisms all have very specific substrate and habitat requirements that should be considered in the development of a dredging plan. These requirements are discussed in other sections of this report.

Potential Impact of Dredging

Environmental effects of dredging may include alteration of physical habitat, increased turbidity, remobilization of contaminants associated with sediments and alterations in hydraulic regimes governing flow, flushing salinity and deposition of solids and associated contaminants. Impacts may be felt both at the dredged site and at the disposal site. Generally, disposal of

the sediments is more apt to affect water quality while the dredged site is more likely to feel impacts from habitat destruction and alteration of flow regimes. However, without knowing the character of the sediments in the Five Mile River Estuary, it is impossible to predict what the most serious water quality problems, if any, might be.

Apart from the physical and hydraulic alterations associated with dredging discussed in other sections, some impacts in water quality may be expected at the dredge site during the operation and for an indefinite period following the completion of dredging. Contaminant problems arise from substances buried in the sediments which may be remobilized during the dredging process. In industrialized or urbanized areas, heavy metals, synthetic organic compounds and petroleum hydrocarbons may be present in the sediments. Generally, these substances are associated with the sediments even when resuspended and are not likely to dissolve in the water column to a hazardous level. However, this evaluation must be made based on the quality of sediments in the Five Mile River Estuary, which is not known at this time. Also, filter feeding organisms may accumulate some of these substances even in a particulate form while feeding. Potential for toxic substance remobilization can be evaluated by analyzing the sediments to be dredged and criteria exist defining problematic levels of contaminants.

Longer term water quality impacts may occur if contaminated sediments are exposed but not removed from the area by the dredging process. As benthic organisms recolonize the substrate, they may accumulate the toxins and be impacted directly or introduce them to other organisms which prey on them. Exposure of reducing sediments to oxygenated waters may also result in release of some substance which had been stabilized in a sulfidic state in the absence of oxygen. Oxygen-demanding substances and nutrients may also be released

during dredging. Generally, this would cause only a short-term impact and would not be likely to create a persistent imbalance.

Changes in the hydraulics of the system may have water quality implications. A wider, deeper channel could alter the degree and location of saltwater intrusion from Long Island Sound. This could cause changes in the biology of the system since the range of salinity tolerance of the resident species may be exceeded. Similarly, the chemistry of the estuary will be altered which determines distribution and availability of contaminants. Movement of contaminants out of the estuary may be slowed (or enhanced) if the changed configuration of the estuary reduces (increases) the flushing action of the tides and/or the river transport mechanisms. These concepts are complex and cannot be predicted without detailed field evaluations but should be considered prior to dredging.

MARINE FISHERIES

Overview

The Marine Fisheries team member was asked to provide the following information concerning this environmental review:

(1) A description of existing marine environments, their conditions and function;

(2) Discuss resident and migratory fish populations utilizing the study area for either breeding, feeding or nursery purposes; and

(3) Comment on the potential impacts to marine fishery resources from the proposed dredging.

Area Description

Except for the existing navigational channel, the Five Mile River Estuary is a generally shallow embayment. There is a healthy and productive salt marsh on the western (Darien) side of the estuary and fringe marshes are scattered along the entire shoreline. Field inspection of the marsh revealed dense populations of fiddler crabs (Uca pugnax), ribbed mussels (Modiolus demissus) and mud snails (Nassarius obsoletus). Waterward, the salt marsh extends into extensive intertidal flats.

Salt marshes and intertidal flats are extremely valuable components of marine ecosystems and provide critical nursery areas and feeding grounds to a variety of important finfish species. They are also utilized as feeding and resting areas for shorebirds and migratory waterfowl. "There is every indication that the marshes and adjacent intertidal flats along the mouth of the Five Mile River Estuary are ecologically viable and highly productive, therefore contributing significantly to the marine production of the adjacent estuarine and coastal waters of Long Island Sound" (Niering and Steever 1972).

Marine Fishery Resources

Table 1 lists finfish species that are known to inhabit the Five Mile River Estuary or are characteristic of Connecticut coastal habitats of this type. Also listed is the seasonal occurrence of three loosely defined life stages. The adult stage broadly includes all fish over one year old. Mature fish about to spawn or in the process of spawning are called spawning adults. Young of the year juveniles includes all stages less than one year old.

Of the fish that inhabit this type of environment, the cunner, windowpane flounder, killifish,, sheepshead minnow, silversides, sticklebacks, tomcod and white perch are year-round residents. All of these species may complete their

Table 1. Five Mile River Estuary / Seasonal Finfish Occurrence

Species	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
River Herring (Alosa spp.)	A	A	A,J	A,J
Blackfish (Tautoga onitis)	-	S	S,J	A,J
Bluefish (Pomatomus saltatrix)	-	A,J	A,J	A,J
Butterfish (Peprilus triacanthus)	-	A	A	-
Cunner (Tautogolabrus adspersus)	A	S	S,J	A,J
American Eel (Anguilla rostrata)	-	A	A	A
Summer Flounder (Paralichthys dentatus)	-	A	A	-
Winter Flounder (Pseudopleuronectes americanus)	S	S	A,J	A,J
Windowpane Flounder (Scophthalmus aquosus)	A	S	S,J	A,J
Killifish (Fundulus spp.)	A	S	S,J	A,J
Mackerel (Scomber scombrus)	-	A	A	-
Menhaden (Brevoortia tyrannus)	-	A	A,J	A,J
Scup (Stenotomus chrysops)	-	S	A,J	-
Sheepshead Minnow (Cyprinodon variegatus)	A	S	S,J	A,J
Silversides (Menidia menidia)	A	S	S,J	A,J
Sticklebacks (Apeltes spp., Gasterosteus spp.)	A	S	S,J	A,J
Striped Bass (Morone saxatilis)	-	A	A	A
Tomcod (Microgadus tomcod)	S,J	A	A,J	S,J
Weakfish (Cynoscion regalis)	-	S	S,J	A,J
White Perch (Morone americanus)	A	S	A,J	A,J

Occurrence: A - Adults
S - Spawning adults
J - Young of the year juveniles
- - Not present

entire life cycle in inshore estuarine environments.

Winter flounder are permanent residents of Long Island Sound. Adults migrate into cooler, deeper waters during the summer and move inshore during the winter. Spawning occurs in estuaries between January and May. Juveniles spend their first year in estuarine waters and prefer soft, muddy, substrate such as that in the Five Mile River Estuary. Blackfish are also permanent residents of Long Island Sound and are most often found along rocky shorelines and submerged structures.

Anadromous fish may pass through the estuary during their migrations to or from freshwater spawining grounds. River herring larvae generally metamorphose to juveniles before descending to estuaries during the late summer and fall.

The remainder of the fish that occur seasonally in the study area utilize inshore estuarine waters as nursery and feeding grounds. Summer flounder move inshore to feed in shallow coastal waters in the early summer and migrate offshore in the fall. While occasionally found in harbors and estuaries, mackerel are more commonly found in open waters. Scup prefer smooth to rocky bottom and stay in fairly deep waters during the summer in Long Island Sound. Weakfish spawn in Long Island Sound during the summer and their juveniles inhabit inshore areas during the late summer and fall. Striped bass prefer shallow estuaries and bays, and rocky stretches. Menhaden spawn offshore during the summer and young-of-the-year are transported into estuarine nursery areas during the late summer and fall. The bluefish enters Long Island Sound during the summer and juveniles (snappers) are prevalent in river mouths and estuarines during the late summer and fall.

Data from aerial flights conducted for the DEP - Marine Fisheries Program's Marine Angler Survey indicate that the mouth of the Five Mile River Estuary is fished by boat-based recreational fishermen. Because extensive shoreline

development in the project area has precluded public access, there is little opportunity for shore-based anglers. Winter flounder, blackfish, bluefish and striped bass are the primary species sought by recreational anglers in the Five Mile River Estuary.

Shellfish Resources

The Five Mile River Estuary supports a diverse population of shellfish. According to maps of shellfish concentration areas prepared by the DEP - Coastal Area Management Program, molluscan shellfish occurring in the area include the American oyster (Crassostrea virginica) and soft-shell clam (Mya arenaria). Hard clams (Mercenaria mercenaria), and moon snails are also known to inhabit this estuary (Niering and Steever 1972). These shellfish beds provide a major food source for finfish.

Despite the abundance of shellfish resources in the area, the tidal waters and intertidal flats of the Five Mile River Estuary have been closed to shellfishing since 1964 (Shellfish Closure List, Department of Health Services, July 1985) (see Figure 7). The decision to close areas is made on the basis of the concentration of coliform bacteria which may indicate the presence of human pathogens associated with sewage.

Concerns

A Condition Survey of the Five Mile River Estuary was conducted by the Army Corp of Engineers in 1973. Results of this survey indicate that in some areas where new dredging is proposed, depths are already greater than eight feet and deepening is not warranted. This is generally true from the mouth of the estuary to it's confluence with Butler Island Creek. As one proceeds upstream, the areas proposed for dredging become progressively shallower and the proposed

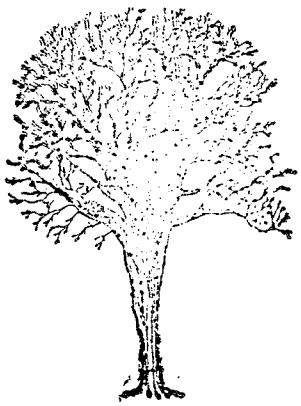
channel will begin to encroach on adjacent intertidal flats and shallow subtidal habitat. This is especially apparent north of Pinkney Park, on the Norwalk side of the estuary.

Because of their ecological importance, loss of intertidal flats is of primary concern when considering the impacts of this project. Dredging will result in the direct removal of estuarine bottom and associated benthos. Channels dredged too close to shore in shallow water areas may accelerate further loss of intertidal and subtidal habitat through channel slumping and shoreline erosion. The bottom community is critical, not only for it's yield of shellfish but also as a major element of the ecosystem stability and supply of forage fishery resources (Clark 1977). Substrate suitable for shellfish and finfish habitat will be removed by dredging and biological productivity decreased accordingly. Demersal finfish are especially dependent on intertidal flats for feeding grounds and will be most affected by this loss of habitat.

The salt marsh, intertidal flats and estuary appear to function as a single integrated system for trapping and recycling nutrients (Welsh and Herring, no date). If the optimum balance between the proportion of salt marsh to intertidal flats is disturbed, dredging may ultimately impact the stability of the tidal wetlands on the western shore.

One study of this area concluded that "...to prevent degradation of these productive habitats, maintenance dredging operations should be restricted to the existing navigational channel" (Niering and Steever 1972). This is sound advise. The amount of dredging may be reduced by modifying the width of the proposed channel to avoid vital habitats and by utilizing deep water areas to their maximum efficiency.

COASTAL MANAGEMENT



program. The CCMA became effective January 1, 1980. It established goals and policies for the use, development and protection of Connecticut's coastal resources. The CCMA protects sensitive coastal resources, while encouraging sound economic development in appropriate areas where the development is matched to the resource's capability to support the use. Where development along the waterfront is appropriate, strong priority and preference is to be given to water-dependent uses.

The policies and goals of the CCMA are primarily implemented through three mechanisms:

(1) Municipal Coastal Programs

Under the CCMA, a municipality may develop a Municipal Coastal Program (MCP) which amends the municipality's Plan of Development to reflect coastal policies and goals. These amendments are adopted in local zoning and other regulations and ordinances affecting the coastal area.

(2) Coastal Site Plan Review

Individual projects proposed in the coastal area must receive local Coastal Site Plan Review (CSPR) approval. This process is implemented through the local planning and zoning bodies of a municipality in conjunction with other permit requirements.

(3) State and Federal Consistency

Through the CZMA and the CCMA respectively, all federal and state projects which affect areas within the coastal boundary must be conducted in a manner consistent with the CCMA. This includes the issuance of permits, such as those required by state and federal agencies for placement of structures or dredging in coastal waters.

Both Darien and Norwalk have participated in the MCP process. Darien has completed its program, while Norwalk has adopted amendments to its Plan of Development and is working to implement these changes through appropriate zoning. These plans, in conjunction with the CSPR process, control development on the land which can affect coastal resources. In the water, the DEP

regulates activities and structures proposed in coastal waters below the mean high water mark (MHW), as well as work proposed in tidal wetlands through a permit process administered by its Water Resources Unit. The Corps issues permits for similar activities proposed below the high tide line under Section 404 of the federal Clean Water Act, and below mean high water under Section 10 of the federal Rivers and Harbors Act of 1899. As described above, no permit may be issued by either the Corps or the DEP unless the activity is consistent with the policies and objectives of the CCMA. The proposed dredging alternative, therefore, must receive permits from the State and the Corps, which cannot be issued unless the project is deemed to be consistent with the CCMA.

Harbor Management Planning

In 1984, the State Legislature adopted the Connecticut Harbor Management Act to enable municipalities to develop a comprehensive plan for the management of their harbor areas. This act gives local governments another tool for coordinating the use, preservation and development of their coastal land and water resources. Although the FMRC is not participating at this time, if they were to develop a comprehensive harbor management plan under the authority of this legislation, it too would need to be consistent with the CCMA as well as the Municipal Coastal Programs of Darien and Norwalk.

Coastal Management Review Process and Requirements

As the proposed dredging affects areas below the mean high water mark, no local CSPR is required except insofar as the proposed activities may affect land-side uses, such as parking, boating support facilities, etc. The permit requirements of the DEP and the Corps will, in this case, be the primary forum through which coastal management issues are evaluated. These reviews will

include, however, the requirement that the project be consistent with the MCP's of both Darien and Norwalk.

In submitting an application to the State for a dredging permit, and in addition to any other statutory requirements, the FMRC must "...demonstrate that such activity is consistent with all applicable goals and policies of Section 22a-92 [of the CCMA], and that such activity incorporates all reasonable measures mitigating any adverse impacts of such actions on coastal resources and future water-dependent development activities." (Section 22a-98 C.G.S.). The policies that will be applicable to any dredging proposal for the Five Mile River Estuary, as well as potential adverse impacts associated with the activity, are described in the following sections.

DARIEN'S MUNICIPAL COASTAL PROGRAM

The Town of Darien adopted amendments to its Plan of Development in February of 1984. Having completed an inventory and analysis of its coastal resources, and having evaluated a series of issues facing it, the Town set forth in its MCP specific recommendations for the management of Darien's coastal area. Seven objectives were included in the amendments:

(1) Improving physical access to Long Island Sound.

