

PART IV – ECOSYSTEM BASED COMPONENTS OF STATUTORY PROTECTIONS AND PROGRAMS

Many of the statutory provisions and programs described in the previous sections of this paper promote or allow for the protection and management of natural resources on an ecosystem-based scale. Instead of focusing on resources on a permit-by-permit, site-by-site, or resource-by-resource basis, these provisions and programs encourage management practices that utilize a more comprehensive strategy – a strategy aimed at protecting, restoring, and enhancing entire systems of interdependent and interconnected natural resources.

A. ECOSYSTEM BASED COMPONENTS OF THE CLEAN WATER ACT

Whether intentional or not, many sections of the Clean Water Act incorporate components that allow for management practices and water-pollution prevention on a larger, ecosystem-based or regional scale.

Each of these significant opportunities provided by the Act and, when applicable, the manner in which they are actually implemented by New Jersey and Delaware, are described below.

Water Quality Management Plans

Water Quality Management Plans are the combined requirements of the section 208 area-wide management plans and the section 303(e) navigable water planning process. These provisions require states to identify areas with water quality control problems and to develop and implement Best Management Practices to control nonpoint sources of pollution that are significant sources of concern to those areas. The boundaries of the areas of concern, the spatial scale at which the Best Management Practices are implemented, as well as the scope, size and level of the planning agencies designated to develop and implement the Plans are left entirely to the discretion of each state. As such, the Plans provide a significant opportunity for states to implement the management practices required by these sections of the Clean Water Act on an ecosystem-based scale.

Experience with these Plans, at least in New Jersey, has demonstrated that smaller planning agencies and the development of smaller plans may not be an effective means of complying with these Clean Water Act provisions. Until recently, there were over 190 Wastewater Management planning agencies in New Jersey, most of which were municipalities. However, despite the fact that the program has been in effect for decades, only 13 of these planning agencies were in compliance with the schedule set forth by the Water Quality Management Planning Rules for the completion of Plans, 63 planning agencies had never adopted a Wastewater Management Plan at all and 117 Wastewater Management Plans were significantly out of date.

In 2008, through changes to the applicable rules, DEP revamped its Water Quality Management Plan program, including a major reduction in the number of Wastewater Management planning agencies. By transferring responsibility for the Wastewater Management Plans from the more

than 190 existing planning agencies to the 21 counties in the state, DEP hopes to do away with the lengthy review times and the inability of the limited DEP staff to engage in outreach, two problems that DEP attributed to the sheer number of planning agencies involved and that significantly contributed to the Program's failure. It is important to note that this change will also lead to the development of Plans on a much larger scale, resulting in 21 county-wide Plans instead of 190 municipal plans, and will more readily allow for the consideration of issues on an ecosystem-based scale.

The National Estuary Program

The National Estuary Program set forth in section 320 of the Clean Water Act provides for the development of Comprehensive Management Plans to restore and protect nationally-significant estuaries that are threatened by pollution, land development and overuse. This section is quite specific in its encouragement of states developing Comprehensive Management Plans to collect, characterize, and assess data on toxics, nutrients, and natural resources within the "estuarine zone."⁷⁴² The use of the term "estuarine zone," by definition, expands the boundaries of the study area beyond the estuary to include the estuary's "associated aquatic ecosystems" as well as "those portions of tributaries draining into the estuary up to the historic height of migration of anadromous fish or the historic head of tidal influence, whichever is higher."⁷⁴³

In addition to encouraging states to implement water quality and other environmental management practices on the basis of each estuary's watershed area, the statute recognizes that some estuaries will span the boundaries of more than one state. As a result, the Program has fostered cooperative management efforts between states as well as the development and implementation of multi-state Comprehensive Management Plans, including for the following National Estuaries:

- The Albermarle-Pamlico Sound Estuary, with a watershed area of 81,791 square kilometers and managed by the states of North Carolina and Virginia;
- The Lower Columbia River Estuary, with a watershed area of 614,771 square kilometers and managed by the states of Washington and Oregon;
- The Partnership for the Delaware Estuary, with a watershed area of 35,297 square kilometers and managed by the state of Delaware, New Jersey and Pennsylvania;
- The Long Island Sound Estuary, with a watershed area of 45,050 square kilometers and managed by the states of New York and Connecticut;
- The Piscataqua Region Estuaries Partnership, with a watershed area of 2,789 square kilometers and managed by the states of New Hampshire and Maine; and the
- The New York-New Jersey Harbor Estuary, with watershed area of 42,128 square kilometers and managed by the states of New York and New Jersey.

Water Quality Standards and TMDLs

The establishment of water quality standards pursuant to section 303(c) is necessary to provide for the protection and propagation of fish, shellfish and wildlife that depend on water for survival as well as for the protection of recreational uses of water bodies. For the most part, the Clean Water Act is consistent in its use of the term “waters” – as if referring to an entire water body - when setting forth these mandates, although the federal regulations pertaining to the development of water quality standards clearly state that the standards, including designated uses, water quality criteria, anti-degradation polices and TMDLs, can be established for “segments” of water bodies as opposed to water bodies as a whole.⁷⁴⁴ However, neither the Act nor the regulations define the geographic extent or substantive parameters of a water body segment, leaving this determination up to the states. In other words, a state can, if it so desires, establish Water Quality Standards that are consistently applied to the entire length of a river and its tributaries within the same watershed, or it can develop standards for many different segments of the same river.

Delaware is currently taking advantage of this opportunity by integrating its TMDL program into its existing Pollution Control Strategies. The Pollution Control Strategies are plans developed and implemented by a combination of citizens and government officials, called Tributary Action Teams, that work with the DNREC’s Whole Basin Management Team to control pollution and improve water quality on a watershed basis. In the Project Area, Pollution Control Strategies are in various stages of development and implementation for the Appoquinimink River, St. Jones River and the Murderkill River watersheds.⁷⁴⁵ By incorporating its TMDL program into these plans, the Tributary Action Teams are striving to achieve the nutrient and bacteria load reductions required by TMDLs throughout their respective watersheds and to identify specific actions that must be taken in order for the surface water quality standards in each watershed to be met.⁷⁴⁶

Sometimes, the discretion allowed by section 303(c) results in what seems to be the random application of water quality standards and related criteria. For example, the Maurice River, which is located in the Project Area, has a drainage area of 386 square miles and flows south for approximately 50 miles through Cumberland County, New Jersey to the Delaware Bay.⁷⁴⁷ According to New Jersey’s surface water quality standards, for classification purposes, the Maurice River is divided into the following five segments, which run contiguously north to south⁷⁴⁸.

Table 16 – Water Quality Standard Segments of the Maurice River

Segment	Area Included	Location (Township)	Miles	Water Quality Classification
1	Source to Willow Grove Road	Willow Grove	25	FW2 – NT
2	Willow Grove Road to confluence with Green Branch	Willow Grove	4	FW2 – NT Category 1
3	Green Branch Confluence to northern boundary of Union Lake Wildlife Management Area	Brotmanville	4	FW2 – NT
4	Union Lake Wildlife Management Area to Confluence with Blackwater Branch	Vineland	6	FW2 – NT Category 1
5	Blackwater Branch to Delaware Bay	Vineland	9	FW2 – NT-SE1

As the table demonstrates, all five segments are classified as freshwater 2 nontrout waters, with the exception of segment 5, which becomes saline (SE2) as it reaches the Delaware Bay. However, segments 2 and 4, but not segments 1, 3 and 5, are classified as Category 1 Waters, which is one of New Jersey’s three anti-degradation levels.

