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Chapter 6

Pollution Remediation Projects in New Bedford

Existing Conditions in the New Bedford Area

The most populous community in the Buzzards Bay drainage basin is the City of New Bedford. With a population of nearly 100,000, it represents approximately 40% of the total population in the Bay's drainage basin. New Bedford is a highly urbanized, industrialized area that contributes significantly to pollution in Buzzards Bay through sewage, industrial effluent, combined sewer overflows, and storm-sewer discharges. The Acushnet River, which flows through Acushnet and New Bedford, drains approximately 15 square miles and discharges into New Bedford Harbor. The Harbor serves as the home port to approximately 350 commercial vessels that fish on Georges Bank and in other areas of the Northwest Atlantic, and New Bedford Harbor is the leading commercial fishing port in America in terms of annual value of catch landed.

New Bedford Harbor has been designated as a Superfund site: it is severely polluted with high levels of polychlorinated biphenyls (PCBs) and other toxic wastes from industrial activities in the area. Significant levels of these pollutants have accumulated in sediments, water, fish, lobsters, and shellfish in the Harbor and adjacent areas. Lobsters in the Harbor typically have PCB concentrations of 1.0 to 4.9 parts per million (ppm) in their bodies, with some lobsters containing up to 23.8 ppm (Hillman et al., 1990; Schwartz, 1987). The U.S. Food and Drug Administration action level for PCBs in seafood is 2.0 ppm. Because of the presence of PCBs in seafood species, the entire Inner Harbor and portions of the Outer Harbor and surrounding waters have been closed to shellfishing, fishing, and lobstering since 1979[1] (Figures 6.1 and 6.2). Through sediment transport processes, the Harbor now acts as a source of these pollutants to other areas of Buzzards Bay near the mouth of the Harbor.

In addition, the New Bedford municipal sewage treatment plant discharges approximately 30 MGD of inadequately treated sewage, industrial waste, and stormwater into the Outer Harbor. The large industrial waste component makes this discharge the largest source of toxic contamination reaching the Bay. Organic material, metals, and other toxic chemicals in the sediments near the outfall site and contribute to fishing restrictions in the Outer Harbor and Clark's Cove.

1 The closure of shellfish areas around New Bedford is principally due to coliform contamination. Shellfish that are relayed out of the closure areas are tested for both PCBs and other toxics before they are transplanted.

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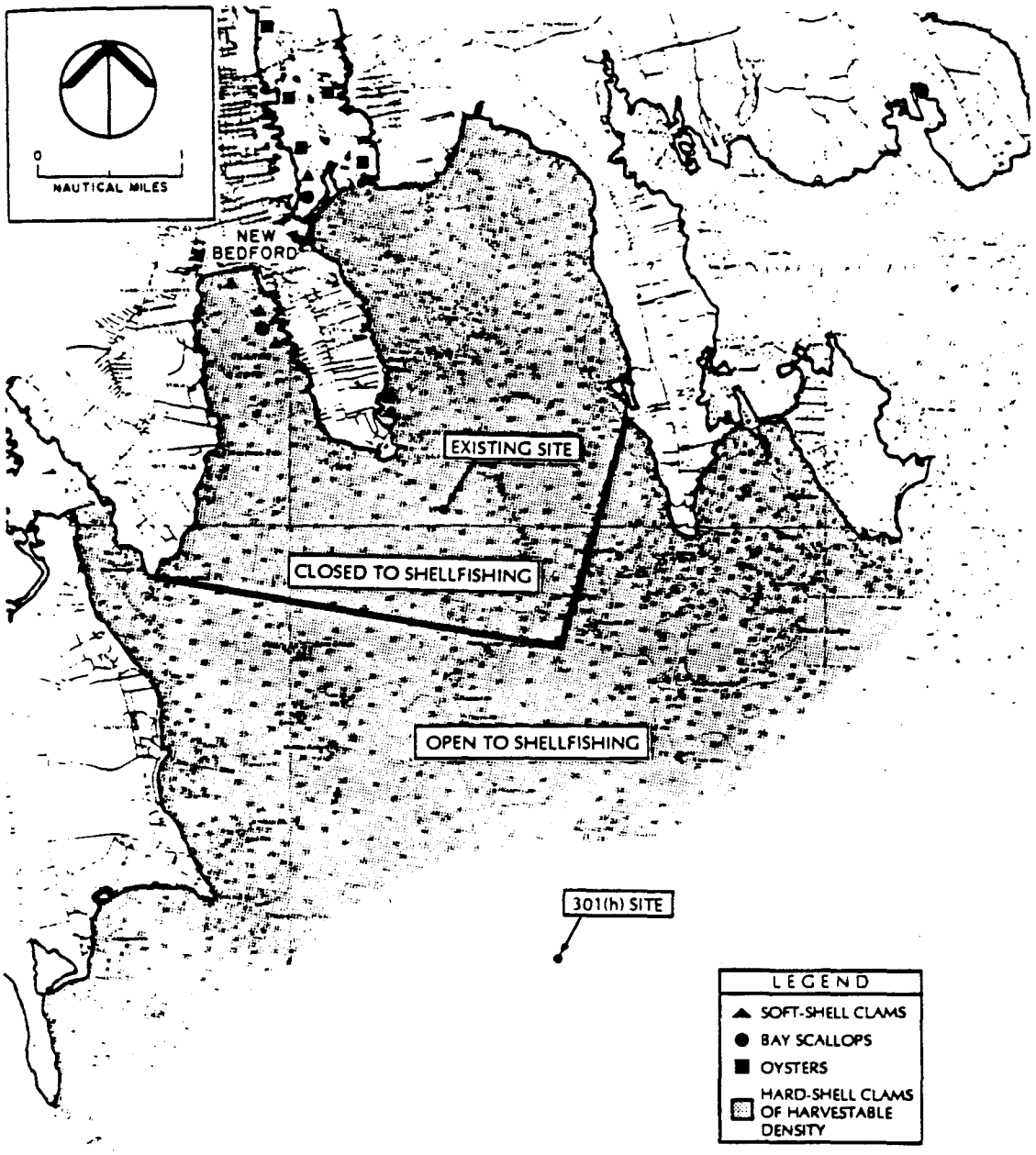

