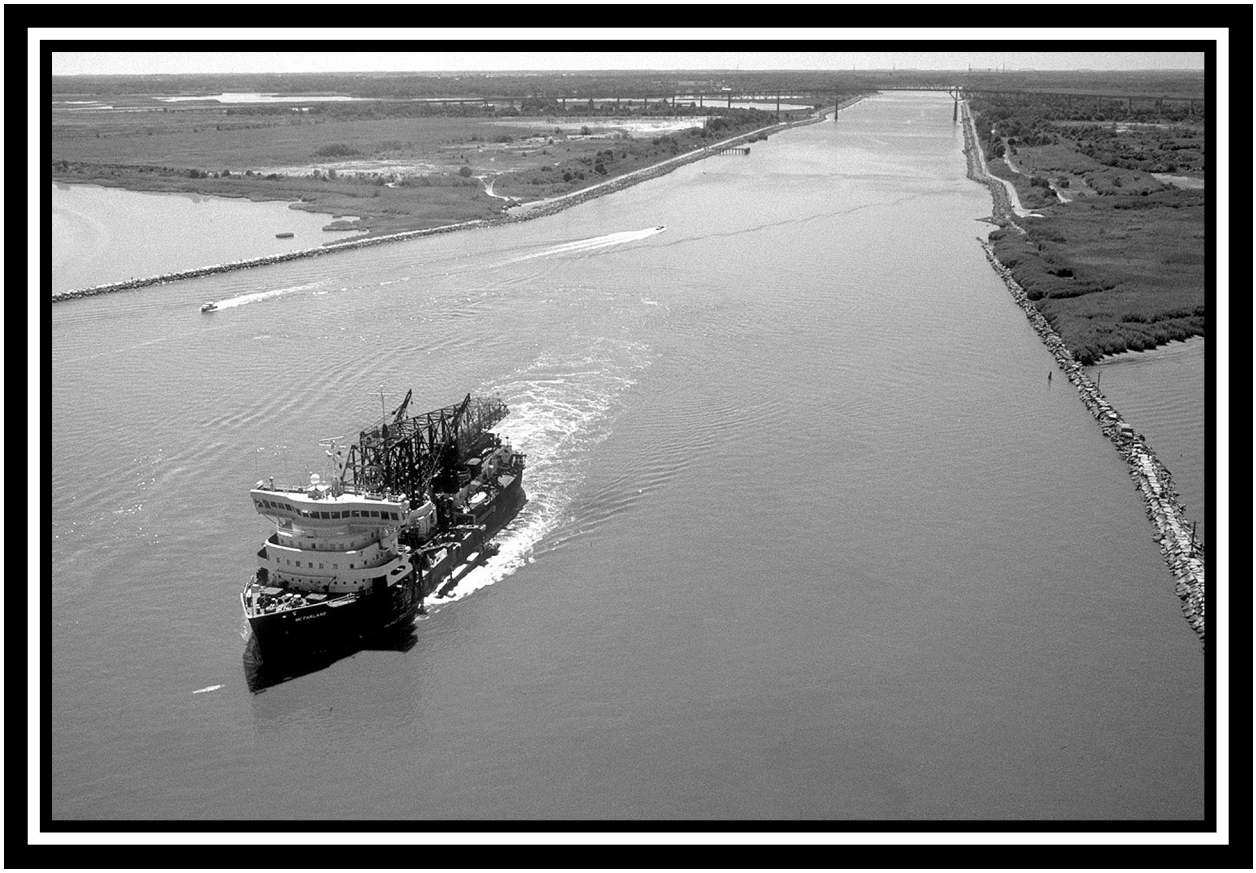
Responsiveness & Reliability:

A History of the Philadelphia District and the Marine Design Center, U.S. Army Corps of Engineers, 1972-2008

Responsiveness and Reliability:

A History of the Philadelphia District and the Marine Design Center, U.S. Army Corps of Engineers, 1972–2008



by
Matthew C. Godfrey
Joshua Pollarine
Paul Sadin
Historical Research Associates, Inc.

Prepared for the
Philadelphia District, U.S. Army Corps of Engineers

2012

Preceding page: The Dredge McFarland *transiting the Chesapeake & Delaware Canal east of Reedy Point Bridge*

Contents

Contents iii

Foreword from the District Commander vi

Acknowledgments viii

Introduction xi

Historical Time Line xviii

1 Reorganizations and Responses: The Evolution of the Philadelphia District, 1972–2008 1

Effects of the Environmental Movement and NEPA. 3

Corps Reorganization in the 1970s and 1980s 10

Corps Reorganization in the 1990s. 16

Regionalization and USACE 2012 24

Project Management Initiatives. 27

Perceptions of the Philadelphia District 34

2 Dams, Basin Planning, and Flood Risk Management . 41

Tocks Island Dam 43

Trexler Lake Project 62

Beltzville Lake and Blue Marsh Lake 65

The Level B Study and the Delaware Estuary Salinity Intrusion Study. 79

Modifications to Walter and Prompton Dams 83

National Dam Safety Inspection Program 91

Molly Ann's Brook Project 95

Continuing Authorities Program 97

3 Coastal Engineering and Storm Risk Management 107

Early Coastal Protection Projects 109

Coastal Protection Projects in New Jersey 116

Coastal Protection Projects in Delaware 124

Inlet Navigation Improvement Projects 131

4 Waterways, Navigation, and Dredging 141

Floating Plant: The District Fleet 143

The Delaware River Dredging Disposal Study 150

Delaware River Main Channel Deepening 160

The Chesapeake and Delaware Canal 170

5 Environmental Programs 185

Regulatory Branch Operations 187

Hazardous, Toxic, and Radioactive Waste Remediation 205

Ecosystem Restoration 209

6 Emergency and Contingency Operations 229

Background 230

Responses to Natural Disasters 233

Other Emergency Responses 243

Support for Military Contingency Operations 246

7 Military Construction and Installation Support 253

Installation Support: Fort Dix and McGuire Air Force Base 254

Installation Support: Dover Air Force Base 262

The Effects of the Base Realignment and Closure (BRAC) Program on MILCON 268

8 The Marine Design Center 279

9 Work for Others (Reimbursable Services) 297

Work for the U.S. Postal Service 299

Work for Qatar and Gabon 300

Support for the EPA Superfund Program 303

Work for the U.S. Coast Guard 314

Work for the Federal Aviation Administration 315

Work for the City of Philadelphia 316

10 Conclusion 325

Appendices

Philadelphia District Dams and Reservoirs 334

Philadelphia District Major Vessels 336

Active Philadelphia District O&M Navigation Projects 338

High-Level Highway Bridges over the Chesapeake & Delaware Canal 340

Marine Design Center Projects, 1982–2008 342

Philadelphia District Gallery of Distinguished Employees 346

Lifetime Customer Care Award 354

Selected Bibliography 356

Index 363

Foreword from the District Commander

Essayons. Long the motto of the U.S. Army Corps of Engineers, this single French imperative is best translated as "Let Us Try." At first glance, it's an unlikely rallying cry. Just try? Doesn't it matter if we succeed? We all know one answer: "If at first you don't succeed, try, try again." But more important—if at first you don't try, you won't succeed at all.

That is how the men and women of the Corps' Philadelphia District embody the true essayons spirit: They keep succeeding because they never stop trying.

This volume picks up where *The District: A History of the Philadelphia District, U.S. Army Corps of Engineers, 1866–1971* leaves off. Aside from the updated time period, the title of this book acknowledges the former Marine Design Division becoming a separate Corps organization in 1979, although both the location and the legacy of the Philadelphia District and the Marine Design Center have remained close together.

We also wanted the title to capture the essential qualities that best reflect the District's reputation. We are known for trying and doing our best from the beginning (**responsiveness** to customer needs) through to the end (**reliability** in delivering solutions that meet those needs).

In these pages, we look at the changes and challenges that have affected the District as a whole, along with the programs, projects, and events that have defined its mission. A lot changed between the Philadelphia District of 1972, which had become largely a civil works district focused on navigation and flood control, and the Philadelphia District of 2008, which had evolved into a full-service district—with its historic military construction mission restored and a third mission officially dedicated to reimbursable work for non-Corps customers. We were always known as a "dredging district," but now we dredge for shore protection as well as for navigation. We had long enjoyed a good reputation with our Army and Air Force customers; now that network of satisfied customers includes EPA, FEMA, the Coast Guard, and many others. What was always a top-notch engineering organization is now a top-notch engineering and environmental organization. We always responded

to any emergency, any contingency. We still do, but more often, and often much farther from home. For decades, one of the District's divisions handled naval architecture and marine engineering for the Corps' varied and wide-ranging fleet; now, as the Marine Design Center, its customer base has steadily grown to include the Army and other federal agencies.

Like that first volume, this is not a comprehensive record of all programs, projects, and events spanning almost four decades. That would require many more volumes. Rather, it is a continuation of the narrative about a unique organization and some of the things that made it so. We did not intend this as a bound catalog of facts, but as a book worth reading. We hope we have succeeded, and that you find it both educational and enjoyable. Most important, I hope you come away with a deeper understanding of the pride I have in serving with such a fine group of people.

Philip M. Secrist III
Lieutenant Colonel, Corps of Engineers
Commander & District Engineer

Philadelphia, 30 January 2012

Acknowledgments

Writing the history of an organization always involves the work of more people than just those doing the research and writing. This history is no different. We are indebted to a number of people for their willingness to help us with research, document collection, and general guidance. The major theme of this history is the responsiveness of the Philadelphia District to the needs of the nation. That responsiveness was certainly exhibited by many people in the district as we prepared this history. However, any errors or omissions in the publication are strictly our own.

Many thanks to Ed Voigt, head of the Philadelphia District's Public Affairs Office, for his help throughout this project. Ed tracked down photographs and information, put us in contact with the right people when we had questions, and served as a sounding board for ideas about the history. His aid has been invaluable.

Thanks as well to Linda Skale, technical information specialist and guardian of the district's Technical Library. Linda cheerfully allowed us access to the numerous holdings in the library, enabling us to prepare a better product, and provided us with space in the library to conduct our research. Monica Strucko helped us find administrative records held in storage by the Philadelphia District, records that proved useful in the preparation of this history.

Several people provided us with documents and answered questions about their areas of expertise. Jeffrey Gebert (coastal planning), Paul Gaudini (military installation support), and Kathleen "Micky" Mulvenna and Bob Eckhardt (emergency management) were especially instrumental in this regard. Anthony DePasquale, chief of the Operations Division, answered questions about the district's navigation mission, while Brian Heverin provided information about the district's military construction work in the 1980s, and John Tunnell answered additional questions about the district's coastal program. Bill Gretzmacher, director of the Marine Design Center, and Vint Bossert shared their insights about the center, while Dwight Pakan and Brian Mulvenna gave us a better understanding of the district's ecosystem restoration projects. Mark Wheeler shared his knowledge

of Superfund projects and the district's regulatory program, and George Bock helped us understand the district's DuPont Chambers Works project better. We thank all of them for their time and knowledge.

We thank also those who participated in formal oral histories with us about the Philadelphia District. John Bartholomeo, John Burnes, Bob Callegari, Vince Calvarese, Frank Cianfrani, Harry Dutchyshyn, Jeffrey Gebert, Keith Lawrence, Ralph Locurcio, Richard Maraldo, Doug Moore, Al Schoenebeck, and Joe Vilord allowed us to interview them about their experiences. Their insights enabled us to focus on the important issues in the district's history from 1972 to 2008, and we thoroughly enjoyed talking with them.

We wish to express our thanks to the Corps commanders who made this project possible. First and foremost, we thank Maj. Gen. Todd T. Semonite, Commander and Division Engineer of the North Atlantic Division, who was an ardent advocate for the importance of celebrating the Corps' illustrious heritage and history and, through his initiative, made this work possible. We also thank the previous and current district engineers who have overseen the project along the way, including Lt. Col. Gwen E. Baker, Lt. Col. Thomas J. Tickner, and current Philadelphia District Commander Lt. Col. Philip M. Secrist.

In addition, we thank Daniel Lee from the Federal Records Center in Philadelphia for his help in accessing Philadelphia District records held by that facility.

Finally, we owe a particular debt of gratitude to Anthony Bley, Philadelphia District Photographer (from 1971 to 2007), whose impressive body of work was the source for the vast majority of photographs included in this volume. His eye for both artistry and accuracy, both style and substance, was invaluable in providing so many pictures that truly helped tell the Philadelphia District story.

New York
Hancock
Judwin Dam
Prompton Lake
Pdrt Jervis
Tobyhanna Army Depot
Francis E. Walter Dam
Beltzville Lake & Northern Area Office
Easton
Pennsylvania
Allentown
Bethlehem
Blue Marsh Lake
Reading
Pottstown
Trenton
Manasquan
Philadelphia
District Office
Camden
Joint Base McGuire-Dix-Lakehurst
Chester
Wilmington
New Jersey
Maryland
Aberdeen Proving Ground
C&D Office
Vineland
Atlantic City
Ocean City
Dover
Delaware Bay
Dover Air Force Base
Cape May
Lewes
Rehoboth Beach
Delaware
ATLANTIC OCEAN
PHILADELPHIA DISTRICT
US Army Corps of Engineers

Introduction

This history covers the operations of both the Philadelphia District and the Marine Design Center (MDC), U.S. Army Corps of Engineers, from 1972 to 2008. These were years of transition and change for the Corps as a whole and for the district and MDC in particular. In 1972, dams and other flood control structures were still seen as the most effective solutions to flooding, but by 2008—mainly because of environmental and economic considerations—dams were for the most part no longer viable. By 2008, owing to the influence of a growing environmental movement in the United States, the Corps had added a separate ecosystem restoration component to its traditional civil works missions of navigation, flood control, and military construction. Also, the misleading term "flood control" had given way to a more realistic emphasis on risk reduction for both floods and coastal storms, the latter of which now account for the lion's share of the district's civil works construction program.

During this period, Congress directed the Corps to extend its expertise outside its own boundaries and to provide support to other federal, state, and local agencies. As the Corps adjusted to these new responsibilities, it undertook internal restructuring to make itself more efficient, more responsive, and more cost-effective in its work. This restructuring included the consolidation of some centers of technical expertise directly under Corps Headquarters; thus, the MDC moved in 1979 from its

Facing page: The Philadelphia District's civil works boundaries, encompassing the Delaware River Basin and the adjacent Atlantic Coastal Plain in New Jersey and Delaware

position under the Philadelphia District to the Water Resources Support Center (although only organizationally; it has remained collocated with the district).[1] Concepts such as project management and regionalization were central to the restructuring, changing the way the Corps did its work; the restructuring caused some instability in individual districts, as some were resized or had certain components removed or added.

All these changes affected the Philadelphia District. Tracing its origins to 1866, the district was originally drawn to include the entire Delaware River Watershed and the adjacent Atlantic Coastal Plain. Although one of the smaller Corps districts in geographic area, it encompassed more than nine million people living in eastern Pennsylvania, New Jersey, Delaware, the Catskills region of New York, and a small corner of Maryland. It had responsibility for 550 miles of federal channels in various waterways and for 150 miles of coastline. It also had jurisdiction over 1.1 million

The Towboat William James, *delivered to the Vicksburg District by the Marine Design Center in 2007*

acres of wetlands. As of 2008, the Philadelphia District was charged with operating and maintaining five dams, four canals, and five highway bridges, and was the home base for the Hopper Dredge *McFarland.* It conducted military construction and contracting oversight at Dover Air Force Base, Del., and Joint Base McGuire-Dix-Lakehurst, N.J., and aided the Baltimore District with its work at Aberdeen Proving Ground, Md. Finally, the district provided engineering and construction services to other federal agencies and state and local governments, including the U.S. Environmental Protection Agency (EPA), the United States Coast Guard, the Federal Emergency Management Agency, the Federal Aviation Administration, and the city of Philadelphia.[2]

Changes in the district's workload occurred gradually between 1972 and 2008. Environmental work evolved over time, originally encompassing regulatory permitting, then adding support to the EPA's Superfund program, and then including an ecosystem restoration component in its civil works mission. Likewise, the district's Support for Others program evolved over time to include support for federal and state agencies, as well as nations such as Gabon. The district also saw its emergency operations role expand between 1972 and 2008, reaching the point that the district established a permanent Emergency Management Office to coordinate support for responses to both natural and manmade disasters and for military contingency operations.

Beginning in the 1980s, remediation of EPA Superfund sites grew into one of the District's largest programs

Along with these new responsibilities, the district maintained its traditional duties of keeping waterways open for safe navigation,

protecting communities from floods and coastal storms, and building facilities for the Army and Air Force. Navigation work involved dredging, jetty construction, and other operations along the Atlantic coastline and both sides of the Delaware Bay, and in waterways such as the Delaware River and the Chesapeake and Delaware Canal. The district's flood and storm damage reduction tasks ranged from operating five dams in eastern Pennsylvania to constructing multiple beach nourishment systems along the Atlantic Ocean in New Jersey and Delaware. Although the military construction mission had disappeared and reappeared among the district's responsibilities at various times, this mission seemed destined for permanence when Philadelphia was redesignated as a military district in 2009. Finally, one of the bigger changes on paper was the

Delaware River flooding at Trenton, N.J., in 2006

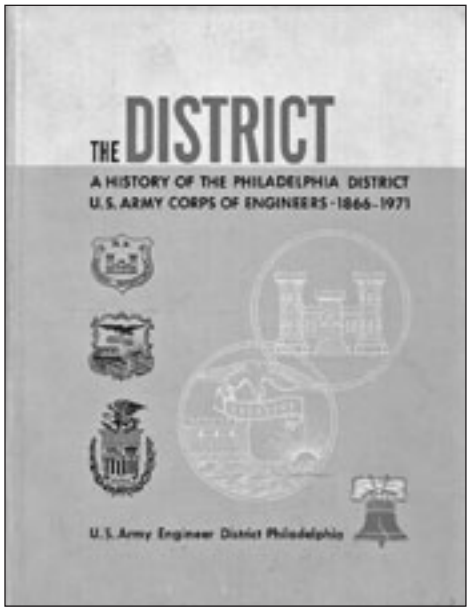
transition of the district's Marine Design Division to the USACE Marine Design Center, although the change was less dramatic in reality: It is still in the same place, doing essentially the same things.

With its host of responsibilities, the district responded well to the changes occurring throughout the Corps, showing remarkable flexibility and ingenuity as its missions were redefined, its responsibilities altered, and its former drastic swings in workload smoothed out. A primary theme running through the district's history between 1972 and 2008 is responsiveness: to change, to the Army, to Congress, and to its customers' needs. The district prides itself on this characteristic, which defines the district in the eyes of those with whom it works.

In tracing the theme of responsiveness, this history picks up where the original Philadelphia District history left off. That history—*The District: A History of the Philadelphia District, U.S. Army Corps of Engineers, 1866–1971*, by Frank E. Snyder and Brian H. Guss—noted that "the stories of the Corps and of the Delaware Valley itself have been freshets feeding the same swift-running stream of American History, sometimes flowing smoothly, sometimes through dangerous rapids." Snyder and Guss's work "attempt[ed] to trace that journey" as it applied to the Philadelphia District.[3] We have the same goal for this history. The Philadelphia District did not operate in a vacuum between 1972 and 2008; rather, its actions occurred in the context of changes in the United States and in the Corps itself. Sometimes these changes led to difficulties for the district, but Philadelphia always soldiered on, adjusting as best it

Dover Air Force Base, Del.

Fort Dix, N.J.



The first Philadelphia District history volume

could. The district may not have looked the same in 2008 as it did in 1972, but it still fully embraced the responsiveness, ingenuity, and "plain engineering know-how" that Snyder and Guss observed as they traced its earlier history.[4] The continuity of responsiveness and reliability is the overall theme of this work.

[1] Keith Lawrence telephone interview by Paul Sadin, 9 March 2009, transcript, 8-9; see also 1972–1995 working draft administrative history of the Philadelphia District, compiled by Joe Morgan, 114 [hereafter referred to as Unpublished Morgan Draft District History], copy provided by Ed Voigt, U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania [hereafter referred to as Philadelphia District].

[2] Linda M. Toth, "Philadelphia District, FY 10 Business Opportunities," Powerpoint presentation available at <http://www.samephiladelphiapost.org/MonthlyMeetings/2009/Oct2009/USACE.ppt#289,2,PHILADELPHIA DISTRICT> (1 June 2010).

[3] Frank H. Snyder and Brian H. Guss, *The District: A History of the Philadelphia District, U.S. Army Corps of Engineers, 1866–1971* (Philadelphia: U.S. Army Engineer District Philadelphia, 1974), II.

[4] Snyder and Guss, *The District*, II.

Historical Time Line 1972–1986

Col. Carroll D. Strider
1971–1973

Col. Clyde A. Selleck
1973–1975

Col. Harry V. Dutchyshyn
1975–1978

1972

- Tropical Storm Agnes drenches the mid-Atlantic, becoming the greatest flooding event known in the Susquehanna River basin.
- A year after completion of Beltzville Lake, site of the second Corps dam within the Lehigh River sub-basin and the district's first "multipurpose" flood control project, the Commonwealth of Pennsylvania officially takes over management of recreation with the dedication of Beltzville State Park.
- The Philadelphia District's only federally constructed flood control project in New York, a levee along the East Branch of the Delaware River, is completed in Hancock, N.Y.
- Congress passes the Federal Water Pollution Control Amendments of 1972, later amended as the Clean Water Act of 1977 and further amended in 1987.
- The Environmental Resources Branch is established within the Philadelphia District's Planning Division to better manage the requirements of the National Environmental Policy Act of 1970.

1973

- The Freighter *Yorkmar* strikes the lift span of the one railroad bridge across the Chesapeake & Delaware Canal, closing the channel for 104 days.

1975

- The Madigan-Praeger Study (analyzing the proposed Tocks Island Dam) is released, with findings supportive of project construction. But later that same year the Delaware River Basin Commission withdraws its support for the project.
- The Philadelphia District completes construction of the U.S. Postal Service Bulk Mail Center in Philadelphia.

1976

- To save a historic structure that would otherwise have disappeared with the filling of Blue Marsh Lake, the Philadelphia District begins the relocation and subsequent restoration of the Gruber Wagon Works, which was turned over to Berks County in 1978 and marked the first such project successfully completed by the Corps.

1977

- The Corps initiates the National Dam Safety Inspection Program.

1978

- The National Parks and Recreation Act designates the Middle Delaware River as a wild and scenic river.
- The Philadelphia District provides dredging and road building expertise to the nations of Qatar and Gabon.

1979

- The Marine Design Division is redesignated the Marine Design Center, a separate "field operating activity" of the U.S. Army Corps of Engineers.
- Blue Marsh Lake, the Philadelphia District's only multipurpose flood control project with recreation managed by Corps Park Rangers, is officially opened northwest of Reading, Pa., serving the Schuylkill River sub-basin.
- The Philadelphia District officially transfers its Tocks Island funds and property to the National Park Service.

Col. James G. Ton
1978–1981

1980

- The Philadelphia District's real estate function is transferred to the Baltimore District, and the district's engineering, design, and construction missions for new projects are removed as well.

Lt. Col. Roger L. Baldwin
1981–1984

1981

- The Chesapeake & Delaware Canal is deepened to 35 feet.
- The U.S. Environmental Protection Agency asks the Philadelphia District to manage cleanup of two sites (Bridgeport Rental and Oil Services and Lipari Landfill) under its new Superfund program.

1982

- Rehabilitation of the jetties flanking New Jersey's Manasquan Inlet involve the first use on the East Coast of interlocking concrete structures called "dolosse" to combat erosion.

Lt. Col. Ralph V. Locurcio
1984–1987

1984

- The Marine Design Center delivers a custom-built low-tech dredge to the government of Sudan, assisting the Sudanese in its operation and instructing them on its future use.

1985

- After a twenty-five-year hiatus, the district resumes MILCON operations by gaining jurisdiction over Fort Dix and McGuire Air Force Base.

1986

- The never-built Trexler Dam project is officially deauthorized by Congress.
- The remediated Krysowaty Farm site in Somerset County, N.J., becomes the first site delisted from the U.S. Environmental Protection Agency's National Priorities List, officially closing out the district's first of many Superfund projects for EPA Region 2.
- Congress passes the Water Resources Development Act of 1986, which establishes nonfederal cost-sharing for all new Corps civil works projects.

Historical Time Line 1988–1996

Lt. Col. George W. Quinby
1987–1990

Lt. Col. Kenneth H. Clow
1990–1992

1988

- The Philadelphia District regains its engineering, construction, and design missions for new projects from the Baltimore District.

1989

- The Philadelphia District hires its first Deputy District Engineer for Programs and Project Management.
- The Marine Design Center is established as an unaffiliated Field Operating Activity of the Corps.
- The Philadelphia District awards a contract for remediation of the Bridgeport Rental and Oil Services site, initiating one of the largest Superfund cleanup efforts to date: removal of 5,000 tons of debris and drums, incineration of 172,000 tons of contaminated sediments, and treatment of 200 million gallons of contaminated water.

1990

- Construction of the Wilmington Harbor South Disposal Area is completed.
- Completion of the Indian River Inlet Sand Bypass Plant begins the continuous pumping of sand from the south side of the inlet to the north side, facilitating the natural northerly transport of sand interrupted by the stabilized inlet. The plant is capable of pumping 100,000 cubic yards of sand annually.

1991

- The Philadelphia District completes construction of a new south jetty at Barnegat Inlet, N.J., to improve navigational safety in one of the most treacherous inlets on the Atlantic Coast.
- Initial beachfill is completed for the district's first long-term shore protection project at Cape May, N.J. Placement of 1,365,000 cubic yards of sand, along with extension of seventeen storm water outfalls, reconstruction of seven groins and construction of two more, is followed by monitoring and renourishment at two-year intervals.
- A Corps reorganization plan proposes to close the Philadelphia District.

1992

- The Philadelphia District ends its longest tenure in one location by moving from the U.S. Customs House at 2nd & Chestnut Streets to the Wanamaker Building on Penn Square, Center City.
- Due to pressure from constituents within the Philadelphia District boundaries, a new Corps reorganization plan proposes to keep the district, but with a significantly reduced mission. Neither this plan nor the one proposed in 1991 ever becomes reality.

1992 ctd.

- Tocks Island Dam, which would have created the largest Corps lake in the northeast if constructed, is formally deauthorized by Congress.
- Congress authorizes deepening the existing Delaware River Federal Navigation Channel from 40 to 45 feet from Philadelphia, Pa., to the mouth of the Delaware Bay, with appropriate bend widenings, partial deepening of the Marcus Hook anchorage, and relocation and addition of aids to navigation.
- A groundwater treatment plant begins operation at the Lipari Landfill Superfund site, ranked number one on the EPA's National Priorities List. Construction of the plant, which processes contaminated water via extraction and injection wells, followed installation in 1984 of a slurry wall and cap to contain the landfill.

Lt. Col. Richard F. Sliwoski
1992–1994

1993

- Initial beachfill is completed for the district's second long-term shore protection project at Ocean City, N.J.

Lt. Col. Robert P. Magnifico
1994–1996

1994

- MILCON at Dix and McGuire is transferred to the New York District, while the same year the Philadelphia District is assigned MILCON duties at Dover Air Force Base.

1995

- Construction begins on a $40 million flood control project at Molly Ann's Brook, a tributary of the Passaic River running through Paterson, Prospect Park, and Haledon, N.J.
- District personnel deploy to the Caribbean to assist with recovery from the most active hurricane season to date. Efforts include building rehabilitation, debris removal, and technical inspection services.

1996

- The combined Fort Dix/McGuire Air Force Base Tertiary Wastewater Treatment Facility is completed.
- January floods across much of Pennsylvania constitute the worst natural disaster within the district's boundaries since Tropical Storm Agnes in 1972. The District's Emergency Management Office activates its operations center and keeps it staffed 24/7 for fifteen days straight.
- Congress authorizes the Philadelphia District to construct the beach nourishment project at Rehoboth Beach and Dewey Beach, the first such project in the State of Delaware.
- The Philadelphia District recommends that the Chesapeake and Delaware Canal be deepened to 40 feet.

Historical Time Line 1997–2004

Lt. Col. Robert B. Keyser
1996–1998

Lt. Col. Debra M. Lewis
1998–2000

1997

- Improvements to the north and south jetties at Manasquan Inlet, N.J., include the positioning of approximately forty "core-loc" structures and a refinement of the previously placed dolosse, to better protect the cores of each jetty.
- The Formerly Utilized Sites Remedial Action Program (FUSRAP), for radiological cleanup at old Manhattan Engineer District and Atomic Energy Commission sites from the 1940s, is transferred to the Corps from the Department of Energy. The district is assigned the FUSRAP site at the DuPont Chambers Works complex in Deepwater, N.J.
- Dover Air Force Base's new state-of-the-art passenger terminal, designed by the district, opens for business.

1999

- The new Visiting Officers' Quarters facility is completed at Dover Air Force Base. The concept design was among twenty-one receiving 1998 Design Excellence Award honors from the Air Mobility Command.
- The Philadelphia District completes its geotechnical investigation of sinking homes in the Feltonville and Wissinoming neighborhoods of Philadelphia. The study identified layers up to 40 feet deep of ash and cinder, mixed with varying amounts of building debris, covering the valley of the former Wingohocking Creek.
- One of the district's largest design-build projects for another federal agency, the National Airport Pavement Test Facility, opens at the Federal Aviation Administration's research center next to the Atlantic City International Airport. The new machine, designed for year-round 24/7 operation, simulates landing impacts of future passenger aircraft on various runway surfaces.
- The City of Philadelphia contracts to remove 2.5 million cubic yards of dredged material from the district's Fort Mifflin confined disposal area and reuse it as fill for a new runway at the adjacent Philadelphia International Airport. Under this agreement the city avoids $7 million in transportation costs and the Corps recovers $8 million in channel maintenance costs.
- The Philadelphia District develops a single shore protection plan that combines coastal storm damage reduction for Cape May Point, N.J., with aquatic ecosystem restoration for the adjacent Lower Cape May Meadows.

2000

- Pier 34 on Penn's Landing collapses into the Delaware River. The Philadelphia District responds to a request from the City of Philadelphia for assistance with channel clearing and engineering expertise.
- Fort Dix returns to the district's military construction jurisdiction.

2001

- The Corps suspends work on the Chesapeake & Delaware Canal deepening.
- Starting the very day of September 11, with one of the Philadelphia District's own survey boats helping shuttle people in and out of Lower Manhattan, the U.S. Army Corps of Engineers responds to the terrorist attacks on the World Trade Center.

Lt. Col. Timothy Brown
2000–2002

2002

- Civilian volunteers from throughout the Corps of Engineers, including the Philadelphia District, begin deploying for periods from two months to a year to Afghanistan, Iraq, and other locations in the Middle East in support of Operations Enduring Freedom and Iraqi Freedom.
- Remediation is completed at the Tranguch Gasoline site, the district's first Superfund cleanup in support of EPA Region III. The project involved the installation of an underground soil vapor and groundwater extraction and treatment system in a mixed residential and commercial area.

Lt. Col. Thomas C. Chapman
2002–2004

2003

- The Philadelphia District designs an expansion of Arlington National Cemetery.
- Initial construction is completed on the $23 million Townsends Inlet to Cape May Inlet Shore Protection Project, the district's first with an integrated berm-and-dune system in the original design. Approximately 4.2 million cubic yards of sand are placed on the beaches of Avalon and Stone Harbor, N.J.

2004

- The district evaluates and awards a $500 million dollar Indefinite Delivery Contract in support of Operation Iraqi Freedom.
- The district restores a vertical lift bridge for the Coast Guard at the Philadelphia Naval Business Center.
- Initial beachfill and dune construction is completed on the $29.1 million Absecon Island Shore Protection Project. Approximately 7.1 million cubic yards of sand are placed on the beaches of Atlantic City and Ventnor to provide coastal storm damage reduction and shoreline protection.
- A new mortuary facility, designated an emergency project based on the 9/11 attacks and the continued threat of major terrorist activity, is completed at Dover Air Force Base. The district selected a design-build approach to complete the $16.6 million project expediently.
- The Tanker *Athos I* spills approximately 265,000 gallons of crude oil in the Delaware River. The district assists the Coast Guard by conducting surveys of the channel in search of obstructions that may have caused the spill.
- The district completes the Cuddebackville Dam removal project and in 2005 receives a Coastal America Partnership Award for its outstanding efforts.

Historical Time Line 2005–2010

Lt. Col. Robert J. Ruch
2004–2006

Lt. Col. Gwen E. Baker
2006–2008

2005

- Construction of beachfill-and-dune systems at Rehoboth and Dewey Beaches and at Fenwick Island (followed by Bethany Beach and South Bethany in 2008) lowers the risk of storm damages for Delaware's Atlantic Coast communities.
- The district, in cooperation with the city of Philadelphia and other entities, renovates a mile-long corridor of the Schuylkill River's east bank, creating a linear park for public recreation.

2006

- Over the next four years, the district's Contracting Division administers more than $2 billion in electrical power contracts for the 249th Engineer Battalion (Prime Power) and more than forty district civilians voluntarily deploy to Afghanistan, Iraq, and other Persian Gulf nations in support of post-9/11 contingency operations.
- As part of a massive Corps response to the widespread devastation of Hurricane Katrina, the district deploys 146 volunteers to Louisiana, Mississippi, and other support locations for Federal Emergency Management Agency missions ranging from electrical power and logistics to housing, roofing, and debris removal.
- The district works with the Delaware River Basin Commission, Pennsylvania state agencies, and recreational groups to develop the first annual Francis E. Walter Dam Flow Management Plan for recreational water releases.
- June marks the third straight year of widespread flood damage within the Delaware River Basin, from the headwaters in New York's Catskills region to as far down as Trenton. The combined impact of these events leads to increased support for Corps watershed studies in New York, New Jersey, and Delaware.

2007

- July marks completion of a dual-purpose coastal project to restore freshwater habitat at Lower Cape May Meadows and reduce the risk of storm damage at neighboring Cape May Point, N.J. Beachfill construction preceded enhancements to local vegetation and hydrology at this key migratory bird stopover on the North Atlantic flyway.
- Tasked by the North Atlantic Division to support relocating the Army's C4ISR electronics research and development program to Aberdeen Proving Ground, Md., under the 2005 Base Realignment and Closure Act, in September the district awards the first major design-build contract for what will total nearly a billion dollars in facilities and infrastructure.

2008

- The Corps and the Philadelphia Regional Port Authority sign a Project Partnership Agreement June 23 for the 45-foot, 102-mile Delaware River Main Channel Deepening Project.
- While the Navy pays the district for dredging in the old Philadelphia Naval Shipyard, capacity at Fort Mifflin is restored with the removal of 500,000 cubic yards via both truck and rail (using a newly built transfer facility) to Hazleton, Pa., to fill an abandoned 300-acre mine.
- The district is formally designated the North Atlantic Division Regional Center of Expertise for Bridge Inspection and Evaluation in September, with structural engineers and rope access technicians certified for short-span and high-level complex bridges.

Lt. Col. Thomas J. Tickner
2008–2010

2009

- The district is formally designated the North Atlantic Division Regional Center of Expertise for Groundwater Modeling in March, teaming modelers, hydrogeologists, geologists, chemists, risk assessors, and GIS experts with engineers from the Engineer Research & Development Center and from two other districts.
- In May the district helps dedicate a renovated fish ladder around historic Fairmount Dam, along one of the most photographed stretches of the Schuylkill River. The third fish passage structure built by the district, it is also just the second Corps civil works project built in partnership with the City of Philadelphia.
- After a more than forty-year hiatus, in April the Philadelphia District is officially redesignated as a Military District, to include installation support at Dover Air Force Base, Del., and Tobyhanna Army Depot, Pa., and sole contracting authority for the Overseas Contingency Operations electrical power mission.
- The American Recovery and Reinvestment Act of 2009 includes $70 million for district projects, including Prompton Dam safety modifications, repairs to the St. Georges and Summit Bridges, and deferred maintenance in four navigation channels, plus another $60 million for three Superfund sites the district is managing for EPA.
- In its first "Ready Reserve" mission, the Hopper Dredge *McFarland* deploys from 28 December 2009 to 31 March 2010, for emergency dredging in the Southwest Pass of the Mississippi River below New Orleans.

Lt. Col. Philip M. Secrist III
2010–2012

2010

- Construction begins in March on the Delaware River Main Channel Deepening Project, starting in "Reach C" (between the Delaware Memorial Bridge and just south of Pea Patch Island).
- Two district structures specialists deploy with the Corps' Urban Search and Rescue Team to assist with recovery immediately after the Haiti earthquake.

1

Reorganizations and Responses: The Evolution of the Philadelphia District, 1972–2008

For much of its history, the U.S. Army Corps of Engineers has had the primary missions of preserving navigability of the waterways of the United States and constructing buildings and other structures for military installations and operations. In the early twentieth century, Congress added flood control and emergency response as Corps missions, leading the Corps to become involved in the construction of levees and dams to provide flood protection, and later to branch out into water resources development and coastal engineering. Although the Corps retained these missions going into the twenty-first century, the 1970s, 1980s, and 1990s saw a drastic decline in the construction of water-related projects involving hard structures such as dams, levees, and seawalls, which were increasingly perceived as environmentally unfriendly. With the passage of the National Environmental Policy Act in 1969, the Corps received a mandate to take environmental and social considerations into account in its projects. Under the Clean Water Act of 1972, Corps projects and activities involving deposition of dredged material had to account for environmental impacts on wetlands and surface waters. The rise of environmentalism in the United States, along with concerns of the Carter and Reagan administrations about, respectively, impacts on local communities and costs to federal taxpayers, led to a decline in dam building and similar large-scale structural solutions.

Facing page: Center City Philadelphia, with the District's Wanamaker Building headquarters situated directly behind City Hall as seen from the steps of the Philadelphia Museum of Art

To offset the loss of this work, the Corps turned to supporting other federal and state agencies in engineering and construction services, particularly environmental cleanup and ecosystem restoration. As these changes occurred, the Corps undertook several reorganizations from the late 1970s into the twenty-first century to enhance efficiencies. These reorganizations included implementing initiatives such as centralization, matrix project management, and regionalization.

The changes trickled down to the Philadelphia District. It, too, saw a decrease in large-scale construction jobs, especially with the demise of the Tocks Island Dam and Trexler Lake projects in the late 1970s. The loss of this work followed the reassignment of other projects and programs to sister districts, eventually leading to the removal of various responsibilities from the district. By the mid-1980s, the number of employees had declined by half and the district's command had been downgraded from colonel to lieutenant colonel. By 1992, the Corps was proposing to eliminate the Philadelphia District entirely. Although the district survived, it had to reinvent itself. Accordingly, the district developed a robust support program for other agencies—particularly the Environmental Protection Agency (EPA) and its Superfund program—and became more involved in military construction.

By the twenty-first century, the Philadelphia District's workload looked quite different than it had in 1972, and the district itself had changed substantially. Some of these changes reflected two major trends that affected almost every aspect of American life over the past generation: computerization and workforce diversity.

The Philadelphia District's transition into the computer age included the first timekeeping program to interface with the Corps-wide management information system; one of the earliest GIS (geographic information system) implementations, for Federal Emergency Management Agency (FEMA) flood plain mapping under a 10-district Corps project known as the National Pilot Study

program; and the inception of several major in-house automated information systems covering a wide range of applications, such as the Schedule of Expenditures and Obligations program (finance), the Time Schedule for Design and Construction program (engineering), and the C&D Canal Ship Traffic Monitoring program (operations). Gradually but steadily, drafting boards were supplanted by AutoCAD, office typing pools gave way to a PC in every cubicle, email surpassed letters, and the Internet made physical distance less and less of an issue.

With computerization came the need for more employees with expertise in computers and information technology. Although many persons with qualifications in those areas also held engineering degrees, the net effect was to add to the growing percentage of nonengineers in the district's workforce. The biggest contributor to this change was the influx of biologists and other natural scientists that began in the 1970s (detailed in the next section); there was also an increased demand for contracting specialists as the district relied on the private sector for a variety of technical services. While civil engineers still constituted the largest single degree group heading into the twenty-first century, the district's professional makeup had become much more diverse. The same was true of its gender makeup. By the early 1970s, women had branched out beyond traditional clerical roles into other support functions, and by the first decade of the new century, they occupied a significant number of the district's scientific, engineering, and managerial positions as well.

The advent of Geographic Information Systems began revolutionizing flood plains mapping in the 1990s

Effects of the Environmental Movement and NEPA

In January 1974, Frank E. Snyder and Brian H. Guss completed a history of the Philadelphia District from its inception to 1971. They noted that, in 1971, the district dealt mainly with "the water-related problems of the Philadelphia area." Activities included conducting studies on "the Delaware River channel,

the development of new dredging systems, and the feasibility of deepwater unloading terminals." The district also had responsibility for implementing a comprehensive water plan for the Delaware River Basin, including constructing reservoirs at Blue Marsh, Trexler, Beltzville, and Tocks Island, and it conducted beach nourishment programs for the Delaware and New Jersey shores.[1]

Looking to the future, Snyder and Guss noted that environmental issues—especially how to balance "the basic conflict between man, the consumer and land, the supplier"—would be "the pivotal mandate for a nation at the crossroads in its choice of lifestyles." As the 1970s unfolded, Snyder and Guss were proved correct. Environmental issues became more important than ever in the United States as a whole, and legislative mandates to protect and restore the environment had significant effects on the Corps of Engineers in general and the Philadelphia District specifically.[2]

In 1969, Congress passed the National Environmental Policy Act (NEPA), which drastically changed how the Corps did business. This act was the result of the burgeoning environmental movement in the United States. In 1962, Rachel Carson, a marine biologist, published *Silent Spring*, a condemnation of environmental pollution and the use of pesticides. In the eyes of many, the publication of *Silent Spring* ushered in the environmental movement, and it grew exponentially thereafter. According to one historian, the movement had three guiding principles: the necessity of "harmonizing . . . nature's world with man's needs,"

Testing at the District's Soils Lab at Fort Mifflin, Pa.

Multipurpose flood control project at Blue Marsh Lake, Pa.

the belief that "progress is not necessarily good, especially if it leads to the dehumanization of life," and the concern that the federal government had had a large hand in upending "the proper ecological balance" in its management of natural resources. As more people became convinced of these ideas, organizations that espoused the promotion of environmental quality, such as the Sierra Club and the National Audubon Society, saw large increases in membership. For example, in 1960 the Sierra Club had 15,000 members; ten years later it had 113,000 members. The National Audubon Society saw its membership go from 32,000 in 1960 to 148,000 in 1970.[3]

Riding the wave of the environmental movement—and with many of its supporters clamoring for laws to promote environmental health—President Richard Nixon signed NEPA into law on 1 January 1970. The law declared the government's intent to ensure the coexistence

of man and nature "in productive harmony" by mandating that federal agencies prepare environmental impact statements (EISs) whenever they conducted activities "significantly affecting the quality of the human environment." These EISs evaluated a project's effects on the environment through both scientific and social-scientific analyses, and through hearings at which members of the general public could voice their concerns. NEPA essentially mandated more public participation in decisions about undertakings that affected the environment and required federal agencies to take environmental health into consideration when planning and funding projects.[4] On the heels of this law came a redefinition of the national interest as applied to economic analysis. Project justifications were being challenged as regionally or locally based rather than reflecting a national need or purpose.[5]

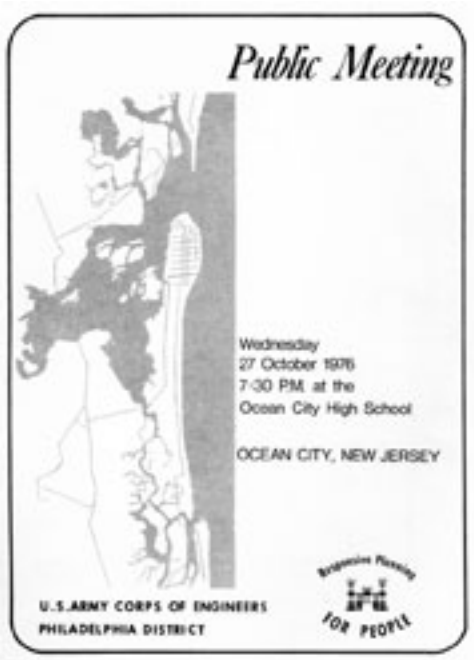
Not long after NEPA became law, the Philadelphia District felt its effects. At the dawn of the 1970s, construction of the Tocks Island Dam was the largest project on the district's horizon. It encompassed building a 3,200-foot-long, 160-foot-high dam that would impound a thirty-seven-mile-long reservoir on the Delaware River close to Stroudsburg, Pa. Designed to provide flood control, water supply, hydropower, and recreation, this multipurpose project was the linchpin of a comprehensive water resources plan approved in 1962 for the Delaware River Basin. But some people had concerns about its environmental effects, charging that it would inundate one of the most scenic parts of the Delaware River (known as the Delaware Water Gap) and create a reservoir with the potential for eutrophication (an overload of nutrients in a water body).[6]

The district prepared an EIS in 1970 as required by NEPA, but the Council on Environmental Quality (established within the Executive Branch by NEPA) deemed it inadequate and required the district to conduct additional studies. This set off a chain reaction of events that eventually led to a withdrawal of support for the project from the governors of New York,

New Jersey, and Delaware, and the halting of any further work on the dam (which had a final design but was not yet in the construction stages) in the early 1970s. In 1978, Congress passed a measure requiring the Corps to transfer all project lands and money to the National Park Service for the establishment of the Delaware Water Gap National Recreation Area. Although the Tocks Island Project was not officially deauthorized until 1992, this transfer effectively killed it.[7]

The National Environmental Policy Act's effects were not confined to the Tocks Island Project. Another impoundment proposed as part of the comprehensive Delaware River Basin planning was Trexler Lake, which the Philadelphia District would construct on Jordan Creek, approximately eight miles northwest of Allentown, Pa. The Corps would use an earth and rockfill embankment for the dam, and the lake would serve flood control, water supply, and recreational purposes. The district completed a general design memorandum in 1971, but construction was delayed for several years because of federal priorities in funding the construction of the Tocks Island and Blue Marsh dams. Congress finally made money available in its fiscal year 1977 appropriations bill, but questions arose over the dam's environmental effects and the contention that only utility and industrial companies would benefit from its construction. As a result of widespread opposition in Lehigh County, the project lost political support from the Lehigh County Commission and from Congressman Fred Rooney (D-Pa.). The Corps placed Trexler Lake on its inactive list in January 1979; in 1986, Congress officially deauthorized the project.[8]

Other Corps districts besides Philadelphia had trouble in the 1970s with large-scale dam construction. The St. Paul District, for example, saw its construction of La Farge Dam on the Kickapoo River in Wisconsin halted because of environmental concerns. In this case, the Corps had completed 40 percent of the actual construction, but worries about the dam's effects



Public meetings on Corps projects such as this one in 1976 were a part of the Environmental Impact Statement process mandated by the National Environmental Policy Act of 1969

on the scenic Kickapoo led to a cessation of construction in 1975 and deauthorization in the 1990s.[9] Using tools such as NEPA, project opponents—not only environmentalists, but also a broad range of other interest groups that seized upon new environmental regulations as a means of achieving their own goals—had the ability to stop large-scale water projects, which happened on a regular basis in the 1970s.

The Corps was also being accused of using faulty economic arguments to justify dam construction and other projects. In making these charges, environmentalists focused on the benefit-cost analyses the Corps used to determine whether a project was economically justified. Under this system, the Corps went through a series of calculations to determine both benefits and costs in annualized terms, then divided the former by the latter to produce a ratio. If a project had a ratio of 1.0 or greater (meaning that for every dollar spent, benefits greater than a dollar resulted), it was economically justified. However, as Daniel Mazmanian and Jeanne Nienaber wrote in 1979, the process had significant issues. For one, the Corps' benefit calculations dealt in financially quantifiable terms such as how a project encouraged development, increased water supply or flood protection, or produced recreational benefits. Environmentalists, on the other hand, saw benefits mainly as "maintaining free-flowing streams, allowing the natural cycle of the ebb and flow of rivers over their banks, and curtailing residential or commercial development in the floodplain." Despite subsequent attempts by the Corps to factor in nonmonetary benefits and costs, disparate cultural values prevented the two sides from reaching consensus.[10]

Benefit-cost ratios were not the only economic feature of Corps projects subject to criticism. Another was the perception of Corps work as largely high-cost, inefficient pork barrel projects that were authorized only because of the Corps' "symbiotic relationship" with Congress. For projects to go forward, the Corps needed congressional approval and funding.

Philadelphia's Delaware River waterfront at Penn's Landing

Members of Congress tended to support Corps projects in their states and districts because they provided visible, tangible benefits to constituent communities. "A congressman will not speak out against a project proposed for a colleague's district, regardless of the project's merits," one observer said, "in order to be rewarded in kind in the future." Thus, Corps projects generally had strong support and little opposition in Congress.[11]

When Jimmy Carter ran for President of the United States in 1976, he pledged to "get the Army Corps of Engineers out of the dam-building business" and to take on Congress's pork barrel politics.[12] Although Carter had an engineering background, he had become distrustful of the Corps of Engineers during his term as governor of Georgia, believing that the Corps manipulated numbers to support projects, regardless of their benefit or the environmental harm they might cause. After becoming president, Carter made good on his pledge by insisting in 1977 that Congress delete eighteen water projects from its public works appropriations bill that, in his words, "would cost billions of dollars and often do more harm than good." His actions outraged

Congress, and he eventually had to compromise on a bill that cut only nine projects. The next year, he vetoed the annual public works bill, which included some of the nine projects. Because "almost every Democratic leader lined up against me," Carter remembered, this "battle left deep scars."[13] However, it indicated to Congress that some people, including presidents, were becoming less comfortable with the legislative branch's close relationship with the Corps, and with projects that they viewed as not in the nation's best interest.[14]

Corps Reorganization in the 1970s and 1980s

Facing opposition from both environmentalists and President Carter, the Corps found it increasingly difficult to get new water projects approved. Indeed, between 1976 and 1986, Congress passed no water resources development acts, the legislation that authorized new Corps projects. Efforts on already authorized projects continued, but the Corps could generate no new work. As the authors of one publication saw it, "By the early 1980s, the era of large-scale water resources development projects had passed, the victim of environmental and budgetary concerns."[15] Accordingly, the Corps examined ways to restructure itself in line with changing national needs and interests, while striving to become more efficient in dealing with its declining workload.

In 1978, the Corps undertook its first reorganization since the Second World War. One of the goals of this restructuring was to realign districts to correspond with major river basins. As early as the 1930s, some organizations had advocated the need for multipurpose river basin planning, and in the 1960s, both John F. Kennedy and Lyndon B. Johnson called for comprehensive plans for river basins. The Philadelphia District had led the way by completing such a plan for the Delaware River Basin in 1962 and by building a close working relationship with the Delaware River Basin Commission, the four-state agency formed "to oversee a unified approach to

managing a river system without regard to political boundaries."[16]

With the idea that it made more sense for water resource planning to revolve around basins, the Corps expressed the intent to facilitate such planning through its 1978 realignment. Ironically, however, what was proposed for the Philadelphia District had nothing to do with aligning it more closely with the Delaware River watershed (whose boundaries it had shared since the district's 1866 founding) and everything to do with aligning the district more closely with its shrinking workload, now that the Tocks Island and Trexler projects had been placed indefinitely on hold.[17]

In 1979, the Marine Design Division, which had been part of the Philadelphia District since 1938, was renamed the Marine Design Center and placed under the jurisdiction of the Corps' Water Resources Support Center at Fort Belvoir (although it remained housed in the Philadelphia District's offices). In 1980, the Corps moved the district's real estate function to the Baltimore District and eliminated Philadelphia's engineering, design, and construction missions for new projects. Finally, in 1983, the Corps reduced the number of hopper dredges under the district's command from three to one. Because of the loss of these functions, the number of district employees fell from nearly 800 in 1978 to fewer than 600 in 1981, to only 400 in 1984. With its drastically reduced size, the district's command was downgraded in 1981 from colonel to lieutenant colonel, making it one of nine Corps districts (out of 40) that did not have full colonels at the helm. As one district publication declared, this period was "one of the more difficult chapters in the Philadelphia District's history."[18]

Facing the diminishment of the district's responsibilities, its leadership set about rebuilding for the future, launching major planning initiatives and exploring alternative sources of work.[19] In this sense, NEPA and other environmental legislation, which had created some problems for the Corps, actually proved to be an opportunity,

especially as Corps leadership tried to embrace the spirit of the laws and comply with their provisions. In 1970, the chief of engineers issued procedures for developing EISs in Corps projects. That same year, the Corps established the Environmental Advisory Board to provide guidance on improving relations with environmentalists and to "examine existing and proposed policies, programs, and activities from an environmental point of view to define problems and weaknesses and suggest remedies." The board served this function until 1980.[20]

Each Corps district was responsible for implementing the new EIS procedures and making itself more responsive to environmental concerns. To achieve these goals, the Philadelphia District established the Environmental Resources Branch in the Planning Division in 1972. The branch provided environmental planning and EIS preparation to the other divisions and branches in the district, functioning, in effect, as in-house consultants while also working externally with states and other federal agencies to resolve any issues they had with the environmental effects of Philadelphia District projects.[21]

To staff the Environmental Resources Branch, the district recruited ecologists, biologists, and archeologists, in addition to engineers. This enabled the branch to effectively prepare EISs, which required input from a variety of disciplines. The hiring of personnel from disciplines other than engineering was a trend in the Corps as a whole in the 1970s and 1980s, especially "staff with expertise in fisheries biology, wildlife biology, archeology, history, economics and sociology." It took some time for the agency to make the transition to a more interdisciplinary culture, but by the 1980s, the Corps could rightly say that it was a "Corps of multidisciplined people."[22]

In addition to the Environmental Resources Branch, the Philadelphia District established a Regulatory Branch in its Operations Division in the 1970s. This branch was responsible for another of the Corps' new roles: wetlands permitting. Under the

Rivers and Harbors Act of 1899, the Corps had received authority to issue permits for activities that affected navigable waters in the United States, ensuring that such activities did not affect navigability and anchorage. In 1972, Congress passed the Clean Water Act. Section 404 of that legislation gave the Corps the responsibility of regulating "the discharge of dredged or fill material into the navigable waters" of the United States. The law specifically charged the Corps with rejecting permit applications if "the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas." In the late 1970s, the definition of navigable waters was expanded to include virtually all wetlands and waters in the United States. Although the Corps resisted this permitting function at first, it had embraced the program by the 1980s.[23]

The Regulatory Branch was charged with both processing permit applications and ensuring that permittees' work was in compliance with the terms of their permits and with the regulatory authorities. While the branch was composed mostly of engineers at the outset, by the twenty-first century the vast majority of its thirty-two employees were biologists or physical scientists.[24]

A significant new mission that the Corps explored in the 1980s was supporting Superfund projects conducted by the EPA. Superfund arose in the early 1980s from growing concern about hazardous waste deposits in the United States. Stemming directly from the nation's

Monitoring by the District's Regulatory Branch at a wetlands mitigation site in Ocean City, N.J.

The Bridgeport Rental & Oil Services Superfund site, Bridgeport, N.J., before remediation. It was once rated the most challenging cleanup on EPA's National Priorities List

experience with Love Canal, N.Y. (in which hundreds of homeowners were forced to evacuate when it was discovered that their homes were built on a toxic waste site), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 created the Superfund to clean up hazardous waste sites in the United States. The EPA, created in December 1970, was responsible for the Superfund program.[25]

The Philadelphia District already had a relationship with the EPA: In 1978, the Corps had concluded an interagency agreement under which the district received charge over all wastewater treatment construction projects in Pennsylvania and Delaware. In just a few short years, this program had come to constitute a significant piece of the district's construction management workload. Building on that relationship, the EPA asked the district in 1981 to supervise hazardous waste cleanup of two Superfund sites in New Jersey: Bridgeport Rental and Oil Services and Lipari Landfill. These efforts began the Philadelphia District's long association with Superfund and the EPA, an association that continued into the twenty-first century and became a significant part of the district's responsibilities.[26] The district undertook these duties as part of its Support for Others program (now known as International and Interagency Services), whereby it worked for other federal agencies, state and local governments, Indian tribes, foreign governments, and international organizations to "provide quality engineering, environmental, construction management, real estate, research and development, and related services."[27]

Another area of operations that the environmental movement made possible was ecosystem restoration. Recognizing that many locations had experienced environmental damage as a result of development—and even because of some Corps projects—Congress authorized the Corps, in the Water Resources Development Act of 1986, to participate in environmental restoration projects. Not long after that, President Bill Clinton's administration placed a priority on ecosystem restoration, paving the way for the Corps to become more involved. Given its previous work to mitigate beach erosion and storm damage on the coastlines of New Jersey and Delaware, the Philadelphia District seemed a natural fit for ecosystem restoration. In fact, the restoration work that the district undertook in the 1990s stemmed from its coastal erosion experience, as it began studying ways to mitigate damage caused by storms and beach erosion in areas such as Lower Cape May Meadows in New Jersey.[28]

In addition to environmental work, the district attempted to restore its military construction mission, which Corps headquarters had transferred to the Baltimore and New York districts in 1960. Lt. Col. Ralph Locurcio, who assumed command of the Philadelphia District in 1984, made it a goal to regain this mission. Largely through his leadership and that of Nicholas Barbieri, then chief of the Engineering Division, the district saw its oversight responsibilities restored for military construction projects at Fort Dix and McGuire Air Force Base in New Jersey. However, although the district continued to do military construction at these and other installations, its military mission was not reinstated

New Jersey's "The Meadows" and the adjacent Borough of Cape May Point, jointly benefiting from the berm-and-dune system constructed by the Philadelphia District

until early in 2009, when it was officially designated one of the Corps' military districts, with responsibility for installation support at Dover Air Force Base and Tobyhanna Army Depot; U.S. Army Reserve Command construction within the district's geographic footprint; and all electrical power contracting for overseas contingency operations. Similarly, in 1988, the district regained its engineering, design, and construction missions from the Baltimore District.[29] With these missions reinstated, the district seemed well positioned for the future.

Corps Reorganization in the 1990s

In the late 1980s and early 1990s, the Corps proposed another reorganization—a major overhaul of its structure. In response to the organization's declining civil works workload, when Lt. Gen. Henry Hatch became chief of engineers in 1988 he undertook a thorough review of the Corps, which at the time had thirty-nine districts under the jurisdiction of thirteen divisions. According to one study, Hatch thought that reorganization was necessary for several reasons, including "imbalances between the locations of the Corps' workforce and its work; the shift from a workload heavy with design and construction to one weighted toward operations, maintenance, regulatory, and environmental restoration activities; and the need to reduce Corps overhead." Congress also recognized that the Corps needed to rethink its structure, mandating in the Energy and Water Development Appropriations Act of 1990 that the Corps "initiate a broad-based conceptual study of potential field organizational structures." Hatch established a team led by Fred H. Bayley, Chief of Engineering of the Vicksburg District, to provide recommendations for reorganization. In January 1991, the team submitted its report to Congress (known as the Bayley Report), outlining a conceptual restructuring framework.[30]

At the same time, the U.S. military was downsizing in response to the end of the Cold War. To deal with these changes, Secretary of

Defense Richard Cheney created the Commission on Base Realignment and Closure (BRAC) in 1988 "to review DoD installations and to recommend some facilities to be realigned, consolidated, or closed." Hoping to keep these closures and realignments from becoming politicized (since the closure of bases would have economic effects on the communities that surrounded them), Congress mandated in the Defense Authorization Amendments and Base Realignment and Closure Act of 1988 that whatever recommendations the BRAC commission made had to be accepted by Congress as a whole, or all would be rejected. In 1990, Congress passed the Defense Base Realignment and Closure Act, mandating that an independent commission review any Department of Defense recommendations to assess their validity. Whatever recommendations the commission ratified, both Congress and the president had to accept as a whole and not in part. Soon after the passage of this act, General Hatch, in consultation with Les Edelman, chief counsel of the Corps, decided that it would be politically expedient to include Corps reorganization under BRAC, as it too had the potential of becoming politically charged and controversial.[31]

With the Corps now planning to use the BRAC Commission, Hatch appointed another team to develop a concrete reorganization plan. The eighteen-person Reorganization Study Team was led by Brig. Gen. Arthur E. Williams, commander of the Lower Mississippi Valley Division. In February 1991, the team completed its report, recommending that the Corps reduce the number of its divisions from ten to six and the number of its districts from thirty-five to twenty-two. Several districts were slated for closure under this plan on the basis of a "D-Pad" computer model developed by the BRAC Commission that measured and ranked districts according to several capabilities. Even though the Philadelphia District ranked sixth out of thirty-five districts in its D-Pad score, Corps Headquarters placed it on the closure list and planned to transfer its operations to New York.[32]

For those who worked in the Philadelphia District, the news that it was slated for elimination came as a cruel blow. As Richard Maraldo, who was serving as deputy district engineer for programs and project management, later explained, "The district was very proud of its history and execution." Even with the problems with Tocks Island and the decline in the amount of work, Philadelphia District personnel believed that the district had "an above average performance history" and that it did its job well.[33]

Others agreed, including members of Congress who did not want to see Philadelphia or other districts closed. Although Congress had not offered any resistance when the Corps first proposed that reorganization be included in the BRAC program, several members of Congress now vehemently disagreed with the proposal, stating that they would reject any BRAC recommendations that included the closure of Corps offices. Fearful that the whole BRAC process was in danger, Secretary of Defense Cheney refused to include the Corps' plan in BRAC, although he did announce in May 1991 that Corps reorganization would go forward separately. However, the BRAC Commission itself recommended to Congress that the BRAC program include the Corps' plan, unless Congress could develop another proposal by 1 July 1992.[34]

Congress, however, took swift action to ensure that Corps reorganization would not survive. First, it prohibited the Corps from using any funds appropriated in either the public works or armed services appropriations bills to close any district or division office. Second, it deleted the Corps' plan from the BRAC Commission's recommendations. In the words of Nancy P. Dorn, who became assistant secretary of the Army for civil works in fall 1991, these actions told Corps leaders that "while there may be a need to reorganize the Corps to meet the challenges of the 21st century, the proposed plan was unacceptable." The actions also convinced Dorn that "there should be an opportunity for congressional involvement in any future plan."[35]

In March 1992, the House Subcommittee on Water Resources of the Committee on Public Works and Transportation held hearings on reorganization of the Corps. Those hearings gave supporters of the Philadelphia District the opportunity to express their opinions about the proposal to close the district. Congressman Wayne "Curt" Weldon (R-Pa.), for example, opposed the closure, stating that the district was a "perfect example of an operation that provides military services and vital civil works assistance." If the Corps closed the district, he said the states of Pennsylvania, New Jersey, and Delaware "would lose the regular delivery of flood control and beach restoration services which support the fishing, boating and tourism industry." Likewise, Congressman Thomas Carper (D-Del.) said that the Philadelphia District was "centrally located for the five states which it serves," giving state and local officials ready access to the Corps. The district "also provides critical services, which I believe are vital to state and local economies within the Delaware River," Carper said, including "shoreline protection, . . . safe and efficient navigation and . . . wetland regulation." He concluded, "This is an example of a case in which government works best when it is closest to the

524

CORPS OF ENGINEERS REORGANIZATION
IMPACTS ON NEW JERSEY

ECONOMIC IMPACTS

*Loss of 632 jobs. Estimated annual wage loss of $21 million.

*Loss of 650 jobs for the A/E (Architect/Engineer) community. Estimated annual wage loss of about $20 million.

*Total direct impact to the area: $41 million in wages lost annually and a total adverse impact of about $75 million annually.

PROGRAMMATIC IMPACTS

*Loss of senior staff at the District and Division offices, many of whom have over 20 years of experience in addressing New Jersey's water resource needs.

*Planning, engineering and environmental expertise will be abolished in New York and Philadelphia District offices.

*The environmental expertise needed to process complex permits would have to be obtained from technical centers in Boston or Baltimore.

*Civil Works contracts will be let from Baltimore or Boston offices; for New Jersey, Military, Superfund and HTRW contracts will be let from Baltimore.

*Increased difficulty for NJ DEPE to coordinate with Corps environmental centers because local expertise is eliminated.

*Disruption of existing systematic approach to New Jersey's water resources problems including shore protection, flood control and dredging. Priorities in place with existing Districts could significantly be altered since residual districts no longer control priorities, monies and resources of technical centers.

*Distancing the work from the local area will increase coordination problems, travel costs. The close coordination that takes place in all aspects of current work will be eliminated.

*Localized engineering and planning support to New Jersey during emergency periods (like December '92's Northeaster storm) will no longer be available.

A statement to Congress concerning impacts on the State of New Jersey if the Philadelphia District is closed

people that it serves." Congressman Thomas Foglietta (D-Pa.), a Philadelphia native, flatly declared that the Corps' decision to close Philadelphia was "wrong" because of the district's dredging activities, as well as the fact that "the loss of almost 500 jobs would have a serious negative impact" on the city of Philadelphia. He said that the Philadelphia District was "critical to the safe, efficient, and competitive operation of the ports in the Delaware Valley and to the regional economy."[36]

Members of Congress were not the only ones voicing support for the Philadelphia District. John LaRue of the Philadelphia Regional Port Authority and Don Rainear of the Delaware River Port Authority lauded the district for its timely responses to emergencies at those ports, as well as the fact that "the Corps employees are local people who are intimately familiar with the area."[37] The hearings showed that many people in the states the Philadelphia District served considered its shoreline protection and navigation work essential to their economic well-being.

However, Assistant Secretary Dorn emphasized the need for some kind of reorganization, citing the fact that the Corps' civil works workload—mainly in design and construction—had declined by 25 percent since 1965 and that its military construction mission had experienced a "much more severe" decline. Dorn pointed out that workload was distributed unevenly throughout the districts, so that in some, "the planning, design, and construction workload changes by as much as 50 percent from one year to the next." With such fluctuations, she said, "It is impossible to staff full service districts efficiently." Small districts especially suffered, Dorn continued, because their overhead was an average of 20 percent higher than the overhead at a large district. "When a district starts to run out of work," she said, "the costs go up" and a "project in a smaller district may end up costing more than the same project in a medium-sized or a large…district." In essence, Dorn was arguing that the closure of some small districts might be unavoidable. However, she

acknowledged that the Corps had "no plan B" at that moment, even though she hoped to implement a plan in fiscal year 1993.[38]

In the midst of these closure discussions and hearings, the Philadelphia District, under the leadership of Lt. Col. Kenneth H. Clow, made plans to move its headquarters office for the first time in more than thirty years. Located in the Customs House since 1961, the district moved to the Wanamaker Building over the course of six weeks in March and April 1992. This was the twelfth move in its history for the district; district personnel hoped that the Wanamaker Building would provide it with a home for many years to come.[39]

However, whether the district would remain in the Wanamaker Building was contingent on whether it would remain a viable district. By November 1992, the Corps—under the leadership of new Chief of Engineers Lt. Gen. Arthur E. Williams, who had chaired the 1991 reorganization study—produced another reorganization plan. Bowing to the congressional firestorm produced by the proposal to close districts, the new plan recommended that all districts be retained (although it proposed a realignment of duties) and that the number of divisions be consolidated from eleven to six. The Corps would establish fifteen civil works technical centers, which could "provid[e] greater concentrations of planning, design, and review." Under this new plan, the Philadelphia District would be retained, although it would undergo significant restructuring. The Corps proposed moving all military construction from Philadelphia to the Baltimore District and transferring the only recently regained engineering and planning missions to the proposed Baltimore District civil works technical center. The Philadelphia District would keep its project management, civil construction, operations, and regulatory missions, but the Marine Design Center would be transferred to the Norfolk District. Overall, the number of Philadelphia District employees would fall from 510 to 348, and the district would be placed under the new North East Division, which would replace

Customs House

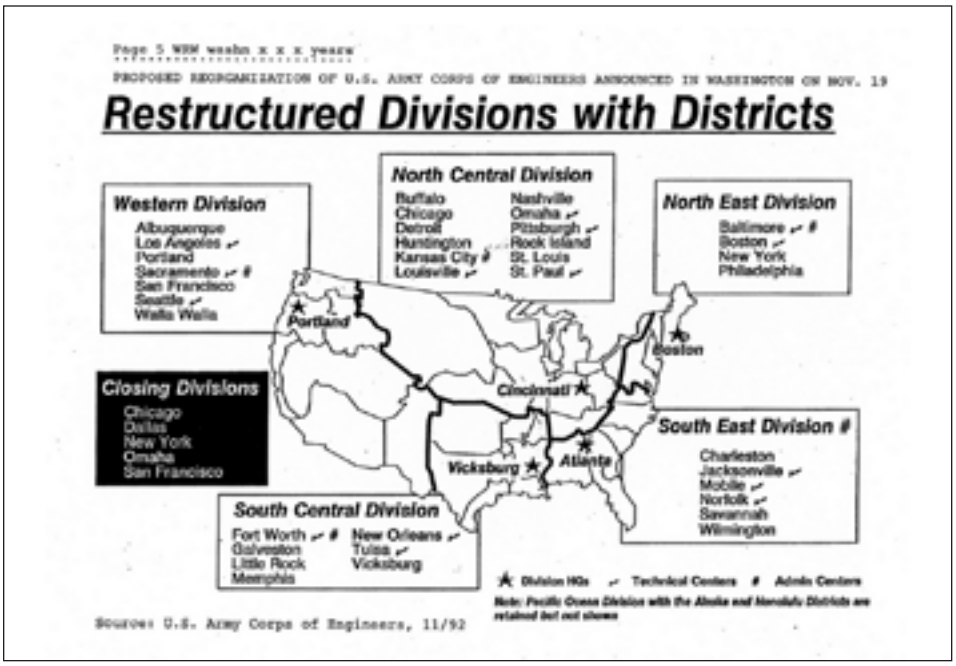
the North Atlantic Division. This restructuring was to occur in fiscal year 1994.[40]

Before the Corps could proceed with its proposal, it had to clear it with the incoming Clinton administration. Clinton was elected in November 1992, just days before Williams unveiled the Corps' new plan, and took office in January 1993. The day after inauguration, Les Aspin, the new secretary of defense, tabled the reorganization plan; according to one history, Aspin refused to act on the plan in 1993, "effectively killing it." Aspin's objections to the plan are unclear; but, faced with this situation, Williams ended the Corps' reorganization efforts. The Clinton administration, under the leadership of Vice President Albert Gore, conducted its own study in 1993 of how to reinvent government, called the National Performance Review. On the basis of recommendations from that study, Clinton proposed legislation to make the federal government more efficient, which Congress passed in 1994 as the Federal Workforce Restructuring Act. Under Section 3201 of that act, the administration proposed "reorganizing the [Corps'] Headquarters offices, reducing the number of Division offices, and restructuring the district functions so as to increase the efficiency." This meant that

proposals to restructure the Corps would continue, and the Clinton administration began planning for reorganization in 1994.[41]

Unlike previous plans, the proposal developed by the Clinton administration did not adversely affect the Philadelphia District, as most of the restructuring occurred at the headquarters and division levels. For example, the administration reduced the number of divisions from eleven to eight, with two becoming "regional centers." Few changes were made in the Philadelphia District. According to Lt. Col. Robert P. Magnifico, District Engineer at the time, the district's size "will be driven by our workload," which he characterized as "healthy." Magnifico told district personnel that "the future looks pretty good as we move our planning studies into the engineering and design areas." The district's workload at the time consisted of a proposed deepening of the Delaware River Main Channel from 40 to 45 feet, its support of EPA Superfund projects, its regulatory program, its shoreline protection and maintenance dredging activities, and military construction at Fort Dix, McGuire Air Force Base, and Dover Air Force Base (where the district had begun working in 1994).[42] Magnifico

Wanamaker Building



The Corps' restructuring proposal, November 1992

estimated that the district did $240 million worth of work in 1994, and he noted that it had a "top 10 district ranking in the Corps of Engineers, nationwide."[43] However, the uncertainty surrounding the status of the Philadelphia District for much of the 1990s was difficult for personnel. "It was very tense having that sword hanging over our heads," Richard Maraldo said, but "we just continued to do our jobs to the best of our ability."[44]

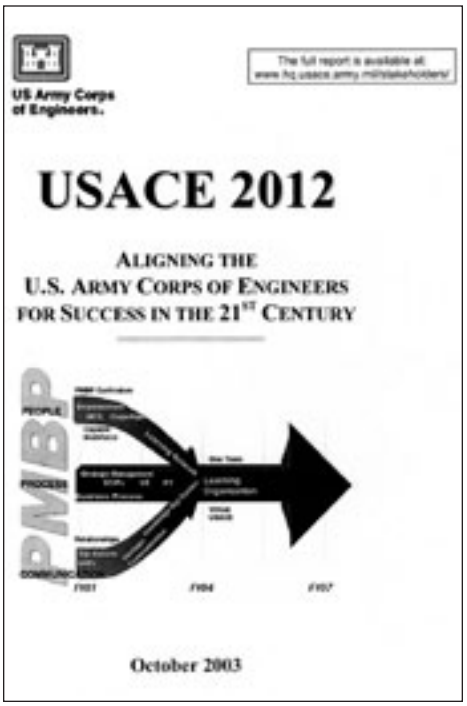
Regionalization and USACE 2012

The creation of regional centers under the Clinton administration's restructuring highlighted a direction that the Corps increasingly traveled in the late 1990s and into the twenty-first century—that of regionalization.[45] For example, Chief of Engineers Lt. Gen. Joe Ballard explored the concept of using Corps personnel and resources across district boundaries in his Door to the Corps initiative in 1996. This concept envisioned the Corps as a place for one-stop shopping for a variety of federal, state, and local agencies. As part of this initiative, the Corps designated the district as the one "door" for EPA Region III's Superfund program, which covered eight districts and three divisions. The Philadelphia District was chosen in large part because of its existing strong relationship with Region III and because the two offices are in close geographic proximity. This new arrangement quickly proved beneficial to the Corps. "Our own Superfund workload is up," observed project manager John Bartholomeo in 1998, "but most of the projects we have brought in have gone to other districts, or in some cases even outside the North

Atlantic Division." He saw his work as an example of the Corps "function[ing] more as a seamless organization."[46]

In 1998, expanding on the Door to the Corps idea, Corps Headquarters developed the concept of regional business centers, whereby "a division headquarters office manages itself and all of its subordinate districts as a single business center, balancing the types and quantities of workload against resources throughout the division's areas of responsibility." The business center goal was to more fully use the resources in a division and provide districts with "the flexibility necessary to meet customer needs, obtain efficiencies, adjust to resource constraints, and optimize good business practices."[47]

Although the Corps made it policy to create regional business centers, the process was a slow one. It gained momentum in the first part of the twenty-first century after Lt. Gen. Robert Flowers became chief of engineers. Flowers emphasized changing the hierarchical, stovepipe nature of the Corps into a more team-based organization. He discussed his ideas with other Corps personnel, soliciting input and comments about what he wanted to implement. In October 2003, Flowers issued USACE 2012, a reorganization plan that aimed, according to one news release, "to increase efficiency and foster teamwork" among Corps personnel.[48] Under USACE 2012, Corps personnel were to think beyond their own district boundaries and embrace the concept of the Corps as one big team. The plan reiterated the policy of establishing regional business centers that would allow districts to draw on the expertise of other districts within their division for specific work. As defined in a January 2008 regulation, the business centers were "the division headquarters, its subordinate districts, and USACE centers, where needed, acting together as a regional business entity."[49] To accomplish specific missions, the centers—governed by a Regional Management Board—would assign work to the districts according to their expertise. Under this new organizational structure,


US Army Corps of Engineers.