Category 1 Waters are those waters designated for protection from measurable changes in water quality based on the water’s exceptional ecological, recreational or fisheries status. Such waters are entitled to, among other things, the protection of 300-foot buffers for development that occurs adjacent to the water body under a variety of the state’s regulations, including the Stormwater Management Rules and Flood Hazard Control Act Rules, as well as a “no measurable change” standard under the NJPDES Rules.

The table also demonstrates that the segmenting of the Maurice River for water classification purposes results in Category 1 segments being sandwiched between segments that are not subject to the same anti-degradation standards or protections. This means that the segments subject to a lesser standard are continually flowing into the Category 1 Waters. Further, because the lesser standard segments above the Category 1 segments are not subject to the no measurable change standard or the protections of 300 foot buffers, it is inevitable that the quality of the lesser segments will deteriorate, making it inevitable that the Category 1 segments they flow into will deteriorate as well.

Integrated Reports

The Integrated Reports that combine a detailed summary of the quality of the waters of each state under section 305(b) and the list of impaired waters under section 303(d) provide an opportunity for states and the EPA to identify trends and patterns in water quality, as well as geographic areas where more needs to be done to protect and enhance water quality on a variety of spatial scales. For example, by reviewing the waters on the 303(d) list and the pollutants for which the water quality standards were exceeded, it can be determined if a water quality problem is limited

to a segment of a water body, an entire water body, or persists on a larger, regional or watershed-based scale.

In addition, if the waters on the list in a particular geographic region are impaired due to the presence of a common pollutant or set of pollutants, this information can assist in the identification of the source of pollutants and inform the substance and spatial extent of management actions necessary to address the problem. For example, the maps below, taken directly from New Jersey's 2008 Integrated Report, demonstrate the geographic trends in four of the top ten pollutants causing New Jersey waters to be characterized as impaired - phosphorous, dissolved oxygen, pathogens (*Enterococcus* or *E. Coli*) and mercury.

Figure 4.8-8: Phosphorus Exceedances

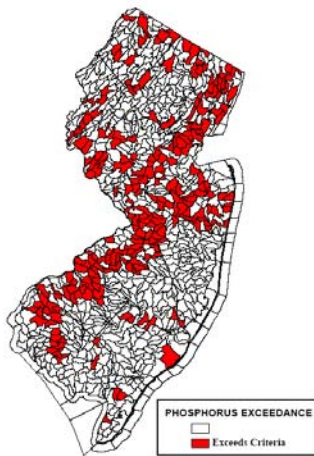


Figure 4.8-10: Dissolved Oxygen Exceedances

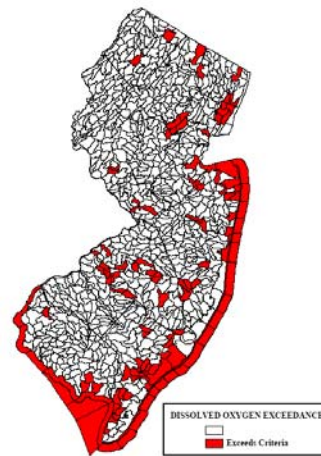


Figure 4.8-9: Pathogen Exceedances

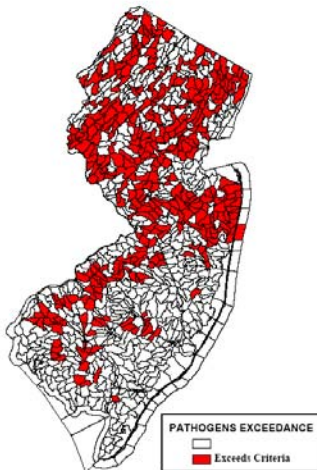


Figure 4.8-6: Mercury Exceedances

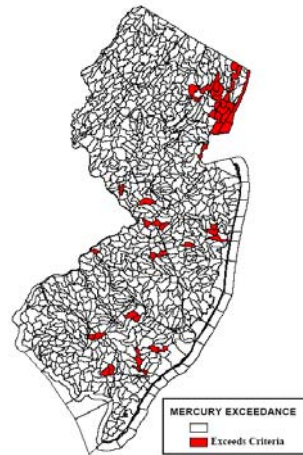


Figure 15 – Distribution of Pollutants Causing Impaired Water Status in New Jersey⁷⁴⁹

These figures make several points immediately apparent: (i) the phosphorus, dissolved oxygen, pathogen and mercury problems are regional in nature and not local or site-specific; (ii) the pathogen and phosphorus problems are mostly problems for inland waterways, with the exception of the northern coastal portion of the state; (iii) the mercury problem is most significant in the north-east portion of the state; and (iv) the dissolved oxygen problem is a major problem affecting the entire state and a major problem for the entire Project Area. This information is important in that it demonstrates that the solutions to these problems cannot be local or site specific and that the problems should instead be evaluated and managed in a manner that is comparable to the ecosystems, spatial scale and geographic areas in which they occur.

Nonpoint Source Management Programs

This provision of the CWA encourages an ecosystem based management approach to nonpoint source pollution control through its requirement that, to the maximum extent practicable, states should develop and implement their management programs on a “watershed-by-watershed basis.”⁷⁵⁰

New Jersey is taking advantage of this opportunity through its Watershed Management and Restoration Plans, which are developed for impaired waters and funded through Clean Water Act section 319(h) grants.⁷⁵¹ In the Project Area, there are five approved and funded Watershed Management or Restoration Plans that are currently in various stages of development and implementation:

- A Regional Stormwater Management Plan for the Raccoon Creek developed and implemented by the Camden and Gloucester County Soil Conservation Districts;
- A Watershed Restoration Plan for the Upper Salem River (Phase I) developed and implemented by the Salem County Soil Conservation District;
- A Regional Stormwater Management Plan for the Upper Mantua Creek developed and implemented by the Camden County Soil Conservation District;
- A Watershed Restoration Plan for the Upper Cohansey River Watershed developed and implemented by Rutgers University; and
- A Watershed Restoration Plan for the Upper Salem River Watershed also developed and implemented by Rutgers.⁷⁵²

Similarly, Delaware’s nonpoint source management program incorporates Pollution Control Strategies, which are watershed-based plans intended to achieve the nutrient and bacteria load reductions required by TMDLs on a watershed-wide basis.⁷⁵³ In the Project Area, Pollution Control Strategies are in various stages of development and implementation for the Appoquinimink River watershed, the St. Jones River watershed and the Murderkill River watershed.⁷⁵⁴

National Pollution Discharge Elimination System

The effluent limitations that are set forth in the NPDES permit and with which the discharger must comply is dependent on the type of industry, the type of pollutants being discharged and the waterway into which the discharge will occur. More specifically, the limitations can be technology based effluent limitations established under section 301 of the Act and based upon the industry-specific effluent categories and guidelines adopted by EPA in the code of federal regulations. The permit may also incorporate water quality related effluent limitations established under section 302 and water quality standards adopted by the state in which the discharge occurs under section 303(c). The effluent limitations in the NPDES permit may also reflect TMDLs established by a state for its impaired waters under section 303(d).

In addition to the discretion that a state has regarding the standards that may be incorporated into a NPDES permit, as was discussed above with regard to the surface water quality standards, the Clean Water Act places no limits on the geographic extent to which these standards, including the designated uses, water quality classifications and anti-degradation policies, are applied. In other words, a state can manage its NPDES program towards the goal of achieving water quality standards that support a designated use in a segment of a waterway, an entire waterway or an entire watershed.