Figure 6.1. Shellfish closures around New Bedford due to pathogen contamination

Source: City of New Bedford Wastewater Facilities Plan, CDM (1989).

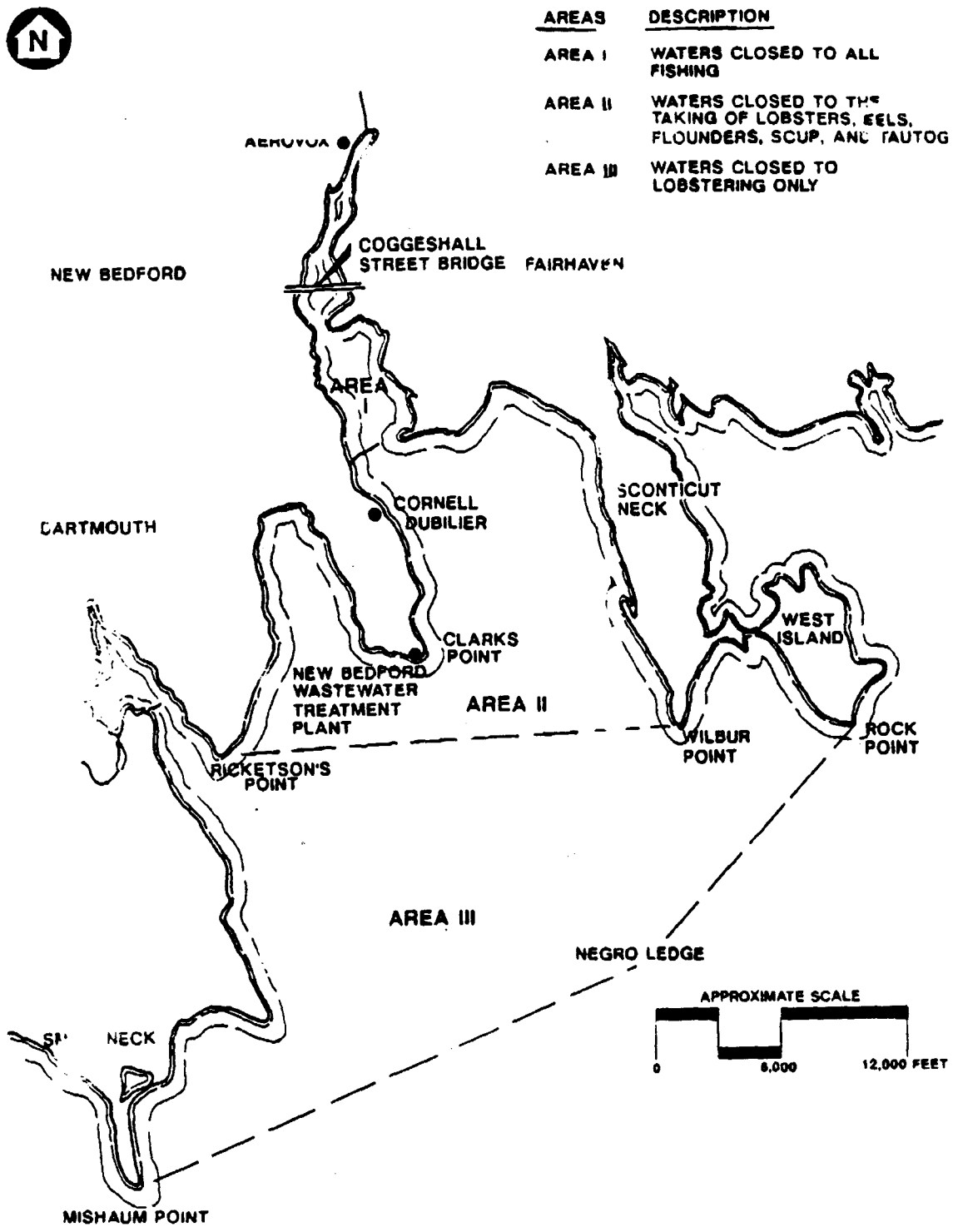

Figure 6.2. Finfish and lobster closures around New Bedford due to PCB contamination

source: City of New Bedford Wastewater Facilities Plan, CDM (1989)

New Bedford is also the only major municipality in the Buzzards Bay area to discharge significant amounts of untreated combined sewage, industrial waste, and stormwater from combined sewer overflows (CSOs). CSOs are overflow pipes connected to combined stormwater and sewer systems. During periods of heavy rain, when the treatment plant or sewer lines have reached their capacity, the CSOs discharge a portion of the combined sewage and stormwater flow directly into surface water. In addition, many CSOs discharge continuously, even during dry weather, because of poor sewer system design or inadequate CSO maintenance. The inadequate capacity of the New Bedford treatment plant also contributes to the high volume of CSO discharges during wet weather. In all, New Bedford has 38 CSOs (Figure 6.3), 20 of which discharge a combined volume of 4 MGD continuously during dry weather. The remaining 18 CSOs are wet-weather discharges with variable volumes, depending on the amount of rainfall. The CSOs discharge into all coastal sections of New Bedford, including the Inner and Outer Harbor and Clark's Cove, and are the primary cause of the permanent shellfish closure in Clark's Cove. Some areas within the Inner Harbor have been closed to shellfishing since the 1920s due to bacterial contamination.