(2) Preserving and enhancing visual access.

(3) Expanding recreational boating opportunities.

(4) Improving recreational shellfishing opportunities.

(5) Preserving and protecting key shoreline resource areas.

(6) Enhancing degraded natural systems.

(7) Improving educational opportunities.

Adoption of its Plan of Development amendments completed Darien's MCP, as no zoning changes were considered necessary for the Town to implement the plan.

A coastal resource map for the Five Mile River Estuary was developed with information collected through the Town's 1981 shoreline survey. The MCP identified the estuary as a major natural system, and described the resources in detail on pages 42 through 49 of the MCP report. These pages have been attached as Appendix E.

Natural resources of importance to Darien include its tidal wetlands. Although the Town has been relatively fortunate to retain most of its tidal wetlands, the MCP recognizes that much has already been lost. An example provided is that marshes once extended unbroken from behind Hay Island along the entire shoreline of Scott's Cove to connect with the Five Mile River Estuary. Thus, the MCP states: "The preservation of existing tidal marshes together with restoration of degraded wetlands from the major goals of Darien's Municipal Coastal Program" (Darien MCP, p. 29.).

With respect to the Five Mile River Estuary specifically, the MCP cites Niering and Steever (1972), in which he describes the high productivity of the Five Mile River marsh as equalling or exceeding other viable marshes along the Atlantic seaboard. The MCP also states that in preparation of the report, a meeting was held with the FMRC, and the Commission "...concurred that it would not be desirable to dredge the Darien side of the River (estuary), due to the existing boat congestion and the need to maintain the natural condition of the marsh which offers the benefits of flood protection and habitat value." (Darien MCP, p. 43).

In the summary and conclusions for the Five Mile River area (pages 48-49), the MCP report states: "Maintenance dredging of the harbor should be restricted to the existing federal project. Disturbance of any of the existing

marshes by dredging should be avoided." (emphasis added.)

In support of the recreational boating needs of the River (estuary), the summary recognizes the importance of maintaining the federally-funded project as well as the water-dependent nature of the Rowayton shoreline. In regard to the latter, the report draws the following conclusions (Darien MCP, p. 49):

(1) The Town of Darien has a major stake in the development of the facing shoreline. Because visual access, mooring access, marine related supply facilities, and other such businesses are in Rowayton, the course of development there will directly (e.g., lack of marinas or gas docks) or indirectly (e.g. visual appearance) affect Darien.

(2) The City of Norwalk is involved in the coastal area management (CAM) process. One of the developments advanced as part of this program involves the creation of a marine-commercial zoning category which would prohibit the development of non-water-dependent uses along the Rowayton shoreline. This approach should be actively supported by the Town of Darien.

NORWALK'S MUNICIPAL COASTAL PROGRAM

The City of Norwalk was an early participant in the Municipal Coastal Program (MCP) process. Norwalk began development of its MCP in 1980 and adopted its Plan of Development amendments in June of 1982. Because of the complexity of the zone changes required to implement the plan, however, Norwalk has not yet completed its entire program. Nevertheless, with the Plan of Development amendments and some zoning changes in place, the goals and objectives of the City are clear. Therefore, any projects occurring within the coastal boundary will be reviewed for consistency with those portions of the plan now in effect, but with recognition of those parts yet to be implemented. The applicable portions of Norwalk's CAM Plan are attached as Appendix F to this report.

The general goals of the Norwalk MCP are to recognize the historical importance of the Norwalk waterfront in the development of the City, and to re-orient the City toward the harbor by revitalizing and supporting water-dependent recreational, commercial, and cultural activities. Several design districts have been implemented or proposed to accomplish these goals, such as the Washington Street Design District and the Reed-Putnam Design District. In addition, the City is supporting and promoting major projects along the waterfront, such as the Norwalk Maritime Center museum and aquarium on North Water Street, and the Harbor Center marina and port at Veteran's Park.

With repect to the Five Mile River Estuary waterfront of Rowayton, the City's CAM Plan calls for encouragement of mixed-use development, with an emphasis on maintaining and enhancing the water-dependent activities and promoting linear public access along the River (estuary) (Norwalk CAM Plan, p. 31 and 39). Zoning regulations now in draft form would allow for water-dependent development "as-of-right" along the River (estuary), and require public access for uses which are not water-dependent. Increased boating opportunities are promoted where environmental impacts are minimized, and in areas less sensitive to boating impacts (Norwalk CAM Plan, p. 21).

Protection of Norwalk's natural coastal resources is also a stated goal of the City's MCP. Preservation of tidal wetlands, intertidal flats, and improvement of water quality are promoted to support the natural habitat for its own sake, but also to protect the physical base for the marine commercial fishing industries (CAM Plan, pp. 12-14). Although the Five Mile River Estuary is not explicitly noted in the resource protection section (with the exception of discussion on water quality), the estuary contains demonstrated natural resources, the protection of which should be supported.

In regards to dredging and harbor maintenance, the MCP calls for continuation of federal maintenance dredging of the Norwalk River Channel, and "privately funded dredging" of Five Mile River Estuary. The Plan states: "The Five Mile River Harbor (estuary), Wilson Cove, Charles Creek, Cove Marina and Sprite Island will continue to be privately funded dredging operations, but if kept within the existing channels are supportable as adjuncts to Norwalk's recreational boating." (CAM Plan, p. 39, emphasis added).

A major emphasis of the Plan is the establishment of harbor management plans for the Norwalk and Five Mile Rivers (page 21) as a means to coordinate recreational boating. Even though the Plan preceded Connecticut's Harbor Management Act, it is clear from the discussion in this section and within the Plan's "Administrative and Organizational Proposals" (page 40), that the objectives and goals for harbor management outlined in the Plan are similar to those contained in the Harbor Management Act.

EVALUATION OF COASTAL MANAGEMENT CONSISTENCY

The proposal to dredge the Five Mile River Estuary must be consistent with all of the above described policies and plans. Any potential adverse impacts must be eliminated, or mitigated to the maximum extent possible. The project must be evaluated by weighing the incremental loss of environmental habitat as well as the incremental gain of recreational boating space. The CCMA, however, requires resolution of competing uses of coastal resources by giving preference to those uses which minimize their impact on the environment while providing long-term stable economic benefits. In cases where a significant and healthy natural resource exists, first priority is given to its protection, and only those uses which do not interfere with such protection should be permitted.

Based on the CCMA policies, a formal consistency determination will require additional information of both a resource and use nature. From the resource perspective, the FMRC must evaluate the effects of the proposal on the subtidal habitat and benthos, tidal hydrology, and sedimentation patterns, as well as the potential impact to the habitat and function of the adjacent tidal wetlands and intertidal flats. Though no activity is planned in these adjacent resources, adverse impacts may occur indirectly through slumping or through subtidal habitat alteration. As has been explained, this level of analysis is beyond the capabilities of the ERT.

On the other side of the balance, even though the use is a water-dependent one, more information regarding the current and proposed use of the area to be dredged is needed to evaluate the extent of the benefits to be derived from the proposal. How many boats of what size and draft are now accommodated in this 50-foot area? How would this change after dredging? If dredged, does the new area adequately fill the existing needs, or resolve the space allocation problems?

Based on the information currently available, however, the proposal to dredge a new portion of the Five Mile River Estuary and widen the channel an additional 50 feet does not appear to be consistent with the CCMA, given the potential impacts to coastal resources. The proposed dredging is strongly discouraged by a variety of policies in the CCMA, is inconsistent with the MCP's of both Darien and Norwalk, and has even been deemed at one time to be undesirable by the FMRC. Although the project would support a valuable water-dependent recreational activity, the relevant policies of the CCMA and the objectives of both MCP's do not promote such a use where it has a significant adverse effect on the environment. The boating facilities of the Five Mile River Estuary are an important part of both Darien and Norwalk's

coastal management programs, but there is a maximum level of use beyond which the natural resources are unable to accommodate. That level of use can probably best be determined through harbor management planning, a process which would evaluate the boating needs within the context of the estuary's capabilities. However, it seems probable that the desirable level of boating activity has already been exceeded.

In short, the acceptability of dredging will depend on:

(1) The environmental quality and health of intertidal flats, subtidal habitat and the coastal waters which may be affected.

(2) Impacts of dredging and boating activities on tidal wetlands, intertidal flats, subtidal habitat, shellfish and water quality.

(3) Benefits to be derived from the activity.

(4) Availability of less environmentally damaging alternatives to the dredging.

(5) Economic impacts of these alternatives on existing water-dependent facilities.

These items must be fully explored by the FMRC. As item number (4) implies, alternatives should be sought which eliminate or minimize impacts to coastal resources.

EVALUATION OF ALTERNATIVES

As part of its evaluation of alternatives to dredging proposal, the ERT encourages that the FMRC consider the following measures as means to improve and legitimize the allocation of mooring space in the Five Mile River Estuary:

(1) Eliminate all illegal moorings from the navigation channel.

This is the simplest alternative that would resolve the conflict with the Army Corps of Engineers. Although resource impacts would be minimized

under this alternative, it would have the greatest impact on existing water-dependent boating facilities and businesses. Economic impacts must be evaluated under all alternatives to ensure the continued operation of existing water-dependent facilities. This alternative may or may not be feasible based on such an analysis.

(2) Eliminate all moorings from the navigation channel and redistribute boats in a manner which takes maximum advantage of existing water depths outside the channel.

The placement of moorings is not inimical to protection of subtidal flats and shellfish, provided water quality does not suffer significantly. In fact, removal of moorings is often timed to allow harvesting of the commercial shellfish resources. The 50-foot area proposed for dredging, as well as other non-channel portions of the estuary, have deeper and shallower areas. These areas should be used for mooring boats according to the amount of water they draw; (i.e., deeper areas for deep-draft boats, and shallower areas for shallow-draft). Under this alternative, the mooring areas are not dredged, but rather are utilized as efficiently as possible at their existing depths. If these areas are already utilized to capacity, it is doubtful the proposed dredging would provide a significant amount of additional space.

(3) Eliminate all moorings from the navigational channel and redistribute these moorings into areas which do not contain or affect intertidal areas.

This alternative would follow the approach outlined in number (2) above, but would allow some dredging in areas where intertidal resources would not be significantly affected, and where impacts to subtidal resources would be acceptable.

(4) Designate the navigation channel as a federal anchorage area.

The estuary is currently designated as a federal anchorage area; however, this designation specifically excludes the channel which comprises a

large portion of the boating and mooring space. Designation of the estuary, including the channel, as an anchorage area will be a legal improvement which would allow some legitimate placement of moorings in what is currently the navigation channel (provided a fair allocation method and fee system are implemented). It would also permit the establishment of fairways of sufficient width to navigate safely and efficiently in the estuary.

The above alternatives could be utilized individually or in combination, except that an increase in the number of boats is not recommended. In all of the proposals, the conflict of moorings in the navigation channel has been eliminated.

Ideally, alternatives would be evaluated within the context of a comprehensive harbor management plan developed under the Harbor Management Act. At the very least, however, the number of moorings allowed should be based on the capabilities of existing resources, and all mooring allocations should be carefully laid out in a mooring grid which identifies the number and size of boats to be moored in the particular area.

To the extent that designation of the estuary as an anchorage area, establishment of fairways, and utilization of natural mooring areas as efficiently as possible can resolve the space allocation problems, these techniques should be employed. Beyond the number of boats accommodated by these methods, no more boats should be permitted. More information will be necessary to promote any dredging proposal, be it the present one, or one developed under alternative number (3) above.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the limited information available regarding the potential impacts of the channel widening upon benthic habitats, shellfish and water quality, it does not appear that the project is consistent with the CCMA. In order to more fully evaluate the impacts and the acceptability of the project, the following information must be collected:

(1) Determine the composition and productivity of the benthic environments, both intertidal and subtidal in the areas proposed to be dredged.

(2) Determine the value of the area in terms of shellfish resources and the potential impacts to this resource. Contact Mr. John Volk of the Aquaculture Division of the Connecticut Department of Aquaculture in Milford for further assistance on this matter.

(3) Determine the existing water quality conditions for the summer months and predict what impacts will result from dredging and increased boat use. Currently the estuary is closed to shellfishing due to elevated levels of fecal coliform. There are potentially two sources of this: septic systems and discharges from boats. Consideration should be given to the installation of boat pump-out facilities, and the establishment of rules and enforcement procedures that will prevent boat operators from illegally discharging waste into coastal waters.

(4) Determine the frequency of maintenance dredging required as a result of any new dredging.

(5) Determine the level of benefit to be derived from the new dredging.

(6) Evaluate alternatives, including those previously discussed in this report, which would minimize the adverse impacts to sensitive coastal resources, eliminate hazards to navigation, and take maximum advantage of deep water areas.

(7) Evaluate the existing water-dependent facilities, their services and their requirements for continued operation and economic viability. Determine the significance of any economic impacts imposed on these existing water-dependent uses by the dredging proposal or any alternatives.

We strongly advise resolution of the problems facing the FMRC by obtaining and evaluating the above information within the context of a comprehensive harbor management plan developed under the authority of the Harbor Management Act. Such planning would serve several purposes: (1) it would guide the FMRC toward alternatives which meet the requirements of the CCMA; (2) it would provide a mechanism for long-range planning which would help avoid similar problems in the future; and (3) it would provide the rules and regulations necessary to implement and enforce the plan, thereby informing both boaters and riparian owners of their responsibilities regarding the use and protection of estuarine resources.

Should the FMRC choose not to pursue a comprehensive planning effort under existing harbor management legislation, all proposals to resolve the current problem must nevertheless be well supported in order to evaluate them for consistency with the CCMA. In all cases, an assessment of the impacts upon intertidal and subtidal resources, shellfish, and water quality must be addressed. The number of moorings allowed must be based on the capabilities of the natural resources to support them. Whichever alternative is selected, provision should be made to assure that the carrying capacity of the area is not exceeded and that illegal moorings are prohibited.

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APPENDIX A

APPLICABLE COASTAL RESOURCE POLICIES

II) Estuarine Embayments:

1) To manage estuarine embayments so as to insure that coastal uses proceed in a manner that assures sustained biological productivity, the maintenance of healthy marine populations and the maintenance of essential patterns of circulation, drainage and basin configuration; to protect, enhance and allow natural restoration of eelgrass flats except in special limited cases, notably shellfish management, where the benefits accrued through alteration of the flat may outweigh the long-term benefits to marine biota, waterfowl, and commercial and recreational finfisheries. C.G.S. Sec. 22a-92(c)(2)(A).