The full report is available at: www.hq.usace.army.mil/stakeholders/

USACE 2012

Aligning the U.S. Army Corps of Engineers for Success in the 21st Century

October 2003

The USACE 2012 proposal

the districts would "focus more directly on actual mission execution without the burden of managing support activities," while "regional use of district technical expertise allows people to further hone their technical skills and knowledge."[50] Another Corps publication characterized USACE 2012 as "a new project-focused design."[51]

For the Philadelphia District, USACE 2012 was not a great change, as the North Atlantic Division had already formed a regional business center in 1998 "as a tool to balance workload, staffing and funding."[52] The Regional Management Board—consisting of each district's deputy district engineer for programs and project management—governed the business center, which North Atlantic Division Commander Brig. Gen. Merdith "Bo" Temple described as "one team of some 3,500 Corps of Engineers professionals located in six districts under one regional office." Temple explained that this model would allow districts to focus on their core expertise rather than trying to develop expertise in all of the Corps' missions. As an example of how regionalization worked, Temple pointed to the Baltimore District's demolition of Tacony Warehouse, an Army facility in Philadelphia. Although Baltimore was responsible for the demolition, it relied on the Philadelphia District "for construction management and quality assurance." Likewise, the Philadelphia District, as part of the Global War on Terror, awarded a $500 million contract in Iraq to a private developer for construction and renovation of schools, health facilities, and other buildings. Administering such a large contract required much time and resources, so the district "drew upon New England and the North Atlantic Division Office for contracting support."[53]

With projects already transcending district boundaries, Lt. Col. Robert Ruch, District Engineer of the Philadelphia District from 2004 to 2006, told district employees in 2004, "We've been operating regionally for years and should recognize how successful we have been." He used the district's Superfund work as an example of

"work that has been accomplished with the help of others" and echoed Temple's sentiments about the Tacony Warehouse demolition.[54] However, Ruch emphasized that "*regionalization does not necessarily mean centralization.*" Rather, Ruch said, it was "all about *delivering the customer's needs in a more efficient manner*, . . . at whatever level that is best accomplished." In short, USACE 2012 forced the Corps to think outside district boundaries to provide better service and better products to its customers.[55]

Project Management Initiatives

In many ways, USACE 2012 merely furthered initiatives that the Corps had undertaken as early as the 1980s in terms of how it managed projects, largely in response to direction from Congress in the Water Resources Development Act of 1986 (WRDA-1986), the first omnibus water resources act to pass in ten years. As noted earlier, President Carter had targeted Corps projects as economically wasteful and environmentally damaging. When Ronald Reagan took over the presidency in 1981, his goal of reducing the federal government's footprint and trimming the federal budget meant that the Corps would remain under attack. Although both James Watt, Reagan's secretary of the interior, and William Gianelli, the assistant secretary of the Army for civil works, favored water resource development, they, together with other administration officials, wanted to find ways to reduce government costs on those projects. They looked to cost-sharing arrangements, under which local communities would bear more financial responsibility for projects, thus relieving the federal government of part of the financial burden while also reducing the number of unnecessary projects (since local interests would theoretically be inclined to pay only for projects that would be of substantial benefit to them).[56]

Traditionally, the federal government had funded every aspect of the construction of flood control projects and river and harbor navigation projects, but

Construction of a streambank erosion control project along Basket Creek in Sullivan County, N.Y.

Gianelli proposed that the federal government only fully fund reconnaissance studies to determine whether a project was feasible. If it was, local interests would share 50-50 with the federal government in the costs of feasibility studies and construction of flood control projects. Although the administration met with initial resistance in Congress, it was successful in getting cost-sharing measures included in WRDA-1986. According to that law, local sponsors would contribute 25 to 50 percent of the construction, operation, and maintenance costs of flood control projects, as well as 50 percent of the cost of feasibility studies. In addition, local sponsors would have to pay up to 60 percent of coastal harbor deepening projects. According to one history, these measures had two effects: they "significantly reduced the number of feasibility studies that were undertaken" and they "encouraged the local sponsor

to take a much larger role in the project through its design and construction phases." Essentially, cost-sharing provisions not only reduced federal government expenditures; they made local sponsors virtual partners with the Corps on many of its projects.[57]

Not everyone was enthusiastic about these changes. According to Locurcio, who was district engineer of the Philadelphia District when WRDA-1986 passed, the cost-sharing provisions were "very detrimental to the locals," because "they couldn't afford it." Locurcio feared that legitimate projects that would benefit communities would fall by the wayside because local sponsors would be unable to fund them.[58] This meant that not only would the Corps be unable to help local communities, but its workload would decrease. Since the Philadelphia District was already struggling with a declining civil works workload in the mid-1980s, this was problematic.

In another sense, cost-sharing forced the Corps to revisit the way it managed projects. As one account explained, before WRDA-1986, the Corps had generally looked at "project needs for the coming fiscal year or for a particular phase (e.g., planning, design, or construction) with less concern for the overall (life cycle) schedule or cost estimate for the full duration of a project." Under WRDA, this approach was no longer possible, because local sponsors would have to "know their share of the cost with a high degree of precision." In terms of military programs (which were not subject to cost-sharing arrangements), the Corps also needed new management techniques, because such projects were generally funded by "federal appropriations [to] other agencies and provided to the Corps."[59]

When Lt. Gen. Henry Hatch became chief of engineers in the late 1980s, he focused on improving the Corps' project management. He worked with Robert Page, the assistant secretary of the Army for civil works, who had experience in private industry and who believed the Corps had a long way to go in terms of project management. At that time, districts had no central way of managing

a project. Districts typically were organized around four functional divisions—planning, engineering, construction, and operations—each with its own programs and projects. The larger civil works projects were often transferred from one functional area to another as they progressed but with no single long-term project manager to ensure that budgets and deadlines were met. This led to cost overruns, delays, and little accountability—and to projects that lasted decades.[60]

Page, with Hatch's full support, made a concerted effort to promote a centralized form of matrix project management, and the two worked with Corps leaders in 1988 to develop the process, which became known as "life-cycle project management." Under this process, a specific project management division in a district would take charge of a project from beginning to end. The project managers in this division would be responsible for ensuring that budgets and timelines were met and that effective communication was occurring with local sponsors and other interested parties. They would shepherd the project through the different stovepipes to ensure a successful outcome.[61]

The Corps had many goals for this centralized process, including a reduction in time spent on planning and design, better communication and collaboration with local sponsors, and more accurate estimates of project costs and deadlines.[62] On 1 July 1988, the Corps directed that project management be implemented at each district through four main steps: creating the position of deputy district engineer for project management; assigning a project manager to every project; creating a Program Management Office for technical support; and establishing a project management board to review every project on a monthly basis.[63]

However, no clear deadline was given for filling the deputy district engineer for project management position, and the implementation of project management proceeded haphazardly for the next several years. Some Corps employees resisted the idea of having a manager outside their stovepipe supervising their

This "sand-throwing" ceremony marked the start of beach nourishment at Rehoboth Beach and Dewey Beach, Del., under a Corps project cost-shared with the Delaware Department of Natural Resources and Environmental Control

projects, while others saw it as just one more layer of bureaucracy.[64] In light of the many previous initiatives that had never fully materialized, the Philadelphia District's leadership decided to take a wait-and-see attitude—to determine how serious Corps leadership was about the project management program before filling the deputy district engineer position.[65]

In 1988, the district appointed the chief of planning to serve as acting deputy district engineer, but as Corps Headquarters continued to emphasize the importance of project management, the district finally created and filled the position of deputy district engineer for programs and project management (DPM) in 1989. Since then, this has been the senior civilian position in each Corps district.[66]

This deputy was dual-hatted as chief of the newly created Programs and Project Management Division (PPMD), which at first incorporated only civil works design and construction. Military construction, the Support for

Others program, planning, and operations and maintenance were not included, although they would be added later. By 1998, PPMD consisted of two branches—the Project Management Branch and the Programs Branch—the latter of which focused primarily on project budgeting. According to Richard Maraldo, the district's first DPM, "The senior leadership of the district" was "very supportive [of] and cooperative" with the project management program, setting it on a path to full integration in the Philadelphia District.[67]

The Corps' increased emphasis on project management was extended to the district's military and interagency missions in the late 1980s under the leadership of Lieutenant Colonel Locurcio, who combined the Engineering and Construction divisions. According to Locurcio, the goal was to provide "continuous management from the cradle to the grave of a project." Because these two types of projects (unlike those in civil works) came to the Corps already fully defined, the "cradle" starting point in the district was not planning but engineering. Despite a push in 1993 to reestablish Construction as a separate division, the single Engineering and Construction Division remained intact.[68]

Similarly, the Philadelphia District reexamined its Operations Division in the 1990s as part of a Corps initiative to assess the operations and maintenance program in all its districts. This division, with 265 personnel, was responsible for operations and maintenance of civil works projects, the dredging fleet, the management of flood control projects and the Chesapeake and Delaware Canal, the district's regulatory mission, and emergency management. In 1995, the district reorganized the division, combining some branches and ensuring that each civil works operations and maintenance project had a designated project manager. For example, elements of the Navigation and Maintenance Branch were combined with part of the Plant Branch to form the Management Support Branch, while the Surveys Branch and Operation and Maintenance Contracts Branch became the Operations

Technical Support Branch. The reorganization eliminated eight full-time positions (which were unfilled vacancies) and streamlined supervisor-to-employee ratios.[69]

As the Corps moved into the twenty-first century, project management continued to evolve. Regionalization progressed, and the Corps formalized and expanded the practice (which had long existed to some extent) of working across district lines to deliver quality products. Corps Headquarters incorporated this practice into project management, calling it the project management business process. Under this process of "one project, one team, one project manager," each project would have a project delivery team that was "responsible for project success." (Previously, such teams were formed only for the larger civil works projects and included specialized consultants, usually from elsewhere in the Corps.) Members of the project delivery team could come from other districts and might include "specialists, consultants/contractors, stakeholders, or representatives from other federal and state agencies." As a 2006 Engineer Regulation stated, "Led by the Project Manager, [the project delivery team is] empowered to act in unison across organizational boundaries focusing on consistent service to customers." To increase its level of partnering, the Corps mandated that the project manager and the project delivery team work with the customer to develop a project management plan and stay in close contact over the course of the project.[70]

Although the project management business process seemed like a natural evolution, given the focus on regionalization in the twenty-first century, the concept met with some resistance in the Corps as a whole and in the Philadelphia District specifically. In 2000, Lt. Col. Timothy Brown, District Engineer for the Philadelphia District, commented that anyone who believed that the project management business process would "pass like past ideas" was "wrong."[71]

And yet, when Lt. Col. Thomas C. Chapman took over as district engineer in 2002, one

interviewer informed him that "District personnel are looking for guidance from you about the project management business process." Chapman responded that he understood "why there may have been negative feelings" but that implementing the principles of the process would "lead . . . to bigger and better things."[72] He said that although the concepts of the process were not new, "the total immersion of all our projects into the PMBP is a new way of doing business for many of us." He characterized the process as "a very positive change" and encouraged district personnel to "learn the process and thoroughly understand it."[73] Eventually, district personnel became more comfortable with the process, especially with increased pressure from Corps Headquarters for full implementation.

Perceptions of the Philadelphia District

Between 1972 and 2008, the Philadelphia District faced changing missions, threatened reorganizations and eliminations, and new policies mandated by Corps Headquarters. In dealing with these issues, the District for the most part responded positively, even though it was handicapped by its status as a small district, which partially explained how it was treated in the reorganization proposals. Former District Engineer Locurcio said that in his interactions with district engineers from the Baltimore and New York Districts, he felt like a "second-class citizen," in part because he was a lieutenant colonel and the other commanders were colonels. Also, the Philadelphia District was sandwiched between two other districts that had perceived advantages in terms of visibility and influence—the New York District was essentially collocated with the parent North Atlantic Division in Manhattan, and the Baltimore District was only an hour from Corps Headquarters in Washington, D.C. Locurcio found it "a little difficult" to work with other districts and believed that the Philadelphia District's interests took a backseat to those of larger districts.[74]

Despite Locurcio's experience, the Philadelphia District seemed to

have earned respect in the Corps for efficiency and effectiveness in the execution of its duties, even if (or because) it was smaller than other districts. At the working level, the district's project teams collaborated well with their counterparts in neighboring districts, and their performance was exceptional. Lt. Col. Robert Keyser, District Engineer from 1996 to 1998, said that the Philadelphia District ranked third among all Corps districts in its cost-effectiveness.[75] Lt. Col. Robert Magnifico, who preceded Keyser, said that other districts recognized the Philadelphia District's efficiency. He had previously worked for the Baltimore District, and he said that in Baltimore, "The Philadelphia District had an outstanding reputation."[76] To Lt. Col. Gwen Baker, District Engineer from 2006 to 2008, proof of this sterling reputation came in the work that the Philadelphia District performed. "Ask anyone at the Engineer Research and Development Center in Vicksburg which districts they work with most closely on groundwater modeling," she said. "Which district does EPA Region 2 keep name-requesting time and time again for Superfund remediation? Who is co-lead for the North Atlantic Division as the USACE Coastal Planning Center of Expertise?" In all cases, it was the Philadelphia District.[77]

The positive attitude toward the district was apparent outside the Corps. As noted earlier, when the Philadelphia District was slated for closure, several members of the community testified about its strong work and good reputation. Congressional representatives from Pennsylvania were effusive. Congressman Foglietta, for example, said that in 1991, the Philadelphia District ranked sixth out of thirty-five in a reorganization study classifying districts "on the basis of five measures of merit." He added that the Philadelphia District "possesses the unique mixture of expertise, proximity, and experience that allows it to successfully meet the varied challenges of the tri-state area it serves."[78] As Lieutenant Colonel Ruch, District Engineer from 2004 to 2006, said, "Hundreds of folks

Placement of stone mat foundation for upgrading the Hereford Inlet Seawall, North Wildwood, N.J.

external to the District" believed that the district was "the friendliest and most proactive government agency they work with." Ruch believed that the small size of the district worked in its favor in this area, as Corps personnel were able to get to know those they served and "personalize our service."[79]

* * * * * * *

Between 1972 and 2008, the Philadelphia District faced some trying times amid changes to what defined the national interest guiding the Corps' missions. The growing environmental movement, the passage of NEPA, and concerns of both the Carter and Reagan administrations about the costs of projects increased scrutiny of the Corps and decreased the number of large construction projects the Corps undertook. This situation led to the demise of the Tocks Island Dam and Trexler Lake projects, and the loss of these projects sent the district into a tailspin that did not improve until the mid-1980s. And just as the district was regaining missions and branching into new areas, the Corps issued plans for reorganization that included closing the Philadelphia District. The district survived this proposal and subsequent proposed reorganizations, and worked hard to embrace the regionalization concept promoted by the Corps in the late 1990s and early twenty-first century. In addition, the district established a project management program in accordance with Headquarters directives.

The district looked different in 2008 than it had in 1972. It continued to handle civil works projects, such as flood control, although on a much smaller scale, and it continued to execute its

dredging, navigation, and shore protection missions. However, environmental programs such as wetlands regulation and ecosystem restoration were more prominent in the district's workload, as was its support of the EPA's Superfund program—along with a number of other federal, state, and local agencies—and its work on military installations. Instead of consisting mainly of engineers, personnel now included significant numbers from the natural sciences, such as biologists and ecologists. There was a new Programs and Project Management Division, and the Engineering and Construction divisions had been combined. The district even had a new home—the Wanamaker Building—after moving from the Customs House in 1992. It worked more closely with other districts in the North Atlantic Division and focused its work on the areas in which it had the most expertise.

Throughout all these changes and challenges, the district continued to provide responsive and reliable service to its customers, and maintained its reputation as one of the most efficient and cost-effective districts in the Corps. In that sense, little had changed since 1972.

[1] Snyder and Guss, *The District*, 207–219, 224–225.

[2] Snyder and Guss, *The District*, 224.

[3] Quotation in Martin Reuss, *Shaping Environmental Awareness: The United States Army Corps of Engineers Environmental Advisory Board*, 1970-1980 (Washington, D.C.: Historical Division, Office of Administrative Services, Office of the Chief of Engineers, 1983) , 3; see also Adam Rome, "'Give Earth a Chance': The Environmental Movement and the Sixties," *Journal of American History* 90 (September 2003): 527; J. Brooks Flippen, *Nixon and the Environment* (Albuquerque: University of New Mexico Press, 2000), 5; Michael E. Kraft, "U.S. Environmental Policy and Politics: From the 1960s to the 1990s," *Journal of Policy History* 12, no. 1 (2000): 23; Kirkpatrick Sale, *The Green Revolution: The American Environmental Movement*, 1962-1992 (New York: Hill and Wang, 1993), 1–3, 20–22.

[4] The National Environmental Policy Act of 1969 (83 Stat. 852).

[5] Edward Voigt, Chief, Public & Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 4 April 2011.

[6] For a summary of the Tocks Island Project, see Unpublished Morgan Draft District History, 29–48; Voigt personal communication. The Tocks Island Project is discussed in greater detail in Chapter Two.

[7] Unpublished Morgan Draft District History, 29–48.

[8] Unpublished Morgan Draft District History, 51–57. The Trexler Lake Project is discussed in more detail in Chapter Two.

[9] See Theodore Catton and Matthew C. Godfrey, *Steward of Headwaters: U.S. Army Corps of Engineers, St. Paul District, 1975-2000* (St. Paul, Minn.: U.S. Army Corps of Engineers St. Paul District, 2004), 70–77.

[10] Quotations in Daniel A. Mazmanian and Jeanne Nienaber, *Can Organizations Change? Environmental Protection, Citizen Participation, and the Corps of Engineers* (Washington, D.C.: The Brookings Institution, 1979), 15–16; see also "Cost-Benefit Trips Up the Corps," Business Week (19 February 1979): 96.

[11] Mazmanian and Nienaber, *Can Organizations Change?*, 12.

[12] As cited in Martin A. Reuss, *Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986* (Fort Belvoir, Va.: U.S. Army Corps of Engineers Institute of Water Resources, 1991), 49.

[13] Quotations in Jimmy Carter, *Keeping Faith: Memoirs of a President* (Toronto: Bantam Books, 1982), 79; see also Reuss, *Reshaping National Water Politics*, 48–52.

[14] Mazmanian and Nienaber, *Can Organizations Change?*, 12.

[15] Lisa Mighetto and William F. Willingham, *Service-Tradition-Change: A History of the Fort Worth District, U.S. Army Corps of Engineers, 1975-1999* (Fort Worth, Tex.: U.S. Army Corps of Engineers Fort Worth District, 2000), 97.

[16] Quotation in Delaware River Basin Commission, "DRBC Overview" <http://www.state.nj.us/drbc/over.htm> (7 May 2009); see also Catton and Godfrey, *Steward of Headwaters*, 11; Martin Reuss, "Coping with Uncertainty: Social Scientists, Engineers, and Federal Water Resources Planning," *Natural Resources Journal* 32 (Winter 1992): 111–115.

[17] Catton and Godfrey, *Steward of Headwaters*, 11; Martin Reuss, "Coping with Uncertainty": 111–115.

[18] Quotation in "Where Are They Now? 1978-1981: Col. James G. Ton," *The Observer* 17 (November/December 1999): 13; see also Unpublished Morgan Draft District History, 66; "Where Are They Now? 1981-1984: Lt. Col. Roger L. Baldwin," *The Observer* 18 (January/February 2000): 13. Other Corps districts with lieutenant colonels as district engineers are Charleston, Nashville, Albuquerque, Walla Walla, San Francisco, Honolulu, Buffalo, and Detroit. Matthew T. Pearcy email to Matthew Godfrey, 22 July 2009, copy in possession of the authors.

[19] The district's planning program included many flood damage reduction, coastal protection, and navigation studies. During this period, the district was also successful in proffering its services to other federal, state, and local government organizations in need of the experience and expertise the U.S. Army Corps of Engineers could provide. Voigt personal communication.

[20] Reuss, *Shaping Environmental Awareness*, 1, 4–5, 7.

[21] "Getting to Know Environmental Resources Branch," *The Observer* 14 (October 1996): 10–11.

[22] "Exit Interview with Mr. Robert L. Lindner, Chief, Planning Division, Baltimore District, 6 April 2004," 6, document provided by Scott Watson, U.S. Army Corps of Engineers, Baltimore District, Baltimore, Maryland.

[23] Quotations in Clean Water Act, Section 404 <http://www.epa.gov/OWOW/wetlands/regs/sec404.html> (11 May 2009); see also Jeffrey K. Stine, "Regulating Wetlands in the 1970s: U.S. Army Corps of Engineers and the Environmental Organizations," *Journal of Forest History* 27 (April 1983): 60–64.

[24] Frank Cianfrani interview by Paul Sadin and Joshua Pollarine, 12 January 2009, Philadelphia, Pennsylvania, transcript, 1–4.

[25] United States Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Superfund: 20 Years of Protecting Human Health and the Environment*, EPA Report 540-R-00-007, digital copy available at <http://www.epa.gov/superfund/20years/index.htm> (12 May 2009).

[26] "Where Are They Now? 1978-1981: Col. James G. Ton," 13; "Where Are They Now? 1981-1984: Lt. Col. Roger L. Baldwin," 13.

[27] Department of the Army, Corps of Engineers, Support for Others (SFO) Program, Annual Report for FY 96, 1, Box 2, SFO Files in temporary holdings, U.S. Army Corps of Engineers, Office of History, Alexandria, Virginia (hereafter referred to as Office of History).

[28] Act of 17 November 1986 (100 Stat. 4082, 4251); "Lower Cape May-Cape May Point Ecosystem Restoration Project, Volume 1, Feasibility Report, Integrated Environmental Impact Statement (EIS), Appendix A: Pertinent Correspondence, August 1998," ES-1, Programs and Project Management Division materials, Dwight Pakan's Office, 6th Floor, Philadelphia District.

[29] Ch, CEPhiladelphia District-EN-MC to Files, 25 August 1988, File 1110-2-1150a Planning & Development Correspondence, FE Walter, Internal Coord., Box 6 of 9, Accession No. 077-97-0001, Record Group (RG) 77, Records of the Office of Chief of Engineers, Federal Records Center, Philadelphia, Pennsylvania (hereafter referred to as FRC); Unpublished Morgan Draft District History, 67; "Where Are They Now? 1984-1987: Lt. Col. Ralph V. Locurcio," *The Observer* 18 (May/June 2000): 13; Brig. Gen. Todd T. Semonite, Commander, North Atlantic Division, Memorandum for Record, 17 April 2009, document provided by Edward Voigt, Philadelphia District.

[30] As cited in Donita M. Moorhus and Gregory Graves, "The Limits of Vision: A History of the U.S. Army Corps of Engineers, 1988-1992," January 1999, 28–30, unpublished manuscript, copy provided by Office of History; see also Mighetto and Willingham, *Service-Tradition-Change*, 97; Catton and Godfrey, *Steward of Headwaters*, 13.

[31] Moorhus and Graves, "The Limits of Vision," 31–32; Catton and Godfrey, *Steward of Headwaters*, 13-14.

[32] Moorhus and Graves, "The Limits of Vision," 32–33; Catton and Godfrey, *Steward of Headwaters*, 14; Quotations in House Subcommittee on Water Resources of the Committee on Public Works and Transportation, *Water Resources Development Act of 1992 and the Reorganization of the U.S. Army Corps of Engineers: Hearings Before the Subcommittee on Water Resources of the Committee on Public Works and Transportation, House of Representatives*, 102d Cong., 2d sess., 1992, 695 (hereafter referred to as WRDA 1992 and Reorganization Hearings).

[33] Richard Maraldo, personal communication with Matthew Godfrey, 27 April 2009.

[34] Catton and Godfrey, *Steward of Headwaters*, 15.

[35] Quotations in WRDA 1992 and Reorganization Hearings, 173; see also Catton and Godfrey, *Steward of Headwaters*, 17.

[36] WRDA 1992 and Reorganization Hearings, 609, 613, 691–692.

[37] WRDA 1992 and Reorganization Hearings, 638–639.

[38] WRDA 1992 and Reorganization Hearings, 173–175, 194.

[39] "1992: The Year in Review," *The Observer* 12 (April 1993): 6; Philadelphia District Timeline, document provided by Edward Voigt, Philadelphia District.

[40] "Details of Corps Reorganization Announced," *The Observer* 11 (December 1992): 2; Senate Committee on Environment and Public Works, *Reorganization of the Corps of Engineers: Hearing Before the Committee on Environment and Public Works, United States Senate*, 102d Cong., 2d sess., 1992, 13.

[41] Quotation in House, *Proposed Legislation, Government Reform and Savings Act of 1993: Message from the President of the United States*, 103d Cong., 1st sess., 1993, H. Doc. 103-155, 14; see also Catton and Godfrey, *Steward of Headwaters*, 19.

[42] Quotations in Lt. Col. Robert P. Magnifico, "Your Involvement Needed for Restructuring," *The Observer* 14 (September 1995): 2; see also "Getting to Know Construction Services Branch," The Observer 18 (January/February 1999): 8-11; Catton and Godfrey, *Steward of Headwaters*, 19; Voigt personal communication.

[43] Lt. Col. Robert P. Magnifico, "Success Last Year Paves the Way for the District's Future," *The Observer* 14 (August 1995): 2.

[44] Maraldo personal communication.

[45] Catton and Godfrey, *Steward of Headwaters*, 19.

[46] "How 'Door to the Corps' Got Started," *The Observer* 17 (March/April 1998): 9.

[47] Department of the Army, U.S. Army Corps of Engineers, Regulation No. 10-1-2, "Organization and Functions, U.S. Army Corps of Engineers, Division and District Office," 31 October 1999 <http://140.194.76.129/ publications/eng-regs/er10-1-2/ entire.pdf> (21 May 2009).

[48] Amelia Gruber, "Army Corps to Release Final Reorganization Plan Next Week," 3 October 2003 <http://www.govexec.com/dailyfed/1003/100303a1.htm> (27 April 2009).

[49] Department of the Army, U.S. Army Corps of Engineers, Regulation No. ER 5-1-13, "Resource Management: U.S. Army Corps of Engineers Policy on Regional Business Centers (RBCs)" <http://140.194.76.129/ publications/eng-regs/er5-1-13/ entire.pdf> (25 January 2008).

[50] Quotations in "Background Information on USACE 2012" <http://corpslakes.usace.army.mil/employees/ strategicplan/2012.html> (27 April 2009); see also U.S. Army Corps of Engineers, "USACE 2012: Aligning the U.S. Army Corps of Engineers for Success in the 21st Century," October 2003, i-ii <www.aapa-ports-org/files/PDFs/USACE_2012Final_ExSum.pdf> (27 April 2009); Gruber, "Army Corps to Release Final Reorganization Plan Next Week."

[51] David Lipsky, "USACE 2012 and the North Atlantic Division Regional Management Board," *The Observer* (Autumn 2004): 3.

[52] Lipsky, "USACE 2012 and the North Atlantic Division Regional Management Board," 3.

[53] "Regional News: Think as a Region . . . Act as a Region," *The Observer* (Winter 2004/2005): 3, 14–15.

[54] "Q&A with the New D.E.," *The Observer* (Autumn 2004): 22.

[55] Lt. Col. Robert J. Ruch, "As I See It: What Does Regionalization Really Mean?" *The Observer* (Winter 2004/2005): 10 (emphasis in the original).

[56] Reuss, *Reshaping National Water Politics*, 64–67, 81.

[57] Quotations in Catton and Godfrey, *Steward of Headwaters*, 30–31; see also Reuss, *Reshaping National Water Politics*, 86–87; Bory Steinberg, "The Federal Perspective," in *Water Resources Administration in the United States: Policy, Practice, and Emerging Issues*, Martin Reuss, ed. (East Lansing, Mich.: American Water Resources Association/ Michigan State University Press, 1993), 264–269.

[58] Ralph Locurcio telephone interview by Paul Sadin, 16 and 20 March 2009, transcript, 4.

[59] "Project Management System, Mission Execution-Implementation, Gains and Costs, Information Paper for District Commanders Conference, Ft. Leonard Wood, MO 19–22 April 1994," 1–2, General Files, Box 108-G-12, Research Collections, Office of History.

[60] Moorhus and Graves, "The Limits of Vision," 16–17.

[61] "Project Management System, Mission Execution-Implementation, Gains and Costs," 3–4. As Hatch's initiatives were taking shape, the Philadelphia District was already headed toward life-cycle project management. Its combined Planning and Engineering Division included a Project Management Branch that was actively managing civil works projects from "concept to contract"—right up to the start of construction and all the way through to completion for the larger civil projects. Voigt personal communication.

[62] "Project Management System, Mission Execution-Implementation, Gains and Costs," 3–4.

[63] Moorhus and Graves, "The Limits of Vision," 18–19.

[64] Moorhus and Graves, "The Limits of Vision," 19–20.

[65] "Veteran District Leader Retires, Ends 36-Year Career," *The Observer* 26 (Winter 2007/2008): 4; Maraldo personal communication.

[66] "Veteran District Leader Retires, Ends 36-Year Career," *The Observer* 26 (Winter 2007/2008): 4; Maraldo personal communication.

[67] Quotations in Maraldo personal communication; see also "Getting to Know The Customer's Door to the Corps: Programs and Project Management Division," *The Observer* 17 (March/April 1998): 8–9.

[68] Quotation in Locurcio interview, 7; see also "Organization Day '93," The Observer 12 (July 1993): 1; U.S. Army Corps of Engineers, Philadelphia District, "Organization Charts," September 2008, copy provided by Edward Voigt, Philadelphia District; Voigt personal communication.

[69] "Operations Division Gets 'New Look,'" *The Observer* 14 (January 1995): 6.

[70] Colonel Yvonne J. Prettyman-Beck, Chief of Staff, Corps of Engineers, Memorandum for Commanders, Major Subordinate Commands, Districts, Centers and Labs, Subject: Revision of ER 5-1-11, U.S. Army Corps of Engineers (USACE) Business Process, 12 January 2007, 4–5 <http://140.194.76.129/publications/eng-regs/er5-1-11/ entire.pdf> (21 May 2009).

[71] Lt. Col. Timothy Brown, "CHANGE: One Thing We Can All Count On," *The Observer* 19 (November/December 2000): 10.

[72] Lt. Col. Thomas C. Chapman, "An Interview with the Commander," *The Observer* 21 (September/October 2002): 3.

[73] Lt. Col. Thomas C. Chapman, "First Impressions Are Strong and Lasting," *The Observer* 21 (July/August 2002): 2.

[74] Locurcio interview, 14.

[75] "Keep Doing What You're Doing and Do It Safely," *The Observer* 15 (September 1996): 4.

[76] "Lt. Col. Magnifico: A Closeup Look," *The Observer* 13 (November 1994): 5.

[77] Lt. Col. Gwen E. Baker, "Highlighting the District's Technical Expertise," *The Observer 25* (Spring 2007): 2.

[78] WRDA 1992 and Reorganization Hearings, 695, 697.

[79] "Q&A with the New D.E.," *The Observer* 23 (Autumn 2004): 11, 22.

2

Dams, Basin Planning, and Flood Risk Management

Beginning in the state of New York, the main stem of the Delaware River flows for more than three hundred miles before entering the Atlantic Ocean through the Delaware Bay. The river and its numerous tributaries constitute the Delaware River Basin, which encompasses 13,600 square miles in the states of New York, Pennsylvania, New Jersey, and Delaware, as well as a small area in Maryland. The river contains several branches and tributaries, including the Lackawaxen, Mongaup, Neversink, Lehigh, Schuylkill, and Christina rivers. These serve many purposes, such as providing recreational opportunities and water supply to a large population. Yet the river, described in 1609 by Henry Hudson as "one of the finest, best and pleasantest rivers in the world," can sometimes turn destructive, overflowing its banks and flooding communities and homes. More commonly, however, the problem has been too little water—droughts that diminish the amount of water the populations of Pennsylvania, New Jersey, New York, and Delaware can use. Drought has also periodically led to saltwater intrusion from the Atlantic Ocean. The Philadelphia District of the U.S. Army Corps of Engineers has battled these issues for most of the twentieth century and into the twenty-first. In the years since 1972, its work in these arenas has become increasingly complicated, as many groups—both environmental and political—have staked out an interest in water management.

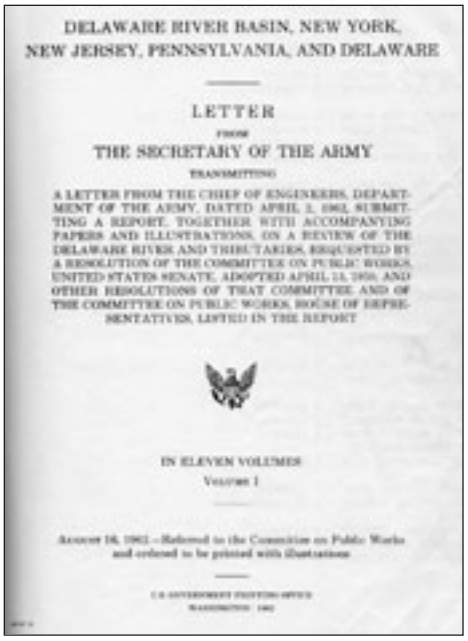
Facing page: Francis E. Walter Dam at maximum discharge in September 2004, returning to normal reservoir levels following Tropical Storm Ivan

In 1955, Hurricanes Connie and Diane rocked the North Atlantic region, spreading destruction and devastation in their wake. One report said, "Bridges along the Delaware were washed out, homes and businesses were destroyed, 99 people died."[1] The extent of the damage caused many to clamor for additional flood protection in the Delaware River Basin. A year earlier, the U.S. Supreme Court had issued an amended decree to govern water distribution on the Delaware River, which allowed approximately 900 million gallons of water a day to be extracted from the river for water supply purposes. With such heavy demands, residents of the states of New York, New Jersey, Delaware, and Pennsylvania needed additional water supplies.[2]

By the mid-1950s, the Philadelphia District had already been working for several years on a comprehensive plan (initiated in 1950) for the Delaware River Basin, but the hurricanes and the Supreme Court decree caused the Corps to reevaluate its plans. After conducting numerous "water use studies based on present and project populations and economic activities in the basin and adjacent areas," the district presented a plan to Congress in 1962.[3] This plan envisioned the "eventual construction of 58 reservoirs to meet projected demands over the next 50 years for municipal and industrial water, recreation, flood control, hydroelectric power, and related purposes." To begin, the Corps asked for authorization to construct "8 of the 19 major control structures at sites designated as Beltzville, Blue Marsh, Trexler, Tocks Island . . . , Aquashicola, Maiden Creek, Prompton and Bear Creek " (the last two were modifications of existing projects). The

Corps estimated that the complete development of the plan would cost $591 million—$232 million from the federal government and $359 million from a nonfederal sponsor.[4]

Throughout the 1960s, the Philadelphia District worked to implement the plan's recommendations. All components of the district—including planning, design, engineering, and construction personnel—were involved in water resources projects. The district conducted reconnaissance and feasibility studies for dams such as Tocks Island, Blue Marsh, and Beltzville, while the Corps worked closely with the Delaware River Basin Commission (DRBC), created in 1961 as "a regional body with the force of law to oversee a unified approach to managing a river system without regard to political boundaries." The DRBC consisted of the governors of New York, New Jersey, Delaware, and Pennsylvania, as well as a federal representative, originally from the U.S. Department of the Interior but later designated as the division engineer of the Corps' North Atlantic Division.[5] For some of the projects proposed in the Comprehensive Delaware River Basin Plan, the DRBC served as the local sponsor and representative. Working with the DRBC, the Philadelphia District had either completed or placed under construction several elements of the plan by 1972, but politics, funding issues, and environmental concerns would soon halt efforts to construct Tocks Island Dam—the linchpin of the plan—and then Trexler Dam.


DELAWARE RIVER BASIN, NEW YORK, NEW JERSEY, PENNSYLVANIA, AND DELAWARE

LETTER

FROM

THE SECRETARY OF THE ARMY

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, DATED APRIL 1, 1962, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND ILLUSTRATIONS, ON A REVIEW OF THE DELAWARE RIVER AND TRIBUTARIES, REQUESTED BY A RESOLUTION OF THE COMMITTEE ON PUBLIC WORKS, UNITED STATES SENATE, ADOPTED APRIL 13, 1959, AND OTHER RESOLUTIONS OF THAT COMMITTEE AND OF THE COMMITTEE ON PUBLIC WORKS, HOUSE OF REPRESENTATIVES, LISTED IN THE REPORT

IN ELEVEN VOLUMES

VOLUME 1

August 16, 1962.—Referred to the Committee on Public Works and ordered to be printed with illustrations

The Delaware River Basin Comprehensive Plan, as transmitted to Congress

Tocks Island Dam

The Tocks Island Dam was one of the most important projects on the Philadelphia District's horizon in the 1960s and 1970s. Several studies—including a book and several master's theses and doctoral dissertations—have been produced on the project. Unlike those works, this history does not present an exhaustive study of Tocks Island. Instead, it focuses primarily on the district's role in this project and on the effect on the district of the demise of the project, while also noting the changing national context in which the district was working in the 1970s and beyond.

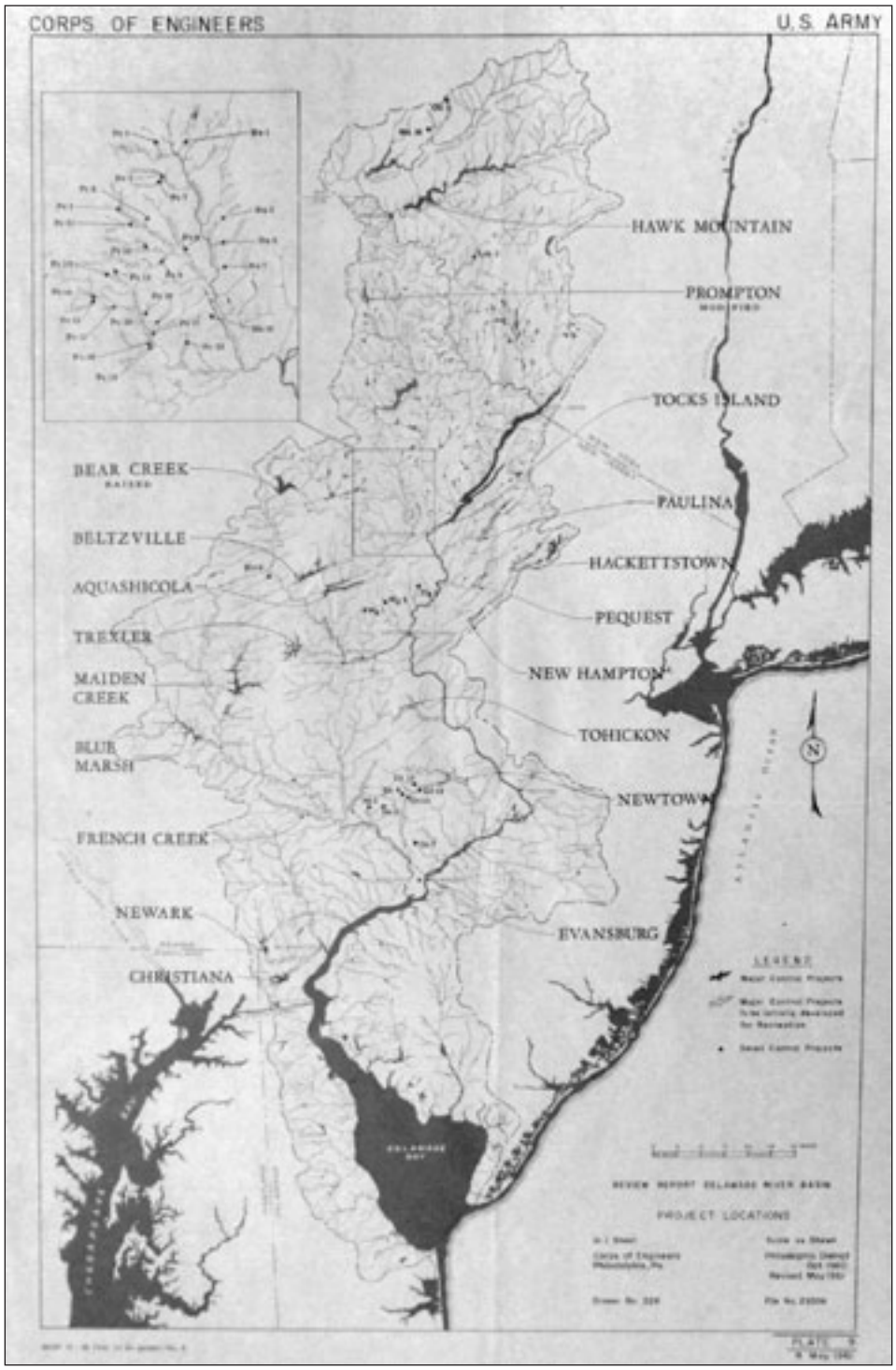
Geographer Gina Bloodworth noted in a dissertation on the Tocks Island Project that the 1970s saw a transition in the nation's focus on water resources to "a more transparent decision-making process that included public input" and an "increased emphasis on preserving environmental quality and values."[6] This shift in thinking affected the Corps' ability to continue with the Tocks Island Project and ultimately affected the amount of work the Philadelphia District had on the horizon. Tocks Island is a good example of how the context of the times affected Corps projects.

Because of the massive scale of the project, especially in the eastern United States—a dam 3,200 feet long and 160 feet high that would create a thirty-seven-mile-long reservoir, construction of which would directly affect six counties across New York (Orange), New Jersey (Sussex and Warren), and Pennsylvania (Pike, Monroe, and Northampton)—the implementation of the project required a large amount of the district's time and resources. One source said that, if constructed, Tocks Island would be the eighth largest dam project ever attempted by the Corps. Accordingly, as one district publication related, "No enterprise enlisted more . . . talent during the late 1960s than the Tocks Island multipurpose flood control project."[7] But Tocks Island came under fire in the 1970s from a host of opponents, who attacked it for the environmental degradation it would supposedly cause and for its elimination of a scenic portion of the Delaware River. Supporters of Tocks Island and representatives of both the Corps and the DRBC responded that the dam was the most efficient way to provide the flood control, water supply, and recreation the Delaware River Basin needed. The opposition was not swayed, however, and the project was eventually scuttled, which had a dramatic effect on the Philadelphia District's workload.

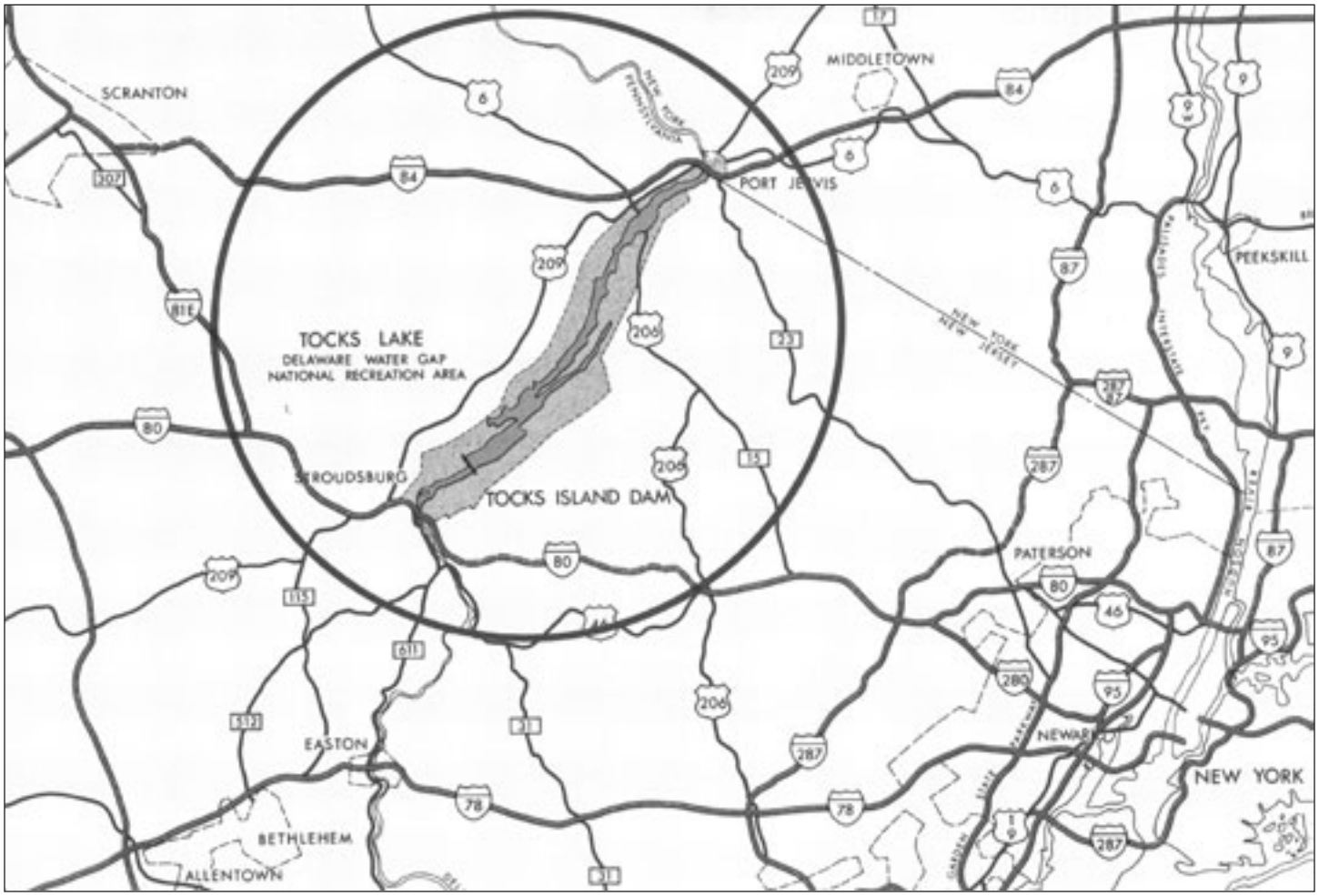
The Corps had studied the potential construction of Tocks Island Dam for many years. In 1934, for example, the Philadelphia District presented a report to Congress on the Delaware

River Basin that, according to one source, "was the first comprehensive water-resources plan ever developed" for that basin. It proposed the construction of dams at thirty-four sites, including Tocks Island, located on the main stem of the Delaware River approximately five miles upstream from the Delaware Water Gap and seven miles northeast of Stroudsburg, Pa. The 1934 proposal called for a reservoir that could hold 214 billion gallons of water at Tocks Island for water supply and power production. But funding was not forthcoming for the project, and in 1939 Congress asked the Corps to reexamine the report. Subsequent onsite boring tests revealed that a large dam was impracticable because of foundation issues; by the mid-1940s, the proposal for a dam at Tocks Island seemed dead.[8]

After the devastating storms of 1955, however, and with the increasing need for water in the area, the chief of engineers directed the Philadelphia District to again examine the most effective ways of controlling floods and providing water. Later that year, the U.S. Senate Committee on Public Works passed a resolution requesting a review of Delaware River Basin reports. In 1956, the committee



The reservoirs originally planned for construction under the Delaware River Basin Comprehensive Plan



Location of the proposed Tocks Island Reservoir

passed another resolution calling for the Corps to specifically study the construction of a dam on the main stem of the Delaware River, either at Wallpack Bend or at Tocks Island. In the course of completing these studies, the Corps determined that a dam was feasible at Tocks Island as long as it was an earthfill dam and was in a slightly different location than the one previously explored. Such a reservoir, the Corps said, could provide twice as much water storage as one at Wallpack Bend. The Philadelphia District made its preliminary findings public in January 1959; in 1962, it issued an official proposal for the construction of a dam at Tocks Island. Estimated to cost approximately $146 million, the dam would be a "multiple-purpose development" that would "provide supplies of water, flood control, production of hydroelectric power, and . . . recreation"

opportunities. More than half the potential storage of the reservoir would be used for water supply, recreation, and power generation, with the balance set aside for flood control and as sediment reserve. According to the Corps' plans, the Philadelphia District would begin constructing the dam in 1967 and would have it fully operational by 1975. Congress authorized the project in the Flood Control Act of 1962, and the DRBC included it in its own comprehensive plan for the Delaware River Basin that year, becoming the nonfederal sponsor of the project in 1965.[9]

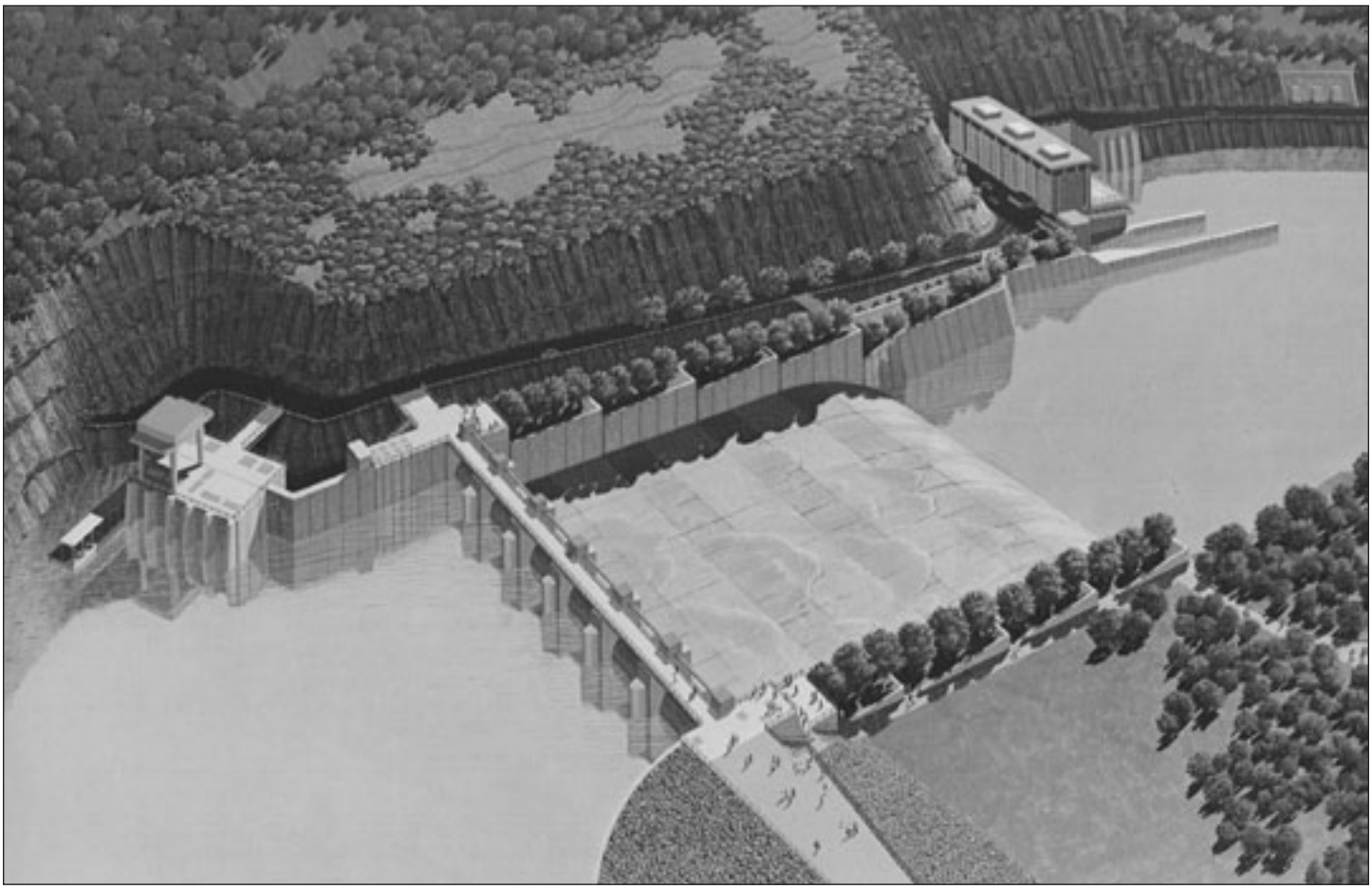
Throughout the 1960s, the Corps completed planning and preliminary design for the dam's construction. In the meantime, Congress expanded the recreational aspects of the project in 1965 by establishing the Delaware Water Gap National Recreation Area, administered by the National Park Service (NPS), on 46,000 acres of land surrounding the proposed dam site. Congress appropriated funds to purchase the 46,000 acres from existing landowners, and the Philadelphia District's Real Estate Division was placed in charge of negotiating such purchases.[10]

But, as the 1960s closed, trouble loomed for Tocks Island, in large part because of the Vietnam War and its drain on the federal government's finances. Lack of funding became an issue for the dam, especially as its cost escalated throughout much of the 1960s, reaching $214 million by 1969. With the price tag rising and little money to spare, Congress asked the General Accounting Office (GAO) to investigate the dam's economics. The GAO focused on the Corps' benefit-cost ratio, projected at around 1:4.[11] The GAO claimed that recreational benefits were overstated while water supply benefits were understated. Although the GAO did not sound an alarm about the overall benefit-cost ratio, concern over the allocation of benefits, coupled with an austere budget that provided the Philadelphia District with only about $2 million in fiscal year 1969 for construction purposes, meant that by the dawn of the 1970s, the Corps had not yet commenced construction.[12]

Ironically, although this initial delay had to do simply with finances, it created a window of opportunity that others proceeded to exploit—starting with those who sought to highlight the Tocks Island Project as potentially damaging to its surrounding environment. In 1970, the DRBC commissioned an environmental study of the project area by Roy F. Weston Inc. This study made various recommendations in terms of ensuring that the reservoir provided sufficient water supply, that a sewage plan be centrally administered by the DRBC, and that engineering studies on solid waste disposal be conducted, but it still considered Tocks Island a viable option.[13]

However, even with this study, and even though Tocks Island was originally authorized before the passage of the National Environmental Policy Act (NEPA) in 1969, the Philadelphia District had to prepare an environmental impact statement (EIS) before any construction could begin. The Corps submitted a draft EIS to the Council on Environmental Quality (CEQ) (as required by NEPA) in February 1971, but the CEQ deemed it inadequate, in part for not exploring alternatives to the project more exhaustively and in part for not devoting more attention to potential eutrophication of the reservoir. Eutrophication—the process by which a water body becomes contaminated by nutrients such as nitrogen and phosphorous—was deemed especially important because it could affect the use of the reservoir for recreation.[14] The CEQ recommended that construction of the Tocks Island Dam be deferred until the Corps could satisfactorily address these issues and, in the spring of 1971, the undersecretary of the Army agreed.[15]

In October 1971, the Corps issued its final EIS on Tocks Island. This document stated that consultants hired by the Corps had determined that eutrophication in the reservoir was likely, in large part because of sewage and animal waste runoff from upstream dairy farms in New York. To combat that, the EIS said, the DRBC would develop a large wastewater treatment system in the



An artist's rendering of the proposed Tocks Island Dam showing the spillway with its tainter gates and stepped terraces, intake structure at left and powerhouse at right

area. Environmentalists, however, were not satisfied by the EIS. In February 1972, the Environmental Defense Fund published its own evaluation of the Tocks Island Project. This document admitted that "legitimate needs for water supply, flood damage prevention, outdoor recreation, and peaking power exist in the Delaware River Basin," but it did not agree that Tocks Island was the best way to meet these needs. The report criticized the Corps' "calculations and studies of the Tocks Island Reservoir water supply function" as "inadequate and misleading" and claimed that the Corps overestimated the recreational benefits of the dam. In terms of flood control, the report stated that, instead of constructing a large dam, the DRBC should use floodplain management to reduce flooding risks. Finally, the report said that "accelerated cultural eutrophication would have serious detrimental effects on the use of Tocks Island

A sign showing some of the opposition expressed over the Tocks Island Dam

Reservoir for water supply and recreation" and insisted that the Corps require the DRBC "to implement an adequate wastewater treatment and control program for both point (municipal and industrial) and nonpoint (agricultural) wastewater sources" before beginning construction.[16] Russell Train, chairman of the CEQ, agreed with many of these criticisms and approached the governors of New York and other states in the Delaware River Basin to receive assurances that New York would take measures to prevent nutrient runoff into the reservoir and that Delaware, Pennsylvania, and New Jersey would provide funding for the wastewater treatment system. When these assurances were not forthcoming, Congress "officially stopped the construction of Tocks Island Dam" in the summer of 1972.[17]

The situation worsened when Governor William T. Cahill of New Jersey (a DRBC member) declared in 1972 that the state wanted to reevaluate its support of the dam, in part because of the cost of the wastewater treatment plant and in part because he had concerns over the effects a large recreation area would have on his state's roads and communities. This came as somewhat of a surprise; former Philadelphia District Engineer Col. James A. Johnson, who commanded the district from 1968 to 1971, noted that Cahill was very enthusiastic about Tocks Island in the late 1960s and early 1970s. Despite this initial support, on 13 September 1972, Cahill told the DRBC that New Jersey could support Tocks Island only if certain economic and social conditions were met.[18] Philadelphia District officials responded that Cahill was exaggerating the impact on New

Jersey of recreational visitation to Tocks Island and that the project should continue, independent of measures implemented by the states. However, in an effort to placate Cahill, they downgraded the estimate of proposed visitors to the dam to four million.[19]

Meanwhile, certain environmental and conservation groups opposed to the dam's construction became more vocal. One of these was the Delaware Valley Conservation Association, which in 1970 joined with the Leni Lenape League and local chapters of the Sierra Club to form the Save the Delaware Coalition, with a stated goal of halting the Tocks Island Project and creating "a park without a dam"—a natural recreation area in the vicinity of Tocks Island centered around the Delaware River. National organizations such as the Wilderness Society and Trout Unlimited also expressed their displeasure with the proposed project.[20]

At the same time, many local residents who did not want to sell their homes and farms for the dam's construction added their voices to the chorus of disapproval. One journalist described the forces against Tocks Island Dam as follows:

A model of the Tocks Island Dam

> From a comparative handful of local people, many of them landowners who tried to sue the government to stop the dam and recreation area . . . the anti-dam faction has grown to a large consortium of fishermen, who fear the loss of one of the best shad runs in the East; canoeists, who stand to lose one of the last stretches of white water in the East; environmental groups, elected officials, members of the Save the Delaware Coalition, the Environmental Protection Agency, the Council on Environmental Quality, and most recently, the Medical Society of New Jersey.[21]

Together, these organizations wielded considerable political power and even began commissioning their own studies of the Delaware River Basin, concluding that the Corps could pursue several alternatives besides dam construction to address flood control and water supply issues, including floodplain zoning and nonstructural flood control solutions.[22] The Corps disagreed substantively with these conclusions, arguing that "the Tocks Island Project meets . . . urgent human requirements in a manner that is more environmentally acceptable, efficient and economic than any other series of known or feasible alternatives."[23] Likewise, the DRBC declared that "the Tocks Island Reservoir would be the keystone of the water supply management program in the Delaware Valley without an alternative, and the DR[B]C sees no alternative."[24] From the perspective of former DRBC employee Richard Albert, the real argument over Tocks Island was an ideological one: "Either you believed that Tocks Island Dam was the long-awaited answer to the water needs of the Delaware River Basin, or you didn't."[25]

As environmental groups and local landowners increased their opposition, a storm hit the Delaware River Basin in 1972 that affected views on the dam. Between 22 and 25 June 1972, Tropical Storm Agnes dumped water across Pennsylvania, bringing rainfall totals of between 5 and 18 inches to various locations. Schuylkill County, for example, received 14.8 inches of rain, and the entire commonwealth of Pennsylvania was declared a disaster area. The Delaware River Basin was not as hard hit as the Susquehanna River Basin, but the storm heightened in the minds of many the need for more flood control in the region.[26]

In Agnes's aftermath, Philadelphia District officials declared that the storm showed the importance of Tocks Island. Had the storm taken a different route, they said, it could have caused damages exceeding those of the 1955 flood. As Colonel Johnson, District Engineer of the Philadelphia District at the time, later explained, "Had Agnes in

Upstream view of Tocks Island Dam as proposed

'72 been 50 miles to the east, the water level in Trenton [New Jersey] would have been 29 feet over the flood stage." Johnson said that Agnes still would have caused flooding, even if all of the Corps' authorized projects had been constructed at that time, but dams such as the one proposed at Tocks Island could have mitigated the damage.[27]

Meanwhile, the Corps faced criticism over its land acquisition methods. The Philadelphia District was given the responsibility in 1967 of acquiring the land necessary to build the dam and reservoir; to relocate Route 209, a two-lane highway that would be flooded by the reservoir; and to create the Delaware Water Gap National Recreation Area. The duty of obtaining these approximately 72,000 acres, owned by approximately three thousand people, fell to the district's Real Estate Division, which established an office in East Stroudsburg with

approximately 120 employees. Understandably, this was a thankless job, as landowners were not happy about giving up their property, especially tracts of land that had been in a family for several generations. Many people who had to sell their land became bitter, blaming the Corps for everything from property loss to shortened life spans. As Colonel Johnson said, "There was one whale of a lot of emotion about those kinds of things."[28]

In addition, after construction of the dam was delayed in the late 1960s and early 1970s, the Corps began leasing out properties that it had acquired to that point, leading to an influx of "hippies" into the area in 1971. Some of these members of the counterculture had legitimate leases on properties, while others were merely squatters on the land. Regardless, locals who remained in the Minisink Valley resented this intrusion and, by extension, the Corps that allowed it to happen. The Corps took legal action against many of the squatters and, in September 1971, even began bulldozing houses, until the squatters placed themselves in the way of the machines. After numerous legal actions, federal marshals obtained authority to evict the squatters in 1974, but, as Richard Albert noted, "The squatter eviction generated a great deal of bad publicity for the Corps of Engineers."[29] According to Vince Calvarese of the Philadelphia District, the bad feelings resulted in people "damaging our vehicles, putting sand in our gas tanks, and flat[tening] tires. We weren't welcome."[30] Looking back, John Burnes, Assistant Chief of the Engineering and Construction Division, said that the Tocks

Some of the squatters who moved into the Minisink Valley

Island land acquisition taught the Corps some lessons. Those dealing with land acquisition, he said, "weren't integrated with the public affairs office," nor were they "tutored in how to give a sound bite or anything else." Burnes believed that Tocks Island taught the Corps the importance of public relations and of using a gentler approach when acquiring lands.[31]

Meanwhile, Congress still refused to appropriate more money for dam construction, even after the Corps requested the release of funds in fiscal year 1974. Part of the problem was that the growing local opposition to the project led the congressional delegations of New Jersey, Delaware, New York, and Pennsylvania to become "skeptical about the merits of the proposed plan." When Brendan Byrne replaced Cahill as governor of New Jersey, he exhibited the same reluctance to support Tocks Island, while Malcolm Wilson, governor of New York, informed the Public Works Subcommittee of the House of Representatives in 1974 that he was opposed to construction at that time. Because of these views, the DRBC could not come to a firm decision about whether or not to support dam construction. Although the DRBC was the local partner in the project, the fact that two of its governors opposed construction was problematic. These developments led Congress to request in the Fiscal Year 1975 Public Works Appropriation Act that an impartial restudy of Tocks Island be conducted under the supervision of the North Atlantic Division, in cooperation with the DRBC, by August 1975. The goal, according to a contemporary observer, was the completion of "an impartial, comprehensive analysis, including alternatives and review." The Corps received $1.5 million for the restudy in August 1974; in December, it selected engineering firm URS/Madigan-Praeger Inc. and architectural firm Conklin and Rossant for the review.[32]

In June 1975, the Corps released the report, *The Comprehensive Review Study of the Tocks Island Lake Project and*

Alternatives (informally known as the Madigan-Praeger study). This six-volume report attempted to answer many of the lingering questions about the proposed Tocks Island Dam. It concluded that the project was the most cost-effective means to achieve the purposes of flood control, water supply, recreation, and hydroelectric development in the region. In terms of the reservoir's potential for eutrophication, the study said that "a con[s]ensus of opinion among limnologists, making independent rational scientific judgments about the lake once it is constructed, would be that it is eutrophic." However, the study team did not believe that eutrophication would adversely affect any of the project's benefits besides recreation. In the case of recreation, eutrophication would "have a detrimental effect," but some recreational purposes could still be served even with eutrophication.[33] Ultimately, the Madigan-Praeger study supported the Corps' view that the dam was both feasible and necessary but, as one scholar noted, it did nothing to change people's positions. "The environmentalists were still solidly against the dam,"

while "the business, labor, engineering, and water interests were clearly for it."[34]

With environmental and local opposition mounting, the DRBC met on 31 July 1975 to decide whether or not to support the dam. In the course of this meeting, New Jersey Governor Byrne reiterated his opposition, although he held out the possibility of constructing the project after the year 2000. This reflected his view that for the next twenty-five to thirty years, New Jersey had sufficient water supply without the Tocks Island Dam, but after that it might need the water. He supported the continuation of land acquisition in case the dam was ever needed. New York Governor Hugh Carey (represented by Ogden R. Reid) and Delaware Governor Sherman Tribbitt also voted to withdraw DRBC support for the dam, while Pennsylvania Governor Milton Shapp voted in favor of the project. As the 1975 annual report for the Water Resources Association of the Delaware River Basin stated, "The Delaware River Basin Commission on July 31, in a closed meeting, decided, in a split decision, against construction start at Tocks Island but for continuation of land acquisition for the Delaware Water Gap National Recreation Area." Without DRBC support, North Atlantic Division Engineer Brig. Gen. James Kelly recommended to the chief of engineers that the dam be deauthorized, a recommendation that the chief transmitted to Congress in September 1975, stating that the Corps should transfer the land it had acquired for the project to the NPS for the Delaware Water Gap National Recreation Area.[35]

In accordance with the Corps' request, Congress prepared bills deauthorizing the Tocks Island Project (the first of which had actually been introduced in 1974). In the summer of 1976, the Senate Subcommittee on Water Resources of the Committee on Public Works debated one of the bills, S. 3106. This bill would deauthorize the dam, transfer all the property acquired by the Corps to the NPS, give the NPS the authority to acquire any additional necessary

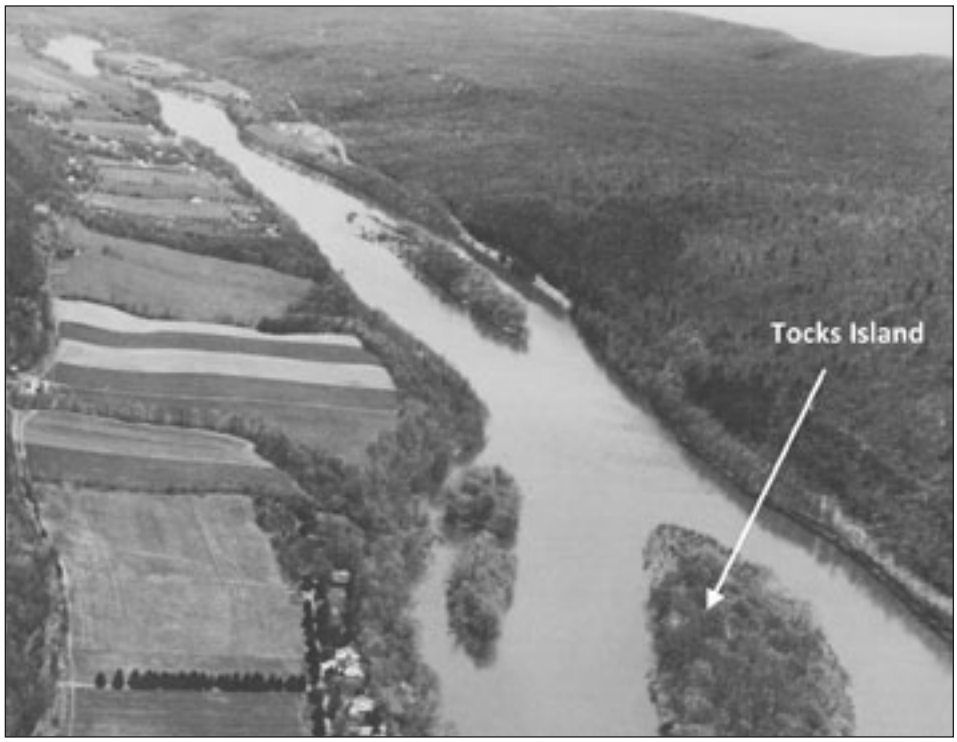
land for the Delaware Water Gap National Recreation Area, and authorize the Department of the Interior to relocate U.S. Highway 209 "in the manner in which such highway was to be relocated by the Secretary of the Army as part of the Tocks Island Reservoir project."[36]

In the course of these hearings, Maj. Gen. Ernest Graves, Director of Civil Works for the Corps, presented the Corps' position on Tocks Island. According to Graves, the Corps requested that the project "be deauthorized and that all land acquired, including real estate and legal obligations, by the Department of the Army pursuant to the project authority be transferred to the Department of the Interior on the assumption that the Congress authorizes expansion of the Delaware Water Gap National Recreation Area." Graves explained that Tocks Island was "the key feature" in the Delaware River Basin Comprehensive Plan and that the Corps would have to "go fairly far back toward first base in order to put together a plan that would be workable," but if the DRBC did not support the project, it was better to deauthorize it than to let it linger. As the chief of engineers of the Corps had stated, according to one congressional delegate, "continued indecision will adversely affect needed present and future programs in such areas as nonstructural flood protection, water supply, pollution control, regional and local planning, and land use controls." According to Graves, the Corps had expended approximately $63.5 million on Tocks Island up to that point, including 553 years of manpower. But the project no longer had adequate support.[37]

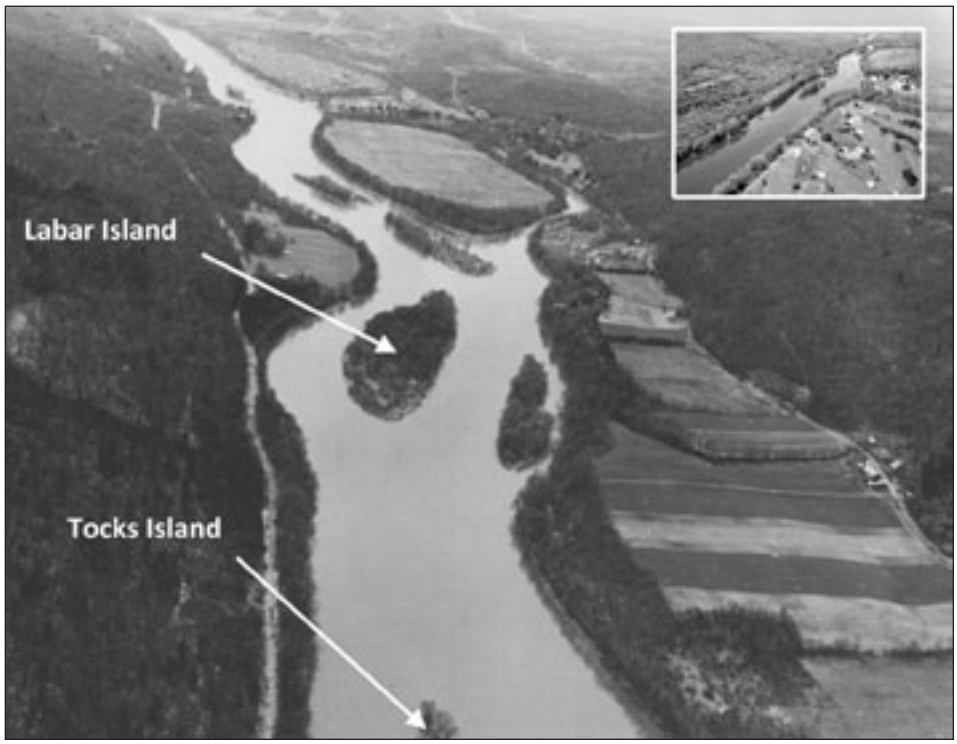
The testimony of senators and representatives from New York, New Jersey, Delaware, and Pennsylvania underscored the lack of support. Senators Clifford Case (R-N.J.) and Jacob K. Javits (R-N.Y.), as well as Congressmen Robert W. Edgar (D-Pa.), Benjamin A. Gilman (R- N.Y.), and Pierre S. du Pont (R-Del.), and Congresswomen Millicent Fenwick (R-N.J.) and Helen Meyner (D- N.J.), all opposed the

Tocks Island Project, with only Congressmen Frank Thompson (D- N.J.) and Edward J. Patten (D- N.J.) coming out in favor of the dam. Senator Harrison A. Williams, Jr. (D- N.J.) said that he would like to see a New Jersey water supply study completed before deauthorization occurred to ensure that the state did not need the Tocks Island Project for that purpose.[38]

However, several people appeared before the subcommittee in support of the project. Maurice K. Goddard, secretary of the Pennsylvania Department of Environmental Resources, represented Governor Shapp's position on Tocks Island by stating that "the Commonwealth of Pennsylvania continues its support for immediate construction of the Tocks Island Dam and Reservoir project, as it has since the project was first conceived." According to Goddard, deauthorizing Tocks Island would "put us right back to the point where we were 20 years ago, with no immediate means of meeting the present and future water



Aerial views upstream (above) and downstream of the proposed dam site, taken in the 1960s—with inset photo showing same downstream area in the 1990s



and water-related needs of the citizens and industry of the four-State basin and its service area." Similarly, Joseph F. Radziul of the Philadelphia Water Department said that Tocks Island was the only way to ensure that the Delaware River Basin would not have "a serious water shortage" in future years. While not supporting immediate construction of Tocks Island, others advocated continued authorization of the project in the event the need for the dam and reservoir ever arose. For example, James W. Wright, executive director of the DRBC and a representative of Governor Tribbitt of Delaware, said that "too many issues remain unresolved as this time to risk the permanent foreclosure of the Tocks Island Lake project." Wright was especially concerned about saltwater intrusion and whether nonstructural flood control measures could provide an adequate amount of protection. "Although the Delaware River Basin Commission member-States voted 3-to-1 against a motion recommending congressional appropriation of Tocks Island construction funds," Wright concluded, "only New York among the four member States has expressed support for deauthorization." To Wright, this showed "the region's uncertainty that there are easy means of filling the void of benefits left by the Tocks Island decision of last year."[39]

Clearly, even with the DRBC's opposition in 1975, there were strong feelings about hanging on to the project. Because of this, and because Congressman Thompson, who was the chairman of the House Administration Committee, opposed deauthorization, Congress passed no deauthorization bill in 1976 or in the years immediately following.[40] The Tocks Island Project continued to hang in limbo.