Together, the New Bedford Superfund site, the treatment plant, and the CSOs contribute the greatest amount of pollution into central Buzzards Bay, and are among the most costly and difficult problems to remediate. In addition to affecting the ecosystem and public health, they also have a large impact on the economy of the region. The hard-shell clam (quahog) is the most important mollusc in the Harbor because of its high economic value, with an estimated worth of 520,000 bushels (nearly $5 million) in the closed area alone. Closure of the lobster fishery has resulted in an estimated loss of $250,000 per year (CDM, 1989). The finfish industry and recreational fishing have been negatively affected as well. The pollution in New Bedford has also inhibited Harbor development, which often requires sediment removal, because of the high cost of disposing of sediments contaminated with PCBs and other toxics, and because of potential risks to human health due to exposure to toxic sediments.

Together with Boston Harbor, Buzzards Bay has the highest incidence in Massachusetts of two lobster diseases that are associated with pollution: black gill disease and shell disease (Estrella, 1987). Black gill disease occurs when pollutants or suspended particles are accumulated on gill filaments, causing a blackening of the gills, a reduction in the lobster's ability to exchange oxygen with the water, and lower resistance to secondary infection. Shell disease includes shell erosion, pitting and tunneling, and ulceration. In New Bedford Harbor, half of lobsters sampled showed evidence of both black gill disease and shell disease. The impact of these diseases on the Buzzards Bay lobster population is difficult to assess.