III) Shellfish Concentration Areas:

1) To manage the state's fisheries in order to promote the economic benefits of commercial and recreational fishing, enhance recreational fishing opportunities, optimize the yield of all species, prevent the depletion or extinction of indigenous species, maintain and enhance the productivity of natural estuarine resources and preserve healthy fisheries resources for future generations. C.G.S. Sec. 22a-92(c)(1)(I).

2) Nothing in Sections 19a-95 to 19a-101, inclusive, shall prohibit the taking of shellfish by commercial harvesters from permanently closed areas when they are removed for transplanting to approved areas under permits issued by the department of health services and under supervision of state and local health agencies having jurisdiction. C.G.S. Sec. 19a-101.

IV) Intertidal Flats:

1) To manage intertidal flats so as to preserve their value as a nutrient source and reservoir, a healthy shellfish habitat and a valuable feeding area for invertebrates, fish and shorebirds. C.G.S. Sec. 22a-92(b)(2)(D).

2) To encourage the restoration and enhancement of degraded intertidal flats. C.G.S. Sec. 22a-92(b)(2)(D).

3) To allow coastal uses that minimize change in the natural current flows, depth, slope, sedimentation and nutrient storage functions. C.G.S. Sec. 22a-92(b)(2)(D).

4) To disallow uses that substantially accelerate erosion or lead to significant despoliation of tidal flats. C.G.S. Sec. 22a-92(b)(2)(D).

V) Tidal Wetlands:

1) To preserve tidal wetlands and to prevent the despoliation and destruction thereof in order to maintain their vital natural functions. C.G.S. Sec. 22a-92(b)(2)(E).

2) To encourage the rehabilitation and restoration of degraded tidal wetlands. C.G.S. Sec. 22a-92(b)(2)(E).

3) Where feasible and environmentally acceptable, to encourage the creation of wetlands for the purpose of shellfish and finfish managment, habitat creation and dredge spoil disposal. C.G.S. Sec. 22a-92(b)(2)(E).

4) It is declared that much of the wetlands of this state have been lost or despoiled by unregulated dredging, dumping, filling and like activities and despoiled by these and other activities, that such loss or despoliation will adversely affect, if not entirely eliminate, the value of such wetlands as sources of nutrients to finfish, crustacea and shellfish of significant economic value; that such loss or despoliation will destroy such wetlands as habitats for plants and animals of significant economic value and will eliminate or substantially reduce marine commerce, recreation and aesthetic enjoyment and that such loss of despoliation will, in most cases, disturb the natural ability of tidal wetlands to reduce flood damage and adversely affect the public health and welfare; that such loss or despoliation will substantially reduce the capacity of such wetlands to absorb silt and will thus result in the increased silting of channels and harbor areas to the detriment of free navigation. Therefore, it is declared to be the public policy of this state to preserve the wetlands and to prevent the despoliation and destruction thereof. C.G.S. Sec. 22a-28 as referenced by C.G.S. Sec. 22a-92(a)(2).

5) To disallow any filling of tidal wetlands and nearshore, offshore and intertidal waters for the purpose of creating new land from existing wetlands and coastal waters which would otherwise be undevelopable, unless it is found that the adverse impacts on coastal resources are minimal. C.G.S. Sec. 22a-92(c)(1)(B).

6) In granting, denying or limiting any permit the commissioner or his duly designated hearing officer shall consider the effect of the proposed work with reference to the public health and welfare, marine fisheries, shellfisheries, wildlife, the protection of life and property from flood, hurricane and other natural

disasters, and the public policy set forth in Sections 22a-28 to 22a-35 inclusive. The fact that the department of environmental protection is in the process of acquisition of any tidal wetlands by negotiation or condemnation under the provisions of Section 26-17a, shall be sufficient basis for denial of any permit. C.G.S. Sec. 22a-33 as referenced by C.G.S. Sec. 22a-92(a)(2).

IV) Developed Shorefront:

1) To promote, through existing state and local planning, development, promotional and regulatory programs, the use of existing developed shorefront areas for marine related uses, including but not limited to commercial and recreational fishing, boating and other water-dependent commercial, industrial and recreational uses. C.G.S. Sec. 22a-92(b)(2)(G).

APPENDIX B

APPLICABLE COASTAL USE POLICIES

3) To protect and where feasible, upgrade facilities serving the commercial fishing and recreational boating industries. C.G.S. Sec. 22a-92(b)(1)(I).

4) To maintain existing authorized commercial fishing and recreational boating harbor space unless the demand for these facilities no longer exists or adequate space has been provided. C.G.S. Sec. 22a-92(b)(1)(I).

5) To design and locate, where feasible, proposed recreational boating facilities in a manner which does not interfere with the needs of the commercial fishing industry. C.G.S. Sec. 22a-92(b)(1)(I).

III) Coastal Recreation and Access:

1) To encourage public access to the waters of Long Island Sound by expansion, development and effective utilization of state-owned recreational facilities within the coastal area that are consistent with sound resource conservation procedures and constitutionally protected rights of private property owners. C.G.S. Sec. 22a-92(a)(6).

2) To make effective use of state-owned coastal recreational facilities in order to expand coastal recreational opportunities including the development or redevelopment of existing state-owned facilities where feasible. C.G.S. Sec. 22a-92(c)(1)(J).

3) To require as a condition in permitting new coastal structures, including but not limited to groins, jetties or breakwaters, that access to, or along, the public beach below mean high water must not be unreasonably impaired by such structures. C.G.S. Sec. 22a-92(c)(1)(K).

IV) Dredging and Navigation:

1) To encourage, through the state permitting program for dredging activities, the maintenance and enhancement of existing federally maintained navigation channels, basins and anchorages. C.G.S. Sec. 22a-92(c)(11)(C).

2) To discourage the dredging of new federally maintained navigation channels, basins and anchorages. C.G.S. Sec. 22a-92(c)(1)(C).

3) To reduce the need for future dredging by requiring that new or expanded navigation channels, basins and anchorages take advantage of existing or autorized water

depths, circulation and siltation patterns and the best available technologies for reducing controllable sedimentation. C.G.S. Sec. 22a-92(c)(1)(D).

4) To disallow new dredging in tidal wetlands except where no permissible alternative exists and where adverse impacts to coastal resources are minimal. C.G.S. Sec. 22a-92(c)(1)(E).

5) The commissioner of environmental protection shall regulate the taking and removal of sand, gravel and other materials from lands under tidal and coastal waters with due regard for the prevention of alleviation of shore erosion, the protection of necessary shellfish grounds and finfish habitats, the preservation of necessary wildlife habitats, the development of adjoining uplands, the rights of riparian property owners, the creation and improvement of channels and boat basins, the improvement of coastal and inland navigation for all vessels including small craft for recreational purposes and the improvement, protection or development of uplands bordering upon tidal and coastal waters, with due regard for the rights and interests of all persons concerned. C.G.S. Sec. 22a-383 as referenced by C.G.S. 22a-92(a)(2).

6) Harbor masters shall have the general care and supervision of the harbors and navigable waterways over which they have jurisdiction, subject to the discretion and control of the commissioner of transportation, and shall be responsible to the commissioner for the safe and efficient operation of such harbor and navigable waterways in accordance with the provisions of this chapter. The commissioner may delegate any of his powers and duties under this chapter to such harbor masters or to any existing board of harbor commissioners, but shall at all times be vested with responsibility for the overall supervison of the harbors and navigable waterways of the state. C.G.S. Sec. 15-1.

V) Ports and Harbors:

1) To promote, through existing state and local planning, develop promotional and regulatory authorities, the development, reuse or redevelopment of existing urban and commercial fishing ports giving highest priority and preference to water-dependent uses, including but not limited to commercial and recreational fishing and boating uses. C.G.S. Sec. 22a-92(b)(1)(C).

2) To disallow uses which unreasonably congest navigation channels, or unreasonably preclude boating support facilities elsewhere in a port or harbor. C.G.S. Sec.22a-92(b)(1)(C).

VI) Water Dependent Uses:

1) To manage uses in the coastal boundary through existing municipal planning, zoning and other local regulatory authorities and through existing state structures, dredging, wetlands, and other state siting and regulatory authorities, giving highest priority and preference to water-dependent uses and facilities in shorefront areas. C.G.S. Sec. 22a-92(b)(1)(A).

2) To give high priority and preference to uses and facilities which are dependent upon proximity to the water or the shorelands immediately adjacent to marine and tidal waters. C.G.S. Sec. 22a-92(a)(3).

APPENDIX C

POTENTIAL ADVERSE IMPACTS

OF

DREDGING PROPOSAL

Potential Adverse Impacts:

1) Degrading water quality through the significant introduction into either coastal waters or groundwater supplies of suspended solids, nutrients, toxics, heavy metals or pathogens, or through the significant alteration of temperature, pH, dissolved oxygen or salinity. C.G.S. Sec. 22a-93(15)(A).

2) Degrading existing circulation patterns of coastal waters through the significant alteration of patterns of tidal exchange or flushing rates, freshwater input, or existing basin characteristics and channel contours. C.G.S. Sec. 22a-93(15)(B).

6) Degrading visual quality through significant alteration of the natural features of vista and view points. C.G.S. Sec. 22a-93(15)(F).

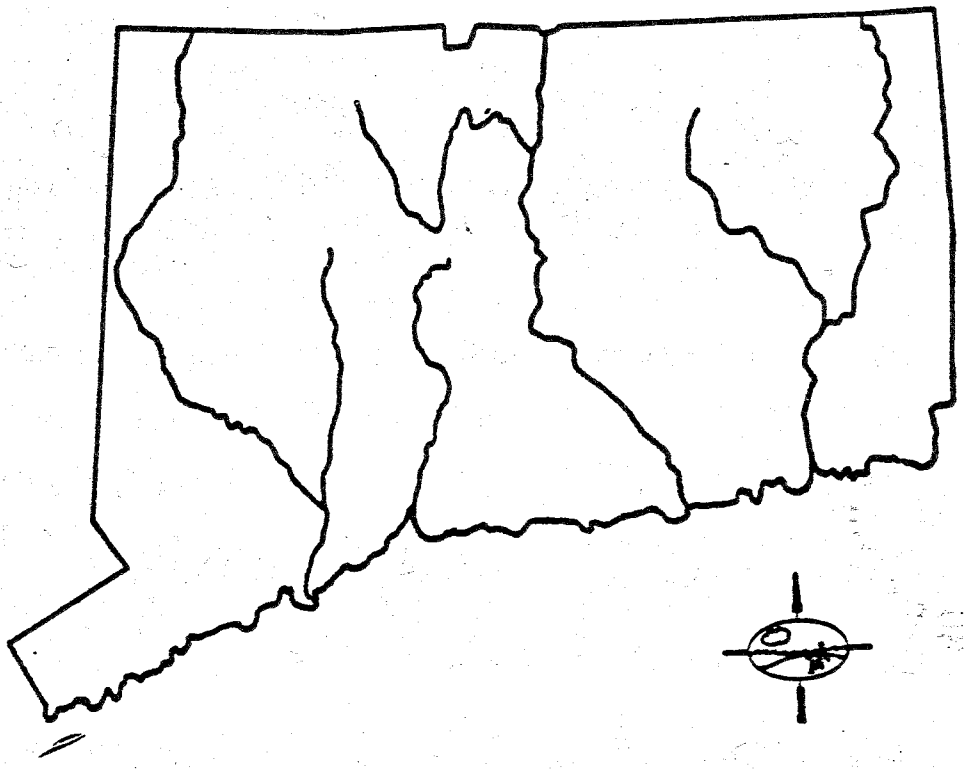
7) Degrading or destroying essential wildlife, finfish or shellfish habitat through significant alteration of the composition, migration patterns, distribution, breeding or other population characteristics of the natural species or significant alterations of the natural components of the habitat. C.G.S. Sec. 22a-93 (15)(G).

8) Degrading tidal wetlands, ... through significant alteration of their natural characteristics or function. C.G.S. Sec. 22a-93(15)(H).

APPENDIX D

CONNECTICUT WATER QUALITY STANDARDS AND CRITERIA

Connecticut Water Quality Standards & Criteria



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER COMPLIANCE UNIT
ADOPTED SEPTEMBER 9, 1980

WATER QUALITY STANDARDS

Introduction

Standards for water quality are required by Section 25-54e of the Connecticut General Statutes. The purpose of the standards is to provide a clear and objective statement of existing and projected water quality and the general program to improve the water resources of the State and to qualify the State and its municipalities for available Federal grants for water pollution control. It is the statutory mandate that these standards shall protect the public health and welfare and promote the economic development of the State and preserve and enhance the quality of the State's waters for present and future use for public water supplies, propagation of fish and aquatic life and wildlife, recreational purposes, agricultural, industrial and other legitimate uses.

The Federal Water Pollution Control Act requires the Water Quality Standards for surface waters be reviewed and modified as appropriate at least every three years. Policies developed in these standards are consistent with the goals expressed in the Federal Water Pollution Control Act.

GENERAL POLICIES

1. It is the policy of the State to restore or maintain the surface waters of the State to a quality consistent with their use for the protection and propagation of fish, shellfish and wildlife including breeding, feeding and nursery grounds, and with their use for recreation. In keeping with this policy, all surface waters will be restored to the extent possible at least to a quality consistent with Class B or Class SB. Such classifications are proposed throughout the State in these standards, however, where they will not be achieved within three years, the anticipated condition on December 31, 1982 is also identified.

These anticipated conditions on December 31, 1982 are the best present estimate of the results which can be expected to be achieved from the water pollution control program over a three year period.

2. Surface waters with existing quality better than established standards will be maintained at their existing high quality. Surface waters of the State will not be lowered in class designation unless and until it has been affirmatively demonstrated to the Commissioner that such change is justifiable as a result of necessary economic or social development and unless it will not interfere with or become injurious to any assigned uses made of, or presently possible in, such waters. Any applicant for a new discharge to high quality waters will be required to justify the project as described above as part of the initial project design and provide a minimum level of treatment equal to or exceeding the applicable standards of performance for new sources promulgated pursuant to the Federal Water Pollution Control Act.

3. It is the policy of the State to restore or maintain the quality of the groundwater to a quality consistent with its use for drinking without treatment. In keeping with this policy, all groundwaters shall be restored to the extent possible to a quality consistent with Class GA. However, restoration of groundwater to Class GA shall not be sought when:

   A) The groundwater is in a zone of influence of a permitted discharge.