With the possibility of the dam still lingering, environmental groups and opponents aimed to ensure that no construction ever occurred by getting Congress to designate the Middle Delaware River as a wild and scenic river. The Wild and Scenic Rivers Act, passed by Congress in 1968, declared that rivers with

"outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values" would be "preserved in free-flowing condition."[41] Under the National Parks and Recreation Act of 1978, Congress added "the segment from the point where the [Delaware] river crosses the northern boundary of the Delaware Water Gap National Recreation Area to the point where the river crosses the southern boundary of such recreation area" to the National Wild and Scenic Rivers System (the law also added the upper Delaware River to the system). In addition, the act authorized the secretary of the interior to include all of the Tocks Island Dam land in the Delaware Water Gap National Recreation Area and to acquire land that the Corps had not yet purchased. In essence, the passage of this legislation killed Tocks Island Dam, although Congress did not officially deauthorize the project until 19 July 1992.[42]

In February 1979, the Philadelphia District ended its official involvement with the Tocks Island Project by concluding the transfer of funds and property to the NPS. No longer involved with Tocks Island, the Philadelphia District did not have a robust workload. In 1980, its real estate function was relocated to the Baltimore District, and engineering, design, and construction of new projects were also eliminated. By 1981, the staffing of the district had decreased from nearly eight hundred to below six hundred, emphasizing the dramatic effect of the demise of the Tocks Island Project. In fact, some critics accused district officials of hanging

The Delaware Water Gap National Recreation Area

on to the project for just that reason, regardless of whether it was economically or environmentally justified. Corps officials responded that they saw the project as the best way to meet the region's needs and that they were doing what Congress had directed them to do. "Tocks Island wasn't authorized by a cadre of evil bureaucrats," Burnes said. "It was authorized by the Congress."[43] Regardless, the demise of the project had a direct and severe impact on the Philadelphia District.

The project also had a direct impact on the Delaware River Basin itself. Supporters continued to believe that Tocks Island was the best solution and, at various times in the 1980s and even into the twenty-first century, some talked about trying to resurrect the project. Whenever drought or floods hit the area, some people would restate the case for Tocks Island (in terms of water supply or flood damage reduction, respectively) and why it should have been built.[44] Despite the bandwagon effect of opposition from multiple interest groups that led to the project's demise, two sides remained to this story, even decades after the fact. And while the debate may continue for years to come over whether Tocks Island was "the solution," the problems it was intended to help solve have not gone away.

Trexler Lake Project

Tocks Island was not the only proposed project that experienced opposition in the 1970s. Another component of the Delaware River Basin Comprehensive Plan was the construction of Trexler Dam on Jordan Creek, a tributary of the Lehigh River. This dam, which was to be located approximately eight miles northwest of Allentown, Pa., would provide flood control, water supply, and recreational opportunities to the area. A smaller dam than Tocks Island, Trexler was proposed as an eight-hundred-foot-long concrete structure, although the Corps later decided to make it an earth- and rockfill embankment. Authorized as part of the Delaware River Basin Comprehensive Plan, Trexler would cost approximately $10

million and would store 55,000 acre-feet of water, of which 40,000 acre-feet would be used for water supply, with the balance set aside for flood control.[45]

By February 1971, the Philadelphia District had completed a general design memorandum for the dam, and in 1973, it published an environmental impact statement. This EIS included a discussion of eutrophication that could occur in the proposed lake. It noted that, although eutrophication would probably be an issue, it could be controlled by clearing "all vegetation, floatable structures and cesspool and septic tank contents" from the reservoir area before construction, as well as by controlling nutrients flowing into the reservoir after construction. In any case, after examining other options (including no construction, placing the dam elsewhere, building a series of small reservoirs, or regulating floodplain development), the Corps determined that the Trexler Lake Project was the best way to fulfill the flood control, water supply, and recreational needs of the area.[46]

The district initially proposed beginning construction of Trexler Lake in 1973. However, the DRBC considered Tocks Island and Blue Marsh dams higher priorities than Trexler, and Congress appropriated no funds for Trexler in fiscal years 1974 through 1977. After the DRBC voted not to continue with the construction of Tocks Island Dam in 1975, its members decided to push the building of Trexler Lake, and in a fiscal year 1977 appropriations bill, Congress appropriated $300,000 to begin land acquisition for the project. President Jimmy Carter promised to include $1.5 million for the beginning of construction in an appropriations bill for fiscal year 1978.[47]

Much like Tocks Island, however, Trexler faced opposition from local residents and environmental groups, such as the Northwest Lehigh Citizens Association, which feared that the dam would be an environmental disaster. In 1976 and 1977, the Philadelphia District, under the

Site of the proposed Trexler Lake Dam

direction of District Engineer Col. Harry V. Dutchyshyn, held a series of public meetings in Lehigh County to explain more about the Trexler Project. In addition, on 14 April 1977, the district held a hearing to obtain input on the project, as required by Section 404 of the Federal Water Pollution Control Act of 1972. According to Dutchyshyn, approximately fifty supporters of the dam attended the hearing, along with five hundred opponents wearing green T-shirts with "Damn the Dam" printed in big yellow letters. Because of the number of people who wanted to speak, the meeting lasted until 2:00 in the morning, showing Dutchyshyn that "there was a lot of consternation" regarding the Trexler Lake Project.[48]

Testimony at the public hearing showed the positions of those in favor of the dam and those against it. For example, Maurice Goddard, representing the Pennsylvania Department of Environmental Resources, said that the commonwealth fully supported Trexler Lake "as an integral part of [the] comprehensive plan for the development and management of the water resources of the Delaware River." Likewise, Harry Bisco, representing the city of Allentown, said that the city government supported the project because it would provide "a source of water supply" as well as "significant protection against flooding along the banks of the Jordan River within the City." Others vehemently opposed the project. Some of the opposition stemmed from the concern that the proposed reservoir would lead to an increase in development in the area, which would further encroach on agricultural lands. Others—much like opponents of Tocks Island—charged that the reservoir would have eutrophication problems, diminishing its potential for recreation. Still others believed that the only true beneficiaries of the project would be downstream utility companies, as the DRBC proposed using Trexler as a standby water supply in times of drought. Finally, several opponents of the project said that the citizens had never had an opportunity to vote on building the

dam. The hearing became heated at times, as proponents of the dam were booed heavily, leading Dutchyshyn on a couple occasions to ask the crowd to show more respect to the speakers. Clearly, there were strong feelings about Trexler.[49]

Because of the heavy opposition to the dam, Congressman Frederick Rooney (D-Pa.), who had originally supported the project, attempted to kill it. In June 1977, he got Congress to delete the Carter administration's promised $1.5 million infusion for construction of the dam from its fiscal year 1978 budget. In answer to the critics who said local residents had never had an opportunity to vote on the dam, Rooney supported holding a public referendum in Lehigh County in the November 1977 election to determine whether enough public support existed for Trexler Dam. A group that supported the project—the PRO-LAKE Group—asked for a court injunction against the referendum, stating that it was illegal to hold "a local (non-binding) referendum on a regional project," but the court dismissed that argument. The referendum was held, and voters rejected the project by a ratio of three to one. Subsequently, the North Atlantic Division of the Corps recommended that the Philadelphia District halt its work, and the district recommended in 1978 that Trexler Lake be designated as an "inactive" project, which the chief of engineers supported. When Congress passed the Water Resources Development Act of 1986, it officially deauthorized construction of the Trexler Lake Dam.[50]

Beltzville Lake and Blue Marsh Lake

Even as environmental concerns and local opposition scuttled the Tocks Island and Trexler Lake projects, the Philadelphia District continued forward on other dams proposed under the Delaware River Basin Comprehensive Plan. The Beltzville Lake Project was completed in 1971 and Blue Marsh Lake was dedicated in January 1979. In addition to providing water

supply and flood control, these two multipurpose dams were recreational facilities for their areas and improved the Philadelphia District's relations with the general public. Unlike Tocks Island and Trexler Lake, the construction of Beltzville and Blue Marsh dams proceeded without much controversy, although the Philadelphia District had to work through some issues at Blue Marsh.

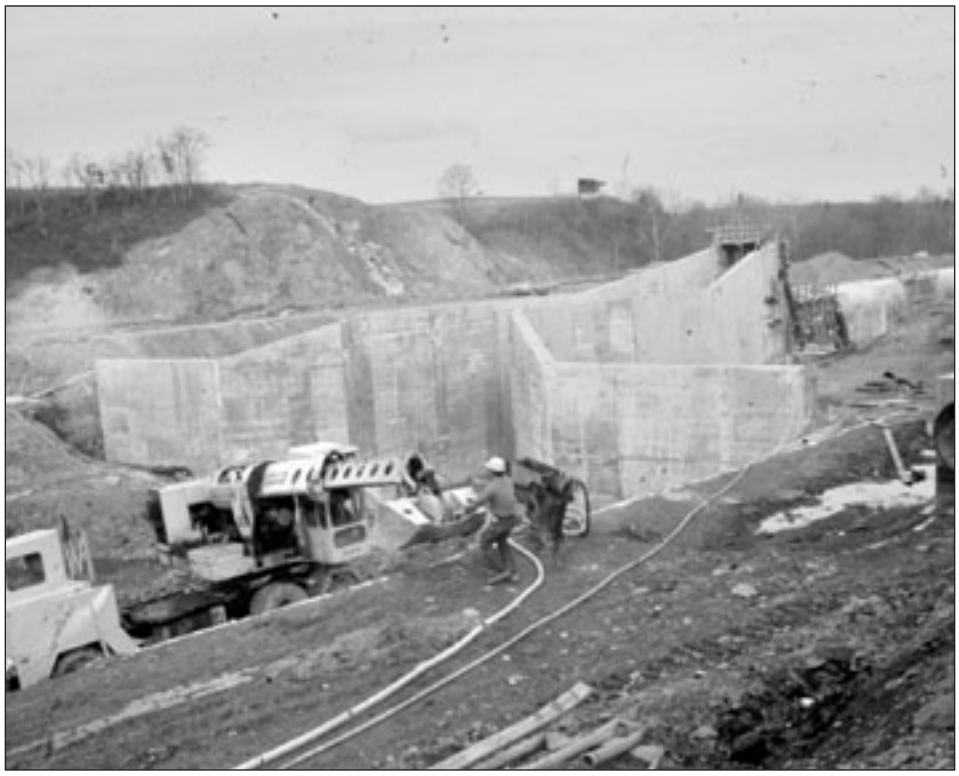
Beltzville Lake, located on Pohopoco Creek just four miles east of Lehighton, Pa., was authorized as part of the Delaware River Basin Comprehensive Plan to provide flood protection to the communities of Allentown, Bethlehem, and Easton, and to provide water to Bethlehem and Palmerton. As one historian wrote, "The flood storage potential of Beltzville is significant in a region characterized by flash floods." The project also was designed to improve water quality in both Pohopoco Creek and the Lehigh River (of which the Pohopoco is a tributary), to prevent salinity intrusion into the Delaware River Basin, and to serve as a recreational area. Constructed at a cost of $22.8 million, the earth- and rockfill dam had a storage capacity of 68,250 acre-feet; the majority was for water supply, water quality, and recreation, with the remaining capacity reserved for flood control.[51]

The provision for water quality at Beltzville was one of the innovative features of the dam. As one historian wrote, to provide for better water quality, the Philadelphia District included a multilevel intake system in the dam, which was "the first in any Corps of Engineers dam."

Beltzville Lake

This system allowed the Corps to "permit the selective withdrawal and mixing of water from seven levels of the permanent storage pool," which could "control the temperature and dissolved oxygen content of downstream releases." In addition, Beltzville provided recreational opportunities such as fishing, swimming, and hiking, although the recreational features—known as Beltzville State Park—were actually operated by the Pennsylvania Bureau of State Parks under an agreement with the Corps (the Corps developed the master plan for recreation that the Pennsylvania Bureau of State Parks followed). Outside of recreation, all other project and dam operations were handled by the Corps.[52]

Blue Marsh Dam was another multipurpose facility constructed as part of the Delaware River Basin Comprehensive Plan. The Philadelphia District planned to construct the dam in the Tulpehocken Creek watershed, about 6.5 miles above the confluence of Tulpehocken Creek and the Schuylkill River, and about 6 miles northwest of the city of Reading in Berks County in southeastern Pennsylvania. The dam, proposed as a ninety-eight-foot-high earth- and rockfill embankment, would provide flood control from Reading to Philadelphia, as well as water for the Reading-Pottstown area. Recreational opportunities were an important component of the project; one report stated that the lake would "be subjected to intensive public use because of its proximity to the large, densely populated area of southeastern Pennsylvania and its



Construction of the Blue Marsh Dam

unusually good accessibility." As with Beltzville Dam, the Corps proposed to include a multilevel intake system to improve water quality downstream.[53]

Although the Philadelphia District did not have as tough a road to traverse with Blue Marsh as it did with Tocks Island and Trexler, it faced some perplexing issues. These included arsenic content in the lake, protection of the borough of Bernville from flooding because of the dam, and the protection of a significant historic resource that would be flooded when the reservoir filled. Addressing these issues required ingenuity on the part of district personnel.

The Philadelphia District originally planned to begin construction on Blue Marsh Dam in 1969, forecasting completion of the project by 1972. However, in 1968 a company that produced a "commercial organic arsenical compound" had discharged a large amount of arsenic into groundwater at a site twenty-seven miles upstream from the location of the proposed dam. When that company was purchased by another firm, that firm began a process of removing arsenic from the groundwater, which required pumping the groundwater into Tulpehocken Creek. This resulted in "significant quantities of arsenic" in the "water and muds of the Tulpehocken Creek," leading the Federal Water Quality Administration to state, according to Edward Conley of the EPA, "that the public water supply to be obtained from the proposed reservoir might contain in excess of 0.05 mg/l of arsenic," which posed a potential health hazard.[54]

To deal with the arsenic issue, the district relied on the DRBC and the Pennsylvania Department of Health, Education and Welfare (PDHEW). The DRBC agreed in 1968 to implement a program "designed specifically to reduce the Tulpehocken drainage area of its arsenical compounds, prior to completion of the Blue Marsh Project." On 21 May 1969, the DRBC met with state and federal representatives to discuss water quality. At this meeting, the group decided that "the impounded waters would be suitable for

fishing and for recreation" and that any water removed from Blue Marsh for domestic use would be treated to ensure that it met "the drinking water standards of the Commonwealth of Pennsylvania and the U.S. Public Health Service."[55]

However, the chief of engineers did not want to proceed with construction until the Corps, in the words of one historian, had conducted "a detailed investigation . . . to establish that the waters of the impoundment would be safe for public use." Accordingly, the Philadelphia District hired the Department of Environmental Sciences at Rutgers University to study the situation. The department took several samples of mud and water in Tulpehocken Creek and issued its report in 1973. The report concluded that "arsenic will always be present in the waters and muds of this reservoir," but if aerobic conditions were maintained in the reservoir (by controlling the temperature of the water so that it did not exceed twenty-five degrees Celsius), the arsenic would remain in the bottom muds and the reservoir water would not exceed arsenic levels of 0.050 mg/l. On the basis of this report, the chief of engineers and the leadership of the Philadelphia District decided that construction could continue, as long as the dam operators used the dam's outlet system to maintain aerobic conditions.[56]

The Philadelphia District also had to implement measures to protect the borough of Bernville from flooding risks associated with the construction of the Blue Marsh Reservoir, as filling the reservoir had the potential of flooding the nearby community. The district held meetings with Bernville officials in 1968, 1969, and 1973 to discuss the measures the Corps would take. Essentially, these consisted of relocating and widening Route 183, one of the major roads in the area, and constructing a 4,800-foot-long protective levee on the southwest side of Bernville, along the north bank of Northkill Creek. The Corps also realigned part of the Tulpehocken Creek channel and provided "a pumping station, detention dams, gravity drains and ponding area, to

Construction of the intake tower (above) and visitors center (below) at Blue Marsh

prevent damage to the borough during high lake levels or flood stages on adjacent creeks." However, the Philadelphia District encountered a problem when it became clear that construction of the levee would prevent the Bernville Fire Department from being able to access Tulpehocken Creek for its water supply. According to Vince Calvarese, who headed up the Blue Marsh design effort, the district solved this problem by constructing a concrete storage tank for the fire department. Such ingenuity served the Corps well in its work on Blue Marsh and enabled the Bernville Protective Works to be completed by the time of the dedication of the dam.[57]

Another issue arose with regard to a historic facility known as Gruber Wagon Works, located in the area that would be flooded when Blue Marsh Reservoir filled. In 1966, Congress had passed the National Historic Preservation Act (NHPA), which contained a section (Section 106) that required the heads of any federal or federally assisted project to "take into

account" the effects of undertakings "on any District, site, building, structure, or object that is included in or eligible for inclusion in the National Register"—a list of all "districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture." This provision meant that whenever the Corps began an undertaking, it had to determine what prehistoric or historic resources would be affected and consult with state historic preservation offices and the Advisory Council on Historic Preservation on how to avoid or mitigate the consequences on those resources.[58]

Before the passage of the NHPA, Temple University had completed an archeological survey of the Blue Marsh Dam site and had concluded in 1965 "that the area contained no sites of national significance," perhaps because it focused only on archeological resources and not on above-ground structures. When the Philadelphia District began its real estate appraisal work in 1970, it discovered the Gruber Wagon Works, a three-level frame building on the east bank of Licking Creek that had existed "totally intact" from the "time where its physical development had virtually stopped some fifty years before." Recognizing the potential significance of this structure, the district requested that the Pennsylvania Historical and Museum Commission and the Northeast Regional Office of the NPS examine the structure. This occurred in July 1970.[59]

The officials discovered that the works had been constructed in 1884 by a German-Swiss immigrant. According to a Philadelphia District report,

Aerial view of the Blue Marsh Dam under construction

The Gruber Wagon Works before (above) and during (below) relocation; its original site is now at the bottom of Blue Marsh Lake

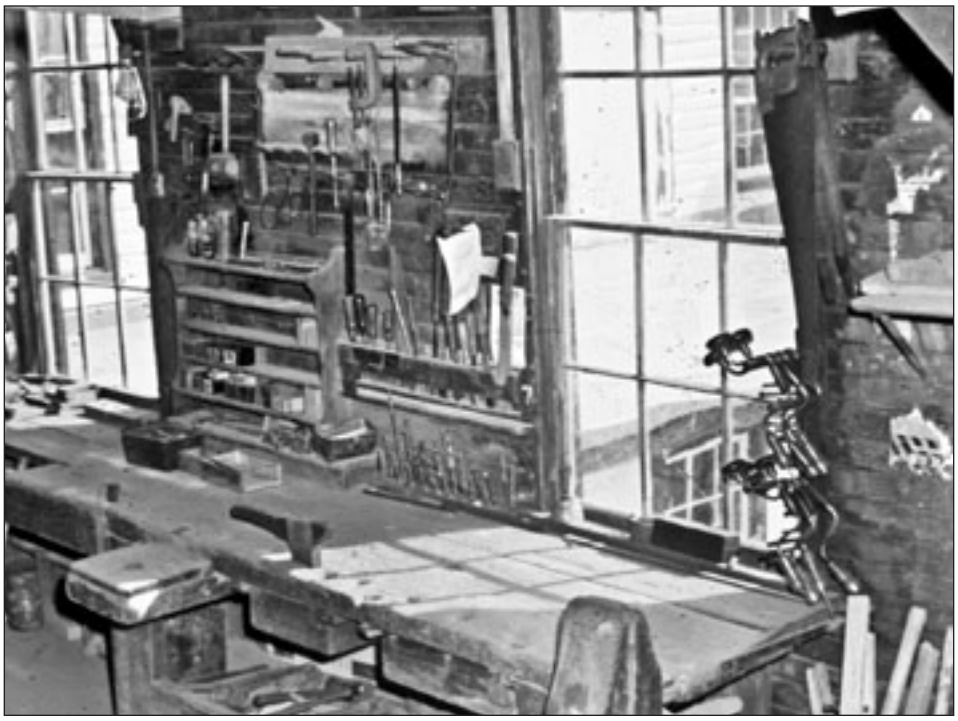
The first floor of the building contains the complete shop for the manufacture of wagons and wagon bodies including a forge. . . . The wagon works is in excellent condition[;] all of its machinery, equipment, hand tools, forge and carpentry shop are well maintained. The entire plant is in operating condition. The second floor has small machine tools and also contains the various parts and slopes for the construction of the wagons. There are several small farm wagons complete with the Gruber name and design as well as hay wagons, and wagons of other types apparently held for exhibit purposes. An elevator, hand or horse operated[,] large enough for a long wagon is available to carry materials . . . from [the] 1st to 2nd floors. The third floor or loft level is mainly used for storage of materials.[60]

The shop's original machinery had been replaced in the early twentieth century; since then, it had essentially remained intact. Because of the historic significance of the wagon works, according to Murray H. Nelligan, NPS Landmark and National Register specialist, all parties agreed "that efforts should be made to salvage the building and its contents by

moving it to an appropriate spot in the projected state park, where it would be outside the reservoir area, and that each agency would explore possibilities for accomplishing this."[61] Accordingly, the Philadelphia District began working with the NPS Historic American Engineering Record to document the structure and its contents "so that it can be reconstructed in a protected area."[62]

The problem was that neither the NPS nor the commonwealth of Pennsylvania had the funding to move the works. The Corps, meanwhile, could pay for the "costs associated with purchase of the real property, transportation of the new structure to a new location, and provision of a foundation at the new site" but did not have authority to expend funds for "dismantlement and reassembly of the structure . . . and purchase of historically significant personal property within the building."[63] The need to preserve the building became even more important after the Advisory Council on Historic Preservation placed the wagon works on the National Register of Historic Places on 2 June 1972. In November 1973, the Philadelphia District requested "the authority to expend funds necessary to relocate the building, complete with its contents, to a site on Government owned land," and the district began working with Congress to get the legislation passed. It also consulted with Berks County and agreed to relocate the shop to a county park, where the county would assume operation and maintenance of the site.[64] The Corps found the money in 1974 to purchase the wagon works, as well as its equipment and furnishings, although it still did not have the money to relocate the structure.[65]

In May 1974, Congress passed the Archeological and Historic Preservation Act (known as the Moss-Bennett Act), permitting federal agencies to spend up to 1 percent of project funding to recover historic and archeological resources. This meant that the Philadelphia District could spend approximately $430,000 to relocate the Gruber Wagon Works (1 percent of the estimated $43 million price tag of Blue Marsh Dam); however,



Tools inside the Gruber Wagon Works

officials estimated that it would cost $922,000 "to relocate and restore the original structure and its equipment."[66] With strong grassroots support, Congress debated two bills in April 1975 that would provide funding to the Corps for the Gruber Wagon Works. These bills authorized the Corps "to relocate and restore intact the historic structure and associated improvements known as the Gruber Wagon Works" and provided appropriations "as may be necessary" for that to occur.[67] Congress eventually included the text of the bills in the Water Resources Development Act of 1976, which it passed on 1 October 1976 and which President Gerald Ford signed on 22 October 1976. The act authorized the Corps to relocate and restore the wagon works "at an estimated cost of $922,000." After the Corps had effectuated the transfer, the legislation directed the Corps to transfer "title to the structure and associated improvements . . . to the County of Berks upon condition that such county agree to maintain such historic property in perpetuity as a public museum at no cost to the Federal Government."[68]

With this funding and authorization, the Philadelphia District contracted with a team of historic preservation consultants, who worked on disassembling the wagon works, relocating it to its new home, and reassembling it. All of this work occurred in 1976 and 1977, and in April 1977 the reassembly was complete. In 1978 and 1979, the Corps also oversaw repair and renovation work to the structure to restore it to its original condition. As Calvarese later explained, "We cut it up into seven large pieces[.] . . . [I]t was very

The Gruber Wagon Works in its new location

old and very weak and we had to structurally support it all over and move it and reassemble it and make it structurally safe for the public to visit."[69] With the restoration complete, the district turned the property over to Berks County in June 1980. However, because of the relocation, the Advisory Council on Historic Preservation removed the Gruber Wagon Works from the National Register of Historic Places, because it had lost the integrity of its original location. The Corps' plan was to renominate the structure, but on 22 December 1977, the secretary of the interior designated the works as a National Historic Landmark, meaning that it "possess[ed] national significance and [was] considered to be of exceptional value in illustrating a specific theme in the history of the United States." Because National Historic Landmarks enjoy the same protections as properties on the National Register, it was not necessary for the Corps to renominate the works.[70]

The relocation of the Gruber Wagon Works was a great accomplishment of the Philadelphia

Blue Marsh Lake (above) provides flood risk reduction and water supply for Reading and Berks County, Pa., and its Corps ranger staff (below) hosts more than a million recreation visitors annually

District in the 1970s. At a time when critics of the Corps labeled the agency's attention to cultural resources as "so rotten it had no way to go but up,"[71] it showed that the district cared about cultural artifacts under its control. Many observers noticed this. For example, A. R. Mortensen, director of the NPS Office of Archeology and Historic Preservation, lauded the district for the Gruber Wagon Works relocation: "We view this effort as a textbook example of how this office can work with other Federal agencies to insure that our precious resources, both natural and cultural, can be preserved through sensitive planning and management."[72] Robert M. Vogel, chairman of the Smithsonian Institution's Department of Science and Technology, agreed: "The Corps clearly has recognized the extraordinary historical worth of the Gruber factory."[73] As an editorial in the *Reading Eagle* put it, "We're pleased that the [C]orps

understands the historical value embodied in the Penn Township structure and is taking such care in seeing that it is preserved."[74]

Upon their completion, both the Blue Marsh and Beltzville dams performed their multipurpose function well. For example, even before Blue Marsh was dedicated, it had already prevented flooding on the Schuylkill River. In January 1978, the Corps operated the dam to impound four billion gallons of water resulting from a thaw after a heavy snowfall. The impoundment prevented "flooding of the Reading Sewage Treatment Plant" and "resulted in data for future use and a review of emergency procedures."[75] In the words of one newspaper article, "This is the first time the dam was used for flood control since its completion."[76] In June 2006, Blue Marsh again showed its flood control value when a series of storms over a weeklong period dumped rain on the Reading area. The dam prevented serious flooding in the city, although some did occur when the reservoir reached capacity and threatened to overtop the dam. However, the spillway on the dam worked in the proper fashion and prevented overtopping. As Al Schoenebeck, supervisory resource manager at Blue Marsh, explained, the episode showed that the dam worked the way it was designed to work. "The control tower worked perfectly," he said. "The spillway did the job it was supposed to by skimming off that increasing elevation to prevent overtopping of the dam."[77]

Both Blue Marsh and Beltzville also became hallmarks of recreation in their respective areas, bringing accolades to the Corps. Beltzville became noted for its fishing; as one district publication said, it was the site of "some of the best [bass fishing] in Pennsylvania."[78] Blue Marsh, meanwhile, had "many varied activities," according to the district, "including swimming, fishing, boating (unlimited horsepower), sailing, cross-country and water skiing, hunting, hiking, bird-watching and picnicking."[79]

The major difference between the two reservoirs was that the Philadelphia District still had charge of the recreational facilities

at Blue Marsh, while it transferred Beltzville's recreational operations to the commonwealth of Pennsylvania. Thus, Beltzville's ranger staff were state employees, although two Corps employees were in charge of operations and maintenance at the dam. Blue Marsh, meanwhile, had its own full-time ranger staff (augmented by seasonal student hires for the peak summer months), as well as two dam operators, a maintenance worker, and an administrative secretary. These employees had various responsibilities, including "public relations, water safety and environmental education, wildlife habitat management, trail management, enforcement of laws and regulations, traffic control and computer operation."[80] They performed these duties well—several rangers were recognized with local and national awards for everything from interpretive work to life-saving actions. Blue Marsh staff ran one of the district's most successful outreach programs, the Junior Ranger program, "designed to promote environmental awareness among the nation's youth, to educate them about the Corps' role in managing natural and water resources, and to get them involved helping Corps rangers

Summer visitors taking in the swimming and boating opportunities at Blue Marsh Lake

serve the public and protect those resources." This and other volunteer programs, such as the annual Take Pride in Blue Marsh cleanup activity, earned national awards for the Philadelphia District in 1982, 1989, and 1993 for volunteer work programs.[81]

Blue Marsh Lake's extensive trail system attracts hikers, bicyclists, and equestrians, and includes one trail for people with disabilities

The Level B Study and the Delaware Estuary Salinity Intrusion Study

Even with the success of the Blue Marsh and Beltzville dams, the Delaware River Basin area still faced water supply problems because of the cancellation of the Tocks Island and Trexler projects. As Tocks Island supporter Carmen F. Guarino, water commissioner for the city of Philadelphia, said in 1978, "I am at a loss for language to describe the potential danger, loss of economic base and other dire things that could be caused by not having an impoundment on the main stem of the Delaware."[82] To determine how to go forward, the DRBC decided to conduct a "complete review of water needs, projections and possible supplies for those needs for the 7 million in-Basin and 25 million out-of-Basin people who depend on the Delaware for water."[83] Funded by the U.S. Water Resources Council, this review, known as the Level B study, became caught up in "good faith negotiations" among representatives of Pennsylvania, New York, New Jersey, and Delaware about how to revise the amount of water dedicated to each state as part of the 1954 Supreme Court water distribution decree. Former DRBC employee Richard Albert said, "Each activity fed information to the other, and the Level B study served as the forum for public input. . . . Water conservation,

Volunteers helping with cleanup (top) and repair projects (bottom) during Take Pride in Blue Marsh Day, held every April in conjunction with Earth Day

water supply, and flow maintenance were three of the elements of the Level B study that tied it to the Good Faith talks."[84]

Both the Level B study and the good faith negotiations were informed by salinity studies conducted by the Philadelphia District and the DRBC to provide information about the effects of salinity intrusion (whereby saltwater moves into fresh water) on the Delaware River Basin. In 1976, Congress had passed a resolution calling for the Corps to determine "the probability for advance or retreat of salinity in the Delaware Estuary and the quantity of fresh-water inflow needed to protect the various water users along the Estuary."[85] To achieve these goals, the Corps undertook a study of "the economic impact of increased salinity on the lower basin industries and users," while the DRBC analyzed various scenarios on the Delaware River to provide data on "the historic and projected extent of movement."[86] Congress authorized this study in part because a severe drought that lasted from 1961 to 1966 increased salinity in the river to levels that "forced industries to close and municipalities to prepare emergency plans for rationing and obtaining alternate sources [of water]." The water supply of Camden and Philadelphia was especially affected. This led the DRBC "to urge studies to define

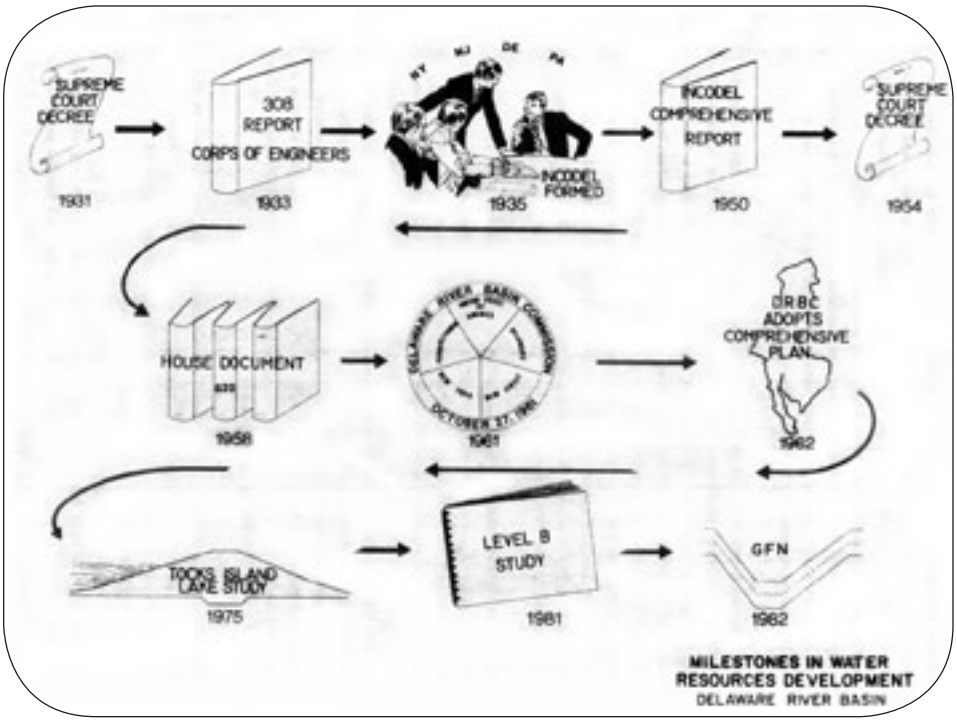
the relationship between river flow and salinity."[87]

In completing the salinity study, the Corps focused on the Delaware estuary, which ran from the bay at Cape Henlopen to Trenton, N.J., and which was "the water gateway to the industrial and commercial complex located in the Delaware Valley." In addition to being "an important spawning ground for finfish and shellfish," the estuary (defined as an area "where fresh water draining from the land through rivers mixes with salt water carried by tidal action from the ocean") provided water to both industry and municipalities.[88] The district's first efforts consisted of analyzing the economic effects of salinity intrusion in the Delaware River. It concluded in 1980 that, in a drought year such as 1965, salinity-related costs for withdrawal uses of river water would be about $32 million; in an average year, such as 1970, they would be about $17.3 million. These costs were highest for domestic users of water and showed that salinity intrusion had a direct economic effect on water users.[89]

Tidal wetlands along the Delaware Bay

The DRBC's salinity work was integrated into its Level B study, published in October 1979. To provide necessary water supply to the Delaware River Basin and flows that could better control salinity intrusion, the report recommended that the Philadelphia District enlarge F. E. Walter Reservoir (formerly known as Bear Creek Reservoir) on the Lehigh River and Prompton Reservoir on the Lackawaxen River. The report also suggested that the Corps look at enlarging Cannonsville Reservoir in New York and constructing Hackettstown Reservoir in New Jersey (later determined by the

Map of the area covered by the Delaware Estuary Salinity Intrusion Study



A chart showing milestones in water resources development on the Delaware River, including the Level B Study and the Good Faith Report

state of New Jersey to be infeasible). This would allow for a flow of three thousand cubic feet per second at Trenton, the standard that the DRBC set as necessary for limiting salinity levels in the Delaware River.[90]

In 1983, the good faith negotiators produced their own recommendations; many of these recommendations paralleled those of the Level B study, but some were new because of a drought that hit the Delaware River Basin in 1980 and 1981, generating new water supply fears and worries about salinity intrusion. As the report noted, "Protection against salinity intrusion requires a volume of fresh water flow into the estuary and improved management on the part of those water users who are subject to the effects of salinity." Therefore, the good faith recommendations advocated for the DRBC to revise the salinity objective in its plan and for the Corps to modify Walter and Prompton dams to add another 420 cubic feet of water per second (290 from Walter, 130 from Prompton) in new flow augmentation. This would provide a flow augmentation of 750 cubic feet per second at Trenton, which would effectively guard against salinity intrusion. "As additional reservoir facilities and storage capacity become available in the Basin," the report continued, "they should be used both to augment water supply, and to improve environmental conditions, water quality, and salinity protection." The report also contained several recommendations pertaining to alleviating drought conditions in the basin, including more coordinated operation of New York City reservoirs with other Delaware River Basin reservoirs,

the development by states of drought contingency plans, and the adoption of criteria for reducing out-of-basin water diversions in times of drought.[91]

In 1983, the Philadelphia District produced its final report, the *Delaware Estuary Salinity Intrusion Study*. In essence, this was a compilation of the district's own economic findings, as well as the flow objectives and recommendations in the Level B study and the good faith negotiations report. As a public notice explained, "The report presents technical information including salinity-related costs incurred to direct water users, the impact of the Chesapeake and Delaware Canal, [and] probabilities of various salinity levels and the impacts of salinity variation on the fish and wildlife resources." According to the Corps, the report fulfilled the congressional requirements established in the 1976 resolution and demonstrated the cooperative effort between the Corps and the DRBC.[92]

The report noted that the Philadelphia District's work had enabled the DRBC to modify a previously developed model of the Delaware estuary "to reflect more accurately the interaction of the Delaware estuary and the Chesapeake and Delaware Canal." The Corps and the DRBC then used this model "to determine the probabilities of salinity levels in the estuary" and "to determine average annual salinity-related costs to estuarine water users." According to the DRBC, the Corps' work "provided much useful information on the ecologic and economic impacts of salinity in the Delaware estuary" and had been "an outstanding example of interagency cooperation from the very beginning."[93]

Modifications to Walter and Prompton Dams

In the 1980s, as requested in both the Level B and good faith negotiation studies, the Corps began examining modifying both Walter Dam (originally Bear Creek Dam, renamed after Congressman Francis E. Walter [D-Pa.] in 1963) and Prompton Dam to provide low-flow augmentation to the

Delaware River and better water supplies. Walter Dam, completed in 1961, was located on the Lehigh River, approximately seventy-five miles above where the Lehigh connected with the Delaware River and about five miles north of White Haven, Pa. Prompton Dam, which was completed in 1960, was on the Lackawaxen River, approximately four miles west of Honesdale, Pa., and a half mile up from where the Waymart Branch enters the river. Congress had authorized modifications to these dams in the Flood Control Act of 1962, as part of the Corps' Delaware River Basin Comprehensive Plan. In that plan, the Philadelphia District had proposed to turn both dams (originally authorized as flood control dams) into multipurpose dams used for flood control, water supply, and recreation.[94] The Philadelphia District had completed a general design memorandum for the Prompton improvements in 1968 but had to halt its work because, as one historian explained, "the DRBC could not establish a current economic demand for additional water supply in the Prompton Lake service area." Likewise, the DRBC requested that the Walter modification be postponed until it had more information of the water

General Edgar Jadwin Dam (above), Prompton Lake (below)

supply needs of the Delaware River Basin.[95]

By the mid-1970s, no modifications had occurred. Both dams had small recreational features run by the commonwealth of Pennsylvania, and the Corps scheduled periodic releases at Walter Dam to create whitewater conditions for rafting and canoeing, but no dam enlargements had been made. In 1974, the Philadelphia District issued a general design memorandum for the Walter modifications, as well as studies on the Prompton Project. However, when engineering and design work was moved from the Philadelphia District to the Baltimore District after the demise of the Tocks Island Project, the Baltimore District assumed design functions for the modifications, although the Philadelphia District continued to provide technical support and advice. When the Corps issued a revised general design memorandum for Walter Dam in 1985, it was listed as a joint publication of the Baltimore and Philadelphia districts.[96]

Francis E. Walter Dam

Because of salinity and water supply concerns, the modifications of Walter and Prompton dams took on new urgency. In 1985, Gerald Hansler, executive director of the DRBC, informed Philadelphia District Engineer Lt. Col. Ralph Locurcio that the DRBC was willing to be the nonfederal sponsor of the Walter Dam modification, which was supposed to begin construction in fiscal year 1987, as Congress had appropriated funds for that purpose. Likewise, the DRBC "identified Prompton Reservoir as their first priority for make-up water during droughts in the basin," making its modification vital as well.[97]

According to the modification plans, the Corps would raise Walter Dam thirty feet to provide an additional 70,000 acre-feet of water supply storage, increasing the storage capacity of the reservoir from 108,000 acre-feet to 178,000 acre-feet. It would also replace the dam's control tower with a multigated tower. The Corps said that the "primary purpose of the modification" was "to provide a regional supply [of] water for the Delaware River Basin" that could "be used to maintain flows in the Lehigh River, lower Delaware River and the Delaware Estuary during droughts." For the Prompton Dam, the Corps would add 28,000 acre-feet of storage capacity and improve the recreational facilities to accommodate up to 156,000 visitors annually.[98]

However, the two projects soon ran into funding problems. As codified in the Water Resources Development Act of 1986, Congress modified cost-sharing provisions on flood control projects, stating that local interests would now be responsible for up to 50 percent of the cost of construction, operation, and maintenance. The legislation also stated that, in the words of one publication, "local interests [were] required to pay all costs allocated to water supply." In the case of the Walter Dam modifications, this meant that the DRBC was responsible for approximately $98.6 million in construction costs and $84,000 a year for operation and maintenance. In addition, the DRBC had to pay half of the costs allocated for recreation, estimated

at $11.7 million, and an annual operation and maintenance charge of $111,000.[99] Because of other obligations, such as the nonfederal share of both the Beltzville and Blue Marsh dams, the DRBC would have had difficulty coming up with this money.

To resolve the funding issue, the DRBC proposed recovering some of the costs for both the Prompton and Walter modifications by imposing fees on Delaware River Basin water users, but this proposal ran into political complications. For one thing, Congress had included a provision in the Delaware River Basin Compact of 1961 that stated that the DRBC could not levy user fees on those water users existing at the time the compact was executed (which included most of the basin's major water users). For the DRBC to levy such fees, Congress would have to pass additional legislation. Senator Bill Bradley (D-N.J.) and Congressman Paul Kanjorski (D-Pa.) introduced various bills between 1985 and 1989 to allow the DRBC to charge user fees, but precompact water users vehemently opposed the bills. With no legislation forthcoming, the DRBC could not provide the funding required for both Prompton and Walter.[100]

Prompton Lake

In response to this situation, the Corps suspended preconstruction and engineering design for the Prompton Dam modifications in fiscal year 1988. That same year, the DRBC announced that it was withdrawing its support for the Prompton Project, believing, according to one historian, that salinity standards "could be met under drought conditions by the combined augmented yields of the modified Walter project (when completed) and the new Merrill Creek Reservoir then being

Construction of safety modifications to Prompton Dam in 2007

constructed near Phillipsburg, N.J., by a consortium of electric utility companies." When the DRBC presented a new Delaware River Basin drought management plan in 1992, it "omitted all reference to a need for the Prompton project through the year 2020."[101] In 1993, Philadelphia District Engineer Lt. Col. R. F. Sliwoski noted that it was "uncertain" when studies for the Prompton modification would resume.[102]

In the case of Walter Dam, Congress removed the funds it had appropriated for the project in its fiscal year 1990 budget and provided no further funding in subsequent years. Lieutenant Colonel Sliwoski explained in 1993 that the district was still "awaiting resolution of non-Federal financing issues" before it could proceed with Walter Dam construction. No resolution to the issues was forthcoming, and the Walter Dam modification never occurred.[103]

Because neither of these projects moved forward to construction, it would be easy to

lump them in with Tocks Island and Trexler, but this would be inaccurate. The Walter and Prompton modifications did not move forward almost entirely for financial reasons. Having experienced strong public opposition (on multiple fronts, in the case of Tocks Island) with the two former projects, the district made an earnest effort to incorporate public involvement and fully address environmental and cultural issues. As a result, the Walter and Prompton projects proceeded as far as they did mostly without controversy.[104]

And even though the projects were scuttled, the Philadelphia District did some work on both Prompton and Walter dams. In 1993, for example, the district completed an evaluation of Prompton Dam to determine "the potential impacts that a range of floods would have on [its] hydrologic/hydraulic capability." This study concluded that a probable maximum flood (PMF) in the area

Rafters take on the rapids of the Lehigh River Gorge, enhanced by scheduled weekend releases from Francis E. Walter Dam

would overtop the dam embankment by 5.5 feet. The Corps recommended that the spillway be widened and lowered to handle the PMF. The district received funding for Phase I of these modifications in fiscal year 2006 and completed modifications to the spillway and outlet works in July 2007. Construction of a crest wall along the top of the dam followed in 2008.[105]

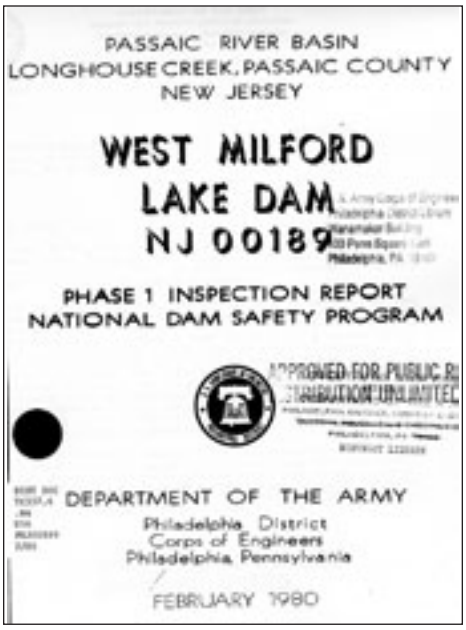
In November 1988, Congress passed a law that authorized using Walter Reservoir for recreational purposes. Because recreation was not a primary function of the reservoir, the Corps did not maintain a ranger staff at the location, although the recreational aspect at Walter Reservoir soon became quite popular. In fact, the district had been making releases for whitewater rafting in cooperation with the commonwealth of Pennsylvania since 1968, eventually settling in at five scheduled events each year: two 2-day events in June and three 1-day events September and October. Because of the multiple use of the water in the reservoir, the Philadelphia District entered into a partnership with the Pennsylvania Fish and Boat Commission, the Pennsylvania Department of Conservation and Natural Resources, the DRBC, and other stakeholders in 2005 "to manag[e] flows out of the Francis E. Walter Dam into the Lehigh River." The district established a Francis E. Walter Dam Flow Management Working Group for this purpose, which had the goal of "strik[ing] an optimal balance among legitimate yet sometimes competing interests in terms of natural resource management and recreational opportunities."[106] This group developed a flow management plan each year that would allow for whitewater releases in the summer and fall while preserving the dam's flood control capacity and providing sufficient water in the reservoir to ensure "cooler deep-water temperatures and better spawning opportunities for fish."[107] In 2005, the Corps completed construction of a new road over Walter Dam, replacing an old road that "flooded during heavy rainfall and was often rendered impassable."[108] By

allowing increased water storage, the new road enabled the Corps "to release water 22 times a year, up from seven," thus providing better rafting opportunities while maintaining a stable pool in June to enhance in-lake fisheries and making fisheries releases throughout the summer for the downstream reach of the Lehigh River.[109]

National Dam Safety Inspection Program

In addition to constructing new dams, modifying old ones, and working in other ways to increase water supply, flood control, and recreational opportunities, the Philadelphia District became involved in the National Program of Inspection of Dams that the Corps led in the 1970s. After the heavy rainfall that accompanied Hurricane Agnes caused the overtopping of some dams, and after other disasters such as the breach of the Canyon Lake Dam in Rapid City, South Dakota, in 1972, Congress enacted a law that directed the Corps to "carry out a national program of inspection of dams for the purpose of protecting human life and property." The act covered all dams in the United States except those constructed by the Bureau of Reclamation, those built with a Federal Power Commission license, and those that had been inspected by a state agency in the twelve months before the enactment of the legislation. The Corps was directed to inform states of its findings and convey a report to Congress that included an inventory of all of the dams in the United States, the recommendations made to states, and "recommendations for a comprehensive national program for

Construction of the new bypass road leading across the crest of F. E. Walter Dam, allowing seasonal inundation of the original service road behind the dam


PASSAIC RIVER BASIN
LONGHOUSE CREEK, PASSAIC COUNTY
NEW JERSEY

WEST MILFORD
LAKE DAM
NJ 00189

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

FEBRUARY 1980

The Philadelphia District's report on the West Milford Lake Dam in New Jersey, conducted as part of the Corps' National Dam Safety Program

the inspection, and regulation for safety purposes of dams of the Nation."[110]

In May 1975, the Corps issued its report. It stated that the dams included in the inventory were those "which are 25 feet or more in height or have a maximum impounding capacity of 50 acre-feet or more." Of the 49,329 dams inventoried, approximately 20,000 were "so located that failure or misoperation of the discharge facilities could result in loss of human life and appreciable or greater property damage." The report recommended that Congress institute a National Dam Safety Program, executed either by states (over dams not under federal authority) or by federal agencies that had jurisdiction over the dams. The program would include "the inspection of all existing dams having a high or significant hazard potential."[111] President Carter authorized the National Dam Safety Program in fiscal year 1978.

In accordance with the Corps' plan, the Philadelphia District conducted investigations of a number of dams in the late 1970s and early 1980s. The district was responsible for inspecting all dams in New Jersey and Delaware, even those within the civil works boundaries of the New York and Baltimore districts; it began its work with Spruce Run Dam in Clifton, N.J., on 12 December 1977.[112]

The report the district released in August 1979 to New Jersey Governor Brendan T. Byrne on its inspection of Longwood Lake Dam in Morris County, N.J., was fairly representative. According to Col. James G. Ton, District Engineer, this dam had been classified as "a high hazard potential structure," but the Corps determined after the inspection that it was "in fair overall condition" and "a low hazard potential structure." However, Ton did note that the dam's spillway was "inadequate" and that analyses should be performed to determine how to improve the spillway. Ton also recommended that the dam's owner "initiate a program of periodic inspection and maintenance, the complete records of which should be kept on file." He asked that the state keep the district informed

regarding how it implemented these recommendations.[113]

Looking at a somewhat more critical example, in 1980 the district inspected Lake Como Dam in Kent County, Del., which was found to be in "poor overall condition" and "a significant hazard potential structure." The district questioned whether the structure had adequate stability and recommended that the spillway be addressed, "since nine percent of the Spillway Design Flood (SDF) would cause the dam to be overtopped." To address these inadequacies, the Corps recommended that the owner hire a professional engineer with dam construction and design experience to analyze "what measures are required to provide adequate spillway discharge capacity and/or to protect the embankment from overtopping." The engineer would also implement erosion protection measures and would remove trees and utility poles from the embankment. The report said that "continuous monitoring of reservoir levels during periods of heavy precipitation should be undertaken until permanent repairs are completed." As with the Longwood Lake Dam, Colonel Ton requested that the state notify him "of proposed actions . . . to implement our recommendations."[114]

When the district's dam safety inspection work ended in September 1981, it had inspected 404 dams classified as significant hazards, the vast majority of which were in New Jersey. Of these dams, the district declared fifteen Delaware dams and fifty-three New Jersey dams unsafe. In the years since 1981, the Corps has continued its dam inspection work, becoming involved with the Federal Emergency Management Agency's (FEMA's) National Dam Safety Program through participation in the Interagency Committee on Dam Safety, a coalition of "federal agencies that build, own, operate, or regulate dams."[115] In addition, the Philadelphia District established its own Dam Safety Committee in 1983, which worked in cooperation with similar committees in both the North Atlantic Division and the Office of the Chief of Engineers. The committee

had various functions, including heightening public awareness of dam safety, preparing emergency action plans and local evacuation plans, and ensuring that the dams under the district's jurisdiction were safe. As John Burnes, chair of the committee in 2009, explained, "Twice a year [the] committee . . . meets and looks at all of our dam projects to make sure they're safe and operable and being maintained and provided for." In this way, the district continues to ensure the safety of dams for residents in the Delaware River Basin area.[116]

And the district's inspection program was not confined to dams. In 1955, Congress passed a law (Public Law 84-99) amending the Flood Control Act of 1941 by establishing "an emergency fund" that the Corps could use for "flood emergency preparation" or "the repair or restoration of any flood-control work threatened or destroyed by flood."[117] Under this act, the Philadelphia District's Operations Division (with technical support from the Engineering Division) conducted inspections on both federal and nonfederal flood control works (which included levees, channels, dams, and hurricane and shore protective structures) to determine whether a structure was active (rated as acceptable or minimally acceptable in its last inspection) or inactive (had previously been rated unacceptable). Active projects were eligible for rehabilitation funding under PL 84-99. The Corps also examined structures to make sure that proper maintenance was being performed. When work needed to be done on a structure, the Corps supervised it.[118] For example, in 1996 and 1997, the district conducted a PL 84-99–funded levee repair project in Stroudsburg, Pa. This project involved placing 2,700 tons of rock on a two-hundred-foot section of a levee lining McMichaels Creek. The total cost of the project, which provided flood protection to "more than 40 local businesses," was $161,370.[119] Thus, work performed under PL 84-99 was another way for the Philadelphia District to help communities and agencies maintain the integrity of flood control structures.

Molly Ann's Brook Project

As the twentieth century wore on, dams became less and less acceptable as a means to provide flood control, water supply, and recreation, in part because of their environmental effects and in part because local sponsors could not come up with the large amounts of money required for dam construction under the Water Resources Development Act of 1986. But although dams became less popular, the problems they had the potential to solve remained. As John Burnes explained, when projects were killed, it did not mean that the needs they intended to address went away. "Believe me," he said in 2009, "there are [still] such needs, such as flood control and . . . water supply."[120] The Corps examined other ways of addressing these needs. For example, nonstructural solutions such as floodplain management became more prevalent in flood control, as well as structural projects that did not involve the construction of large dams. The largest flood control project the district undertook after constructing Blue Marsh Dam was the Molly Ann's Brook Project (which, by virtue of geography, actually belonged to the New York District).[121]

Molly Ann's Brook is a tributary of the Passaic River in northern New Jersey. The brook flows through the communities of Haledon, Prospect Park, and Paterson, and had a history of flooding often, especially in Paterson and Haledon. Significant floods occurred in 1945, 1968, 1971, and 1977, causing damage to both residences and businesses (some $10 million from the November 1977 flood alone). In 1984, the New York District completed a feasibility study recommending stream channel modifications and construction of concrete flumes in a three-mile section of Molly Ann's Brook between Haledon and the confluence with the Passaic River in Paterson, to reduce potential damages related to a fifty-year flood event.[122]

The project was authorized for construction in 1986 with an estimated total cost of $22 million,

A section of the Molly Ann's Brook Flood Control Project

and the New Jersey Department of Environmental Protection (NJDEP) was identified as its nonfederal sponsor.[123] At the time, the New York District had more work than it could handle so, in May 1989, Molly Ann's Brook became a Philadelphia District project. First, the district "reaffirmed" the New York District's flood control plans and began preparing a Phase II general design memorandum. Then, in October 1991, the district and NJDEP held a public meeting on the project in Paterson, N.J., attended by "congressional interests, local governmental representatives, and the public." According to the district, all of those interests "continued to support the project and urged its expeditious construction."[124]

In 1992, the district issued its Phase II general design memorandum, which called for channel modification, concrete flume construction, modifications to five bridges, and construction of retaining walls, all prefaced by the removal of an old warehouse that sat directly over the brook. As Richard Maraldo, the district's former deputy for program management, related, the project had "channels, flood walls, levees, riprap sections, . . . almost every engineering feature for flood control you can think of, other than a dam."[125]

In 1993, Congress appropriated funding to begin construction, and by September 1999, the project was 90 percent constructed. Then Tropical Storm Floyd hit the region, collapsing the Belmont Avenue Bridge in Haledon and setting back project completion. Congress provided additional funding in fiscal years 2006 and 2007, and the project was completed in 2008. Approximately

thirty years after the original study and twenty years after the Philadelphia District took over project management, the Corps had replaced five bridges, created "a modified walled 2.5-mile-long channel," and removed several buildings to significantly reduce the potential for flood damage along the brook.[126]

Indeed, when the Corps announced the completion of the Molly Ann's Brook Project, Philadelphia District Engineer Lt. Col. Gwen Baker noted that the project had already fulfilled many of its objectives. "From Tropical Storm Floyd to the heavy rains of last spring," Baker said, "the Molly Ann's Brook project has been carrying out its mission of flood damage reduction—not trying in vain to prevent or control flooding, but reducing its impact on lives and livelihood." Stephen Kempf, regional administrator for FEMA, agreed: "The Molly Ann's Brook project has significantly mitigated the risk of flooding in this area." Likewise, Congressman Bill Pascrell Jr. (D-N.J.) "applaud[ed] the Army Corps for working with me to see this project through to completion." Pascrell said that the Corps' work reduced the floodplain and "free[d] dozens of home and business owners from . . . having to pay [for] costly flood insurance policies." According to Pascrell, the project was "overdue, but sure to benefit generations to come."[127]

Continuing Authorities Program

Along with these larger flood control projects, the Corps provided flood damage reduction benefits under the Continuing Authorities Program (CAP), which allowed it to construct smaller scale projects (ranging from $500,000 to $5 million) without specific congressional authorization. As stated on the Philadelphia District's website, "This decreases the amount of time required to budget, develop, and approve a potential project for construction." Under various authorities, the Corps could work on small projects for flood control, navigation, beach erosion control, emergency streambank and shoreline protection,

snagging and clearing, and environmental improvement projects. For flood control, Section 205 of the Flood Control Act of 1948 (as amended) authorized the Corps to construct small projects up to a maximum federal share of $7 million without congressional authorization, as long as the chief of engineers had signed off on the project and as long as "the work shall be complete in itself and not commit the United States to any additional improvement to insure its successful operation."[128]

According to a Corps publication, these projects could occur "only after detailed investigation clearly shows [their] engineering feasibility, environmental acceptability, and economic justification."[129] The Philadelphia District outlined the way such projects would occur. The Corps would first receive a request from a city, county, or state to examine the water resource problem. The district would investigate the matter through a site visit to determine whether there was an "adequate federal interest." If so, the Corps would proceed with a reconnaissance study (which could last anywhere from six to eighteen months), which would conclude "whether an economically justifiable solution to the problem exists" and which would recommend a local sponsor for the project. If the project was economically justified, the Corps would proceed with a feasibility study (lasting anywhere from one to two years), up to 50 percent of which had to be funded by the local sponsor. The district would then prepare specifications and plans for the project, request approval from the assistant secretary of the Army for civil works, and issue a request for proposals for construction, which in some cases was completed within three to six months of contract award."[130]

The Philadelphia District completed several projects under CAP, especially after the late 1970s, when large flood control projects became less desirable to the general public. One of its earliest CAP projects dealt with Little Mill Creek, a tributary of the Christina River in New Castle County, Del. In 1959, the Philadelphia District had conducted a reconnaissance

study of flooding problems in the Little Mill Creek watershed, but it ultimately determined that the plan of improvement would exceed the amount authorized under CAP (at that time $1 million). After a large flood hit the region in August 1967, causing $625,000 in damages, the county and state requested that the Corps implement the plan. With the local sponsors willing to take on a larger share of the cost, the Corps began developing a plan for the creek involving "constructing a retention basin, improving channels, and increasing streamflow capacity of bridges."[131]

However, after the Corps completed a detailed project report on Little Mill Creek in July 1973, the state and county withdrew their support of the project, and nothing was ever done. Additional reports completed by the Philadelphia District in the 1980s on Little Mill Creek did not produce any action, but after a devastating flood in July 1989 caused more than $10 million in damages, the Delaware Department of Natural Resources and Environmental Control requested that the Corps conduct another flood control study under the Section 205 authorization. In 1991, the Corps published a reconnaissance report, recommending that it conduct "detailed feasibility studies of the flood control problems along Little Mill Creek" and develop a definite project report for the area.[132]

Construction of the Little Mill Creek Flood Control Project in Delaware

Over the next several years, the Philadelphia District made plans for Little Mill Creek, dividing the project area into upper and lower reaches. According to one Corps report, the plans included deepening the channel of the stream by three feet and stabilizing, widening, and modifying the stream bank. In 2002, the Little Mill Flood Abatement Committee (established in 1991 by Delaware's General Assembly "to oversee and

Assembling one of the gabion retaining wall sections for Little Mill Creek

direct activities for flood control"), the state of Delaware, and the Corps signed a project cooperation agreement that allowed the project to begin. After construction of the upper reach work was completed in July 2007, the districtbegan reevaluation of the lower reach work (leading to a second construction project slated for 2012 completion). The federal share of the cost of the entire project was $7 million, with the local sponsor (the state of Delaware) contributing $2.5 million.[133]

The district conducted a similar project at Aquashicola Creek in Palmerton, Pa. This creek had flooded often over the years, generating as much as $1 million in damages in a 1996 flood. Under CAP, the district partnered with the borough of Palmerton in the 1990s to remove sediment from the creek and conduct stream-bank improvements over a one-mile stretch of the waterway. The total cost of the project, which was dedicated in May 1999, was $2.5 million. Both the district and the community were pleased with the results. According to Philadelphia District Engineer Lt. Col. Debra Lewis, the project was "a perfect example of what can be accomplished when a community, the private sector and government partner with each other." Julie Merkel, a resident of Palmerton whose property had been flooded three times by Aquashicola Creek, agreed. "It's wonderful," she said. "I didn't think I'd see this in my lifetime."[134]

* * * * * * *

The Philadelphia District's flood control efforts encompassed a variety of activities in the period between 1972 and 2008, reflecting changes in the United States as a whole. In 2008, the district faced a much different world than in

1972. In many areas, dams were no longer an option for flood control and water supply; instead, nonstructural measures were considered to be more comprehensive solutions, often with the significant added benefit of being seen as more environmentally friendly. Although Blue Marsh, Beltzville, and the proposed Walter modification were relatively noncontroversial projects that were favorably regarded even in the twenty-first century, other dam construction projects—most notably Tocks Island and Trexler—were halted in the 1970s owing to a combination of environmental advocacy and local politics that trumped other regional and national interests.

By the 1990s, most of the Corps' work to reduce flood risks involved either a combination of less ambitious structural measures, such as at Molly Ann's Brook, or locally focused solutions under CAP. The Philadelphia District also continued to provide valuable inspection and rehabilitation services for flood control projects operated and maintained by others, especially in eastern Pennsylvania. With these responsibilities, the district helped protect communities and populations under its jurisdiction, providing a measure of security and safety for residents in the Delaware River Basin.

The Aquashicola Creek Flood Control Project in Palmerton, Pa., during construction (top) and after completion (bottom)

[1] Delaware River Basin Commission, 1993 Annual Report, 6, Technical Library, U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania (hereafter referred to as Philadelphia District-Library).

[2] "Comprehensive Report on the Development of the Water Resources of the Delaware River Basin, Syllabus," in House, *Delaware River Basin, New York, New Jersey, Pennsylvania and Delaware: Letter from the Secretary of the Army Transmitting a Letter from the Chief of Engineers, Department of the Army, Dated April 2, 1962, Submitting a Report . . . On a Review of the Delaware River and Tributaries . . . , in Eleven Volumes*, 87th Cong., 2d sess., 1962, H. Doc. 522, 1:a (hereafter referred to as H. Doc. 522); see also Richard C. Albert, *Damming the Delaware: The Rise and Fall of Tocks Island Dam*, 2nd ed. (University Park, Pa.: Pennsylvania State University Press, 1987), 44–46.

[3] "Comprehensive Report on the Development of the Water Resources of the Delaware River Basin, Syllabus," 1:a.

[4] David Bell, Director, Bureau of the Budget, to Honorable Cyrus R. Vance, Secretary of the Army, 17 July 1962, in H. Doc. 522, 1:vii; see also Snyder and Guss, The District, 194–198.

[5] Delaware River Basin Commission, "DRBC Overview" <http://www.state.nj.us/drbc/over.htm> (2 March 2010); Edward Voigt, Chief, Public and Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 4 April 2011.

[6] Gina Bloodworth, "Tocks Island Dam, the Delaware River and the End of the Big-Dam Era," Ph.D. dissertation (State College, Pa.: Pennsylvania State University Graduate School, Department of Geography, 2005), xviii–xiv.

[7] "Where Are They Now? 1968-1971: Col. James A. Johnson," *The Observer* (September/October 1998): 13.

[8] Quotations in Albert, *Damming the Delaware*, 27-28, 31; see also Unpublished Morgan Draft District History, 31.

[9] Quotation in H. Doc. 522, 1:99; see also "Tocks Island Lake, Pennsylvania, New Jersey and New York, Pertinent Data," Loose Papers, Box 503, Administrative Records, U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania (hereafter referred to as Philadelphia District-AR); see also "Interstate Water Management: Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission Pursuant to Commission Resolution 78-20," draft, July 1982, v, Loose Papers, Box 5276, Philadelphia District-AR; Albert, *Damming the Delaware*, 51–58, 62–64, 70, 74; Unpublished Morgan Draft District History, 31; Flood Control Act of 1962 (76 Stat. 1173 at 1182).

[10] Margaret S. Nichols, "Showdown at Tocks Island," *Field & Stream* 80 (August 1975): 14; Unpublished Morgan Draft District History, 32–33.

[11] Albert, *Damming the Delaware*, 75–80.

[12] Albert, *Damming the Delaware*, 77–80.

[13] Delaware River Basin Commission, "Summary of Report on the Tocks Island Region Environmental Study," 16 November 1970, copy in New Jersey State Library, Trenton, New Jersey.

[14] Luther J. Carter, *The Florida Experience: Land and Water Policy in a Growth State* (Baltimore, Md.: Resources for the Future, Johns Hopkins University Press, 1974), 26.

[15] Keith S. Krause, Chief, Technical Services Branch, Division of Water Supply and Pollution Control, Department of Health, Education, and Welfare, to Major General W. K. Wilson, Jr., Chief of Engineers, 29 December 1961, in H. Doc. 522, lxxxvi–lxxxvii.

[16] Environmental Defense Fund, "Evaluation of the Proposed Tocks Island Reservoir Project," February 1972, Summary, copy in Yale University Library, New Haven, Connecticut.

[17] Quotations in Albert, *Damming the Delaware*, 103–109; see also Russell E. Train, Chairman, Council on Environmental Quality, to Mr. Belieu, February 3, 1972, Loose Papers, Box 503, Philadelphia District-AR.

[18] Unpublished Morgan Draft District History, 39–40; Albert, *Damming the Delaware*, 109–111; U.S. Army Corps of Engineers, Office of History, *Engineer Profiles: Major General James A. Johnson, U.S. Army, Retired* (Washington, D.C.: U.S. Army Corps of Engineers, Office of History, n.d.), 227. Cahill was not alone in objecting to the impact of visitation on New Jersey's road system. According to an article in *Parks and Recreation*, the National Park Service estimated providing 40,000 parking spaces in the recreational area. "The uniform emptying of those spaces within four hours on a summer Sunday evening would send 10,000 cars per hour into the area's already inadequate road system." Charles A. Stansfield, Jr., "The Tocks Island Controversy," *Parks and Recreation* 7 (March 1972): 33.