Dredge and Fill Permits/ Wetlands Protections

Only two states, New Jersey and Michigan, have assumed section 404 authority through the development of their own dredge and fill permit programs. As a result, New Jersey is responsible for the issuance of 404 permits in certain non-navigable waters within the state, but in Delaware, the program authority remains with the EPA and the U.S. Army Corps as part of the nation-wide program.

The Clean Water Act discusses the dredging and filling of wetlands in terms of “specified disposal sites” and their impact upon “navigable waters,” but gives no express or implied direction regarding the geographic or spatial scale upon which the program and the permits issued should apply. Nevertheless, certain actions taken by the EPA when New Jersey established its own 404 program indicate that the agency interprets the Act as encouraging the protection of wetlands under this section on an ecosystem-based scale.

In March 1994, the same month that EPA’s approval of New Jersey’s assumption of 404 program authority became effective, EPA Region 2 issued a document entitled “Priority Wetlands for the State of New Jersey.” Through this document, EPA sought to establish “a technically sound and consistent basis for EPA positions on 404 permits” and “to focus regional resources on the identification of the most important wetlands in that region.”⁷⁵⁵ In other words, EPA was artfully attempting to tell New Jersey how to implement the program.

The list of wetlands included in the document, known as the “EPA Wetlands Priority List,” recognized the most important and vulnerable wetlands in the state and, while not a comprehensive inventory, included those wetlands known to EPA at that time to be important and/or under particular threat.⁷⁵⁶ The priority list includes, among many others, the following

wetlands in the Project Area, which are significant due to their size and the fact that they encompass entire systems of wetlands as opposed to select or individual patches:

- An undisclosed acreage of wetlands associated with the Maurice River System, which includes the Maurice River, Manumuskin Creek, Manatico Creek and Muskee Creek and that spans four counties - Cumberland, Gloucester, Salem and Atlantic Counties – and multiple municipalities;⁷⁵⁷
- 6500 acres of wetlands associated with Oldmans Creek located in Logan Township, Gloucester County, and Oldmans and Woolrich Townships, Salem County;⁷⁵⁸
- Wetlands of the Delaware Bayshore spanning Cape May and Gloucester Counties, referred to as the Delaware Bayshore Macrosite, located within 0.5 miles of Delaware Bay and housing various state wildlife areas within its boundaries;⁷⁵⁹ and
- Numerous additional wetlands in Cape May County, including those associated with:⁷⁶⁰
 - Belleplain Pond South (acreage not provided)
 - Bennets Bog (acreage not provided)
 - Cape May Meadows (500 acres)
 - Crooked Creek (acreage not provided)
 - Great Cedar Swamp and Indian Trails Swamp (15,000 acres)
 - Lizard Tail Swamp (acreage not provided)
 - Rio Grande Swamp (acreage not provided)
 - Sewell Point Wetlands (110 acres); and
 - Woodbine Pond (acreage not provided)

The New Jersey legislature chose to incorporate the EPA Priority Wetland List into the New Jersey Freshwater Wetlands Protection Act and the Act's implementing regulations to ensure consistency between the state and federal programs.⁷⁶¹ The state Act prohibits the issuance of any General Permits in wetlands included on the EPA Wetlands Priority List.⁷⁶²

The priority list presented by EPA to New Jersey demonstrates that EPA is encouraging states to implement this program through the use of ecosystem-based management techniques, and, more specifically, by identifying the systems of wetlands where 404 permits should not be issued.

B. ECOSYSTEM BASED COMPONENTS OF THE COASTAL ZONE MANAGEMENT ACT

From the very first section of the Coastal Zone Management Act, it is apparent that the Act contemplates water quality and land use management on an ecosystem-based level. The Act begins with the Congressional Findings, which note the inadequacy of existing state and local management programs, finding instead that the key to more effective protection of the coastal zone is the development of programs that incorporate unified policies, criteria, standards, methods, and processes to make land and water use decisions “of more than local significance.” Nearly every section thereafter reiterates this point through the encouragement of the development of programs and plans that operate on a wide-scale basis.

Development of Coastal Zone Management Programs

The CZMA mandates the elements that must be included in a state CZMP, including the identification of the coastal boundaries subject to management, an inventory of areas of particular concern and the means by which the state will exert control over the coastal area.⁷⁶³ Thus, the Act leaves it up to each state to decide whether it will exert such control on an ecosystem-based or watershed-based scale or on some other management basis. Nevertheless, through its emphasis on the Coastal Zone as a whole, and its findings that the programs should be designed to allow decision making “of more than local significance,” the CZMA attempts to guide the states towards the development of CZMPs that are implemented on a larger spatial or geographic scale.

It was entirely through its own discretion that New Jersey chose to implement its program through the CAFRA statute and the Coastal Rules and that Delaware chose to implement its program through the Coastal Zone Act, the Beach Preservation Act and their associated regulations. The extent to which these state programs utilize ecosystem-based management techniques is discussed in more detail in section IV-D, below.

Coastal Nonpoint Source Pollution Control Plan

As with the CZMPs, the CZMA identifies the elements that must be included in a Coastal Nonpoint Source Pollution Control Plan but does not dictate the means or geographic or spatial extent of Plan implementation. However, as with other sections of the Act, this section indicates that bigger is better. For example, it requires that, as part of its Plan, each state must establish mechanisms to facilitate the coordination between state and local agencies so they can make collective decisions on more than a local basis.⁷⁶⁴ In addition, it requires each state to prepare a proposal to modify the inland boundaries of the state coastal zone if it is determined at any time that such boundaries need to be extended to control the land and water uses that have a significant impact on coastal waters.⁷⁶⁵

While neither state has requested to expand the boundaries of its Coastal Zone, Delaware has incorporated some elements into its Plan to be implemented on a state-wide basis. In response to a request from NOAA to develop a five-year enhancement strategy for its existing Plan, Delaware identified specific activities that would be carried out under each of the six

management strategies identified in the CZMA. The activities identified are designed to enhance agricultural areas, forestry areas, urban areas, marinas, areas subject to hydromodification and wetland and riparian areas on a state-wide basis, and include:

- Updates to the Erosion and Soil Control Handbook, including new legally binding standards for activities affecting erosion and sediment loading in state waters (agricultural areas);
- Engaging in more advanced pre-harvest planning to, among other things, identify locations of water bodies and sensitive areas such as wetlands, threatened aquatic species habitat areas or high erosion areas within a harvest area (forestry areas);
- Amendments to the Regulations Governing the Design, Installation and Operation of On-Site Wastewater and Disposal Systems to provide more inspectors to conduct more regular site visits (urban areas);
- Development of a Marina Guidebook that provides information on the permitting process as well as technical guidance on the environmentally sound siting, design and operation of marinas (marinas);
- Development of a Policy Framework for Decision Making Related to the Evaluation, Monitoring and Design of Dredging Projects to allow for the easy identification of environmental concerns associated with dredging projects (hydromodification); and
- Implementation of the Riparian Buffer Initiative to protect critical areas from water quality degradation (wetlands and riparian areas).

