Analysis of Reasonably Foreseeable Interstate Coastal Effects of Federal Actions Occurring in Pennsylvania and Delaware on New Jersey's Coastal Zone
(6-1-07)

"Interstate coastal effects" pursuant to 15 CFR 930.151 means any reasonably foreseeable effect resulting from a Federal action occurring in one state of the United States on any coastal use or resource of another state that has a Federally approved coastal management program. Effects are not limited to environmental effects, but also include effects on coastal uses. Further, interstate coastal effects include both direct and indirect effects. Direct effects are those that occur at the same time and in the same location as the activity whereas indirect effects are cumulative and secondary.

New Jersey is surrounded by water except along 50 miles of its northern border with New York. The Delaware River and Bay form the State boundary between New Jersey and Pennsylvania and New Jersey and Delaware. These waters are part of one of the 28 nationally recognized estuaries, the Delaware Estuary.

An estuary is a semi-enclosed body of water that is formed by the mixing of freshwater from rivers and streams and salt water from the Ocean. Each river and stream that feeds the estuary is part of a watershed connecting the estuary to areas many miles from its boundaries. As such, estuaries are affected by activities within their feeding watersheds. Estuaries are important to wildlife and coastal communities that are located adjacent to these areas. Estuaries provide refuge for many species of wildlife; mammals, birds, fish and other wildlife depend on estuaries as a place to live, feed and reproduce. Estuaries are an important stopover for many migratory species and spawning grounds for many recreational and commercial fish and shellfisheries. Wetlands within estuaries not only provide habitat, but also protect the waters of the estuary from nonpoint source pollution and protect coastal communities from erosion, flooding and storm damage.

Many coastal communities located within an estuary rely on the resources the estuary provides. For example, eco-tourism such as boating, fishing and birding is important to the economy of coastal communities located within the estuary. Further, the protected waters of estuaries provide an ideal location for ports for fishing (both recreational and commercial), transportation and industry.

The Delaware Estuary includes portions of Pennsylvania, Delaware and New Jersey through which the Delaware River flows. It covers approximately 6,747 square miles of watersheds that drain into 134 miles of the Delaware River and Bay from the Trenton Makes Bridge to the mouth of the Delaware Bay. The Delaware Estuary is home to more than 6 million residents living in 22 counties and over 500 municipalities. The Estuary provides 10 percent of the United States drinking water.

The Delaware Estuary is home to the largest population of horseshoe crabs in the world, and is an integral link in the migratory path of numerous species of birds, including shorebirds and waterfowl. The Estuary is the second largest staging area in the Western Hemisphere and plays host to approximately 1.5 million shorebirds annually. Pea Patch

Island, located within the Delaware River, is the largest heronry north of Florida with 12,000 pairs of birds. The Estuary provides vital spawning, nursery and feeding grounds for over 200 species of fish, shellfish and marine mammals. It supports wading birds, reptiles and mammals and serves as a source of drinking water. The Estuary includes more than 641 square miles of wetlands that filter pollutants and sediments from the land and acts as a buffer that provides protection from flooding and erosion.

The Estuary supports a diverse natural environment, as well as vital industrial base of the surrounding region. In addition to its natural beauty and habitat value, the Estuary supports one of the world's greatest concentrations of heavy industry. The Estuary maintains the world's largest freshwater port in Philadelphia and the second largest refining-petrochemical center in the nation receiving nearly 70 percent of all petroleum shipped to the East Coast. Further, the Estuary receives wastewater discharges from 162 industries and municipalities and approximately 300 combined sewer overflows.

For the purposes of examining the interstate coastal effects of Federal actions occurring within this Estuary, the Estuary was divided into 2 areas. These are: the Delaware Bay in Delaware and the Delaware River in Pennsylvania up to the "Trenton Makes" Bridge.