[19] Unpublished Morgan Draft District History, 40-41.

[20] Albert, *Damming the Delaware*, 113–119; see also Unpublished Morgan Draft District History, 42–43.

[21] Nichols, "Showdown at Tocks Island," 14.

[22] Albert, *Damming the Delaware*, 113–123; Unpublished Morgan Draft District History, 43–44. The Environmental Defense Fund, for example, released two reports in 1972 and 1973 that advocated nonstructural flood control solutions, while the Save the Delaware Coalition issued a study in 1973 that explored means to produce a greater water supply and flood control.

[23] Philadelphia DistrictEN-E, "Summary and Evaluation, Tocks Island Lake Project: Compliance with National Environmental Policy Act of 1969," Loose Papers, Box 503, Philadelphia District-AR.

[24] As cited in Stansfield, "The Tocks Island Controversy," 31.

[25] Albert, *Damming the Delaware*, 125.

[26] Patricia Barnes-Svarney, "Awful Agnes," *Weatherwise* (May/June 2002): 40. The Philadelphia District's response to Agnes is discussed in greater detail in Chapter Six.

[27] Quotations in *Engineer Profiles: Major General James A. Johnson*, 232; see also Albert, *Damming the Delaware*, 126.

[28] *Engineer Profiles: Major General James A. Johnson*, 230; Dave Pierce, "Long Arm of Government Changed the Poconos Forever," *Pocono Record*, 12 August 2001; Elizabeth Rosbach, "Why Do They Have to Leave?" *New York Times*, 27 September 1981 (Sunday, Late City Final Edition).

[29] Quotation in Albert, *Damming the Delaware*, 132–142; see also Dave Pierce, "Displaced Homeowners, 'Hippie' Land Squatters Discuss Painful Past," *Pocono Record*, 12 August 2001.

[30] Vince Calvarese telephone interview by Joshua Pollarine, 19 January 2010, transcript, 15.

[31] John Burnes interview by Paul Sadin and Joshua Pollarine, 15 January 2009, Philadelphia, Pennsylvania, transcript, 11.

[32] Quotation in Nichols, "Showdown at Tocks Island," 14; Unpublished Morgan Draft District History, 44–45; Albert, *Damming the Delaware*, 128–131, 143.

[33] URS/Madigan-Praeger, Inc., and Conklin & Rossant, *A Comprehensive Study of the Tocks Island Lake Project and Alternatives, Vol. B—Review of Tocks Island Lake Project* (New York: URS/Madigan-Praeger, Inc., 1975), IX-87, IX-98–100.

[34] Quotation in Albert, *Damming the Delaware*, 145–146; Unpublished Morgan Draft District History, 46–47.

[35] Quotation in Water Resources Association of the Delaware River Basin, Annual Report, 1975, copy in File 1517-03 (Water Resources Assoc. of Delaware River Basin) Annual Reports, Box 239, Philadelphia District-AR; see also Albert, *Damming the Delaware*, 146; Unpublished Morgan Draft District History, 47–48.

[36] S. 3106, "A Bill to terminate the authorization for the Tocks Island Reservoir Project as part of the Delaware River Basin project, and for other purposes," copy in Senate Subcommittee on Water Resources of the Committee on Public Works, *Tocks Island Deauthorization: Hearings Before the Subcommittee on Water Resources of the Committee on Public Works, United States Senate*, 94th Cong., 2nd sess., 1976, 23–26 (hereafter referred to as Tocks Island Deauthorization Hearings).

[37] Tocks Island Deauthorization Hearings, 56–58 (quotation from the chief of engineers is given by Rep. Millicent Fenwick [R-N.J.] on p. 30).

[38] Statements or testimony from the senators and representatives mentioned in this paragraph begin on the following pages in Tocks Island Deauthorization Hearings: 3, 5, 8, 11, 27, 30, 37, 38, 42, 45, 47, 50.

[39] Tocks Island Deauthorization Hearings, 69, 90–92.

[40] Albert, *Damming the Delaware*, 149.

[41] Quotation in Act of 2 October 1968 (82 Stat. 906); see also Albert, *Damming the Delaware*, 150.

[42] Quotation in National Parks and Recreation Act of 1978 (92 Stat. 3467 at 3483–3484, 3527); see also Unpublished Morgan Draft District History, 50–51.

[43] Burnes interview, 10. As an example of the type of criticism levied by some against the Philadelphia District, in 1981, Rep. Robert W. Edgar (D-Pa.) charged Philadelphia District Engineer Colonel James G. Ton with "talking lovingly about the Tocks Island Dam" as if he were "hoping that maybe through some congressional magic we would put the Tocks Island Dam back in place and begin to move in that direction." Ton strongly objected to this, stating that "the [C]orps is not an advocate of any project. We are not going to build any project that is not supported by the Delaware River Basin Commission who represent the States of New York, New Jersey, the Commonwealth of Pennsylvania, and Delaware." House Subcommittee on Water Resources of the Committee on Public Works and Transportation, *Water Resources Problems Affecting the Northeast: The Drought, and Present and Future Water Supply Problems: Hearings Before the Subcommittee on Water Resources of the Committee on Public Works and Transportation, House of Representatives*, 97th Cong., 1st sess., 1981, 797.

[44] See, for example, Leslie A. Pappas, "Troubled Water for River Towns: After Repeated Floods, N.J. and Pa. Look for Solutions," *Philadelphia Inquirer*, 24 April 2005; Martin Gansberg, "New Jersey Journal," *New York Times*, 11 August 1985.

[45] H. Doc. 522, 1:109; see also Unpublished Morgan Draft District History, 51–52.

[46] Department of the Army, Philadelphia District, Corps of Engineers, *Lehigh River Basin, Trexler Lake, Jordan Creek, Pennsylvania: Final Environmental Impact Statement* (Philadelphia: Department of the Army, Philadelphia District, Corps of Engineers, 1973), 1-3, 3-10 – 3-11.

[47] Unpublished Morgan Draft District History, 52–53.

[48] Quotations in Harry Dutchyshyn telephone interview by Joshua Pollarine, 3 August 2009, transcript, 13–14; see also Unpublished Morgan Draft District History, 54.

[49] Department of the Army, Philadelphia District, Corps of Engineers, "Lehigh River Basin, Trexler Lake, Jordan Creek, Pennsylvania: Public Hearing Transcript taken at Parkland Senior High School, Orefield, Pa., under Provisions of Section 404, Federal Water Pollution Control Act Amendments of 1972," Philadelphia District-Library. The transcript for this hearing is 186 pages long. Toward the end of the hearing, one speaker "noted that by my count 30 proponents of the dam have spoken but 60 opponents have spoken" (p. 147).

[50] Quotations in Raymond H. Snyder, "Report of the Lehigh Basin Group – May 16, 1978," in "Nineteenth Annual Report of the Water Resources Association of the Delaware River Basin, WRA/DRB, for the Calendar Year 1977," 12, File 1517-03 (Water Resources Assoc. of the Delaware River Basin) Annual Reports, Box 239, Philadelphia District-AR; see also Unpublished Morgan Draft District History, 55–57.

[51] Quotation in Snyder and Guss, *The District*, 216; see also H. Doc. 522, 1:105; Unpublished Morgan Draft District History, 17-19.

[52] Quotations in Unpublished Morgan Draft District History, 18; see also U.S. Army Corps of Engineers, Philadelphia District, "Lehigh River Basin, Pohopoco Creek, Pennsylvania: Beltzville Lake, Design Memorandum No. 18A, Appendices to the Master Plan, Recreation-Resource Management," April 1974, copy in Philadelphia District-Library; "Department of the Army, Lease for Public Park and Recreational Purposes, Beltzville Lake," Lease No. DACW61-1-72-124, 19 August 1971, File 1110-2-1150a Planning & Development Correspondence, Box 6 of 9, Accession No. 077-97-0001, RG 77, FRC.

[53] Quotation in Office of the District Engineer, U.S. Army Engineer District, Philadelphia, Corps of Engineers, "Design Memorandum No. 5, Schuylkill River Basin, Tulpehocken Creek, Pennsylvania, Blue Marsh Dam and Reservoir: Land Requirements Plan – Public Use," 3, copy in Philadelphia District-Library; see also H. Doc. 522, 2:113; Department of the Army, Philadelphia District, Corps of Engineers, *Blue Marsh Lake: Design Memorandum No. 14, Reservoir Clearing* (Philadelphia: Department of the Army, Philadelphia District, Corps of Engineers, 1974), 2-1; Unpublished Morgan Draft District History, 20–21.

[54] Quotations in Edward J. Conley, Federal Activities Coordinator, U.S. Environmental Protection Agency, to Colonel James A. Johnson, District Engineer, Philadelphia District, 21 January 1971, in U.S. Army Engineer District, Philadelphia, "Environmental Statement: Blue Marsh Lake Project, Tulpehocken Creek, Pennsylvania," April 1971, copy in Philadelphia District-Library; see also Unpublished Morgan Draft District History, 21-22.

[55] James F. Wright, Delaware River Basin Commission, to Colonel James A. Johnson, District Engineer, U.S. Army Engineer District, Philadelphia, 2 December 1970, in "Environmental Statement: Blue Marsh Lake Project."

[56] Quotations in Department of Environmental Sciences, Rutgers, The State University, "Final Report: 'Investigation of the Arsenic Conditions at the Blue Marsh Lake Project Site, Pennsylvania'," v–vi, Appendix A, U.S. Army Engineer District, Philadelphia, Pennsylvania, "Supplement to the Final Environmental Impact Statement, Blue Marsh Lake Project, Tulpehocken Creek, Pennsylvania," June 1973, copy in Philadelphia District-Library; see also "Supplement to the Final Environmental Impact Statement," 21–23; Unpublished Morgan Draft District History, 23–24.

[57] Quotation in U.S. Army Corps of Engineers, Philadelphia District, "Blue Marsh Lake" (pamphlet), File 1110-2-1150a Planning & Development Correspondence, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC; see also Vince Calvarese telephone interview by Joshua Pollarine, 19 January 2010, transcript, 7; Unpublished Morgan Draft District History, 21; Department of the Army, Philadelphia District, Corps of Engineers, "Schuylkill River Basin, Tulpehocken Creek, Pennsylvania, Blue Marsh Lake: Design Memorandum No. 13, Bernville Protective Works," 3–4, File 7 Bernville Protective Works D.M. No. 13, Vol. II, Box 5 of 9, Accession No. 077-89-0004, RG 77, FRC; Robert Corrigan for Daniel E. Price, Chief, Project Management Branch, Memo for Record, 15 August 1975, File 1 Bernville Local Protection—P&S (Pertinent Correspondence), Box 5 of 9, Accession No. 077-89-0004, RG 77, FRC.

[58] Quotations in "National Historic Preservation Act of 1966, as amended through 1992," in U.S. Department of the Interior, *Federal Historic Preservation Laws* (Washington, D.C.: U.S. Department of the Interior, 1993), 7, 9–10, 22; see also Mike Wallace, *Mickey Mouse History and Other Essays on American Memory* (Philadelphia: Temple University Press, 1996), 190.

[59] Quotations in John Milner Associates, "Historic Structures Report, Gruber Wagon Works, Blue Marsh Lake, Berks County, Pennsylvania," 28 April 1978, 8–10, Philadelphia District-Library; see also John F. Wrocklage, Chief, Planning Division, North Atlantic Division, to District Engineer, Philadelphia, 12 June 1970, in Office of the District Engineer, U.S. Army Engineer District, Philadelphia, Corps of Engineers, "Schuylkill River Basin, Tulpehocken Creek, Pennsylvania, Blue Marsh Lake: Preliminary Case Report on Gruber Wagon Works, Pleasant Valley, Pennsylvania," May 1975, E-66, Philadelphia District-Library.

[60] H. Fein, Chief, Relocation & Recreation Section, to Ch, Design Br., 29 July 1970, in "Preliminary Case Report on Gruber Wagon Works," E-60 – E-61.

[61] Murray H. Nelligan, Landmark and National Register Specialist, to Director, Northeast Region, 10 July 1970, in "Preliminary Case Report on Gruber Wagon Works," E-62 – E-63.

[62] Lieutenant Colonel Samuel J. Newsom, Jr., Deputy District Engineer, to Mr. Eric DeLony, Historic American Engineering Record, n.d., in "Preliminary Case Report on Gruber Wagon Works," E-49.

[63] Worth D. Phillips, Chief, Engineering Division, to Mr. Harold E. Yoder, Jr., Historical Society of Berks County, 13 September 1973, in "Preliminary Case Report on Gruber Wagon Works," E-48.

[64] Quotation in Worth D. Phillips, Chief, Engineering Division, to Division Engineer, 20 November 1973, in "Preliminary Case Report on Gruber Wagon Works," E-44 – E-45; see also Board of County Commissioners to Colonel C. A. Selleck, Jr., District Engineer, 21 February 1974, ibid., E-37.

[65] John Milner Associates, "Historic Structures Report," 13–14.

[66] Quotation in Colonel V. L. Rathburn, Assistant Director of Civil Works, Atlantic, Corps of Engineers, to Dr. A. R. Mortensen, Director, Office of Archeology and Historic Preservation, National Park Service, 27 February 1975, in "Preliminary Case Report on Gruber Wagon Works," E-14 – E-15; see also James Kahn, "History Takes a Step Forward," *Water Spectrum* 7 (Fall 1975): 40.

[67] S. 1497, in *Congressional Record*, 94th Cong., 1st sess., 22 April 1975, 121:11176.

[68] Act of 22 October 1976 (90 Stat. 2917, at 2927–2928).

[69] Calvarese interview, 4.

[70] John Milner Associates, "Historic Structures Report," 19–20; Unpublished Morgan Draft District History, 29.

[71] Robert M. Vogel, quoted in Kahn, "History Takes a Step Forward," 40.

[72] A. R. Mortensen, Director, Office of Archeology and Historic Preservation, to Colonel V. L. Rathburn, Office of the Chief of Engineers, 18 March 1975, in "Preliminary Case Report on Gruber Wagon Works," E-12 – E-13.

[73] Robert M. Vogel, Chairman, Department of Science and Technology, 7 October 1974, in "Preliminary Case Report on Gruber Wagon Works," E-23.

[74] "Army Engineers Help Preserve Old Wagon Works," *Reading Eagle* (Reading, Pa.), 16 September 1974.

[75] Quotations in R. B. Jaggard, Resident Engineer, Blue Marsh Lake Project, to District Engineer, 27 February 1978, File 1519-10 DACW61-74-C-0229 Impoundment, Box 299, Philadelphia District-AR; see also "Blue Marsh Dam Begins to Pay Off," *Reading Eagle*, 28 January 1978.

[76] Ellen R. Schwartz, "Blue Marsh Gates Closed," *Reading Eagle*, 27 January 1978.

[77] Al Schoenebeck interview by Joshua Pollarine, 14 January 2009, Leesport, Pennsylvania, transcript, 7–8.

[78] "Hit Beltzville for Bass," *The Observer* (Summer 2007): 17.

[79] U.S. Army Corps of Engineers, Philadelphia District, "Blue Marsh Lake" (pamphlet), copy in File 1110-2-1150a Planning & Development, Correspondence, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC.

[80] "Getting to Know Northern Area Office (Corps Dams)," *The Observer* (May/June 2000): 10.

[81] Quotations in "Junior Rangers Learn How They Can Take Care of Our Resources," The Observer (May 1996): 5; see also "Blue Marsh Ranger Honored by Corps," The Observer (September 1996): 3; "District Employee Wins National Education Award," *The Observer* (Winter 2007/2008): 7; "'Blue Marsh Day' Draws Hundre[d]s for Clean Up Project," *The Observer* (Spring 2008): 7.

[82] Carmen F. Guarino, Water Commissioner, to Sen. Richard Schweiker, 14 August 1978, File DRBC's Material, Box 5061, Philadelphia District-AR.

[83] Water Resources Association of Delaware River Basin, 1977-78 Annual Report, File 1517-03 (Water Resources Assoc. of Delaware River Basin) Annual Reports, Box 239, Philadelphia District-AR.

[84] Albert, *Damming the Delaware*, 157–158.

[85] House Committee on Public Works and Transportation, Resolution, 23 September 1976, File Congressional Resolution, Box 347, Philadelphia District-AR.

[86] First quotation in *Water Resources Problems Affecting the Northeast*, 792; second quotation in "Memorandum of Agreement Between the United States of America and the Delaware River Basin Commission," File DRBC—Correspondence, Box 347, Philadelphia District-AR.

[87] Quotations in U.S. Army Corps of Engineers, Philadelphia District, "Delaware Estuary Salinity Intrusion Study: Reconnaissance Report, Stage 1 – Water Resources Survey Investigation," December 1978, 2, Box 503, Philadelphia District-AR; see also William B. Strandberg, "Control of Salinity Intrusion in the Delaware River Estuary: A Report to the Delaware River Basin Commission," January 1975, 1-2, File DRBC—Health-Related Salinity, Box 5059, Philadelphia District-AR.

[88] U.S. Army Corps of Engineers, Philadelphia District, "Delaware Estuary Salinity Intrusion Study: Reconnaissance Report," 7, 10.

[89] U.S. Army Corps of Engineers, Philadelphia District, "Delaware Estuary Salinity Intrusion Study: Executive Summary of the Report 'Economic Study of Salinity Costs in the Delaware Estuary,'" February 1980, 8, 10, File Material for Col's. Speech, Box 347, Philadelphia District-AR.

[90] Albert, *Damming the Delaware*, 162–163.

[91] Quotations in "Interstate Water Management: Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission Pursuant to Commission Resolution 28-20 (with appendices)," draft, July 1982, Loose Papers, Box 5276, Philadelphia District-AR; see also Albert, *Damming the Delaware*, 166–169; see also "Additional Questions and Answers, Delaware Estuary Salinity Intrusion Study," File Delaware River Estuary Salinity Intrusion, FY 82 Budget, Box 347, Philadelphia District-AR. The 1980–81 drought also resulted in a contract between the Corps and the DRBC to use 27,880 acre-feet of storage space in Beltzville Reservoir "to impound water for anticipated future demand or need for water supply." "Contract Between the United States of America and the Delaware River Basin Commission for Water Storage Space in Beltzville Lake," 16 September 1980, File Beltzville and F. E. Walter Contracts, Box 3 of 5, Accession No. 077-96-0013, RG 77, FRC.

[92] "Division's Public Notice: Notice of Report, Delaware Estuary Salinity Intrusion Study," File Coordination with NAD, Box 5277, Philadelphia District-AR.

[93] First quotation in Delaware River Basin Commission to Colonel Baldwin, 12 November 1982, File DRBC—Correspondence, Box 347, Philadelphia District-AR; second quotation in Gerald M. Hansler, Executive Director, Delaware River Basin Commission, 27 August 1980, ibid.

[94] See H. Doc. 522, 96, 102.

[95] Unpublished Morgan Draft District History, 63–65.

[96] See Philadelphia District, Office of the District Engineer, "Lehigh River, Pennsylvania: Francis E. Walter Dam and Reservoir, Design Memorandum No. 10, Revised Master Plan," August 1974, 1-1, Box 503, Philadelphia District-AR; "Lehigh River Basin, Lehigh River-Bear Creek, Pennsylvania, Francis E. Walter Dam (Modified), Cost and Benefit Methodology," January 1978, 6, Box 5276, Philadelphia District-AR; Philadelphia District, "Lackawaxen River Basin, Wayne County, Pennsylvania: Reconnaissance Report, Proposed Rehabilitation of Prompton Dam Upstream Slope," August 1977, Philadelphia District-Library; "1989 Lehigh River Whitewater Events," U.S. Army Corps of Engineers, Philadelphia District, News Release, File 1105-2-40a F. E. Walter Newspaper Articles, Box 3 of 5, Accession No. 077-96-0013, RG 77, FRC; Unpublished Morgan Draft District History, 66.

[97] Quotation in Charles J. Kulp, Supervisor, U.S. Fish and Wildlife Service, to Lt. Colonel G. William Quinby, District Engineer, Philadelphia District, 9 March 1988, File 1110-2-1150a Planning & Development Corresp., Box 3 of 9, Accession No. 077-97-0001, RG 77, FRC; see also Gerald M. Hansler to Lt. Colonel Ralph V. Locurcio, District Engineer, 24 October 1985, File F. E. Walter (Modified), Water Storage Contract, Box 6 of 9, ibid.

[98] Quotations in U.S. Army Corps of Engineers, Philadelphia District and Baltimore District, "Modification of the Francis E. Walter Dam and Reservoir, Lehigh River Basin, Pa., General Design Memorandum: Main Report and Environmental Impact Statement," August 1985, Syllabus, copy in Regional Center for Environmental Information, U.S. Environmental Protection Agency Region III, Philadelphia, Pennsylvania; see also "Draft, F.E. Walter Dam Project," 3, File 1110-2-1150a Planning & Development Correspondence, FE Walter, Internal Coordination, Box 6 of 9, Accession No. 077-97-0001, RG 77, FRC; Unpublished Morgan Draft District History, 64.

[99] "Francis E. Walter Dam, Pennsylvania, Modification, Flood Control Reservoir Project," File 1110-2-1150a Planning & Development Correspondence, Box 6 of 9, Accession No. 077-97-0001, RG 77, FRC.

[100] "Draft, F.E. Walter Dam Project," 4; Bruce E. Stewart, Executive Director, to Honorable Robert P. Casey, Governor of Pennsylvania, 19 February 1990, File 1110-2-1150a Planning & Development Correspondence, FE Walter, Internal Coordination, Box 6 of 9, Accession No. 077-97-0001, RG 77, FRC; Unpublished Morgan Draft District History, 68-69; Albert, *Damming the Delaware*, 179–180.

[101] Unpublished Morgan Draft District History, 70–71.

[102] Lieutenant Colonel R. F. Sliwoski, District Engineer, to Honorable Joseph M. McDade, 27 April 1993, File 1110-2-1150a Planning & Development Correspondence, Walter General Corresp., Box 6 of 9, Accession No. 077-97-0001, RG 77, FRC.

[103] Quotation in Sliwoski to Honorable Joseph M. McDade, 27 April 1993; see also "Draft, F.E. Walter Dam Project," 4; Stewart to Casey, 19 February 1990; Unpublished Morgan Draft District History, 68-69; Albert, *Damming the Delaware*, 179-180.

[104] Voigt personal communication.

[105] U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Prompton Lake, Prompton, PA, January 2010," <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/PA/5OM_Prompton%20Lake.pdf> (13 April 2011).

[106] U.S. Army Corps of Engineers, Philadelphia District, "Francis E. Walter Dam Flow Management Working Group" <http://www.Philadelphia District.usace.army.mil/Projects/FEWalter/index.htm> (1 April 2010); Voigt personal communication.

[107] Sarah Fulton, "Walter Dam Presents Aggressive Water Release Plan," *The Morning Call* (Allentown, Pa.), 17 February 2006.

[108] "Kanjorski Officially Opens New Road at Francis E. Walter Dam, Increasing Dam's Capacity," News Release, 6 July 2005, The Kanjorski News Room <http://kanjorski.house.gov/index.php?option=com_frontpage&Itemid=103> (1 April 2010).

[109] Tom Long, "New Road at Walter Dam Will be Boon to Tourism, Officials Say," *Citizensvoice.com*, 7 July 2005; Voigt personal communication.

[110] Quotations in Act of 8 August 1972 (86 Stat. 506); see also Department of the Army, Office of the Chief of Engineers, *National Program of Inspection of Dams* (Washington, D.C.: Department of the Army, 1975), 1:2.

[111] Lieutenant General W. C. Gribble, Jr., Chief of Engineers, Memorandum for Secretary of the Army, 16 May 1975, in Department of the Army, National Program of Inspection of Dams, 1: vi–viii.

[112] Unpublished Morgan Draft District History, 111.

[113] Colonel James G. Ton, District Engineer, to Honorable Brendan T. Byrne, Governor of New Jersey, 25 September 1979, in Department of the Army, Philadelphia District, Corps of Engineers, "Passaic River Basin, Rockaway River, Morris County, New Jersey, Longwood Lake Dam, NH 00333: Phase I Inspection Report, National Dam Safety Program," copy in Philadelphia District-Library.

[114] Colonel James G. Ton, District Engineer, to Honorable Pierre S. DuPont, Governor of Delaware, 17 February 1981, in Department of the Army, Philadelphia District, Corps of Engineers, "Delaware River Basin, Mill Creek, Kent County, Delaware, Lake Como Dam, DE 00028: Phase I Inspection Report, National Dam Safety Program," copy in Philadelphia District-Library.

[115] Quotations in FEMA, "The National Dam Safety Program: 25 Years of Excellence" <http://www.fema.gov/library/file;jsessionid=990ABE86437E65977608FE9C65955AB3.WorkerLibrary?type=publishedFile&file=ndsp_25_years.pdf&fileid=2995cdf0-3d90-11db-8620-000bdba87d5b> (2 April 2010); see also FEMA, "About the National Dam Safety Program" <http://www.fema.gov/plan/prevent/damfailure/ndsp.shtm> (2 April 2010). The Water Resources and Development Act of 1996 formally established the National Dam Safety Program under FEMA's direction.

[116] Quotation in Burnes interview, 27; see also "Dam Safety Committees Meet," *The Observer* (May 1993): 7.

[117] Act of 28 June 1955 (69 Stat. 186).

[118] U.S. Army Corps of Engineers, Philadelphia District, "Corps Rehabilitation & Inspection Program" <http://www.Philadelphia District.usace.army.mil/emo/fcw-list.htm> (12 April 2010).

[119] Quotations in "District Finishes Up 84-99 Levee Repairs at Stroudsburg," *The Observer* (September/October 1997): 6; see also "Allentown & Stroudsburg: Bringing the Levees Back to Life," *The Observer* (October 1996): 13.

[120] Burnes interview, 8.

[121] Voigt personal communication.

[122] U.S. Army Corps of Engineers, New York District, "Passaic River Basin, New Jersey and New York, Phase I – General Design Memorandum: Interim Report on Flood Protection Feasibility, Molly Ann's Brook, Haledon, Prospect Park, Paterson, N.J.," November 1984, 1–3, 18–19, 45, File 1105-2-40a Molly Ann's Brook Interim Report on Flood Protection Feasibility FY 90, Box 7168, Philadelphia District-AR.

[123] Water Resources Development Act of 1986 (100 Stat 4082, 4119).

[124] U.S. Army Corps of Engineers, Philadelphia District, "Molly Ann's Brook Flood Control Project, Haledon, Prospect Park and Paterson, N.J.: Draft, Phase II General Design Memorandum, Main Report," March 1992 (hereafter referred to as Phase II GDM), Box 7168, Philadelphia District-AR.

[125] Quotation in Richard Maraldo interview by Joshua Pollarine, 19 August 2009, Philadelphia, Pennsylvania, transcript, 34; see also Phase II GDM, Syllabus.

[126] U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Molly Ann's Brook, Haledon, Prospect Park & Paterson, N.J.," October 2009 <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/NJ/Molly%20Anns%20Brook.pdf> (6 April 2010); "Pascrell Joins Army Corps to Announce Completion of Molly Ann's Brook Flood Damage Reduction Project," Press Release, 21 April 2008 <http://pascrell.house.gov/list/press/nj08_pascrell/Pascrell_Joins_Army_Corps_To_Announce_Completion_Of_Molly_Anns_Brook_Flood_Damage_Reduction_Project.shtml> (6 April 2010).

[127] All quotations in "Pascrell Joins Army Corps to Announce Completion of Molly Ann's Brook Flood Damage Reduction Project."

[128] Quotation in Act of 30 June 1948 (62 Stat. 1171); see also U.S. Army Corps of Engineers, Philadelphia District, "Continuing Authorities Program" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/ca.htm> (2 April 2010).

[129] U.S. Army Corps of Engineers, Walla Walla District, "Section 205: Authority for: Flood Damage Reduction Projects" <http://www.nww.usace.army.mil/html/pub/ap/facts/sec205.pdf> (5 April 2010).

[130] U.S. Army Corps of Engineers, Philadelphia District, "Continuing Authorities Program."

[131] Quotation in Department of the Army, Philadelphia District, Corps of Engineers, "Announcement of Public Meeting on Small Flood Control Project for Little Mill Creek, New Castle County, Delaware," in "Corps of Engineers, Small Flood Control Project for Little Mill Creek, New Castle County, Delaware, Transcript of proceedings held on Tuesday, September 12, 1972," (see also pp. 9–10 of this transcript), File 1110-2-1150a Planning & Development, Correspondence, Box 4, Accession No. 077-97-0001, RG 77, FRC.

[132] Quotations in "Little Mill Creek, New Castle County, Delaware, Flood Control Study (Section 205), Reconnaissance Report, July 1981," 83–84, File 1110-2-1150a Planning & Development, Correspondence, Little Mill Creek July 1991 Recon., Box 4, Accession No. 77-97-0001, RG 77, FRC; see also "Little Mill Creek PCA Signed," The Observer (September/October 2002): 4.

[133] Quotations in "Little Mill Creek PCA Signed," The Observer (September/October 2002): 4–5; see also U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Little Mill Creek, New Castle County, DE, October 2009" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/DE/Little%20Mill%20Creek%20NCC.pdf> (5 April 2010).

[134] All quotations and information in "Flood Protection Comes to Palmerton: Residents Applaud Work Completed at Aquashicola Creek," *The Observer* (May/June 1999): 4.

3

Coastal Engineering and Storm Risk Management

In addition to protecting communities from river flooding, the Philadelphia District managed a variety of projects along the New Jersey and Delaware coastlines. This type of work mainly involved beach erosion control, shoreline protection, navigation improvements, and beach replenishment. The district had constructed coastal projects as early as the 1910s, when it built jetties at Cape May Inlet along the New Jersey shore. However, the district's coastal work became more prevalent in the 1990s and 2000s, after a series of storms convinced New Jersey and Delaware to undertake a more concerted program of coastal protection. By 2008, the Philadelphia District's efforts on the Delaware and New Jersey shores had become one of the largest coastal programs in the Corps, while making the district one of the leading experts in the United States on coastal engineering and planning.

According to the Corps of Engineers, shore protection projects were any "projects which reduce the damaging effects of coastal flooding, wave impacts, or erosion due to tides, surges, waves, or shore material deficits resulting from natural or human causes." They could involve the construction of several different features, including groins (structures built out from the seashore to reduce longshore sediment transport) and revetments, seawalls, bulkheads, levees, and surge barriers. Shore protection projects included beach nourishment, either through sand bypassing (transporting sand across

Facing page: Conducting shoreline surveys concurrent with dredging operations for beach nourishment at Dewey Beach, Del.

an inlet, from a wider updrift beach to the narrower downdrift beach) or through the direct placement of fill on eroding beaches.[1] As Jeff Gebert, chief of the district's Coastal Planning Section explained, "We're keeping sand on the beach . . . as well as high enough dunes to keep storm water . . . from flooding and damaging the coastal community." These kinds of projects were funded through the Construction General fund, both for initial construction and for periodic renourishment.[2]

As in the Corps in general, the Philadelphia District's initial shoreline work was not for protection but was part of the agency's navigation mission. At various inlets, the Corps provided maintenance dredging to ensure good navigability and constructed jetties to improve navigation. However, jetties sometimes impeded the transport of sand, thereby accelerating beach erosion. Therefore, solving navigation problems in the early part of the twentieth century led to different problems

The seawall at Avalon, N.J., upgraded by the district as part of the Townsends Inlet to Cape May Inlet Coastal Storm Damage Reduction Project

later on—problems that required coastal planning and engineering expertise.[3] The district's coastal engineering work in the 1970s and beyond continued to involve navigation improvements.

Early Coastal Protection Projects

The Corps' involvement in coastal protection and beach erosion prevention was a relatively new responsibility. Beach erosion control along the Atlantic Coast was limited to isolated local initiatives until the early 1900s. Municipalities and private interests in New Jersey began looking at the problem in earnest after a series of hurricanes and other tropical storms battered the shore, all during a period of unprecedented and rapid growth in coastline development. According to one source, various parties implemented erosion control in an uncoordinated way, "often produc[ing] results that were minimally effective and in some cases, counterproductive." As one Corps report on coastal protection noted, "It was soon realized that the efforts of individual property owners were incapable of coping with the problem of coastal erosion and that a broader-based approach was necessary." In 1930, Congress passed an act authorizing the Corps to work with state governments to provide shore protection to communities. Subsequent amendments

The Townsends Inlet to Cape May Inlet Shore Protection Project included seawall upgrades for two Jersey Shore communities: Avalon, along Townsends Inlet (top) and North Wildwood, along Hereford Inlet (bottom)

established the cost sharing of such projects as one-third federal and two-thirds nonfederal, but the River and Harbor Act of 1968 stated that beach restoration and nourishment projects would be funded 100 percent by the federal government. Additional legislation expanded the Corps' jurisdiction to work on private beaches "where substantial public benefits would result" and stated that periodic nourishment would be classified as construction projects. As more hurricanes and tropical storms affected the increasingly developed eastern seaboard in the 1950s and 1960s, Congress passed acts authorizing the Corps to construct several coastal protection projects.[4] In addition, the Corps received authority under Section 103 of the River and Harbor Act of 1962 "to construct small shore and beach restoration or protection projects including periodic beach nourishment" without specific congressional approval, as long as the total cost of a project did not exceed $1 million.[5]

One of the first areas to which the Philadelphia District turned its newly expanded coastal protection attention was Delaware Bay. This work resulted from a Corps-wide study done in the late 1960s and early 1970s at the direction of Congress to develop "general conceptual plans for needed shore protection." The Corps produced this study in 1971; it said that, of the nine regions investigated, "the North Atlantic has the greatest percentage of critical erosion,"[6] and New Jersey was fifth out of the ten states in that region for "miles of critical erosion." Accordingly, in 1972, the House Committee on Public Works issued a resolution requesting that the Philadelphia District review an earlier report on Delaware Bay to "determin[e] the advisability of providing improvements for beach erosion control, hurricane protection and related purposes along the Delaware Bay shore of New Jersey and the lower portion of the Delaware River in Salem, Cumberland, and Cape May counties."[7]

The Corps conducted the review and additional examinations of the issue in the 1970s, holding public meetings in 1973 on where

The Atlantic coastline of Cape May, N.J., before (above) and after (below) beach nourishment

erosion control was necessary and what measures would best alleviate the problem. At these hearings, and in correspondence to the Corps and to New Jersey's congressional delegation, it was clear that residents and businesses on the New Jersey shoreline believed that protection was necessary. For example, one citizen from Elsinboro, N.J., wrote, "We are losing shoreline at an alarming rate and are in danger of losing homes."[8] Yet when the Corps issued its feasibility report on beach erosion control and hurricane protection along the Delaware Bay shore in 1979, it stated that, although there was "erosion damage . . . at damage centers along the river and bay in the study area," there were no "economically feasible alternative plans of improvement," meaning that the Corps could find no project with a benefit-cost ratio that exceeded 1.0. The Corps thus recommended that no new federal work be authorized at that time, although it did suggest that a study of erosion problems at Pennsville, N.J., be undertaken under the Continuing Authorities Program.[9]

This study highlighted the conundrum that some coastal communities faced. Residents might feel that coastal protection was necessary, but if projects did not meet or exceed the required benefit-cost ratio, the Corps could not implement them, regardless of the needs of communities and individuals. In addition, in the eyes of many, using federal money on coastal protection projects was not an acceptable option, because it benefited only a few (those residing on the shore). "The problem is we built too close to the ocean," one critic said. "Is the solution putting all this sand endlessly in front of these structures at taxpayers' expense?" Those who supported using federal dollars for coastal projects countered that coastal communities were tourist havens for a variety of people and that it was in the nation's interest to protect them.[10] However, because of the criticisms against the Corps' involvement, President Bill Clinton's administration considered removing the Corps from beach erosion projects across the United States and even proposed

Only a thin ribbon of beach separated the Atlantic Ocean from the Boardwalk prior to initial beachfill placement at Atlantic City, N.J.

in its fiscal year 1996 budget that no other coastal erosion projects be funded. Some members of Congress, including Senator Bill Bradley (D-N.J.), fought against this proposal, and the administration finally relented, allowing projects to go forward.[11]

Certain guidelines determined when the federal government could become involved in beach erosion control and coastal protection projects. According to the National Oceanic and Atmospheric Administration, these included whether the beach was publicly owned, whether the area had a public access recreational component, and whether the economic return was sufficient, "measured by the increase in national economic development benefits." The federal government did not participate in any projects involving privately owned beaches with no public recreational component or projects that would protect undeveloped private lands.[12]

In addition, the Water Resources Development Act of 1986 (WRDA-1986) contained certain cost-sharing stipulations for coastal protection projects. According to that act, any beach erosion control projects would be designated as a flood control, nonstructural flood control, or other purpose project, and costs would be shared according to the designation. Flood control projects required nonfederal interests to contribute up to 50 percent of the project costs, while nonfederal partners had to provide 35 percent of nonstructural flood control project costs. If a project was designated as a hurricane and storm damage reduction project or as an environmental protection and restoration project, it required 35 percent from nonfederal interests, while recreation projects required 50 percent of costs. The law also stated that the cost of using dredged material from federal navigation projects for beach nourishment would be cost-shared on a 50-50 basis.[13] Because of these cost-sharing requirements, local interests became much more involved in the development of coastal protection projects. As Jeff Gebert explained, requiring nonfederal sponsors to provide cash for projects created "a higher level of involvement on the nonfederal side . . . to make sure that the solution you come up with in the project . . . fits better" and is "more likely to be implemented."[14]

However, one of the unresolved questions in WRDA-86 was what to do about periodic nourishment of beaches. Generally, in most beach erosion control projects, the Corps needed to replace sand on beaches at regular intervals, such as every three or four years. Under most

Sand being pumped ashore for beach nourishment at Cape May, N.J.

coastal projects, the nonfederal sponsor was responsible for the operation, maintenance, repair, and rehabilitation of the completed project. Did periodic nourishment fall into this category as well? In 1992, Brig. Gen. Stanley G. Genega, Director of the Corps' Civil Works Program, issued a memorandum stating that the placement of additional sand on beaches could be classified as continuing project construction and should be cost-shared along the same lines as general construction (65 percent federal, 35 percent nonfederal). As Acting Assistant Secretary of the Army (Civil Works) John H. Zirschky put it, "Projects that are in this long-term construction phase will continue as Federal projects through the term of the current agreements with non-Federal sponsors."[15]

As these new guidelines were being established, Congress directed the Philadelphia District to initiate a new study addressing both shores of Delaware Bay (as opposed to the New Jersey-only studies and previous separate studies of the Delaware side). On 1 October 1986, the House Committee on Public Works and Transportation passed a resolution requesting that the district review "existing reports on communities within the tidal portion of the Delaware Bay" to develop plans for coastal protection and "to provide up-to-date information for state and local management of this coastal area." The committee also asked the district to decide whether any previous recommendations for the area should be modified."[16] Accordingly, the district produced a reconnaissance report in 1991 that "identified a number of problem areas where erosion was negatively impacting the adjacent shorelines." It recommended that feasibility studies be conducted for projects in some of these areas (but not all, as some local communities were not interested in sharing the cost of additional studies), especially at Broadkill Beach, Roosevelt Inlet/Lewes Beach, and Mispillion Light in Delaware, and at Cape May Peninsula and Oakwood Beach in New Jersey.[17] The district constructed several projects at these locations in the 1990s and 2000s.

Coastal Protection Projects in New Jersey

Meanwhile, Congress authorized the Philadelphia District to conduct a study of New Jersey's entire ocean shoreline to collect data that would serve "as the basis for actions and programs to prevent the harmful effects of shoreline erosion and storm damage." It also called specifically for "studies for beach erosion control, hurricane protection and related purposes . . . in areas identified as having potential for a project, action or response which is engineeringly, economically, and environmentally feasible."[18] Because of the studies initiated by the Philadelphia District at the request of Congress in the 1986 and 1987 resolutions, the number of coastal projects conducted by the district increased greatly in the 1990s. This followed a trend in the Corps of Engineers as a whole. According to one report, few beach restoration projects occurred in the 1980s "due to a lack of water resource authorization." The 1990s, however, saw "as many projects completed in the 1990-93 period as there were during the entire decade of the 80's."[19]

Another reason the Philadelphia District saw its coastal protection work grow was that the state of New Jersey became greatly interested in these projects, largely because of two storms that impacted the region. Around Halloween in 1991, a huge "nor'easter" hit the Atlantic coast, causing high winds and large waves along the coastline and flooding several areas. In December 1992, another nor'easter pounded the coast, causing "an astronomical

Construction of the Roosevelt Inlet/Lewes Beach Project (Del.) near the mouth of the Delaware Bay

high tide and rainfall, . . . flooding of coastal marshes and some additional coastal washover."[20] Because of the damages caused by these two storms—both in monetary costs and beach destruction—the state of New Jersey passed legislation in 1992 establishing a shore protection fund using realty transfer fees. According to the law, these moneys could be used for "shore protection projects associated with the protection, stabilization, restoration or maintenance of the shore, including monitoring studies and land acquisition." The state could also use the funds to provide "the non-federal share of any State-federal project."[21] This allowed New Jersey to partner with the Corps on several beach erosion control projects that the state wanted done. As Gebert explained, "Before those storms, the State of New Jersey didn't have a program where they regularly set aside money every year . . . for shore protection." With that funding, the state worked with the Corps on several coastal protection projects.[22]

In the 1990s, the district began a number of projects along the New Jersey shoreline, some of which were a part of the Delaware Bay studies the Corps had performed and some of which were in response to additional needs identified by the state. The first project to come to fruition was at Cape May on the southern tip of New Jersey, a community "dominated by a resort economy" and by "miles of ocean-front beaches."[23] The Philadelphia District had long-standing involvement in beach erosion control in this area. In 1907, Congress authorized the Corps to construct two 4,400-foot-long jetties 850 feet from each other to provide "a stable inlet between Cape May Harbor and the Atlantic Ocean." Although these jetties improved navigation, they facilitated erosion down the shore from the inlet, while creating accumulation up the shore. In the 1990s, the Corps "determined that 76 percent of the shoreline erosion in the Cape May Meadows area is caused by the existing Federal navigation works and the remaining 24 percent shoreline erosion is caused by natural forces." Local and state interests had attempted to stabilize the shoreline through

groin construction, but additional measures were necessary.[24]

In the 1970s, the Philadelphia District investigated implementing a beach erosion control and storm protection project from Cape May Inlet to Lower Township, N.J. The Water Resources Development Act of 1976 authorized the Corps to prepare a general design memorandum for the project, which consisted of constructing new groins along the coastline and placing beachfill from Cape May Inlet to Lower Township. The U.S. Coast Guard had considerable interest in the project because it was losing land to beach erosion, which threatened some of its training operations.[25]

In the early 1980s, the Corps completed the Phase I general design memorandum for this project, based largely on mitigating the damage caused by the 1911 jetties; it called for new groins and beachfill up to the existing 3rd Street groin in the city of Cape May, plus a deferred deposition basin. The Corps began work in 1990 to add five hundred thousand cubic yards of sand at Cape May, completing initial beach construction in 1991.[26]

Just a year after Cape May, construction started on a second major beach nourishment effort along the Jersey shore. The Corps had initially become involved in the Great Egg Harbor Inlet and Peck Beach Project in 1970, when the House of Representatives authorized the district to begin a navigation and beach erosion control project around Ocean City. The state of New Jersey had problems funding its share of the project cost in the 1970s, but in 1983, it expressed interest in a "scaled-down project."[27] Having received authorization for this under WRDA-86, the Philadelphia District completed a general design memorandum in 1989. The project planned by the district called for placing four million cubic yards of beachfill along a point extending from the Surf Road groin to 34th Street in Ocean City, using 835,000 cubic yards of sand to repair erosion along the shore, extending thirty-eight storm drain outfall pipes, and providing beach nourishment every three years.

The Corps characterized it as a "$600 million, 50-year beachfill project."[28]

In September 1991, the state of New Jersey and the Corps concluded a local cooperation agreement for the project, and work began soon thereafter. When Hurricane Felix hit the Atlantic coast in August 1995, Philadelphia District Engineer Lt. Col. Robert Magnifico deemed the Ocean City project a success, as it "performed as designed. The event didn't destroy the integrity of the project at all," Magnifico said. He characterized the project as "epitomiz[ing] what 'partnering' is all about."[29]

In the 2000s, the district supplemented this project with beach erosion control work from Great Egg Harbor Inlet to Townsends Inlet, N.J. This project involved placing beachfill from 34th Street to 59th Street in Ocean City, as well as nourishment of 403,000 cubic yards of sand every three years "synchronized with the existing Federal beachfill project at Ocean City (Great Egg Harbor Inlet to 34th Street)." The project's

The Cape May Inlet to Lower Township Beach Nourishment Project

estimated cost was $33.6 million in federal funding and $18.5 million in nonfederal contributions.[30]

Aside from Cape May and Ocean City, all the district's subsequent coastal storm damage reduction projects along the Jersey shore emerged from one comprehensive plan: the New Jersey Shore Protection Study, the bulk of which was conducted in the 1990s. Addressing the full length of that state's Atlantic coastline, it spun off a succession of interim feasibility studies within

The Atlantic coastline of Ocean City, N.J., before (above) and after (below) beach nourishment

Philadelphia District boundaries: Manasquan Inlet to Barnegat Inlet, Barnegat Inlet to Little Egg Inlet (Long Beach Island), Brigantine Island, Absecon Island, Great Egg Harbor Inlet to Townsends Inlet, Townsends Inlet to Cape May Inlet, Hereford Inlet to Cape May Inlet, and Lower Cape May Meadows and Cape May Point. By 2008, all but Hereford-Cape May had been authorized for construction, and the district had completed initial beach nourishment for the central portion of Long Beach Island (Surf City and Ship Bottom), Brigantine Beach, Atlantic City and Ventnor, Avalon and Stone Harbor, and Lower Cape May Meadows and Cape May Point, as well as seawall improvements at Avalon and North Wildwood. (Harvey Cedars would follow in 2010 as the second phase on Long Beach Island.)[31]

The most visible among these would be the Absecon Island Project, as it included Atlantic City—one of the preeminent entertainment and resort centers east of the Mississippi. Absecon Island—which extends 8.1 miles from Absecon Inlet to Great Egg

The Absecon Island Coastal Storm Risk Reduction Project

Initial beach nourishment at Brigantine, N.J.

Harbor Inlet and includes the communities of Ventnor, Margate, and Longport—had received much attention from the Corps in the twentieth century. In the 1920s, Congress authorized a navigation project for Absecon Inlet to establish an entrance channel twenty feet deep by four hundred feet wide. Congress also directed the Corps to conduct beach erosion control projects on Absecon Island in 1954. This work involved replacing damaged sheetwalls, building the Brigantine Jetty, groin construction, and widening of the Absecon Inlet. In addition, the Corps conducted periodic nourishment on the island. However, problems continued with beach erosion and in 1976 Congress authorized the district to proceed with Phase I Design Memorandum Stage of Advanced Engineering and Design for Absecon Island beach erosion. Congress reauthorized this project under WRDA-86. After the Corps completed a cost-sharing agreement for a feasibility study with the state of New Jersey in March 1993, it proceeded with the preparation of that study.[32]

When the feasibility study was concluded, it proposed constructing a 200-foot-wide berm to an elevation of 8.5 feet NGVD (National Geodetic Vertical Datum of 1929, a geodetic vertical datum that can establish a vertical reference plane—elevation—relative to sea level) and a dune with an elevation of 16 feet NGVD at Atlantic City. The Corps would also place beachfill and a 100-foot berm and dune with an elevation of 14 feet NGVD at Ventnor, Margate, and Longport. Initial beachfill would consist of 7.1 million cubic yards of sand deposited over 42,825 linear feet; the Corps would also provide nourishments of 1.7 million cubic yards every three years. In addition, the district would construct two new bulkheads along the Absecon Inlet where it fronted Atlantic City to provide storm protection.[33] Congress authorized this project in the Water Resources Development Act of 1996 (WRDA-1996), estimating its total cost at $52 million.[34]

In July 2003, the Corps concluded a project cooperation agreement with the state of New

Jersey for construction, and the initial beachfill construction began in Atlantic City in December 2003 when 4.5 million cubic yards of sand was pumped from Absecon Inlet to the beach. Beachfill construction at Ventnor was completed in June 2004. In 2008, the Corps was still awaiting funding to complete the second nourishment cycle. However, the project promised to provide a measure of protection to Atlantic City and Ventnor that was not there before. Because of this, as one report stated, the work "brought unprecedented local publicity—most all positive—to the Corps' shore protection efforts along the Jersey Shore."[35]

In 1999, the Philadelphia District developed another plan for the Cape May peninsula, whereby it would provide not only shore protection but ecosystem restoration as well. The Lower Cape May Meadows Ecosystem Restoration Project is discussed more fully in Chapter Five, but the protective features of the project included the building of a protective berm and dune system between the 3rd Avenue terminal groin in Cape May City and the Central Avenue groin in Cape May Point. The Corps also scheduled placing 650,000 cubic yards of sand on the beach every four years for the next fifty years, using an offshore borrow site for the sand. According to Gebert, this was a significant project—before

Summer beachgoers at Cape May, in view of the Cape May Point Lighthouse

Initial beach nourishment at Surf City along New Jersey's Long Beach Island

the district's work in the 1990s, there was no beach at Cape May. "The City of Cape May had no beach over most of the ocean shoreline at Cape May City for 40 or 50 years before 1990," Gebert said. "They just had no sand." The district had to be conservative in its periodic nourishment schedule to ensure that the beach remained.[36]

Coastal Protection Projects in Delaware

New Jersey was not the only location of beach erosion protection projects; the Corps also performed this work along the Delaware coastline. Like New Jersey, the state of Delaware had a history of providing funding for this purpose; as of 2001, newspapers estimated that the state had spent $19 million to rebuild eroded beaches. However, some communities were still in need of shore protection, and the state partnered with the district to provide it. For example, under Section 860 of WRDA-86, Congress directed the Corps to construct sand bypass facilities and stone revetments at Indian River Inlet in Delaware. Between 1938 and 1940, the Corps had constructed parallel jetties in the inlet "to create a stable 500-ft-wide inlet that provided a navigation pass for recreational boats." However, the construction of these jetties led to "erosion of the unprotected interior inlet shoreline."[37] In 1984, the Corps determined that an environmentally and economically feasible solution to the erosion was to conduct "beach nourishment utilizing a fixed sand bypass plant" that would be constructed on the south side of the inlet. At the state's request, the fixed plant was replaced by a semimobile jet pump system in the plans. With this system, as a district report explained, "Sand would be removed from this zone of accretion, transported by pipeline north across the bridge over the inlet, and deposited along the 3500 foot section of beach immediately north of the Inlet."[38] After gaining approval for this project in WRDA-86, the district completed installation in 1990. Since then, the plants has been operated and maintained by the

The sand bypassing plant at Indian River Inlet, Del., soon after construction in 1989

state of Delaware with federal cost-sharing; it pumps an average of a hundred thousand cubic yards of material a year from the south shore across the inlet to the depleted north shore. According to Gebert, this was the first time the Philadelphia District had conducted sand bypassing operations, making it a landmark coastal protection project.[39] The district and the state of Delaware received an Outstanding Coastal Project Award from the American Shore and Beach Preservation Association in 2001 for the sand bypassing operation, because it "successfully demonstrat[ed] 'effective, long-term, fixed-sand bypassing using jet pump technology.'"[40]

One of the biggest shore protection efforts in Delaware began in June 1988, when the Senate Committee on Environment and Public Works issued a resolution requesting that the Corps review an existing report on the Delaware Coast to see if any shore and hurricane protection projects were feasible from Cape Henlopen to

Fenwick Island, Del. The Corps had developed the existing report in 1957, outlining shore protection plans for locations along both Delaware Bay and the Atlantic Ocean, including Kitts Hummock, Slaughter Beach, Broadkill Beach, Lewes Beach, Bethany Beach, and a stretch of coastline from Rehoboth Beach to the Indian River Inlet. However, the Corps had determined that the only economically feasible projects were those in the area from Rehoboth Beach to Indian River Inlet. Accordingly, Congress directed the Corps in the River and Harbor Act of 1958 to restore beaches along that stretch of coastline and to provide periodic nourishment.[41]

Bethany Beach (top) and South Bethany (bottom) show the effects of the 1992 nor'easter on Delaware's Atlantic Coast

Two of the communities the Corps envisioned protecting under this project were Rehoboth Beach and Dewey Beach. Located in Sussex County in southern Delaware, these adjacent towns are popular recreation destinations for residents of the mid-Atlantic, especially from the Washington-Baltimore area. The Corps conducted hurricane protection and beach erosion prevention studies in the 1960s, 1970s, and 1980s, but none of these projects were implemented. The need for such projects became more pressing in the late 1980s when Bethany Beach, South Bethany Beach, and Fenwick Island (farther

south than Rehoboth and Dewey, but also in Sussex County) "experienced a loss of shoreline protection due to chronic erosion problems." These issues led Congress to pass a resolution in 1988 asking the Corps to revisit its studies on this coastline. The Philadelphia District, working with the Delaware Department of Natural Resources and Environmental Control (DNREC), instituted feasibility studies to determine which coastal protection projects were financially desirable. The first study, which lasted from 1992 to 1995, dealt with Rehoboth Beach and Dewey Beach; the second (from 1995 to 1998) examined Bethany Beach and South Bethany; and the third (1997 to 2000) dealt with Fenwick Island.[42]

In 1996, the Philadelphia District issued its feasibility study for Rehoboth Beach and Dewey Beach, recommending, according to one account, "the construction of a 125-foot-wide berm and a dune at Rehoboth Beach, a 150-foot-wide berm and a dune at Dewey Beach, and grass, dune fencing and periodic beach nourishment at both locations."[43] Congress authorized this project in WRDA-1996. According to this act, the project involved "storm damage reduction and shoreline protection" at Rehoboth Beach and Dewey Beach; it would cost $9,423,000, with the nonfederal sponsor contributing $3,298,000. The project also would provide periodic beach nourishment for fifty years at an annual cost of $282,000.[44] The economic need for the project seemed obvious; the Federal Emergency Management Agency (FEMA) issued a report in June 2000 stating that the two towns might lose an average of three to four feet of beach each year for the next sixty years. "If the state were forced to buy and

Dredging and pumping operations for beach nourishment contracts typically continued round the clock

Beachfill operations at Rehoboth Beach, Del.

relocate oceanfront homes," one report stated, "costs could rise as high as $300 million."[45]

In December 2003, the Corps entered into a project cooperation agreement with DNREC to construct the project at Rehoboth Beach and Dewey Beach. This agreement established the department as the non-federal sponsor of the project's construction and enabled the Corps to begin work on the necessary measures. By July 2005, the beachfill part of the project had been completed, and the placement of dune grass, dune fencing, and crossovers had occurred by January 2006. The district estimated that periodic nourishment would be needed on the beaches "every three years to ensure the integrity of the design."[46]

Meanwhile, between 1995 and 1998, the Corps examined shore and hurricane protection measures for Bethany Beach/South Bethany. The district determined that the project was feasible and developed a plan to construct a 150-foot-wide berm to an elevation of 7 feet NAVD (North American Vertical Datum of 1988, an updated geodetic vertical datum that can be referenced to the aforementioned NGVD 29) and a dune to 16 feet NAVD over a 2.8-mile distance.[47] The district also proposed depositing an initial beachfill of 3.5 million cubic yards and nourishments of 480,000 cubic yards every three years. Congress authorized this project in the Water Resources Development Act of 1999, estimating that it would cost $22,205,000, of which the nonfederal sponsor would pay $7,772,000. Periodic nourishment would cost $1,584,000 a year for fifty years. On 26 July 2006, the Corps signed

a project cooperation agreement with DNREC, committing the latter to serve as the project's nonfederal sponsor, and construction began. Initial construction was completed in June 2008.[48]

The final part of the Corps' three-pronged approach to southern Delaware coastline protection was work at Fenwick Island. As mentioned earlier, the Corps conducted a feasibility study of that area from 1997 to 2000, recommending a project involving the construction of a 200-foot-wide berm to an elevation of 7.7 feet NAVD and a dune to 17.7 feet NAVD covering a 6,500-foot-long area extending from the Maryland border to Fenwick Island State Park. The Corps recommended placement of 595,400 cubic yards of beachfill at Fenwick Island, as well as nourishment every four years. Congress approved this project in the Water Resources Development Act of 2000, estimating the total cost at $5,633,000, with a nonfederal share of $1,972,000. In 2004, the Corps completed a project cooperation agreement with DNREC;

Construction of the Bethany Beach/ South Bethany Project

Initial nourishment at Fenwick Island, southernmost of three storm risk reduction projects covering Delaware's Atlantic Coast

initial construction was completed in November 2005.[49]

In view of the three major shore protection projects the Corps did for the state of Delaware in the 2000s, Gebert considers that decade as a "watershed" for the state. From Delaware's perspective, protecting the shoreline—especially the resort areas of Rehoboth Beach, Dewey Beach, Bethany Beach/South Bethany, and Fenwick Island—was of paramount importance, as it was to New Jersey. As Gebert explained, coastal projects were generally done for "coastal communities with a significant density of residential and business and public infrastructure [that was], for the most part, open to the public." The increase in the district's work in this area in the 1990s and 2000s expanded the number of employees working on coastal projects and gave the district the reputation as one of the Corps' experts in coastal planning. In fact, beginning in the 2000s, the Corps had the Philadelphia District conduct an annual course for Corps planners on coastal engineering and planning.[50]

Inlet Navigation Improvement Projects

In addition to its beach erosion control and shore protection projects, the Philadelphia District improved inlet navigation through its coastal program, funded largely from its operations and maintenance account. Barnegat Inlet in Ocean County, New Jersey, was one area where the Corps performed this type of work. The main link connecting the Atlantic Ocean and Barnegat Bay, Barnegat Inlet separates Island Beach State Park and Long Beach Island.[51] According to one source, the inlet had "a long history of shifting. . . . Before it was first stabilized in 1940, the inlet was known to move as much as 40 feet a year."[52] As a Corps engineer explained, "Fishermen could go out one week, come back a week later and the channel wasn't in the same place as when they left."[53]

To deal with this problem, Congress authorized the Corps to take several measures as part of the

Barnegat Inlet, N.J., widely considered one of the most treacherous inlets on the Atlantic Coast before rehabilitation of the south jetty was completed in 1991

federal navigation project authorized in 1935. The Corps built a groin by Barnegat Lighthouse on the south side of the inlet, constructed a north jetty and a south jetty and dredged a flood shoal in 1939, and built a sand dike in 1943 "in an attempt to 'train' the tidal flow to follow a straighter path through the remaining channel." Sediment deposition in the channel meant that the district had to dredge the channel "on an annual or semi-annual basis between 1972 and 1981."[54] The goal of the dredging and the rest of the Corps' work was to maintain

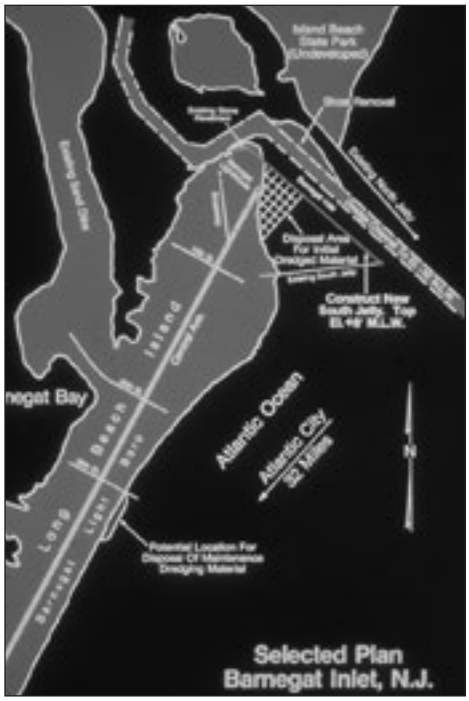
> a channel 8 feet deep through the inlet and 10 feet deep through the outer bar, a channel of suitable hydraulic characteristics extending in a northwesterly direction from the gorge in the inlet to Oyster Creek channel and through the latter channel to deep water in the bay, and the maintenance of a channel 8 feet deep and 200 feet wide to connect Barnegat Light Harbor with the main inlet channel.[55]

In the 1960s and 1970s, the Corps' Waterways Experiment Station conducted studies that "concluded that the construction of a new south jetty parallel to the existing north jetty and a 90-[meter] wide, 3-[meter] deep channel would provide inlet and channel stability."[56] The Philadelphia District conducted its own study of whether any modifications to the 1935 navigation plan were warranted, determining in 1974 that modifications should occur along the lines outlined by the Waterways Experiment Station. Congress authorized preconstruction planning in 1976; in 1981, the Corps issued a general design memorandum that determined that, in the words of District Engineer Lt. Col. Roger Baldwin, "the most significant problem . . . was the instability and shoaling of the Barnegat Inlet navigation channel," in large part because the south jetty's alignment did not "properly confine the flow to any specific channel" and because sand brought in by ocean currents generally accumulated at the entrance to the channel.[57]

In 1985, Congress authorized the Corps to begin the new construction, based on the Corps' determination of a design

deficiency associated with the earlier project. Accordingly, when the Corps signed a local cooperation agreement with the state of New Jersey for the work in May 1986, the federal share of the cost was set proportionately higher. This agreement stated that the district would improve the navigation channel in the inlet by building a new south jetty and by dredging "a 10 foot deep, 300 feet wide navigation channel," as well as removing a shoal between the proposed channel and the north jetty and constructing "jetty sport fishing facilities."[58] As the non-federal sponsor, the state would contribute 35.4 percent of the cost of construction. After the passage of WRDA-1986, the agreement was amended so that the state would provide "a cash contribution equal to 10 percent of the total costs of construction of general navigation facilities" and up to 50 percent of the cost of the recreation facilities.[59] With these agreements in place, the Philadelphia District oversaw the construction of the new south jetty between 1987 and 1991. According to one report, part of the work involved "angl[ing] the rocks more to the south of the due east direction that the old South Jetty had pointed, to better funnel the water flow."[60]

In the years that followed, the Philadelphia District continued to dredge the inlet periodically and to monitor project conditions. In addition, it conducted a variety of other work at Barnegat Inlet, including protecting the Barnegat Lighthouse when it discovered in 2000 that "underwater erosion was threatening the base of the lighthouse." This $1.38 million project involved "placing 160 stone-filled 'mattresses'—each four inches thick, six feet wide



The plan for Barnegat Inlet involved construction of an entirely new south jetty backfilled with sand dredged from the inlet

Improving erosion protection around Barnegat Light

and twenty feet long—in the deepest part of the slope to shore up the eroded rock."[61] In 2002, the district completed the installation of an anti-erosional geotextile fabric across the south jetty that would act as a filter to prevent sand loss. The Corps had discovered that "water was working its way through the jetty unimpeded," causing erosion behind and underneath the structure. With the fabric in place, water would be able to travel through without taking sand with it.[62]

The innovative technology the district used at Barnegat Inlet illustrated the importance of staying abreast of new features in coastal planning. Because of its work on the New Jersey and Delaware shorelines, the Philadelphia District was often on the cutting edge of these technologies. This was especially evident in the Corps' work at Manasquan Inlet, which divides

Monmouth and Ocean counties in New Jersey and is "the northernmost connection between the ocean and the New Jersey Intracoastal Waterway." Between 1881 and 1883, and again in 1922, local interests attempted to stabilize the inlet, which tended to migrate as much as a mile north of its present location, by constructing timber jetties. When these failed to work, Congress authorized the Corps in 1930 to construct two parallel stone jetties four hundred feet apart. Although these jetties provided the necessary stabilization, they experienced frequent storm damage between 1935 and 1975, especially on the outer ends, where stone would be dislodged and displaced. In 1978, the Philadelphia District came up with an innovative solution to protect the jetties and, by extension, the inlet.[63] The district proposed rehabilitating the jetties using a slightly modified version of dolosse, structures designed by a South African coastline engineer to combat erosion. Described by one source as eleven-foot-high "concrete jacks" weighing sixteen tons and reinforced with steel, the dolosse interlocked to form an improved protective armor layer around the jetties. Between 1980 and 1982, the district placed 1,343 dolosse around the north and south jetties; this was the first time the structures had been used on the east coast of the United States. The dolosse provided much-needed protection, but between 1982 and 1997, about five of them were damaged and others moved from their original location. To provide further protection, the Philadelphia District placed forty CORE-LOC® structures (developed by the U.S. Army Engineer Research and

Manasquan Inlet, N.J., where "dolosse" were first used on the Atlantic Coast

Putting the dolosse into place at Manasquan Inlet

Development Center) at the heads of the north and south jetties in 1997. Though similar to dolosse, the CORE-LOCs had "three 'flukes' (opposing sets of legs) instead of just two" and weighed three more tons. "The extra fluke helps strengthen the structure against breakage," a district article noted, while "the extra weight makes the coreloc less susceptible to movement due to wave action." In the words of Philadelphia District project manager Jerry Jones, the CORE-LOCs interlocked with the dolosse "in much the same way that armor mail once worked to protect a medieval knight." Use of the CORE-LOCs was another example of the district's ability to innovate; this was the first time they had been used in the United States.[64]

* * * * * * *

CORE-LOCs and dolosse working in combination along Manasquan Inlet

Coastal projects were a large part of the workload of the Philadelphia District, whether they involved beach erosion control or navigation improvement. The district conducted a number of projects for the states of New Jersey and Delaware between 1972 and 2008, projects that together constituted one of the largest coastal programs in the nation. The district emerged from these projects as one of the leading authorities in the United States on coastal protection and planning. Perhaps more important, the projects provided a previously unknown measure of protection to coastal communities, enhanced recreational opportunities along the coastline, and improved navigation of coastal inlets. Not everyone agreed that the federal government should foot the bill to protect these communities, but the district gained satisfaction from what it accomplished technically in meeting a challenge from Congress.

[1] Department of the Army, U.S. Army Corps of Engineers, "Hydraulic Design for Coastal Shore Protection Projects," Engineering Regulation (ER) No. 1110-2-1407, 1, B-1 <http://140.194.76.129/publications/eng-regs> (16 April 2010) (hereafter referred to as ER 1110-2-1407).

[2] Jeff Gebert interview by Joshua Pollarine, 19 October 2009, Philadelphia, Pennsylvania, transcript, 16–17, 29.

[3] Gebert interview, 6–7. The Philadelphia District's coastal planning work (whether for beach erosion control, hurricane protection, or navigation improvement) initially was done out of the Coastal and Special Studies Section of the Planning Branch in the Engineering Division. When the Planning Division was created in 1987, the Coastal Planning Section shifted to the Project Development Branch of the Planning Division. John Tunnell email to Jeff Gebert and Joshua Pollarine, 10 May 2010; copy in possession of the authors.

[4] Quotations in U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources, *Shoreline Protection and Beach Erosion Control Study: Final Report: An Analysis of the U.S. Army Corps of Engineers Shore Protection Program*, IWR Report 96-PS-1 (Alexandria, Va.: U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources, 1996), II-2 – II-6; see also Snyder and Guss, *The District*, 208–209.

[5] U.S. Army Corps of Engineers, Philadelphia District, *Small Projects Program* (pamphlet) (Philadelphia: Philadelphia District, U.S. Army Corps of Engineers, n.d.), n.p.

[6] Department of the Army, Philadelphia District, Corps of Engineers, "Survey Study, Beach Erosion Control and Hurricane Protection, Delaware Bay Shore, New Jersey, Plan of Survey," June 1974, 3, File Del. Bay Shore, N.J. Work Sheets, Box 223, Philadelphia District-AR.

[7] As cited in Department of the Army, Philadelphia District, Corps of Engineers, "Survey Study, Beach Erosion Control and Hurricane Protection, Delaware Bay Shore, New Jersey: Feasibility Report," August 1979, 1 (hereafter referred to as Delaware Bay Shore Feasibility Report, 1979), File Delaware Bay Shore, New Jersey, "Final Feasibility Report," Report and Inclosures [*sic*], Box 223, Philadelphia District-AR.

[8] T. R. Hudson to Corps of Army Engineers, U.S. Department of the Army, 28 October 1976, File 1518-01 Delaware Bay Shore of N.J., Correspondence 1975-76-77, Box 223, Philadelphia District-AR.

[9] Delaware Bay Shore Feasibility Report, 1979, 33.

[10] Quotation in Anthony R. Wood, "New Jersey Expected to Get $20.7 Million for Beaches," *Philadelphia Inquirer*, 14 October 2009; see also "In Defense of Jersey's Shores," *Philadelphia Inquirer*, 8 March 2000, online edition <http://marine.rutgers.edu/cool/education/coast09.html> (14 April 2010).

[11] See "Navigation, Beachfill Projects Under New Scrutiny," *The Observer* (July 1995): 3; John H. Zirschky, Acting Assistant Secretary of the Army (Civil Works), to Mr. Stan Tait, President, Florida Shore and Beach Preservation Association, n.d., Harry Shoudy's Files, Office of History.

[12] National Oceanic and Atmospheric Administration, Coastal Services Center, "Beach Nourishment: A Guide for Local Government Officials" <http://www.csc.noaa.gov/beachnourishment/html/human/law/history.htm> (16 April 2010).

[13] Water Resources Development Act of 1986 (100 Stat. 4082); NOAA, "Beach Nourishment: A Guide for Local Government Officials."

[14] Gebert interview, 5–6.

[15] Quotation in Zirschky to Tait, n.d.; see also Brigadier General Stanley G. Genega, Director of Civil Works, Memorandum for Major Subordinate Commands and District Commands, 17 November 1992, Harry Shoudy's Files, Office of History.

[16] As cited in Department of the Army, Philadelphia District, Corps of Engineers, "Delaware Bay Coastline, Delaware and New Jersey: Reconnaissance Report, August 1991," 1, Box 246, Philadelphia District-AR.

[17] Philadelphia District, "Delaware Bay Coastline," 133–135. The Corps had previously completed beach erosion control projects at Broadkill Beach and Lewes Beach, but by the early 1990s, "the 10 year period for federal involvement in period nourishment [had] lapsed." "Delaware Bay Coastline, New Jersey and Delaware, Reconnaissance Review Conference, 13 August 1992," 1, File Del. Bay RRC, Slides w/ Green Slide Book, Box 247, Philadelphia District-AR.

[18] Committee on Public Works and Transportation, U.S. House of Representatives, "Resolution: Coast of New Jersey, Erosion and Storm Effects Study, Docket No. 2294," 10 December 1987, document provided by Jeff Gebert, Chief, Coastal Planning, Philadelphia District, Philadelphia, Pennsylvania.

[19] ER 1110-2-1407, 1.

[20] Quotation in Kelvin W. Ramsey, John H. Talley, and Darlene V. Wells, "Summary Report: The Coastal Storm of December 10-14, 1992, Delaware and Maryland," State of Delaware Geological Survey Open File Report No. 37, February 1993, 22, document provided by Jeff Gebert; see also NOAA Satellite and Information Service, "The Perfect Storm: October 1991" <http://www.ncdc.noaa.gov/oa/satellite/satelliteseye/cyclones/pfctstorm91/pfctstorm.html> (16 April 2010); Gebert interview, 8.

[21] Senate Budget and Appropriations Committee, Statement to Assembly No. 1676, State of New Jersey, 10 December 1998, document provided by Jeff Gebert.

[22] Gebert interview, 8.

[23] "Cape May County," 195–196, File Delaware Bay Shore, Erosion Rater (George Hicks), Box 223, Philadelphia District-AR.