Enhancement and Assessment Strategy

This section of the CZMA clearly contemplates coastal zone management on a wide-scale basis through its promotion of specific “enhancement objectives.” Such objectives include the development and adoption of procedures to assess, consider and control cumulative and secondary impacts of coastal growth and development on the coastal zone its resources.⁷⁶⁶

Another objective is the preparation of special area management plans, or SAMPS, which are regional plans that can be employed in areas where the existing program policies are not working well, there is a need to better align coastal policy, or to address complex multi-jurisdictional coastal issues.⁷⁶⁷ A third objective encourages states to adopt procedures and policies for siting energy facilities, government facilities and energy-related activities which may be of a “greater than local significance.”⁷⁶⁸ NOAA will issue grants to coastal states to fund program changes that seek to attain one or more of these objectives, each of which seek to facilitate coastal management practice on a greater-than-local scale.

With regard to these objectives, both New Jersey and Delaware have identified cumulative and secondary impacts to coastal resources caused by land use development decisions as a major issue of concern in their coastal areas.⁷⁶⁹ However, neither state clearly articulated how it intends to deal with these concerns.

In its 309 Assessment Document, Delaware stated its willingness to use SAMPs to address some of the issues in its Coastal Zone, and recently received a three year grant from NOAA to develop a SAMP to revitalize South Wilmington. The development of this SAMP is currently under way.⁷⁷⁰ A SAMP is also being developed for Pea Patch Island, a Delaware State Park located in the upper reach of the Delaware Estuary that supports the east coast's largest heron rookery north of Florida.⁷⁷¹ With the abundance of birds on the island in serious decline, the DNREC recognized that this unique resource requires better management efforts. The SAMP is being developed by DNREC with the help of representatives of local, state and federal agencies, nonprofit organizations, and business and industry and seeks to identify the causes of changes to the natural condition of the birds' habitat.⁷⁷²

In New Jersey, other than a SAMP for the Meadowlands Area developed in the 1970s, this planning mechanism has not been utilized again, nor is it mentioned as a possible means for dealing with coastal issues in the state's most recent 309 Enhancement and Assessment document. However, statements made in that document indicate that a SAMP may be warranted, particularly to deal with the serious issues facing the Delaware Bay and its environs.

Specifically, New Jersey identified threats to the Delaware Bay and River from cumulative and secondary impacts as a priority matter of concern.⁷⁷³ It further noted that the Estuary's location in three different states, each with its own agency with different mandates and objectives, complicated the coordinated management of the Estuary.⁷⁷⁴ DEP also concluded that some of the state's most important natural communities, including the Delaware Bay beaches that support horseshoe crabs and migratory birds, are not being protected under existing regulations from the cumulative and secondary impacts associated with development.⁷⁷⁵ These issues seem to be precisely the type for which the SAMP concept was developed.

Despite the fact that the potential use of a SAMP is not mentioned in the 309 Assessment Document, DEP personnel have stated their desire to utilize SAMPs or some other regional-based planning mechanism as a means to protect coastal resources and are actively considering areas throughout the Coastal Zone where such a mechanism would be best employed.⁷⁷⁶ It seems clear that the Delaware Bay Estuary is one such area.

Performance Evaluation/Performance Measurement System

The Performance Measurement System has great potential to provide information on a wide-scale basis regarding the success or failure of each state CZMP and of the national program as a whole. Adopted by NOAA in the face of criticism for its inability to demonstrate more than anecdotal evidence of the progress of the various state's CZMPs, the System identifies data that each state must collect and submit to NOAA on an annual basis. Most prevalent in these data collection requirements is that for coastal habitats, for which collection and submission becomes mandatory in the year 2010, and which includes:

- The number of acres of key coastal habitats created or restored using CZMA funds;

- Number of acres of key coastal habitats protected by acquisition or easement using CZMA funds; and
- The number of acres of key coastal habitats lost or gained due to activities subject to core CZMA regulatory programs, including mitigation.

This data must be collected for each of the following habitats.

- tidal wetlands;
- beach and dune;
- nearshore intertidal, sub-tidal, and submerged habitat; and
- other habitats.

This will force states like Delaware and New Jersey that admit cumulative and secondary impacts to habitat are a problem but have done little to measure, account for or attempt to address such impacts, to begin tracking the extent and location of these impacts. This information in turn will allow for the development of management measures to address this serious issue.

National Estuarine Research Reserve System

This section, through its recognition of the importance of preserving, protecting, enhancing and studying estuarine ecosystems in their entirety, promotes an ecosystem-based management approach. Both New Jersey and Delaware have designated National Estuarine Research Reserves. The Jacques Cousteau National Estuarine Research Reserve is located in the Mullica River-Great Bay ecosystem in the southeastern part of the New Jersey. The Delaware National Estuarine Research Reserve consists of two unique components located on Blackbird Creek in Townsend and on the St. Jones River in Dover, both of which are in the Project Area.

Harmful Algal Bloom and Hypoxia Research and Control Act

As with all other sections of the CZMA, the HAPHRCA, for which studies of algal blooms and hypoxic events are funded under section 318 of the CZMA, provide no limitations on the geographic or spatial extent to which such studies are performed. Instead, based on the past occurrence of algal blooms and hypoxic events, in adopting the HAPHRCA, Congress recognized that these problems can impact entire coastal zones or large swaths of coastal zones at a time. This is clearly demonstrated in the following figure depicting the low dissolved oxygen levels measured along New Jersey's coast taken directly from the 2008 Integrated Report.

Figure 4.8-10: Dissolved Oxygen Exceedances

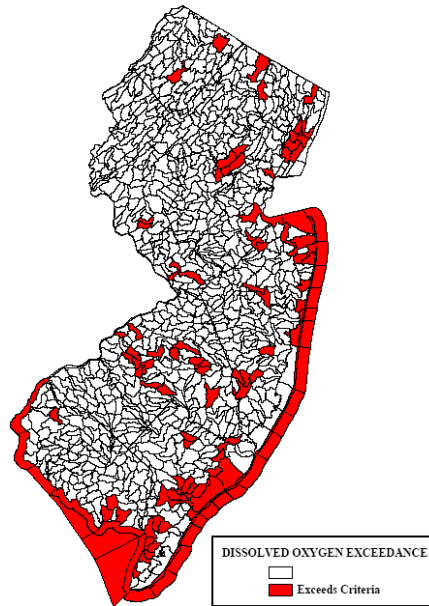


Figure 16 – Low Dissolve Oxygen Levels in New Jersey Coastal Waters

As this figure shows, the problem, and thus, management measures to address the problem, must be developed and implemented on a coast-wide basis.

The DEP also conducts aerial surveillance of near-shore coastal waters six days a week using remote sensing capability for estimating chlorophyll levels in coastal waters. This information allows the DEP to track the intensity of algae along the entire coast, including Barnegat Bay and Delaware Bay, and to target boat sampling at locations where algal blooms might be occurring. Data from these flights show that, in June and July, 2009, there was no *Chlorophyll a* detected in the project area and that the trail of *Chlorophyll a* along New Jersey's coast extended from Perth Amboy to the Forked River, encompassing about a third of the length of the coastline.⁷⁷⁷ However, the line of *Chlorophyll a* gradually extended south as the summer progressed and, by August, *Chlorophyll a* was detected from Perth Amboy to the mouth of the Delaware Bay adjacent to Cape May.⁷⁷⁸ By late September, it extended into and across the entire Bay and into the Delaware River, reaching a point adjacent to the town of Bridgeton, New Jersey.⁷⁷⁹

C. ECOSYSTEM BASED COMPONENTS OF THE ENDANGERED SPECIES ACT

Listing of Threatened or Endangered Species

By design, the Endangered Species Act encourages the identification and protection of endangered and threatened species on an ecosystem-based level. The main mechanism of the Act, the listing of endangered species, is based upon a determination that the species is in danger of extinction throughout all or a significant portion of its range.⁷⁸⁰ The ESA also requires the designation of critical habitat for listed species when possible, which includes the geographic areas that contain the physical or biological features essential to the conservation of the species and that may need special management or protection to ensure protection of the species.⁷⁸¹ The ESA specifies that critical habitat may include areas that are not occupied by the species at the time of listing, but that are essential to its conservation.⁷⁸²

Land Acquisitions

The purchase or lease of land to protect endangered and threatened species is based upon the range of each species and its critical habitat, which, as described above, may be more expansive than its range. As such, the land acquisition efforts must be based on the ecosystem upon which the species sought to be protected depends, as opposed to some other artificial legal or jurisdictional boundary.