The Delaware River is the longest free-flowing river in the eastern United States. Approximately 6,422 square miles of land area in Pennsylvania, 2,969 square miles of land area in New Jersey, and 1,002 square miles of land area in Delaware drain into the River. The River is navigable by oceangoing vessels up to the Port of Philadelphia and Camden and by smaller boats to Trenton. For the purposes of considering the interstate coastal effects of Federal actions on New Jersey's coastal zone, only the tidal portion of the River up to the "Trenton Makes" Bridge has been listed.

The State boundary of New Jersey and Delaware is generally the center of the shipping channel of the Delaware River with the exception of the area located within the 12-mile circle. In 1682, Duke of York granted William Penn land north of a 12-mile circle centered on New Castle Delaware. In 1934, the Supreme Court set the New Jersey-Delaware boundary within the Twelve-Mile Circle at the mean low water line of the New Jersey shore, subject to the Compact of 1905.

The Delaware River flows into the Delaware Bay, which is bordered by New Jersey and Delaware. The Bay is approximately 70 miles long and covers approximately 782 square miles and is roughly half in New Jersey and half in Delaware. The Delaware Bay is the second largest migratory stopover in the Western Hemisphere with over one million birds annually. This is due to a readily available food source, horseshoe crab eggs, along the Delaware Bay. The Delaware Bay is home to the world's largest population of horseshoe crabs. Since the 1990s horseshoe crab populations have declined significantly resulting in the decline of shorebird populations such as the Red Knot. Horseshoe crabs are harvested for eel and conch bait. It is believed that the decline of horseshoe crab populations is the result of overharvesting. To address this issue, increased restrictions on horseshoe crab harvesting have become necessary.

The Delaware Bay was once home to commercial densities of Eastern Oysters. Throughout the early 1990s oyster landings from the Bay ranged from one to two million bushels. However, the MSX and Dermo parasites have plagued the Bay's oyster populations. Currently only one oyster shucking house and one oyster packinghouse with a combined employment of 50 people operate in the Town of Bivalve, Cumberland County, New Jersey. Because of the decline of oyster production in the Bay, these facilities process mostly out-of-state oysters. In 1995 the direct harvest of oysters from the State's natural seed beds was permitted, in the spring and fall. Participants in this program have received quotas of roughly 1,000-3,000 bushels per season and harvesters are charged a $1.25 to $1.75 per bushel fee. From the spring of 1996 through the spring of 1997, approximately 88,000 bushels worth approximately $1,800,000 were direct marketed from the upper Bay. Since 1999, approximately 40 oyster dredge boats have participated in the direct market program each year, with an annual harvest worth $1,500,000. Since 1995, the price per bushel of oysters has risen from approximately $18 to $27 per bushel. In an effort to revitalize the industry, the Delaware Bay Oyster Restoration Task Force (consisting of representatives of the New Jersey Department of Environmental Protection, Delaware Department of Natural Resources and Environmental Control, Rutgers University, Delaware River Basin Commission and Delaware River Bay Authority) in 2005 initiated a large-scale oyster shell planting and transplant program using 280,000 bushels of shell. This effort yielded a 10% increase in oyster recruitment despite a population decline in areas outside the seed beds.

Port complexes have historically been the anchors of large waterside communities. Early in its history, the Delaware River inspired the funding and growth of the ports in the Estuary. Today, the Delaware Estuary is a vital industrial base for the surrounding region, supporting one of the world's greatest concentrations of heavy industry. The Estuary is home to a port complex consisting of the Ports of Philadelphia, Pennsylvania; Camden, Gloucester City and Salem New Jersey; and Wilmington, Delaware, with the most significant being the Ports of Philadelphia, Camden and Wilmington**.**