   B) The groundwater is designated as Class GB; unless there is a demonstrated need to restore groundwaters to a Class GA designation or where it can be demonstrated to the Commissioner that restoration to Class GA can be reasonably achieved.

   C) The groundwater is designated Class GC.

4. The zone of influence of a discharge may be described as the soil or water area needed to allow the treatment of effluent by soils or the mixing of effluent with ground or surface waters. The establishment of zones of influence created by a permitted discharge shall not affect the adopted water usage class. The zone of influence is used by the Commissioner in permitting and regulating discharges to the waters of the State. The Commissioner is required to determine whether any proposed system to treat a discharge will protect the waters of the State from pollution.

A) Surface Waters

(1) Wherever zones of influence are allowed, zones of passage for free swimming and drifting aquatic organisms shall be provided.

(2) No minimum criteria can be given for zones of passage because of varying hydraulic, physical/chemical, and biological considerations.

(3) As a guideline, zones of influence should be limited to no more than 25% of the cross-sectional area or volume of flow, leaving at least 75% free for a zone of passage.

(4) The cross-sectional area or volume of flow assigned to zones of influence shall be limited to that which will not adversely affect biological value to a degree which is damaging to the ecosystem.

B) Groundwaters

(1) Zones of influence may be allowed and the determination of boundaries of a zone shall be required when natural soil materials are used to treat a discharge or to allow the dilution of substances by groundwater to acceptable concentrations for

discharge to the surface waters in an effluent/groundwater mix which will not violate the established water quality classification for the surface water.

(2) The zone of influence for subsurface sewage disposal systems which are permitted under the authority delegated to the Commissioner of Health Services by Section 25-54i-1.0-5.2 shall be defined as the area required by the separating distances established as minimum requirements of the Public Health Code.

(3) The zone of influence for all other discharges to the groundwater shall be the area in which the groundwater could be in violation of any pertinent Federal and State drinking water standards or otherwise be polluted by the discharge.

5. It shall be the general policy of the State to limit discharges to the surface waters to the following categories:

A) Class AA surface waters may be suitable to receive backwash discharges from public or private drinking water treatment systems subject to the approval of the Commissioner of Health Services, provided the backwash discharge is treated to a level which may be considered clean water and which in the judgement of the Commissioner equals or exceeds the quality of raw water from which it is drawn.

B) Class A and SA surface waters may be suitable to receive discharge from treated backwash waters from public or private drinking water treatment systems, minor cooling and clean water discharges, and dredging and dredged material dewatering operations.

C) Class B and SB surface waters may be suitable to receive cooling

water discharges and major and minor discharges from municipal and industrial wastewater treatment systems. In addition, certain in-river sand and gravel mining operations may be permissable.

D) The designation of surface waters as Class C or Class SC shall not be a reason for authorizing a new discharge that would not allow the receiving surface waters to attain Class B or Class SB.

6. It shall be the policy of the State to limit discharges to the groundwaters to the following categories:

A) Class GAA areas may be suitable to receive discharges of domestic sewage as defined in Section 25-54i-1.0 or wastes from acceptable agricultural practices or backwash from public drinking water treatment systems or other minor cooling or clean water discharges.

B) Class GA areas may be suitable to receive those discharges permitted in Class GAA areas and septage or other wastes of predominantly human or animal origin. These groundwaters may also receive effluents containing substances of natural origin or materials which easily biodegrade in the soil system and pose no threat to untreated drinking water supplies drawn from the groundwater outside any zone of influence.

C) Class GB areas may be suitable for receiving discharges permitted in Class GAA and Class GA. In addition, these groundwaters may be suitable for receiving certain treated industrial process waters amenable to further treatment by the soils. Such discharges shall not cause degradation of groundwaters that could preclude future use of the groundwater for drinking supplies without treatment or violate adjacent surface water classification.

Class GB groundwaters are those located in areas where historical

industrial, commercial or residential development has or is likely to render the groundwaters unsuitable for drinking water without treatment, however, the intent is to prevent new discharges from causing further degradation.

D) Class GC areas may be suitable for all discharges allowed in areas designated as Class GAA, Class GA, and Class GB. Class GC areas may also be suitable for other discharges operating under a Section 25-54i discharge permit, as long as such discharges will not cause a violation of an adjacent surface water classification. The groundwaters in Class GC areas may be unsuitable for drinking water purposes without treatment. There is a present and continuing need to allow discharges to the ground which are currently best treated by making use of the restoration or attenuation characteristics of the soil and subsurface hydrogeologic conditions. The best places to meet this need in Connecticut exist in limited areas of the State where specific soil and hydrogeologic conditions exist that may be most favorable to the acceptance of such discharges and the existing land uses are compatible with such discharges. In many Class GC areas, the historic waste disposal practices may have, for all practical purposes, permanently rendered the groundwater unsuitable for drinking water without treatment, and/or the development of large yield and high quality water supply from the aquifer conditions is unlikely.

7. Groundwaters assigned to a specific class are not protected by such designation when the subsequent withdrawal of groundwaters creates a gradient from adjacent water or from an authorized zone of influence or from adjacent groundwater areas of different classification.

8. It shall be the general policy of the State to require all sewage

treatment plants to disinfect their effluent prior to its discharge to the surface waters with the exception of discharges to the following streams for which disinfection shall be required only during the period from May 1st to October 1st of any year: Housatonic River north of the I-95 bridge; Naugatuck River; Quinnipiac River north of the I-95 bridge; Farmington River; Pequabuck River; Connecticut River north of the I-95 bridge: Hockanum River; Willimantic River; Shetucket River; Quinebaug River; and the Thames River north of the I-95 bridge. It is recognized that criteria for coliform bacteria may not be met on the above streams during the period when disinfection of sewage treatment plant effluent is not required. The degree of treatment and disinfection shall be as required by the Commissioner and shall be consistent with the health standards established by the Commissioner of Health Services.

9. Coastal and marine waters are those generally subject to the rise and fall of the tide and as defined by Section 22a-93 of the Connecticut General Statutes as amended by P.A. 79-535 Section 3(5).

10. Consideration of other criteria will constitute a portion of the continuing effort of the Commissioner to further define water quality standards. The Commissioner reserves the right to amend or extend the criteria for each class of waters as new information or improved or more stringent criteria relative to water quality impacts are developed and justified subject to the legal and procedural requirements of State and Federal laws or regulations.

11. The waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal or aquatic life for the most sensitive and governing water use class. Criteria for chemical constituents contained in guidelines published by the U.S. Environmental

Protection Agency shall be considered. In areas where fisheries are the governing consideration and numerical limits have not been established, bioassays may be necessary to establish limits on toxic substances. The recommendations for bioassay procedures contained in "Standard Methods for the Examination of Water and Wastewater" and the application factors contained in EPA water quality guidelines shall be considered.

A) For surface waters classified for use as public drinking water, the raw water sources must be maintained at a quality as defined by criteria developed by the U.S. EPA in accordance with the Safe Drinking Water Act (P.A. 93-523) or the State of Connecticut (Section 19-13-B102 of the Regulations of Connecticut State Agencies), whichever is more stringent, so that criteria for finished water can be met after conventional treatment.

B) For groundwaters classified for use as public or private drinking water (Classes GAA and GA), the raw water sources must be maintained or restored at a quality as defined by criteria developed by the U.S. EPA or the State, whichever is more stringent, so that criteria for finished water can be met without treatment.

12. The discharge of radioactive materials in concentrations or combinations which would be harmful to human, animal or aquatic life shall not be allowed. In no case shall the Alpha emitters in a surface water exceed a concentration of 1,000 picocuries per liter.

13. Reasonable controls may be defined by the Commissioner on a case-by-case basis or the Commissioner may require that it be affirmatively demonstrated by any person or municipality engaged in such activities that all reasonable controls will be or are being used.

14. The minimum average daily flow for seven consecutive days that can be expected to occur once in ten years under natural conditions is the minimum flow to which the standard for surface waters apply, except when a stream has been historically regulated to result in low flows below that level, in which case the standards apply to the absolute low flow resulting from such regulation.

15. Except within designated dredged material disposal areas, waters shall be substantially free of pollutants that: a) unduly affect the composition of bottom fauna; b) unduly affect the physical or chemical nature of the bottom; or c) interfere with the propagation and habitats of shellfish, finfish, and wildlife. Dredged materials dumped at approved disposal areas shall not pollute the waters of the State and shall not result in; a) floating residues of any sort; b) release of any substance, biological or chemical constitutents which may result in long-term or permanent degradataion of water quality in waters overlying or adjacent to the dumping grounds; c) dispersal of sediments outside a zone of influence enclosing the designated dump points; or d) biological mobilization and subsequent transport of toxic substances to food chains.

16. Proposed drinking water supply intakes and impoundments and tributary surface waters identified in the Long Range Plan for Management of Water Resources prepared and adopted pursuant to Section 25-5b of the Connecticut Statutes shall be adopted as Class AA.

17. Section 25-26(a) of the Connecticut General Statutes imposes an absolute restriction on the discharge of sewage to Class AA surface waters. The coliform bacteria criteria of "none of human origin" if violated by a discharge source outside the state where similar requirements are not imposed, shall not be a valid reason for either relaxing such restriction in Connecticut or changing the Class AA water quality

standard. It shall be the policy of Connecticut to pursue the adoption of compatible Water Quality Standards in neighboring states to assure the protection of drinking water supplies in Connecticut.

18. Physical obstructions such as dams, which prevent cold water fish from reaching an area suitable for spawning and growth, shall not be considered a valid reason for not meeting the criteria.

19. There shall be no point source discharge into any natural lake or pond or tributary surface waters which will raise the phosphorus concentration of the receiving surface waters, including phosphorus contained in suspended matter, to an amount in excess of 0.03 mg/l. For the purpose of this policy the Class B or Class C impoundments listed below shall be considered natural lakes or ponds.

Town	Lake or Pond
Bozrah	Fitchville Pond
Griswold	Ashland Pond
Killingly	Fivemile Pond
Stafford	Glenville Pond
Stafford	Riverside Pond
Stafford	Warren Pond

20. Upstream of the mouths of the Housatonic River, Connecticut River, and Thames River, the allowable temperature increase shall be consistent with the corresponding non-tidal surface water.

NOTES

These notes include additional criteria and supplementary information to insure proper interpretation and use of the criteria.

1. These criteria do not apply to conditions brought about by natural causes. Conditions which exist in the water in part due to man's normal uses of the land shall be considered natural. In the case of Class AA watersheds, man's normal use of the land means farming and other agricultural practices, low density residential development and the improvement and maintenance of secondary roads provided Best Management Practices are used. Thus the meaning of the word natural is not limited to only those conditions which would exist in the water if drained from pristine land.
2. Water courses which are contained in drainage conduits or pipes and which are not assigned a specific class are considered to be the class of the stream segment to which they discharge.
3. Class D and Class SD waters are considered unacceptable.
4. Existing and proposed drinking water supply sources and the lands from which they drain may be subject to restricted use by State regulations, local ordinance, or by the property owner.
5. A) In order to assure a reasonable level of confidence, criteria for coliform bacteria and fecal coliform are to be based on a minimum of five samples taken over a 30 day period.

   B) In addition to criteria for coliform bacteria, another criteria useful in judging the sanitary quality of water is the Fecal Coliform/Fecal Streptococci ratio. Fecal Streptocci are native to the intestines of warm blooded animals including man and like coliform are considered non-pathogenic. What makes the FC/FS ratio useful is the fact that the research has shown the ratio

for human wastes to be about 4.4 and the ratio for common domestic animals to be considerably less than 1.0. The rates of die-off for coliform and streptococci organisms is different and therefore the ratio is most meaningful when the contamination is less than 24 hours old.

The following ratios can be used as a useful tool in interpreting data for which both Fecal Coliform and Fecal Streptococci values exist:

FC/FS ratio	Significance
greater than 4.0	strong evidence that pollution is from human wastes
between 2.0 and 4.0	may suggest a predominance of human waste in mixed pollution
between 1.0 and 2.0	uncertain interpretation
between 0.7 and 1.0	may suggest a predominance of livestock and poultry wastes in mixed pollution
less than 0.7	strong evidence that pollution is from livestock and poultry waste and not human wastes.

6. The use of subscript b in Classes A_b, B_b, and SB_b is intended to identify those areas where natural conditions or conditions which cannot be expected to be appreciably altered by the control of discharges may preclude bathing. It may also be used in Classes B_b and SB_b to designate areas in the immediate vicinity of treated sewage outfalls where bathing is not advisable.
7. The use of subscript c in Classes B_c, C_c, SB_c is to identify areas suitable for cold water fisheries including spawning, growth and passage.
8. Sample collection, preservation, handling and analysis should conform to "Standard Methods for the Examination of Water and Wastewaters", 14th

Edition, American Public Health Association, New York, N.Y. The following references may be used where they contain applicable laboratory methods.

A) "ASTM Standards", Part 23, Water; Atmospheric Analysis, 1970; American Society of Testing and Materials, Philadelphia, Pennsylvania 19103

B) "Methods of Chemical Analysis of Water and Wastes", Environmental Protection Agency Water Quality Office, Analytical Quality Control Laboratory, 1014 Broadway, Cincinnati, Ohio 45263.

C) Any later edition of the above references or any other different but equivalent methods approved by the Commissioner.

9. Property rights to groundwater and the ability to degrade groundwater are not granted by the assignment of groundwater to a class. The Commissioner may require applicants for section 25-54i permits to demonstrate that they have acquired the rights to any groundwater which may be degraded by a discharge or its zone of influence. The Commissioner may also require any applicant for such discharge to record on the land records of the relevant town(s) the effect and extent of any discharge on the groundwaters and the effect and duration of effect of any discharge following cessation of the discharge.

INLAND WATERS

CLASS AA

Existing or proposed drinking water supply impoundments and tributary surface waters (See Note 4).