Ongoing Federal and State Actions

The problems described above have been recognized by federal and state agencies, particularly the U.S. Environmental Protection Agency (EPA) and the Department of Environmental Protection (DEP), for some time. In particular, the existing treatment plant and CSO discharges are in violation of the Federal Water Pollution Control Act of 1972 (also known as the Clean Water Act), and the City of New Bedford is currently under court order to correct these violations. The court order specifies that the city must plan, design and construct new treatment facilities according to a certain

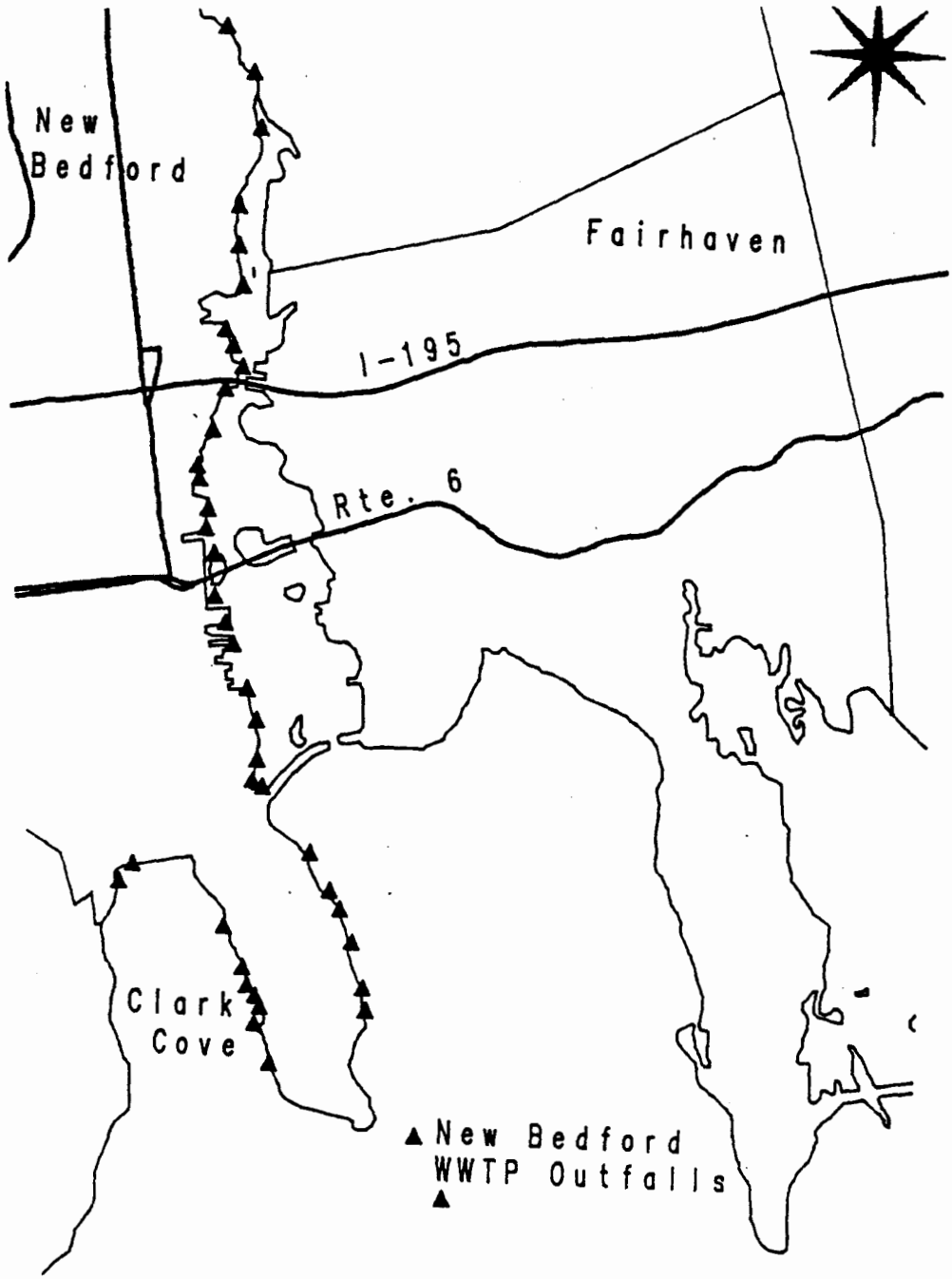

Figure 6.3. Location of CSOs and New Bedford wastewater discharge.

(CSO locations provided by Massachusetts Department of Environmental Protection, Divison of Water Pollution Control)

schedule. In addition, New Bedford, along with other potentially responsible parties, is the subject of an EPA Superfund enforcement action related to the PCB contamination of New Bedford Harbor. The enforcement action will require responsible parties to offset EPA's and the Commonwealth's expense in cleaning up the Harbor.