[24] Quotations in Lieutenant General Joe N. Ballard, Chief of Engineers, to The Secretary of the Army, 5 April 1999, document provided by Jeff Gebert; see also "Appendix D, Study of Sand Bypassing Options at Cape May Inlet, New Jersey," 31 January 1991, document provided by Jeff Gebert.

[25] See U.S. Army Corps of Engineers, Philadelphia District, "Cape May Inlet to Lower Township, New Jersey: Phase I General Design Memorandum," Draft, March 1980, document provided by Jeff Gebert; John E. Tunnell email to Jeffrey Gebert and Joshua Pollarine, 3 May 2010, copy in possession of the authors.

[26] U.S. Army Corps of Engineers, Philadelphia District, "Cape May Inlet to Lower Township, New Jersey: Phase I General Design Memorandum," Draft, March 1980, document provided by Jeff Gebert; John E. Tunnell email to Jeffrey Gebert and Joshua Pollarine, 3 May 2010, copy in possession of the authors; see also Ballard to The Secretary of the Army, 5 April 1999; "Nourishment Continues at Cape May," The Observer (December 1992): 5; U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Cape May Inlet to Lower Township, N.J., January 2010" <http://www.Philadelphia District.usace.army.mil/ cePhiladelphia District-dp/projects/factsheets/NJ/4CG_CapeMayInlet_to_LowerTwp.pdf> (20 April 2010).

[27] Unpublished Morgan Draft District History, 88–89.

[28] Quotations in "Felix is No Match for Jersey Shore Partnership," *The Observer* (September 1995): 10; see also "Ocean City Beach Replenishment Begins: City's Ocean Front Gets a Facelift," *The Observer* (November 1994): 3; Unpublished Morgan Draft District History, 88–89; "Local Cooperation Agreement Between the Department of the Army and the State of New Jersey for Construction of the Great Egg Harbor Inlet and Peck Beach, New Jersey Project," 18 September 1991, document provided by Jeff Gebert; Gebert interview, 10.

[29] Quotations in "Felix is No Match for Jersey Shore Partnership," *The Observer* (September 1995): 10; see also "Ocean City Beach Replenishment Begins: City's Ocean Front Gets a Facelift," *The Observer* (November 1994): 3; Unpublished Morgan Draft District History, 88–89; "Local Cooperation Agreement Between the Department of the Army and the State of New Jersey for Construction of the Great Egg Harbor Inlet and Peck Beach, New Jersey Project," 18 September 1991, document provided by Jeff Gebert; Gebert interview, 10.

[30] Lieutenant General Carl A. Strock, Chief of Engineers, to The Secretary of the Army, 24 October 2006, document provided by Jeff Gebert.

[31] Edward Voigt, Chief, Public & Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 4 April 2011.

[32] House, *New Jersey Shore Protection Study: Communication from the Acting Assistant Secretary (Civil Works), the Department of the Army, Transmitting a Report on a Storm Damage Reduction and Shoreline Protection Project for Brigantine Inlet to Great Egg Harbor Inlet, Absecon Island, New Jersey, Pursuant to Pub. L. 104-303, Sec. 101(b)(13)*, 105th Cong., 1st sess., 1997, H. Doc. 105-153, serial 14432, 15–16.

[33] House, *New Jersey Shore Protection*, 187; "Brigantine Inlet to Great Egg Harbor Inlet, Shore Protection Project," *The Observer* (October/November 2003): 9; Lieutenant

General Joe N. Ballard, Chief of Engineers, to The Secretary of the Army, 23 December 1996, document provided by Jeff Gebert.

[34] Water Resources Development Act of 1996 (110 Stat. 3658).

[35] Quotations in "Coastal Construction Moves Forward in N.J., Del.," *The Observer* (Autumn 2004): 7; see also "Brigantine Inlet to Great Egg Harbor Inlet, Shore Protection Project," 9; U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: New Jersey Shore Protection, Brigantine Inlet to Great Egg Harbor Inlet, Absecon Island, N.J.," March 2010 <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/NJ/4CG_NJShore%20Protection_Absecon%20Island.pdf> (30 April 2010); "Project Cooperation Agreement Between the Department of the Army and the State of New Jersey Department of Environmental Protection, Brigantine Inlet to Great Egg Harbor Inlet, Absecon Island, NJ, Shore Protection Project," 31 July 2003, document provided by Jeff Gebert.

[36] Quotation in Gebert interview, 11; see also Ballard to The Secretary of the Army, 5 April 1999; "Nourishment Continues at Cape May," *The Observer* (December 1992): 5; U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Cape May Inlet to Lower Township, N.J., January 2010" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/NJ/4CG_CapeMayInlet_to_LowerTwp.pdf> (20 April 2010). In addition to these projects, the Philadelphia District completed a variety of other coastal protection projects for the state of New Jersey in the 1990s and 2000s, including projects involving seawall construction at Avalon and Stone Harbor.

[37] Quotations in The Committee on Tidal Hydraulics, "Indian River Inlet: An Evaluation by the Committee on Tidal Hydraulics," July 1994, 6, document provided by Jeff Gebert; see also Water Resources Development Act of 1986 (100 Stat. 4082).

[38] U.S. Army Corps of Engineers, Philadelphia District, "Atlantic Coast of Delaware: General Design Memorandum and Environmental Assessment," July 1984, Syllabus, copy in Philadelphia District-Library.

[39] Gebert interview, 6–7.

[40] "Two District Projects Receive National Recognition," *The Observer* (Summer 2001): 10. The article noted that the bypass operation was "now operated and maintained by the Delaware Department of Natural Resources and Environmental Control"; Voigt personal communication.

[41] House, *Beach Nourishment Project: Communication from the Acting Assistant Secretary (Civil Works), the Department of the Army, Transmitting a Report on the Storm Damage Reduction and Shoreline Protection Project for Rehoboth Beach and Dewey Beach, Delaware, Pursuant to Section 101(b)(6) of the Water Resources Development Act of 1996*, 105th Cong., 1st sess., 1997, H. Doc. 105-144, serial 14429, 9, 16-18 (hereafter referred to as *Beach Nourishment Project*); "Delaware Shore Plans Unveiled at Public Hearing," *The Observer* (March 1996): 5; Lieutenant General Joe N. Ballard, Chief of Engineers, to The Secretary of the Army, 23 December 1996, document provided by Jeff Gebert; "Public Perspective," *The Observer* (January/February 2001): 16; Voigt personal communication.

[42] House, *Beach Nourishment Project*, 9; Voigt personal communication.

[43] "Delaware Shore Plans Unveiled at Public Hearing," 5.

[44] Water Resources Development Act of 1996 (110 Stat. 3667).

[45] "Public Perspective," *The Observer* (January/February 2001): 16. This was a reprint of an article published in the *Baltimore Sun* on 18 February 2001.

[46] Quotations in U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Delaware Coast from Cape Henlopen to Fenwick Island, Rehoboth Beach/Dewey Beach, DE," January 2010 <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/DE/4CG_DelCoast_Rehoboth%20Dewey.pdf> (27 April 2010); see also "Project Cooperation Agreement Between the Department of the Army and the Delaware Department of Natural Resources and Environmental Control for Construction of the Delaware Coast from Cape Henlopen to Fenwick Island, Delaware, Rehoboth Beach and Dewey Beach, Delaware Project," 19 December 2003, document provided by Jeff Gebert.

[47] In 1988, the NGVD was renamed North American Vertical Datum.

[48] U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Delaware Coast from Cape Henlopen to Fenwick Island, Bethany Beach/South Bethany, DE," January 2010 < http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/DE/4CG_DelCoast_Bethany%20S%20Bethany.pdf> (28 April 2010); Water Resources Development Act of 1999 (113 Stat. 269); Lieutenant General Joe N. Ballard, Chief of Engineers, to The Secretary of the Army, 21 April 1999, document provided by Jeff Gebert; "Project Cooperation Agreement between the Department of the Army and the Delaware Department of Natural Resources and Environmental Control for Construction of the Delaware Coast from Cape Henlopen to Fenwick Island, Bethany Beach to South Bethany, Delaware, Hurricane and Storm Damage Reduction Project," 26 July 2006, document provided by Jeff Gebert.

[49] U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Delaware Coast from Cape Henlopen to Fenwick Island, Fenwick Island, DE," January 2010 <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/DE/4CG_DelCoast_Fenwick%20Island.pdf> (28 April 2010); Lieutenant General Robert B. Flowers to The Secretary of the Army, 29 December 2000, document provided by Jeff Gebert; Water Resources Development Act of 2000 (114 Stat. 2572); "Project Cooperation Agreement between the Department of the Army and the Delaware Department of Natural Resources and Environmental Control for Construction of the Delaware Coast from Cape Henlopen to Fenwick Island, Delaware Project," 13 September 2004, document provided by Jeff Gebert.

[50] Quotations in Gebert interview, 9, 29, 32-33; see also "Planning Associates Coastal Course," 27 April-1 May 2009, Powerpoint presentation provided by Jeff Gebert.

[51] William C. Seabergh, Mary A. Cialone, and John W. McCormick, "Inlet Modifications and the Dynamics of Barnegat Inlet, New Jersey," *Journal of Coastal Research* 19 (2003): n.p., document provided by Jeff Gebert.

[52] "'Old Barney' Gets New Lease on Life," *The Observer* (January/February 2001): 4.

[53] As cited in Maria Scandale, "Rock Steady: Jetty Stones Shored Up To Stem Erosion," *The Observer* (September/October 2002): 15.

[54] Seabergh, Cialone, and McCormick, "Inlet Modifications and the Dynamics of Barnegat Inlet, New Jersey," n.p.

[55] U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Barnegat Inlet, Ocean County, NJ," January 2010 <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/NJ/5OM_BarnegatInlet.pdf> (30 April 2010).

[56] Seabergh, Cialone, and McCormick, "Inlet Modifications and the Dynamics of Barnegat Inlet, New Jersey," n.p.

[57] Quotations in U.S. Army Corps of Engineers, Philadelphia District, "Barnegat Inlet, Ocean County, New Jersey, Transcript, 26 August 1981 Public Meeting," 3–5, copy in Philadelphia District-Library; see also U.S. Army Corps of Engineers, Philadelphia District, "Barnegat Inlet, Ocean County, New Jersey: Phase II, General Design Memorandum," August 1984, Syllabus, copy in Philadelphia District-Library.

[58] Quotations in "Agreement Between the Department of the Army and the State of New Jersey for Local Cooperation at Barnegat Inlet, Ocean County, New Jersey," 19 May 1986, document provided by Jeff Gebert; see also Act of 15 August 1985 (99 Stat. 293); Voigt personal communication.

[59] "Modification No. 1 to the Agreement Between the Department of the Army and the State of New Jersey for Local Cooperation at Barnegat Inlet, Ocean County, New Jersey," 20 March 1987, document provided by Jeff Gebert.

[60] Scandale, "Rock Steady," 15.

[61] "'Old Barney' Gets New Lease on Life," 4.

[62] "Jetty Work Almost Done, Summerlong Repairs Will Leave Sinkholes Fixed," The Observer (July/August 2002): 17.

[63] Quotation in Jeffrey A. Gebert and J. Michael Hemsley, "Monitoring of Jetty Rehabilitation at Manasquan Inlet, New Jersey," Monitoring Completed Coastal Projects Program Miscellaneous Paper CERC-91-8, September 1991, 1-2, document provided by Jeff Gebert; see also Gebert interview, 13–14; "Manasquan Inlet History," document provided by Jeff Gebert.

[64] Quotations in "Another 'First' Set in Place at Manasquan Inlet," *The Observer* (September/October 1997): 3; see also "Manasquan Inlet History"; Gebert interview, 13–14; Voigt personal communication.

4

Waterways, Navigation, and Dredging

One of the long-standing civil works missions of the U.S. Army Corps of Engineers is maintaining navigable waterways. The Philadelphia District has had this responsibility for the Delaware River, its tidal reaches, its tributaries, and inlets along the Atlantic coast since its official founding in 1866, and it continued to be an important, albeit complicated, mission into the twenty-first century. By the end of the twentieth century, much of the Philadelphia District's navigation mission focused on stretches of the Delaware River from Philadelphia to the ocean and from Philadelphia to Trenton, N.J., as well as ports and inlets in New Jersey and Delaware. The district also had responsibility for the Chesapeake and Delaware Canal, which connected Chesapeake Bay and Delaware Bay and shortened the shipping of goods along the eastern seaboard by 150 miles. Much of the district's navigation mission involved channel deepening and maintenance dredging, and the district frequently dealt with issues of where to place dredged material and the effects of their disposal on the environment, a topic that became increasingly controversial as environmental awareness increased in the United States. Because of the economic importance of the waterways within the Philadelphia District's boundaries, the navigation mission was not only one of the district's oldest functions, but also one of its most important.

The Corps' efforts in navigation could take several forms.

Facing page: Dredging from the Delaware River, Philadelphia to Sea federal channel for pumpout to the Killcohook confined disposal facility

According to one source, it consisted of "river deepening, channel widening, lock expansion, dam operations, and dredged material disposal."[1] It could also involve construction of jetties and other structures in inlets to develop shipping channels. Most of the Philadelphia District's navigation work involved maintaining waterways through dredging. This was the process by which shoal material was taken from the bottom of a waterway and disposed of elsewhere, thereby keeping a channel at its authorized depth.[2] It involved not only the physical removal of the built-up sediments, but also significant planning as to where they could be safely and productively deposited.

The planning, development and construction of navigation projects involved personnel from a number of the district's branches and sections, but operation and maintenance activities (including hydrographic surveying, dredging, and dredged material management) fell entirely within the Operations Division.[3] Work on existing projects was typically funded out of operation and maintenance funds appropriated by Congress, while any new navigation project was covered under the Construction General account. Under the stipulations of the Water Resources Development Act of 1986, for commercial navigation projects involving coastal ports, the federal government paid between 40 and 80 percent of construction costs and 50 percent of the cost of feasibility studies (with the nonfederal sponsor accountable for the balance), while the government footed 100 percent of the bill for reconnaissance studies.[4]

Kilcohook Confined Disposal Facility, one of eight Corps-owned and operated sites for dredged material from the Delaware River, Philadelphia to Sea federal navigation channel

The Survey Boat Shuman *approaching the Chesapeake City Bridge, en route to its next assignment in the Chesapeake & Delaware Canal*

Floating Plant: The District Fleet

In dredging a waterway, the Philadelphia District could use its own hopper dredges or could delegate the work to a private contractor. Between 1972 and 1980, the district used three Hopper Dredges: the *Comber*, the *Goethals*, and the *Essayons*. Each was outfitted to provide "direct pump-out of dredged material, a method of disposal developed by the Philadelphia District in the early 1960s" to "transfer . . . material from dredge hoppers to onshore sites without intermediate rehandling."[5] In 1978, however, Congress passed an act that required the secretary of the army to contract out dredging operations "if he determines private industry has the capability to do such work and it can be done at reasonable prices and in a timely manner."[6] Accordingly, the Corps engaged private contractors for dredging work, gradually reducing its own fleet of hopper dredges. By the end of 1983, the *Comber*, *Goethals*,

From top: Hopper Dredges Comber, Goethals, *and* Essayons

and *Essayons* were gone, while the *McFarland* had been reassigned from the Jacksonville District to the Philadelphia District to take their place as the Corps' sole hopper dredge for the east coast.[7]

The fate of the three old dredges decisive if not dignified. They were retired in consecutive years—*Essayons* in 1981, *Goethals* in 1982, and *Comber* in 1983—and remained for some time at the U.S. Maritime Administration's National Defense Reserve Fleet in James River, Va. Eventually the latter two were acquired by the United States Navy for target practice and sunk off the coast of Puerto Rico, where they serve in perpetuity as artificial reefs (fish habitat). As for the *Essayons*, it was sold to a U.S. buyer, sent to India and cut up for scrap; and in a particularly cruel twist of irony for a vessel that had served the nation through the heart of the Cold War, its 1991 final voyage from Virginia to India was powered by a Soviet tugboat.[8]

By 2007 it appeared that the *McFarland*, by then one of only four Corps-owned seagoing hopper dredges, was bound for the same

fate as its three Philadelphia District predecessors. The prevailing argument in Congress was that, as the oldest of the four remaining vessels, it was no longer cost-effective to maintain. But after some people expressed concern over the diminishment of the nation's quick-response capabilities, the Water Resources Development Act of 2007 included a provision assigning the *McFarland* to ready reserve status, which meant continued operation—albeit for fewer days annually—and readiness for deployment.[9]

The *McFarland* was a propelled floating plant, meaning that it was "capable of dredging material, storing it onboard, transporting it to the disposal area, and dumping it." It was also the only dredge in the world with the triple capability for direct pumpout, bottom discharge, and "sidecasting," or boom discharge, of dredged sediments. First constructed in 1967 under the jurisdiction of the Galveston District, the *McFarland*, which had about a sixty-person crew, had a twofold mission for the Corps: dredging of the Delaware River and other waterways along the Atlantic coast, and emergency dredging anywhere in the world. According to Joe Vilord, former captain of the *McFarland*, the dredge went wherever the work was.[10]

An integral part of dredging was surveying the waterway before, during, and after dredging activities. The Philadelphia District used the Survey Boat *Shuman*, as well as other vessels operating out of Fort Mifflin and the Atlantic City Field Survey Section, to perform these activities. According to one district publication, the Survey Section had two missions. Its first responsibility

The twin-hull Survey Boat Shuman, *with full-service onboard capabilities to provide channel depth reports to the maritime community*

was "collect[ing] and record[ing] depth measurements for use in both navigation and dredging"; its second duty was "locat[ing] and identify[ing] underwater objects that pose a potential hazard to either of those activities." The *Shuman* could provide data to the Corps on the size of a shoal that needed dredging, as well as the type of soil in the shoal.[11]

After survey work was done on a waterway, the actual dredging began. As mentioned earlier, the Philadelphia District devised a dredging method known as a "direct pumpout." According to Vilord, this meant that the dredge would make one pass along a waterway and fill up the ship with dredged material. It would then hook on to a barge, connect to the pipes on the barge, and pump the material onto a disposal site onshore before making another pass. This would continue for several days. The survey boat would then do another survey to gauge progress, more dredging would occur if necessary, and the process would repeat until the waterway had reached the desired

The Hopper Dredge McFarland*, with unique triple capability for hopper, pipeline, and sidecast dredging*

depth. Over time, the implementation of the Global Positioning System (GPS) enabled the Corps to be more precise in its dredging and surveying activities, which made the entire process more efficient from all perspectives.[12]

Serving on a dredge was not an easy experience. The crew of the *McFarland*, for example, generally worked two-week shifts at a time. Because the vessel operated twenty-four hours every day, posts were constantly manned. One never knew what to expect. For instance, at one point the *McFarland* had so much trouble with sea turtles being caught in the ship's filter, which prevented objects from reaching the vessel's hull, that the Marine Design Center had to develop a dredging draghead deflector to prevent them from entering the pumping system in the first place. But most of the *McFarland*'s crew enjoyed their work. "It's a great lifestyle," said Captain Thom Evans. "There's always a pot of coffee on and someone to talk to."[13]

The *McFarland* (and the *Essayons* before it) did not just dredge in waterways under the Philadelphia District's jurisdiction. The vessel also frequented other ports and waterways along the east coast. In 1996, for example, after Hurricane Fran had passed over the east coast, the Corps sent the *McFarland* to the Cape Fear River in North Carolina to remove material clogging its mouth. In this case, the *McFarland* worked with the Wilmington District with good results. According to Eric Stromberg, director of the North Carolina State Ports, "We were very pleased with how quickly the *McFarland* was able to restore our channel to its proper dimensions."[14] Such emergency dredging responsibilities took the *McFarland* all over the eastern United States.

The Survey Boat Cherneski

The bridge of the McFarland

Routine dragarm inspection

Tying up at dockside at the end of a mission

In 1995, Assistant Master Karl Van Florcke (who became captain of the *McFarland* in 1999, after Vilord's retirement) noted that the *McFarland* had visited "the ports of Philadelphia, Norfolk (Va.), Wilmington (N.C.), Charleston (S.C.), Savannah (Ga.), and Fernadina and Canaveral harbors in Florida" for emergency dredging purposes, eventually ending up in Galveston Harbor in Texas to clear shoals from the inner bar channel.[15] Other emergencies also required the *McFarland* to travel out of the Philadelphia District boundaries. In 2001, for example, the *McFarland* answered a distress call from the CIC Vision in the Mississippi River Gulf Outlet stating that the ship was on fire. The crew of the *McFarland*, many of whom were trained firefighters, extinguished the blaze over an eight-hour period.[16]

Fire was not the only hazard that those working on dredges sometimes faced. In 1993, the Philadelphia District discovered that dredged material being deposited at the Fort Mifflin disposal area contained "unfired, live

ammunition" from "old rifle[s] and anti-aircraft" devices. The district was forced to halt dredging operations, which were being conducted by a private company at the berthing piers of the Philadelphia Navy Base.[17] In 2007, the Corps was constructing a beachfill project at Surf City and Ship Bottom, N.J., when it discovered World War I-era discarded munitions in the dredged material the contractor was depositing on the beach. Even though neither incident resulted in any personal injuries or property damage, the Corps instituted requirements for additional screening and filtering of dredged material in areas considered at risk for submerged munitions.[18]

By the 1970s, the largest dredging projects the Philadelphia District undertook within its own boundaries were the Delaware River, Philadelphia to the Sea Project, the Chesapeake and Delaware Canal (and Chesapeake Bay approach channels to Baltimore Harbor), the Wilmington Harbor Project, the Delaware River, Philadelphia to Trenton Project, and the Schuylkill River Project.

The McFarland *hooks up to Mooring Barge #2 for direct pumpout to the disposal site*

In addition, the district performed maintenance dredging on smaller projects under the Continuing Authorities Program. According to Section 107 of the River and Harbor Act of 1960, as amended, the district could construct new channels or extend existing projects, as long as the Corps' expenditures on those projects did not exceed $2 million.[19]

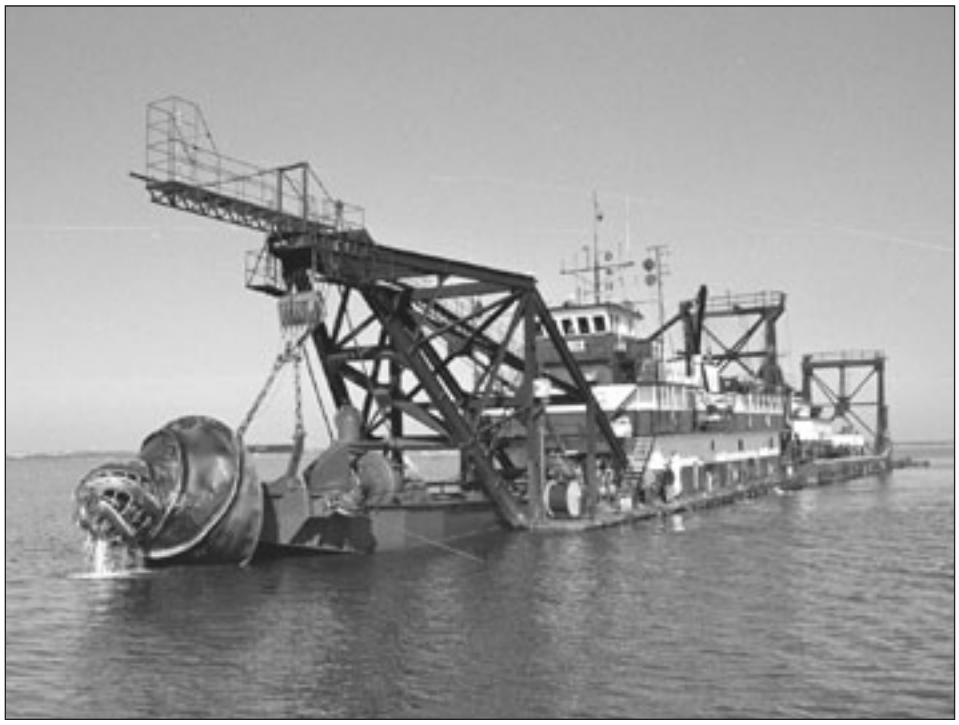
The Delaware River Dredging Disposal Study

One of the Philadelphia District's main navigation functions was the dredging of waterways to maintain their authorized depth. According to one Corps publication, maintenance dredging was "the repetitive removal of naturally recurring deposited bottom sediment such as sand, silt, and clays in an existing navigation channel." Together with "occasional enlarging and deepening of navigation channels," the practice was "essential to accommodate commercial and recreational vessels."[20] As mentioned previously, the district was responsible for maintaining numerous waterways through dredging. However, gaining approval for maintenance dredging was not always easy, in part because of the perceived environmental impact of the process. Environmentalists questioned whether material dredged from the bottom of rivers and waterways contained toxins that would harm the environment and expressed concern about the ever-increasing amount of dredged spoils that had to be deposited somewhere. The Corps did not pretend that dredging produced no adverse environmental effects, but it sought ways to minimize those effects. For example, as early as 1975, the Corps admitted that maintenance dredging on the Delaware River could "produce temporary local turbidity" which could "release pollutants into the water." Especially in the 1990s and 2000s, the agency explored ways to minimize these environmental effects and to reuse dredged material in beneficial ways, such as for beach nourishment, ecosystem restoration, or building and road construction. In addition, the

Corps began publishing newsletters such as *Environmental Effects of Dredging* to provide a forum for scientists, engineers, and others to discuss how to minimize impacts on the environment.[21]

As dredging continued in the twentieth century, it became more difficult to find areas to dispose of the material. As Lt. Col. Ralph Locurcio, former District Engineer of the Philadelphia District, explained, "Because the Delaware runs through such an urbanized area, trying to find places to put the muck that you dredge up out of the river becomes an issue" because "there just aren't too many open lands where you can put this stuff."[22] The district estimated in the 1970s that its existing sites would be "filled to capacity by the 1990s."[23]

Some people were concerned about the cost of maintenance dredging and dredging disposal. Between 1956 and 1978, the federal government bore all the costs of disposal area preparation, requiring local sponsors to provide only "lands, easements, rights-of-way, and spoil disposal areas necessary for construction of the project and for subsequent maintenance when and as required." As Col. James G. Ton, District Engineer of the Philadelphia District from 1978 to 1981, noted, this meant "that the States only furnish the land for disposal areas, as well as any necessary clearing." In 1978, the chief of engineers began requiring local sponsors to bear site preparation costs, much to the displeasure of local and state governments. This led to the deferral of several maintenance dredging projects under the Philadelphia District's purview.[24]



Dredging in the Delaware River, Philadelphia-to-Sea federal navigation channel

Depositing of dredged material via pipeline at the Fort Mifflin CDF

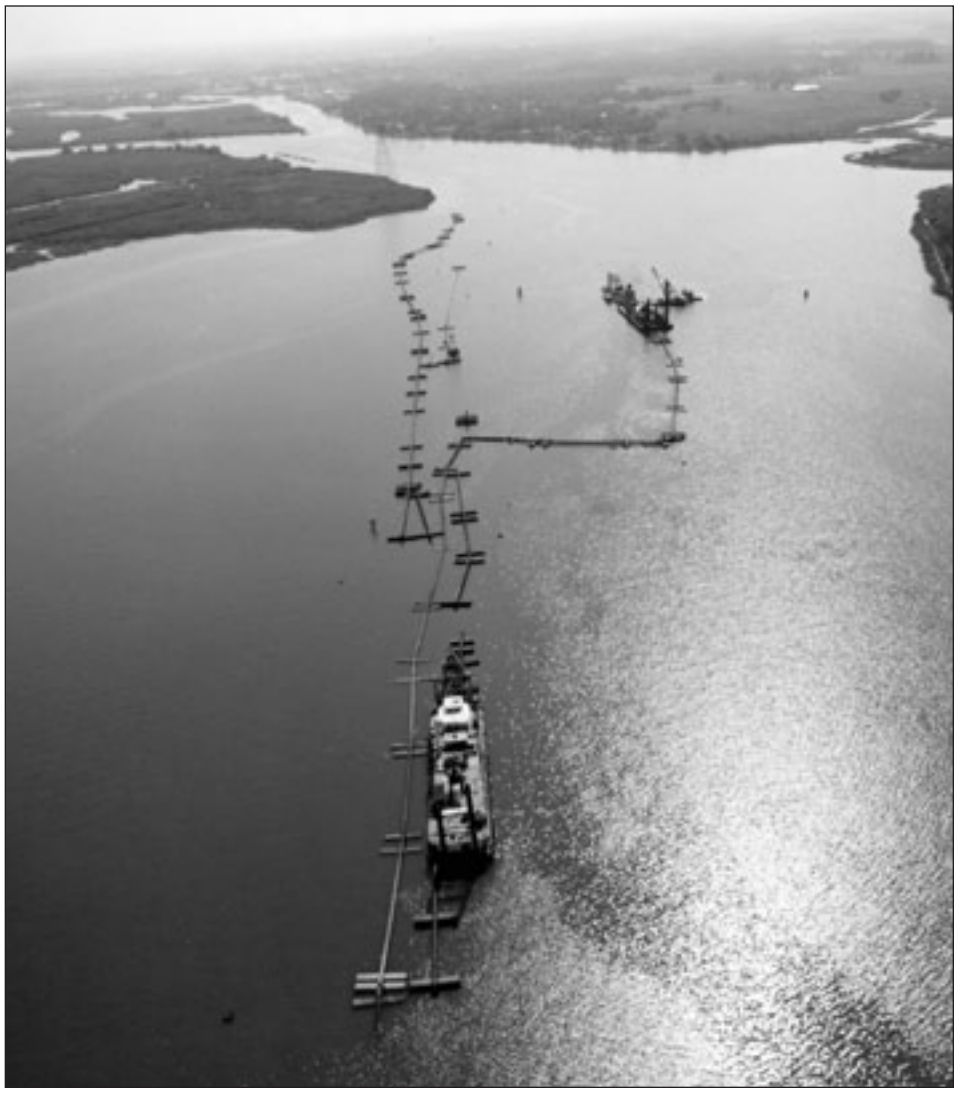
Other problems arose because existing dredged disposal sites were quickly reaching maximum capacity. In the 1970s and 1980s, the district turned its attention to developing a long-term strategy for disposing of dredged materials. In 1974, the Delaware River Basin Commission (DRBC) had requested that the Philadelphia District prepare, in the words of one historian, "a long-range regional disposal plan which would minimize environmental degradation."[25] This plan would focus on how to dispose of dredged material in the tidal Delaware River, the tidal tributaries of the river, and Delaware Bay. It would identify specific sites that both the Corps and its private contractors could use to dispose of dredged material "with minimum degradation of the natural environment." After the passage of this resolution, the Senate Committee on Public Works authorized the development of "a regional dredging spoil disposal plan for the tidal Delaware River, its tidal tributaries and Delaware Bay." The Philadelphia District received funding for this study in fiscal year 1978 and commenced its investigations. Congress directed the Corps to include Indian River Inlet and Bay in the study.[26]

In June 1979, the Philadelphia District released a reconnaissance report outlining both long-term and short-term disposal plans. In preparing the report, the Corps had coordinated with the DRBC, the Delaware Valley Regional Planning Commission, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the U.S. Geological Survey, as well as with Delaware and New Jersey environmental departments.

Work included evaluating bottom sediments in the Delaware River navigation channel and compiling an inventory of fish and wildlife that might be affected by dredging and disposal. In addition, the Corps' Waterways Experiment Station in Vicksburg, Mississippi, conducted a Dredged Material Research Program to provide "answers to questions of why and under what circumstances does the disposal of dredged material produce adverse environmental impacts." This work "produced tested, viable, cost-effective methods and guidelines for reducing the impacts of conventional disposal alternatives."[27]

In preparing the reconnaissance study, the district considered ten alternatives for dredging disposal. These included dewatering disposal sites, increasing the height of containment dikes, reusing dredged material, reducing the amount of dredging, acquiring new upland sites for dredging, and disposing of material in open water. Ultimately, the district concluded that all of these alternatives should be studied further so the Corps could "more formally document attempts at extending the useful life of disposal areas and to more formatively analyze potential new sites."[28]

The district proceeded with Phase II studies of the alternatives, continuing to work with interested parties to develop dredging disposal plans that were environmentally sound. As part of the Phase II program, the district held



Maintenance dredging, Salem River, N.J.

Loading of dried-out dredged material to be transported offsite by third parties for beneficial re-use

public meetings to give "citizens a chance to sound off about where to put the material after its 18 active disposal areas are exhausted in the 1990s."[29] The Corps also used the meetings as a way to inform the general public about its plans. In a March 1980 gathering in Delaware, for example, Deputy District Engineer Lt. Col. Joel Callahan provided an overview of the Corps' dredging responsibilities on the Delaware River, explaining that the river had "more than 15 port areas and two open-bay areas which handle significant amounts of waterborne commerce along the Delaware River and Bay from Trenton to the sea." Callahan said, "Dredging is vital to the effective operations of these port areas." He listed the major commodities that were shipped along the Delaware, which include petroleum, metal products, sugar, nonmetallic minerals, scrap metals, coal, chemicals and allied products, and farm products. Because "one out of every ten jobs in the Delaware Valley is related to the ports along the Delaware," Callahan said maintaining the navigation channel through dredging was "vital to the economy and well-being of the entire region."[30]

Several disposal sites existed in the area, including seven for the Delaware River, Philadelphia to the Sea and the Schuylkill River, two for Wilmington Harbor, and nine for the Delaware River, Philadelphia to Trenton. But by 1999, all these sites would reach their capacity (the Wilmington Harbor sites would reach theirs by 1983). If solutions were not found to this dilemma, the district argued, dredging would cease along the Delaware River, adversely affecting the area's economy. To

address concerns about possible toxicity of dredged material, Callahan said the district conducted "a total chemical analysis of the composition of the material" before each mission and shared the results with various agencies (such as the EPA, the U.S. Fish and Wildlife Service, and state environmental agencies) to receive their concurrence before proceeding. He mentioned the possibility of the Corps using some of the dredged material to create wetlands, thereby enhancing the environment.[31] However, some people continued to believe that dredging was harmful to the environment.

After obtaining input from the public, the Philadelphia District continued with its review of the alternatives presented in the reconnaissance plan, including "real estate studies, economic and environmental studies, public involvement and agency coordination and aerial survey data."[32] The district had removed nearly eight million cubic feet of material a year as part of three Delaware River navigation projects, combined with the Christina River, Wilmington Harbor, and Schuylkill River projects (defined as the "deep draft" dredging projects). The Corps investigated whether the huge amount of material could be reduced through "changes in certain dredging operation practices" and through channel realignments and other methods, "without significantly increasing the safety hazard to navigation."[33]

In June 1984, the Corps released its recommendations for a disposal plan along the Delaware River and its tributaries. This report explained that federal and nonfederal dredging produced over eleven million cubic yards

The Wilmington Harbor South confined disposal facility

Another view of the Wilmington Harbor South disposal site

of material each year, an amount that would increase as projects were added. The district determined that, in the worst-case scenario (in which every proposed project was authorized), it would have a shortfall in disposal of 335 million cubic yards. In a more probable scenario, the shortfall would be just over 78 million cubic yards. The district recommended both a short-term and a long-term strategy to deal with the deficit. In the short term, the Corps recommended "extend[ing] leases at existing sites, acquir[ing] and us[ing] advanced dewatering equipment, continu[ing] to make dredge material available for re-use and consider[ing] acquiring one additional site." For the long-term, the district recommended "continu[ing] past management practices and incorporat[ing] new development, as appropriate, . . . acquir[ing] long term leases or land in fee where appropriate and consider[ing] acquiring five new disposal sites."[34]

The report suggested that the long-range recommendations be implemented "at least 5 years prior to the exhaustion of disposal capacity to allow sufficient time to carry out the site acquisition and preparation phase." In addition to helping guide its own future decisions about acquiring disposal sites, the Corps believed the information it had gathered from the study could provide states with a starting point for their own dredging disposal plans.[35] With these recommendations in place, the Corps hoped to have adequate dredged material storage capacity for years to come.

By the time the report was published, the advanced dewatering equipment had already been

acquired and was "operating successfully" on Cherry Island, where dredged material from Wilmington Harbor was disposed. The report noted that the Corps could obtain "more efficient use of existing and potential new disposal sites."[36]

However, even with these general recommendations, the district still had to deal with specific dredging sites. Before the dredging disposal study was finalized, the Philadelphia District acquired a new site for Wilmington Harbor. The Corps first received authorization to dredge Wilmington Harbor, located at the confluence of the Christina and Delaware Rivers, in 1896. Throughout the twentieth century, the district performed this function, maintaining the harbor to a depth of thirty-five feet. Most of the dredged material was placed on Cherry Island, but by 1983 it was apparent that this site would soon be filled. The Corps undertook a study of alternatives, resulting in a 1985 recommendation to develop "an approximately 326-acre area between the mouth of the Christina River and Pigeon Point as a disposal area."[37] Later that year, the Corps filled "a subtidal mudflat in the upper Delaware Estuary. . . to create a dredged-material disposal area" known as the Wilmington Harbor South site.[38] The creation of this site apparently fulfilled the needs of disposal, as dredging continued at Wilmington Harbor.[39] The Wilmington Harbor South Disposal Area won a 1992 Federal Design Achievement Award from the National Endowment for the Arts, recognizing the district's ". . . Contribution to Excellence in Design for the Government of the United States of America."[40]

Meanwhile, environmental concerns about dredging and its effects continued to be expressed in the 1980s, 1990s, and 2000s. In the 1980s, for example, the Delaware Basin Fish and Wildlife Management Cooperative (an amalgamation of representatives from the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and Pennsylvania, New Jersey, and Delaware) recommended that bucket dredging in the Delaware River and Bay be halted from March through May and from

September through November because of concerns that "increased turbidity and related effects in the water" would "adversely affect shad migration." These recommendations had no force of law, but the Philadelphia District made a policy decision to follow any suggestions the group offered; accordingly, the district did no dredging during those periods, even though this action resulted in shorter periods when the Corps could dredge.

In 1990, the cooperative recommended that hydraulic dredging be halted on reaches of the Delaware River each spring to ensure that striped bass eggs were not displaced by dredging. However, in making this recommendation, the cooperative did not have hard evidence that the dredging actually harmed striped bass. The Philadelphia District conducted its own study of the issue and determined not only that the dredging would not adversely affect striped bass but that bucket dredging did not have harmful effects on the shad. The district presented

Dredging in Wilmington Harbor

these findings to the cooperative in 1993, and the cooperative agreed to let the district lift the ban on fall bucket dredging and spring hydraulic dredging. According to one account, the Philadelphia District's coordination with and willingness to listen to the cooperative "enhanced its relations with the group, exemplifying what the Corps means when advancing the benefits of partnering with other agencies and commissions."[41]

The district exhibited this same spirit of cooperation during other projects. In 2007, the district unveiled its plans to use 20 acres of the 330-acre Palmyra Cove Nature Park to deposit 55,000 cubic yards of sediment from the Delaware River. The Nature Park had actually been constructed on an old dredging disposal site in the late 1990s, under an agreement among the Corps, the New Jersey Department of Environmental Protection, and the Burlington County Bridge Commission, with the understanding that seventy acres of the site could still be used for dredging disposal. However, because of funding issues, the Corps had not been able to do much maintenance dredging of the Philadelphia to Trenton channel in the intervening years and, as explained in one article, "the site's original purpose faded from local memory." When the district proposed to use part of the site for dredging disposal, some environmental groups saw it as an attempt to destroy the Nature Park, and they quickly objected.[42]

Dredge pumpout at Palmyra Cove, where part of the original disposal area was converted into a nature center

The district's project team directly engaged these critics, assuring them "that the Corps would take great pains to disturb the center as little as possible." When the disposal occurred, the district was true to its word, leaving opponents surprised but

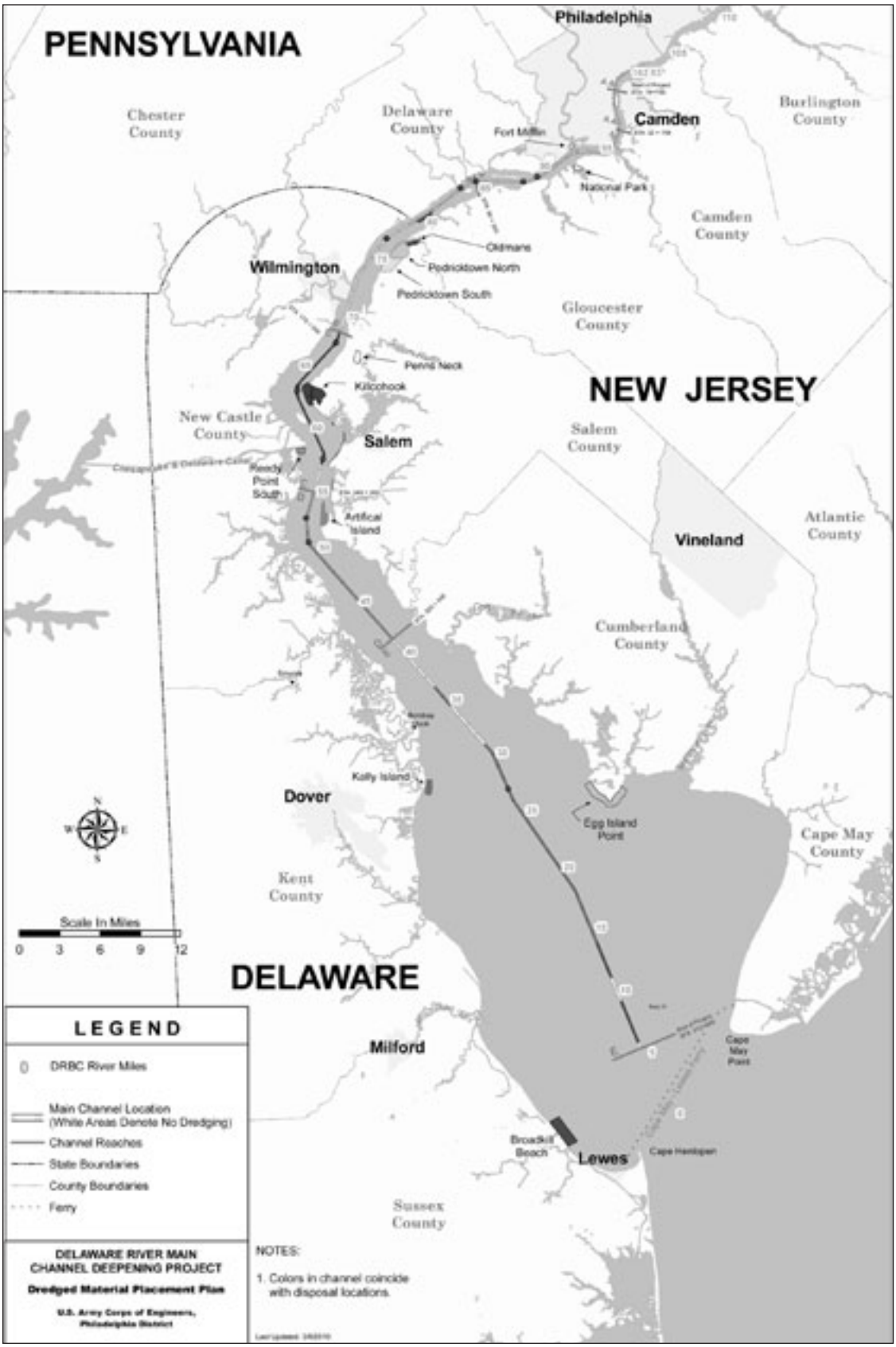
also satisfied. As Clara Ruvolo, director of the Nature Park, said, "The Army Corps lived up to its promise to preserve the Dragonfly Pond, accomplishing a difficult job with minimal disruption." In Ruvolo's eyes, Corps personnel treated their critics with respect, "engag[ing] them in dialogue and express[ing] an interest in their opinions." Such willingness to communicate allowed the district to defuse a potentially volatile situation.[43]

Delaware River Main Channel Deepening

Though most of the district's year-to-year navigation activities (and the Corps') fell under the heading of operations and maintenance, the end of the twentieth century saw the emergence of two large-scale improvement projects—both to deepen existing navigation channels. But just as not all the proposed dams from the 1962 comprehensive study were built, only one of these two projects—the Delaware River Main Channel Deepening—would move forward to eventual construction, and that only after multiple challenges and delays. (The other was the proposed Chesapeake and Delaware Canal deepening, discussed later in this chapter.)[44]

In the late 1800s, the Philadelphia District assumed responsibility for maintaining the federal shipping channel in the Delaware River, which ran 106 miles from Trenton, N.J., to Delaware City, Del., at a depth of eighteen feet. As ships traversing the river became larger, it was necessary to deepen the channel. By the Second World War, the authorized depth was forty feet, and the district had three separate navigation projects covering the river: Delaware River, Philadelphia, Pa., to Trenton, N.J. (first adopted in 1930); Delaware River, Philadelphia to the Sea (adopted in 1910); and Camden, N.J. (adopted in 1919).

To maintain the Delaware River main channel at forty feet, the Corps had to conduct periodic dredging. In 1975, it estimated that it had removed approximately one billion cubic yards of material from the river, including


PENNSYLVANIA
Philadelphia
Chester County
Delaware County
Camden
Burlington County
Fort Mifflin
National Park
Camden County
Oldmans
Pedricktown North
Pedricktown South
Wilmington
Gloucester County
Penns Neck
Kilcohook
NEW JERSEY
New Castle County
Salem
Salem County
Reedy Point South
Artificial Island
Atlantic County
Vineland
Cumberland County
Kelly Island
Dover
Egg Island Point
Cape May County
Kent County
Scale In Miles
0 3 6 9 12
DELAWARE
LEGEND
DRBC River Miles
Main Channel Location (White Areas Denote No Dredging)
Channel Reaches
State Boundaries
County Boundaries
Ferry
Milford
Cape May Point
Broadkill Beach
Lewes
Cape Henlopen
Sussex County
DELAWARE RIVER MAIN CHANNEL DEEPENING PROJECT
Dredged Material Placement Plan
U.S. Army Corps of Engineers, Philadelphia District
NOTES:
1. Colors in channel coincide with disposal locations.

six million cubic yards annually from the Philadelphia to the Sea stretch alone. These operations ensured safe passage for the "over 100 million tons of waterborne commerce"[45] that traversed the river each year, making it "the second largest port-complex in the United States."[46]

In 1970, the House Committee on Public Works passed a resolution requesting that the Philadelphia District conduct a Delaware River Comprehensive Navigation Study "to address the problems at waterways of Federal interest," including the main Delaware River channel, the Chesapeake and Delaware Canal, waterways tributary to the Delaware River, and the area's port system. Four years later, the Senate Committee on Public Works charged the district with producing a regional dredging plan for the Delaware River. Finally, to supplement these studies, Congress authorized the Philadelphia District in 1983 to examine whether the main channel of the Delaware River needed to be deepened to accommodate larger ships. In 1992, the district completed a feasibility study that addressed these issues.[47]

Recognizing that many large vessels, including oil tankers, could not traverse the forty-foot channel fully loaded, the Corps recommended in the feasibility study that it deepen the channel—which it defined as stretching "from deep water in the Delaware Bay to the Beckett Street Terminal in Philadelphia Harbor, a distance of about 102.5 miles"—to forty-five feet. This recommendation was based on a calculation of the highest ratio of benefits to costs among alternatives that were both technically and environmentally sound. While channel widths would not change, twelve bends would have to be widened for improved navigational safety. To maintain the channel depth at forty-five feet, the Corps estimated it would need to dredge a total of 52,523,300 cubic yards initially and then annually remove 756,000 cubic yards through maintenance dredging. The district recommended various locations for the disposal of this material, mostly former sites in southern New

Jersey, and suggested that some of the material be used for "wetland/island creation." Total cost for the project, according to the district, would be $278,293,000, of which $93,937,000 would be the responsibility of the nonfederal sponsor.[48] Congress accepted the Corps' plans for the Delaware River main channel, authorizing the project for construction under the Water Resources Development Act of 1992.[49]

The Philadelphia District moved into the design phase of the project, completing its general design memorandum in 1996. Although it was based largely on the 1992 feasibility study report, the design plan included an updated total dredging estimate of 33 million cubic yards, down a third from the original forecast of 50 million. It was also more specific about placement of dredged material from the Delaware Bay "for wetland restoration at Egg Island Point, New Jersey and Kelly Island, Delaware, and for stockpiling of sand for later beach nourishment work at Slaughter and Broadkill beaches in Delaware."[50] The updated price tag was more than $300 million, of which the nonfederal sponsor, the Delaware River Port Authority (DRPA), would contribute approximately 35 percent, as well as lands and rights-of-way.[51]

Although many individuals and organizations supported the project—including the Delaware River Port Authority, which saw the deepening as meeting its "requirement for a more efficient channel to keep the nation's fourth busiest port complex competitive with others on the east coast"[52] — others expressed misgivings about the environmental impact. Led by an organization called Delaware Riverkeeper, environmental interests questioned the effects that deepening the Delaware River main channel would have on landscapes, aquatic populations, and the river itself, including whether the project "would resuspend toxic substances in the water, degrade water quality, permit salt water intrusion into groundwater supplies used for drinking and other purposes, or significantly harm fish and wildlife." The district worked with

One of the district's federally owned and operated confined disposal facilities for dredged material at Fort Mifflin, Pa.

various local and state agencies to address these concerns, producing a supplemental environmental impact statement in 1997 and holding public meetings in 1998 to respond to criticisms of the project.[53]

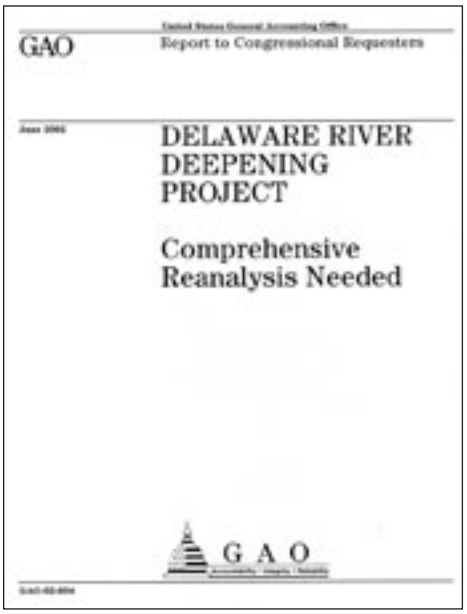
The outcome of these meetings led to one substantive change in the dredged material disposal plan. The original recommendation involved using underwater sand "stockpiles" in the lower part of the bay, but in response to concerns about the effect on local oyster beds, the district came up with an alternative of pumping sand directly onto the beach at no significant additional cost. The Corps issued a Record of Decision for the project in December 1998, signifying its compliance with the National Environmental Policy Act.[54]

In addition to the final design and supplemental EIS, the Corps updated its economic analysis of the project. An increase in depth from forty to a forty-five feet would allow for "more efficient

vessel loading, reduced lightering (double-handling of crude oil in transfer from tankers to barges) in the lower Delaware Bay, and attraction of more efficient container and dry bulk vessels." The Corps calculated the project's benefit-cost ratio at 1.4, with estimated annual benefits of $40 million as a result of transportation efficiencies. Recognizing these benefits—along with the prospects for "an improved business climate" for the Delaware River ports and the potential for job creation—the DRPA authorized the expenditure of $50 million for the project in November 1999. In the words of one publication, this "clear[ed] the last major financial hurdle for the $311-million dredging project."[55]

But opponents who had focused primarily on environmental issues soon challenged the project's economic merits as well. The original financial estimates (done in 1992) were more than five years old; to receive construction funds, the Corps had to conduct an economic reevaluation. After the

Container ships docked at Packer Avenue Marine Terminal, Port of Philadelphia, on the Delaware River


GAO

Report to Congressional Requesters

DELAWARE RIVER DEEPENING PROJECT

Comprehensive Reanalysis Needed

GAO

Report by the Government Accountability Office on its first audit of the Delaware River Main Channel Deepening Project

Philadelphia District published its 1998 limited reevaluation report (the economic update mentioned earlier) confirming a favorable benefit-cost ratio, critics charged the Corps with overstating project benefits, thereby skewing the project's economic justification. As these concerns became more pronounced, Senator Robert Torricelli (D-N.J.) and Congressman Robert Andrews (D-N.J.) requested that the GAO review the 1998 limited reevaluation report to see whether "the Corps of Engineers' economic analysis accurately and appropriately considered the benefits and costs of the project."[56]

The GAO commenced what amounted to an audit, issuing its findings in 2002. According to the GAO, the Corps' study "contained or was based on miscalculations, invalid assumptions, and outdated information." These included misapplications of growth rates for shipping traffic in the Delaware River channel, an inconsistent discounting of the project's future benefits, and the use of different years when presenting dollar values for benefit categories. The GAO said it could only verify $13 million of the project's estimated $40 million a year in benefits and that the Corps' limited reevaluation report did "not provide a reliable basis for deciding whether to proceed with the project."[57] Despite differences of opinion on some of the details, the district accepted the GAO's findings and recommendations, emphasizing that any mistakes by the project team were unintentional—they were primarily a byproduct of constantly changing shipping traffic and highly complex mathematical models.[58]

By way of formal response to the GAO's unfavorable report, Maj. Gen. Robert Griffin, Director of the Corps' Civil Works Division, suspended work on the channel deepening and called for a "comprehensive economic reanalysis" of the project, declaring that "GAO criticism of our 1998 report was well founded." The Philadelphia District contracted with David Miller & Associates to conduct the examination, giving them access to "all documents, assumptions, economic models, and actions leading to the preparation" of

the 1998 limited reevaluation report. In December 2002, after examining these documents and considering the "many changes in the dynamics of the Port of Philadelphia that have occurred since the original 1992 project feasibility study," David Miller & Associates reported that the project was still economically sound, although its benefit-cost ratio was now 1.18, rather than 1.4. The Corps also had an external review panel evaluate the project's economics; the panel agreed that the project was economically justified.[59] However, an oil lightering company raised questions about the figures used to delineate the costs of oil lightering. The Corps released a supplement to its report in February 2004 that gave an updated project cost of $264.6 million but only minor changes to the benefit-cost ratio, which now stood at a still-favorable 1.15.[60]

Some people continued to express environmental concerns, especially about the potential of stirring up toxic substances from the bottom of the channel that could harm humans, fish, and wildlife. The district's response was summarized in a presentation made by Philadelphia District Engineer Lt. Col. Tim Brown in Dover, Del., in 2001. Directly countering the charge that "deepening the ship channel, including bend widening, and deepening berthing areas will stir up long-buried toxins," Brown explained that the district, in concert with the EPA, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and state environmental agencies of Delaware, Pennsylvania, and New Jersey, had conducted studies "to determine actual contaminant concentrations." These studies found that concentrations in bottom sediments were at a "low to medium" level, "meaning they are in a range that will not adversely affect drinking water supplies, water quality, or wildlife." Some people had charged the Corps with trying to "mask 'hot spots'" of contamination by using an averaging method, but Brown disputed this claim. "The point I want to emphasize is that the sediment analysis entailed review of all of the 12,000 data points to determine the overall

June 2008 signing ceremony for the Project Partnership Agreement with the Philadelphia River Port Authority to deepen the Delaware River Main Channel from 40 to 45 feet

environmental impact of deepening the river," he said.[61]

In addition to the question of toxic sediments, Brown addressed a perception that the deepening would adversely affect oyster populations and other aquatic populations in the Delaware Bay. He said the district had "set up pre-construction monitoring to establish baseline information" that would help it gauge "the ongoing effects of the project" on "oysters, horseshoe crabs, shorebirds, blue crabs and sand builder worms." In addition, the district would schedule annual maintenance dredging "around appropriate seasonal environmental windows to minimize impact on marine habitat." Finally, Brown showed that, although some adverse effects might occur, the district was prepared to keep those effects negligible.[62]

Economic and environmental concerns about the main channel deepening continued to linger in the 2000s, resulting in delays to the project. The situation worsened when the Delaware River Port Authority pulled out of its agreement to be the nonfederal sponsor on the project, in part because of conflicting interests that fell largely along state lines and rendered long-term regional support for the project uncertain. Fortunately, the Philadelphia Regional Port Authority agreed to become the sponsor and, after significant negotiations, the Philadelphia District and the port authority signed a Project Partnership Agreement on 23 June 2008. According to the Philadelphia District newsletter, this represented "a major step forward in a 15-year effort to deepen the Delaware River."[63] Construction would get under way at last in March 2010.[64]

The Delaware River at Marcus Hook

Although this project did go to construction, comparisons with the never-built Tocks Island Dam are tempting: two major projects by the Philadelphia District, both encountering opposition that was expressed at first in environmental terms. But while the demise of Tocks Island was heavily influenced by the nascent but rapidly growing environmental movement in the United States, the delay of the Delaware River deepening had far more to do with the aftereffects of the Water Resources Development Act of 1986, which instituted nonfederal cost sharing for civil works projects. This meant that where competing state and local interests were at stake, resolution of their differences was essential to determine whether—or at least when—a Corps project would come to fruition.[65]

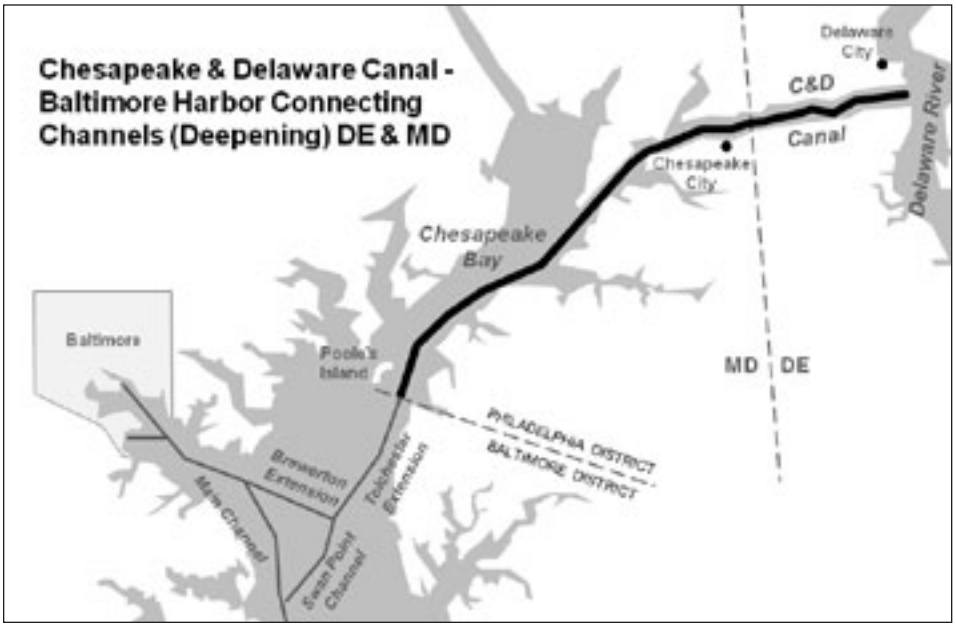
The Chesapeake and Delaware Canal

The Philadelphia District encountered difficulties of a somewhat similar nature when it proposed deepening the Chesapeake and Delaware (C&D) Canal. Again, both environmental and economic objections were voiced; in this case, the latter proved substantive and were decisive in halting the project short of construction.

A nineteen-mile-long waterway linking the Chesapeake Bay with the Delaware Bay, the C&D Canal first began transporting vessels in 1829 as a private venture. In 1919, the federal government purchased the waterway and authorized the Corps to convert it into a sea-level canal and enlarge it to a depth of twelve feet. In 1933, the Philadelphia District received jurisdiction over the canal, and Congress authorized additional modifications in 1935, 1939, and 1954, eventually directing the Corps to deepen it to 35 feet and widen it to 450 feet. The district completed these modifications in 1975.[66]

In September 1988, the House Committee on Public Works and Transportation passed a resolution asking the district to review reports relative to the C&D Canal "to determine the feasibility of measures to promote and encourage the efficient, economic and logical development of the channel system serving the Port of Baltimore and Delaware River Ports." Specifically, the committee wanted the Philadelphia District to examine the canal and determine "current and future shipping needs, adequacy of channel depth and dimensions, [and] clearances and other physical aspects affecting water-borne commerce."[67]

Map of the Chesapeake & Delaware Canal Deepening Project



A car carrier ship on the C&D Canal

In 1990, the Philadelphia District issued a reconnaissance report addressing these issues. It noted that its objectives for the C&D Canal were to "provide adequate and safe navigation channels," to ensure the most "efficient, economic use of the canal," to "minimize degradation of the natural environment," and to "protect fish and wildlife resources during initial construction and project maintenance." The district suggested deepening the canal to 37 feet and widening the channel to 438 feet. It concluded that such deepening would "not cause an incremental increase in the average annual maintenance dredging requirements since no new dredging areas are involved." The report said that implementing this plan would provide economic benefits in terms of more efficient vessel movement through the canal, resulting in a benefit-cost ratio of 1.2 for the project. Declaring "that there is a Federal interest in further study of improvements to the canal and the connecting channels," the district recommended that it conduct "further studies for navigational improvements."[68]

Accordingly, the district began a feasibility study in partnership with the Maryland Department of Transportation for the channel

deepening. The work involved coordinating with the Maryland Port Authority (MPA), the Delaware Department of Natural Resources and Environmental Control (DNREC), and other interested groups on the effects of the deepening on fish, wildlife, and the environment. In 1992, the district held a meeting with the MPA and the DNREC to review the process the Corps would undertake to complete its studies on the deepening. The Corps informed the other agencies that it was conducting chemical analyses of sediments in the canal, a study on striped bass in both Chesapeake and Delaware bays, and evaluations of proposed upland and aquatic disposal areas. The Corps believed that "all of these studies plus input on canal flows, salinity impacts, and groundwater resources will provide the basis for the development of an environmental impact statement for any proposed modifications."[69]

By the time the district released its draft feasibility study and environmental impact statement in January 1996, its plans for the C&D Canal had changed. Further analysis had shown that the most cost-effective approach was to deepen the canal to 40 feet, with an allowable overdepth of 1 foot and a "constant width" of 450 feet. Additionally, the district recommended "the enlargement of the Reedy Point flare, bend widening at Sandy Point and construction of an emergency anchorage at Howell Point." It estimated that these features would require the dredging of an additional eighteen million cubic yards of material, which it would deposit in several different "upland disposal areas" along the canal and in an "overboard proposed site" near Pooles Island in Chesapeake Bay. Finally, the Corps would use some of the material for an ecosystem restoration project the Baltimore District was doing at Hart-Miller Island. According to the district, this work would cost approximately $84 million, but it "would not result in any significant long-term adverse impacts on the environment," because the Corps would take great pains to ensure that dredging operations would not harm fish and wildlife.[70]

Despite the district's assurances, its plans for the C&D Canal drew opposition from environmental groups and local residents. According to former Deputy for Program Management Richard Maraldo, four persons—who referred to themselves as The Concerned Citizens—led the charge, attacking the proposed plan for both its economics and its environmental impacts. "They said it wasn't necessary," Maraldo explained, and that "it would change the flow between

The District's project office in Chesapeake City, Md., where dispatchers monitor and control C&D Canal traffic 24/7

The C&D Canal looking east toward the Chesapeake City Bridge and the District's project office (on the peninsula at the top center of the photo)

the Delaware and Chesapeake and ruin the ecology of the Chesapeake Bay."[71]

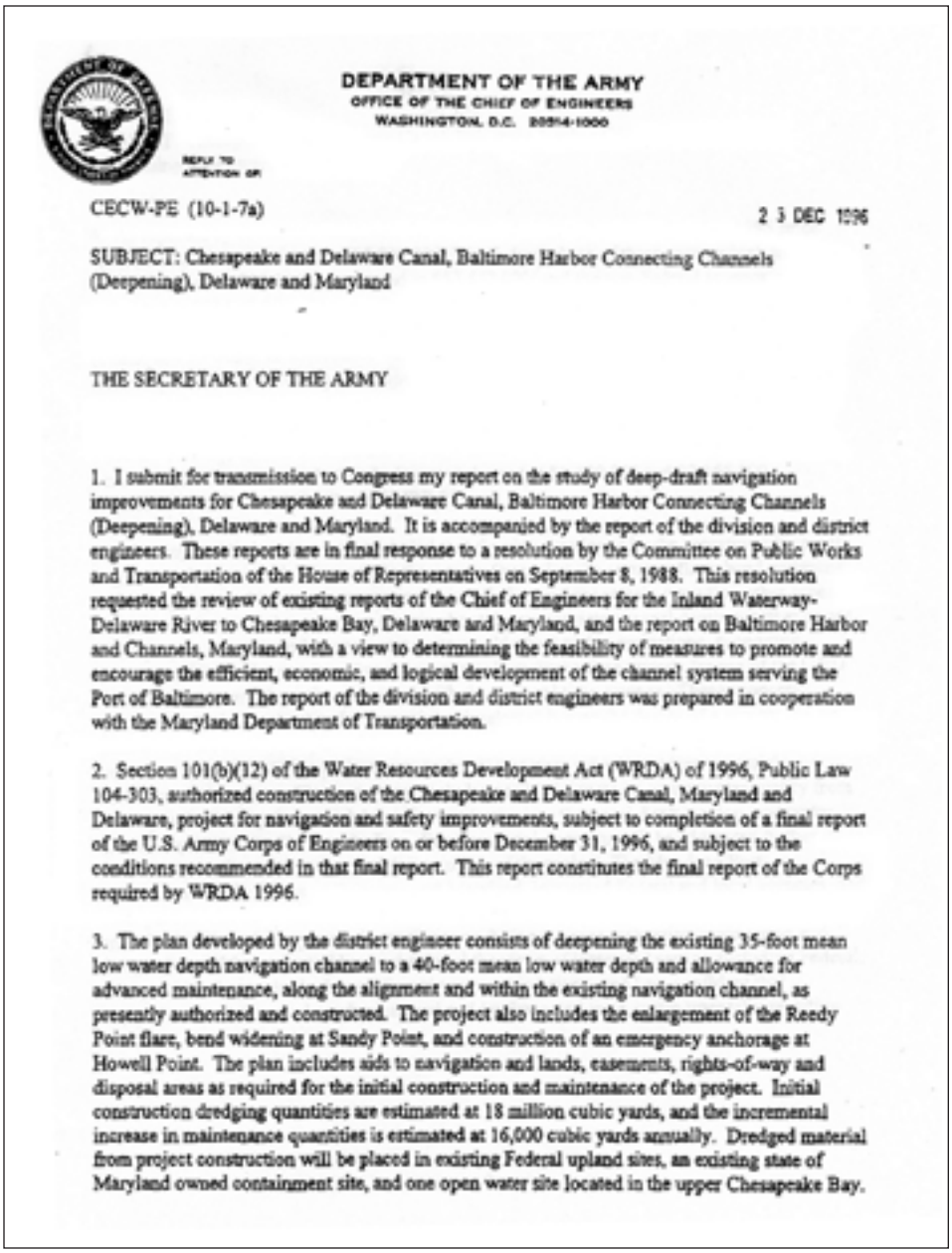
Amid this opposition, in July 1996 the district conducted a public meeting at Bohemia Manor High School in Chesapeake City to explain the proposed deepening. Project representatives pointed out that the district had prepared its recommendations in coordination with a variety of stakeholders, including the C&D Canal Citizens' and Technical Advisory Committees, the U.S. Coast Guard, the Association of Maryland Pilots, the Pilots' Association for the Bay, and River Delaware. The district had also held workshops in Chesapeake City "to address the concerns the community had regarding potential impacts on their community from structural improvements to the Canal." As for the selected plan, it not only provided economic benefits, but also allowed for "adequate and safe navigation channels . . . and techniques and protection of fish and wildlife resources," whereas the channel currently "present[ed] constraints to efficient vessel movements."[72]

According to one newspaper account, many of those attending the public meeting came away still skeptical, believing "that the analysis done by the Corps may be inadequate." Some expressed concern that increased dredging would lead to groundwater

Summit Bridge

contamination or that it would worsen erosion along the banks of the canal. District representatives did their best to address these concerns, acting, according to the reporter, "in a professional manner," but some of their answers were not enough to satisfy all those in attendance.[73]

Noting these concerns, the Corps finalized its environmental impact statement and feasibility report (lowering its estimate of project costs to $82.8 million), and Congress authorized the project in the Water Resources Development Act of 1996.[74] In December 1996, Chief of Engineers Lt. Gen. Joe N. Ballard completed his final report to Congress, indicating that the plan was "engineeringly sound" and "economically justified." However, Ballard noted that several questions remained regarding "the appropriate channel depth, whether or not recent improvements at other east coast ports would affect traffic projections," and how much time vessels would save using the canal. According to Ballard, such concerns would have to be "resolved and a channel depth selected before the design of a project can be initiated." Ballard also recognized that the public meetings had raised questions about "possible impacts on groundwater quality from the disposal of dredged material, loss



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO ATTENTION OF

CECW-PE (10-1-7a) 23 DEC 1996

SUBJECT: Chesapeake and Delaware Canal, Baltimore Harbor Connecting Channels (Deepening), Delaware and Maryland

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress my report on the study of deep-draft navigation improvements for Chesapeake and Delaware Canal, Baltimore Harbor Connecting Channels (Deepening), Delaware and Maryland. It is accompanied by the report of the division and district engineers. These reports are in final response to a resolution by the Committee on Public Works and Transportation of the House of Representatives on September 8, 1988. This resolution requested the review of existing reports of the Chief of Engineers for the Inland Waterway-Delaware River to Chesapeake Bay, Delaware and Maryland, and the report on Baltimore Harbor and Channels, Maryland, with a view to determining the feasibility of measures to promote and encourage the efficient, economic, and logical development of the channel system serving the Port of Baltimore. The report of the division and district engineers was prepared in cooperation with the Maryland Department of Transportation.

2. Section 101(b)(12) of the Water Resources Development Act (WRDA) of 1996, Public Law 104-303, authorized construction of the Chesapeake and Delaware Canal, Maryland and Delaware, project for navigation and safety improvements, subject to completion of a final report of the U.S. Army Corps of Engineers on or before December 31, 1996, and subject to the conditions recommended in that final report. This report constitutes the final report of the Corps required by WRDA 1996.

3. The plan developed by the district engineer consists of deepening the existing 35-foot mean low water depth navigation channel to a 40-foot mean low water depth and allowance for advanced maintenance, along the alignment and within the existing navigation channel, as presently authorized and constructed. The project also includes the enlargement of the Reedy Point flare, bend widening at Sandy Point, and construction of an emergency anchorage at Howell Point. The plan includes aids to navigation and lands, easements, rights-of-way and disposal areas as required for the initial construction and maintenance of the project. Initial construction dredging quantities are estimated at 18 million cubic yards, and the incremental increase in maintenance quantities is estimated at 16,000 cubic yards annually. Dredged material from project construction will be placed in existing Federal upland sites, an existing state of Maryland owned containment site, and one open water site located in the upper Chesapeake Bay.