1.	Dissolved oxygen	Not less than 5 mg/l at any time.
2.	Sludge deposits - solid refuse, - floating solids, oils and grease - scum	None other than of natural origin
3.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used.
4.	Color and turbidity	Turbidity shall not exceed 10 JTU over ambient levels. A secchi disc shall be visible at a minimum depth of 1 meter. All reasonable controls are to be used.
5.	Coliform bacteria per 100 ml	Fecal coliform shall not exceed an arithmetic mean of 20 organisms/ 100 ml in any group of samples nor shall 10% of the samples exceed 100 organisms/100 ml.
6.	Taste and odor	None other than of natural origin.
7.	pH	As naturally occurs.
8.	Allowable temperature increase	None other than of natural origin except when it can be demonstrated that cold water fish spawning and growth will not be impaired.
9.	Chemical constituents	See General Policy 11
	(a) Phosphorus	None other than of natural origin
	(b) Sodium	Not to exceed 20 mg/l

INLAND WATERS

CLASS A

May be suitable for drinking water supply and/or bathing; suitable for all other water uses; character uniformly excellent; may be subject to absolute restrictions on the discharge of pollutants.

1.	Dissolved oxygen	Not less than 5 mg/l at any time.
2.	Sludge deposits - solid refuse - floating solids, oils and grease - scum	None other than of natural origin.
3.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used.
4.	Color and turbidity	Turbidity shall not exceed 10 JTU over ambient levels. A secchi disc shall be visible at a minimum depth of 1 meter. All reasonable controls are to be used.
5.	Coliform bacteria per 100 ml	Fecal coliform shall not exceed an arithmetic mean of 20 organisms/100 ml in any group of samples nor shall 10% of the samples exceed 100 organisms/ 100ml.
6.	Taste and odor	None other than of natural origin.
7.	pH	As naturally occurs.
8.	Allowable temperature increase	None other than of natural origin except when it can be demonstrated that cold water fish spawning and growth will not be impaired.
9.	Chemical constituents	See General Policy 11
	(a) Phosphorus	None other than of natural origin.

INLAND WATERS

CLASS B

Suitable for bathing, other recreational purposes, agricultural uses, certain industrial processes and cooling; excellent fish and wildlife habitat; good aesthetic value.

1.	Dissolved oxygen	Not less than 5 mg/l at any time
2.	Sludge deposits - solid refuse - floating solids - oil and grease - scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
3.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity or dredge material disposal provided all reasonable controls are used.
4.	Color and turbidity	Turbidity shall not exceed 25 JTU; B_c not to exceed 10 JTU over ambient levels. A secchi disc shall be visible at a minimum depth of 1 meter; Class B_b - criteria may be exceeded. (See Note 6)
5.	Coliform bacteria per 100 ml	Fecal coliform shall not exceed a log mean of 200 organisms/ 100ml nor shall 10% of the samples exceed 400 organisms/100 ml.
6.	Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class nor cause taste and odor in edible fish.
7.	pH	6.5 - 8.0

8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 85°F, or in any case raise the normal temperature of the receiving water more than 4°F.
9. Chemical constituents	See General Policy 11.

INLAND WATERS

Class C

Suitable for certain fish and wildlife habitat, recreational boating, and certain industrial processes and cooling; good aesthetic value.

1.	Dissolved oxygen	Not less than 4 mg/l at any time.
2.	Sludge deposits - solid refuse - floating solids - oils and grease - scum.	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
3.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls are used.
4.	Color and turbidity	Turbidity shall not exceed 25 JTU.
5.	Coliform bacteria per 100 ml	Fecal coliform shall not exceed a log mean of 1,000 organisms/ 100 ml nor shall 10% of the samples exceed 2,500 organisms/100 ml.
6.	Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class nor cause taste and odor in edible fish.
7.	pH	6.0 - 8.5
8.	Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed $85^{o}F$ or in any case raise the normal temperature of the receiving water more than $4^{o}F$.
9.	Chemical constituents	See General Policy 11.

INLAND WATERS

Class D

May be suitable for bathing or other recreational purposes, certain fish and wildlife habitat, certain industrial processes and cooling; may have good aesthetic value. Present conditions, however, severely inhibit or preclude one or more of the above uses.

COASTAL AND MARINE WATERS

Class SA

Suitable for all sea water uses including shellfish harvesting for direct human consumption (approved shellfish areas), bathing, and other water contact sports; may be subject to absolute restrictions on the discharge of pollutants.

1.	Dissolved oxygen	Not less than 6.0 mg/l at any time.
2.	Sludge deposits - solid refuse - floating solids- oils and grease - scum.	None other than of natural origin
3.	Silt or sand deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls are used.
4.	Color and turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls are used. A secchi disc shall be visible at a minimum depth of 1 meter; Class SA_b-criteria may be exceeded (See Note 6)
5.	Coliform bacteria per 100 ml*	Fecal coliform shall not exceed an arithmetic mean of 20 organisms/100 ml in any group of samples nor shall 10% of the samples exceed 100 organisms/100 ml.
6.	Taste and odor	None allowable.
7.	pH	6.8 - 8.5

* Criteria for shellfish harvesting areas as established by FDA is found in Appendix A.

8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.
9. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses. See General Policy 11.

COASTAL AND MARINE WATERS

CLASS SB

Suitable for bathing, other recreational purposes, industrial cooling and shellfish harvesting for human consumption after depuration; excellent fish and wildlife habitat; good aesthetic value.

1. Dissolved oxygen	Not less than 5.0 mg/l at any time.
2. Sludge deposits - solid refuse - floating solids, oils and grease - scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
3. Sand or silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls are used.
4. Color and turbidity	A secchi disc shall be visible at a minimum of 1 meter; Class SB_b - criteria may be exceeded. (See Note 6)
5. Coliform bacteria per 100 ml	Fecal coliform shall not exceed a log mean of 200 organisms/100 ml nor shall 10% of the samples exceed 400 organisms/100 ml.
6. Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
7. pH	6.8 - 8.5
8. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown

	that spawning and growth of indigenous organisms will not be significantly affected.
9, Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this class. (See General Policy 11)

COASTAL AND MARINE WATERS

Class SC

Suitable for fish, shellfish and wildlife habitat; suitable for recreational boating and industrial cooling; good aesthetic value.

1.	Dissolved oxygen	Not less than 4 mg/l at any time.
2.	Sludge deposits - solid refuse - floating solids - oils and grease - scum	None except for small amounts that may result from the discharge from a waste treatment facility providing appropriate treatment.
3.	Sand and silt deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, or dredge material disposal provided all reasonable controls are used.
4.	Color and turbidity	None in such concentrations that would impair any usages specifically assigned to this class.
5.	Coliform bacteria per 100 ml	Fecal coliform shall not exceed a log mean of 1,000 organisms/100 ml nor shall 10% of the samples exceed 2,500 organisms/100 ml.
6.	Taste and odor	None in such concentrations that would impair any usages specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
7.	pH	6.5 - 8.5
8.	Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case exceed 83°F or in any case raise the normal temperature of the receiving water more than 4°F. During the period including July, August and September, the normal temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected.

9. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this class. (See General Policy 11)

CLASS SD

May be suitable for bathing or other recreational purposes, fish and wildlife habitat and industrial cooling; may have good aesthetic value. Present conditions, however, severely inhibit or preclude one or more of the above uses.

GROUNDWATERS

CLASS GAA

Existing or proposed public drinking water use without treatment.

(See General Policy 6 and Notes 4 and 9)

1.	Dissolved oxygen	As naturally occurs.
2.	Oils and grease	None other than of natural origin
3.	Color and turbidity	None other than of natural origin
4.	Coliform bacteria per 100 ml	Not to exceed a monthly arithmetic mean of 1 or, more than 4 in any individual sample collected.
5.	Taste and odor	None other than of natural origin.
6.	pH	As naturally occurs or as may result from normal agricultural, horticultural silviculture, lawn maintenance or construction activity provided all reasonable controls are used.
7.	Chemical constituents	See General Policy 11

GROUNDWATERS

CLASS GA

May be suitable for public or private drinking water use without treatment. (See General Policy 6 and Notes 4 and 9)

1.	Dissolved oxygen	As naturally occurs.
2.	Oils and grease	None other than of natural origin
3.	Color and turbidity	None other than of natural origin.
4.	Coliform bacteria per 100 ml	Not to exceed a monthly arithmetic mean of, 1 or more than 4 in any individual sample collected.
5.	Taste and odor	None other than of natural origin.
6.	pH	As naturally occurs or as may result from normal agricultural, horticultural silvicultural, lawn maintenance or construction activity provided all reasonable controls are used.
7.	Chemical constituents	See General Policy 11

GROUNDWATERS

Class GB

May not be suitable for public or private use as drinking water without treatment. No quantitative or qualitative limits apply since the groundwaters specified as GB are known or presumed to be degraded. (See General Policies 3, 6 and Note 9).

GROUNDWATERS

Class GC

May be suitable for certain waste disposal practices because past land use or hydrogeologic conditions render these groundwaters more suitable for receiving permitted discharges than development for public or private water supply.

No qualitative or quantitative limits apply. (See General Policies 3, 6 and Note 9).

APPENDIX A

Criteria for coliform bacteria are intended to provide a basis for data evaluation related to the possibility of contamination by sewage. Coliform bacteria reside in the intestines of warm blooded animals including man. Their presence may indicate the presence of human wastes and a potential health hazard. Therefore coliform bacteria are used as indicator organisms for the possible presence of pathogenic organisms normally found in sewage. Coliform organisms also are found in the tissue of plants, soils and the intestines of other warm blooded animals including common domestic animals. Therefore, the presence of large numbers of coliform organisms is cause for concern but not proof that waters are contaminated with sewage and accompanying pathogenic bacteria. High results should be investigated by a field survey of sanitary conditions or other appropriate means to determine the cause and confirm the sanitary quality.

Following are criteria for coliform bacteria. A major change is incorporated in this revision in that fecal coliform are now used as criteria for the sanitary quality of waters. A specific test for fecal coliform gives a value for organisms found in the intestines of warm blooded animals but not plants and soils. The test for total coliform include both fecal coliform and coliform found in plants and soils. Values for total coliform are to be used as a guide.

Class AA, Class A, Class SA* Criteria - Fecal coliform shall not exceed an arithmetic mean of 20 organisms/100 ml in any group of samples nor shall 10% of samples exceed 100 organisms/100 ml.

Guide - total coliform not to exceed a median of 100 nor shall 10% of samples exceed 500 organisms/ml.

* For shellfish harvesting areas, the U.S. Food and Drug Administration has established the following criteria:

Class SA, Shellfish harvesting - Fecal coliform shall not exceed a median of 14 organisms/100 ml nor shall 10% of samples exceed 43 organisms/100 ml.

or: total coliform not to exceed a median of 70 organisms/100 ml nor shall 10% of samples exceed 230 organisms/100 ml.

At the present time, the State Department of Health uses the FDA criteria for Total Coliform. Analysis is performed using the MPN 5-tube decimal dilution procedure. In order to insure an acceptable confidence level, a minimum of 15 samples is required.

Class B, Class SB criteria - Fecal coliform shall not exceed a log mean of 200 organisms/100 ml in any group of samples nor shall 10% of samples exceed 400 organisms/100 ml.

Guide - Total coliform not to exceed a median of 1,000 nor shall more than 20% of samples exceed 2,400 organisms/100 ml.

Class C, Class SC Criteria - Fecal coliform shall not exceed a log mean of 1,000 organisms/100 ml nor shall 10% of samples exceed 2,500 organisms/100 ml.

Guide - Total coliform not to exceed mean of 5,000 organisms/100 ml nor shall 20% of samples exceed 12,500 organisms/100 ml.

A P P E N D I X B

Maine Sanitation Devices
No Discharge Zones

1) The discharge of sewage, sink and galley wastes from vessels (boats), whether treated by any marine sanitation device or not, is prohibited to any freshwater stream, river, lake or pond in the State of Connecticut which is not capable of navigation by interstate vessel traffic. These inland freshwaters, where the discharge of sewage, sink and galley wastes from vessels is prohibited, shall be referred to as "no discharge zones."

   No person shall launch, moor, dock or operate any vessel equipped with a marine sanitation device (MSD) in a no discharge zone unless:

   a) Such MSD is designed and operated to prevent the discharge of sewage treated or untreated, or

   b) its MSD not meeting the requirements of paragraph (a) above, shall, prior to launching, have been securely sealed and made visibly inoperative so as to prevent its use.

2) In order to protect the public health, to avoid disease transmission due to consumption of contaminated commercial or recreational shellfish, to protect the public health of bathers, and to protect against significant or aesthetic pollution resulting from concentrations of vessels (boats) at commercial or recreational anchorage, it shall be the policy of this Department to prohibit the discharge of sewage, sink and galley wastes to marine or freshwaters capable of interstate vessel traffic in the following areas:

   a) Marked (staked) Shellfish Areas (Public Health Code, Sec. 19-13-B71)
   b) Bathing Areas
   c) Mooring Areas

   It should be made clear that the three areas listed above are not classified as "no discharge zones." It is the purpose of this policy to prohibit the <u>use</u> of flow-through marine sanitation devices in these three areas.

A P P E N D I X C

Lake Trophic Classification

Oligotrophic

May be Class AA, Class A, or Class B water; Low in plant nutrients; Low biological productivity characterized by the absence of nuisance algae blooms and nuisance macrophyte beds. Excellent opportunities for water contact recreation.

1. Total Phosphorus	0-10 ug/l spring and summer
2. Total Nitrogen	0-200 ug/l spring and summer
3. Chlorophyll-a	0-2 ug/l mid-summer
4. Secchi Disk Transparency	6 + meters mid-summer

Mesotrophic

May be Class AA, Class A, or Class B water. Moderately enriched with plant nutrients. Moderate biological productivity characterized by occasional nuisance blooms of algae and/or small areas of nuisance macrophyte beds. Good opportunities for water contact recreation.

1. Total Phosphorus	10-30 ug/l spring and summer
2. Total Nitrogen	200-600 ug/l spring and summer
3. Chlorophyll-a	2-15 ug/l mid-summer
4. Secchi Disk Transparency	2 - 6 meters mid-summer

Eutrophic

May be Class AA, Class A, or Class B water. Highly enriched with plant nutrients. High biological productivity characterized by frequent nuisance blooms of algae and/or extensive areas of dense macrophyte beds. Water contact recreation opportunities may be limited.
limited to absent.

1. Total Phosphorus	30-50 ug/l spring and summer
2. Total Nitrogen	600-1000 ug/l spring and summer
3. Chlorophyll-a	15-30 ug/l mid-summer
4. Secchi Disk Transparency	1-2 meters mid-summer

Highly Eutrophic

May be Class AA, Class A, or Class B water. Excessive enrichment with plant nutrients. High biological productivity, characterized by severe nuisance blooms of algae and/or extensive areas of dense macrophyte beds. Water contact recreation may be extremely limited.