These problems are already being addressed through ongoing enforcement actions. The Buzzards Bay Project supports the goals of the enforcement actions, which are consistent with the goals of the Project. The remediation of the Superfund site, the upgrade of the treatment plant, and the mitigation of CSO problems are high priorities for water quality and habitat restoration around New Bedford, as well as for the protection of the Buzzards Bay ecosystem. What follows is a description of the issues surrounding each project and a discussion of how each project relates to other actions discussed in this Comprehensive Conservation and Management Program (CCMP). Goals, objectives, and recommended actions for these three issues are combined within this section.

The Superfund Project

PCBs, a family of synthetic chemicals used generally in electronic equipment, were employed in manufacturing processes in New Bedford from the 1930s until 1977, when EPA banned production of PCBs. The presence of PCBs in New Bedford Harbor and Buzzards Bay was first documented in 1974. Over the next several years, additional studies confirmed the extent of the contamination — sediment concentrations as high as 100,000 ppm were found. Concentrations of PCBs in excess of 50 ppm are considered hazardous wastes; hence, in July 1982, the upper Acushnet River was placed on EPA's Interim National Priorities List as a high priority for remediation under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), better known as Superfund, and the amendments of 1986 known as the Superfund Amendment and Reauthorization Act (SARA).

PCB contamination is not limited to the sediments of the Acushnet River and Inner Harbor; high levels of PCBs also are found in the Outer Harbor and Buzzards Bay (Figure 6.4). These sediments also contain elevated levels of other contaminants, e.g., petroleum hydrocarbons, PAHs, and trace metals, especially copper. Sediments along the New Bedford shoreline south of the Hurricane Barrier are also contaminated, with concentrations occasionally exceeding 50 ppm (Fig. 6.4). The water column in New Bedford Harbor contains PCBs in the parts-per-billion range, well in excess of EPA's guideline of 30 parts per trillion for protection of saltwater aquatic life from chronic toxic effects.

A significant issue surrounding the PCB contamination in New Bedford Harbor is its potential effects on human health. A probable route of PCBs into humans is by consumption of contaminated fish, lobsters, and shellfish, although contacts with water, sediments, and air are also possible pathways in selected areas and with particular age groups. Widespread contamination of the Acushnet River estuary and Inner Harbor has resulted in the accumulation of PCBs in many marine species. Although thousands of acres have been closed to the harvesting of shellfish, finfish, and lobsters, residents are known to harvest and eat all three groups, thus exposing themselves to potential health effects resulting from ingestion of PCBs. In addition,