The first page of Lieutenant General Joe Ballard's report to Congress on the Delaware River Main Channel Deepening Project

of groundwater into the canal, bank erosion, and water quality impacts in the Chesapeake Bay." He said these issues needed to be addressed in the preconstruction and engineering and design phases. "I am confident that improvements to the canal can be designed and implemented in an environmentally sound manner," he concluded.[75]

With the approval of Ballard and Congress, the district began the preconstruction and engineering design phase of the project in April 1997, with the Maryland Port Administration serving as the local sponsor. The district focused first on Ballard's question regarding how deep the channel should be, given changes in recent years to "port call patterns, railroad mergers, trends in transportation alliances, and the deepening of New York Harbor to 40 feet." The district also conducted studies on stream bank erosion and groundwater effects in response to the specific concerns of the public.[76] After conducting these studies, the district released a draft economic reevaluation of the deepening in June 1999 that called for the canal to have a depth of 39 feet, with channel widths of 434 to 600 feet.[77]

Before the district finalized these recommendations, however, Corps Headquarters and the North Atlantic Division called for a review of the plan, stating that "multiple reviews, correspondence and coordination have raised issues needing address."[78] One of these "issues" may have been the fact that, in July 1999, seven of Maryland's congressional representatives asked Assistant Secretary of the Army for Civil Works Joseph Westphal why the Corps did not stay with its original recommendation of deepening the canal to 40 feet, since "all major competing ports on the East Coast have at least 40 feet of water and many have approved plans to deepen to 45 feet."[79] However, by the early 2000s, traffic to and from the Port of Baltimore had fallen off "to the point where the project's economics no longer supported the recommendation" to deepen the canal.[80] Corps leaders decided to suspend all canal deepening action in 2001, because, according to one district

report, "recent downturns in Port of Baltimore container ship traffic" made the project no longer economically justifiable. Work on the preconstruction and engineering design was halted, and as of 2008 it showed no sign of resuming.[81]

Despite the cessation of the canal deepening project, the Philadelphia District continued to provide maintenance dredging to maintain the C&D Canal's thirty-five foot depth. It was also responsible for operating the canal out of its Chesapeake City Project Office, located next to the historic 1837 pumphouse that housed the district-run C&D Canal Museum.[82]

Operational duties involved directing traffic on the canal through an electronic system and establishing "rules governing the dimensions of vessels and other specific conditions and requirements to govern the movement of vessels through the waterway."[83] This was no small feat—in 2007, more than fifteen million tons of cargo passed through the canal, constituting "approximately 40 percent of the ship traffic in and out of Baltimore."[84] To accomplish these operations, the district had several controllers working on eight-hour rotations to keep the canal open 24 hours a day, 7 days a week, 365 days a year. The controllers monitored canal traffic "through state-of-the-art fiber optic and microwave links …[and] closed-circuit television and radio systems," thereby maintaining a safe system.[85] The district also had to deal with accidents and other issues on the canal; for example, in 1973 a freighter hit the railroad bridge, rendering the bridge inoperable, and in 2001 a tugboat sank in the canal. In both cases, the district worked quickly to restore

The C&D Canal Museum, featuring the waterwheel and pumping engines from the Old Pump House

In 1995, a new state-owned bridge (foreground), later named after Senator William V. Roth, Jr., came alongside the Corps' St. Georges Bridge (background) as the primary span across the C&D Canal. Congress transferred it to the Corps in 2007

operations and minimize effects on the shipping industry.[86] In such ways, the district helped maintain navigability of the C&D Canal.

The district's ownership, operation, and maintenance responsibilities for the canal also applied to the highway bridges that spanned it; in some years, repairs or upgrades to just one of these bridges accounted for well over half the total project budget. Since the late 1960s four bridges had been upgraded: the Chesapeake City Bridge in Maryland, and the Summit, St. Georges, and Reedy Point Bridges in Delaware.[87] Under the Water Resources Development Act of 2007, the district also became responsible for the U.S. Senator William V. Roth Jr. Bridge, which since its 1995 opening had belonged to the state of Delaware as part of its north-south limited access toll road, Delaware Route 1. The Roth Bridge and the adjacent St. Georges Bridge were at the center of a controversy that arose

in the late 1990s over whether the newer span was intended as a "replacement bridge" (the position of the Department of the Army, which had sought to demolish the St. Georges Bridge) or a "relief bridge" (the term used by the state of Delaware in insisting that both structures were critical on the basis of traffic projections). WRDA 2007 resolved the issue in favor of the state.[33]

* * * * * * *

In some ways, the Philadelphia District's navigation mission from 1972 to 2008 could be characterized as an era of unfulfilled plans. Two of the largest navigation projects on which the district worked during this period—the Delaware River Main Channel and C&D Canal deepenings—had not reached fruition by the end of 2008 (although the former did get under way very soon after). Both projects highlighted the changing

Reedy Point Bridge, easternmost of five Corps-owned high-level highway bridges spanning the C&D

The Chesapeake City Project Office has specially designed truck-mounted equipment for below-deck bridge inspections and maintenance

political environment in which the Corps had to operate. As with dam building in the 1970s, the district had to balance a variety of interests, including those of state and local governments, in its channel deepening activities. The district showed a willingness to work with its critics to reach solutions that were acceptable to all parties, and it showed a continued commitment to environmental quality and sustainability as it conducted the necessary dredging and other operations essential to the navigation mission. By upholding its reputation for being both responsive and reliable, the Philadelphia District developed partnerships with other agencies and groups that would enhance its navigation work in the twenty-first century.

[1] Nicole T. Carter and Betsy A. Cody, "The Civil Works Program of the Army Corps of Engineers: A Primer," CRS Report for Congress, 20 September 2006, CRS-2 <http://www.nationalaglawcenter.org/assets/crs/RS20866.pdf> (14 May 2010).

[2] Anthony DePasquale, Chief of Operations Division, conversation with Joshua Pollarine, 19 May 2010 [informal conversations held with district personnel hereafter referred to as conversation]. For more information on the dredging process, see U.S. Army Corps of Engineers, Philadelphia District, "Dredging the Delaware," July 1967, File Dredging Techniques, Box 1115, Philadelphia District-AR.

[3] U.S. Army Corps of Engineers, Philadelphia District, "Organization Charts," September 2008, document provided by Edward Voigt, Philadelphia District.

[4] Carter and Cody, "The Civil Works Program of the Army Corps of Engineers: A Primer," CRS-3 – CRS-4.

[5] Unpublished Morgan Draft District History, 76-77.

[6] Act of 26 April 1978 (92 Stat. 218).

[7] Unpublished Morgan Draft District History, 77; "Hopper Dredges" <http://www.globalsecurity.org/military/systems/ship/dredge-hopper.htm> (20 May 2010); "McFarland Stays in Corps Dredge Fleet," *The Observer* (November 1994): 8; Joe Vilord interview by Paul Sadin, 13 January 2009, Blackwood, New Jersey, transcript, 13. Vilord was the captain of the *McFarland* until his retirement in the 1990s. According to one source, the main private dredger in the Delaware River was the American Dredging Company. Lewis Caccese, Chief, Construction-Operations Division, to Actg. Ch, Engineering Div., 13 September 1978, File General Dredging & Disposal Input Data, Box 1115, Philadelphia District-AR; Edward Voigt, Chief, Public & Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 4 April 2011.

[8] Voigt personal communication.

[9] Voigt personal communication.

[10] Vilord interview, 4; Voigt personal communication.

[11] Quotations in "*Shuman* Delivers More and More for Its Customers," *The Observer* (January/February 2001): 8; see also "Aboard the Surveyboat Shuman; An 'Inside' Look at Survey Branch," *The Observer* 12 (April 1993): 1, 4-5, 8.

[12] Vilord interview, 7-8.

[13] Quotations in "A Virtual Tour Aboard the McFarland," *The Observer* (Summer 2005): 10-11; see also "McFARLAND and Marine Design Center Assist with Study to Save Sea Turtles," *The Observer* (July 1993): 9.

[14] "McFARLAND Answers the Call Again, Keeps Key N.C. Port Open for Business After Hurricane Fran," *The Observer* (October 1996): 3.

[15] Quotation in "Technical Innovations to Protect Turtles . . ." *The Observer* (September 1995): 6.

[16] "*McFarland* Crew Members on the Front Lines Battling Blaze in Gulf," *The Observer* (Summer 2001): 8.

[17] "Ammunition Found in Dredge Material from Navy Base," *The Observer* (April 1993): 2.

[18] Gebert interview, 26; "Group: Surf City Alerted to Ordnance; Surfriders Say They Warned of Danger in Beach Project," pressofAtlanticCity.com, 27 March 2007 <http://www.surfriderjsc.org/press.asp?pid=2> (20 May 2010).

[19] U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Dredging Disposal Study, Transcript, Initial Public Meeting, 6 March 1980," 7, Loose Papers, Box 1115, Philadelphia District-AR; U.S. Army Corps of Engineers, Philadelphia District, *Small Projects Program* (pamphlet) (Philadelphia: Philadelphia District, U.S. Army Corps of Engineers, n.d.), n.p.; Voigt personal communication.

[20] U.S. Army Corps of Engineers, Philadelphia District, "Dredging" <http://www.Philadelphia District.usace.army.mil/dredge/ d2.htm> (26 May 2010).

[21] U.S. Army Engineer District, Philadelphia, "Delaware River, Trenton to the Sea and Schuylkill River and Wilmington Harbor Tributaries, New Jersey, Pennsylvania, Delaware, Final Environmental Impact Statement," Box 503, Philadelphia District-AR. For an example of *Environmental Effects of Dredging*, see Vol. D-92-1 (March 1992), in File Del. Bay—Thin Layering Dredge Material, Box 247, Philadelphia District-AR.

[22] Locurcio interview, 24.

[23] Unpublished Morgan Draft District History, 78.

[24] Quotations in Colonel James G. Ton, District Engineer, to MG James J. Johnson, Division Engineer, U.S. Army Engineer Division, Atlantic Division, ca. November 1978 [date is unclear on letter], File Federal Diking Policy Info., Box 1115, Philadelphia District-AR; see also Ton to Mr. Austin P. Olney, Secretary, Delaware Department of Natural Resources and Environmental Control, September 27, 1978, File General Dredging & Disposal Input Data, Box 1115, Philadelphia District-AR.

[25] Unpublished Morgan Draft District History, 78.

[26] Quotations in U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Dredging Disposal Study: Phase I, Reconnaissance Report," June 1979, 1-2, Box 503, Philadelphia District-AR [hereafter referred to as Dredging Disposal Reconnaissance Report]; see also Lieutenant Colonel Joel T. Callahan, Acting District Engineer, to Honorable Bill Bradley, United States Senate, 20 March 1980, Loose Papers, Box 1115, Philadelphia District-AR.

[27] Dredging Disposal Reconnaissance Report, 4, 10.

[28] Dredging Disposal Reconnaissance Report, 56-57, 65-66.

[29] Elliot Goldberg, "Sites Sought for Dumping River Spoils," *The Gloucester County Times* (Woodbury, N.J.), 22 February 1980, copy in Loose Papers, Box 1115, Philadelphia District-AR.

[30] U.S. Department of the Army, U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Dredging Disposal Study: Transcript, Initial Public Meeting, 6 March 1980," 4-5, Loose Papers, Box 1115, Philadelphia District-AR [hereafter referred to as Dredging Disposal Study Public Meeting Transcript].

[31] Dredging Disposal Study Public Meeting Transcript, 8-11, 39, 41-43.

[32] "General Investigations," 24 February 1981, File Dredge Disposal Sites, Box 1115, Philadelphia District-AR.

[33] Leonard J. Lipski, Chief, Hydrology & Hydraulics Branch, to Chief, Policy Planning Section, 13 July 1981, File Federal & Non-Federal Historical Dredging Quantities, Box 1115, Philadelphia District-AR.

[34] U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Dredging Disposal Study," June 1984, Syllabus, copy in Philadelphia District-Library.

[35] Philadelphia District, "Delaware River Dredging Disposal Study," Syllabus, 179. In 1991, for example, the Maryland Port Administration drafted a "Dredged Material Management Master Plan." Many of its recommendations were similar to those that the district suggested in its plan. See "C&D Canal Deepening, Initial Disposal Screening, August 1991," 1, File 1110-2-1150a Planning & Development Correspondence—Drafts, Box 4, Accession No. 077-03-0001, RG 77, FRC; Port of Baltimore to Ms. Barbara Stratton, Planning Division, Philadelphia District Corps of Engineers, 22 February 1991, File 1110-2-1150a Planning & Development Correspondence—Disposal Measures, Box 4, Accession No. 077-03-0001, RG 77, FRC.

[36] Philadelphia District, "Delaware River Dredging Disposal Study," Syllabus, 179; see also "C&D Canal Deepening, Initial Disposal Screening, August 1991," 1, File 1110-2-1150a Planning & Development Correspondence—Drafts, Box 4, Accession No. 077-03-0001, RG 77, FRC; Port of Baltimore to Ms. Barbara Stratton, Planning Division, Philadelphia District Corps of Engineers, 22 February 1991, File 1110-2-1150a Planning & Development Correspondence—Disposal Measures, Box 4, Accession No. 077-03-0001, RG 77, FRC.

[37] U.S. Army Corps of Engineers, Philadelphia District, "Draft Environmental Impact Statement: Wilmington Harbor Federal Navigation Project, Dredged Material Disposal Area," April 1985, I, copy in Philadelphia District-Library.

[38] W. H. Burton, J. S. Farrar, F. Steimle, and B. Conlin, "Assessment of Out-of-Kind Mitigation Success of An Artificial Reef Deployed in Delaware Bay, USA," ICES Journal of Marine Science 59 (2002): S106.

[39] See U.S. Army Corps of Engineers, Philadelphia District, "Project Factsheet: Wilmington Harbor, New Castle County, DE, January 2010" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-dp/projects/factsheets/DE/5OM_ Wilmington Harbor.pdf> (27 May 2010). This document explains that the Corps had contracted out dredging of Wilmington Harbor to the Norfolk Dredging Company.

[40] Voigt personal communication.

[41] "Partnering Effort Results in Extended Dredging Season," *The Observer* (August 1993): 1, 3.

[42] "Palmyra Cove Effort Wins Over Skeptics," *The Observer* (Winter 2007/2008): 10–11.

[43] "Palmyra Cove Effort Wins Over Skeptics," *The Observer* (Winter 2007/2008): 10–11.

[44] Voigt personal communication.

[45] Quotations in U.S. Army Engineer District, Philadelphia, "Delaware River, Trenton to the Sea and Schuylkill River and Wilmington Harbor Tributaries, New Jersey, Pennsylvania, Delaware, Final Environmental Impact Statement," Box 503, Philadelphia District-AR; see also U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Main Channel Deepening Project" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/drmcdp/drmc.htm> (14 May 2010).

[46] Unpublished Morgan Draft District History, 74–75. One source noted that Philadelphia was "the world's largest freshwater port." U.S. Army Corps of Engineers, Philadelphia District, "Serving You," File 1110-2-1150a Planning & Development Correspondence, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC.

[47] Quotation in U.S. Army Corps of Engineers, Philadelphia District, "Delaware River, Philadelphia, Pennsylvania to Wilmington, Delaware: Interim Feasibility Study and Environmental Assessment," June 1985, Syllabus, copy in Philadelphia District-Library; see also U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Comprehensive Navigation Study, Main Channel Deepening: Final Interim Feasibility Report," February 1992, Syllabus (hereafter referred to as "Final Interim Feasibility Report"), copy at Morgan Library, Colorado State University, Fort Collins, Colorado.

[48] "Final Interim Feasibility Report," Syllabus, 261–263.

[49] Voigt personal communication; Water Resources Development Act of 1992 (106 Stat. 4797).

[50] U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Main Channel Deepening Project: Supplemental Environmental Impact Statement," July 1997, Syllabus, copy at Morgan Library, Colorado State University, Fort Collins, Colorado.

[51] U.S. General Accounting Office, *Delaware River Deepening Project: Comprehensive Reanalysis Needed* (Washington, D.C.: U.S. General Accounting Office, 2002), 4; "Philadelphia District Project Update," *The Observer* (August 1995): 10.

[52] "Main Channel Deepening Draws Closer to Reality," *The Observer* (November/December 1999): 6.

[53] Quotations in U.S. General Accounting Office, *Delaware River Deepening Project*, 1–2; see also "Delaware Meetings Give Public a Closer Look at Main Channel, Bethany/South Bethany Projects," *The Observer* (May/June 1998): 4; Maraldo interview, 36.

[54] U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Main Stem & Channel Deepening Project" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/drmcdp/drmc.htm> (14 May 2010); Voigt personal communication.

[55] Quotations in "Main Channel Deepening Draws Closer to Reality," *The Observer* (November/December 1999): 6; see also Maraldo interview, 36–37. According to this report, the rest of the funding from nonfederal sponsors would come from the states of New Jersey, Pennsylvania, and Delaware.

[56] U.S. General Accounting Office, *Delaware River Deepening Project*, 1–2.

[57] U.S. General Accounting Office, *Delaware River Deepening Project*, 1–5.

[58] See Maraldo interview, 37.

[59] Quotations in "Comprehensive Economic Reanalysis of Delaware River Main Channel Deepening Project Finds Project to be Justified for Construction," *The Observer* (November/December 2002): 4; see also U.S. Army Corps of Engineers, Philadelphia District, North Atlantic Division, "Delaware River Main Channel Deepening Project (Pennsylvania, New Jersey, and Delaware): Comprehensive Economic Reanalysis Report," copy at <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/drmcdp/reports/Final%20Main%20Report%20December%2016 %202002.PDF> (18 May 2010).

[60] U.S. Army Corps of Engineers, Philadelphia District, North Atlantic Division, "Delaware River Main Channel Deepening Project (Pennsylvania, New Jersey, and Delaware): Supplement to Comprehensive Economic Reanalysis Report, December 2002," February 2004, copy at <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/drmcdp/reports/February%202004%20Del%20Riv%20Final%20Supplemental%20Report.pdf> (18 May 2010); U.S. Army Corps of Engineers, Headquarters, "Supplemental Report Confirms Economic Justification of Delaware River Deepening after Independent Review," Release No. PA-04-03-19 <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/drmcdp/nr.htm> (18 May 2010).

[61] U.S. Army Corps of Engineers, Philadelphia District, "Delaware River Main Channel Deepening Project: LTC Brown's Testimony, Delaware River Main Channel Deepening Project, State of Delaware Public Hearing, Dec. 4 and 5, 2001, Dover, Del." <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/drmcdp/brown.html> (5 May 2010).

[62] "LTC Brown's Testimony, Delaware River Main Channel Deepening Project, State of Delaware Public Hearing, Dec. 4 and 5, 2001, Dover, Del."

[63] Quotation in "Corps and PRPA Sign Deepening Agreement," *The Observer* (Summer 2008): 4; see also "Philadelphia District's Project Progress Report," *The Observer* (Autumn 2007): 3. As some personnel in the district noted, New Jersey officials began to take issue with the fact that four additional disposal sites proposed for the project were all on their side of the river, even though that had been in the plan throughout most of the 1990s. This ultimately became a nonissue, since a significant decrease in dredged material estimates made additional sites unnecessary. Nevertheless, a rift in consensus was exposed. Subsequently New Jersey, and later Delaware, withdrew support for the project, leading to the Delaware River Port Authority's rescission from the agreement. Voigt personal communication.

[64] In September 2010, deepening was completed in "Reach C" of the channel (a 13-mile stretch south of Wilmington, Delaware.). "Delaware River Deepening Gets in its First Digs at Last," *The Observer* (Fall 2010): 6–8; Voigt personal communication.

[65] Voigt personal communication.

[66] See U.S. Army Corps of Engineers, Philadelphia District, "The Chesapeake & Delaware Canal" <http://www.Philadelphia District.usace.army.mil/sb/c&d.htm> (27 May 2010); U.S. Army Corps of Engineers, Philadelphia District, *The Chesapeake & Delaware Canal* (Philadelphia, Penn.: U.S. Army Corps of Engineers, Philadelphia District, 1974); Snyder and Guss, *The District*, 94–104.

[67] As quoted in U.S. Army Corps of Engineers, Philadelphia District, "The Chesapeake and Delaware Canal—Baltimore Harbor Connecting Channels (Deepening) Delaware and Maryland, Reconnaissance Report," February 1990, 1, File 1110-2-1150a Planning & Development Correspondence, Box 4, Accession No. 077-03-0001, RG 77, FRC [hereafter referred to as C&D Canal Deepening Reconnaissance Report].

[68] C&D Canal Deepening Reconnaissance Report, 1, 106, 117–119, 156.

[69] "Memorandum for Files," 15 April 1992, revised 4 June 1992, attachment to Robert L. Callegari, Chief, Planning Division, to Mr. David B. Carter, Delaware Co[a]stal Management Program, Department of Environmental Resources and Environmental Control, n.d., File 1110-2-1150a Planning & Development Correspondence Folder 2, Box 4, Accession No. 077-03-0001, RG 77, FRC.

[70] Department of the Army, Philadelphia District, Corps of Engineers, "Chesapeake and Delaware Canal-Baltimore Harbor, Connecting Channels (Deepening) Delaware and Maryland: Draft Feasibility Study and Environmental Impact Statement," January 1996, 1-1 – 1-2, File 1110-2-1150a Planning & Development Correspondence, Accruals FY00, Box 4 of 8, Accession No. 077-03-0002, RG 77, FRC.

[71] Maraldo interview, 35.

[72] "Chesapeake and Delaware Canal-Baltimore Harbor, Connecting Channels Draft Feasibility Report, Public Meeting, 9 July 1996," 4, 11-13, File 1110-2-1150a Planning & Development Correspondence—D Canal Feas., Box 5 of 8, Accession No. 077-03-0002, RG 77, FRC.

[73] Jack Shagena, "Proposed Canal Changes Draw Fire," *The Cecil County Times*, 15 July 1996, copy in File Newspaper Articles Related to Public Meeting, C&D Canal Feas., Box 3 of 8, Accession No. 077-03-0002, RG 77, FRC.

[74] Water Resources Development Act of 1996 (110 Stat. 3658); "Chesapeake and Delaware Canal-Baltimore Harbor, Connecting Channels (Deepening), Delaware and Maryland: Feasibility Report and Environmental Impact Statement," File: 1110-2-1150a Planning & Development Correspondence, C&D Canal PED, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC.

[75] Lieutenant General Joe N. Ballard, Chief of Engineers, to The Secretary of the Army, 23 December 1996, File C&D Canal Feas. Letters, Box 3 of 8, Accession No. 077-03-0002, RG 77, FRC.

[76] Quotation in U.S. Army Corps of Engineers, Philadelphia District, "Design Phase Underway on Deepening Project," C&D Update 1 (April 1998): 1–2; see also "C&D Canal Deepening Analysis: Shoreline Erosion Analysis," draft, attachment to Richard J. Maraldo, Deputy District Engineer, Programs and Project Management, Memorandum Thru Commander, North Atlantic Division, 13 July 1999, File 1110-2-1150a Planning & Development Correspondence, C&D Canal PED, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC; U.S. Army Corps of Engineers, Philadelphia District, "Chesapeake & Delaware Canal-Baltimore Harbor Connecting Channels (Deepening), Delaware & Maryland: Hydrogeologic Report," 1 November 1999, File 1110-2-1150a Planning & Development Correspondence, Hydrogeological Report Origins, 1 November 1999, Box 5 of 8, Accession No. 077-03-0002, RG 77, FRC.

[77] "Chesapeake and Delaware Canal-Baltimore Harbor Connecting Channels (Deepening), Delaware and Maryland, Preconstruction Engineering and Design Study Economic Reevaluation, Executive Summary," June 1999, File 1110-2-1150a Planning & Development Correspondence, Debriefing to General Rhoads, 27 January 2000, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC.

[78] U.S. Army Corps of Engineers, Philadelphia District, "Information Paper, Subject: Chesapeake and Delaware (C&D) Canal-Baltimore Harbor Connecting Channels (Deepening), Delaware and Maryland Preconstruction Engineering and Design Phase," June 2000, File 1110-2-1150a Planning & Development Correspondence, Rhoads & NAD, 13 June 2000, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC.

[79] Ben Cardin and Steny H. Hoyer, et al. to The Honorable Joseph W. Westphal, Ph.D., Assistant Secretary of the Army (Civil Works), 6 July 1999, File 1110-2-1150a Planning & Development Correspondence, C&D Canal PED, Box 6 of 8, Accession No. 077-03-0002, RG 77, FRC.

[80] Maraldo interview, 36.

[81] U.S. Army Corps of Engineers, Philadelphia District, "The Chesapeake & Delaware Canal" <http://www.Philadelphia District.usace.army.mil/sb/c&d.htm> (27 May 2010).

[82] "On the Front Page," *The Observer* (August 1995): 2; "Renovations Completed at C&D Canal Museum," *The Observer* (March 1996): 3. The museum was listed on the National Register of Historic Places in 1965.

[83] Nathan Associates Inc., "C&D Canal Feasibility: Without-Project Condition Analysis," November 1992, 5, File 1110-2-1150a Planning & Development Correspondence Folder 3, Box 4, Accession No. 077-03-0001, RG 77, FRC.

[84] "The C&D: Where Progress Meets Preservation," *The Observer* (December 1996): 6; "The C&D Canal: A Waterway Landmark," *The Observer* (Spring 2007): 13.

[85] "Getting to Know C&D Canal Project Office," *The Observer* (September/October 2000): 10–11.

[86] See Unpublished Morgan Draft District History, 81–82; Calvarese interview, 8; "C&D Canal Reopens after 7-Day Closing," *The Observer* (Summer 2001): 6–7. In the case of the bridge accident, the district was able to reopen the bridge in 50 days and the canal in 104 days. According to the Unpublished Morgan Draft District History, "The total cost of repairs was $1.4 million, well below the government's original estimate of $3.4 million, a savings accomplished through ingenuity of design and to a sense of urgency to complete the job quickly that was shared by both contractor and the District." Because of this service, the Corps gave the district an Award of Merit "for distinguished design supervision of the repair project."

[87] Quotation in "On the Front Page," The Observer (August 1995): 2; see also "New Highway Bridge Opens Over the C&D Canal," *The Observer* (February 1996): 4; "Maintenance Keeps Summit Bridge in Top Form," The Observer (September 1996): 9; "Getting to Know C&D Canal Project Office," *The Observer* (September/October 2000): 11.

[88] Voigt personal communication.

5

Environmental Programs

Concern about the environment grew to unprecedented heights in the United States during the 1960s and 1970s. The growing influence of the environmental movement had a direct impact on the Philadelphia District, as the district assumed new responsibilities in response to these concerns. Since 1972, the district's environmental work has been expanded to include regulatory and permitting operations; remediation of Environmental Protection Agency (EPA) Superfund sites; other hazardous, toxic, and radiological waste cleanup operations, including EPA Resource Conservation and Recovery Act projects and the Formerly Utilized Sites Remedial Action Program; and ecosystem restoration. Among these responsibilities, regulatory and Superfund work were the largest in terms of budget and number of personnel employed, while ecosystem restoration projects represent the district's newest endeavor in the environmental arena. Most of these programs emerged in response to the flurry of environmental protection laws Congress enacted in the early to mid-1970s.

In the late 1960s and 1970s, Congress passed legislation aimed at protecting the environment that had an enormous impact on Corps of Engineers work around the country. One of the most important new laws, which altered Corps project planning and operations in general, was the National Environmental Policy Act (NEPA) of 1969, which President Richard

Facing page: The Cooper River Fish Ladder in Camden County, N.J., winner of the Coastal America Award in 2001

Nixon signed on January 1, 1970. One of the key features of the law was its requirement that federal agencies prepare environmental impact statements (EISs) whenever they conducted activities "significantly affecting the quality of the human environment." The EIS process required public input on proposed projects before officials made final decisions to implement them.

The advent of NEPA prompted the Philadelphia District to develop a new organizational framework to coordinate the district's various realms of environmental work. In late 1971, the district created the Environmental Resources Branch in the Engineering Division to address environmental aspects of the Corps' missions, including support to the Regulatory Branch. This branch was responsible for the environmental planning aspects of civil works studies and projects, in particular the NEPA environmental assessment process. When the branch was formed, there was already a sizable EIS backlog for both ongoing and new district projects; in time, the branch was staffed to meet this challenge. In "the high water days," according to former branch chief John Burnes, there were as many fourteen employees.[1]

Although not as all-encompassing as NEPA, other new environmental laws of that era reshaped the district's approach to project planning and implementation. Among the most notable were the National Estuarine Protection Act of 1968; the Coastal Zone Management Act of 1972; the Marine Protection, Research, and Sanctuaries Act of 1972; the Clean Water Act of 1972; the Endangered Species Act of 1973; the Water Resources Development Act of 1974; and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Although not an environmental law, the National Historic Preservation Act of 1966 also affected project planning to incorporate standards set by the secretary of the interior for the preservation of historic sites. Many of these laws led to the creation of new program areas and prompted

the expansion of existing programs in the Philadelphia District.

Regulatory Branch Operations

Throughout the twentieth century, the Corps of Engineers was responsible for regulating the construction of water-control structures and for collecting and dumping dredged materials from the country's navigable rivers and waterways, pursuant to Section 10 of the Rivers and Harbors Act of 1899. Before 1972, the Corps worked within a narrow definition of navigable waters, which meant only those water bodies used to transport interstate or foreign commerce. Within the Philadelphia District, the staff of the Permits Section (forerunner of the Regulatory Branch) was responsible for evaluating applications for dumping or fill operations and issuing dredging permits for those activities. The Permits Section was part of the Engineering Branch until a 1968 reorganization moved it into the Navigation

Wetlands under the jurisdiction of the Philadelphia District

and Engineering Branch. At that time, five employees worked in the Permits Section, handling two to three hundred dredge and fill applications a year. Forty years later, the Regulatory Branch had approximately thirty staff members who reviewed and processed approximately 2,500 permit applications annually.[2]

By the late 1960s, environmental activism and legislative responses to environmental threats had begun to transform the operational stance of federal land management agencies, including the Corps. The first major shift occurred with a 1967 memorandum of agreement among the Army, the secretary of the interior, and the U.S. Fish and Wildlife Service (FWS) that authorized the FWS to review Corps dredge and fill permits. In accordance with this agreement, the Corps' central office regulatory staff established a new review policy that would assess each permit's potential effects on the project environment.[3] Second, the U.S. Court of Appeals decided in *Zabel v. Tabb* that the Corps, because of its long-established authority to review waterway dredging and fill operations, could refuse to grant permits for dumping material if permitting staff determined that the projects would be harmful to water quality.[4] In response to these new responsibilities, the staff of the Philadelphia District's Permits Section had grown from five to fifteen by 1972.[5]

But the expansion of the district's regulatory and permitting functions was just beginning. In 1972, Congress enacted the Federal Water Pollution Control Act (subsequently called the Clean Water Act), which handed most of the responsibility for studying, restoring, and protecting the nation's water quality to the newly created Environmental Protection Agency. However, Section 404 of the act mandated that the Corps would retain responsibility for permitting and monitoring dredging and dumping activities in state and federal waterways.[6]

For several years after the passage of the Clean Water Act, there was uncertainty about how the Corps would implement its

responsibilities under the legislation. Internal debates in the Corps and lobbying by the dredging industry on one side and environmental groups on the other focused on what the term "waters of the United States" meant in the legislation.[7] For a time, the Corps continued to adhere to the strict definition of "navigable waters" that typically meant navigable rivers and shipping lanes only. But eventually the National Wildlife Federation and the National Resources Defense Council (NRDC) filed suit against the Department of the Army for failure to comply with the "intention of the Clean Water Act."[8]

In 1975, the Federal District Court for Washington, D.C., heard the case *National Resources Defense Council v. Callaway* and ruled that the Corps should employ a broader interpretation of "waters." District Court Judge Aubrey Robinson ordered the Corps to "expand the coverage of the 404 program to include all waters that the Federal Government could constitutionally regulate under the commerce clause."[9] Accordingly, Corps officials rewrote the permitting policy regarding dredge and fill materials, setting the Corps on a new jurisdictional course of protecting federal coastal waters, streams, lakes, ponds, and wetlands, in addition to its traditional role of regulating material deposits in navigable rivers and waterways. The Corps thus became the lead federal agency in the protection of wetlands, defined as "any area that (a) is periodically or permanently inundated by surface or ground water and (b) support[s] vegetation adapted for life in saturated soil."[10] This

Wetlands areas such as this fell under the Corps' jurisdiction after the decision in National Resources Defense Council v. Callaway

broad definition included "not only swamps and marshes, but also many forests and meadows that are wet only during part of the year."[11]

In 1977, amendments to the Clean Water Act clarified and strengthened the Corps' role in the permitting and regulatory process. The amendments put more teeth in the Corps' regulatory actions, providing the agency with "explicit authority to seek judicial sanctions against violators of 404 permits." The Corps also worked with the EPA to identify and sanction contractors or individuals who discharged materials without a permit.[12]

Tidal wetlands along the Atlantic Coast of New Jersey

Even before the district court handed down its decision in *National Resources Defense Council v. Callaway*, the Philadelphia District had begun preparing for the expected influx of new permit applications by making the Permitting Section into a full-fledged branch, renamed the Regulatory Branch in the mid-1970s.[13] Not only did the staff handle a greater number and broader range of permit applications, they had to conduct reviews in light of new environmental guidelines that the Corps and EPA had crafted in response to the Section 404 authorities. Among other things, the new guidelines gave the EPA the authority to veto Corps permit decisions.[14] Frank Cianfrani, chief of the Regulatory Branch as of this writing, recalled how the district permitting program "grew geographically." According to Cianfrani, "Our jurisdictional responsibilities grew immensely, from a rather small geographic area" encompassing navigable waterways to "essentially every aquatic area."[15] At the same time, the educational background

of personnel in the Regulatory Branch changed. Before the Clean Water Act, most of the Permitting Section staff were engineers; after implementation, according to Cianfrani, the "type of expertise that was required" to evaluate permit applications led to the hiring of more physical scientists and biologists. By 2009, Cianfrani and one of his section chiefs were the only engineers left among the thirty-two employees of the branch.[16]

The Corps' permitting responsibilities continued to evolve throughout the 1970s, making the administration of the program "much more complex" than it had been in the past. Section 404, for example, required coordination with the FWS and the National Marine Fisheries Service in the permitting process, emphasizing that the Corps "must consider the effect of its permit decisions on fish and wildlife."[17] Meanwhile, another piece of environmental legislation—the Marine Protection, Research, and Sanctuaries Act of 1972—gave the Corps responsibility for issuing and enforcing permits for the dredging industry and government agencies to dump dredged material into the ocean. Section 103 of the Marine Protection Act authorized the Corps to assume regulatory tasks similar to its tasks under Section 404 of the Clean Water Act, except that Section 103 jurisdiction encompassed the open ocean beyond the "low water line," while Section 404 pertained to the salt and fresh waters above that line.[18]

The Regulatory Branch demonstrated flexibility as it adhered to other federal statutes, most notably the Endangered Species Act and Section 106 of the National Historic Preservation Act. Cianfrani explained that "those particular acts require us . . . to ensure that what we're allowing is consistent with those laws" and in keeping with the "public interest."[19] Because of the complexity of the permit review process, the Regulatory Branch, although a "small part of the District's overall mission, . . . consumed a very big portion of our time just because permitting issues were so public, and we had a lot of public

hearings and a lot of debates, and a lot of alternatives" to consider.[20] According to Cianfrani, the public interest review was the "keystone" of the district's permitting process, as it forced the Corps to consider an ever-increasing range of potential effects, whether in terms of air quality, noise issues, or "the impact on [the] aquatic environment."[21]

The district's permit application and review process typically unfolded in three steps. First, the project manager would hold one or more preapplication consultation meetings with the applicant, other federal and state resource management officials (such as the EPA, FWS, or state departments overseeing environmental quality), and local citizens who might have a stake in the project. The meetings were designed to expedite the permitting process by allowing applicants to adjust their requests to avoid potential conflicts that could hold up the process once the formal review was under way.[22] In the next step, a contractor or individual would submit a permit application to the Regulatory Branch for review. A Corps project manager would guide the permit through additional steps: posting a public notice of the proposed action, assessing the project's potential effects on the environment and the local economy, and preparing a decision document approving or denying the permit. To make the final decision (the third step of the permitting process), the project manager, with the assistance of other federal and state agencies, evaluated how the project would affect "conservation, economics, commerce, cultural values and any other factors considered in the public interest."[23] When the evaluation was completed, the district engineer made the formal decision of acceptance or denial.

In 1972, the Philadelphia District denied a permit application to fill wetlands in a project known as Loveladies Harbor. This rejection became a test case for the Corps' new Section 404 authorities under the Clean Water Act. In 1958, a development group called Loveladies Harbor Inc. purchased 250 acres of land for residential and commercial real

estate development that included some sections of wetlands on Long Beach Island. During the 1960s, the company developed 199 of the 250 acres, filling some of the wetlands in the process. Because the Clean Water Act did not exist at the time, the company did not have to obtain a permit for the filled parcels. But in 1972, when Loveladies Harbor applied for a permit to fill and develop the remaining fifty-one acres of its property, it encountered the new requirements to file for a permit with the Corps of Engineers.

Loveladies first applied to the state of New Jersey for the requisite dredge and fill permits, but the state refused to grant them. After Loveladies sued the state, the two sides compromised, allowing Loveladies to develop 12.5 acres of the property in exchange for an agreement to preserve the remaining 38.5 acres under a conservation easement. Loveladies then applied to the Corps for the necessary federal dredge and fill permits. At that point, New Jersey officials reversed their decision on the compromise and decided to oppose the permits. Accordingly, the Philadelphia District denied the permit applications in May 1982.[24]

Aerial view of Loveladies Harbor

Loveladies sued the Corps in Federal District Court to reverse the decision, but the judge upheld it in 1984. In the meantime, the company filed a suit in the Court of Federal Claims, seeking damage payments from the federal government for the projected loss of income from the undeveloped property. In 1990, the Court of Claims awarded $2,658,000 plus interest to Loveladies as compensation for the potential income lost as a result of the permit denial. In essence, the court ordered the

government to purchase the 12.5 acres from Loveladies, because the permit denial had amounted to a federal "taking" of the private land. The government appealed the decision in the Federal Circuit Court of Appeals, embroiling the Corps legal staff in hearings, trials, and findings. Finally, in 1994, the Circuit Court ruled in favor of Loveladies. It ordered the government to purchase the property and denied a Corps request for additional hearings.[25]

In these court cases, the question of property rights and "takings doctrine" had overshadowed the original issue of permit denial because of the adverse effect it would have on the wetlands. However, the Federal Court of Appeals ruling did not overturn the district's decision to deny the permit. The court explicitly stated that its ruling in favor of Loveladies did not preempt the Corps' Section 404 authorities. "What is not at issue," the court stated, "is whether the Government can lawfully prevent a property owner from filling or otherwise injuring or destroying vital wetlands." According to the court, "The importance of preserving the environment, the authority of state and federal governments to protect and preserve ecologically significant areas, whether privately or publicly held, through appropriate regulatory mechanisms is not here being questioned." The court said it upheld the takings decision because "the cost of obtaining that public benefit" (meaning the protection of wetlands), should not "fall solely on the affected property owner."[26]

Although legal proceedings affirmed the Corps' Section 404 authorities, the appeals court decision in *Loveladies Harbor v. U.S.* nonetheless altered the Corps' Section 404 permitting procedures. As Cianfrani reported, "When that case was decided, it had a ripple effect across the country with [the] regulatory program." Because of the *Loveladies* decision, he said, "Any time we deny a permit we have to do what is known as a taking analysis." That analysis "doesn't alter the decision," he explained, but it had to be done to see "whether there's a potential

for that to occur."[27] In essence, the decision meant that the permitting process would require more time, labor, and analysis to complete.

In the 1980s, a permit decision regarding the extension of Interstate 476, known as the "Blue Route," became another high-profile project for the Regulatory Branch. Permitting for road construction projects was almost always time-consuming. Because of their linear nature, roads affected large areas that could contain multiple ecosystems that required evaluation. These difficulties were compounded by additional factors in the Blue Route permit, including the fact that the road had already been "a very contentious project for many, many years before it even came to the Corps."[28] The original planning for an interstate highway to connect I-95, the primary north-south highway along the eastern seaboard, with the Pennsylvania Turnpike, the state's main east-west thoroughfare, began in the late 1950s. The three proposed corridors were color coded; in 1963, the U.S. Bureau of Public Roads selected the Blue Route as the best alternative, primarily because it "provided the most traffic relief and least community disruption among the three alternatives."[29] As with Loveladies Harbor, the project began before passage of the Clean Water Act; and although the Pennsylvania Department of Transportation (PennDOT) completed construction

The "Blue Route," Interstate 476, at its southern terminus with Interstate 95

of a portion of the interstate in the 1960s, a section of the corridor in Delaware and Montgomery counties remained unfinished into the 1970s. That portion had to meet NEPA environmental guidelines before it could be completed. Among other things, NEPA required PennDOT to complete an EIS detailing the potential effects of the project on the natural and human habitats within or adjacent to the right-of-way.[30]

Just as PennDOT completed the final EIS in 1978 and prepared to resume construction on the unfinished portion of the highway, a collection of local residents, community organizations, and representatives of a private college along the planned route sued the state to block construction. Opponents of the road argued that the EIS failed to take into account noise and other effects of the interstate highway. Although the noise issue and the overall thoroughness of the environmental assessment remained central aspects of what became a decades-long conflict, the real issue, according to Cianfrani, was that the groups "just didn't want this highway running through [their] very exclusive areas," increasing the potential for development in those locations.[31] In August 1982, the Federal District Court for the Eastern District of Pennsylvania ruled in favor of the plaintiffs and ordered a halt to all construction work on one section of the route until PennDOT submitted "a supplemental EIS and a more thorough analysis" of the project's environmental impacts. When the two sides resolved the lawsuit, PennDOT applied for a permit from the Corps of Engineers to complete the project. This set off another lengthy and litigious process, this time with the Philadelphia District, which was at the center of the maelstrom. When District Engineer Lt. Col. G. William Quinby finally issued a permit for construction in November 1987, many of the same parties involved in the earlier legal proceedings sued the Corps and PennDOT. In this lawsuit, the court did not "question whether or not the decision" to deny the permit was "right or wrong." Instead, it "questioned whether or not the

process was followed," ultimately determining that the district was correct in issuing the permit.[32] With that decision, the remainder of the Blue Route was finally built.

In addition to issuing permits for construction by outside agencies, the Regulatory Branch periodically had to issue permits to the Philadelphia District itself, most often for dredging operations. For example, when the district needed to dredge Wilmington (Delaware) Harbor, it had to apply for a Section 404 permit to build a new disposal area for the dredged material. In that situation, as one district employee noted, "We had to permit ourselves."[33]

By the early 1990s, the Regulatory Branch had expanded to three sections and added two field offices. In 1989, the district opened the Pocono Field Office in Tobyhanna, Pa., to monitor permits for the northeastern corner of Pennsylvania and three counties in northwestern New Jersey. The second field office, in Dover, Del., opened in May 1992, to serve the area south of the Chesapeake and Delaware Canal and the Delaware counties of New Castle and Kent. Dover Field Office staff performed "wetland delineations, surveillance and enforcement of permitted and non-permitted activities in federally-regulated waterways and wetlands."[34] Both field offices operated with small staffs (two or three employees) and functioned as "extensions of [the] Surveillance and Enforcement Section, although they also engage in some wetland jurisdictional determinations and other Regulatory matters."[35]

At times, the district's permitting process, as with the Corps in general, came under criticism from environmental groups that

Motorists travel the completed "Blue Route" around the west side of Philadelphia—Its construction involved one of the district's largest permit actions to date

contended that the Corps did not take adequate steps to protect wetlands and other aquatic ecosystems in the United States. Environmental organizations protested that the Philadelphia District's Regulatory Branch had, on occasion, "rubber stamped" permit approvals for construction projects. In the late 1990s, for instance, opponents of PennDOT's plans to reroute Route 220/ Highway 99 over Bald Eagle Mountain and make it a four-lane highway contended that the district had "blown off" FWS's appeal of the permit decision. Conservation groups argued that an alternative route closer to the old highway would create less environmental damage to wetlands and would require less mitigation.[36] The decision put the district in the political spotlight, because Congressman E. G. "Bud" Shuster (R-Pa.), influential chair of the House Transportation Committee, had pushed PennDOT to situate the route over Bald Eagle Mountain when he obtained federal funding for the project via a legislative rider to an enormous transportation appropriations bill.[37] Eventually, an alliance of environmental and sports-enthusiast groups sued the Corps, the Federal Highway Administration, and PennDOT to have the permit revoked.

According to the local branch of the Sierra Club, the plaintiffs argued that the Corps' decision to issue the permit for Route 220 expansion over Bald Eagle Mountain violated the Clean Water Act by issuing a permit "approving this ridge route despite the existence of a feasible alternative route through Bald Eagle Valley . . . that would cause less damage to wetlands and streams."[38] The court eventually dismissed the suit against PennDOT and the Corps, allowing the permit decision to stand and the road project to go forward. The contentious Route 220 permit decision revealed the complex issues the Regulatory Branch often faced in reviewing permit applications and the criticism that could follow. In many ways, the branch faced a "damned if you do, damned if you don't" situation in issuing permits. If it

granted permits for construction, environmental and local interest groups often expressed opposition; if it denied permits, land developers and the business community were likely to object.

In the early 1980s, Regulatory Branch staff had faced a similarly contentious permitting process regarding the Point Pleasant Water Diversion Project in Bucks County, Pa. The Neshaminy Water Resources Authority, representing residential and commercial water users in Bucks and Montgomery counties, applied for a permit to build a water intake structure and pumping station that would divert water from the Delaware River at a location called Point Pleasant. The Point Pleasant system would provide ninety-five million gallons of water a day to residential and business customers in Bucks County, including the Philadelphia Electric Company's Limerick nuclear power plant. Cianfrani noted that it became "an example of how a project that on the surface didn't look like a big deal to us . . . was like dynamite to the local residents." Local homeowners protested that increasing the available water supply would spur development of what Cianfrani called "a very pristine

The Delaware River at Point Pleasant, Pa., where homeowners staunchly opposed the proposed water diversion project

area" and that the resulting commercial and housing developments would "change their whole way of life." Environmental activists from around the region, claiming that the project would cause irreparable ecological damage, joined local residents in resisting project construction for the better part of a decade. As a result, a permit for what the district initially viewed as "just a little pipe [with] . . . no impact in terms of the Delaware River, . . . turned out to be a very, very controversial, very contentious permit application."[39]

As the permitting process went forward, a number of other issues surfaced, including the potential detrimental effect the pumping station would have on the river's short-nose sturgeon population, the possibility that noise from the pumping station would degrade the recreation experience of river users, and claims that tubers might get "sucked into" the water intake pipe. The proposed project became a high-profile target for local legislators, political activists, and the news media. Regulatory staff became aware of just how high-profile the project had become when the district held a public hearing on the project. According to Cianfrani, "We were anticipating a couple hundred people," but "over a thousand people showed up." Although the meeting "came off pretty well," it was a harbinger of the volatile protests that would follow.[40]

The short-nose sturgeon (SOURCE: U.S. Fish and Wildlife Service)

After reviewing the extensive public comments and investigating the potential effects on area resources, including historic resources along the Delaware Canal, the Regulatory Branch issued a permit for construction of the water intake and pumping

plant in October 1982. Project opponents then turned to other means to halt the water diversion. Following a countywide referendum on the water supply plant in May 1983, the Bucks County Commissioners announced that they were terminating the water sales agreement with the Neshaminy Water Supply System and withdrawing their approval of the Point Pleasant construction contract.[41] In June 1983, attorneys representing a coalition of environmentalists opposed to the water project wrote to Philadelphia District Engineer Lt. Col. Roger Baldwin to request that the district revoke the Point Pleasant permit, citing the court-ordered work stoppage at one of the nuclear power plants targeted to receive water from the Point Pleasant supply and a recent mudflow caused by slope erosion near the construction site.[42] Regulatory Branch staff reviewed the letter but saw no reason rescind the permit or halt construction.[43]

After that, project opponents moved the battle to the state courts and to demonstrations at the pumping station site, where hundreds of protesters were arrested between 1983 and 1987.[44] In early 1987, the Pennsylvania Department of Environmental Resources reissued Point Pleasant construction permits, and the state Supreme Court ordered construction of the water intake system to resume. After some additional delays owing to delinquent payments and protests at the site, construction recommenced and the Point Pleasant water supply system became operational in the summer of 1988.[45]

In addition to issuing permits, the Regulatory Branch's mission under the Section 404 authorities included enforcing permit rules and responding to regulatory violations. The Surveillance and Enforcement Section of the Regulatory Branch monitored permits, assessed possible violations, and issued penalties. This establishment of a separate section that focused on compliance was unusual in the Corps, but the district did not want enforcement to play "second fiddle" to permitting. As Cianfrani explained, "If

The historic Delaware Canal, Bucks County, Pa.

you don't have a separate enforcement section . . . your enforcement and your surveillance would suffer."[46]

Consequences for disregarding permit regulations—or for engaging in dredging and dumping without a permit—took a variety of forms, including fines up to $25,000, larger compensatory donations to conservation organizations or communities, and mitigation to offset damages incurred at the original project site. In 2007, for example, the Cutler Group, a residential developer in Montgomery County, Pa., failed to follow the terms of its permit when it began work on a housing project before it had obtained approvals of deed restrictions that would prevent disruption of wetlands near the construction site. To resolve the regulatory violation, the Cutler Group negotiated with the district and agreed to donate $70,000 to the nonprofit Montgomery County Lands Trust to support wetlands protection work in that area.[47]

In another case, a more serious violation resulted in a much larger negotiated settlement. In

2000, the Columbia Transmission Communications Corporation agreed to donate $1.2 million to the local branch of the Nature Conservancy as recompense for federal regulatory violations during the company's construction of a right-of-way for new communications lines in Pennsylvania's Chester, Bucks, and Montgomery counties. Faulty construction management resulted in the unauthorized deposition of mud and debris into forty separate wetland sites that were designated as potential habitat for an endangered species, the bog turtle. Barry Gale, an attorney for the district, called it "one of the most serious violations we've ever had in the Philadelphia District from the standpoint of the number of violations and the potential for environmental harm."[48] Accordingly, the settlement amount was also "significantly greater" than the usual regulatory penalties; the corporation agreed to pay it to avoid prosecution. As part of the settlement, Columbia agreed to hire "endangered-species specialists" to identify sensitive and/or protected habitats and to include an environmental manager at its construction sites to ensure that no other violations occurred.[49] The Nature Conservancy used the sizable donation to purchase and preserve additional bog turtle habitat in southeastern Pennsylvania.

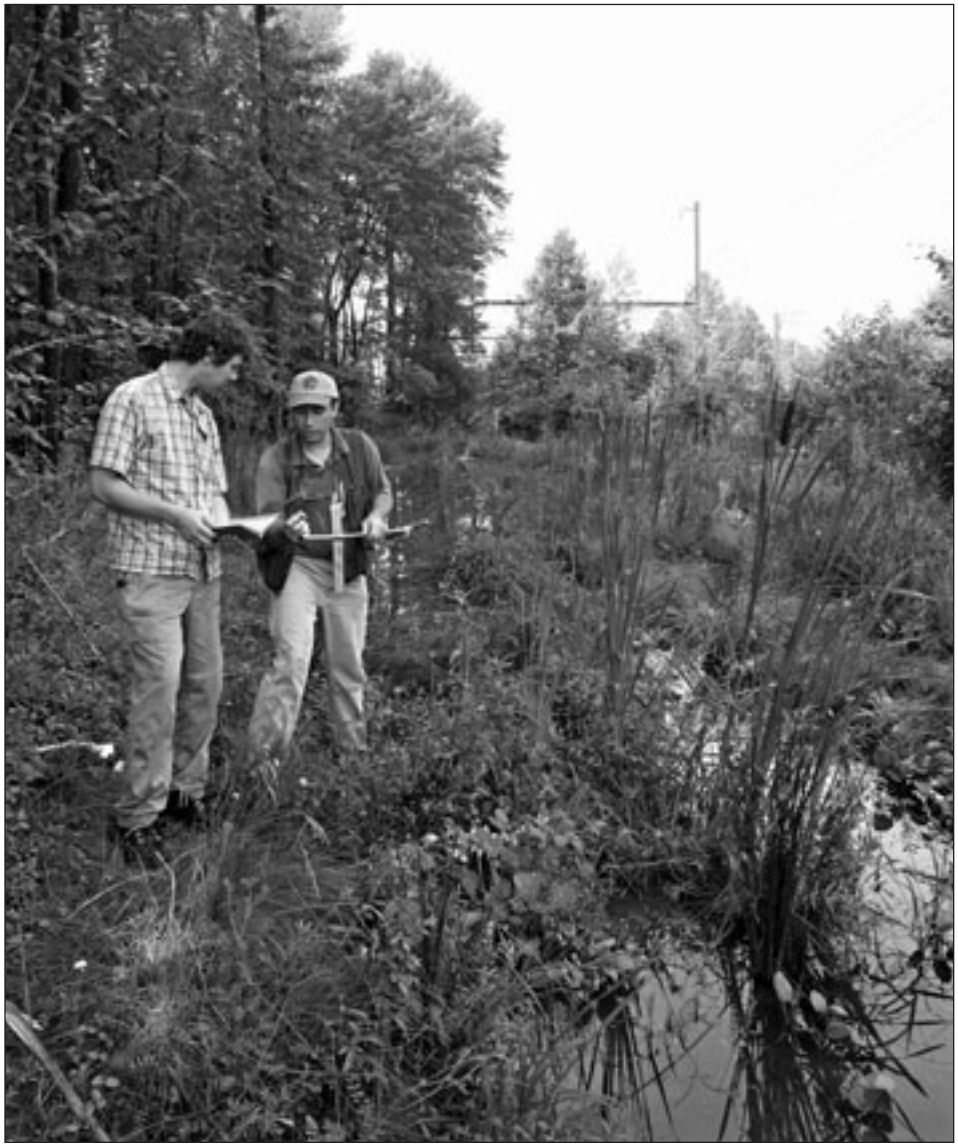
Not all violators were private developers. In 1992, the Regulatory Branch issued a citation to the city of Philadelphia for dumping dredged material from the Delaware River at Fort Mifflin, a violation of Section 301 of the Clean Water Act, which pertained to the dumping of fill material on federally owned wetlands. The

The bog turtle
(SOURCE: U.S. Fish and Wildlife Service)

district issued a cease and desist order in March 1992 and negotiated a settlement to mitigate the damages. Instead of a monetary settlement, the city hired an environmental engineering firm to design methods to remove the fill and restore the site. The city completed the removal phase, at an estimated cost of $40,000, in the fall of 1992, and finished the restoration work in 1993.[50]

As the Regulatory Branch evolved, it settled into a unique place in the district organization. According to Cianfrani, the branch "probably ha[d] the most public interface on a day-to-day basis of any organization within the Corps of Engineers and certainly at the district level." Because of the high-profile, public nature of the permitting process, the branch and three section chiefs had to maintain communication with the Public Affairs Office and the District Engineer. The Regulatory Branch also worked closely with a number of other district divisions and branches. For example, regulatory staff consulted with the Engineering Division when a permit review required "special engineering expertise, such as groundwater information or hydrology."[51] And when a permit application involved federal property, they dealt with the Baltimore District's Real Estate Division, which was responsible for real estate matters in the Philadelphia District.

Delineating wetlands for a Jurisdiction Determination (JD)



Despite the heavy and complicated regulatory workload, the district proved itself to be highly efficient in handling permitting responsibilities. A 1999 statistical survey revealed that the Philadelphia District completed 99 percent of all permit actions within the mandated sixty-day period, compared with a Corps-wide completion rate of 94 percent. The Philadelphia District's Regulatory Branch processed individual permits in an average of fifty-three days, compared with seventy-four days across all Corps districts.[52] Because branch personnel worked closely with applicants and other agencies throughout the permitting process, the district typically denied only a small percentage (roughly 3 percent) of applications.[53]

Remediation at the Bridgeport Rental & Oil Services Superfund Site, Bridgeport, N.J.

Hazardous, Toxic, and Radioactive Waste Remediation

After the regulatory arena, the Philadelphia District's second largest area of environmental responsibilities encompassed work with the EPA in cleaning up industrial sites contaminated by hazardous and toxic waste. The district's environmental remediation activities were in three categories: (1) Superfund cleanup project support for EPA Region 2; (2) all other hazardous and toxic waste cleanup work in support of EPA and other federal agencies; and (3) work under the auspices of the Corps' Formerly Utilized Sites Remedial Action Program.

Superfund work was by far the largest area in terms of the number of personnel and the size of budgets involved. According to retired program chief John Bartholomeo, when the district's Superfund program was "in full swing" during the late 1980s and

1990s, the district received roughly one-third of all the funding EPA had earmarked for the entire Corps of Engineers.[54] (The district's role in the Superfund program and other remediation projects for EPA is discussed at length in conjunction with its work for other agencies in Chapter Nine.)

Another element of the Philadelphia District's environmental cleanup program was the Formerly Utilized Sites Remedial Action Program (FUSRAP). Created in 1974 by the U.S. Department of Energy (DOE), the program was aimed at studying and cleaning up former atomic energy program sites contaminated by radiological elements, primarily uranium, thorium, and radium. Although the majority of FUSRAP locations were cleaned up and decontaminated when they closed, subsequent research revealed that even low-level radiological contamination posed hazards to the public. In addition, Congress created much stricter environmental guidelines for removal and disposal of radiologic contaminants. With the passage of the Energy and Water Development Appropriations Act for fiscal year 1998, Congress transferred FUSRAP cleanup work from DOE to the Corps.[55] The Philadelphia District became one of seven Corps districts to participate in these cleanup activities.[56] Unique among the district's environmental remediation efforts, its FUSRAP project was funded not through reimbursement from another agency but directly under the auspices of the Corps' Civil Works program.

As with the district's Superfund program, Corps staff members who planned and oversaw cleanup work at FUSRAP sites had to follow the guidelines established in CERCLA, in coordination with the EPA. DOE also had a role in the process—it maintained administrative responsibility for the property and determined which sites were eligible for federal cleanup. A memorandum of understanding with DOE allowed the Corps to take on the study and cleanup work at FUSRAP sites. The Philadelphia District's primary FUSRAP project was located entirely within the 1,455-acre

DuPont Chambers Works complex in Deepwater, N.J., home to an active chemical manufacturing facility of E. I. du Pont de Nemours and Company.[57]

According to Philadelphia District personnel, "Operations involving uranium processing began at DuPont Chambers Works in 1942." The plant was responsible for "convert[ing] uranium oxide to uranium tetrafluoride and small quantities of uranium metal." In 1948 and 1949, the Atomic Energy Commission "conducted radiological surveys and decontamination of the building surfaces," then transferred the buildings back to DuPont.[58] However, a 1977 radiological survey revealed that concentrations of uranium were present at the DuPont site, leading to its inclusion in the FUSRAP program in 1980. Testing by DOE in 1983 identified six locations within the DuPont property that showed evidence of elevated soil or structural contamination.[59] In addition to uranium and uranium byproduct, studies revealed chemical contamination, the most hazardous of which was tetraethyl lead in "soil vapor."[60]

The DuPont Chambers Works complex, site of the District's FUSRAP project

In October 1998, the Philadelphia District signed a general release agreement with DuPont Corporation, clearing the way to begin work at the Chambers Works site.[61] Later that year, the district team performed its first work, supervising the removal of nine drums of waste and forty bags of protective gear stored in one of the contaminated buildings. DuPont demolished the building in 1999, and the Corps' contractor removed and transported all the structural steel to a Texas disposal facility.[62] The DuPont FUSRAP project team members completed

the first elements of the remedial investigation—a geophysical survey, walkover surveys, and aerial photography—during the summer of 2002.[63] Remedial investigation reports for two of the three areas of concern were completed in 2003, and the first round of investigations at the third area began in 2004.[64]

Following completion of remedial investigation and risk assessment reports in 2008, work began on a site feasibility study and cleanup plan.[65] The investigation and risk assessment at the DuPont site consisted of "a combination of on-site direct radiation measurements using handheld radiation detectors, on-site laboratory sample analyses, and off-site laboratory sample analyses." Remedial investigation and risk assessment activities also included removing the uranium-contaminated soil and disposing of it at a designated repository on the site. During that process, DuPont researchers collected samples of contaminated soil and provided the material to representatives of Oak Ridge National Laboratory "to evaluate radiological concerns."[66] At the end of the project, Philadelphia District staff would identify the most appropriate offsite storage facility for disposal of all solid contaminated material, which included soil samples, disposable sampling equipment, and personal protective gear worn during the investigations.

At this point, the district engaged the technical assistance of the Baltimore District, which housed the Hazardous, Toxic, and Radioactive Waste Center of Expertise for the Corps' North Atlantic Division. The Philadelphia and Baltimore districts were joint participants in preparing the remedial investigation report, with Philadelphia maintaining project management responsibilities. Joint operations involving two or more Corps districts were somewhat unusual, but not unheard of for EPA cleanup work. Philadelphia District staff served as members of the project technical/design team, as groundwater modeling specialists, and also provided Geographic Information System (GIS) support. Other key project partners were EPA Region 2, the New Jersey

Department of Environmental Protection, DuPont, and the prime contractor.[67]

Representatives of the participating agencies, companies, and members of the local communities established a Restoration Advisory Board for the DuPont FUSRAP project. Board meetings to discuss cleanup/restoration progress took place at regular intervals and were always open to the public "as a forum for community input on restoration issues" and a venue to "provide accurate information" regarding the cleanup.[68] Richard Maraldo, former deputy district engineer for programs and project management, explained that the public meetings and frequent progress updates were particularly important for the work at DuPont because people in the local communities were, not surprisingly, quite concerned about the risks involved in removing and transporting radioactive materials.[69] In part to address this concern, the Philadelphia District would continue to monitor the site for possible groundwater contamination after the project was complete.

Ecosystem Restoration

Much of the district's environmental program involved either permit regulation or environmental cleanup, but another aspect was restoring damaged ecosystems to states of health. This ecosystem restoration work, which began in the 1990s, was a new endeavor in the environmental arena. But although it was a relatively new realm for the Corps, it quickly became a prominent aspect of the Corps' Civil Works program. By 2005, according to a Corps policy statement, ecosystem restoration—defined as a "return of natural areas or ecosystems to a close approximation of their conditions prior to disturbance"—had become "a primary mission of the Corps' Civil Works program."[70] Philadelphia District staff quickly adapted their knowledge and expertise to overseeing successful species and ecosystem restoration projects, including four that won presidential Coastal America awards given to ventures that demonstrated "extraordinary partnerships that enhance the coastal

environment."[71] Between 2001 and 2008, the White House bestowed Coastal America awards for the district's Delaware Bay Oyster Restoration, Cuddebackville Dam Removal, Batsto Fish Ladder, and Cooper River Fish Ladder projects.

Nationwide, Corps of Engineers involvement in restoration projects dated to the National Estuarine Protection Act of 1968, which gave FWS the authority to survey and develop plans for the Corps to implement to protect and restore coastal estuaries. The Coastal Zone Management Act of 1972 and the Water Resources Development Act of 1974 provided additional authorities for the Corps to engage in environmental projects aimed at restoring particular populations or entire ecosystems. However, the Corps engaged in little ecosystem restoration work until the late 1980s and early 1990s, when the idea began to gain larger credence nationally.

In response to the nation's concerns about the necessity for ecosystem restoration in certain locations, such as the Everglades in Florida, Congress passed laws

The District joined with its partners from the U.S. Fish and Wildlife Service and the New Jersey Department of Environmental Protection in October 2005 to receive the Coastal America Award for the Batsto River Fish Ladder Project

giving the Corps the authority to conduct such projects. These laws included a series of Water Resources Development Acts from 1996 to 2000 that made environmental protection, the beneficial use of dredged material, creation of wildlife habitats, and ecosystem restoration significant components of Corps work. Under the Water Resources Development Act of 1992, Congress also gave the Corps, as part of its Continuing Authorities Program (CAP), authority to protect, restore, and create aquatic and ecological habitats in connection with federal navigation projects. If these projects did not exceed $15 million, the Corps could complete them without specific congressional authorization.[72] In 2000, Congress passed the Estuaries and Clean Waters Act, which provided direction for the Corps in undertaking and performing estuarine restoration projects.[73] To provide guidance on how these authorities were to be used, Corps Headquarters published Engineer Regulation 1165-2-501 in September 1999. According to this regulation, there were two different types of environmental restoration projects: environmental restoration studies and actual "study, design, and implementation of environmental projects."[74]

With these authorities and regulations, the Philadelphia District conducted several ecosystem restoration projects in the 1990s and 2000s. One project—Lower Cape May Meadows and Cape May Point—became the showpiece of the district's restoration work and illustrated the success of the Corps' new emphasis on ecosystem restoration throughout the United States. The project embraced about 350 acres of shoreline, dunes, and marshland at the far southern tip of New Jersey. The western half of the Meadows was part of Cape May Point State Park, while the eastern half encompassed the Nature Conservancy's Cape May Meadows Migratory Bird Refuge.

The project had its genesis in the New Jersey Shore Protection Study of the 1990s, emerging via interim feasibility study as the southernmost of seven coastal projects recommended for

The piping plover
(SOURCE: U.S. Fish and Wildlife Service)

construction. But unlike the others (and unique among Corps beach nourishment projects around the nation), it had a dual purpose: aquatic ecosystem restoration in the Meadows and coastal storm damage reduction for the adjacent borough of Cape May Point. To complete this project, the Philadelphia District partnered with the New Jersey Department of Environmental Protection (the nonfederal sponsor) and the city of Cape May, Cape May County, the Nature Conservancy, and the towns of Cape May Point and West Cape May.[75]

Cape May and the surrounding vicinity was a popular recreational destination for the millions of Pennsylvania, Delaware, and New Jersey residents who lived within thirty miles of the cape. Lower Cape May Meadows was considered a natural area of national and global significance, because it contained a sizable wetland astride the Atlantic flyway that migratory birds traveled between North and South America. The wetland also served as breeding grounds for several endangered species, including the piping plover. Lower Cape May Meadows had received recognition for the environmental values found there; the area was included in the Western Hemisphere Shorebird Reserve Network and on the Ramsar List of Wetlands of International Importance.[76]

The erosion-threatened Lower Cape May Meadows, N.J., before beach nourishment

The problems at Cape May Meadows were both of natural origin and caused by humans. Cape May had always been vulnerable to erosion because of its extension into the Delaware Bay on one side and the Atlantic Ocean on the other, with no island barrier or peninsula to block the paths of Atlantic storms and hurricanes moving up the eastern seaboard. However, erosion was also facilitated by the construction of the Cape May Inlet Federal Navigation Project in 1911. Over time, both of these factors reduced the width of the beach and the size of the dunes, leaving Cape May Meadows even more vulnerable to storm damage.[77] Between 1936 and 1998, more than 1,000 feet of Cape May Meadows shoreline had eroded. A Corps project feasibility study estimated that if no action was taken, half of the entire Meadows area would disappear by 2050 and the remainder would be inundated by saltwater.[78]

The work at Lower Cape May Meadows and Cape May Point would involve constructing a continuous beachfill-and-dune system (in front of both the town and the wildlife area) to provide a measure of protection against coastal erosion, and then restoring the freshwater wetlands so important to wildlife by removing undesirable aquatic vegetation

The seriously eroded shoreline at Cape May Point before beach nourishment (top) and after (bottom)

in the wetland, replanting native wetland vegetation, constructing water control structures in the area (including "deep water fish reservoirs within existing ponds" and "a self-regulating tide gate to allow for a 25-acre tidal marsh"), and restoring "hydrologic linkages within the wetlands."[79] One of the biggest challenges of the restoration was that waves from a 1991 storm had breached the intertidal and dune areas and inundated the freshwater wetlands with seawater. Thus, the district had to erect a new sea barrier (Phase I of the project) before it could perform the ecological restoration (Phase II).

Self-regulating tide gate within the Meadows

To restore freshwater wetland habitat, the district had to recreate the original water flow patterns disrupted by the 1991 storm breach that carried sand and seawater into the marshland. Construction crews scoured out sand and other debris from the clogged ditches and dug a deeper main canal, which was the key conduit for moving water into Cape Island Creek and then out to sea. Project work also involved raising paths that acted as dikes and building "weir flow control structures" to improve the hydrology of the Meadows. The weir structures allowed the Nature Conservancy to control the water level on its portion of the meadow to improve habitat for threatened species when necessary.[80] Project planners added viewing platforms along the dikes to enhance opportunities for bird watching and photography. Bob Allen, director of conservation science for the Conservancy's New Jersey chapters, explained that the additional waterways and enhanced supply of fresh water "should have a phenomenal effect on providing

good stopover habitat for migratory birds."[81]

Reestablishing healthy water flows through the Meadows ensured the success of a number of other key project elements, many aimed at restoring habitat for specific species. To provide better feeding habitat for the endangered piping plover, project crews dug three small ponds in the meadow area immediately behind the dunes, along with "plover crossover paths" to facilitate the birds' movement between the beach and the ponds. The fenced-off ponds gave piping plover chicks a sheltered area for protection from people, dogs, and other animals. In the first two years following construction of the ponds, research observers recorded that plovers were using the ponds for almost all their foraging and that chick survival had significantly increased compared with prerestoration survival rates.[82] Project crews also dug deeper pools in preexisting ponds to act as reservoirs for fish; built five small, shallow ponds especially suited for frog spawning; and created a snake hibernaculum (winter habitat).[83]

Birding enthusiasts take in the sights at the Meadows, one of the chief migratory stopovers along the entire North Atlantic Flyway

In addition, the project team focused on restoration of native plant species and removal of invasive exotics, which produced one of the most visible changes to the Cape May Meadows landscape. Over the course of the previous several decades, a non-native marsh reed, *Phragmites australis*, had taken over approximately two-thirds of Lower Cape May Meadows wetlands. *Phragmites* flourished after saltwater intrusion in the 1990s killed the native marsh vegetation. Removing the plant was a prerequisite for

Work at Lower Cape May Meadows included reditching to restore natural stream flows (above) and replanting of native vegetation (below)

restoring the native ecosystem, but the task became one of the few controversial components of the project. Prescribed burning and application of herbicides were necessary to eliminate the aggressive vegetation, because it reproduced and spread so quickly, but these actions posed risks for certain native species. Furthermore, removal of the reed was disconcerting for some local residents who had fond memories of walking through the tunnel-like paths, which easily grew to ten feet tall or more.[84] In September 2004, project staff began their eradication activities by applying a special herbicide, then mowing the stalks throughout the Meadows. Staff and volunteers then planted approximately 70,000 seedlings of native marsh species.[85]

The district completed the restoration in 2007, although site monitoring and revegetation by local organizations may continue for many years. Because the work helped restore an important habitat, the district received accolades and appreciative comments from the Cape May community. Richard Maraldo recalled

his experience at the dedication ceremony:

> When we finished the Cape May Beach job, we got invited for a dedication ceremony and they had closed off a whole section of the town by the beach. They had banner planes flying saying, "Come to Cape May. We've got our beaches back." They had a festival in the streets, free hotdogs, and we were treated like kings when we were down there. . . . It's always good when . . . you can see that they appreciate what you do for them.[86]

Upon completing the project, the district turned its management over to New Jersey State Parks, the local branch of the Nature Conservancy, and the towns abutting the area. The Corps retained responsibility for conducting periodic beach nourishment for the next fifty years.

The structural elements of ecosystem restoration work at Cape May Meadows involved reconstructing and building up the protective beach and dunes. Another district restoration project—involving two dams on the Neversink River in Orange County, N.Y.—did just the opposite, albeit on a smaller scale. The Cuddebackville Dam Removal Project removed crumbling dam structures as a means of restoring the river ecosystem. The foundations of the dams dated to earlier structures erected in 1902 and 1908, respectively. In 1915, power

Cape May Meadows State Park, with historic Cape May Point Light in background

The project at Lower Cape May Meadows became a showcase for aquatic ecosystem restoration both within and outside the Corps of Engineers

Sunrise at Cape May Meadows State Park

companies rebuilt both structures in order to convert them to hydropower production. Construction crews reinforced the southwest pier stop log dam and rebuilt the northeast one to make it a concrete gravity dam. In 1948, following damage to one of the dams, the companies halted hydropower production and transferred ownership of the dams to Orange County. In the 1970s, concerns about the structural integrity of the northeast dam prompted the state of New York to cut a notch in it, lowering the level of the reservoir behind it by four feet.[87]

In the 2000s, environmental proponents clamored for the removal of the Cuddebackville dams. Doing so, proponents said, would achieve two goals. First, it would restore a free-flowing Neversink River, thereby restoring upstream access to suitable spawning habitat for anadromous fish. In addition, biological studies showed that "the world's largest and healthiest population of the dwarf wedge mussel, listed as endangered both in New York State and under the Federal Endangered Species Act," lived just below the dam but were prevented by the structure from populating additional suitable river habitat. Removing the dams would allow the dwarf wedge mussel to expand its range to the area above the dams.[88] Finally, removal of the dams would eliminate safety concerns about their deteriorated state.