The Delaware River Port Complex (including docking facilities in Pennsylvania, New Jersey and Delaware) Port of Philadelphia Pennsylvania is the world's largest freshwater port with over 3,000 ships annually. According to testimony submitted to a US House of Representatives subcommittee in 2005, the port complex generates $19 billion in economic activity. The Port handles more than ¼ of the entire Northern District's annual tonnage and is the fourth largest port in the United States in handling imported goods. By volume, the Port is the second largest Port in the North Atlantic handling bulk, liquid bulk, container break bulk, project cargo, automobiles as well as supporting a cruise line terminal. In October 2002, the Port was named the nation's 14th strategic military port by the Department of Defense, making it one of only 14 ports in the United States permitted to handle the nation's military cargoes. In 2003, the cruise season generated 133 full time equivalent jobs, $8.4 million in business revenue, $4.4 million in employment revenue and $500,000 in state and local taxes (DRPA, 2003).

The Delaware River and Bay is home to the 3rd largest petrochemical port as well as five of the largest East Coast refineries. Nearly 42 million gallons of crude oil are moved on

the Delaware River on a daily basis. There are approximately 3,000 deep draft vessel arrivals each year and it's the largest receiving port in the US for Very Large Crude Carriers (tank ships greater than 125,000 deadweight tons). It is the largest North American port for steel, paper and meat imports as well as the largest importer of coca beans and fruit on the East Coast.

The Port of Camden New Jersey specializes in break bulk and bulk cargo. The primary cargoes of the Port of Camden are steel products, wood products, fruit, cocoa beans, furnace slag, petroleum, coke, scrap metal and project cargo. It is the #1 port for handling import wood products in the United States. In 2002, the Port generated more than 23,000 jobs and generated more than $202 million in annual income in the Camden/South Jersey Region.

The Port of Wilmington Delaware handles over 400 vessels per year with an annual import/export cargo tonnage of 5 million tons. The primary cargoes for the Port include bananas, tropical fruit, deciduous fruits, juice concentrates, frozen meat and fish, citrus fruits, automobiles, containers, lumber, steel, non-ferrous metals, dry bulk ores and minerals, special project cargo, automobiles, trucks, heavy equipment, paper, general cargo, petrolcoke, deciduous fruits. This port is #1 in North America for the import of fresh fruit, bananas and juice concentrate. Further, the Port of Wilmington is the nation's leading port for imports of frozen beef. The Port also receives over 1 million tons of liquid bulk petroleum products at its specialized tanker berth on Christina River**.** In 2000**,** the Port handled over 1.2 million tons of containerized cargo making it the largest container port on the Delaware River. In 2000, the Port generated 2,550 full time jobs of which New Jersey residents held 5 percent of these jobs. Further, in 2000, the maritime activity of the Port generated $212.8 million of business revenue including $90.4 million of direct personal earnings and $22.8 million of state, county and local taxes. Of the $22.8 million in tax revenue, New Jersey received $1.1 million[1]**.**

[1] Martin Associates, 2001. "The local and Regional Economic Impacts of the Port of Wilmington Delaware." Report was prepared for the Diamond State Port Corporation. Lancaster, PA: Martin Associates, February 1, 2001.

I. ARMY CORPS OF ENGINEERS, DEPARTMENT OF DEFENSE

Federal actions affecting New Jersey's coastal zone	Legal Authority	Location of Federal action in PA that may effect NJ's coastal zone	Location of Federal action in DE that may effect NJ's coastal zone
Construction of structures such as dams or dikes, bulkheads, revetments, groins, jetties, piers, docks, artificial reefs, pipelines, cables and wind turbines and islands or activities such as dredging, filling, mining, excavation and mooring of vessels in navigable waters, creation of artificial islands	Sections 9 and 10 of the Rivers and Harbors Act (33 U.S.C. 410 et seq.)	Dredging 50,000 or more cubic yards of material below the high tide line in the Delaware River up to the "Trenton Makes" Bridge. Subaqueous disposal of 50,000 or more cubic yards of dredged material below the high tide water in the Delaware River up to the "Trenton Makes" Bridge.	Dredging 50,000 or more cubic yards of material below the high tide line in the Delaware Bay. **Note**: This listing does not include the mining of sand for beach nourishment projects. Subaqueous disposal of 50,000 or more cubic yards of dredged material below the high tide water in the Delaware Bay.