1.	Total Phosphorus	50 + ug/l spring and summer
2.	Total Nitrogen	1000 + ug/l spring and summer
3.	Chlorophyll-a	30 + ug/l mid-summer
4.	Secchi Disk Transparency	0-1 meters mid-summer

As part of an on-going Lake Management Program, the Department is gathering data and classifying major recreational lakes with public access according to their trophic condition. Listed on the following pages are lakes which have been classified by the Lakes Management Program. Additional lakes will be surveyed and classified in the future as resources permit.

Oligotrophic

Lake	Town
Alexander	Killingly
Beach	Voluntown
Highland	Winchester
Mashapaug	Union
West Hill	New Hartford

Mesotrophic

Black	Meriden/Middlefield
Bolton (Middle)	Vernon
Bolton (Lower)	Bolton/Vernon
Candlewood	New Fairfield/Sherman/New Milford Danbury/Brookfield
Cedar	Chester
Cream Hill	Cornwall
Crystal	Ellington/Stafford
Dodge	East Lyme
East Twin	Salisbury
Gardner	Salem /Montville /Bozrah
Gorton	East Lyme
Hayward	East Haddam
Hitchcock	Wolcott
Long	Ledyard/North Stonington
Mamanasco	Ridgefield
Mt. Tom	Litchfield/Morris/Washington
Mudge	Sharon
Pachaug	Griswold
Pataganset	East Lyme
Pocotopaug	East Hampton
Quassapaug	Middlebury
Rogers	Lyme/Old Lyme
Shenipsit	Vernon/Ellington/Tolland
Taunton	Newtown
Terramuggus	Marlborough
Tyler	Goshen
West Side	Goshen
Wyassup	North Stonington

Eutrophic

Lake	Town
Bantam	Litchfield/Morris
Batterson Park	Farmington/New Britain
Beseck	Middlefield
Roseland	Woodstock
Waramaug	Warren/Kent/Washington
Wononscopomuc	Salisbury

Highly Eutrophic

Cedar	North Branford
Lilliononah	Southbury/Bridgewater/Brookfield/ Newtown
Linsley	North Branford
North Farms	Wallingford
Silver	Berlin/Meriden
Zoar	Newtown/Monroe/Oxford/Southbury
1860 Reservoir	Wethersfield

APPENDIX E

DARIEN MCP

For the purposes of this study, and in order to identify major natural systems, the Darien coastline has been divided into the following geographical areas:

4.1 - Five Mile River
4.2 - Contentment Island
4.3 - Fish Islands
4.4 - Scott's Cove
4.4 (a) - Contentment Island Cove
4.4 (b) - Tokeneke Brook
4.4 (c) - Tokeneke Trail Cove
4.4 (d) - Delafield Island Cove
4.4 (e) - Salem Straits Cove
4.5 - Sargent's Cove
4.6 - Long Neck Point
4.7 - Pear Tree Point
4.8 - Darien River
4.9 - Gorham's Pond
4.10 - Noroton Bay
4.11 - Holly Pond
4.12 - Noroton River

4.1 Five Mile River

The tidal portion of the Five Mile River lying within the Town of Darien's Coastal Boundary extends approximately one mile on a north-south axis, from just north of the White Bridge on Tokeneke Road, to the mouth of the River at the southwestern corner of Butler's Island. The full shoreline involves more than 2 miles of land, and incorporates a variety of freshwater and estuarine habitat. The watershed of the Five Mile River originates in Westchester County, New York and flows south through New Canaan, Norwalk and Darien. The entire drainage basin is 12.3 square miles in area with flow levels ranging from a high of 265 cubic feet per second in the spring, to a range of 1.9-6.0 cubic feet per second during low flow periods. The coastal portion of the River is heavily used as a marina and mooring basin. During the summer, some 500 boats, along with all services associated with boating (i.e., fuel, marine supplies, provisions), are located on the Rowayton shore.

The mean tidal range for the Five Mile River estuary is 7.2 feet, with a mean spring tide of 8.3 feet. The flood encroachment area is calculated under the National Flood Insurance Program to be approximately 15 feet above mean sea level within this area.

The coastal portion of the Five Mile River is estuarine. Fresh waters from the upper reaches of the River mix with marine waters from Long Island Sound. Changing values for fresh water input, tidal velocity, and on-shore wind lead to variations in salinity and sedimentation rates. These fluctuations lead to the development of the estuarine community. While the entire waters of Long Island Sound may be considered estuarine, it is the fresh water/marine water interfaces, such as the Five Mile River, where estuarine habitats are most prevalent.

An ecological analysis of this area was undertaken by Professor William Nearing and his associates in 1972. Their findings showed that the tidal marshes associated with the Five Mile River were highly productive, especially when compared to other marshes along the Atlantic seaboard. The productivity of the Five Mile River marshes was found to equal or exceed other viable marsh sites. Twenty different species of plants were found in the area, and the list of associated marsh fauna included more than thirty species of mollusks, crustaceans and birds. The report concluded that the marshes and adjacent mudflats along the south of the River were ecologically viable, and they contributed significantly to the marine productivity of the adjacent estuarine and coastal waters of Long Island Sound.

Along another line, a Federal navigation project is maintained within the Five Mile River. The existing channel, authorized in 1888, provides for a depth of 8 feet extending 6,000 feet upstream to the White Bridge. However, the upper 700 feet was de-authorized in 1978, and the actual depth and width of this part of the channel varies. Historically, maintenance dredging of the Five Mile River has entailed the removal of 47,700 cubic yards of material. The project was last dredged in 1968, and is scheduled for its next maintenance in the near future. The Corps of Engineers, New England Division, projects the need for four projects during the period 1985 to 2035, with an average volume per project of 70,000 cubic yards. Knowledgeable boaters estimate the depth and width of the existing channel to be 7 feet deep and 100 feet wide.

The Five Mile River Commission exercises control over project applications for dredging, the number of vessels moored, and the number and placement of mooring buoys. This Commission is composed of four individuals -- two from Darien, and two from the City of Norwalk -- and concerns itself with the pollution, conservation, and navigation of the Five Mile River. As part of the process of preparing this report, a meeting was held with the Five Mile River Commission. They concurred that it would not be desirable to dredge the Darien side of the River, due to the existing boat congestion and the need to maintain the natural condition of the marsh which offers the benefits of flood protection and habitat value.

The uppermost portion of the River, lying within the Coastal Boundary, is largely freshwater in nature and extends 500 yards south from the point where the Conrail railroad tracks cross the River to a riprap dam situated approximately 350 feet upstream from White Bridge. This section consists of two branch streams of the Five Mile River that join just north of the dam to form a small pool. The stream beds are largely gravel and cobble in nature, and the streams, especially the western branch, are dry during low-flow periods. The surrounding upland areas are largely vegetated slopes backed by private residences. Topography is such that most of this area has little flood potential except at the highest flows.

The coastal nature of the Five Mile River begins downstream of the riprap dam. While some tidal mixing of fresh and estuarine waters may occur in the pool behind the dam, it is south of the dam that true marine nature is evident.

From the dam to the White Bridge (the southern-most of the two spans crossing the River at this point), the Five Mile River is characterized by sand/mud sediments with stony banks. The Darien side lacks any development on the shoreline, with shrubs and other vacant lot vegetation occupying the upper shoreline, and boulder/riprap occupying the tidal zone. During the inspection, a good deal of green algae was present in the riverbed along with a few fiddler crab burrows.

The River from the White Bridge south could be considered a true river from a navigation/marine perspective. As one stands on the White Bridge and looks south, one sees either an extensive area of tidal creek and mudflat, or a body of water from shore to shore, depending on the stage of the tide. Nowhere else in Darien, with the possible exception of Scott's Cove, can such a startling example of tidal influence be seen.

This section of Five Mile River south of White Bridge may be divided into four sections; upper estuary, Five Mile River marsh, Tokeneke marsh and river mouth.

The upper estuary is dominated by a residentially developed shorefront, typically including a lawn extending to some form of shoreline protection. The protection structures range from concrete or masonry sea walls to riprapped revetments. Seaward, the intertidal area is covered by alterniflora, or cordgrass, a marsh fringe which may vary from 1 to 10 feet in width. In the center of the River, a mudflat extends from just south of the White Bridge for a distance of approximately 400 yards.

South of the White Bridge, the shoreline is dominated by a stone abutment for the bridge which extends 200 feet before turning westward along a small drainage creek. A gas station lies immediately inland of this portion, and the riverbed contains numerous pieces of automotive debris and other litter. This is one of the few areas along the entire Darien shoreline where commercial development is adjacent to the shoreline. The stone abutment ends at the head of a small tidal creek and storm drain outlet. A fringe of alterniflora is backed by stone riprap. The lot immediately south of the first tidal creek was vacant at the time of inspection.

Approximately 225 feet south of the first inlet is a second inlet which also terminates at a drainage ditch. This second inlet is used during the boating season as a mooring area for boats which lie on the mud during low tide. Along the southern shore of the inlet, heavy riprap is in place protecting the slope of a private home. The inlet consists of a vegetated upland with cordgrass fringe, and muddy bottom sediments. Along the southern edge, a

riprap revetment begins, and swings south at the base of a house built immediately adjacent to the tidal zone. This revetment shows signs of erosion which the owner claims is due to tidal action and muskrat burrowing activity. South of this location, the shore is dominated by a large stand of phragmites. One hundred and eighty feet further downstream is a third inlet which extends some 100 feet inland.

At this location, Five Mile River swings eastward and narrows slightly. The shore downstream from the third inlet is lawn with a small dock and boat ramp. The remaining distance to the point is vegetated upland with sparse areas of cordgrass fringe.

On the point, the shore is riprapped with a dock. South of the point, the Darien side of the River opens up into a small cove. The northern edge is primarily cordgrass with scrub upland. The middle portion of the cove is a masonry or seawall fronted by cordgrass fringe and gravel sediments. The southern portion is cordgrass with upland vegetation behind. The River swings to the south at this site.

The next area of the Five Mile River marks the head of navigation: i.e., the upper limit of the navigation channel and northern limit for most vessel traffic. From this area south, the Darien shore is marked by docks of various sizes and construction.

Six major docks are found along the next 300 yards of shoreline. The docks are well maintained and serve private residences. They reach out into or near the navigation channel edge. The shoreline is characterized by a cordgrass fringe backed by seawall or revetment. Between the first and second dock, one property lacks structural shoreline protection. The fifth and sixth docks are backed by large rock seawall, and the southern-most dock extends 250 feet back into the northern corner of the Five Mile River marsh -- a major cordgrass marsh system on the Darien shore. This marsh is in sharp contrast to the Rowayton shore, which is heavily developed for commercial and boating uses. The marsh and associated mudflats extend north-south for approximately 530 yards, and lie between the navigational channel and the Darien shoreline, a distance between 65 and 200 yards. As the Nearing report stated, this marsh is an important part of the Five Mile River system. In addition to its biological importance, its role in reducing wake wash from boats and other wave action, along with its scenic value, cannot be underestimated.

Five Mile River Road parallels the shore for most of the marsh's length. This offers one of the best scenic views in the Town of Darien. The shoreline is primarily seawall fronted by the cordgrass marsh. The marsh itself is marked by tidal creeks and mudflats and a number of boats are haphazardly moored in it. One vessel was found tethered to a telephone pole.

Although this marsh is one of the most extensive in the Town, it lacks the associated high marsh or patens marsh typical of many other systems. This is most likely the result of historical grading and land extension resulting in the lack of high intertidal ground suitable for patens growth and associated plant life. The southern border of the marsh swings eastward, and the shoreline returns to the seawall/private dock appearance. In addition to seawalls, a number of rock outcroppings are found in this area. From the southern border of the Five Mile River marsh to the entrance of the Tokeneke marsh, there are five docks and two groins perpendicular to the shoreline. The property on the upper portion of this shoreline segment has a cordgrass fringe backed by a low seawall, and a narrow segment of patens marsh which is backed in turn by a seawall. The middle segment is rocky in appearance with natural rock formations linked together with seawalls. As the shoreline approaches the Tokeneke Creek entrance, the foreshore becomes sandy, and a small sand beach is found at the northern entrance to Tokeneke marsh.

Extending west from Five Mile River, the drainage creek for Tokeneke marsh extends 275 yards before opening up into the marsh proper. The creek averages some 50-75 feet in width. Beginning on the sandy point, the northern shore is predominantly cordgrass with upland vegetation behind. Three docks in various stages of repair occupy the northern shore. As the creek opens up into the marsh, the cordgrass is bounded by a patens marsh. Patens marsh is found inland of the cordgrass throughout the marsh, though not in a continuous band.

Tokeneke marsh consists of approximately 6.23 acres of cordgrass marsh and some 2.66 acres of adjacent patens marsh. No obvious freshwater drainage enters this marsh system, though a freshwater pond does lie a short distance to the northwest. Both the patens and alterniflora marshes appear to be healthy and productive, and a variety of marsh-related life was observed, including fiddler crab, mud snails, and the snowy egret. The patens marsh, however, has been ditched for mosquito control. Human impact on the area included two dock/float structures, some erosion on the south shore of the creek, several abandoned vessels in the creek, and the presence of composition clay from tennis courts deposited in the southwestern corner of the marsh. Discussions with two riparian land owners in the area indicated street flooding problems due to the lack of drainage, especially during high tide coinciding with heavy rainfall. There was also interest shown in dredging the marsh creeks to allow access at other than high tide. Presently, even shallow draft vessels are largely restricted to the main stream of the creek and only at high tide.

The southern shore of the inlet creek to Tokeneke marsh is again predominantly cordgrass, backed by upland vegetation and private home development. Two docks reach out into the intertidal zone, and a "boathouse" also extends into the intertidal area. Some erosion is present along the creek bank, and several abandoned boats are present eyesores. At the junction of this creek and Five Mile River, a wooden bulkhead is in poor repair.