Cooperation with the States

Partnerships with the states are considered essential to federal efforts to conserve listed species, and section 6 of the ESA encourages states to develop and maintain conservation programs for threatened and endangered species in their jurisdictions. State ESA programs can be more, but not less, restrictive than the federal ESA requirements and are essentially based upon the same principals as the federal Act, but are applied on a state-wide instead of a nation-wide basis. Both New Jersey and Delaware have endangered species programs that include lists of species that are threatened and endangered on a state-wide basis and that consider and map the habitats and communities of these species throughout their respective states.

D. ECOSYSTEM BASED COMPONENTS OF THE MIGRATORY BIRD CONSERVATION ACT

The Establishment of National Wildlife Refuges

Like the ESA, the Migratory Bird Conservation Act by its very design is concerned with the protection of birds on an ecosystem-based scale. The extent and impact of the MBCA is very broad, in that it focuses on birds that spend only part of their time in the United States and that winter and/or breed in other parts of the world. Projects implemented under the MBCA are developed and funded in significant part by the North American Waterfowl Management Plan, an international strategy and agreement for the long-term protection of wetlands and associated

uplands habitats needed by waterfowl and other migratory birds in North America. The Canadian Minister of the Environment, the U.S. Secretary of the Interior and Mexico are all signatories to the Plan.

A significant outcome of the MBCA is the establishment of National Wildlife Refuges across the United States under which more than 4 million acres have been acquired by the U.S. Fish and Wildlife Service. In the Project Area alone, this has led to the establishment of the 11,500 acre Cape May National Wildlife Refuge in New Jersey, the 15,978 Bombay Hook National Wildlife Refuge in Delaware and the 10,000 acre Prime Hook National Wildlife Refuge, also in Delaware.

E. ECOSYSTEM BASED COMPONENTS OF THE NEOTROPICAL MIGRATORY BIRD CONSERVATION ACT

Red Knot Protection Efforts in the Project Area, Argentina and Chile

Like the MBCA, the NMBCA takes ecosystem-based management to a new level. In adopting the Act, Congress recognized that, of the nearly 800 bird species that occur in the United States, approximately 500 migrate across our borders. As a result, the habitat loss threatening the survival of these species occurs on a hemisphere-wide basis.⁷⁸³ Congress also recognized that approximately 75% of the projects funded under the Act as necessary to protect these species would actually be implemented outside of the United States.⁷⁸⁴

One such effort funded under the NMBCA with direct impacts to the Project Area is the multi-national project aimed at conservation of red knots in New Jersey, Delaware, Argentina and Chile. With funding provided in 2002, the project aims to accomplish the following:

- In Delaware and New Jersey, develop a model based on years of data on horseshoe crabs and shorebirds that quantifies the crab eggs needed to support red knots during their stopover in Delaware Bay;
- In Argentina, at San Antonia Oeste, create a Nature Interpretation Center for education purposes and as a control point for restricting beach access during times of critical shorebird usage, develop a management plan for the site and nominate the site as a Western Hemisphere Shorebird Reserve Network (WHSRN) international site.⁷⁸⁵
- In Argentina, at the Rio Gallegos Estuary Provincial Reserve, create a Nature Interpretation Center for environmental education and nature-guide training programs, collect data for the development of a management plan for the site and nominate the reserve as a WHSRN site;⁷⁸⁶ and
- In Chile, develop a modest research and education station at Bahia Lomas and nominate it as a WHSRN international site.⁷⁸⁷

F. ECOSYSTEM BASED COMPONENTS OF STATE WATER QUALITY, WILDLIFE AND HABITAT PROTECTIONS AND PROGRAMS

In addition to the ecosystem-based components of the New Jersey and Delaware water quality and coastal programs discussed above, the states have the following ecosystem-based management opportunities available to them, some of which are being utilized in existing ecosystem-based programs.

CAFRA and Coastal Zone Management Rules in New Jersey

The CAFRA statute and the Coastal Zone Management Rules (Coastal Rules) are the major regulatory means by which New Jersey implements its CZMP. Through CAFRA and the Coastal Rules, the DEP seeks to protect coastal resources by controlling land use decisions and development in the coastal zone. In adopting CAFRA, the legislature specifically determined that development in the coastal zone should occur

“...within the framework of a comprehensive environmental design strategy which preserves the most ecologically sensitive and fragile areas from inappropriate development and provides adequate environmental safeguards for the construction of any developments in the coastal area.”⁷⁸⁸

The CAFRA Section 10 Findings

To facilitate this “comprehensive environmental design strategy,” CAFRA and the Coastal Rules have some significant ecosystem-based elements built in, including the CAFRA Section 10 Findings. The legislature deemed these Findings so important, that the entire provision was incorporated directly into the Coastal Rules.⁷⁸⁹ The CAFRA Section 10 Findings mandate that, even if a proposed development project meets every one of the applicable Coastal Rules, DEP still cannot issue a development permit unless and until it finds that the proposed development:

- Conforms with all applicable water emission and effluent standards and all applicable water quality criteria;
- Prevents water effluents in excess of the existing dilution, assimilative and recovery capacities of the water environments at the site and within the surrounding region;
- Would result in minimal feasible impairment of the regenerative capacity of water aquifers or other ground or surface water supplies;
- Would cause minimal feasible interference with the natural functioning of plant, animal, fish, and human life processes at the site and within the surrounding region.⁷⁹⁰
- Is located or constructed so as to neither endanger human life or property nor otherwise impair the public health, safety, and welfare; and

- Would result in minimal practicable degradation of unique or irreplaceable land types, historical or archaeological areas and existing public scenic attributes at the site and within the surrounding region.⁷⁹¹

These standards demonstrate that environmental considerations under CAFRA extend to the regional impacts of a development proposal in addition to the impacts to the development site itself, and make it clear that the cumulative impacts caused by development projects in the coastal zone must be assessed and considered. Significantly, these requirements explicitly apply to and are intended to protect the “natural functioning and life process of plants, animals and fish” in addition to those of humans.

The Coastal Goals

The Coastal Goals represent “the results that the Coastal Management Program strives to attain.” They are embodied in the very first Coastal Rule, which clearly states that the Coastal Goals and their correlating supplemental policies “are enforceable policies of New Jersey’s Coastal Management Program as approved under the Federal Coastal Zone Management Act.”⁷⁹²

The number one Coastal Goal is “healthy coastal ecosystems,” which is to be achieved by ensuring that all CAFRA development permits:

- Protect, enhance and restore coastal habitats and their living resources to promote biodiversity, water quality, aesthetics, recreation and healthy coastal ecosystems; and
- Manage coastal activities to protect natural resources and the environment.⁷⁹³

Number six promotes the “safe, healthy and well-planned coastal communities and regions” by ensuring that any CAFRA development permits:

- Preserve and enhance beach and dune systems and wetlands and manage natural features to protect the public from natural hazards.