Analysis: As evidenced by the above discussion, the Delaware Estuary is an environmentally sensitive ecosystem that is heavily used for both commercial and recreational interests. Shipping is important to the economy of the states bordering the Delaware Estuary. To support the Delaware River Port Complex, and accommodate large vessels, the US Army Corps of Engineers has conducted dredging activities in the estuary since the latter part of the 19th century. The current depth of the Delaware River Channel at mean low water is approximately 40 feet. To maintain this depth approximately 5.5 million cubic yards of sediment are dredged on an annual basis. Historically, the dredged material was deposited largely on the shores and marshes of the Estuary creating areas that were later developed with industrial uses.[2]

In many areas of the state sediments have become contaminated with a variety of toxic substances, including PCBs, heavy metals, pesticides and polycyclic aromatic hydrocarbons (PAHs). Sediments in tidal waterways may be contaminated as a result of discharges from industrial, municipal and storm sewer sources, marina and boating

[2]Comprehensive Conservation and Management Plan for the Delaware Estuary, September 1996; pp. 31

operations, and atmospheric deposition. The dredging and subsequent disposal or use of these sediments if not properly managed, could result in direct and indirect effects on the natural environment and public health.

Elevated levels of toxic substances including heavy metals and organic contaminants have been detected in the sediments, the water column, and in the tissues of organisms dependent on the estuary. Toxic substances are present in the sediments as a result of point and nonpoint discharges to the Estuary and atmospheric deposition. Contaminated sediments may act as a source of continued contamination of the water and biota. DDT, PAHs, copper, lead, zinc, chromium, nickel, cadmium, and mercury were found in the sediments in the greater Philadelphia area. Lead, zinc, cadmium, pesticides, and some PAHs exceeded NOAA effects-level-median, which is the level at which adverse effects are frequently observed in benthic species.[3]

Potential adverse environmental impacts associated with dredging operations arise from the alteration of benthic habitat as a direct result of the operation and the dispersal of sediments and associated contaminants away from the dredging area. Impacts could result from the direct physical settlement of the dispersed sediments onto sensitive benthic areas. Dispersal of contaminants associated with these impacts could have both direct and indirect effects on benthic and water column food webs.

Potential water column impacts vary with each type of dredging method employed, that is, mechanical or hydraulic. Mechanical methods have been documented to release more suspended sediments at the dredging site than hydraulic methods. Hydraulic dredging causes greater mixing of sediments with water which is an important consideration when dredging contaminated sites, since slurry water is usually released into the water body.

Previously dredged areas typically accumulate black muds high in clay and silt, detritus and other organics and if sources are present, toxic heavy metals, petroleum and chlorinated hydrocarbons. The majority of potentially toxic contaminants are closely bound to fine grained sediment particles and may or may not be available for uptake by aquatic organisms. Bioaccumulation testing is necessary to determine there is contaminant uptake.

The discharge of dredged material into the waterway, and the discharge from upland disposal facilities can affect biological resources, from release of sediments, including contaminated sediments, into the water column as well as settling of those sediments. Subaqueous disposal has additional effects as well, modifying the bay or river bottom, which would affect the benthos and potentially habitat value.

The information available on aquatic species responses and/or mortality due to dredge-induced water quality changes is incomplete. It is known however that egg and larval forms of aquatic biota are more sensitive than adult stages. American oyster eggs and larvae are known to be sensitive to turbidity levels and durations that typically occur at mechanical dredging sites. Turbidity is known to block upstream migration of striped

[3] Comprehensive Conservation and Management Plan for the Delaware Estuary, September 1996; pp. 44

bass. Turbidity may therefore, block other anadromous species during upstream migration. Aquatic finfish and blue crabs which winter in the Estuary are lethargic at cold water temperatures. Large-scale mechanical and hydraulic dredging operations could entrain and kill significant numbers, since they would not be able to evacuate a dredging area.