FIVE MILE RIVER

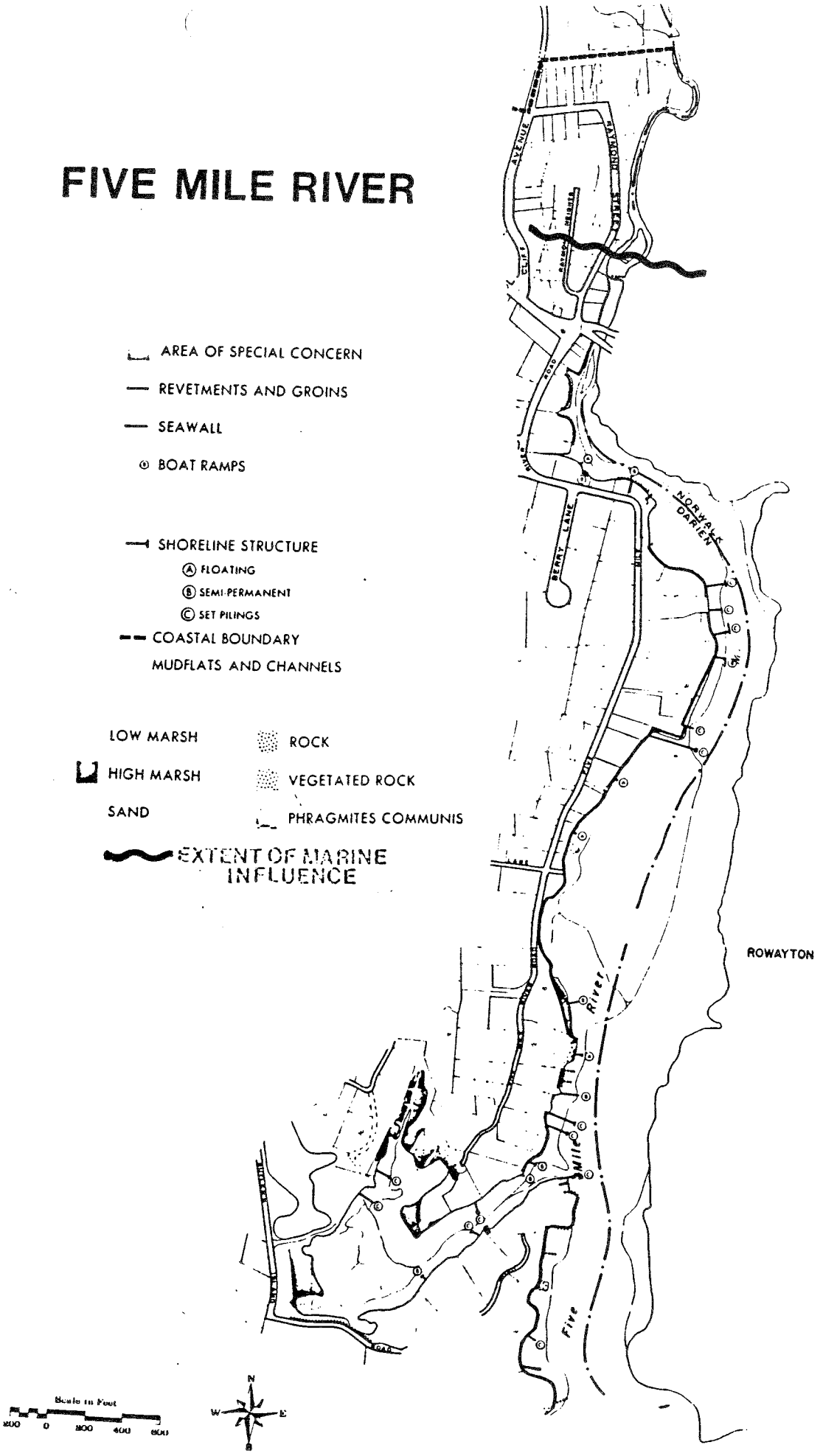


FIGURE 8

The lower reaches of Five Mile River (eastern end of Butler's Island) are bordered by a mixture of sand beach, fronted by fringes of alterniflora, rock outcroppings, and shoreland protection structures. At the southern junction of Tokeneke Creek and the Five Mile River, the coastal appearance is degraded by the presence of bulkheads in disrepair, abandoned power boats, and shoreline erosion. Just to the south, a massive riprapped and filled area exists which is inconsistent with the surroundings.

Downstream of this riprapped area, the shoreline largely consists of cordgrass fringe backed by small bands of sand and some form of shoreline protection. In three places along this portion of the shoreline, stone or concrete groins have been placed out into the intertidal zone. One hundred yards north of the mouth of the Five Mile River, a gazebo is placed on top of a rock outcropping. A small sandy cove lies south of the structure just inside the river mouth. At several places along this portion of the shore, low seawalls have been breached by coastal storms with sand and shells evident inland of the structures. While the River is largely a protected body of water, this lower western shore is its most exposed area. At the confluence of Five Mile River and Long Island Sound, the western shore rises to approximately 35 feet above mean sea level.

Summary and Conclusions - Five Mile River

1. Because of the hydrology and extent of the Five Mile River watershed, water quality of the estuarine section of the River is largely dependent on activities upstream. Protection of inland wetlands lying in the watershed, erosion control, and other mitigation measures will be extremely important to the future quality of the estuary.

2. Maintenance dredging of the harbor should be restricted to the existing federal project. Disturbance of any of the existing marshes by dredging should be avoided.

3. Proposed legislation to end any further Federal funding for this dredging project may have a significant impact on the Five Mile River. The recreational nature of this harbor will make funding of 25%-50% of the dredging project a major financial burden on the individuals involved.

4. Regardless of the status of the Federal Marine Sanitation Device legislation, efforts should be undertaken and maintained to ensure that holding tanks aboard moored vessels are not discharged into the River. Because of the small area, the large number of vessels involved, tidal regime and poor circulation, even minute amounts of discharge could have significant effects on ambient water quality. Public education of the boaters involved should prove helpful in this effort.

5. The Five Mile River marsh must be recognized as a major component of the Five Mile River ecosystem. Dredging and other projects having a major impact should not be considered for this area.

6. The practice of hauling boats across marsh areas, and of tying small boats to stakes and telephone poles, are not deemed to be a major problem, but they do have adverse effects on marsh vegetation and general shoreline appearance.

7. An investigation of the extent and severity of existing flooding along Butler's Island Road and Manor Drive should be undertaken.

8. The Darien side of Five Mile River remains residential with a shoreline that is largely stable. Use of the shoreline is limited to small boats and sailboats which gain access via beach or dock structures. The River is heavily congested with boat traffic, with access and services mostly limited to the Rowayton (Norwalk) shore.

9. The Town of Darien has a major stake in the development of the facing shoreline. Because visual access, mooring access, marine-related supply facilities, and other such businesses are in Rowayton, the course of development there will directly (e.g. lack of marinas or gas docks) or indirectly (e.g. visual appearance) affect Darien.

10. The City of Norwalk is involved in the CAM process. One of the developments advanced as part of this program involves the creation of a Marine-Commercial zoning category which would prohibit the development of non-water dependent uses along the Rowayton shoreline. This approach should be actively supported by the Town of Darien.

4.2 Contentment Island

This area extends from the entrance to the Five Mile River westerly to the tip of Contentment Island. With a shoreline of some 1.1 miles, this coastal region is marked largely by the presence of rock bluff, rocky shorefront, and two sandy beach coves. This location's exposure to strong winds and storm waves precludes the location of private docking facilities except in the two coves that break the rock relief. The area can be further subdivided into three distinct subsections:

- southern coast of Butler's Island
- Tokeneke Club cove
- southern coast of Contentment Island

The southern shore of Butler's Island is marked by rock bluff and rocky shorefront. Running west from Five Mile River for approximately 200 yards, a rock bluff rises some 40 feet above mean sea level. This bluff is modified in places by masonry work, which

APPENDIX F

NORWALK MCP

(5) Coordinate the monitoring and enforcement of Federal, State, and local water quality laws by the formation of a local Coastal Water Quality Committee made up of representatives from the Norwalk Health Department, Marine Police, Department of Public Works, Conservation Commission, Norwalk Pollution Abatement Committee and others from appropriate State and Federal agencies.

(6) Establish a public education program to disseminate information about the implications of clean water and water pollution control as related to marine and human communities.

(7) Protect and enhance freshwater wetlands and water courses especially the Norwalk River, Five Mile River, Betts Pond Brook, Farm Creek, and Roton Brook which flow into Long Island Sound and thus effect/impact natural coastal resources by requiring minimum setbacks, erosion and sedimentation controls, and vegetative buffering.

(8) Establish an acquifer protection program in accordance with recommendations in SWRPA's Guide to Ground Water & Acquifer Protection-Norwalk (July 1980).

Goal II Protect the natural coastal resources as unique biological areas which serve as habitats for plant and animal life.

Objectives

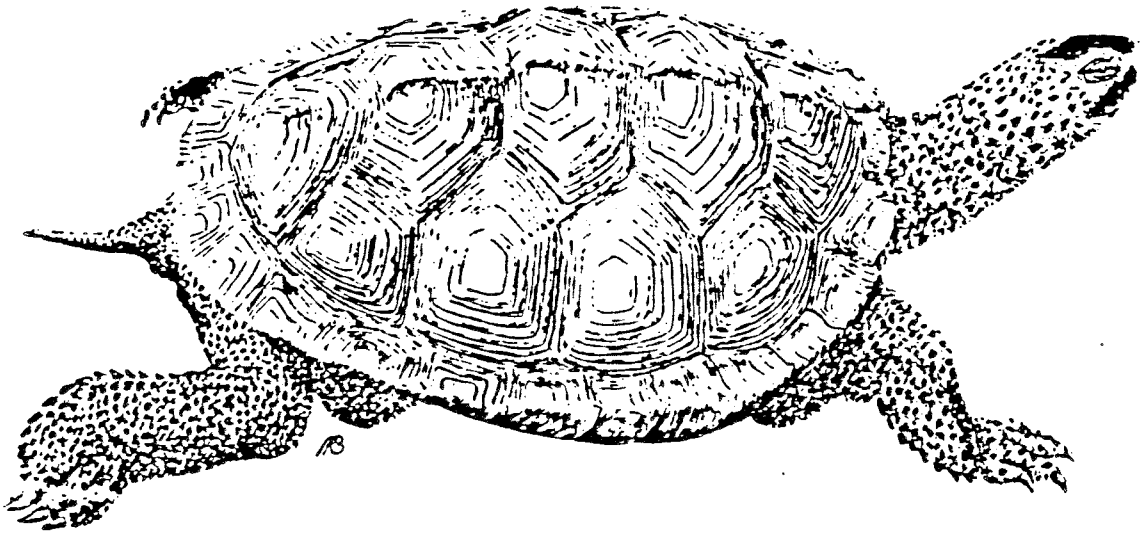
(1) Protect unique natural coastal resources by securing conservation easements or through fee simple acquisition. Easements should be sufficient width to ensure that coastal resources are not impacted by upland development. Resources which should be protected are:

a) tidal wetlands (designated and undesignated)
b) rocky shores
c) cobble beaches
d) mud flats
e) island archipelago

(2) Support the protection of Norwalk's waters and marine habitat as the physical base for the commercial fisheries industries (mollusks, finfish, lobsters) and as a unique environmental and economic base in Long Island Sound through the establishment of municipal ordinances and state statutes.

(3) Establish wetland conservation areas through zoning or transfer of development rights to protect tidal wetlands or critical islands.

(4) Manage the Norwalk Islands to promote their use as critical habitat for native and migratory bird species for indigenous plant and animal species, and as major recreational/open space areas. Prohibit uses which will have adverse impacts on the island's natural coastal resources.



Diamondback Terrapin

PARKS/OPEN SPACE, WATERBASED RECREATION, AND PUBLIC ACCESS

Goal 1 Develop a management plan for Norwalk's coastal area parks.

Objectives

1) Develop a plan linking Calf Pasture Park, Shady Beach, and Taylor Farm, three municipally owned tracts on East Norwalk

2) Endorse the Veterans Park Master Plan as the guide to the park's future development. The plan is particularly commendable as it provides a waterfront promenade/passive recreation area, protect fragile coastal resources, and provides ample water based recreation opportunities (boating and fishing).

3) Improve city street ends as physical and visual access points to the waterfront. Street end facilities should be designed to attract neighborhood or district use (with pedestrian or bicycle access) rather than city wide use (with motor vehicle use). Street end areas could be granted or responsibilities vested with interested neighborhood groups. These groups could create, manage, and maintain neighborhood park areas as has been done by the Marvin Beach Association in East Norwalk.

4) Explore creative techniques which encourage public/private management of municipal parks.

   a) secure franchises to provide/operate boat rental sailing school, and restaurants at Calf Pasture Park, Veterans Park, and the Landfill

   b) establish a public/private cooperative venture to operate the proposed Harbor Center at Veterans Park.

5) Improve existing municipally owned and managed district and neighborhood parks

   a) Irving C. Freese Park - reorient toward the water

   b) Mill Pond - provide walkways, benches, and appropriate planting

   c) Woodward Avenue Park - reorient toward Village Creek wetland

6) Reserve the Landfill's shoreline area as a city waterfront park. Require a vegetative buffer between the park area and the turnpike.

7) Endorse the Mathews Park Master Plan to guide development of that Park.

8) Endorse the Norwalk River Linear Park/Bikeway Plan to guide development along the River's east bank.

Goal II Manage and expand the public's coastal area open space reserve.

Objectives

1) Develop an open space land acquisition plan identifying coastal areas for inclusion in Norwalk's reserve system. The plan should:

a) identify and set priorities for the acquisition of desireable open space.

b) utilize the parkland acquisition account (L-103) which was established with cash paid to the City for parkland taken for state projects (I-95, U.S. Route 7, Norwalk Community College, Stroffolino Bridge) to purchase key waterfront open space as available -

c) establish linear green belts along the Norwalk and Five Mile Rivers

2) Secure and protect key waterfront clubs. These clubs represent unique waterfront access, open space and recreation points and would result in a major loss of waterbased recreation if they were developed as private residential subdivisions.

3) Develop a management plan for Taylor Farm, Norwalk's largest coastal open space reserve.

4) Develop a management plan for municipally owned islands (Shea, Grassy, The Plains, Little Ram).

5) Secure right of first refusal to purchase tidal wetlands and critical island areas as they become available.

Goal III Secure the establishment of private coastal area open space reserves

Objectives

1) Secure conservation easements and dedication of land and tidal areas to the Norwalk Land Trust, Nature Conservancy-Connecticut Chapter, or other private land conservation trusts to protect Norwalk's unique coastal resources. These land and tidal areas should be of sufficient width to ensure that coastal resources are not impacted by adjacent shoreline development and provide limited public access.