Like the CAFRA Section 10 Findings, the Coastal Goals provide DEP with a powerful tool to deny or require changes to projects that meet all of the individual Coastal Rules, but fail to meet the broader ecological or public safety concerns of New Jersey’s Coastal Management Program.

Implementation of the CAFRA Section 10 Findings and the Coastal Goals

The DEP is not fully utilizing the significant authority it has under the CAFRA Section 10 Findings or the Coastal Goals. This is evident not only from the permits it issues, but in recent statements the agency made in its Section 309 Enhancement and Assessment document. In that document, DEP identified the inundation of coastal wetlands as one of the many problems that will occur as a result of sea level rise.⁷⁹⁴ DEP further concluded that the most likely adaptation of coastal wetlands in response to sea level rise would be inland migration, which would occur as the hydrology of the inland area becomes suitable for wetland species.⁷⁹⁵ However, DEP has

also concluded that, under its existing Wetlands and Wetlands Buffer Rules, “inappropriate development” in areas suited to inland migration of coastal wetlands will likely continue and preclude this adaptation and the wetlands will either diminish in extent or will be lost to inundation.⁷⁹⁶

In the same document, DEP identified the need to direct development away from high-hazard areas, and specifically the FEMA V-zones, which are flood prone and subject to high velocity waters and wave run-up, as a high priority for the state.⁷⁹⁷ Nevertheless, DEP concluded that, despite these dangers, development in these high hazard areas will continue for the simple reason that such development is allowed under the current Coastal Rules, particularly the Coastal High Hazard Areas Rule and its numerous exceptions.⁷⁹⁸

These statements and conclusions of DEP demonstrate that the agency is failing to take advantage of the powerful regulatory tools it has at its disposal. As discussed above, even if a permit application meets the letter of every applicable Coastal Rule, including the Wetlands and Wetlands Buffers Rules and the Coastal High Hazard Areas Rule and its exceptions, a permit cannot be issued unless and until DEP determines that the project is in accordance with each of the CAFRA Section 10 Findings as well as the Coastal Goals. Clearly, a project that interferes with wetlands, wetlands buffers or their ability to engage in inland migration or that is built in a high-hazard area prone to flooding cannot be found “to cause minimal feasible interference with the natural functioning of plant...processes at the site and within the surrounding region” or to be “located or constructed so as to neither endanger human life or property nor otherwise impair the public health, safety, and welfare” as is required by the Section 10 Findings. Similarly, neither project can be said to meet the Coastal Goal of preserving and enhancing beach and dune systems and wetlands or to be managing natural features to protect the public from natural hazards.

Based on the CAFRA Section 10 Findings and/or the Coastal Goals, the DEP can reject the very types of projects it has stated it does not have the power to prevent.

The New Jersey Coastal and Ocean Protection Council Act

Signed into law in early 2008, the Coastal and Ocean Protection Council Act declares that New Jersey’s efforts to protect the ocean must be guided by principles of “ecosystem health” that recognize “the interconnectedness between land and the ocean.”⁷⁹⁹ The Act further declares that this should be accomplished through an “ecosystem-based management approach,” specifically defined as an approach “that integrates biological, social and economic factors into a comprehensive strategy aimed at protecting, restoring, and enhancing the sustainability, diversity and productivity of ecosystems.”⁸⁰⁰

To carry out this approach, the Act establishes within the DEP the New Jersey Coastal and Ocean Protection Council, a nine-member council comprised of a representative from the DEP, the New Jersey Economic Development Authority and the New Jersey Division of Travel and Tourism, and six members of the public to be appointed by the Governor.⁸⁰¹ The purpose of the council is to determine how to incorporate ecosystem-based management approaches into New

Jersey's existing coastal and ocean protection programs and to recommend and develop new plans for protecting coastal and ocean resources through such an approach.⁸⁰²

Despite the fact that the Act was passed nearly a year ago, only two of the four public members have yet to be appointed and no actions under the Act have yet to be taken.

The Delaware Whole Basin Management Approach

Developed by the DNREC, the Whole Basin Management approach looks to manage Delaware's environmental resources in a comprehensive and coordinated manner that utilizes major drainage basins as the main management unit.⁸⁰³ DNREC relies on the combined expertise of all of its divisions – Air and Waste Management, Fish and Wildlife, Parks and Recreation, Soil and Water Conservation, Water Resources and the Office of the Secretary – to facilitate this approach, which divides the state into four major drainage basins: the Piedmont Basin, the Delaware Bay & Estuary Basin, the Chesapeake Bay Basin and the Inland Bays/Atlantic Ocean Basin.⁸⁰⁴ Each basin consists of smaller management units, or sub-basins, known as watersheds.⁸⁰⁵

The Delaware Bay and Estuary Basin is located in the eastern portion of New Castle, Kent, and Sussex Counties and drains approximately 520,960 acres, or 814 square miles.⁸⁰⁶ This basin includes the following watersheds: The Delaware River, Army Creek, Red Lion Creek, Dragon Run Creek, Chesapeake and Delaware Canal, Appoquinimink River, Blackbird Creek, Delaware Bay, Smyrna River, Leipsic River, Little River, St. Jones River, Murderkill River, Mispillion River, Cedera Creek and the Broadkill River.⁸⁰⁷

As a first step in managing this basin, the DNREC established the Delaware Bay and Estuary Basin Whole Basin Management Team, led by an environmental scientist with the Delaware Division of Water Resources, and comprised of persons from all of the aforementioned DNREC divisions.⁸⁰⁸ The Team set out to compile all the available data and information about the basin into one single comprehensive document.⁸⁰⁹ The result of this effort was the Delaware Bay and Estuary Whole Basin Assessment Report, issues in August 2005. The first half of the report is comprised of the Assessment, which sets forth all the information gathered and compiled by the Team regarding each of the following parameters:

- Geology, hydrology and soils;
- Land use and demographics;
- Contaminants;
- Bay and Estuary issues (boundaries, commerce, governance);
- Water resources;
- Wetlands;
- Living resources; and

➤ Recreation.⁸¹⁰

The Assessment identifies data trends and gaps, areas of programmatic overlap, initiatives that may be integrated into existing programs, areas requiring additional focus, and environmental stressors in the basin environment.⁸¹¹

The second half of the report is dedicated to Major Issues and Associated Recommendations.⁸¹² Here, the Team presents immediate actions that may be taken to improve the basin's health, makes recommendations for additional or enhanced monitoring of specific environmental indicators, and provides recommendations that the Team will focus on during the next phase of the Whole Basin Management process.⁸¹³

The New Jersey Climate Change Action Plan

On July 7, 2007, New Jersey Governor John Corzine signed the Global Warming Response Act into law.⁸¹⁴ The Act requires New Jersey to lower its greenhouse gas emissions to 1990 levels by 2020, a 20% reduction, and to further reduce such gases to 80% below 2006 levels by the year 2050.⁸¹⁵ In passing this legislation, New Jersey became only the third state to make greenhouse gas reduction goals law.⁸¹⁶ The Act also requires the DEP to work with the state Department of Transportation and Department of Community affairs and other stakeholders to evaluate methods to meet the 2020 target reductions.⁸¹⁷ DEP must also develop a 1990 greenhouse gas inventory, a system for monitoring current greenhouse gas levels as well as recommendations for additional actions that must be taken to reach the targets. DEP is required to report progress towards the target reductions to the Governor and legislature no less than every two years.⁸¹⁸

