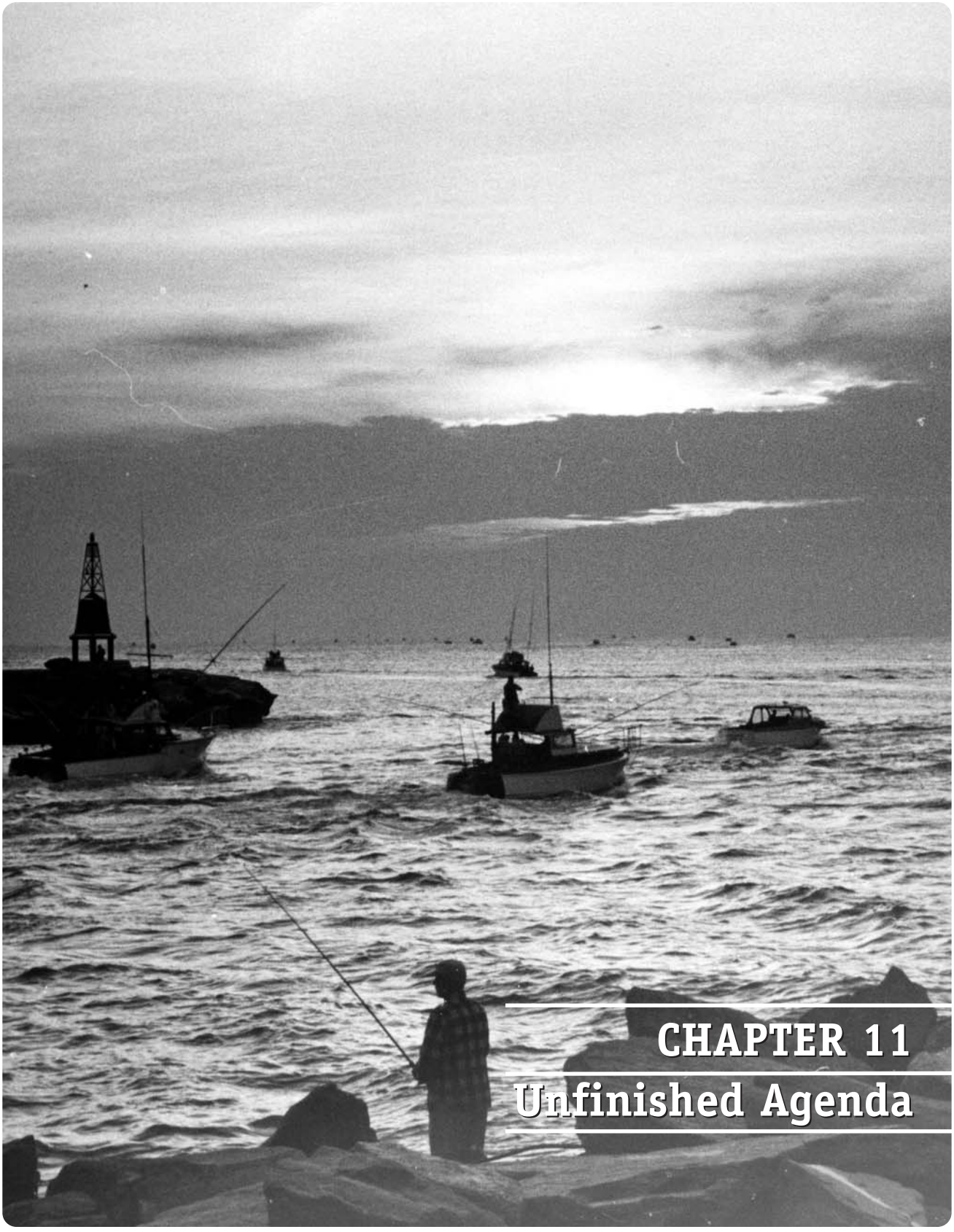

CHAPTER 11
Unfinished Agenda

Fishing the estuary, circa 1940s. PHOTO COURTESY OF TOMS RIVER SEAPORT SOCIETY.

We're all downstream.

––Margaret and Jim Drescher,
Windhorse Farm, Nova Scotia

11.1 INTRODUCTION

The BBNEP Management Conference members recognized that scientific and policy issues that would emerge, both during the characterization phase and the development of CCMP action plans, would have to be addressed after the CCMP was completed. It was also recognized that new issues would be identified during the CCMP public review process. There are a number of issues that are potentially significant in terms of maintaining the water quality and living resources of Barnegat Bay and its watershed, but that are insufficiently documented to justify specific actions to address them. The purpose of this Unfinished Agenda chapter is to lay out these remaining issues, which will be addressed by the BBNEP and the Program Monitoring Plan after the publication of the CCMP.