2) Establish wetland conservation areas through zoning or transfer of development rights to protect tidal wetlands (designated and undesignated) and critical island areas

3) Use the tax abatement concept of Public Act 490 (An Act Concerning the Taxation and Preservation of Farm, Forest, and Open Space Land) to give tax incentives to private property owners to maintain and protect coastal area lands a) of natural, scenic, and historic value, b) enhance preserves, or c) promote orderly urban or suburban development. These open space areas are crucial in development. These open space areas are crucial in developed communities as they provide the opportunity for leisure and recreation in natural settings, a relief from the man-made environment.

GOAL IV Improve public access to Norwalk's coastline

Objectives

1) Support the appropriation of public and private funds to establish walkways, roadways, and promenades immediately adjacent to the waterfront especially in areas of mixed use development in areas along upper harbor, South Norwalk waterfront, and Five Mile River Harbor.

2) Secure public access easements to increase opportunities to reach Norwalk's coastline.

3) Secure right of first refusal to purchase any privately owned tidal wetlands (designated or undesignated)

4) Seek cooperation with Connecticut Light and Power Company in managing organizing study groups which visit the Manresa Island tidal wetland.

5) Secure dedications of waterfront parcels as a reasonable condition of development at appropriate locations.

6) Develop a municipal land acquisition plan to:

   a) identify coastal areas for potential acquisition (based on physical and visual access)

   b) organize a park acquisition fund so that purchases can be rapidly completed when land parcels become available

7) Establish linear walks, beltways, and greenbelts along the Norwalk and Five Mile Rivers. Endorse the Norwalk River Bike Plan and the Veterans Park Master Plan.

GOAL V Promote and manage waterbased recreation activities while minimizing impacts on the coastal environment

Objectives

1) Expand the municipal marina at Veterans Park making moderately priced boating opportunities available in accordance with the Veterans Park Master Plan.

2) Establish additional locations for public boating facilities (boat rental/launching) at Calf Pasture Beach, Veterans Park, Manresa Island, and at appropriate city street ends.

3) Establish a public dock for transient and commercial slips at Veterans Park in accordance with the Veterans Park Master Plan.

4) Seek cooperation from the Army Corps of Engineers and other federal agencies to ensure that Norwalk's existing federal navigation channels are maintained.

5) Coordinate recreational boating activities by preparing a Harbor Management Plan for Norwalk Harbor and the Five Mile River Harbor. These plans should designate permanent and transient mooring basins, specify tackle requirements, rental and use procedures, establish strict operational regulations (speed, water skiing, fishing, waste disposal), and require licensing of water scooters, hydroplanes, and assign moorings and slips. The plan should be enforced by the Harbor Masters aided by Norwalk's marine police division. Management of the Five Mile River Harbor must be coordinated by the Five Mile River Commission.

6) Measure intensity of boating use throughout the harbor. Restrict growth of recreational boating in already congested areas. Promote fulfilling the recreational boating potential of underutilized areas.

7) Encourage the development of new commercial marinas and boatyards and private wharfs (for the use of the owner) in areas less sensitive to boating impacts.

8) Establish a recreational boating education program to instruct users in the appropriate use of motor and sail boats, good maintenance practices navigation, and laws of the city's Harbor Management Plan (e.g. power squadron courses at Calf Pasture Beach).

9) Require annual inspections of boats for safe and efficient engine and equipment operations (gas and oil leaks, high exhaust levels).

10) Establish activity zones where environmental impacts are low. Establish strict regulations regarding speed, activities, and size of wakes near sensitive or critical coastal areas.

GOAL VI Endorse plans for the Norwalk Maritime Center to be housed in the Norwalk Fabricators building in South Norwalk as a major educational, scientific, and recreational facility.

Objectives

1) Support the appropriation of public and private funds to develop adequate support facilities including esplanades, greenbelts, marinas, and fishing piers adjacent to the Maritime Center and at Veterans Park.

2) Develop contingency plan for the Maritime Center should the original goal of a major institution not be realized

3) Restudy location of Maritime Center Parking Garage on the waterfront with preference being given to an upland site

4) Enlarge the concept of a Maritime Center to the entire waterfront by encouraging visitors to the Center to see and experience the diversity of Norwalk's working waterfront including the Oyster Industry, the Marinas, the Harbor Center port, tidal marshes, and the Islands.

Governmental Policies

The third broad category of policies pertain to intergovernmental coordination, permit simplification, planning programs, national interest and related topics:

A. Intergovernmental Coordination of Planning and Regulatory Activities
B. Coordination and Consistency of State Programs, Expenditures & Acquisitions
C. Flooding and Erosion Planning
D. Dredging and Dredged Material Disposal Planning
E. Coastal Related Research
F. National Interest Facilities and Resources

Process

The process for determining compatibility of a proposed project in the coastal area involves the following four steps:

1) Determine coastal resources that may be affected
2) Determine coastal use policies which may be applicable
3) Assess adverse impacts of the project on the affected coastal resources
4) Apply for permits under local zoning regulations and state regulatory programs

Thus, while the general procedures and standards for coastal management have been established by the State, local zoning becomes important as the basis for the permit and site plan review.

The following proposals and recommendations refer to specific land use, public improvement and administrative and organizational recommendations to implement Norwalk's coastal program and bring the fourth phase of the process in harmony with the first three phases.

1. Design District (Related Goals: A1, A2, A3, A4, A5, C2, C4, C6, D1, D2)

A mixed use flexible zoning district on the waterfront and shoreland urban areas under which a wide variety of land uses would be permitted but all of which would be subject to specific design controls including waterfront setbacks, required public access to the waterfront, waterfront visual easements, sign controls, architectural review, historic preservation and other standards for landscaping and site amenities. Transfer of development rights and transfer of off-street parking requirements to shared parking lots would also be a feature of the new zone. Transfer would be permitted only from water dependent land uses to non-water dependent land uses and only to upland locations.

The zone would be divided into two sub-categories:

(1) Neighborhood, and
(2) Central Business District

The difference in these design districts would be the height and bulk limitations (see sample development guidelines).

The following areas are proposed as design districts:

(1) Rowayton Avenue
(2) Landfill-Reed Putnam Railyards
(3) South Smith Street
(4) Upper Harbor

2. Marine Commercial (Related Goals: A2, A3, A4, A5, C4, C5, C6, D1, D2)

This zoning district would establish a firm policy towards protecting boatyards, marinas, port facilities and commercial fishing. Permitted uses would be limited to marinas, boatyards, commercial fishing, sail lofts, boat building and repair and related commercial uses, port facilities, and public utilities which are water dependent.
All other uses such as office and residential uses would only be permitted on up to 40% of the land area on each parcel. Historic Preservation standards would be established.

The following areas are proposed as marine commercial zones:

(1) Water Street

(2) Cove Marina

3. Low Density Residential/Waterfront Club by Special Permit
(Related Goals: C3, C4, C5, D1, D2)

The primary purpose of this concept is to preserve the character of the single family neighborhood. Waterfront clubs would be recognized as providing significant waterfront recreation within the constraints of their surrounding low-density residential neighborhood, by placing them in a special permit use category.

Each time the club expanded or modified its facility special permit would be required involving a public hearing. The burden of proof would be on the club to show why it should be allowed to make the changes. Impact on the neighborhood and coastal resources would be evaluated in determining whether a special permit should be granted.

Veterans Park

The Master Plan for Veterans Park was approved last year and provides the basis for future improvements. Phase I of the plan entails a waterfront beautification with walks, benches, and a bandshell. This improvement should be under construction late this year.

The proposed "Harbor Center" would provide a public dock south of the launching ramps with slips for transient boats, commercial fishing boats, and display vessels as well as a building with support activities. The project could proceed as a public/private joint venture with the capital costs and operations run by a private profit/making entrepreneur under terms outlined in a lease. (For other elements see Veterans' Park Master Plan).

Calf Pasture, Shady Beach, Taylor Farm

The three largest parks on the waterfront need to be tied together in a coherent system of roads, parking lots and walks. The parks could easily have a boating component by leasing out on a concession basis a sunfish sailboat rental on the southern edge of the park. Preliminary plans have been prepared for improving the parks by the Redevelopment Agency's landscape architect and these plans should serve as the basis for further discussion and adoption of a final scheme.

(b) Park and Open Space Acquisition

- Linear Parks - East and West Bank of the Norwalk River in conjunction with upper harbor development
- Landfill Park - in conjunction with development on the Landfill
- Mathews Park - extension east of Crescent Street to River

- Canfield Avenue Peninsula (Spook Island) - acquisition for fishing wildlife sanctuary, and to protect adjacent wetland in Canfield Creek.
- Wilson Avenue Peninsula - acquisition for fishing, wildlife sanctuary, and to protect adjacent wetland
- Chimmons and Sheffield Islands-acquisition using local, state, federal and private non-profit resources such as Nature Conservancy and Audubon Society.
- Sammis Street Peninsula - acquisition or dedication of undeveloped peninsula south of Sammis Street.

(5) Public Access to the Waterfront
The following waterfront access points are proposed:
(a) Norwalk River Linear Parks on East and West Bank - 8 acres
(b) Five Mile River - Harbor Walk - 600 Linear feet
(c) Manresa -1,000 linear feet
(d) Water Street - 1,200 linear feet

Street - ends
The approximately 35 city streets which end at the water's edge are public access points which should be enhanced by neighborhood groups and the city working together cooperatively. Street-ends are small in scale and should be designed to minimize neighborhood impact, but could provide a resource for additional limited public waterfront access.

Semi-public street ends are open to immediate neighborhood residents only, but as such still provide a recreational resource.

(6) Sewers and Drainage **(Related Goals:A2,A5,B1,C2,C3,C4)**
The City's clean water program of separating combined sewers and upgrading the sewage treatment plan should be continued in keeping with the "Facilities Plan Update for Sewerage System - 1979" until all elements of the plan are complete. With the lack of federal and state participation in these projects the program will have to continue at a scaled down level, but should receive a high priority since it directly leads to better water quality and provides the necessary infrastructure for new development in the center of Norwalk. When drainage easements are obtained from city streets to the waterfront, public access rights-of-way should also be obtained.

Tide gates and coastal estuarine systems such as the series of tidal wetlands along Roton Brook between Wilson Cove, Wilson Avenue and Old Trolley Way should be maintained to allow a daily tidal flooding action to occur, thereby allowing the marsh grasses to survive. Tidal marsh preservation and replanting should be a major concern of every public works drainage project within the Coastal Area.

(7) Dredging and Harbor Maintenance **(Related Goals:A2,A3,A4,A5,C5)**
The Army Corps of Engineers should be encouraged to continue dredging Norwalk harbor. Both the commercial port and the extensive public recreation in the harbor are strong arguments for its continued dredging. The land use policies of creating marine commercial zones on Water Street and at Manresa will indicate the city's commitment to water dependent land uses. Strengthening the public boating facilities at Veterans' Park, and the proposed Maritime Center dock will provide further cause for federal dredging of the channel.

The Five Mile River Harbor, Wilson Cove, Charles Creek, Cove Marina and Sprite Island will continue to be privately funded dredging operations, but if kept within existing channels are supportable as adjuncts to Norwalk's recreational boating.

C. Administrative & Organizational Proposals

(1) Harbor Management Plan: **Related Goals: (A3,A4,A5,C1,C4,C5)**
Harbor Management Plans are urgently needed for the Five Mile River Harbor and the Norwalk River Harbor.

The first step in this process is to develop a working team of key persons responsible for harbor management:

Norwalk Harbor
(a) Harbormaster
(b) U.S.Corps of Engineers
(c) Connecticut D.E.P.
(d) Connecticut D.O.T.
(e) Norwalk Marine Police
(f) Norwalk Recreation & Parks Comm.
(g) Norwalk Planning & Zoning Comm.

Five Mile River Harbor
(a) Harbormaster
(b) U.S. Corps of Engineers
(c) Connecticut D.E.P.
(d) Connecticut D.O.T.
(e) Five Mile River Commission
(f) Norwalk Marine Police
(g) Norwalk Rec. & Parks Comm.
(h) Norwalk Planning & Zoning Comm.

The harbor management plan could be modeled after those adopted in Newport, Rhode Island and Stonington, Maine. It would consist of a locally adopted ordinance outlining areas of responsibility for permanent and transient mooring basins, placement of floats, bulkheads, piles, channel location and width, tackle requirements and rental use procedures, operational requirements, procedure for allocating moorings and coordinating moorings and slips with land uses.

The harbor management plan would also consist of an accurate harbor plan showing the location of all moorings and their assignment, location width and depth of channel, and an accurate land use map showing water based support facilities including storage, and parking for all slips and moorings. The map should be updated annually.

Harbor management plans should also be prepared for minor harbors including Wilson Cove, Village Creek and Sprite Island.

(2) Development & Marketing Strategy: **(Related Goal: A1)**
Individual elements of the Norwalk Coastal Program have the potential for significant private investment.

The first step towards initiating this development is the adoption of the revisions to the City's master plan. This will indicate to private investors the future development policy of the city - where the city wishes to encourage development, the kind of development and the public improvements which will be made to support the private development.

ABOUT THE TEAM

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state, and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists, landscape architects, recreational specialists, engineers, and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC & D) Area - a 83 town area serving western Connecticut.

As a public service activity, the Team is available to serve towns and/or developers within the King's Mark RC & D Area - free of charge.

PURPOSE OF THE ENVIRONMENTAL REVIEW TEAM

The Environmental Review Team is available to assist towns and/or developers in the review of sites proposed for major land use activities. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments, and recreational/open space projects.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision-making. This is done through identifying the natural resource base of the site, and highlighting opportunities and limitations for the proposed land use.

REQUESTING AN ENVIRONMENTAL REVIEW

Environmental Reviews may be requested by the chief elected official of a municipality, or the chairman of an administrative agency such as planning and zoning, conservation, or inland wetlands. Environmental Review Request Forms are available at your local Soil and Water Conservation District, and the King's Mark ERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner/developer allowing the Team to enter the property for purposes of review, and a statement identifying the specific areas of concern the Team should investigate. When this request is approved by the local Soil and Water Conservation District and King's Mark RC & D Executive Committee, the Team will undertake the review. At present, the ERT can undertake two (2) reviews per month.

For additional information regarding the Environmental Review Team, please contact your local Soil and Water Conservation District or Keane Callahan, ERT Coordinator, King's Mark Environmental Review Team, King's Mark Resource Conservation and Development Area, 322 North Main Street, Wallingford, Connecticut 06492. King's Mark ERT phone number is 265-6695.