A survey of the southwest dam (the smaller of the two) indicated that it was unsafe because it facilitated the pile-up of debris, which people then used to cross over to an island in the river. Dam failure and the resultant flood of water and debris during a high-water

The Cooper River Fish Ladder Project

event were also considered potential risks. The larger northeast dam, meanwhile, had an eroded apron at its base. According to the Nature Conservancy, dam failure was "a major concern due to the heavy undercutting that can be seen below the dam."[89]

The Philadelphia District took on the Cuddebackville Dam Removal Project under its CAP, with the Eastern New York Chapter of the Nature Conservancy as project sponsor and the district's nonfederal partner in the removal process. In February 2003, the district signed a cooperative agreement with the Nature Conservancy for the Cuddebackville Dam removal, committing the group to supplying 35 percent of the project costs. The nonprofit organization eventually supplied "$150,000 in materials and $449,000 in other project requirements" out of the final $1.3 million contract total.[90]

After evaluating proposals for the removal of both dams, the district concluded that possible adverse effects on the historic

Removal of the old Cuddebackville Dam (above) and subsequent restored flow on the Neversink River (below)

Delaware and Hudson Canal meant that only the southwest dam should be removed.[91] The northeast dam was left standing at the request of Orange County, so that its reservoir would provide a regular water flow to a feeder canal that helped maintain the water level of the Delaware and Hudson Canal, a portion of which was designated a national historic landmark.[92]

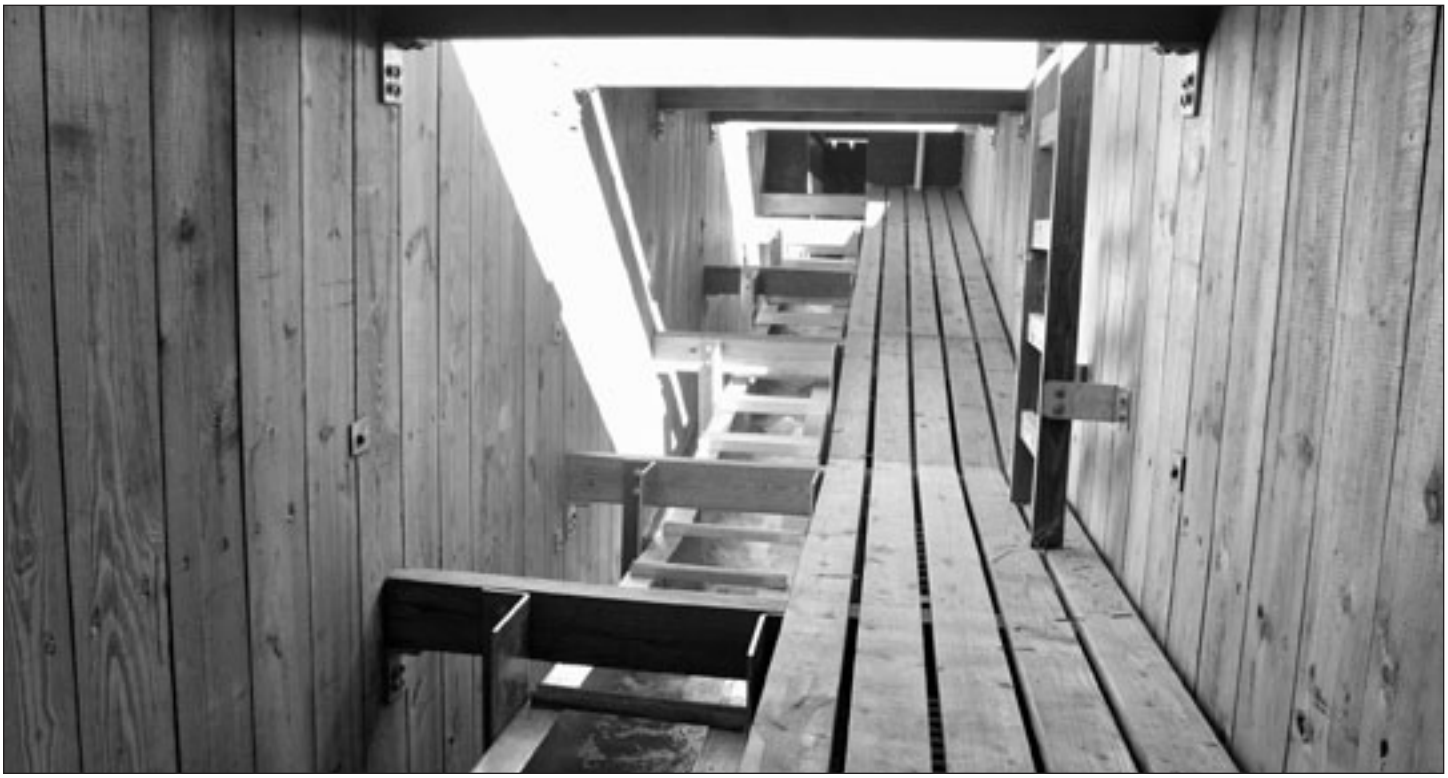
The Philadelphia District awarded a construction contract for this project in June 2003, and work commenced soon after. Specifics of the dam removal involved construction of a temporary bridge across the river below the dams and installation of a cofferdam below the southwest dam to provide a dry worksite and to collect sediment flowing downstream during excavation. Demolition was accomplished by placing explosives at locations calculated to break the concrete into large pieces, which the contractor then removed from the river. After demolition was completed, crews removed the temporary bridge and initiated revegetation of damaged areas.[93] The project was completed

in November 2004, and the following year the district received a Coastal America partnership award for the project team's "outstanding efforts to restore and protect the coastal environment."[94]

The Philadelphia District used its CAP to construct three other environmental restoration projects involving fish passages. One of these—the Batsto River Fishway Restoration—involved construction of a fishway on a dam on the Batsto River in New Jersey's Burlington County. This was not the first time the district had restored a fishway on a dam. In 2001, the district completed a fishway restoration project on the Cooper River near Cherry Hill, N.J., that garnered a Coastal America award. Drawing on its experience with this project, the district worked on the Batsto Dam, which had blocked passage of upstream spawning habitat for two anadromous fish species. District personnel collaborated with staff from FWS, the New Jersey chapter of the Corporate Wetlands Restoration Project, and the New Jersey State Historic Preservation Office to plan and build a fish passage structure that bypassed the dam's spillway, with the state of New Jersey serving as the nonfederal sponsor. Because the project site was in historic Batsto Village, planning had to ensure that "the design was compatible with the historic nature of the site," in addition to incorporating the required engineering and biologic expertise.[95]

Project construction on the Batsto Fishway began in November 2004 and was completed in October 2005, within the projected budget of $600,000. The fishway consisted of three 10-foot-long concrete ramps covered with removable wooden roof segments that helped the structure blend in with the historic features of the village.[96] The Batsto River Restoration Project successfully restored access to an additional eight miles of upriver spawning habitat for the migratory alewife and blueback herring, and provided greater ecological diversity to the Batsto River. Design features of the fishway and its location in historic Batsto Village gave park visitors opportunities

The Batsto River fishway restoration under construction (above) and an inside look at the removable wooden structures enclosing the fish ladders (below)



for "environmental education regarding the ecological importance of anadromous fish."[97]

The third project, completed in 2008, involved upgrading an existing fish ladder alongside Philadelphia's historic Fairmount Dam on the Schuylkill River. Partnering with the Philadelphia Water Department, the district used state-of-the-art design methodologies to make the structure more negotiable to native fish working their way upstream around the dam.[98]

The Fairmount Fish Ladder was located in a scenic and prominent setting, along a linear park that had been built under a previous CAP project. In 2005, the district had partnered with the city of Philadelphia, the Schuylkill River Development Corporation, and Fairmount Park Commission to renovate and beautify a mile-long corridor of the river's east bank between the Philadelphia Art Museum and South Street. The project incorporated grading, topsoil, planting, and groundcover, and was designed to make the area "a more natural recreational resource for center city visitors and area neighborhoods."[99] As reported in the district newsletter, Schuylkill River Park was "the first construction project within walking distance of the Wanamaker Building home office."[100]

The Fairmount Dam Fish Ladder Project upgraded an existing structure in the heart of Philadelphia, helping restore native fish migration up the Schuylkill River

These projects all brought accolades to the district for its ecosystem restoration work, as did other projects that were ongoing in 2008, such as the Delaware Bay Oyster Restoration initiative. Work in ecosystem restoration as a stand-alone project (as opposed to as a byproduct of navigation or of flood or storm risk reduction) did not begin in the Philadelphia

The Schuylkill River Park Trail represented the cooperative efforts of the City of Philadelphia, the Schuylkill River Development Corporation, the Fairmount Park Commission and the Philadelphia District

Ground-up shells being deposited in the Delaware Bay in 2005 to promote oyster habitat and help restore the native oyster population

District until the 1990s, but it has continued to be an important part of the district's workload in the 2000s. The success of these projects guaranteed that this kind of work would increase in importance in the years after 2008.[101]

* * * * * * *

As the Philadelphia District headed into the second decade of the twenty-first century, the number and technical range of its environmental projects had expanded far beyond what the staff could have imagined in 1972. In addition to the growth of the Regulatory Branch into one of the district's biggest program elements, emerging environmental work in other realms led to the creation of new programs in Superfund cleanup, other site remediation tasks, and ecosystem restoration. The district performed admirably on all these projects, both in technical expertise and in its ability to work with all interested parties to guarantee the success of a project. The environmental function had thus become one of the focal points of the district by the twenty-first century.

[1] John Burnes interview by Paul Sadin and Joshua Pollarine, 15 January 2009, Philadelphia, Pennsylvania, transcript, 14, 17; John Burnes, conversation with Matthew Godfrey, 25 May 2010; "Getting to Know Environmental Resources Branch," 10–11; Edward Voigt, Chief, Public and Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 18 April 2011.

[2] Cianfrani interview, transcript, 4; "Getting to Know Regulatory Branch," *The Observer* (July/August 1999): 7.

[3] Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington, D.C.: Island Press, 1997), 254.

[4] Vileisis, *Discovering the Unknown Landscape*, 255.

[5] Unpublished Morgan Draft District History, 97–98

[6] Federal Water Pollution Control Act of 1972 (86 Stat. 816).

[7] Jeffrey K. Stine, "Regulating Wetlands in the 1970s: U.S. Army Corps of Engineers and the Environmental Organizations," *Journal of Forest History* 27 (April 1983): 64–66.

[8] Vileisis, *Discovering the Unknown Landscape*, 258.

[9] Michael C. Blumm, "The Clean Water Act's Section 404 Permit Program Enters its Adolescence: An Institutional and Programmatic Perspective," *Ecology Law Quarterly* 8 (1979–1980): 416–417.

[10] "Getting to Know Regulatory Branch," 7.

[11] "Getting to Know Regulatory Branch," 7.

[12] Blumm, "The Clean Water Act's Section 404 Permit Program Enters its Adolescence," 441.

[13] Unpublished Morgan Draft District History, 97.

[14] Blumm, "The Clean Water Act's Section 404 Permit Program Enters its Adolescence," 419.

[15] Cianfrani interview, 2–3.

[16] Cianfrani interview, 3.

[17] Blumm, "The Clean Water Act's Section 404 Permit Program Enters its Adolescence," 443.

[18] "Regulatory Jurisdiction Overview," n.d., document from Philadelphia District.

[19] Cianfrani interview, 3.

[20] Locurcio interview, 23.

[21] Cianfrani interview, 6.

[22] "Getting to Know Regulatory Branch," 8.

[23] Sam Reynolds, Regulatory Branch, Application Section Chief, as quoted in "Getting to Know Regulatory Branch," 8.

[24] U.S. Court of Appeals, Federal Circuit, *Loveladies Harbor, Inc. and Loveladies Harbor, Unit D, Inc. v. The United States*, No. 91-5050, 15 June 1994, available at <http://ftp.resource.org/courts.gov/c/F3/28/28.F3d.1171.91-5050.html> (15 March 2010).

[25] *Loveladies Harbor, Inc. and Loveladies Harbor, Unit D, Inc. v. The United States*.

[26] *Loveladies Harbor, Inc. and Loveladies Harbor, Unit D, Inc. v. The United States*.

[27] Cianfrani interview, 10.

[28] Cianfrani interview, 5.

[29] "Mid-County Expressway ('Blue Route') Historic Overview" <http://www.philly-roads.com/roads/blue-route> (26 March 2010).

[30] G. William Quinby, Lieutenant Colonel, U.S. Army Corps of Engineers, District Engineer, "Statement of Findings," Application Philadelphia DistrictOP-R-86-1035-11, Pennsylvania Department of Transportation, 23 November 1987, 2, document provided by Frank Cianfrani, Philadelphia District.

[31] Cianfrani interview, 6.

[32] Cianfrani interview, 8.

[33] Locurcio interview, 23.

[34] "Regulatory Opens Dover Office," *The Observer* (May 1992): 1.

[35] "Regulatory Branch: Where the Environment Is Always Paramount," *The Observer* (May 1993): 5-6; "Getting to Know Regulatory Branch," 6.

[36] Ted Williams, "Who Can Save a Wetland," *Audubon* 101 (September/October 1999): 60–64.

[37] Williams, "Who Can Save a Wetland," 62–63.

[38] "Sporting and Environmental Groups File Lawsuit Challenging I-99 Bald Eagle Ridge Route," *Moshannon Sierra News* (State College, Pa.), February 2000, available at <http://pennsylvania.sierraclub.org/moshannon/news/Newsletter00-02.pdf> (24 March 2010).

[39] Cianfrani interview, 13.

[40] Cianfrani interview, 14.

[41] Elaine Zettick, Chair, Bucks County Office of the Commissioners, to Montgomery County Commissioners, 18 May 1983, and Elaine Zettick to Neshaminy Water Resources Authority, 18 May 1983, File 204-01 Bucks County, Pennsylvania (Zone 4), Emergency Management Office Storage, Emergency Management Office, U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania (hereafter referred to as Philadelphia District-EMO).

[42] Attorneys, to Lt. Col. Roger Baldwin, District Engineer, Philadelphia District, 17 June 1983, File 204-01 Bucks County, Pennsylvania (Zone 4), Emergency Management Office Storage, Philadelphia District-EMO.

[43] Lt. Col. Baldwin, to Robert Sugarman, 27 June 1983, File 204-01 Bucks County, Pennsylvania (Zone 4), Emergency Management Office Storage, Philadelphia District-EMO.

[44] "Bucks County's Long Water War: Decision Time," *New York Times*, 12 June 1987, online edition, available at <http://proquest.umi.com.ezproxy.spl.org:2048/pqdweb?index=16&did=956563481&SrchMode=1&sid=4&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1273777458&clientId=11206> (13 May 2010).

[45] In 1988, Bucks County agreed to pay a $900,000 settlement to the water and construction contractors for wrongful termination of their contract; "Bucks Pays $900,000 To Settle Pump Suits," 11 August 1988, *The Morning Call*, available at <http://articles.mcall.com/1988-08-11/news/2652219_1_water-diversion-project-bucks-settlement-ends> (13 May 2010).

[46] Cianfrani interview, 21.

[47] "Cutler Group Resolves Permit Violation Via Monetary Donation to Lands Trust," *The Observer* (2007): 7.

[48] Gale quoted in "District Obtains $1.2 Million for Permit Violation," *The Observer* (September/October 2000): 3, article originally appeared in the 21 September 2000 issue of the *Philadelphia Inquirer*.

[49] "District Obtains $1.2 Million for Permit Violation," 5.

[50] "City Restores Wetlands After District Citation," *The Observer* (April 1993): 3.

[51] Cianfrani interview, 17.

[52] "Getting to Know Regulatory Branch," 8. By 2010, the rate had fallen to 85 percent completed within the 60-day time period, but 100 percent of all permits were completed within 120 days. U.S. Army Corps of Engineers, Philadelphia District, "Solution Builders," <http://www.Philadelphia District.usace.army.mil/solution.htm> (23 April 2010).

[53] Cianfrani interview, 13.

[54] John Bartholomeo interview by Paul Sadin, January 13, 2009, Philadelphia, Pennsylvania, transcript, 2.

[55] Energy and Water Development Appropriations Act for Fiscal Year 1998 (111 Stat. 1320); Voigt personal communication.

[56] U.S. Army Corps of Engineers, "Formerly Utilized Sites Remedial Action Program Update," September 2009 (Washington D.C.: Headquarters, U.S. Army Corps of Engineers, 2009), digital copy (no page numbers). The other six districts were Baltimore, Buffalo, Pittsburgh, New England, New York, and St. Louis.

[57] U.S. Army Corps of Engineers, "Formerly Utilized Sites Remedial Action Program Update"; Voigt personal communication.

[58] "Meeting Summary, Dupont Chambers Works FUSRAP Site Restoration Advisory Board Meeting (RAB), Pennsville, New Jersey," 15 October 2003 <http://www.Philadelphia District.usace.army.mil/fusrap/rab/ rab_meeting_summary_20031015.pdf> (5 March 2010).

[59] "DuPont Chambers Works FUSRAP Site" *The Bulletin: DuPont Chambers Works FUSRAP Site* 2 (September 2001): 1–2, copy in Binder DuPont Chambers Works FUSRAP Project (hereafter referred to as FUSRAP Binder), document provided by George Bock, Philadelphia District.

[60] Cabrera Services, Inc., "Draft Executive Summary of the Work Management Plans for the Remedial Investigation at Ou 2: AOC 3, Central Drainage Ditch Area and AOC 5, Building J-26, DuPont Chambers Works Site, Deepwater, New Jersey," prepared for U.S. Army Corps of Engineers, Baltimore and Philadelphia Districts, September 2003 <http://www.Philadelphia District.usace.army.mil/fusrap/new/DRAFT_Executive_Summary_Oct_2002.pdf> (5 March 2010).

[61] U.S. Army Corps of Engineers, Philadelphia District, "A Remarkable History at the DuPont Chambers Works Site," *The Bulletin: DuPont Chambers Works FUSRAP Site* 3 (June 2002): 3, copy in FUSRAP Binder.

[62] U.S. Army Corps of Engineers, Philadelphia District, "OU-1 Site History," *The Bulletin: DuPont Chambers Works FUSRAP Site* 3 (June 2002): n.p., copy in FUSRAP Binder.

[63] U.S. Army Corps of Engineers, Philadelphia District, "Military Helicopter Flyover," *The Bulletin: DuPont Chambers Works FUSRAP Site* 3 (June 2002): 1, copy in FUSRAP Binder.

[64] U.S. Army Corps of Engineers, Philadelphia District, "Investigative Site Description: DuPont Chamber Works Site, Deepwater, NJ," September 2004, FUSRAP Binder.

[65] U.S. Army Corps of Engineers, "Formerly Utilized Sites Remedial Action Program Update," 3.

[66] Cabrera Services, Inc., "Draft Executive Summary of the Work Management Plans," 4.

[67] Cabrera Services, Inc., "Draft Executive Summary of the Work Management Plans," 3.

[68] U.S. Army Corps of Engineers, Philadelphia District, "DuPont Chambers Works FUSRAP Site" <http://www.Philadelphia District.usace.army.mil/fusrap/rab/rab_overview.pdf> (5 March 2010).

[69] Maraldo interview, 39.

[70] Chief of Engineers, "Restoration Authorities of the US Army Corps of Engineers," 2–3.

[71] Richard Pearsall, "District Works to Restore Depleted Oyster Population," *The Observer* (Autumn 2009): 12.

[72] Nicole T. Carter and Betsy A. Cody, "The Civil Works Program of the Army Corps of Engineers: A Primer" Congressional Research Service Report for Congress, 3 February 2005, 6 <http://ftp.fas.org/sgp/crs/natsec/RS20866.pdf> (2 July 2009); U.S. Army Corps of Engineers, Philadelphia District, "Continuing Authorities Program" <http://www.Philadelphia District.usace.army.mil/cePhiladelphia District-pl/ca.htm> (20 May 2010).

[73] 67 FR 232.

[74] U.S. Army Corps of Engineers, "Water Resources Policies and Authorities, Civil Works Ecosystem WRDA Restoration Policy," Engineer Regulation 1165-2-501, 30 September 1999, 2. The specific sections were WRDA 1986, Section 1135, regarding project modifications for improvement of the environment; WRDA 1992, Section 205, regarding dredged material; and WRDA 1996, Section 206, aquatic ecosystem restoration.

[75] U.S. Army Corps of Engineers, Philadelphia District, "Ecosystem Restoration: Lower Cape May Meadows – Cape May Point, ENR Conference, 1 November 2007, Powerpoint presentation, copy provided by Dwight Pakan, Project Manager, Philadelphia District-Programs and Project Management Division (hereafter Philadelphia District-PPM); Voigt personal communication.

[76] U.S. Army Corps of Engineers, Philadelphia District, "Lower Cape May Meadows – Cape May Point Feasibility Study," vol. 1, August 1998, ES-1.

[77] U.S. Army Corps of Engineers, Philadelphia District, "Ecosystem Restoration: Lower Cape May Meadows – Cape May Point."

[78] U.S. Army Corps of Engineers, Philadelphia District, "Lower Cape May Meadows – Cape May Point Feasibility Study," 3-5.

[79] Lt. Gen. Joe N. Ballard, Chief of Engineers, to The Secretary of the Army, 5 April 1999, document provided by Jeff Gebert; Voigt personal communication.

[80] "Project Spotlight, Ecosystem Restoration: Lower Cape May Meadows," *The Observer* (Autumn 2007): 8-9.

[81] "Plover Patrol: Army Corps Restores Endangered Bird Habitat," *The Nature Conservancy* (Summer 2007): 13.

[82] "Project Spotlight, Ecosystem Restoration," 9; and "Plover Patrol: Army Corps Restores Endangered Bird Habitat," 14.

[83] "Project Spotlight, Ecosystem Restoration," 9.

[84] U.S. Army Corps of Engineers, Philadelphia District, "Lower Cape May Meadows – Cape May Point Feasibility Study," ES-9.

[85] "Integrating Ecosystem Restoration and Shore Protection," *The Observer* (Autumn 2005): 18-19.

[86] Maraldo interview, 39.

[87] Colin Apse, "Results of the Neversink River Rare Mussel Survey: Part of the Cuddebackville Dam Removal Project," prepared for the Nature Conservancy, 31 October 2001, Appendix A, 1-2, File EA/Design, Cuddebackville Box, Planning Division Office Files, Philadelphia District (hereafter Philadelphia District-Planning Division), 2.

[88] U.S. Army Corps of Engineers, Philadelphia District, "Philadelphia District Continuing Authorities Fact Sheet: Cuddebackville, NY," March 2003, electronic file provided by Brian Mulvenna, Philadelphia District-Planning Division.

[89] Apse, "Results of the Neversink River Rare Mussel Survey," 3.

[90] USACE, Philadelphia District, "Ltc. Ruch Brief One.ppt," 9 August 2004, Powerpoint presentation, provided by Brian Mulvenna, Philadelphia District-Planning Division.

[91] Bob Callegari, Chief, Philadelphia District-Planning Division, to Michael Stoll, Sr., U.S. Fish and Wildlife Service, New York Field Office, 12 December 2001, File EA/Design, Cuddebackville Box, Philadelphia District-Planning Division.

[92] U.S. Army Corps of Engineers, Philadelphia District, "Philadelphia District Continuing Authorities Fact Sheet: Cuddebackville, NY."

[93] U.S. Army Corps of Engineers, Philadelphia District, "Philadelphia District Continuing Authorities Fact Sheet: Cuddebackville, NY."

[94] U.S. Army Corps of Engineers, Philadelphia District, Cuddebackville Project Summary, n.d., ca. October 2006, electronic document provided by Brian Mulvenna, Philadelphia District-Planning Division.

[95] Coastal America, media advisory, Batsto River Fishway Restoration, 14 October 2005, Environmental Resources Branch electronic files, copy provided by Mark Eberle, Philadelphia District (hereafter Philadelphia District-ERB).

[96] U.S. Army Corps of Engineers, Philadelphia District, Talking Points for Batsto River Fishway Restoration Project, n.d., ca. 2005, electronic file, Philadelphia District-ERB.

[97] Coastal America, media advisory, Batsto River Fishway Restoration, 14 October 2005, copy provided by Mark Eberle, Philadelphia District-ERB.

[98] Voigt personal communication.

[99] "Close to Home…Two of the District's Projects are being Built Right Here in the City of Philadelphia," *The Observer* (Summer 2005): 6.

[100] "Close to Home…Two of the District's Projects are being Built Right Here in the City of Philadelphia," *The Observer* (Summer 2005): 6.

[101] Delaware Bay Oyster Restoration Task Force, "Delaware Bay Oyster Restoration Project," n.d. <http://www.delawareestuary.org/pdf/Oyster%20Publications/2008_fact_sheet.pdf> (March 4, 2010).

6

Emergency and Contingency Operations

The Corps' emergency response program falls under the authority of Public Law 84-99, a 1955 amendment to the Flood Control Act of 1941. This law directed the Corps to conduct emergency response activities and provided funding for such operations. As explained in the Philadelphia District's Disaster Response Primer, PL 84-99 "authorizes the Chief of Engineers to provide disaster preparedness, emergency operations, advance measures, rehabilitation of flood control works threatened or destroyed by flood, protection or repair of Federally authorized shore protection works threatened or destroyed by coastal storms, and provisions of emergency water due to drought or contaminated source."[1] In effect, this is the authority under which the district's Emergency Management Office (EMO) operates in its response to all emergencies within the district's footprint. Public Law 84-99 was later amended under Section 917 of the Water Resources Development Act of 1986, which authorized the Corps, at the request of governors, to respond to state emergencies for ten days without any further disaster declaration.[2] The district provides a wide array of support under PL 84-99 to state and local governments, supplying services before, during, and after emergency events. At all times, however, the support provided by the Corps of Engineers is supplemental to local efforts.[3]

Facing page: Conducting damage assessments in New Hope, Pa. in June 2006, after the third major flood event along the Delaware in as many years

Background

At the Philadelphia District, the EMO maintains team preparedness to respond to emergencies and staffs the district's Emergency Operations Center when it is activated. It coordinates with local sponsors for inspections of flood works, both federal and nonfederal, and maintains lines of communication for prompt response when needed. When storms strike, the district provides sandbags and innovative flood-fight products to help stem the tide. In the wake of disaster, district personnel provide technical assistance, including structural assessments of buildings before emergency teams conduct search and rescue, and the application of Corps expertise in inspecting flood control structures after a storm has passed. Finally, the EMO assists with executing contracts for rehabilitation, and the Corps provides needed repairs to damaged federal flood-protection works. In situations involving contaminated water or drought, the district provides water for human consumption.[4]

The Corps of Engineers responds not just locally but nationally and, in some instances, internationally. Under Public Law 93-288, passed in 1974, the federal government can "direct the Corps to utilize its available personnel, supplies, facilities, and other resources to provide assistance" following a presidential disaster or emergency declaration.[5] In the early 1990s, a federal response plan was created for the use of federal agencies under the Federal Emergency Management Agency (FEMA).[6] The Corps of Engineers became the "primary agency overseeing Public Works and Engineering," falling under Emergency Support Function #3 of the national framework.[7]

Changes in the Corps' emergency response organization occurred throughout the nation as part of the Corps' Readiness 2000 (R2K) restructuring to address the national need for Army Corps resources. Under R2K, the Corps sought to manage resources "through a *national strategy*, aligning the readiness community into a corporate Corps team that

shares planning responsibilities and response capabilities."[8] An important aspect of this alignment was the creation of planning and response teams (PRTs). Districts around the country staffed teams dedicated to specific response and recovery missions, including debris removal and temporary roofing and housing. The PRT structure enabled the Corps to implement start-to-finish emergency response operations for teams of expertise. This was especially beneficial for sequential storms—instead of redeploying a group from one disaster to another, the Corps could deploy a different crew for each event.[9]

The Philadelphia District became one of seven to host an emergency power PRT, responsible for prepositioning power resources, assessing critical facilities (with the 249th Engineer Battalion Prime Power) and, through contracting, managing the hauling and installation of generators. Other district personnel serve on national functional PRTs such as Global Information System, Urban Search and Rescue, External Affairs, and Leadership. FEMA regions follow state borders rather than the Corps' watershed structure, so state capitals within a Corps district boundary are the principal responsibility of that district for first response. Thus, the Philadelphia District's primary FEMA response area is in Delaware and New Jersey—FEMA Regions 2 and 3, respectively.[10]

Emergency equipment on loan from the Philadelphia District pumps down flood waters in Sussex County, Del.

The Philadelphia District's EMO is exceptional. It is one of four in the United States that stockpiles innovative flood-fight materials for loan to local governments.[11] The EMO is responsible for storing and maintaining products

The Philadelphia District is the sole supplier of red and white "visibility items" worn to readily identify Corps personnel during emergency operations, to include (from left) caps, safety vests, polo shirts, sweatshirts and windbreakers

designed and developed under the Corps' Engineer Research and Development Center, headquartered in Vicksburg, Miss. The district EMO delivers those products to emergency response locations and inspects them after deployment for future use. The flood-fight products are designed to offer transportable protection "to critical infrastructure and key facilities," providing an effective temporary barrier against floods. The district maintains responsibility for deployment of these supplies along the entire east coast.[12] The Philadelphia District is the only district that stores Corps visibility items for emergency events, such as emergency operations shirts, hats, safety vests, and rain gear.[13]

The district's EMO evolved as the Corps' emergency response duties increased. Although the district provided personnel in support of emergency operations in the period leading up to the 1980s, there was no established office for emergency management. During the 1970s, the district's initial emergency response activities included sending two- and three-person teams into the field in the wake of natural disasters—usually floods or coastal storms—to assess damage and provide situation reports. In 1980 (a year after the creation of FEMA and with Corps officials becoming increasingly aware of the need for a dedicated emergency response staff to answer to national authority when required), the district established the Readiness Branch, whose sole purpose was to keep district personnel trained and equipped for emergency response. Initially reporting to the Operations Division, this small office would see its role and responsibilities

grow in the coming decades. Yet, as of 2008, the EMO had had only three chiefs, providing stability and continuity to the district's response efforts.[14]

The Readiness Branch functioned as a part of the Operations Division for nearly twenty years before a significant reorganization in 1999. Effective 14 June 1999, the Readiness Branch was renamed the Emergency Management Office. With the change in name came a change in organizational affiliation. The EMO now reported directly to the deputy district commander. The change was "consistent with similar reorganizations that have taken place at Corps and division levels."[15] It also paralleled changes taking place at the state and local levels for dealing with disasters, leading to a formalized EMO network and improved disaster response coordination. EMO personnel maintained connections with people on the ground where events occurred; instant situation reports enabled the office to direct its response to the greatest needs in the hardest hit areas.[16]

Responses to Natural Disasters

Although not yet operating under a formal emergency office in the 1970s, the district provided personnel in response to disasters that occurred during that decade. The most significant event happened in June 1972, when a hurricane-turned–tropical storm stalled over the central part of Pennsylvania for nearly twenty-four hours. Hurricane Agnes dropped a minimum of five—in some areas as much as eighteen—inches of rain on the state, inundating streams, rivers, and towns.[17] On the evening of 23 June 1972, Agnes moved north

Tropical Storm Agnes left much of downtown Reading, Pa. under water

Flooding due to Tropical Storm Agnes brought much of the Schuylkill Valley to a virtual standstill

across western New York and into Canada, dissipating along the way. In its wake, the storm left "a persistent drizzle and one of the most devastating natural disasters in the history of the United States."[18]

Federal flood control structures constructed by the Philadelphia District successfully accomplished their intended purpose during the storm. Elsewhere, however, floodwaters topped nonfederal flood works and inundated towns, leading the Philadelphia District to mobilize in response. Commencing "around the clock, on 21 June," the district activated personnel before the arrival of Agnes for field monitoring, "maintaining a watch on storm advance, river stages, readiness of reservoirs to store flood waters, and availability of sandbags." On 23 June, as the storm hovered over Pennsylvania, district officials directed that the Emergency Operations Center be activated. Shortly thereafter, district personnel posted to Francis E. Walter Reservoir deployed to Wilkes-Barre to help with sandbagging, although their efforts were halted when floodwaters

overflowed dikes and deluged the town. In other areas closer to Philadelphia, the district assisted with the removal of debris from the Schuylkill and Delaware rivers.[19]

The district's role ramped up considerably in the aftermath of the storm with the establishment of emergency field offices in Pottstown and Reading. District personnel conducted initial damage assessments, identified and prioritized critical needs, and coordinated and oversaw the deployment of Army Reserve and National Guard units as first responders. The district provided contracted support on a time-and-materials basis, along with onsite inspection and monitoring of that support. In some instances, letter contracts were scoped, estimated, and awarded within five days. With health and safety taking top priority, the district's missions included providing temporary drinking water, repairing water and wastewater treatment plants, restoring electrical power, inspecting and repairing bridges upon request, demolishing structures that had been assessed as dangerous, removing massive amounts of debris, restoring damaged stream channels, and repairing nonfederal flood control structures under existing authorities. Within a week, the district personnel staffing those two emergency offices were supplemented,

Helping restore electrical power was one of the first orders of business for the Corps in its post-Agnes response

and in some cases replaced, by counterparts from other Corps districts in the North Atlantic Division and elsewhere.[20]

In addition to these duties, the district assisted with "extraordinary functions." The flooding from Agnes affected an estimated 7,300 homes in the Schuylkill River Valley. Recognizing the need for emergency shelter for those displaced by the storm, North Atlantic Division Engineer Maj. Gen. Richard H. Groves arranged with the state for the preparation of two temporary mobile home sites, which the district contracted under competitive bid, successfully prepping sites for 58 trailers. The flooding also displaced "a large quantity of sludge remaining from oil-reprocessing operations and stored in open lagoons," sending it into the Schuylkill River. In an effort to mitigate this disaster, the district removed approximately 2,500 tons of "oil-sludge-coated vegetation and debris."[21] The district also helped the U.S. Postal Service survey damage to all post office facilities in eastern Pennsylvania, identifying an estimated $3.6 to $4 million in damage. As the storm waters receded and the commonwealth of Pennsylvania recovered, the district removed an estimated two hundred thousand cubic yards of debris.[21] Agnes was one of the worst natural disasters to strike in the district's history.

The aftermath of "Awful Agnes"

Although the district's activities in national natural disasters were dramatic, emergency operations were more often undertaken in response to events within the district's boundaries, under the Corps' PL 84-99 authority. For example, in 1979, Acting District Engineer Joel T. Callahan exercised this authority to assist

Burlington County, N.J., following emergency operations conducted by the district in February. The county's emergency services agency requested assistance from the Corps to deal with "heavy rains, snow melt and high tides." Callahan deployed district personnel to conduct rehabilitation investigations "to ascertain storm related damages" to a local dam and submit a formal situation report. The district was also asked to investigate the county's flood management policies and assess the Corps' "capability to provide technical assistance in the development of a flood preparedness plan for Burlington County."[22] Such an emergency response on the part of the district was standard procedure for extraordinary situations.

In January 1996, the district suffered the worst natural disaster within its boundaries since Agnes in 1972. A winter storm affected the entire commonwealth of Pennsylvania, with a wintry mix of snow, rain, and sleet triggering floods throughout the state. Although every county in Pennsylvania was declared a federal disaster area, district personnel maintained their capability to respond within their home territory. The EMO activated its Emergency Operations Center on 19 January 1996 and remained open twenty-four hours a day through 2 February 1996, "fielding requests for assistance from states, counties and municipalities in New York, Pennsylvania, New Jersey and Delaware."[23] As with Agnes twenty-seven years earlier, the district's federally constructed flood works performed as planned, despite massive influxes of water from the storm. The reservoir at F. E. Walter Dam surged 100 feet

Filling sandbags for flood-fighting

Flooding in Bucks County, Pa., January 1996

in its water level, yet maintained minimum water release in its floodgates. Flood storage at Blue Marsh Lake kept the Schuylkill River at an estimated two to three feet below its projected flooding level.[24] While flooding was not entirely averted, the district's flood control measures prevented extensive damage, and the district made itself available to assist state and local entities throughout the disaster.

Also in response to the 1996 floods, the district repaired damaged local flood control structures in Allentown and Stroudsburg, Pennsylvania. The work was covered by the PL 84-99 Rehabilitation and Inspection Program, under which non-Corps flood control structures that have been operated and maintained according to certain engineering criteria are eligible for restoration to pre-flood conditions at 75 percent federal funding. The district made similar repairs at Stroudsburg, as well as in East Stroudsburg and Weissport, Pa.,

following high water events in 2004, 2005, and 2006.[25]

In addition to its postdisaster responsibilities, the district's emergency management role included efforts to reduce the risk of damages from future events. Emergency stream-bank erosion studies were a part of this mission. In cooperation with local sponsors, the district conducted studies to determine best practices and effective measures for the repair—and, in some instances, replacement—of eroded stream embankments. Such mitigating construction measures may include placement of supplemental rip-rap, gabions for support of embankments, and backfill. These preventive actions help protect public works, such as roads that follow the course of streams and rivers, from being undermined in significant storm events. In the 1980s, the district completed such projects along Perkiomen Creek and Darby Creek in Pennsylvania, and the Manasquan River in New Jersey.[26]

While the Corps takes proactive measures to prevent flooding, communities are at the mercy of nature when it unleashes its fury. Coastal storms striking Delaware and New Jersey have caused significant damage, requiring a response by the district. For example, in March 1984, New Jersey's governor declared a limited state of

Overseeing logistical support following Hurricane Ike, 2005

Repairs to a storm-damaged levee at Stroudsburg, Pa., under the Public Law 84-99 Rehabilitation & Inspection Program

Philadelphia District personnel conducting flood damage surveys in Bucks County, Pa.

emergency after a nor'easter struck the shore. The district was involved in surveying damage all along the New Jersey coast, noting beach erosion and damage to streets and structures, and providing estimates of material lost from beaches and debris that collected in the wake of the storm.[27]

In December 1992, the New Jersey and Delaware coasts were again battered by a storm that caused flooding throughout the mid-Atlantic region. Along the coast, "waves swept over roads, destroying seawalls and battering houses, boats and businesses." The district was involved in reconnaissance surveys to assess damages immediately after the storm.[28]

Once the surveys were complete, FEMA asked the Corps to compile preliminary damage estimates. Using survey results and other data, President George Bush determined that the destruction inflicted by the storm warranted a federal disaster declaration. The district subsequently went to work for FEMA, developing detailed damage survey reports throughout Delaware and New Jersey. The Corps completed "1,100 of the more than 3,100 damage survey reports for FEMA," identifying $9 million of an estimated $35 million worth of damage from the storm in New Jersey alone.[29]

The district worked with FEMA after other natural disasters as well. For example, the devastating storm that caused severe damage to Pennsylvania in 1996 was also followed by a presidential disaster declaration. After its initial efforts to staff the Emergency Operations Center and respond to communities within its boundaries, the district assisted FEMA with damage survey reports in the wake of the disaster. District personnel worked with local authorities to

review damage assistance applications and document the extent of destruction. FEMA used the surveys to determine compensation for the state.[30]

District work in support of FEMA has not been limited to emergency assistance. The district's Flood Plain Management Services Branch has provided Geographic Information System (GIS) services to the federal agency that have been applied to "emergency preparedness, community planning and water resources management." Although not formally part of the district's International and Interagency Services Program (see Chapter Nine), as of 1997 these reimbursable services for FEMA accounted "for close to 60 percent of the branch workload," including the branch's development of an innovative "all-hazards" map covering the entire state of Delaware. The map, "the first such GIS product in the country," provided critical

Surveying damages from a 1992 Nor'easter in Rehoboth Beach, Del.

location information based on the potential for emergency response necessitated by floods, hurricanes, earthquakes, and even nuclear disasters.[31]

On numerous occasions, the Philadelphia District has supported FEMA outside the district's boundaries. In September 2003, the district deployed personnel to support FEMA's response operations in the wake of Hurricane Isabel along the east coast. On 16 September, the district's Emergency Operations Center was activated, and the next day the district's emergency power crew, under the national PRT framework, headed to Virginia. Other district personnel, along with extra supplies of sandbags, were sent to assist with emergency response efforts in Delaware and New Jersey. As the storm subsided and the extent of damage was revealed, the district deployed additional staff to Washington, D.C., to assist FEMA with procuring and distributing ice.[32] Hurricane Isabel caused power outages, floods, and debris accumulation along the entire east coast, and the district did its part to assist with federal emergency response efforts throughout the affected area.

District deployments in response to hurricanes have extended beyond the borders of the continental United States, including twice to the Caribbean. In 1995, after Hurricane Marilyn, a small district team deployed to the U.S. Virgin Islands and Puerto Rico to help with building rehabilitation and debris removal, and to provide technical inspection services for contract operations.[33] Three years later, another team was in Puerto Rico providing disaster relief in the wake of Hurricane Georges. Fifteen district employees, including the first emergency power team to arrive in Puerto Rico following the storm, worked to mitigate damages. The teams assisted with debris removal, roofing, and onsite logistics. Back in Philadelphia, other district personnel were supporting the response by handling contracting services, running the Emergency Operations Center, and distributing essential Corps visibility items to persons on the ground.[34]

Other Emergency Responses

In addition to responding to natural disasters, the Philadelphia District has been involved in a number of unique activities related to its emergency response mission. In November 1990, the district's EMO participated in the recovery and extraction of American Civil War era artifacts from Fort Delaware on Pea Patch Island, Del. The fort was built in the early 1800s as part of America's coastal defense system and retained that purpose through the Civil War. However, as the war escalated, the fort functioned less as a defense against seaborne attack and more as a penitentiary for Confederate prisoners of war.[35]

More than 125 years later, the district received the mission of "coordinating the lifting and transporting of the Fort Delaware artifacts" from the island, which is accessible only by boat. Further complicating matters, historic gun carriages were buried in sand and exposed only at low tide, which restricted the project schedule to six days every two weeks for

In the early 90s, the District worked with the State of Delaware to retrieve and restore a number of Civil War-era gun carriages from Fort Delaware that had been exposed by erosion on the eastern shore of Pea Patch Island

The McFarland *on an emergency dredging mission in 1996 to clear North Carolina's Cape Fear River after Hurricane Fran—one of many such missions along the Atlantic and Gulf Coasts*

daylight operations. An additional safety concern was the potential for "unexploded ordnances in the vicinity of the gun carriages." District staff coordinated airlift operations with the Delaware National Guard to move the gun carriages to the mainland. As stated in a later account, "The successful completion of this mission is attributable to the conscientious efforts of the district personnel who were involved." The report went on to note that "the project was not only completed ahead of schedule, but was accomplished safely and to the complete satisfaction of the State of Delaware."[36]

The district also has responded to emergencies that have involved loss of life. On the night of 18 May 2000, patrons of a Philadelphia nightclub located on Pier 34 along the Delaware River were suddenly plunged into sixty-degree water "amid tons of debris" as a portion of the pier collapsed. The Coast Guard contacted the district for help in debris removal, "both to free up the shipping channel and to facilitate divers' search for bodies."[37] The collapse resulted in three deaths and forty-three injuries.[38] The district provided the Crane Barge *Titan* to assist with the removal of debris, the Survey Boat *Shuman* to inspect the vicinity for "obstructions to navigation," photographic

A crane from the Philadelphia District's labor and equipment force removes debris from the Pier 34 site

and videographic support, and technical staff to provide forensic engineering assistance to Philadelphia investigators.[39]

The district also took part in emergency operations in New York City on 11 September 2001, after terrorists flew airplanes into the World Trade Center towers. Starting "within hours of the terrorist attacks on September 11, when five of the *McFarland*'s crew helped transport thousands to safety across the Hudson River," the district was involved in aiding rescue and recovery efforts over the course of the ensuing weeks. District volunteers helped with "tasks from water transportation and power restoration to structural surveys and administrative and logistical services."[40] In Philadelphia, the EMO activated its Emergency Operations Center to assist with relief coordination; the center was staffed continuously for ten days following the attacks. Onsite, the district was tasked with the mission of receiving, staging, onward movement, and integration (RSOI)—processing all Corps personnel deployed to New York to ensure that everyone was properly credentialed and had personal protective equipment before they engaged in operations.[41]

Shortly after the 9/11 attacks and the subsequent heightened scrutiny of homeland defenses, district staff engaged in risk assessment surveys to help the federal government determine the threat to the district's dam infrastructure. The mission was to "improve protection, lower risk and be cost effective" by assessing potential damage and developing "techniques and procedures to mitigate such damage."[42] Following Corps-directed training

Philadelphia District personnel assisted in the initial federal response at "Ground Zero" in downtown Manhattan following the attacks of September 11, 2001

Among those from the Philadelphia District who helped out after 9/11 were five McFarland *crew members, in New York City for training, who immediately shifted to ferrying evacuees across the Hudson*

in Risk Assessment Methodology for Dams (RAM-D), district teams were sent to conduct the surveys, compile information, and quantify recommendations for Corps Headquarters. As Barry Leatherman, the district's team leader, reported after the operation, "The Team's thorough research and recommendations resulted in final products that were 200 to 500-hundred-page *[sic]* documents for each site assessed."[43]

The Corps also responded to disasters that were manmade or attributable to human error. The Philadelphia District's footprint covered waterways on which vessels transported petroleum products, inherently running the risk of oil spills. Although the U.S. Coast Guard was the first federal responder for such disasters, the Corps often worked with the Coast Guard to provide expert assistance. For example, on Friday, 26 November 2004, the day after Thanksgiving, the Tanker *Athos I* spilled approximately "265,000 gallons of crude oil into the Delaware River while en route to its destination." The Coast Guard called on the Philadelphia District to conduct surveys of the channel in search of obstructions that might have caused the spill. The district performed survey operations over the course of two weeks following the incident and found no objects impeding channel transport.[44] Ultimately, investigations concluded that nothing in the channel had caused the spill, placing responsibility for the resultant damages on the owner of the craft.[45]

Support for Military Contingency Operations

The district, like the rest of the Corps, has provided staff in support of the Global War on Terror, the military operations policy promulgated by the Bush administration in response to the 9/11 attacks. The district's EMO was responsible for administering the initial deployment of district personnel in support of this mission, soliciting volunteers, preparing them for deployment, and supporting overseas staff with administrative matters at home. The district's first task in preparing

volunteers for overseas service involved helping them assemble what EMO Chief Micky Mulvenna referred to as "the Fours": security clearance, an up-to-date passport, a signed volunteer statement, and a preliminary medical statement certifying their capacity to perform their potential jobs. Once volunteers had their papers in order, the EMO put them in contact with the Corps' Deployment Center for assignment overseas.[46]

The first decade of the 2000s closed with the United States embroiled in conflict abroad—the EMO supported 48 district volunteers who took their expertise to the front lines. Many served multiple tours in Iraq or Afghanistan. On the home front, the EMO provided the critical function of maintaining personal connections with the deployed staff's family at home.[47]

Beyond the collective contributions of the Philadelphia District's deployed civilian volunteers, its Contracting Division became a key component of the Corps' support for contingency operations. For example, in 1995 and 1996, the district's Civil Works Contract Administration Branch handled an estimated $30 million worth of contracts under its Work for Others Team. The contracts were to help U.S. peacekeeping forces upgrade medical facilities in Croatia and Bosnia. The work involved the installation of local and wide-area computer networks and video-teleconferencing, facilitating communications between overseas field hospitals and their support bases, and "improving the effectiveness of medical care for U.S. troops," an integral component of all military operations.[48]

The district's own contracting specialists also played a vital role

Philadelphia District hydrographic survey crews helped clear the Delaware River for reopening after the December 2004 Athos I *oil spill*

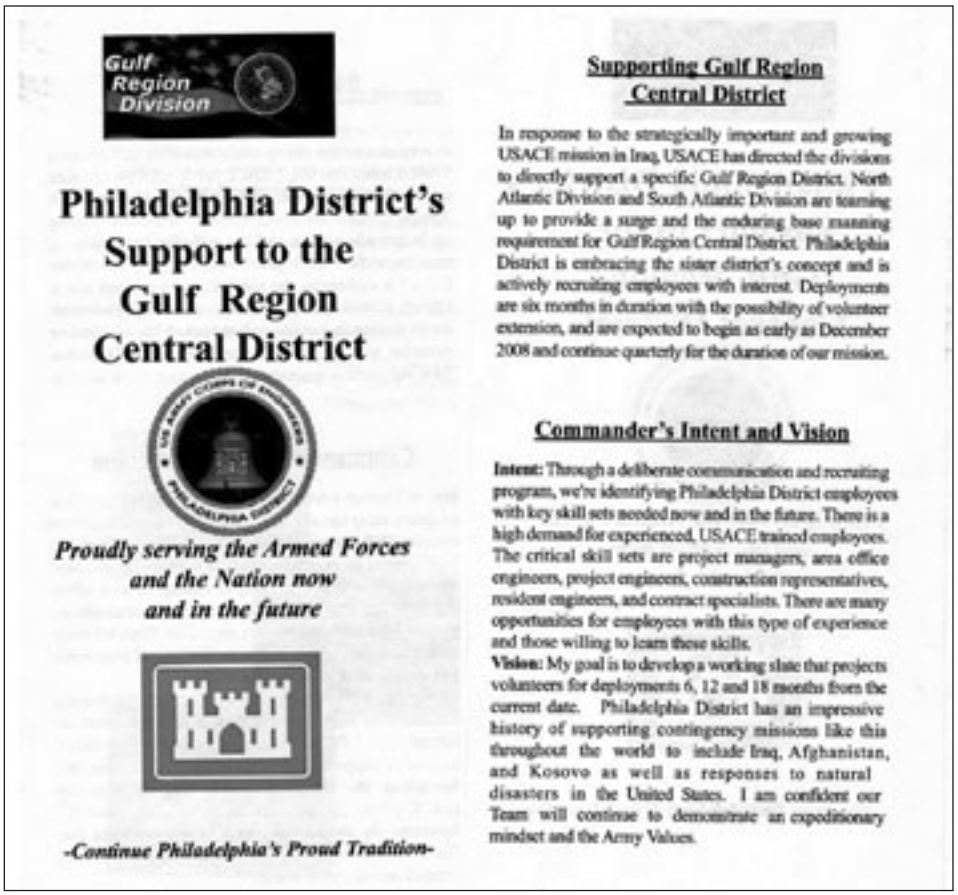
Civilian volunteers from the Philadelphia District have assisted with a wide variety of construction and repair projects in Iraq and Afghanistan since 2002

in the Global War on Terror (later redesignated Overseas Contingency Operations) in the 2000s, handling Corps contracts for power missions in support of both civil and military construction. As the district took on the challenge of restoring facilities and infrastructure in Iraq, one of the most urgent tasks was restoring and stabilizing that nation's electrical grid. The Philadelphia District's Contracting Division was selected as the Corps' single procurer of electrical power contracts to backfill the first response efforts of the 249th Engineer Battalion (Prime Power) in Iraq and Afghanistan. Multimillion dollar agreements were managed from the Philadelphia District office to install and operate power plants, construct transmission and distribution lines, and connect installations with electricity in ongoing missions overseas.[49]

* * * * * * *

The district's emergency and contingency operations have varied greatly in its history, but it has retained its fundamental mission of providing assistance to local and state governments and

to other federal entities in time of need. District personnel have served as emergency responders within the district, around the nation, and throughout the world, and have successfully enabled communities to recover and rehabilitate in the wake of natural and manmade disasters. In each instance, the district has answered the call quickly and fully, with numerous volunteers ready and willing to serve. This willingness is part of the very fabric of the Philadelphia District and its people, who prove themselves responsive and reliable when those qualities matter most.



Gulf Region Division

Philadelphia District's Support to the Gulf Region Central District

Proudly serving the Armed Forces and the Nation now and in the future

-Continue Philadelphia's Proud Tradition-

Supporting Gulf Region Central District

In response to the strategically important and growing USACE mission in Iraq, USACE has directed the divisions to directly support a specific Gulf Region District. North Atlantic Division and South Atlantic Division are teaming up to provide a surge and the enduring base manning requirement for Gulf Region Central District. Philadelphia District is embracing the sister district's concept and is actively recruiting employees with interest. Deployments are six months in duration with the possibility of volunteer extension, and are expected to begin as early as December 2008 and continue quarterly for the duration of our mission.

Commander's Intent and Vision

Intent: Through a deliberate communication and recruiting program, we're identifying Philadelphia District employees with key skill sets needed now and in the future. There is a high demand for experienced, USACE trained employees. The critical skill sets are project managers, area office engineers, project engineers, construction representatives, resident engineers, and contract specialists. There are many opportunities for employees with this type of experience and those willing to learn these skills.

Vision: My goal is to develop a working slate that projects volunteers for deployments 6, 12 and 18 months from the current date. Philadelphia District has an impressive history of supporting contingency missions like this throughout the world to include Iraq, Afghanistan, and Kosovo as well as responses to natural disasters in the United States. I am confident our Team will continue to demonstrate an expeditionary mindset and the Army Values.

A brochure explaining how the Philadelphia District supports the Gulf Region District of the Corps in Iraq, Afghanistan, and Kosovo

The power plant and distribution grid for Bagram Air Field, Afghanistan, contracted by the Philadelphia District and constructed by the 249th Engineer Battalion (Prime Power) and the Corps' Afghanistan Engineer District-North

[1] U.S. Army Corps of Engineers, Philadelphia District, "Disaster Response Primer," n.d., 3, Emergency Management Office Storage, Emergency Management Office, U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania (hereafter referred to as NAP-EMO).

[2] Act of 17 November 1986 (100 Stat. 4082).

[3] Kathleen "Micky" Mulvenna, conversation with Joshua Pollarine, 22 October 2009.

[4] U.S. Army Corps of Engineers, Philadelphia District, "Support to State & Local Governments (Emergency Authorities under Public Law 84-99)" <http://www.nap.usace.army.mil/emo/PL8499.htm> (21 May 2010).

[5] "Disaster Response Primer," 2–3.

[6] The Federal Response Plan was renamed the National Response Plan in 2004, and in 2008 became the National Response Framework. Mulvenna conversation, 22 October 2009.

[7] "Disaster Response Primer," 3.

[8] U.S. Army Corps of Engineers, San Francisco District, "Responding to Emergencies: The Role of the U.S. Army Corps of Engineers in Support of the Nation" <http://www.spn.usace.army.mil/infopaper.pdf> (21 May 2010) [emphasis in original].

[9] Mulvenna conversation, 22 October 2009.

[10] U.S. Army Corps of Engineers, Philadelphia District, "The Corps and the Federal Response Plan" <http://www.nap.usace.army.mil/emo/nrp.html> (21 May 2010); Mulvenna conversation, 22 October 2009; Edward Voigt, Chief, Public & Legislative Affairs, NAP, personal communication with Joshua Pollarine, 8 April 2011.

[11] U.S. Army Corps of Engineers, Philadelphia District, "Innovative Flood Fight Products Distribution Process" <http://www.nap.usace.army.mil/emo/NAP%20Flood-Fighting%20Products.pdf> (21 May 2010).

[12] Mulvenna conversation, 22 October 2009; U.S. Army Corps of Engineers, Philadelphia District, "Innovative Flood Fight Products Distribution Process" <http://www.nap.usace.army.mil/emo/NAP%20Flood-Fighting%20Products.pdf> (21 May 2010); U.S. Army Corps of Engineers, Philadelphia District, "Innovative Flood Fight Products" <http://www.nap.usace.army.mil/emo/NAP%20Innovative%20Flood%20Fight%20Fact%20Sheet%202007.pdf> (21 May 2010).

[13] U.S. Army Corps of Engineers, Philadelphia District, "Corps Visibility Items" <http://www.nap.usace.army.mil/emo/shirts.htm> (21 May 2010).

[14] The three regular EMO chiefs were Richard Nocella, Brian Mulvenna, and Kathleen "Micky" Mulvenna; however, acting chiefs were employed between tenures. Mulvenna conversation, 22 October 2009.

[15] "Organizational Update…Readiness Branch Renamed, Reports Directly to Front Office," *The Observer* (May/June 1999): 5.

[16] Mulvenna conversation, 22 October 2009.

[17] Patricia Barnes-Svarney, "Awful Agnes," *Weatherwise* (May/June 2002): 40.

[18] Philadelphia District, "Post-Flood Report, Hurricane Agnes, June 22, 23 1972," n.d., 1, Loose Papers, Box 7, Accession 77-97-0001, RG 77, FRC.

[19] "Post-Flood Report, Hurricane Agnes, June 22, 23 1972," n.d., 92, Loose Papers, Box 7, Accession 77-97-0001, RG 77, FRC.

[20] Voigt personal communication.

[21] "Post-Flood Report, Hurricane Agnes, June 22, 23 1972," n.d., 93-94, 96-100, Loose Papers, Box 7, Accession 77-97-0001, RG 77, FRC.

[22] Joel T. Callahan, Lieutenant Colonel, Corps of Engineers, Acting District Engineer, "Emergency Operations Assistance," 2 March 1979, File 500-1-1q Smithville Dam, Files, Emergency Operations Center, NAP-EMO.

[23] "Projects, People Join Forces in Wake of Flooding," *The Observer* (February 1996): 3.

[24] "Projects, People Join Forces in Wake of Flooding," 3.

[25] Voigt personal communication.

[26] "Continuing Authorities Fact Sheet, Emergency Streambank Erosion, Perkiomen Creek, Hereford Twp.," 30 May 1986, as found in "Philadelphia District Emergency Activities, 1989, Zone 3, Berks County," n.d., File 204-01, Berks County, PA, (Zone 3), Emergency Operations Center, NAP-EMO; U.S. Army Corps of Engineers, Philadelphia District, "Emergency Streambank Erosion Study, Feasibility Report, Manasquan River, Howell Township, Monmouth County, New Jersey," December 1989 (Revised October 1990), miscellaneous reports, unlabeled box, Planning Division, NAP; "Continuing Authorities Fact Sheet, Emergency Streambank Erosion Project, Darby Creek, Lansdowne Borough," 30 May 1986, File 204-01, Delaware County, PA, (Zone 5), Emergency Operations Center, NAP-EMO.

[27] Untitled document, report of damages to New Jersey communities from 1984 coastal storm, n.d., File Atlantic County, NJ, Emergency Operations Center, NAP-EMO.

[28] Andrews, Miller & Assoc., Inc., "Post Storm Report: Coastal Storm of 11-15 December 1992, Delaware and New Jersey Coast," November 1993, 1, 7, 70, Emergency Management Office Storage, NAP-EMO.

[29] "Work for FEMA Completed," *The Observer* (April 1993): 7.

[30] "District Answers FEMA Call for Damage Surveys," *The Observer* (March 1996): 4.

[31] "Getting to Know Flood Plain Management Services Branch," *The Observer* (February 1997): 6-7; Voigt personal communication.

[32] "District Provides Support during Hurricane Isabel," *The Observer* (October/November 2003): 24-25. For people affected by significant storm events, FEMA supplies such items as bottled water, bags of ice, tarps, and Meals Ready to Eat (MREs). In its response to Hurricane Isabel in Washington, D.C., the district was "mission assigned to provide ice." Kathleen Mulvenna email to Joshua Pollarine, 25 May 2010, copy in possession of the authors.

[33] "Three from District Take Part in Hurricane Marilyn Cleanup Work," The Observer (December 1995): 3, 19.

[34] "Volunteers Recognized for Hurricane Georges Relief Role," *The Observer* (January/February 1999): 4.

[35] "Saving Pea Patch Island," *The Observer* (September/October 1998): 8.

[36] At the time of the project, it was unclear why Emergency Management received this mission. Mulvenna conversation, 22 October 2009; "Justification," document provided by Robert Eckhardt, NAP.

[37] "Rapid Response at Pier 34," The Observer (May/June 2000): 3.

[38] Emilie Lounsberry, "Judge Declines to Jail Pier 34 Owner, Operator," *The Philadelphia Inquirer*, 22 June 2007.

[39] "Rapid Response at Pier 34," *The Observer* (May/June 2000): 3, 16; Voigt personal communication.

[40] U.S. Army Corps of Engineers, Philadelphia District, "Emergency Management" <http://www.nap.usace.army.mil/sb/emerg.htm> (21 May 2010).

[41] Mulvenna conversation, 22 October 2009.

[42] "District Team Supports Homeland Defense," *The Observer* (July/August 2002): 4.

[43] Leatherman quoted in "District Team Supports Homeland Defense," 4.

[44] "Survey Team Responds to Delaware River Oil Spill," *The Observer* (Winter 04/05): 4.

[45] Mulvenna conversation, 22 October 2009.

[46] Mulvenna conversation, 22 October 2009

[47] Mulvenna conversation, 22 October 2009; Voigt personal communication.

[48] "Contracting Plays Supporting Role in Bosnia Mission," *The Observer* (February 1996): 5.

[49] "Task Order," 27 June 2006, document provided by Bill Bailey, NAP; "Scope of Work," n.d., document provided by Bill Bailey, NAP; Voigt personal communication.

7

Military Construction and Installation Support

Throughout the twentieth century, the Philadelphia District's military construction (MILCON) mission encompassed widely varying levels of responsibility, from significant project loads in times of war to periods when the district had no military construction role. These workload fluctuations reflected larger trends in the Corps and the military as a whole, from periods of massive mobilization and the need for an increased military infrastructure to efforts aimed at reducing military spending and downsizing defense installations. The North Atlantic Division responded to the changing needs of the military by balancing its MILCON workload across its stateside districts. Thus, the Philadelphia District's level of construction support to Army and Air Force bases was largely dependent on other districts' capabilities. When demand was high, Philadelphia often supported more than one installation; in quieter times, its involvement was scaled back. Because of these fluctuations, the district had to exhibit flexibility in mobilizing quickly to respond to military construction needs; it was able to do this, thereby providing efficient and responsive service to the bases it served.

The Philadelphia District took on a significant MILCON role during the Second World War in response to the nation's mobilization efforts. The district participated in barracks construction to house the influx of recruits entering military service and

Facing page: pouring the foundation for a section of the Air Freight Terminal at Dover Air Force Base, Del.

constructed arsenal and ammunition facilities. It completed projects at installations such as Fort Dix, N.J., and Dover Army Airfield, Del. However, on 1 October 1944, the district's MILCON mission was transferred to New York and Baltimore, primarily so that the Philadelphia District could focus on civil works.[1]

But the break from the MILCON mission was a brief one. In 1950, as the United States again faced increasing military needs because of the Cold War and the Korean conflict, the district resumed its MILCON role, performing work at McGuire, Dover, and Pittsburgh Air Force Bases. Projects included ordnance depot design and construction, building facilities for the Signal Corps, and conducting rehabilitation work at Fort Dix. After the Korean armistice, the district's work turned toward missile defense sites in the greater Philadelphia area as America braced itself against the threat of nuclear attack. Although the district successfully carried out its MILCON mission throughout the 1950s, by 1960 Corps officials decided once more to transfer this work to New York and Baltimore.[2] Again, the transfer was temporary, although it lasted into the 1980s.

Installation Support: Fort Dix and McGuire Air Force Base

In the mid 1980s, Philadelphia District Engineer Lt. Col. Ralph Locurcio, facing a civil works mission that had declined from the 1970s because of the cancellation of projects such as Tocks Island and Trexler, sought to regain the district's MILCON role. In 1985, an opportunity presented itself when the North Atlantic Division was considering which district should construct what amounted to a completely new Army base at Fort Drum, N.Y. At a division meeting, Locurcio proposed transferring New York's responsibility for Fort Dix and McGuire Air Force Base to Philadelphia to allow the New York District to focus its efforts on constructing the new base. The division commander agreed with this suggestion, and in October 1985, after a twenty-five-year hiatus, the district resumed

MILCON operations as primary installation support provider to Dix and McGuire.[3]

Although the Philadelphia District now had responsibility for some military construction, it was not officially classified as a Corps Military District and thus did not directly receive MILCON funds. Instead, those monies were funneled through the Baltimore District, which had the Military District designation. However, to manage the increased workload, the Philadelphia District created the Military Project Management Branch within its Engineering and Construction Division, and continued to shape its workforce over the next several years as it recommenced construction assignments at these military installations.[4]

Much of the district's initial MILCON work was in operations and maintenance. For example, on an early trip to Fort Dix, Construction Branch Chief Brian Heverin found a sewage treatment center in particular disrepair. The steel frame of the facility was torn, and the pink insulation inside the wall was shredded. As Heverin contemplated the cause of the building's deterioration, the answer rounded the corner: a goat.[5] He wondered if this was an inauspicious introduction to the work needed at Fort Dix.

District officials wasted no time consulting with personnel at Dix and McGuire to identify past problems at the bases and determine what the Corps could do better. Resident engineers and contractors working at the bases told district staff that the contractors were concerned about getting paid on time, and the bases wanted projects completed on time. Another issue was the need

An aerial view of Fort Dix, N.J. (now part of Joint Base McGuire-Dix-Lakehurst), with the district-built wastewater treatment facility in the foreground

for better communication. The district responded by establishing a single point of contact and clear lines of accountability, streamlining and documenting business practices, equipping the resident engineer offices with updated telecommunications and information technology, and instituting monthly reports and meetings with the base civil engineers and the directorates of engineering and housing at Dix and McGuire. These innovations improved communications, which, in turn, improved levels of service to the bases.[6]

Over the next several years, the district handled a wide variety of MILCON projects. These included improvements to existing infrastructure and renovations to family housing and enlisted personnel dormitories, as well as the design and construction of state-of-the-art military facilities, such as a flight simulator addition for McGuire and weapons ranges at Fort Dix. By 1992, the district had twenty-seven active military construction contracts in hand totaling $61.3 million.[7]

One of the district's most significant and challenging projects in the 1990s was the construction of a tertiary wastewater treatment plant to serve both installations, one of the first such joint facilities, with a programmed project amount of $49.7 million. Outdated treatment plants at both bases necessitated renovation to handle military, domestic, and industrial wastewater. This project was unusual in the parameters within which it had to be completed—a strict, court-ordered time frame—and the environmental impacts that had to be considered. Because of the installations' failure to meet water quality discharge standards, a court order had been issued

Resource Recovery Facility, Fort Dix

Completed in 1996, the Tertiary Wastewater Treatment Facility was built to serve both Fort Dix and McGuire Air Force Base

requiring standards to be met, meaning that the district had to work on an expedited timeline. In addition, the project was located in the Pinelands National Reserve in New Jersey, which Congress had designated a natural reserve in 1978. Because of this designation, effluent could not be discharged into surface waters but had to be treated "to achieve *drinking water quality* for total direct recharge to the protected Pinelands Aquifer."[8]

The project required intensive coordination with the New Jersey Department of Environmental Protection (NJDEP), the Environmental Protection Agency (EPA), and the Pinelands Commission.[9] During the course of design and development, the district faced challenges in permit acquisition, compliance requirements, and changes in project effluent flow after the pilot tests had been completed.[10] Although the project underwent significant alterations while in progress, the district succeeded in constructing the new facility at 14 percent below the programmed cost.[11]

Completed in 1996, the project incorporated innovative technologies to meet the mandates of environmental protection coupled with the demands of treated wastewater flow. The plant featured "one of the first large-scale applications of an innovative biological nutrient removal (BNR) technology, the

Construction of the US Army Reserve Center at Fort Dix, N.J., built to accommodate units from other installations being closed under BRAC 2005

Bardenpho advanced activated sludge process, which removes nitrogen and phosphorus to extremely low levels." Capable of handling 4.6 million gallons daily through "total effluent recharge to the aquifer," the Fort Dix and McGuire Air Force Base tertiary wastewater treatment facility was "one of the first aquifer recharges of treated military wastewaters," and was "hailed by both military and government officials as a monumental step toward environmental enhancement."[12]

Beyond its joint work at Dix and McGuire, the district's MILCON included significant projects at each base. For example, at Fort Dix, the district oversaw the modernization and upgrading of base firing ranges. This $6 million project involved the renovation of firing ranges for pistols, machine guns, grenade launchers, and light antitank weapons, as well as those for tank ranges (using both stationary and moving targets). In addition, the district constructed new tube-launched, optically tracked, wire-guided (TOW) missile ranges.[13] These projects included building facilities such as weapons racks, classrooms, latrines, and ammo huts, and incorporated the installation of upgraded technology for remoted engagement target system (RETS) ranges.[13] The firing range project began in 1986 and was scheduled for completion before 1990, but it was delayed in August 1988 after the EPA and the U.S. Fish and Wildlife Service required the creation of new wetlands to replace those lost in construction of the ranges, which was not part of the original scope of work. To meet these requirements, the district created an in-house design for

the mitigation of approximately nineteen acres of wetlands and procured the NJDEP's approval of the proposed site. Final inspections of the Fort Dix range upgrade occurred in the early 1990s.[14]

Meanwhile, at McGuire Air Force Base, the district oversaw the construction of a $3 million addition to an existing C-141 flight simulator training facility for the 438th Military Airlift Wing. The project began in the early 1990s; two years in, the Air Force issued a temporary stop work order. Five months later, the district received a directive to "resume design with revised floor plan," which increased the size of the facility from 14,000 to 16,800 square feet. The Corps designed the facility to house "2 modern state-of-the art C-141 flight training simulators" as well as offices, a classroom, debriefing rooms, a cockpit procedures trainer, and other amenities. Despite the challenge of adjusting to the changed floor plan, the addition was quickly completed and underwent a final inspection in 1994, after jurisdiction had been transferred back to the New York District (see below).[15]

In addition, in the late 1980s and early 1990s, the Philadelphia District managed the design and

McGuire's Flight Simulator Facility

construction of a nearly $2 million security police complex at McGuire. The two-story facility was designed to house law enforcement, investigation, training, emergency services, and administration sections as well as a 900-square-foot armory. The project initially received only one construction bid in 1989 (30 percent higher than the government estimate); it was reopened for bids the following year and eventually completed under the initial estimated project amount of $2.3 million.[16]

Other projects at McGuire were geared toward health services facilities. The district managed a contract for the construction of a $3.6 million, 17,000-square-foot dental clinic that included laboratories, executive offices, and storage rooms. As part of the project, the district demolished the old clinic. Simultaneously, the district served as in-house architect for a new building adjacent to McGuire's whole blood processing laboratory to house freezer units for the storage of whole blood.[17]

The Philadelphia District also completed projects at McGuire that involved family housing and barracks renovation. Between 1986 and 1993, the district completed in-house design work for the demolition of nearly three hundred termite-damaged and deteriorated buildings in disrepair. These multimillion dollar contracts involved asbestos removal and modifications to utility and

Military construction projects at McGuire Air Force Base in the 80s and 90s included both demolition (top) and renovation (bottom) of enlisted personnel housing

Child Development Center at McGuire

service lines. In the same period, the district oversaw the renovation of barracks and improvements to unaccompanied enlisted personnel housing and family housing; these included roof repairs, installation of new doors and windows, asbestos abatement, and installation of air-conditioning in family housing units. Finally, in the early 1990s, the district completed the in-house design of a 29,000-square-foot child development center with a capacity of three hundred children for McGuire, scheduled for construction contract award in September 1993.[18] The district's MILCON work served both soldiers and their families.