Given the fact that the Delaware Estuary receives wastewater discharges from 162 industries and municipalities and approximately 300 combined sewers, the potential exists for fecal bacteria to become suspended during dredging operations. Little information exists on the resuspension of fecal bacteria in contaminated sediment. The potential exists that a dredging turbidity plume could carry fecal bacteria into harvestable shellfish beds. This could result in closure of the beds due to human health hazards.

The effects of dredging operations in the Delaware River in Pennsylvania and Delaware Bay may also affect the recreational and commercial fisheries of the River and Bay. For example, as discussed previously, there is an effort underway to re-establish the oyster industry of the Delaware Bay by both New Jersey and Delaware. This industry could be affected by changes in water quality resulting from the turbidity associated with the dredging of the River and Bay. The Striped Bass fishery may also be affected by the turbidity resulting from the dredging activities. In addition, the Blue Crab recreational fishery could also be affected by dredging activities if seasonal restrictions are not in place.

Due to the complexities and wide range of circumstances associated with dredging operations on sediments, the water column and benthos, the specific types and degrees of these effects and their consistency with the enforceable policies of the New Jersey Coastal Management Program can not be predetermined. Moreover, the specific types and degrees of effects on coastal resources and uses of the Delaware River in Pennsylvania and Delaware Bay must be fully evaluated in order to assess the overall effects of dredging on New Jersey's coastal zone. Therefore, the New Jersey Coastal Management Program is listing the Federal permits for the "Dredging of 50,000 or more cubic yards of material" and "subaqueous disposal of 50,000 or more cubic yards of material" in the Delaware River in Pennsylvania up to the "Trenton Makes" Bridge and in the Delaware Bay as interstate activities that have reasonably foreseeable effects on the coastal resources and uses of New Jersey's coastal zone. For the purposes of this listing and in accordance with New Jersey's enforceable policies, the term "dredging" does not include mining of sand for beach nourishment activities. Dredging is the removal of sediment for navigation purposes (see N.J.A.C. 7:7E-4.6 and 4.7), while sand mining is the removal of sand for use at another location (see N.J.A.C. 7:7E-4.12)

The threshold of 50,000 cubic yards was chosen based on an evaluation of dredging projects the Department has reviewed in the Delaware Bay and Delaware River up to the "Trenton Makes" Bridge since 1998. The Department has determined that this volume is of significant size such that it will result in localized water quality effects.

II. ARMY CORPS OF ENGINEERS, DEPARTMENT OF DEFENSE

Federal actions affecting New Jersey's coastal zone	Legal Authority	Location of Federal action in PA that may effect New Jersey's coastal zone	Location of Federal action in DE that may effect New Jersey's coastal zone
Discharge of dredged and fill materials and other activities in the waters of the United States, including wetlands	Section 404 of the Clean Water Act (33 U.S.C. 1344)	Subsurface (in water) dredged material disposal or relocation or redistribution of sediments below the high tide line in the Delaware River up to the "Trenton Makes" Bridge. Confined upland disposal facilities with capacity to handle at least 50,000 cubic yards of dredged material that discharge directly into Delaware River up to the "Trenton Makes" Bridge.	Subsurface (in water) dredged material disposal or relocation or redistribution of sediments below the high tide line in the Delaware Bay. Confined upland disposal facilities with capacity to handle at least 50,000 cubic yards of dredged material that discharge directly into the Delaware Bay.