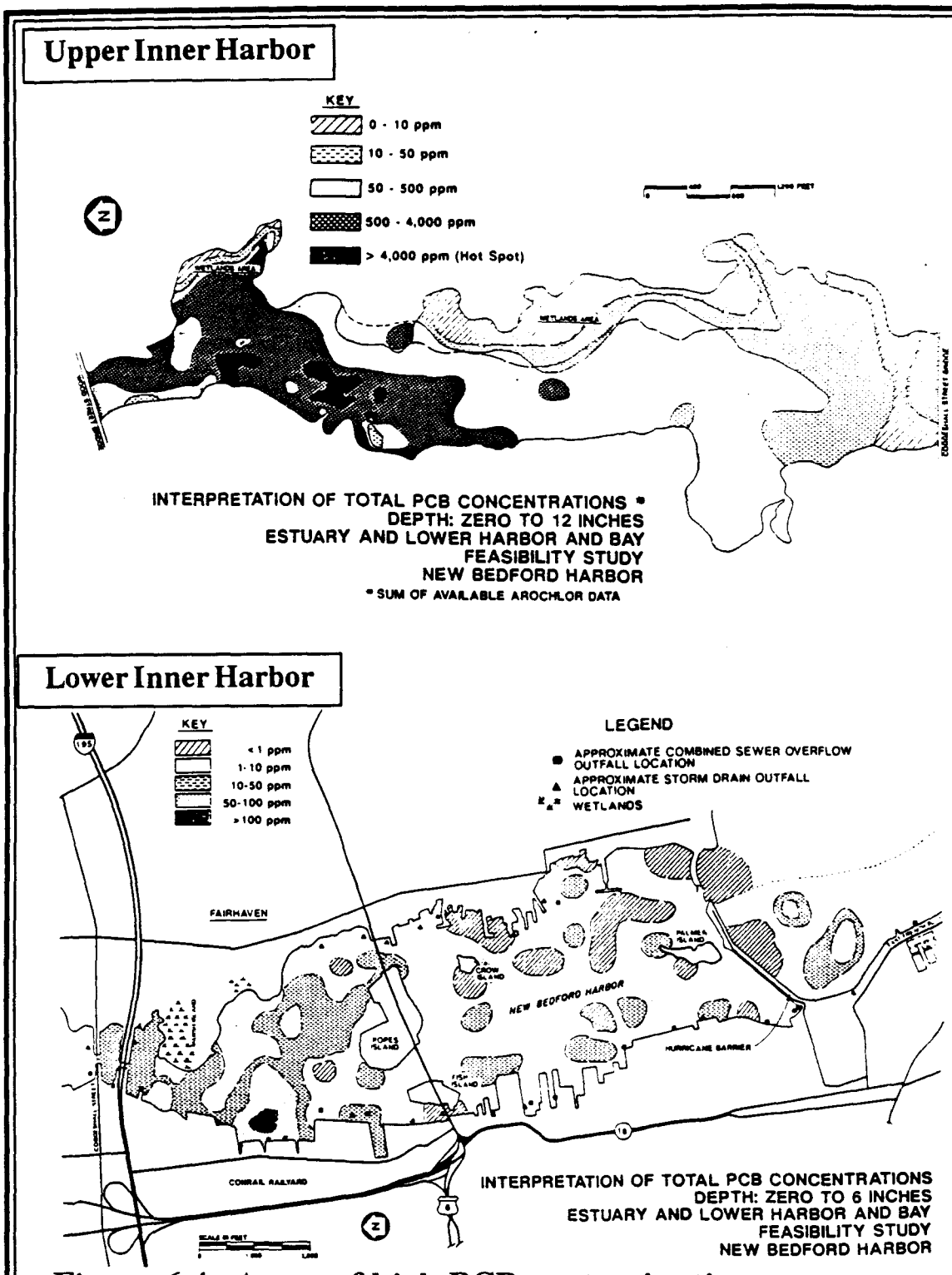

Figure 6.4. Areas of high PCB contamination

source: Map courtesy of U.S. Environmental Protection Agency, produced under contract with Ebasco Services Inc.

many individuals regularly consumed contaminated fish before the extent of contamination by PCBs was known. The long-term health effects on these individuals are not well understood. The Massachusetts Department of Public Health (1987) tested PCBs levels in blood serum of New Bedford residents and found that concentrations were within an acceptable range compared to the national population. Unfortunately, the experimental design did not include many seafood consumers and results were less than conclusive.

Another potential source of PCBs to consumers is consumption of shellfish that have been relayed out of PCB (and coliform) contaminated areas and then sold at market. Currently, there is an active shellfish relay program that takes quahogs from Clarks Cove and the Inner Harbor and relays them to "clean" areas on Cape Cod and Martha's Vineyard for at least the period of a spawning. These shellfish are tested for coliform bacteria and toxic chemicals including PCBs. Some scientists have contended that even after several months in clean areas, quahogs may still have elevated levels of contaminants like PAHs, which may represent a threat to consumers.

PCB contamination is also affecting the health of marine organisms themselves. Winter flounder from PCB-impacted areas near Clark's Cove showed higher larval mortality, smaller size at birth, and slower juvenile growth rates compared to winter flounder from cleaner areas (Black, 1987). Some have suggested that tumors in winter flounder from the New Bedford area are correlated with PCB levels (Stegeman, 1988). Even organisms at higher trophic levels are susceptible. Dead terns from Bird Island appear to have high PCB levels in nervous tissue (Blodgett, Massachusetts Division of Fish, Wildlife and Environmental Law Enforcement, personal communication).

Beyond carcinogenic risks assumed to be associated with PCBs, PCBs negatively impact nervous systems, reproduction, survival, and growth in vertebrates. These chronic effects are not easily assigned risk in our current governmental evaluation process (see PTI, 1987).

The cleanup operation has been divided into two phases. The first phase is the remediation of the hot spots where approximately 45% of the total amount of PCBs are present at sediment concentrations from 4000 ppm up to 100,000 ppm. It is currently proposed that these sediments be removed , treated, and incinerated on site. The second phase is the cleanup of the remainder of the Superfund site to some, as yet unagreed upon, level. Currently EPA proposes to dredge sediments above 50 ppm and to contain and cap these sediments within a portion of the harbor. Other affected areas may also be restored.