11.2 DATA GAPS

Significant gaps in the scientific understanding of the Barnegat Bay estuary and its watershed and its response to environmental stressors have been identified by the Management Conference. Information is lacking on certain basic estuarine processes as well as on the cumulative environmental effects of pollutant loadings on these processes. A recommendation for additional research and policy initiatives emerged over the last four years as the Management Conference evaluated concerns, resource and funding needs to adequately carry out certain actions, and current and future priorities.

The Science and Technical Advisory Committee (STAC) identified the following projects to address data gaps for the Barnegat Bay estuary and watershed.

FISH AND FISHERY RESOURCES OF BARNEGAT BAY: A Plan for Long-Term Data Gathering

Recently, few assessments have been undertaken to evaluate the status of fishery resources in Barnegat Bay. Given the declining status of many fisheries, and the lack of information to support informed fishery management programs, it is necessary to assess the seasonal availability, species composition, and habitat use patterns associated with finfish and blue crab resources in Barnegat Bay in order to develop an appropriate strategy for fishery resource management.

PREDATOR-PREY INTERACTIONS BETWEEN BLUE CRABS AND HARD CLAMS in the Little Egg Harbor Portion of Barnegat Bay

Hard clam abundance has declined significantly in Barnegat Bay since the 1960s. Potential reasons for this decline range from reduced larval settlement, the closure of shellfish grounds because of poor water quality, to an increase in predation. To ensure a sustainable stock of clams, this proposal aims to determine the array of natural predators that juvenile clams face and the factors governing predator-prey interactions.

BAY SCALLOP RESTORATION AND ENHANCEMENT in Barnegat Bay

The bay scallop is a common and often abundant member of shallow marine communities along the Atlantic and Gulf coasts. Bay scallops recruit to seagrasses and use them as attachment sites, so the decline of seagrass habitat has severely limited bay scallop populations in some areas, such as Barnegat Bay. Although eelgrass has recovered in Barnegat Bay from a previous low point, bay scallop densities remain low. This proposal aims to reseed selected sites throughout Barnegat Bay with bay scallops to determine the potential for restoring this fishery.

SEDIMENT CONTAMINATION/TOXICITY

Little is known about the distribution, concentration, or toxicity of sediments throughout Barnegat Bay. Such information is needed for future bay management if sediment contamination or toxicity is found to be significant. This proposal aims to analyze benthic infaunal communities as an indicator of sediment toxicity.

BROWN TIDE INCIDENCE AND DEVELOPMENT in Barnegat Bay

Brown tides, caused by the minute alga, *Aureococcus anophagefferens* have been recurring since 1995 in the Barnegat Bay and other coastal bays in New Jersey. While there are no known human health effects, brown tide blooms may cause significant negative ecological impacts to shellfish and sea-grasses. Elevated concentrations of brown tide blooms may cause cessation of feeding in hard clams, mussels and bay scallops and cause a reduction in growth and/or mortalities and recruitment failure in shellfish. Prolonged blooms of greater than one month may produce enough shading to damage eelgrass beds.

In June 1999, a massive brown tide bloom was reported in Little Egg Harbor and southern Barnegat Bay. Because of limited data on brown tide blooms, the NJDEP's Division of Science, Research and Technology established the Brown Tide Assessment Project in 1999. Systematic monitoring for brown tides began in 2000 and continued in 2001 to assess the spatial and temporal distribution of brown tide blooms. Recently, the NJDEP has begun to analyze the brown tide data using a newly developed Brown Tide Bloom Index, and has found that the highest cell concentrations are found in Little Egg Harbor, Great Bay (the next coastal bay to the south), and southern Barnegat Bay. The results to date indicate that additional monitoring, assessments and research are needed to more comprehensively document the negative impacts of brown tide blooms on natural resources. Continued monitoring of selected stations is also needed, but not yet funded, to assess brown tide concentrations and the water quality/environmental factors that may promote and sustain brown tide blooms in the Barnegat Bay, Little Egg Harbor and other coastal bays.

ESTABLISHMENT OF A SUBAQUEOUS SOIL CLASSIFICATION SYSTEM FOR EFFECTIVE MANAGEMENT OF SHALLOW-WATER HABITAT in Barnegat Bay

The purpose of this study is to develop information on the properties of subaqueous and tidal soils in order to enhance the re-establishment of emergent and submerged vegetation. Emergent and submerged vegetation provide nutrients and shelter for finfish and shellfish, and help to mitigate shoreline erosion.

SEDIMENTS AND GEOMORPHOLOGY of Barnegat Bay

Barnegat Bay is comprised of a variety of sediments and sedimentary features that support diverse habitat assemblages. A detailed characterization of these features can be used to develop a better understanding of habitat value and its relationship to water quality, and to prepare a sea level rise curve for the bay.