In response to this mandate, DEP developed the Climate Change Action Plan, which analyzed all major sources of pollutants that contribute to global warming, including transportation, electricity generation, land use, residential and commercial buildings and industry.⁸¹⁹ Released on December 15, 2008, the Plan sets forth actions and methods for New Jersey to increase energy efficiency and renewable energy in buildings, cars and transportation systems and outlined the means to make drastic reductions in greenhouse gas emissions. Highlights of the Plans recommendations include actions and policies that will:

Transportation

- Promote clean, efficient vehicles, including zero emission electric cars, toward a goal of eliminating fossil fuels from the transportation sector;
- Develop a regional, multi-state low carbon fuel standard that will require fuels to meet increasingly strong standards for greenhouse gas emissions;
- Maintain existing mass transit infrastructure, expand rail capacity and support bus rapid transit;
- Support rapid-transit oriented development;

- Create incentives for the most efficient vehicles and disincentives for the dirtiest;
- Ensure that all vehicle miles traveled are green, meaning at 33 MPG or greater, within 15 years.

Electricity

- Establish standards for power plants that require fossil fuel-fired plants to be as clean as efficient natural gas plants;
- Ban new coal-fired power plants;
- Continue to aggressively increase the use of renewable energy so that all electricity generation is ultimately carbon neutral.

Commercial Buildings

- Ensure that by 2030 all new buildings will combine energy efficient technologies and renewable energy to reach net zero energy consumption;
- Support green buildings through enhanced building codes and incentive programs.

Other

- Promote waste reduction strategies, including advanced recycling and composting, toward a goal of zero waste production by 2050;
- Establish the Garden State Climate Fund to identify and promote effective and verifiable offset projects for companies or individuals seeking to offset their carbon footprint.⁸²⁰

The Climate Change Action Plan was intended by DEP as a first step towards meeting the goals of the Act, and served as the basis for a comprehensive stakeholder process. On January 6, 2009, the DEP initiated a series of six stakeholder sessions to solicit input on the Plan for inclusion in a final report. Written comments and suggestions were also accepted. The stakeholder meetings were held to discuss the following topics:

- Session 1 – Green Buildings
- Session 2 – Industry, Energy Generation and Use, Waste and Water
- Session 3 – Terrestrial Sequestration and Agriculture
- Session 4 – Transportation – Vehicles, Fuel and Infrastructure
- Session 5 – Land Use and Transportation Planning

- Session 6 – Non CO2 Highly Warming Gases⁸²¹

All comments received at these sessions, as well as those received in writing, are currently being reviewed by the DEP to consider how they might impact the final report which is currently under development.⁸²²

The Delaware River Basin Commission

The DRBC was established in 1961 when President Kennedy and the governors of Delaware, New Jersey, Pennsylvania and New York combined forces to sign a unique piece of legislation known as the Delaware River Basin Compact.⁸²³ The Compact created the first regional body empowered with the force of law and dedicated to taking a unified approach to the management of a river system without regard to political boundaries. Members of the DRBC are the governors of the four basin states and one federal representative, the Division Engineer, North Atlantic Division, of the U.S. Army Corps of Engineers.⁸²⁴

DRBC programs include water quality protection, water supply allocation, regulatory review (permitting), water conservation initiatives, watershed planning, drought management, flood loss reduction, and recreation.⁸²⁵ The DRBC has reached many milestones since its establishment, a few of which are highlighted below:

- 1962 – The DRBC approves its first Comprehensive Plan;
- 1968 – The DRBC sets national precedent by adopting regulations to implement water quality standards for the Delaware Estuary that are tied to an innovative waste load allocation plan;
- 1977 – The DRBC adopts regulations to restrict development in the 100-year floodplain and prohibit development in the floodway;
- 1978 – the DRBC helps draft federal legislation that adds two reaches of the Delaware River totaling over 100 miles to the National Wild and Scenic Rivers System;
- 1985 – The DRBC adopts a basin-wide well registration program, just one component of its expanding ground-water management strategy;
- 1986 – The DRBC adopts regulations requiring the source metering of large water withdrawals;
- 1992 – The DRBC adopts special regulations to protect the high water quality of the upper and middle Delaware “Scenic River” reaches;
- 1993 – The Maurice River and several tributaries, including Menantico Creek, Muskee Creek and the Manumuskin River, are added to the National Wild and Scenic River System;

- 1996 – The DRBC adopts regulations governing the discharge of toxic pollutants from wastewater treatment plants to the tidal Delaware River;
- 1999 – The DRBC amends its Ground Water Protected Area Regulations for Southeastern Pennsylvania, placing withdrawal limits on 62 additional watersheds;
- 2003 – The DRBC, the EPA and the states of New Jersey, Delaware and Pennsylvania, established TMDLs for PCBs in the tidal Delaware River from Trenton, New Jersey downstream to the head of the Delaware Bay;
- 2005 – The DRBC adopts a rule to establish pollutant minimization plan requirements for point and non-point discharges of PCBs in the Delaware Estuary;
- 2006 - The DRBC, the EPA and the states of New Jersey and Delaware established TMDLs for PCBs in the Delaware Bay.
- 2008 – The DRBC issues the first State of the Basin Report, which acts as a benchmark of current basin conditions and provides a means for measuring and reporting progress.⁸²⁶

The last milestone listed, the State of the Basin Report, is a major source of information for regulators, managers, non-governmental organizations and anyone interested in the health of the Delaware River Basin. The information is broken into four broad categories – hydrology, water quality, living resources, and landscape – and evaluates each based upon a series of environmental indicators.⁸²⁷ In addition, each category features a new and emerging issue and discusses its impact on that category, such as the impact of climate change on hydrology, the impact of contaminants of emerging concern on water quality, the effect of invasive species on living resources and, in the landscape category, the importance of valuing the basin's “natural capital.”⁸²⁸

The Delaware Bay Benthic and Sub-Bottom Mapping Project

To increase the understanding of the Delaware Bay, the Delaware Coastal Programs are currently engaged in the Delaware Bay Benthic and Sub-Bottom Mapping Project. A cooperative effort between the Delaware CMP, DNERR, and the Department of Geology at the University of Delaware, the project will identify and map the benthic habitat and the sub-bottom sediments of the Delaware Bay.⁸²⁹ This research will address several areas of concern including the impacts of dredging on Bay bottom, the identification of critical habitat for a variety of organisms, including many larval and juvenile fishes, and the identification of the marine life upon which these organisms depend for food. More specifically, the participants seek to determine how disturbance to the bottom caused by increased trawling might be affecting the benthos and influencing stocks utilized in other commercial and/or recreational fishing. In addition, the participants hope to quantify the extent and health of shellfish beds, and examine the effectiveness and longevity of artificial reefs. The fundamental goal of the project is to identify and protect the estuarine biodiversity of the Bay.⁸³⁰

The New Jersey and Delaware Wildlife Action Plans

Through the State Wildlife Grants Program established in 2002, Congress challenged the states to demonstrate their wildlife conservation needs in terms that considered all species and habitats and not just game, sport fish and endangered species.⁸³¹ Both Delaware and New Jersey have risen to this challenge and developed Wildlife Action Plans that identify their respective species in greatest need of conservation (SGNC), identify the key habitats for these species, describe the states' efforts to conserve the SGNC and address the "full array of wildlife" and wildlife-related issues in each state.⁸³²