Unresolved issues still to be addressed include control of resuspension during any dredging or other sediment disturbance activities, determination of appropriate cleanup levels, and selection of optimal solutions for different areas being affected. A Citizens Advisory Committee and working committees composed of representatives from state and federal agencies meet regularly to review proposed solutions.

Determining responsibility for damages has resulted in litigation against potentially responsible parties. Recently, a settlement has been reached with three defendants. Some of the money from the settlements is earmarked for restoration. The Commonwealth of Massachusetts, as represented by the Secretary of Environmental

Affairs, the National Oceanic and Atmospheric Administration (NOAA), and the Department of Interior (DOI) has appointed trustees to oversee restoration activities.

The cost of cleanup ranges from $30 million for removal and incineration of PCBs in the hotspot and dredging and capping of sediments contaminated with more than 50 ppm to more than $300 million for a similar treatment strategy down to 1 ppm.

Upgrading the New Bedford Wastewater Treatment Plant

The Clean Water Act requires that all publicly owned sewage treatment facilities provide at least secondary treatment (that is, treatment to remove 85% of the suspended solids and organic matter). The New Bedford municipal treatment plant is the only facility discharging to Buzzards Bay that does not currently meet the secondary standard. The present level of primary treatment at the New Bedford facility consists of settling the solids out of the wastewater and adding chlorine to reduce the number of harmful bacteria and other pathogens in the effluent. Primary treatment removes only approximately 30-40% of suspended solids and organic matter. Furthermore, because of poor design and maintenance, this treatment plant sometimes fails to reach this level of treatment for the 30 million gallons of effluent discharged daily.[2] This level of treatment is a problem, not only because of the large amounts of nitrogen and pathogens discharged to Buzzards Bay, but because the wastewater handled by this system includes approximately 6 MGD of industrial wastewater bearing toxic contaminants.

In 1987, EPA, DEP and the Conservation Law Foundation (a nonprofit environmental advocacy group) sued the City of New Bedford for failure to meet the secondary treatment requirement of the federal and state Clean Water Acts. Under the suit, a consent decree was rendered requiring the city to plan, design, and build a new secondary treatment plant and to strengthen its program for minimizing industrial discharges into the sewer system. New Bedford has nearly completed the planning phase of the project, and has selected sites and technologies for the new secondary plant, the effluent outfall, and the sludge processing and disposal facilities.

Several issues are currently being debated in New Bedford. For example, residents of the neighborhoods surrounding the proposed plant site have criticized the city's decision, citing concerns over construction noise, odors, aesthetic impacts, and potential decreases in property value. The siting process is still the subject of ongoing state and federal reviews. The Buzzards Bay Project supports the selection of a workable and acceptable treatment plant site as expeditiously as possible, so that the city's can begin to construct a secondary treatment facility as soon as possible.

The site for the outfall is another issue being debated as part of the facilities planning process. There are convincing arguments both for moving the outfall further out into

[2] Mean dry weather flow is 24 MGD; 30 MGD is based on annual discharge including stormwater.

Buzzards Bay (the 301h site) and for keeping it at its current location. The cost of moving the outfall to the 301h site may add approximately $74 million to the cost of the new sewage treatment facility,[3] whereas keeping it at its current site may run from $10 to $50 million depending upon technologies used. A driving force in the decision is whether water quality standards for both dissolved oxygen and selected metals can be met at the current site. The Executive Office of Environmental Affairs Technical Advisory Group (TAG) and scientists from the Buzzards Bay region reviewed the relevant data (including studies supported by the Buzzards Bay Project and conducted by A. Giblin of the Marine Biological Laboratory [unpublished data] and R. Geyer of the Woods Hole Oceanographic Institution [Geyer, 1989]), particularly the dissolved oxygen predictions based on nutrient loading. The TAG recommended that additional dissolved oxygen data be collected to make an informed decision. New Bedford will soon begin a study to gather the water quality data necessary to select the outfall site.

Perhaps the largest issue surrounding the new treatment facilities is funding. The current estimated construction costs for the new plant, sludge facilities, and outfall range from $187 million to as high as $300 million, depending on design criteria and outfall location. Should the city be unable to secure state or federal funds for this project, financing the facility could become a huge financial burden for New Bedford and its residents. The Buzzards Bay Project supports the Mayor of New Bedford's current efforts to secure outside funding. Possible funding mechanisms under consideration by New Bedford include no-interest or low-interest loans through the State Revolving Fund, increased user fees, and taxes. Moreover, the Project encourages the city in its efforts to implement water conservation measures and to reduce toxic inputs to the wastewater system through pretreatment and source reduction. Aggressive programs in these areas would both reduce pollution loadings to Buzzards Bay and help cut costs.