Analysis: The disposal of dredged material has effects on coastal resources and uses. It can have significant adverse effects such as the introduction of heavy metals, burial of benthic flora and fauna and increased turbidity. Further, the discharge of dredged material into the waterway and the discharge from upland disposal facilities can affect biological resources, from the release of sediments, including contaminated sediments into the water column as well as the settling of those sediments. These effects will vary depending upon the type of disposal (in-water vs. upland) and the distance from the disposal site. For example, open water disposal, particularly of hydraulically dredged fine grain sediments frequently forms a "fluid mud" layer along the water body bottom. Fluid muds have been documented to cause acute mortality of aquatic benthic organisms due to low oxygen levels and slow rate of consolidation. Upland disposal can result in contamination of surface and ground waters. The discharge of contaminants to surface waters can affect the aquatic ecosystem, while its dispersal to the terrestrial ecosystem can effect receptor organisms.

The effects of the disposal of dredged material in the Delaware River in Pennsylvania and Delaware Bay may also indirectly effect the recreational and commercial fisheries of the River and Bay. For example, as discussed previously, there is an effort underway to re-establish the Oyster industry of the Delaware Bay by both New Jersey and Delaware. This industry could be affected by changes in water quality resulting from the disposal of dredged material into the River and Bay. The Striped Bass fishery may also be affected by the turbidity resulting from the dredged material disposal, as turbidity is known to block upstream migration of stripped bass.

"Reprofiling or beam leveling" is the movement of sediments from one location to a specific adjacent and deeper location without removing the sediments from the water, resulting in a recontouring of both the reprofiled and depositional areas. It is usually performed by a crane or tugboat dragging a steel I-beam across the area to be reprofiled. The drag is terminated in the adjacent, deeper area, where the sediments are deposited. Reprofiling or leveling typically occurs between dredging events. The New Jersey Coastal Management Program considers "reprofiling or beam leveling" a method of dredging. However, in its permit decision CENAP-OP-R-200300429-46, Sunoco Inc-Point Breeze, the Army Corps of Engineers determined that reprofiling or beam leveling was not a dredging activity but rather an activity requiring Section 404 authorization as it involves the discharge of both dredged and fill materials within waters of the United States.

Because reprofiling or beam leveling only moves sediments from one location to another, there is concern that the sediments may be resuspended and redeposited in other areas impacting existing benthic communities in the vicinity of the project area. Whereas conventional dredging operations attempts to remove contaminated sediments from the aquatic ecosystem, reprofiling does not and thus results in the redistribution of such sediments. The potential direct and indirect effects of reprofiling or beam leveling on the coastal resources and uses of New Jersey's coastal zone are the same as those associated with dredging discussed on pages 6 and 7 of this document.

In summary, the effects of dredged material disposal and relocation or redistribution of sediment will differ depending on the manner in which the sediments are released into the water column, the types of sediments and pollutants suspended, depths of the water and surface and other currents in the area. These effects could be direct effects such as burial of benthic flora and fauna or indirect through changes in water quality. Because of these variables, the New Jersey Coastal Management Program can not predetermine the effects of dredged material disposal and relocation or redistribution of sediments on the coastal resources and uses of New Jersey's coastal zone nor consistency with New Jersey's enforceable policies. Moreover, the specific types and degrees of effects on coastal resources and uses of the Delaware River in Pennsylvania and Delaware Bay must be fully evaluated in order to assess the overall effects of dredged material disposal and relocation or redistribution of sediments on New Jersey's coastal zone. Therefore, the New Jersey Coastal Management Program is listing "Subsurface (in water) dredged material disposal or relocation or redistribution of sediments" and "Confined upland

disposal facilities with the capacity to handle at least 50,000 cubic yards of dredged material" in the Delaware Bay and Delaware River in Pennsylvania up to the "Trenton Makes" Bridge.

The threshold of 50,000 cubic yards was chosen based on the Department's experience reviewing projects using the Weeks confined upland disposal site, and an evaluation of the size of facilities the Department has reviewed in the Delaware River and Delaware Bay since 1998. The Department has determined that facilities of this size will have a greater effect on coastal resources and uses over a greater period of time.