In 2004, through funding provided in part by the State Wildlife Grants Program, the DNREC's Division of Fish and Wildlife and the Nature Conservancy entered into a partnership to develop a plan for the Blackbird-Millington Corridor to preserve and enhance its most important natural resources and habitats.⁸³³ The Corridor consists of a band of open space that stretches across the Delmarva Peninsula, from the Cypress Branch and Millington area in Maryland to the Delaware Bay at the mouth of the Blackbird Creek. Over 60 experts from 30 organizations and agencies and 150 local residents and landowners participated in this effort. The Plan has been completed and implementation is currently underway.⁸³⁴

Since 2001, New Jersey has received \$7.3 million dollars from Congress through the State Wildlife Grants Program, which has funded the following projects:

- Landscape Project – Funding went towards updates to this DEP GIS digital mapping program, that uses species location data, land-use/land-cover data and species life history information to produce maps that depict critical wildlife habitat throughout the state.⁸³⁵
- Pine Barren Tree Frog Monitoring – Funding helped establish a project to monitor this imperiled species and to investigate the impacts upon it associated with land uses including farming, forestry practices, and development.
- Delaware Bay Shorebird Conservation Project – Funding went towards monitoring of 13 species of arctic-nesting shorebirds that stop over in the Delaware Bay in New Jersey each spring, as well as the identification of the essential habitat of these species.⁸³⁶

The New Jersey Green Acres Program

Established in 1961 and administered by the DEP, the Green Acres Program brings public and private partners together to acquire and protect open space and provide outdoor recreational facilities throughout New Jersey.⁸³⁷ Of New Jersey's 1.4 million preserved acres, approximately 640,000 were protected through the Green Acres Program.⁸³⁸ Although the program purchases and preserves important open space piece by piece, recent acquisitions demonstrate that the program makes an effort to add on to existing open space and wildlife areas to increase the size of the contiguous natural resources and ecosystems preserved. Examples of such acquisitions include the following:

- Jeffrey’s Cranberry Farm, Manchester Township, Ocean County – Green Acres funds in combination with funds provided by the U.S. Navy were used to acquire 246 Acres in Manchester Township. This acreage will be added to the Manchester Wildlife Management Area and will serve as a protective buffer between the Wildlife Management Area and the Lakehurst Naval Air Engineering Station;
- Dragositz Parcel, Holland Township, Hunterdon County – Green Acres funds were used to acquire this 70-acre property which will be added to the Musconetcong River Wildlife Management Area and is contiguous with other state-owned preserved land. This acquisition, which includes over 700 feet of access to the Musconetcong River, a tributary of the Delaware River, brings the total preserved land area to over 300 contiguous acres of forest and fields;
- Higbee Beach Wildlife Management Area – Green Acres funds were used to acquire 18.5 acres in Lower Township, Cape May County, as an addition to the Higbee Wildlife Management Area. Located in the Project Area, this acquisition provides critical undeveloped upland and wetland habitat at the southern end of the Cape May Peninsula, particularly as habitat for migrating raptors and neo-tropical songbirds.⁸³⁹

The Delaware Shorebirds Project

The Delaware Shorebirds Project is a team of state and federal scientists, local volunteers, local and international researchers, birders and others who work to improve the understanding of the importance of the Delaware Bay in the life cycles of migrant shorebirds and their connection to spawning horseshoe crabs.⁸⁴⁰ Partners in this research effort include the DNREC, the DEP, the British Trust for Ornithology, volunteers from the Wash Wader Ringing Group in Great Britain, as well as the U.S. Fish and Wildlife Service which provides staff and logistical support from the Delaware Bay Estuary Project and the Prime Hook/Bombay Hook National Wildlife Refuge complex.

This international team of scientists and local volunteers has banded nearly 60,000 shorebirds in Delaware Bay since 1997 which has resulted in a growing database of sightings describing their migration routes and timing, stopover duration and other important aspects of their ecology.⁸⁴¹

G. SUMMARY OF EXISTING ECOSYSTEM BASED PROGRAMS

Based on the information and analysis above, the following existing programs and projects employ what could be considered to be an ecosystem-based management approach. These programs are categorized as such because they recognize and are based upon, to varying degrees, the biological connections between resources and are implemented on a larger-than-local, more regional geographic or spatial scale.

**TABLE 17
EXISTING ECOSYSTEM BASED PROGRAMS**

Program	Implemented By	Authority	Scope
Water Quality Management Plans	New Jersey	CWA	County
Delaware National Estuary	Delaware & New Jersey	CWA	Estuary
Integrated Reports	Delaware New Jersey	CWA	State
Dredge and Fill Permits – EPA Priority Wetlands	New Jersey	CWA	Wetland Systems
Coastal Non-Point Source Plan	Delaware	CZMA	Enhancement Area (forests urban areas, agriculture areas, riparian areas)
Special Area Management Plans	Delaware	CZMA	South Wilmington Pea-Patch Island
Section 309 Assessment and Enhancement	Delaware New Jersey	CZMA	Coastal Zone
Performance Measurement System Data - Coastal Habitats (mandatory as of 2011)	Delaware New Jersey	CZMA	Coastal Zone
Jacques Cousteau National Estuarine Research Reserve	New Jersey	CZMA	Estuary
Delaware National Estuarine Research Reserve	Delaware	CZMA	Estuary
<i>Chlorophyll a</i> Aerial Sureveillance	New Jersey	HAPHRCA/ CZMA	State Coast, Barnegat Bay and Delaware Bay
Endangered and Threatened Species Lists	Delaware New Jersey	ESA	State
Cape May National Wildlife Refuge	New Jersey	MBCA	Refuge – 11,500 acres
Bombay Hook National Wildlife Refuge	Delaware	MBCA	Refuge – 15,978 acres

**TABLE 17
EXISTING ECOSYSTEM BASED PROGRAMS**

Program	Implemented By	Authority	Scope
Prime Hook National Wildlife Refuge	Delaware	MBCA	Refuge – 10,000 acres
Red Knot Conservation Project	Delaware, New Jersey, Argentina, Chile	NMBCA	Delaware Bay - New Jersey, Delaware, USA; San Antonia Oeste, Argentina; Rio Gallegas Estuary Provincial Reserve and Bahia Lomas, Chile
CAFRA Section 10 Findings, Coastal Goals*	New Jersey	CAFRA	Coastal Zone
Coastal Ocean Protection Council*	New Jersey	COPCA	Coastal Zone
Delaware Whole Basin Management	Delaware	Miscellaneous	Delaware Bay and Estuary Basin
Climate Change Action Plan	New Jersey	GWRA	State
Delaware Bay Benthic and Sub-Bottom Mapping Project	Delaware	CWA, CZMA	Delaware Bay
Delaware Bay River Basin Commission	Delaware, New Jersey, New York, Pennsylvania	Delaware River Basin Compact	Delaware River Basin
Wildlife Action Plans	Delaware New Jersey	State Wildlife Grants Program	State/Multi-Species Habitat
Green Acres Program	New Jersey	Green Acres Laws	Strategic/Contiguous Acquisitions
Delaware Shorebirds Project	Delaware	ESA Delaware Natural Heritage Program	Delaware Bay

*Not being utilized to its full potential at this time