NONPOINT SOURCE TOXICS in Barnegat Bay and the Surrounding Watershed

The lack of data on toxic chemical compounds in groundwater and streams contributing freshwater inflow to Barnegat Bay could be improved by expanding ongoing efforts aimed at quantifying nonpoint source contaminants. Current studies focus on the evaluation of nutrients, sediment, and bacteria in surface waters that originate from nonpoint sources. Additional samples could be analyzed for volatile organic compounds, pesticides, and/or trace elements.

ECONOMIC VALUATION of Barnegat Bay Resources

Very little information is available on the natural resource value of Barnegat Bay and its surrounding watershed. Data do exist on the economic impact of activities occurring throughout the bay, such as boating, fishing, and tourism. However, the resources upon

which these activities rely – open space, habitat quality, and water quality – are not easily quantified. Efforts are needed to define the value of the bay's natural resources in terms that can be used to support informed decisions on the future character of Barnegat Bay.

EFFECT OF ATMOSPHERIC POLLUTANT LOADINGS on Barnegat Bay and Watershed

Airborne pollutants reach coastal New Jersey from continental, regional, and/or local origins. Understanding patterns of deposition from vehicular, industrial, and agricultural operations, and the proportional influence of local and out-of-state atmospheric sources, is essential for developing a comprehensive watershed-based management strategy for Barnegat Bay.

The New Jersey Atmospheric Deposition Network includes nine sites where concentrations of organic, metal, and nutrient constituents are measured in wet and dry deposition. Designed by university scientists, the air-monitoring stations have been operating for several years. Preliminary results suggest that atmospheric deposition (precipitation, air-water and air-soil/vegetation exchange, as well as dry particle deposition) may be important pollutant sources to the region's coastal waters. These efforts provide evidence of seasonal and spatial variations in concentration, deposition, and exposure, and serve as the basis for characterizing sources and source strengths, and sub-regional, regional, and long-range transport.

The atmosphere is an important pathway for pollutants entering the coastal zone. Results of previous studies suggest that dry deposition by aerosol particles and wet deposition via precipitation are both important atmospheric deposition mechanisms. These studies also verify that air emissions of toxic compounds from urban/industrial centers enhance the atmospheric deposition fluxes to nearby coastal waters such as the Barnegat Bay and its watershed.

Current studies under way in New Jersey are designed to characterize atmospheric inputs of metals, organics, and nitrogen to New Jersey coastal waters, including:

- Fluxes of polychlorinated biphenyls (PCB), poly cyclic aromatic hydrocarbons (PAH), and chlordanes across the air-water interface of the Hudson River Estuary;
- Atmospheric deposition of mercury, trace metals, and nitrogen to the New York-New Jersey Harbor/Bight;
- Atmospheric nitrogen deposition to Barnegat Bay;
- Air-sea exchange of PCBs and PAHs in New Jersey coastal waters; and
- Estuarine eutrophication; that is, seasonal cycles of the contribution of dissolved organic nitrogen from nonpoint and point sources.

In coastal ecosystems like Barnegat Bay, which are experiencing rapid development, atmospheric emissions may result in increased deposition of toxic and nitrogenous species. Diffusive air-water exchange of persistent pollutants may be an important process contributing to, and sometimes dominating, the input, output, and control of, aquatic concentrations in freshwater, estuarine, and marine components of the bay-watershed complex.

The research under way, and concurrent collection of atmospheric deposition data at a regional network of monitoring stations, will ultimately be used to address the question: Are atmospheric loadings a significant proportion of inputs to the watersheds and estuaries of New Jersey? If the answer is yes, then management strategies to reduce the adverse effect of these loadings will become an important part of future contaminant reduction schemes.

The air emissions data will ultimately be incorporated into multimedia models developed to estimate waste load allocations for dischargers into coastal waters; to support long- and short-term dredged material management planning efforts; and to track down significant sources of airborne pollutants. For Barnegat Bay, answers to the following questions must be sought:

- What is the state of current knowledge regarding the significance of airborne pollutants and their impacts on Barnegat Bay?

- What are the substantive gaps in knowledge concerning the effects of airborne pollutants on the bay?
- How can the data be used to develop science-based management tools?
- How can the data be placed into a regulatory framework?

Eventually, the collected air data must be made available in a form that environmental managers can use in decision-making.

11.3 ADDITIONAL RESEARCH NEEDS

Additional data gaps to be addressed include:

- Periodic updating of the BBNEP data synthesis report.
- Identification of the source of phosphorous inputs to Barnegat Bay.
- Conducting a toxics assessment for Barnegat Bay.
- Quantification of riverine inputs to Barnegat Bay.
- Identification of factors controlling turbidity in Barnegat Bay.

Eelgrass harvest goes to market. *PHOTO COURTESY TUCKERTON SEAPORT, A PROJECT OF THE BARNEGAT BAY DECOY AND BAYMEN'S MUSEUM, INC.*