The Action Plan Managing Sewage Treatment Facilities, contains recommendations applicable to the New Bedford Facility.

Controlling New Bedford Combined Sewer Overflows

As part of the consent decree discussed above, the City of New Bedford is required to construct and implement measures to control CSO discharges, which are one of the largest sources of pathogens to Buzzards Bay and the primary cause of shellfish and swimming beach closures around New Bedford. Although detailed plans have yet to be worked out, the city has focused on offering the most immediate and highest degree of protection to locations with sensitive uses such as swimming and shellfish harvesting. Priorities for upgrading CSOs are to eliminate all dry-weather overflows and to phase efforts to obtain maximum tangible benefits first. Once the dry-weather overflows, which still discharge raw untreated sewage into the Harbor and vicinity, are remediated,

3 The total cost of the New Bedford Sewage Treatment facility is projected to be $185,000,000 to $300,000,000. The cost to eliminate or repair the CSOs tied into the system will be an additional $50,000,000 to $75,000,000.

then Clark's Cove and other highly ranked areas could be restored by eliminating all CSO discharges.

In particular, the city has identified Clark's Cove as a high priority, because controlling the CSOs here should allow the reopening of very productive shellfish beds and afford protection for beaches. Conversely, the Inner Harbor has been identified as a lower priority because, even if CSOs were controlled, the existing contaminants in the sediments would continue to impact future uses in this location. The Outer Harbor has been judged to be a middle priority because the potential benefits of CSO controls would be offset by impacts from stormwater discharges from Fairhaven, which are estimated to have a significant impact on resource areas in the Outer Harbor. Regardless of timing, however, under the consent decree, all CSO discharges must eventually be controlled to the point at which they do not have a negative effect on water quality and marine resources.

The major issues surrounding CSO control concern schedule and cost. In particular, the relative priority of constructing CSO controls versus constructing the new treatment plant, sludge facilities, or outfall has yet to be negotiated between the city and the parties to the lawsuit. The timing of these projects is also inextricably connected to the cost to the city for these construction projects. Again, the Buzzards Bay Project supports New Bedford's efforts to gain federal or state funding so that these projects may be completed as soon as possible.

Large projects like the New Bedford Superfund Project and the CSO and sewage treatment facilities upgrades require close cooperation and coordination among many agencies and groups. Even though the same agencies at the state and federal level are responsible for oversight of both the cleanup of the Superfund site and the upgrade of the treatment facility, conflicts have occurred, and coordination between the agencies' divisions and branches could be improved. Because of the integrated approach of this CCMP, the Buzzards Bay Project will support ongoing efforts and facilitate communication between and among agencies.

Goal

Support the ongoing projects designed to remediate pollution in New Bedford Harbor and to restore habitats and use to the greatest extent possible.

Recommended Actions

Superfund Cleanup and Restoration

1. EPA and DEP should continue to move forward on adoption and implementation of a remediation plan.

Because EPA and DEP are lead agencies, they assume overall responsibility for the cleanup. In addition to human health risks, ecosystem risk should be taken into account in determining the level of PCB cleanup in sediments.

2. Trustees (EOEA, DOI, and NOAA) should oversee development and implementation of a restoration plan that benefits those who have been most affected by lost use of the resource.

The Trustees are responsible for developing and implementing a restoration plan that provides the greatest benefit to the ecosystem and those who have suffered lost use as a result of contamination.

Treatment Facility and CSO Recommendations

1. The City of New Bedford should continue to meet deadlines for the planning efforts (as outlined in its draft Facilities Plan) to upgrade its treatment facility to secondary treatment.

The City of New Bedford is preparing a Final Facilities Plan which will incorporate comments from state and federal agencies and the general public. The Facilities Plan includes all the technical and design details, requirements and schedules related to constructing and operating the plant. Siting the treatment facility and outfall and securing finances to proceed with construction are major issues to be resolved.

2. The City of New Bedford, with DEP and EPA, should carefully coordinate CSO and sewage treatment facility upgrades so that benefits from CSO remediation can be realized as soon as possible.

3. The City of New Bedford should implement approved plans for CSO upgrades.

The city has prepared a draft Environmental Impact Report recommending that dry-weather discharges be eliminated first. Clark's Cove and other areas that have beach and shellfish closures due to CSOs are also high on the priority list.

Target dates: Ongoing, with project-specific times according to the various plans.