However, the resumption of the district's MILCON role at Dix and McGuire was relatively short-lived. On 12 October 1993, the Philadelphia District Military Project Management Branch attended its final in-progress review meeting for the two installations, as Corps officials transferred the bases back to the New York District in 1994. The branch noted in its October monthly report that its association with Fort Dix and McGuire Air Force Base "has been mutually beneficial" and wished the

installations continued success in working with the New York District.[19] The phased transfer began on 1 October 1993, with active contracts transferred to the New York District by 1 October 1994 and a full transfer of contracting duties completed by December of that year. The only exception was the tertiary wastewater treatment facility, which the Philadelphia District would continue to administer "until financial closeout," including the retention of resident personnel assigned to the project.[20] Nearly six years later, the district's MILCON responsibility would return to Fort Dix through the Base Realignment and Closure Act (discussed below).

Installation Support: Dover Air Force Base

While its MILCON role was diminishing at Dix and McGuire, the district received a new assignment at another familiar base. In 1994, the Corps reassigned military construction at Dover Air Force Base from the Baltimore District to the Philadelphia District. With this reassignment, the district inherited responsibility for a number of projects in progress at Dover, among them over $12 million in new construction of airmen's dormitories and a $16 million replacement of an underground aircraft hydrant fueling system, as well as new design and construction assignments.[21] The district applied the experience it had gained through its Dix and McGuire work to take a more active role in the design of new projects at Dover.

One of the first Dover projects the district designed was a $5.9 million mobility passenger processing center. At 34,900 square feet, the new center was over twice the size of its predecessor and was designed to handle "more than 100,000 active military personnel, retirees, and dependents who pass through Dover AFB each year."[22] At the facility's groundbreaking ceremony on 30 October 1995, North Atlantic Division Commander Brig. Gen. Milton Hunter commented on the district's efforts and the partnership it had

Airman dormitories at Dover

A common area inside Dover's dormitories

Dover's then state-of-the-art Passenger Terminal

The award-winning Visiting Officers' Quarters at Dover

created with the state of Delaware and the base:

> We prepared a state-of-the-art design in less than 10 months, thanks to a great effort by both the Philadelphia District and the base civil engineer. The State of Delaware worked closely with us to address all the environmental issues, and we benefited from strong congressional support. As a result, this facility will serve our airmen and women, soldiers, sailors and marines well into the 21st century.[23]

Just two years later, on 10 October 1997, the terminal opened for business. Dover Air Force Base Commander Col. Felix M. Grieder expressed his thanks to the Corps for constructing, in his words, "the finest Air Force passenger terminal in the United States."[24]

For the district, this was just one project among many. By October 1996, Philadelphia was managing "14 projects totaling $67 million out of its resident office at Dover."[25] One of them was a projected $6.8 million C-5 aerial delivery facility under in-house design by the district, which would be used by pilots to maintain required drop certifications.

The district was also involved in evaluating proposals for a 64,200-square-foot visiting officers' quarters for temporary duty personnel. This project, estimated at $12 million and under Philadelphia contract management, received an Air Force award for design excellence in 1998. It opened its doors in February 2000.[26]

Another MILCON project was notable for its solemn significance: the Charles C. Carson Center for Mortuary Affairs at Dover Air Force Base. As of 2008, the mortuary held numerous distinctions: it "not only serves as our Nation's sole port mortuary but is the largest mortuary in the DoD [Department of Defense] and the only one located in the continental United States."[27] The Philadelphia District undertook the mission to design and construct the 73,000-square-foot facility to replace the existing mortuary at Dover, which had been in service since 1955. The assignment, "designated an emergency project based on the 9/11 attacks and the continued threat of major terrorist activity," included demolition of the existing mortuary

The Charles C. Carson Center for Mortuary Affairs at Dover Air Force Base is the Department of Defense's sole stateside mortuary

An interior view of the new facility

Fort Dix Consolidated Club

Timmerman Conference Center, Fort Dix

Ammunition Storage Facility, Fort Dix

Fire/Crash Rescue Station, Dover Air Force Base

Air Freight Terminal, Dover Air Force Base

Dover Air Force Base Consolidated Club

buildings and construction of a $30 million, state-of-the-art facility. The district broke ground on 8 April 2002, and the mortuary officially opened in October 2004.[28] According to the Air Force, the center was responsible "for the return of all Department of Defense (DoD) personnel and dependents from Overseas Contingency Operations (OCO)" and, when requested, "maintains contingency response capabilities in the event of homeland mass fatalities."[29] The mortuary was the first stopping point on United States soil in the return journey of all U.S. service personnel killed in the line of duty in operations abroad.[30]

The district's near-decade-long span of work at Dix and McGuire had prepared it for MILCON projects at Dover, and it applied the expertise it gained at those bases to its Dover work. Likewise, as the district moved into the 2000s, it expected to use the experience it had gained at Dover. This experience would prove important as the district dealt with changes produced by the Base Realignment and Closure program.

The Effects of the Base Realignment and Closure (BRAC) Program on MILCON

In October 1988, not long after the district resumed its MILCON activities, Congress enacted the Base Realignment and Closure Act (BRAC). According to the Department of Defense (DoD), this law was intended to allow DoD "to more readily close unneeded bases and realign others to meet its national security requirements." The act stemmed from the ending of the Cold War in the late 1980s, which left the United States with a downsized military and excess facilities in the United States and in Europe. The law created BRAC commissions to "recommend specific base realignments and closures to the President, who in turn sent the commissions' recommendations with his approval to the Congress."[31] Over the next eighteen years, five rounds of BRAC commissions either closed or realigned numerous bases in the United States. The Philadelphia District's MILCON work emerged relatively unscathed from BRAC,

but it did experience some effects. The most significant were the closure of a Defense Logistics Agency facility in Philadelphia, the realignment of Fort Dix from an active Army training installation to an Army Reserve facility, and the addition of more MILCON work at Aberdeen Proving Ground in Maryland.

In 1993, the BRAC commission slated the Defense Personnel Support Center (DPSC) in Philadelphia for closure. This was a facility for which the district had provided some support in the preceding years. The center, known throughout the Second World War and up to 1965 as the Philadelphia Quartermaster Depot, was a branch of the Defense Logistics Agency tasked with providing the armed forces with the consumable items necessary for the execution of their duties. In the 1990s, the DPSC was the troop support center, supplying "armed services members with food, clothing, textiles, medicines, medical equipment, and construction supplies and equipment."[32] The Philadelphia District assisted with this mission by managing both MILCON and operation and maintenance construction for the DPSC. These projects included heating and cooling system maintenance and roof repair as well as contaminant remediation for polychlorinated biphenyl (PCB) transformer removal and DDT clean-up. After BRAC designated the facility for closure, the district prepared to end its support at the center. When the DPSC officially closed in 1999, the district's work at the facility ended as well.[33]

Headquarters building for the Defense Personnel Support Center before closure and redevelopment (currently leased by Defense Realty, LLC)

Although BRAC removed some military facilities under the district's jurisdiction, the program also added MILCON work. For example, because of

BRAC realignment of Fort Dix's responsibilities, the district once again received jurisdiction over it on 1 May 2000.[34] Dix retained its military training mission for Reserve personnel, so its MILCON needs continued.[35] Upon receiving responsibility for Fort Dix, the Philadelphia District immediately assumed work on several multimillion dollar projects in progress.

One of these projects was the construction of an approximately $7 million centralized tactical vehicle wash facility that incorporated access roads and drive-through prewash basins; another involved taking on contracting responsibilities for a nearly $10 million ammunition supply point that would include an operations building, inspection building, residue turn-in building, and ten 2,000-square-foot storage magazines. Work on the supply point was delayed when ordnance was discovered at the job site, but six months later the project was back online, and it officially opened on 10 February 2003.[36]

An armored personnel carrier proceeds through Fort Dix's Tactical Vehicle Wash Facility

The district also completed in-house design work for Dix in the early 2000s, modernizing the base in two distinct ways. Beginning in 2001, the district designed a complete $13 million renovation of three barracks dating from the 1950s for officers' quarters. The three-story buildings required both interior and exterior renovations, including new windows, doors, interior partition walls, an upgraded dining facility, and connections for computers, telephones, and cable television.[37]

Fort Dix ammunition storage facility under construction

The second modernization project occurred in 2004 when the district completed an in-house design of an urban assault course. The project reflected the changing nature of America's involvement in modern war, in which operations occur against armed insurgents in primarily populated areas. The course was "based on the most recent designs developed" by the Combined Arms Military Operations in Urban Terrain Task Force. The five-station facility incorporated "an Individual/Team Trainer, Squad/Platoon Trainer, Grenadier Gunnery Trainer,

Renovated barracks at Fort Dix

Fort Dix Annual Training Barracks, renovated by the District for the U.S. Army Reserve Command

Offense/Defense House, and an Underground Trainer." The course included targets for each station, and although it was not designed as a live-fire range, the Grenadier Gunnery station could support the use of 40mm target practice rounds and 5.5mm service ammunition.

Building new family housing units at Dover Air Force Base

The total cost for the project was estimated at $2.4 million.[38]

The BRAC process also brought the Philadelphia District new work at Aberdeen Proving Ground in Maryland. The 2005 BRAC commission recommended the closure of Fort Monmouth, N.J., and the transfer of the Army's research and development operations for Army Team C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) to Aberdeen. Because the Baltimore District (which had responsibility for Aberdeen) was already facing an increased MILCON workload under BRAC, Baltimore outsourced work on the C4ISR center (at one time estimated to be nearly $500 million) to the Philadelphia District.[39] Most of the work involved constructing a 1.6-million-square-foot facility and streamlining Monmouth's sixty to seventy buildings into thirteen new structures (plus one to be renovated) at Aberdeen. On 17 March 2008, a groundbreaking ceremony heralded the start of Phase I construction on the project.[40]

By 2007, the North Atlantic Division had programmed $275 million in MILCON work to the Philadelphia District for the next five years.[41] Recognizing the increasing role the district was playing in military construction, the Corps restored its official designation as a Military District in 2009.[42] With that designation, and with projects such as C4ISR, the Philadelphia District seemed poised to continue its MILCON work in the twenty-first century.

* * * * * * *

New facilities under construction at Aberdeen Proving Ground, Md., in 2008 for relocation of the Army's Team C4ISR from Fort Monmouth, N.J.

An artist's rendering of the completed C4ISR complex at Aberdeen Proving Ground

Dover's new Air Traffic Control Tower, 2008

Throughout the twentieth century, the Philadelphia District's MILCON role fluctuated with the changing needs of the military. During periods of massive military build-up, the district was called on to provide military installation support where needed; it completed a number of construction assignments throughout the Northeast. Through the 1970s and the first half of the 1980s, the district had no MILCON mission, but that hiatus ended in 1985 when new military construction necessitated a shared workload among Corps districts, resulting in the transfer of responsibilities for Fort Dix and McGuire Air Force Base to the Philadelphia District. In its resumed MILCON role, the district took on a wide variety of projects—from facilities for frontline soldiers, such as training courses and firing ranges, to renovation of barracks and family

housing. As the basing requirements of the military changed in the 1990s, so did its military construction needs and, accordingly, the district's MILCON duties. Dix and McGuire were transferred to other districts, but the Philadelphia District acquired work at Dover Air Force Base. The district took the changes in stride, applying lessons learned from its work at Dix and McGuire to Dover. As a result of the BRAC program, some of the district's MILCON work came to an end and the DPSC closed permanently; but the district gained new work, including responsibility again for Fort Dix and the C4ISR project at Aberdeen Proving Ground. Despite the repeated transfers, the district maintained a strong association with its MILCON customers throughout this period and became known for its responsiveness to the needs of the various bases. This responsiveness allowed the district to complete projects in an efficient and cost-effective manner, earning it recognition for its outstanding work and cementing its military construction role for the future.

[1] Snyder and Guss, *The District*, 142–144.

[2] Snyder and Guss, *The District*, 145, 150, 155.

[3] Locurcio interview, 6–7; Snyder and Guss, *The District*, 155; Unpublished Morgan Draft District History, 132.

[4] It is not clear why MILCON funds came through the Baltimore District and not the New York District. Paul Gaudini email to Joshua Pollarine, 20 April 2010, copy in possession of the authors.

[5] Brian Heverin, conversation with Paul Sadin, 8 August 2009.

[6] Heverin conversation, 8 August 2009; Edward Voigt, Chief, Public & Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 19 April 2011.

[7] Construction Services Branch, Philadelphia District, "Orientation Briefing for LTC Richard F. Sliwoski, District Commander," July 1992, Loose Papers, Drawer 3, John Burnes Office, Philadelphia District.

[8] U.S. Army Corps of Engineers, Chief of Engineers, Design and Environmental Awards Program, "Fort Dix/McGuire Air Force Base Tertiary Wastewater Treatment Facility," 1998, document provided by Paul Gaudini, Philadelphia District [emphasis in original]; Paul Gaudini email to Joshua Pollarine, 1 June 2010, copy in possession of the authors.

[9] U.S. Army Corps of Engineers, Philadelphia District, Military Construction Management Report [hereafter Military Construction Management Report], "In Progress Review: Design Projects, Fort Dix, New Jersey," 19 October 1988, A-2, File FY 1989 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," September 1988, A-2, File 1988 IPR Fort Dix, ibid.; Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," October 1990, A-1.2, File FY 1991 IPR Fort Dix, ibid.

[10] Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," October 1989, A-2-1, File FY 1990 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District. Although design started in 1988, a directive altering flow amount to 3.6 million gallons daily was not issued until 10 January 1991. Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 8 October 1991, A-1.1, File FY 1992 IPR Fort Dix, ibid.

[11] U.S. Army Corps of Engineers, Chief of Engineers, Design and Environmental Awards Program, "Fort Dix/McGuire Air Force Base Tertiary Wastewater Treatment Facility," 1998, document provided by Paul Gaudini, Philadelphia District.

[12] U.S. Army Corps of Engineers, Chief of Engineers, Design and Environmental Awards Program, "Fort Dix/McGuire Air Force Base Tertiary Wastewater Treatment Facility," 1998, document provided by Paul Gaudini, Philadelphia District.

[13] Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," October 1989, A-1, File FY 1990 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "STAR Report, Military Construction, Fort Dix, New Jersey," 23 June 1986, n.p., 33–34, 38, File FY 1986 IPR Ft Dix, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; S. J. Bucolo, Acting Chief, Planning/Engineering Division, "SUBJECT: MCA PN 227, FY88, Range Upgrade, Fort Dix," 24 September 1986, File FY 1986 IPR Ft Dix, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District.

[14] Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 10 September 1991, C-2, File FY 1991 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; see also Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 19 October 1988, A-1, File FY 1989 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; "Fort Dix Military Construction," 13 July 1992, 1, Loose Papers, Drawer 3, John Burnes Office, Philadelphia District.

[15] Military Construction Management Report, "In Progress Review: Design Projects, BCE McGuire Air Force Base, New Jersey," 9 October 1990, 4, File FY 1991 IPR McGuire AFB, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; U.S. Army Corps of Engineers, Philadelphia District, Fort Dix/McGuire Resident Office, "In Progress Review, Military Construction Projects, Management Reports, McGuire A.F.B., New Jersey," 12 October 1994, n.p., File FY 94 IPR McGuire, ibid.

[16] Military Construction Management Report, "In Progress Review: Design Projects, BCE McGuire Air Force Base, New Jersey," 11 October 1988, 3, File FY 1989 IPR McGuire AFB, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; U.S. Army Corps of Engineers, Philadelphia District, Fort Dix/McGuire Resident Office, "In Progress Review, Military Construction Projects, Management Reports, McGuire A.F.B., New Jersey," 12 October 1993, 5, File FY 94 IPR McGuire, ibid.; Military Construction Management Report, "In Progress Review: Design Projects, BCE McGuire Air Force Base, New Jersey," 4 October 1989, 2, File FY 1990 IPR McGuire AFB, ibid.; Military Construction Management Report, "In Progress Review: Design Projects, BCE McGuire Air Force Base, New Jersey," 9 October 1990, 2, File FY 1991 IPR McGuire AFB, ibid.

[17] Military Construction Management Report, "In Progress Review: Design Projects, BCE McGuire Air Force Base, New Jersey," 4 October 1989, n.p., File FY 1990 IPR McGuire AFB, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District.

[18] Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," September 1986, F-1, File FY 1986 IPR Ft Dix, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 10 September 1991, D-2, File FY 1991 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," September 1988, F-1, File 1988 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "STAR Report, Military Construction, Fort Dix, New Jersey," 23 June 1986, n.p., File FY 1986 IPR Ft Dix, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 12 October 1993, D-1, File FY 1993 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," October 1990, 2, File FY 1991 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, BCE McGuire Air Force Base, New Jersey," 14 September 1993, 2, File FY 1993 IPR McGuire AFB, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District.

[19] Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 12 October 1993, forward, File FY 1993 IPR Fort Dix, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District.

[20] Draft, Memorandum of Understanding between New York District and Philadelphia District, North Atlantic Division, for Transfer of Military Programs Work, Fort Dix, N.J. and McGuire Air Force Base, N.J., 3 September 1993, 3, 4–6, File Military Transfer Aug-Sep 93, Drawer 2, John Burnes Office, Philadelphia District.

[21] Military Construction Management Report, "In Progress Review: Construction Projects, BCE Dover Air Force Base, Delaware,"6 September 1994, n.p., File FY 1994 IPR Dover AFB, DE, Drawer Dover IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Design Projects, BCE Dover Air Force Base, Delaware,"19 October 1994, 11, File FY 1994 IPR Dover AFB, DE, ibid.

[22] "The Project Place: Getting the Job Done at Dover AFB," The Observer (October 1996): 8; Military Construction Management Report, "In Progress Review: Design Projects, BCE Dover Air Force Base, Delaware," 19 October 1994, 9, File FY 1994 IPR Dover AFB, DE, Drawer Dover IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District.

[23] As quoted in "Work Begins on Passenger Terminal for Dover AFB," *The Observer* (December 1995): 15.

[24] "Passenger Terminal, Dorms Completed at Dover," *The Observer* (September/October 1997): 4.

[25] "The Project Place: Getting the Job Done at Dover AFB," 8.

[26] Military Construction Management Report, "In Progress Review: Design Projects, Air Mobility Command, Base Civil Engineering, Dover Air Force Base, Delaware," 18 September 1996, 4–5, no file title, Drawer Dover IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; "Award-winning Design Goes to Work at Dover Air Force Base," *The Observer* (January/February 2000): 4.

[27] U.S. Air Force Fact Sheet, "Air Force Mortuary Affairs, Port Mortuary," August 2009 <http://www.mortuary.af.mil/library/factsheets/factsheet_print.asp?fsID=15361&page=1> (21 May 2010).

[28] U.S. Army Corps of Engineers, Philadelphia District, "A New Millenium: 1999-2005" <http://www.Philadelphia District.usace.army.mil/sb/Time_1999-2005.pdf> (21 May 2010); "Dover Air Force Base: Mortuary," *The Observer* (November/December 2002): 6; K. L. Vantran, "New DOD Mortuary Opens at Dover," *American Forces Press Service*, 30 October 2003, digital copy available at <http://www.af.mil/news/story.asp?storyID=123005914> (21 May 2010).

[29] U.S. Air Force Fact Sheet, "Air Force Mortuary Affairs, Port Mortuary." Overseas Contingency Operations was the Obama administration's name for the Global War on Terror, the military operations policy promulgated by the Bush administration in response to the attacks of 11 September 2001.

[30] Vantran, "New DOD Mortuary Opens at Dover."

[31] U.S. General Accounting Office [GAO], *Military Base Closures: Better Planning Needed for Future Reserve Enclaves*, Report No. GAO-03-723 (Washington, D.C.: U.S. General Accounting Office, 2003), digital copy (no page numbers) available at <http://www.gao.gov/htext/d03723.html> (21 May 2010); see also U.S. Department of Defense, Report of the Defense Secretary's Commission, "Base Realignment and Closures," December 1988, 6–11, digital copy available at <http://www.hqda.army.mil/acsimweb/brac/003283.pdf> (21 May 2010).

[32] Defense Logistics Agency, Defense Supply Center Philadelphia, "History of Defense Supply Center Philadelphia" <http://www.dscp.dla.mil/history.asp> (21 May 2010); Defense Logistics Agency, Defense Supply Center, Philadelphia, "Defense Supply Center Philadelphia" <http://www.dscp.dla.mil/> (21 May 2010).

[33] U.S. Army Corps of Engineers, Philadelphia District, "Defense Personnel Support Center, Military Construction," 10 July 1992, 30–41, Loose Papers, Drawer 3, John Burnes Office, Philadelphia District; Military Construction Management Report, "In Progress Review: Construction Projects, Defense Personnel Support Center, Philadelphia, PA," 1 February 1996, 1, File FY 1989 IPR McGuire AFB, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; Military Construction Management Report, "In Progress Review: Construction Projects, Defense Personnel Support Center, Philadelphia, PA," 1 February 1996, 5, File FY 1989 IPR McGuire AFB, Drawer McGuire IPR, Cabinet 8, files in 7th floor hallway, Philadelphia District; Department of Defense, "Base Closure and Realignment Schedules as of September 30, 2001," 30 September 2001 <http://www.oea.gov/OEAWeb.nsf/D6457626D512D16E85256E8300447D2F/$File/ BRAC%20Schedules%20Report2.pdf> (21 May 2010).

[34] "Fort Dix Returns to the Philly Fold," *The Observer* (March/April 2000): 4.

[35] GAO, *Military Base Closures*, n.p.

[36] The project amount started at $6.4 million and was later modified to $7.2 million. Military Construction Management Report, "In Progress Review: Design Projects, Fort Dix, New Jersey," 14 November 2000, 1, File Ft Dix IPR 14 Nov 00, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; "Tactical Vehicle Wash Facility," 24 September 2004, File Dix IPR 24 Sep 04, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; Lieutenant Colonel Timothy Brown, "As I see it…Global Expertise + Neighborhood Solutions – The DISTRICT that GETS IT DONE," *The Observer* (Summer 2001): 3; "Ammunition Supply Point," 24 September 2004, File Dix IPR 24 Sep 04, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District.

[37] Fact Sheet, AT Barracks Upgrade, Ft. Dix, FY 02, October 2001, File Ft Dix IPR 27 Aug 01, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District; "AT Barracks Renovation," 25 October 2004, File Dix IPR 29 Oct 04, ibid.

[38] "Urban Assault Course," 27 October 2004, File Dix IPR 29 Oct 04, Drawer Dix IPR, Cabinet 10, files in 7th floor hallway, Philadelphia District.

[39] Ed Lopez, Communications-Electronics Command [CECOM], "Future Army C4ISR Facilities a Convergence of Many Goals," 6 July 2009 <http://www.army.mil/-news/2009/07/06/23924-future-army-c4isr-facilities-a-convergence-of-many-goals/> (21 May 2010); Jim Parsons, "Owner of the Year: U.S. Army Corps of Engineers Baltimore District," Summer 2009 <http://midatlantic.construction.com/ features/archive/2009/summer09_C_OwnerOfTheYear.asp> (21 May 2010).

[40] Ed Lopez, Communications-Electronics Command [CECOM], "Future Army C4ISR Facilities a Convergence of Many Goals," 6 July 2009 <http://www.army.mil/-news/2009/07/06/23924-future-army-c4isr-facilities-a-convergence-of-many-goals/> (21 May 2010); Jim Parsons, "Owner of the Year: U.S. Army Corps of Engineers Baltimore District," Summer 2009 <http://midatlantic.construction.com/ features/archive/2009/summer09_C_OwnerOfTheYear.asp> (21 May 2010); U.S. Army Corps of Engineers, Philadelphia District, "Solution Builders," <http://www.Philadelphia District.usace.army.mil/solution.htm> (21 May 2010). By the summer of 2010 the district would turn over the first five buildings to Team C4ISR on time and within budget. Voigt personal communication.

[41] U.S. Army Corps of Engineers, North Atlantic Division, "Corps of Engineers BRAC/MILCON 07-11," 10 August 2006, document provided by Philadelphia District.

[42] Brigadier General Todd T. Semonite, Commander, North Atlantic Division, Memorandum for Record, 17 April 2009, document provided by Edward Voigt, Philadelphia District.

8

The Marine Design Center

Created in 1908 as the Marine Division and headquartered with the Philadelphia District since 1938, the Marine Design Center (MDC) has had a distinguished history within the Corps of Engineers. From the outset, the mission of the Marine Division (renamed the Marine Design Division in 1938 and the Marine Design Center in 1979) was to provide the Corps with "a group of naval architects and marine, mechanical, and electrical engineers who could design, build, and maintain the complex craft needed to improve and maintain our inland and coastal waterways."[1] The center has upheld and expanded this mission throughout its history, as it has provided services not just for the Corps but for other government agencies as well. Physically collocated with the Philadelphia District but operating as a separate entity, the MDC uses innovative technologies and rehabilitative maintenance to keep the Corps' fleet afloat.

At its inception, the MDC was the only division in the Corps with nationwide responsibility.[2] Its initial assignment centered on the development and maintenance of the Corps' dredge fleet, the critical element in ensuring the navigability of the nation's waterways. During the Second World War, the division's responsibilities increased significantly, as it engaged in various projects and expanded its portfolio. The division designed and constructed "tugboats, towboats, barges of wood and steel, floating cranes, floating machine shops, port

The USACE Marine Design Center logo

Facing page: Survey Boat Moritz *during sea trials, prior to delivery by the Marine Design Center to the New York District*

The Towboat Creve Coeur

repair ships, and floating power plants." It outfitted dredges with guns, armor, and ordnance.[3] These changes supported the war effort; with the cessation of hostilities, the division turned away from gunnery and armaments and resumed its work of refining, rehabilitating, and applying state-of the-art technologies to Corps vessels.

From the 1950s to the 1970s, the MDC worked on a variety of innovative projects. It designed controllable pitch propellers for dredge use and implemented the first enclosed duct-type bow thruster on an American dredge. Staying on the cutting edge of technology, the MDC designed the first floating nuclear power plant, the *Sturgis*, which was capable of generating 10,000 kilowatts. The Corps deployed the vessel for use in the Panama Canal Zone. At the same time the MDC was developing new technologies, it upgraded older ships with modern equipment so they could continue in service, repowering dredges and converting them to use

contemporary techniques, such as topside discharge via a "snorkel" (1960s). The division continued its work on other watercraft for the Corps, designing and managing the construction of barges, towboats, and survey boats.[4]

The 1970s was a time of change for the MDC. Throughout most of the decade, the center operated under the aegis of the Philadelphia District, so the division chief reported to the district engineer. In 1979, that arrangement changed as a result of a Corps-wide reorganization in which a number of separate organizations dealing with water resources were gathered under the umbrella of the Water Resources Support Center, headquartered at Fort Belvoir, Va. The MDC was transferred to the new organization and placed within its Dredging Division. But although the center reported to a new chief, its offices remained in Philadelphia. As former MDC Director Keith Lawrence recalled, "We stayed right there. Nothing changed,

Construction of a survey boat

The Marine Design Center teams with workers at the Corps' Ensley Engineer Shipyard in Memphis, Tenn. to set the kingpost on the St. Paul District's Crane Barge Leonard *prior to load testing*

nobody moved, nothing happened, but organizationally we were no longer part of the Philadelphia District. We were now part of the Water Resources Support Center."[5]

The organizational transfer of the MDC was followed by other changes focused on keeping up with rapid innovations in technology, such as upgrading personnel qualifications to incorporate computer-aided drafting and design. Certain positions were realigned, with such jobs as inspectors and draftsmen reclassified to professional engineering posts. Having an increasingly professional staff generated new responsibilities, and expanded responsibility led to increased staff interest in the projects. In addition, the creation of project teams allowed a greater delegation of accountability within the center. Each team, with its own project manager and project engineers, became "the face of the organization" to the project sponsor.[6] The use of a single project manager "from the initial studies to sea trials" was an effective maneuver and foreshadowed the Corps' implementation of life cycle project management in the 1990s.[7]

Although the MDC was under the auspices of the Water Resources Support Center, it was a self-sustaining unit. As Lawrence explained, "Nobody in the Corps of Engineers has Marine Design Center in their budget….the organization exists only on the work that comes in." The MDC had to promote itself as an organization to ensure that other entities within the Corps knew "who could help them, who could get them the right kind of equipment that they needed to help them repair what they needed, improve what they had."[8] The MDC's continued existence testified to its usefulness, expertise, and excellence.

Because the MDC remained housed with the Philadelphia District, it continued to rely on the district for administrative support. The district provided contracting and human resources services, as well as finance, accounting, and legal support on a reimbursable basis—and occasionally assisted with technical support unique to district missions. As Lawrence

recalled, although it was separate, the MDC "still worked hand-in-glove with all the elements of the Philadelphia District." Because the district provided contract support, the district engineer had to sign off on contracted work for the MDC, although the work was subsequently managed by the MDC with minimal district involvement.[9]

Changes in the MDC's administrative affiliation continued into the 1980s. Just as the MDC had to perpetuate itself through its project load, its umbrella organization, the Water Resources Support Center, was also somewhat precariously positioned. According to Lawrence, when the head of the Dredging Division retired, that branch of the Support Center simply "ceased to exist."[10] With no clear direction as to the revised chain of command, the MDC director took the initiative to report to the director of civil works at Corps Headquarters. Perhaps because of this, the MDC was established as an unaffiliated field operating activity in 1989, reporting directly and officially to the Directorate of Civil Works.[11]

Cover design for MDC information brochure

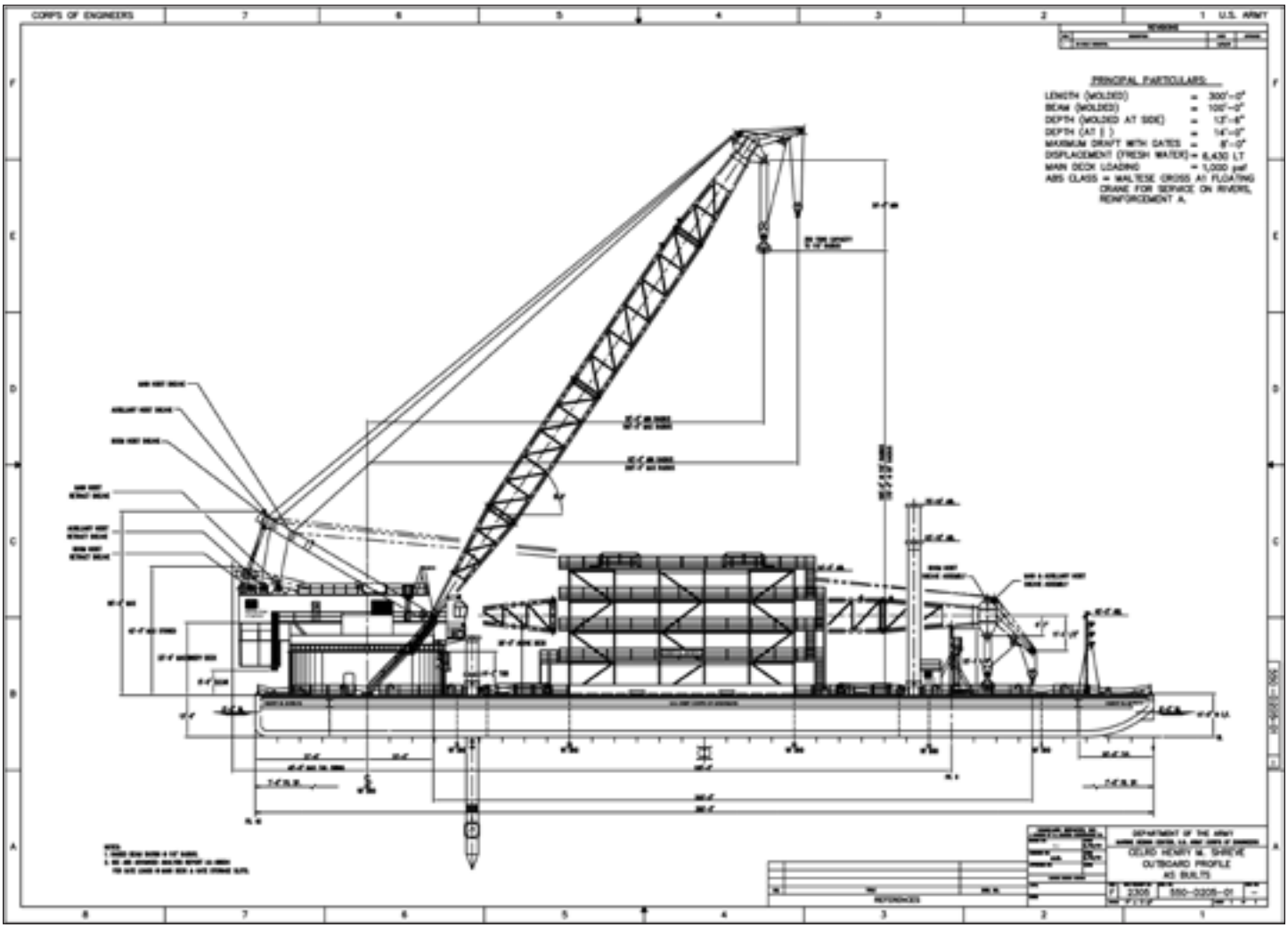
The Dredge Chester Harding

Three of the Corps' four "Minimum Fleet" oceangoing Hopper Dredges (from front): McFarland, Wheeler, *and* Essayons

The MDC was significantly affected by operational changes as well. In 1976, the Office of the Chief of Engineers "directed the Marine Design Division to begin preliminary design work on three new state-of-the-art hopper dredges," to be constructed under the most "modern marine construction techniques."[12] However, in 1978, Congress passed legislation requiring the secretary of the army to "retain only the minimum federally owned fleet capable of performing such work."[13] In effect, the MDC was tasked with designing new dredges while the Corps sought ways to reduce the fleet.

A Corps of Engineers study completed in response to the 1978 legislation recommended "that the hopper dredge portion of the minimum fleet consist of 8 dredges: 1 large class, 4 medium class and 3 small class dredges."[14] This would occur as a phased reduction in the fleet, dropping from fifteen dredges in fiscal year 1978 to the recommended eight by fiscal year 1983.[15] The upshot of phasing in the fleet reduction was that the MDC continued with its design and construction of three new dredges that would replace older, still active models.

The MDC successfully carried out its orders. In 1981, it completed construction of the small-class Dredge *Yaquina*, and in spring 1982, it finished the medium-class *Essayons*, both of which were assigned to the Portland District to serve the entire west coast and Hawaii. (*Essayons* was originally destined for the Philadelphia District but was replaced by the *McFarland*.) In 1981, the MDC also completed construction of the large-class *Wheeler*, assigned to the New



Design drawings for the Crane Barge
Henry M. Shreve

Orleans District "for work along the Gulf Coast and in the lower Mississippi River." The latter two dredges replaced two Corps vessels that had been in service since the first half of the twentieth century: the *Goethals*, built in 1938, and the *Langfitt*, completed in 1947. The new ships incorporated automated technology, which reduced the number of crew required to operate the vessels and effectively cut costs. Additionally, the modernized dredges had such luxuries as air-conditioning and recreational facilities for the crews, including gyms and saunas.[16]

Even with the reduction in the number of dredges, the MDC continued its mission to maintain and improve the Corps' fleet into the twenty-first century, remaining at the forefront of technology and implementing

the latest innovations in marine design. With a fleet comprising debris collectors, survey and patrol vessels, towboats, floating cranes, dredges, and barges, this was no small task.[17] According to Richard Pearsall of the Philadelphia District's Public Affairs Office, "At any given time the U.S. Army Corps of Engineers keeps 2,500 vessels afloat," and the MDC "gives a decentralized fleet a central organization to turn to for advice on everything from repairing old craft to designing and purchasing new ones."[18]

In addition to designing new craft for the Corps, the MDC rehabilitated aging vessels to extend their operational life. In 1985, the MDC repowered the Dredge *Jadwin* from steam powered to diesel-electric powered for the Vicksburg District. The refurbished dredge returned to Vicksburg with new generators, propellers, propulsion motors, and dredge pump gears and motors,

Crane Barge Henry M. Shreve

among other substantial improvements that incorporated "power management"—the enhanced application of power, fuel savings, and the resultant emission reductions. The renovation was an outstanding achievement considering that the *Jadwin* was originally commissioned in 1932 and its contemporaries had long been retired from active service. In 2001, the MDC completed a similar rehabilitation (also from steam to diesel-electric) with the Dredge *Potter* for the St. Louis District.[19]

In its rehabilitation projects, the MDC operated within the confines of increasingly stringent environmental standards. As William F. Gretzmacher III, who became director of the MDC in 1999, reported, "A lot of what we do deals with being more 'green.'"[20] Even relatively recently built Corps craft, such as the *Yaquina* and the *Essayons*, constructed in the early 1980s for the Portland District, underwent substantial repowering in the first decade of the twenty-first century. The *Essayons*, in particular, benefited from changes in technology—a major renovation completed in 2009 would boost its propulsion by 2000 horsepower. The MDC was also providing the dredge with new propellers to increase its efficiency and eight new engines that would "greatly reduce" emissions, keeping the vessel in line with environmental emission standards.[21]

Beyond increasing the efficiency and effectiveness of the Corps' fleet, the MDC was an innovator in the field of floating cranes. According to Lawrence, "One of the most dangerous pieces of marine equipment ever is a floating crane."[22] Engineers at the MDC developed a set of standards to make the cranes safer, while at the same time optimizing crane load charts in relation to vessel stability.[23] The result, according to Lawrence, was that "any floating crane that comes out of the Marine Design Center today is the safest floating crane anybody is ever going to see and it will do the job that it's designed to do."[24] A notable example was the heavy-lift Floating Crane *Shreve*, which allowed a new lock and dam

New launch boat for the Hopper Dredge Essayons, *delivered to the Portland District in 2003*

maintenance concept—replacing existing gate leaves with spares, thus reducing lock closure periods and the resultant delaying effects on the transportation industry.

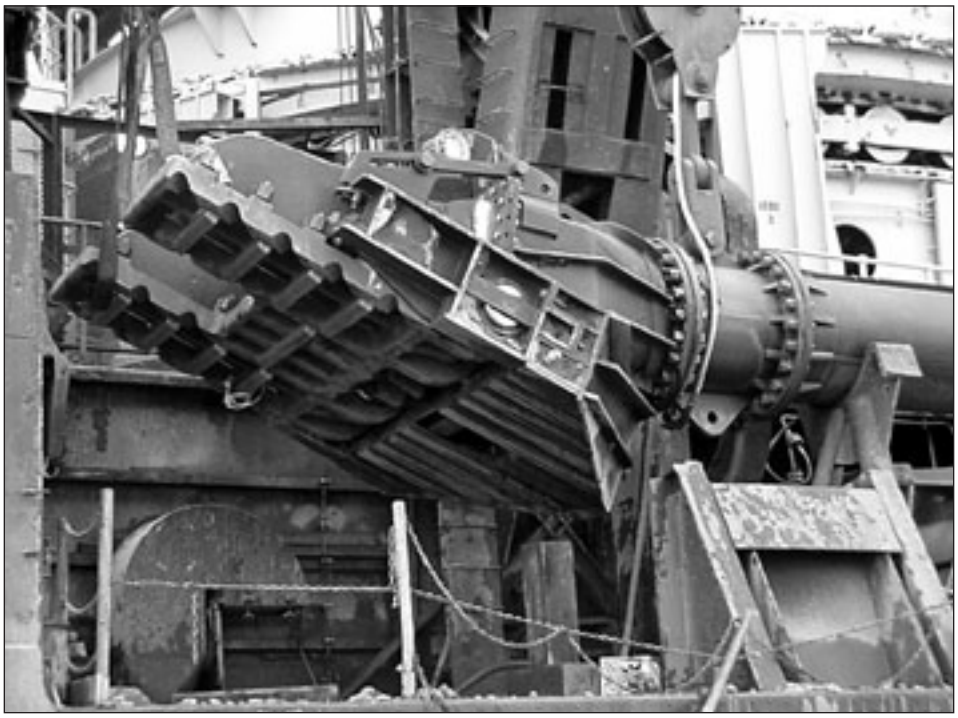
The Floating Crane Monallo

In 1993, the Corps' Waterways Experiment Station (WES) enlisted the assistance of the MDC in its efforts to minimize the impact of dredging on sea turtles in Florida's waterways. A study conducted by the Jacksonville District and the WES investigated the potential for a device "installed on hopper dredges to deflect turtles before they got sucked into the dredge pumping system." The MDC created a prototype deflector to be installed on the draghead intake, "the 'working ends' of dredging equipment which suck up material from a navigation channel." The study involved two other experimental deflectors constructed by outside sources, along with three hundred artificial turtles built from concrete and foam to approximate the "actual size, shape, and weight of sea turtles." After initial tests, project manager Mark Wolff reported that the MDC's design was "far and away the most successful."[25]

In addition to its work for the Corps, the MDC worked for other federal entities. In the early 1990s, the MDC completed a project for

the Navy, working alongside a Navy research and development group operating out of the Naval Surface Warfare Center, Carderock Division. The approximately $2 million project (funded by the Navy) involved the repowering of a surface effect ship, transforming it "from a traditional propeller configuration to a water jet configuration."[26] When the MDC began the project, the use of water jet propulsion was an experimental practice. The collaborative effort was a singular success—designed, contracted, and completed in just over two years, an impressive accomplishment for the Navy.[27] William Gretzmacher recalled that the "two organizations blended very well together and we had an excellent combined Government team."[28]

Another federal agency for which the MDC worked was the U.S. Geological Survey (USGS). In the twenty-first century, the MDC assisted the USGS with the construction of two fisheries research vessels: the *Kiyi*, commissioned in 2000, and the *Sturgeon*, commissioned in 2004. The MDC worked in partnership with the USGS Great Lakes Science Center, based in Ann Arbor, Mich., for the construction of both craft, completed at a total project cost of approximately $6 million. The vessels were placed in active service in the waters of the Great Lakes.[29]



Turtle deflector visor designed by the Marine Design Center for the McFarland

The MDC also worked on projects in other countries, most notably one completed in the 1980s for Sudan. In the early 1980s, Khartoum, the capital, and 87 percent of the rest of the nation received their power from a hydroelectric plant on the Blue Nile River. However, the dam providing the power had been subject

The U.S. Geological Survey Research Vessel Kiyi

The USGS vessel Sturgeon *on the waters of the Great Lakes*

to repeated spring runoffs that deposited silt in and around the hydroelectric generating turbines. The issue came to a head when runoff collapsed a stream bank, clogging a turbine with silt and compromising power generation for the country. To assist the government of Sudan, the U.S. State Department solicited the aid of the Corps, which, in turn, looked to the MDC.[30]

The MDC faced the task of designing a dredge that would be assembled in the United States, disassembled, transferred to the job site half a world away, reassembled using less-than-modern tools, and put to work removing the excess silt from the river. Keith Lawrence explained the assignment to his staff this way: "'This is a new challenge. . . . You guys are constantly working on state-of-the-art stuff . . . [but] this has to be low tech.'"[31] Working under this directive, the center designed a dredge that would meet the need.

Vint Bossert was the MDC technical representative who oversaw the reassembly of the craft in Sudan in 1984. He recalled

that the delegation that delivered the project "built it, launched it, operated it, showed them how to operate it, made sure it could be maintained, and then we took off." Although in Sudan for just four months, the MDC crew, augmented by Sudanese laborers, successfully completed the mission of clearing the silt from the turbine. The MDC team trained the Sudanese in the operation of the equipment to maintain their waterway in the future.[32]

As the 2000s drew to a close, the MDC continued to function as a streamlined technical organization, although it had grown to comprise three branches with a staff of thirty. Eighteen people worked in the Design Branch, including "all the engineers engaged in technical work." The MDC also included a Program Management Branch, composed of the program manager, project managers, and a contract administrator. Finally, the center had a Support Services Branch that provided administrative support, although the MDC continued to rely on the Philadelphia District for contracting services to assist with the MDC's use of best value procurements—maximizing the use of industry and vendor knowledge and participation to obtain better overall results, rather than going with the lowest bidder.[33]

Installing an engine on a hopper dredge

* * * * * * *

Throughout its history, the MDC has been the Corps' go-to source for state-of-the-art marine design. Its record has made it "the Corps of Engineers center of expertise and experience for

Above: Crane Barge Binkley, *Memphis District*

Left: Survey Boat Moritz, *New York District*

Below: Towboat Gordon M. Stevens, *Louisville District*

Above: Dredge Goetz, *St. Paul District*

Right: Deck Cargo Barge, Omaha District

Below: Dredge Hurley, *Memphis District*

the development and application of innovative strategies and technologies for naval architecture and marine engineering."[34] The MDC has extended its expertise to other federal agencies and even to other nations. Although the center underwent numerous administrative and operational changes after 1972, it continued to fulfill its mission and earn its reputation for cutting-edge marine design and engineering in the twenty-first century.

The newly repowered Dredge Potter *headed back to work*

[1] "Marine Design Center," document provided by William F. Gretzmacher III, U.S. Army Corps of Engineers, Marine Design Center, Philadelphia, Pennsylvania (hereafter referred to as MDC); Snyder and Guss, *The District*, 187.

[2] Keith Lawrence telephone interview by Paul Sadin, 9 March 2009, transcript, 8.

[3] Snyder and Guss, *The District*, 188.

[4] Quotations in Snyder and Guss, *The District*, 189–192; see also Unpublished Morgan Draft District History, 114.

[5] Quotations in Lawrence interview, 8-9; see also Unpublished Morgan Draft District History, 114.

[6] Lawrence interview, 8–10.

[7] "Marine Design Center."

[8] Lawrence interview, 10–11, 17.

[9] Lawrence interview, 12–13; Edward Voigt, Chief, Public & Legislative Affairs, NAP, personal communication with Joshua Pollarine, 4 April 2011.

[10] Lawrence interview, 19.

[11] "Marine Design Center."

[12] Unpublished Morgan Draft District History, 115–116.

[13] Act of 26 April 1978 (92 Stat. 218).

[14] "Minutes, Corps of Engineers Marine Engineering Board, 24–26 April 1979, Philadelphia, PA," 3, Minutes of the Marine Design Engineering Board, Sept 77 thru Apr 79, Marine Design Center Library, U.S. Army Corps of Engineers, Philadelphia, Pennsylvania [hereafter referred to as MDC-Library].

[15] Unpublished Morgan Draft District History, 115.

[16] Unpublished Morgan Draft District History, 116–117; Voigt personal communication.

[17] U.S. Army Corps of Engineers, Marine Design Center, "USACE Vessel Factsheets" <http://www.nap.usace.army.mil/mdc/factsheets.htm> (7 April 2010). Regarding survey vessels, the MDC designed high-speed craft, with specific attention to the incorporation of multibeam survey transducers. Voigt personal communication.

[18] U.S. Army Corps of Engineers, Philadelphia District, "District Spotlight: Marine Design Center Keeps the Fleet Fit" <http://www.nap.usace.army.mil/cenap-pa/spotlight/index.htm> (7 April 2010).

[19] U.S. Army Corps of Engineers, Marine Design Center, "USACE DREDGE POTTER" <http://www.nap.usace.army.mil/mdc/fs13.htm> (7 April 2010); Voigt personal communication.

[20] U.S. Army Corps of Engineers, Philadelphia District, "District Spotlight: Marine Design Center Keeps the Fleet Fit" <http://www.nap.usace.army.mil/cenap-pa/spotlight/index.htm> (7 April 2010).

[21] "MDC Repowers Portland's Essayons," *The Observer* (Spring 2008): 8-9.

[22] Lawrence interview, 21.

[23] William F. Gretzmacher III email to Joshua Pollarine, 2 April 2010, copy in possession of the authors.

[24] Lawrence interview, 21.

[25] "McFARLAND and Marine Design Center Assist with Study to Save Sea Turtles," *The Observer* (July 1993): 9.

[26] Gretzmacher email to Pollarine, 2 Apr 2010; William F. Gretzmacher III email to Joshua Pollarine, 5 April 2010, copies in possession of the authors.

[27] Lawrence interview, 15.

[28] Gretzmacher email to Pollarine, 5 April 2010.

[29] U.S. Army Corps of Engineers, Marine Design Center, "USACE Fisheries Research Vessel KIYI" <http://www.nap.usace.army.mil/mdc/fs12.htm> (7 April 2010); U.S. Army Corps of Engineers, Marine Design Center, "USACE Fisheries Research Vessel STURGEON" <http://www.nap.usace.army.mil/ mdc/fs17.htm> (7 April 2010).

[30] Vint Bossert, conversation with Joshua Pollarine, 6 April 2010.

[31] "Low tech" may have been an understatement. Lawrence recalled that the craft was reassembled in Sudan and "put to work with nothing but screwdrivers and pliers and hammers." Lawrence interview, 14.

[32] Bossert conversation, 6 April 2010.

[33] Gretzmacher email to Pollarine, 5 April 2010; see also U.S. Army Corps of Engineers, Philadelphia District, "District Spotlight: Marine Design Center Keeps the Fleet Fit" <http://www.nap.usace.army.mil/cenap-pa/spotlight/index.htm> (7 April 2010); Voigt personal communication.

[34] U.S. Army Corps of Engineers, Marine Design Center, "Our Mission" <http://www.nap.usace.army.mil/mdc/index.htm> (7 April 2010).

9

Work for Others (Reimbursable Services)

The Corps is a unique federal agency in that its technical capabilities can be applied to a wide array of applications. In addition to multiple engineering disciplines, its expertise is well suited to "environmental and project management issues."[1] In the later twentieth century and entering the twenty-first, the Corps found its services increasingly in demand by other government agencies that had need of these capabilities.

While Congress determined the authorities and annual funding for the Corps' civil works and military construction programs, the Corps was authorized to perform work for others in the public sector—such as state and local governments, federal agencies outside the Department of Defense, foreign countries, and international agencies—on a reimbursable basis. In this role, the Corps operated essentially as a global engineering, environmental, and construction firm, although one that belonged to the United States government.

In 1984, as its work for other agencies outside the Department of Defense continued to expand, the Corps centralized management in the reimbursable arena by establishing its Support for Others (SFO) program. SFO became the Corps' reimbursable support platform and quickly grew to constitute a significant share of the Philadelphia District's workload.[2]

The goal of SFO was to "apply its capabilities to assist others in the execution of their missions." By centralizing program management, SFO facilitated the use of the

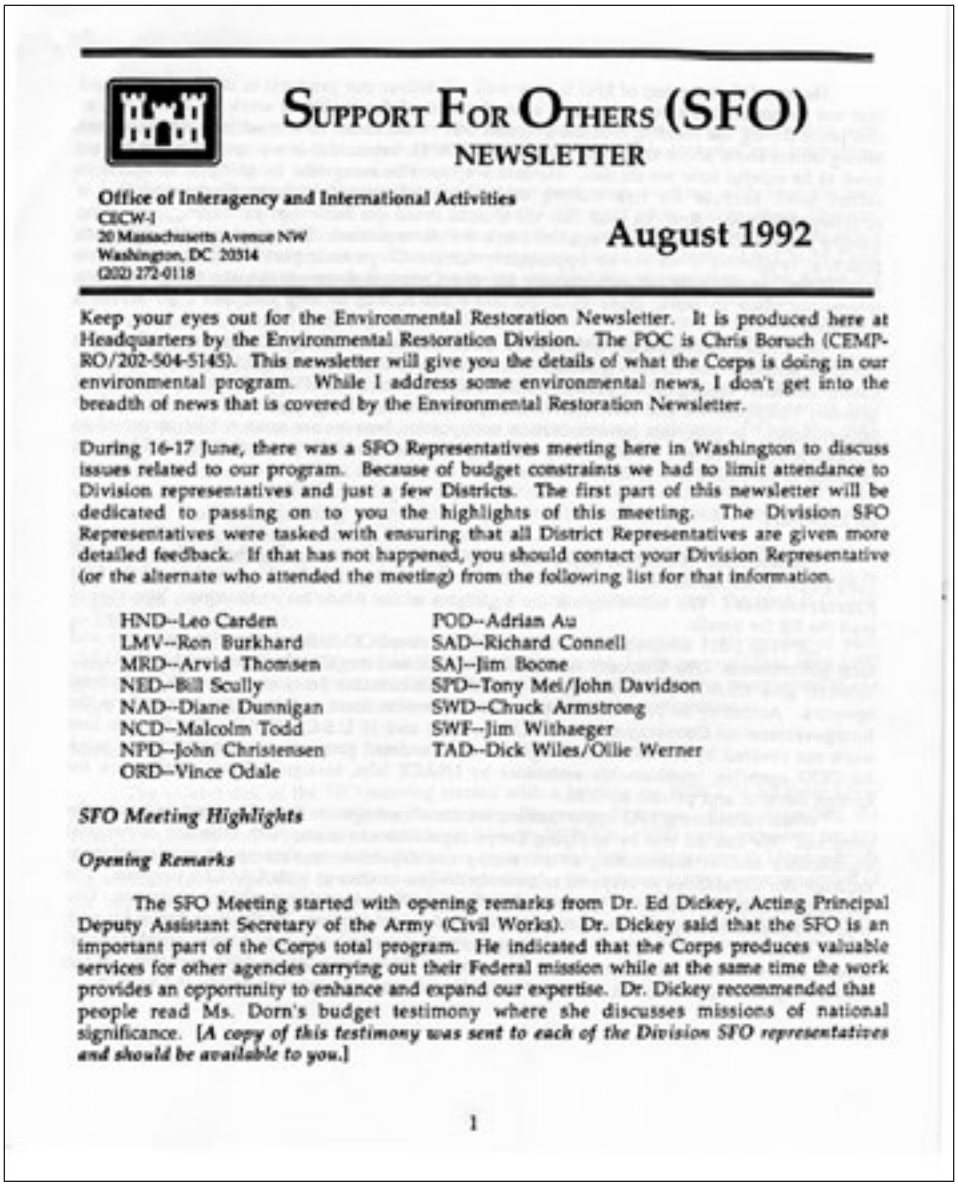
Facing page: Inside the groundwater pump-and-treat operation at the Vineland Chemical Company site, one of the District's largest EPA Superfund projects

Corps' technical resources by other government agencies—customers now had a formal path to securing the Corps' assistance on a reimbursable basis. All entities involved benefited from the program. The customer funding the project received Corps services while retaining control and responsibility for its program; in turn, SFO "enable[d] the Corps to maintain and enhance its capabilities."[3]

The Office of Interagency and International Activities, Directorate of Civil Works, manages the SFO program. Under this umbrella, the Corps uses a number of program authorities for its reimbursable work. Work for other federal agencies is done under authority provided in the Intergovernmental Cooperation Act of 1968 and the 1935 Economy in Government Act, as amended. In addition, the Foreign Assistance Act of 1961 allows the Corps to provide support to foreign nations and international organizations. The Corps is authorized to initiate work for other agencies when either "funds or reimbursable orders" are received.[4]

Since the formalization of SFO in 1984, the Corps has had a steady flow of work for outside entities. A number of the projects have involved EPA Superfund support (also mentioned in Chapter Five); in 1995, this was the single largest program in the Corps' environmental work for

Because of the increase in the Support for Others Program in the 1980s and 1990s, the Corps began publishing a newsletter devoted to that mission



SUPPORT FOR OTHERS (SFO)
NEWSLETTER

Office of Interagency and International Activities
CECW-I
20 Massachusetts Avenue NW
Washington, DC 20314
(202) 272-0118

August 1992

Keep your eyes out for the Environmental Restoration Newsletter. It is produced here at Headquarters by the Environmental Restoration Division. The POC is Chris Boruch (CEMP-RO/202-504-5145). This newsletter will give you the details of what the Corps is doing in our environmental program. While I address some environmental news, I don't get into the breadth of news that is covered by the Environmental Restoration Newsletter.

During 16-17 June, there was a SFO Representatives meeting here in Washington to discuss issues related to our program. Because of budget constraints we had to limit attendance to Division representatives and just a few Districts. The first part of this newsletter will be dedicated to passing on to you the highlights of this meeting. The Division SFO Representatives were tasked with ensuring that all District Representatives are given more detailed feedback. If that has not happened, you should contact your Division Representative (or the alternate who attended the meeting) from the following list for that information.

HND--Leo Carden
LMV--Ron Burkhard
MRD--Arvid Thomsen
NED--Bill Scully
NAD--Diane Dunnigan
NCD--Malcolm Todd
NPD--John Christensen
ORD--Vince Odale
POD--Adrian Au
SAD--Richard Connell
SAJ--Jim Boone
SPD--Tony Mei/John Davidson
SWD--Chuck Armstrong
SWF--Jim Withaeger
TAD--Dick Wiles/Ollie Werner

SFO Meeting Highlights

Opening Remarks

The SFO Meeting started with opening remarks from Dr. Ed Dickey, Acting Principal Deputy Assistant Secretary of the Army (Civil Works). Dr. Dickey said that the SFO is an important part of the Corps total program. He indicated that the Corps produces valuable services for other agencies carrying out their Federal mission while at the same time the work provides an opportunity to enhance and expand our expertise. Dr. Dickey recommended that people read Ms. Dorn's budget testimony where she discusses missions of national significance. [*A copy of this testimony was sent to each of the Division SFO representatives and should be available to you.*]

1

others, comprising $322 million in contracts.[5] The numbers reflect the success of SFO. By 1989, just five years after its inception, the Corps had managed $207 million in SFO projects. Seven years later, that figure had ballooned to over $700 million and was projected to hit $800 million by fiscal year 1997.[6] The district's involvement in SFO reflected a larger Corps-wide trend. At the close of 2007, the district managed nearly $60.5 million in SFO work, $58.8 million of which was in EPA Superfund projects. Through SFO, the Corps has provided assistance to nearly sixty federal agencies, as well as international entities such as the North Atlantic Treaty Organization and foreign governments that include Sweden, Argentina, and the Republic of Belarus.[7]

Philadelphia Bulk Mail Center (now Philadelphia Network Distribution Center), U.S. Postal Service

Work for the U.S. Postal Service

The Philadelphia District's involvement in SFO predated the centralization of the Corps function in the 1984. In the early 1970s, the district assisted the U.S. Postal Service with the construction of a bulk mail center in Philadelphia, a cutting-edge facility designed to incorporate the transition to automated mail sorting sweeping throughout the Postal Service in that decade. As former District Engineer Col. Harry Dutchyshyn explained, because the Postal Service was not "in the business of building post offices . . . they had asked the Corps to help solve the problem of building major facilities all over the country all at the same time."[8] The Philadelphia bulk mail center involved innovative automated equipment, upgrading the agency's work "from a pen and pencil post office to a computerized system."[9] However, the complicated nature of the project proved problematic for the contractors

involved, leading to delays and increased costs. In addition, government-furnished equipment was delivered to the district in random order rather than according to a planned implementation schedule. Dutchyshyn, as the district's chief contracting officer, had the task of managing the myriad problems and reconciling legitimate contract costs with discrepancies in charges. Nevertheless, in November 1975, two years after the start of construction, the bulk mail center was successfully completed; it began operating early the following year.[10]

The district also helped the Postal Service renovate older post offices in the Philadelphia area. Through the first half of the 1970s, the district oversaw the "rehabilitation and expansion of existing postal facilities, building of training facilities, and installation of sprinkler systems, mail sorting machines, and service counters with bullet-proof screens." The district's work on the smaller facilities concluded in 1976 when the Postal Service took sole control of the rehabilitation effort.[11]

Work for Qatar and Gabon

In addition to its work in the United States, the Philadelphia District provided technical support to governments overseas. In 1978, the emir of Qatar contacted the U.S. Department of State for assistance in investigating the legitimacy of dredging surveys and their associated costs completed by private contractors for the emirate. At issue were two locations: the Doha harbor and marine facilities at Umm Said. The State Department contacted the Corps, which delegated the project to the Philadelphia District owing to its expertise in dredging operations.[12]

District personnel sent to review the work conducted "comparative surveys over selected sites" at Umm Said and ultimately judged the surveys to be accurate and the expenses comparable to other projects of that scale. "At Doha, however," according to one account, "the District team concluded that additional costs being charged to the government of Qatar were not justified." The emir was pleased with the district's work

and paid the Corps $32,000 plus all expenses for its assistance.[13]

The following year, the Philadelphia District took on a more comprehensive project for the government of Gabon, Africa. Located along the equator in central-west Africa, the nation sought economic growth and development through the use of its vast natural resources, especially its extensive reserves of iron ore and manganese. On 10 January 1979, President Omar Bongo of Gabon sent a letter to the U.S. ambassador "requesting that a team of American experts be sent to make a survey and give recommendations for maintenance and upgrading of the National Road System, improvement of port facilities and forestry development." The work in Gabon's ports included dredging and development, while investigations into Gabon's forestry incorporated "evaluating and exploiting native timberlands."[14] The ambassador transmitted Gabon's request to the Agency for International Development (AID), U.S. Department of State. In a letter dated 5 February 1979, AID "authorized the Chief of Engineers to undertake an exploratory mission as provided by Section 661 of the Foreign Assistance Act."[15] Lt. Gen. John W. Morris, then Chief of Engineers, assigned the mission to the Philadelphia District on the basis of its broad experience in maintaining one of America's major waterways, the Delaware River, and its expertise in building and relocating highways in conjunction with flood control and Chesapeake and Delaware Canal work.[16]

Map of the Republic of Gabon

Bridge conditions in Gabon

Given the scope of the request, the U.S. and Gabon governments agreed on a two-phase mission—a preliminary reconnaissance followed by more detailed site investigations—over the course of two trips in 1979. The first trip occurred in March; the second in July. The project teams quickly discovered that significant work was required if the government of Gabon was to begin exploiting its natural resources, as the country's road network was barely developed. Of approximately 1,740 miles of state roads in Gabon, only 180 miles—roughly 10 percent—were paved.[17] The remaining roads were primarily dirt, subject to frequent damage and even closure from the average annual rainfall of a hundred inches.[18] Massive construction would be necessary to provide a stable system to transport forestry products and iron and manganese ore, found mostly inland, to the coast for export. In addition, even if the Gabonese had been able to get the ore to the shore, none of the ports had channels deep enough to accommodate the deeper draft vessels necessary to transport the heavy loads. The proposed location, the Port of Owendo, proved problematic—preliminary investigations "found significant rock deposits in the channel area, formations that could make dredging either impractical or more difficult." Additional hydrographic surveys would be necessary before initiating any development of Gabon's port facilities.[19] It became increasingly clear that the costs to develop Gabon's commerce infrastructure would be immense.

Following its in-country investigations, the Philadelphia District compiled technical reports on the three issues: roads, ports, and

forestry development. The reports detailed the need for improvements to the infrastructure, such as deeper channels at the ports for shipment of natural resource products and an enhanced and extended road system to access resources. The district's conclusions and recommendations were to be used to obtain international funding. But as project team member Vince Calvarese recalled, "It never went any further than the report."[20]

Support for the EPA Superfund Program

Congress established the Superfund program with the passage of the landmark Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), signed by President Jimmy Carter on 11 December 1980. The new law, which arrived on the heels of the highly publicized environmental disaster at Love Canal, N.Y., created a trust fund (the Superfund) to pay for federal cleanup activities at selected sites across the country and authorized the EPA to develop and manage the program. Although the Clean Water Act and Clean Air Act of the early 1970s ended outright dumping of pollutants into the nation's rivers and streams, industrial producers of toxic wastes continued to pour chemical residues and other hazardous compounds into large underground tanks or into barrels warehoused onsite, buried offsite, or dumped on abandoned property. As the unmonitored storage tanks and barrels began to leak, a plethora of highly toxic materials escaped into streams and lakes, turning them into death traps for aquatic species. Toxins also seeped into the water table, where they became a

Soil sampling to assess Superfund site conditions

hidden threat to public drinking water supplies. Congress established the Superfund program to address these biological and public health hazards.

Superfund attempted to identify the most highly polluted areas where, for the most part, dumping had already occurred. Federal taxes on the chemical and petroleum industries formed the initial pool of $1.6 billion to pay for cleanup projects; in 1986, Congress amended CERCLA to increase the amount in the trust to $8.5 billion. In addition to the original trust fund, CERCLA allowed the government to collect mitigation payments from individuals and companies found liable for creating or dumping pollutants at designated Superfund sites.[21]

The EPA divided Superfund cleanup activity into two programs. The first involved short-term removal of toxic substances, while the second encompassed long-term remedial actions that addressed

The Krysowaty Farm Site, the first Superfund cleanup completed by the Philadelphia District for EPA Region 2

a wide range of cleanup and restoration work. The Philadelphia District's Superfund projects were almost all long-term remedial actions. The EPA also developed a three-part administrative framework to organize toxic waste response and cleanup activities. The components were the National Contingency Plan, the Hazard Ranking System, and the National Priorities List. The EPA used the Hazard Ranking System to determine which sites required the most immediate or extensive action. In 1983, the agency issued the first Superfund National Priorities List (NPL), which identified specific toxic/hazardous waste sites that were "national priorities for receiving further investigation and long-term cleanup actions."[22]

In the meantime, interagency agreements signed in 1982 and 1984 authorized the EPA to seek support from the Corps for tasks that included research and development, environmental assessments, five-year reviews, real estate activities, and other technical assistance.[23] According to James Woolford, director of the Office of Superfund Remediation and Technology Innovation, "EPA has relied on the USACE to provide construction support for the Superfund program based on their expertise as both constructors and construction contract and project administrators." Woolford said the Corps' support included "an on-site Federal presence at Superfund sites, along with expertise in contract administration, field level management and management of construction change orders and claims." The Corps also provided "overall construction expertise."[24]

At the outset of the program, the EPA did not designate the Philadelphia District for Superfund work. However, the large number of NPL sites in the Northeast put a heavy load on the Corps districts in that region that were responsible for EPA projects: the New England, New York, and Baltimore districts. To reduce its Superfund workload, the New York District decided to "broker" individual projects in New Jersey to the Philadelphia District.[25]

The district's first completed Superfund remediation was at Krysowaty Farm in Somerset

County, N.J. (in the New York District). Cleanup at Krysowaty Farm involved excavating and removing contaminated soil and debris from the one-acre site where five hundred drums of toxic paints, dyes, and other chemicals were dumped and buried between 1965 and 1970.[26] When the state of New Jersey first investigated the site in 1979, it found that volatile organic compounds, pesticides, acids, and polychlorinated biphenyls (PCBs) had seeped into the groundwater and contaminated numerous local wells. EPA Region 2 developed the cleanup strategy (excavation, removal, and monitoring) in 1984 and tapped the Corps to begin the cleanup operation in 1985. Philadelphia District staff and the contractor completed work at the site in 1987; in 1989, Krysowaty Farm became one of the first Superfund sites to be "delisted" from the NPL.[27]

Although the effort at Krysowaty Farm was relatively small compared with those that followed, it gave the district's Superfund team valuable experience. The quality of the district's performance also convinced EPA Region 2 to begin delivering NPL cleanup sites directly to the Philadelphia District. As retired program chief John Bartholomeo explained, "Philadelphia District had a great Superfund team and

An EPA publication about successful remediation of the Krysowaty Farm Site

United States Environmental Protection Agency | Solid Waste and Emergency Response (5502G) | EPA520-F-92-011 Fall 1992

EPA **Superfund At Work**

Hazardous Waste Cleanup Efforts Nationwide

Krysowaty Site Profile

Site Description: Hazardous waste dump in rural Hillsborough Township, New Jersey

Site Size: 1 acre

Primary Contaminants: Volatile organic compounds (VOCs), pesticides, and polychlorinated biphenyls (PCBs)

Potential Range of Health Risks Without EPA Cleanup: Skin irritation; increased risk of cancer

Nearby Population: 1,200 within one mile

Ecological Concerns: Raritan River

Year Listed on NPL: 1982

Year Deleted from NPL: 1989

EPA Region: II

State: New Jersey

Congressional District: 12

Success In Brief

Krysowaty Farm…Cleaned Up

The one-acre dump at Krysowaty Farm was small in size compared to some other Superfund sites. But five years of dumping proved to be a challenge when designing an appropriate cleanup. Nevertheless, the U.S. Environmental Protection Agency (EPA) quickly and efficiently alleviated immediate and potential dangers to the community of Hillsborough, New Jersey. In less than five months, Superfund staff:

- Worked closely with community members and Hillsborough Township officials to ensure an effective solution;
- Funded a permanent alternate water supply for residents threatened by contaminated well water; and
- Completed a permanent cleanup of hazardous wastes at the site.

Krysowaty Farm is a good example of how an active community, coupled with EPA responsiveness and expertise, can eliminate the dangers posed by the unauthorized dumping of hazardous substances.

The Site Today

Krysowaty Farm was once considered one of the worst uncontrolled hazardous waste sites in the United States. It was deleted from the National Priorities List (NPL) in 1989, after all known contaminants were removed. The cleanup effort meets established safety standards and no further actions are required at the site. A local health official said, "(I) couldn't be more pleased" with the "state-of-the-art" cleanup of Krysowaty Farm.

Superfund financed and conducted the site cleanup because the owner of the Krysowaty property was deceased, and the identity of other contributing parties was unknown.

Five Years of Uncontrolled Dumping

The Krysowaty Farm site had hazardous material strewn over a one-acre area of a ravine. Tires, demolition debris, and many corroded drums of paint, pesticides and dye wastes were illegally dumped.

U.S. Environmental Protection Agency
Region 5, Library (PL-12J)
77 West Jackson Boulevard, 12th Floor
Chicago, IL 60604-3590

had a wealth of knowledge… [therefore,] EPA Region 2 always turned to Philadelphia when they had something that was tough."[28] The district obtained larger and more difficult Superfund projects, some of which included long-term, high-profile cleanup activities. To meet this larger workload, the district created a dedicated Superfund staff of five employees.[29]

In May 1989, the district began work on one of its largest and possibly most complex Superfund projects, the cleanup and disposal effort at the Bridgeport Rental and Oil Services property on the Delaware River in southwestern New Jersey. Bridgeport was number 15 on the NPL when the project launched and remained on the list until waste removal work ended in early 1996. The total cost of the cleanup came to $174 million, the largest single-site total in district Superfund history to date. But the significance of the Bridgeport work went well beyond the price tag. Bridgeport was one of the district's highest-profile Superfund projects: the huge oil lagoons were featured in magazine articles, making the site a poster child for America's legacy of industrial toxic waste and a symbol for the entire Superfund program.[30] Bridgeport also became a "giant lessons learned project for the District" as well as for the Superfund program nationwide.

Remediation of the Vineland Chemical Company site would eventually eclipse both Bridgeport and Lipari in scope and complexity

Jeanne Fox, EPA Region 2 administrator at the time, observed that Bridgeport "was the classroom for the nation—the laboratory where we wrote the formula on how to clean up hazardous waste sites." Fox said one unique and innovative aspect of the project—the onsite incineration of PCBs—subsequently became "a standard item in the cleanup toolbox for Superfund."[31]

The Bridgeport Rental & Oil Services Superfund Site during remediation (above) and afterward (below)

The Bridgeport property had been a toxic dump site since the 1940s, but the problem was compounded when an oil reprocessing facility operated there from 1959 to 1980. By the time the oil operation closed, the site contained detritus of four decades of industrial waste releases, including "a 13-acre waste oil lagoon, more than 100 storage tanks and process vessels interconnected by miles of piping, seven concrete-block-and-steel buildings, a number of abandoned vehicles (including an entire school bus later found *in the lagoon*), and a large quantity of discarded drums and other debris." Additionally, PCBs were present at the site.[32] As John Bartholomeo said, "It was disgusting."[33]

And these items were only the hazards visible from surface surveys and testing. As work continued, the discovery of additional

materials submerged in the lagoon revealed an even bleaker environmental picture. When contractors began to pump oil out of the lagoon, site managers realized that waste drums lined the lagoon's entire embankment. Instead of the original estimate of approximately one hundred drums of waste to process, "it turned out to be thousands of them."[34] The remediation contractor had to process each drum, which involved identifying the contents, recording all visible marks on the barrels, draining them, and neutralizing the toxic compounds.

The precedent-setting decision to incinerate the PCBs onsite made the Bridgeport cleanup a technically challenging project and a potential public affairs dilemma for the district. Bartholomeo called it "a baptism by fire" for the district's Superfund team. He said the process the district had to negotiate to obtain approval for the incinerator (which at one point included meeting with approximately forty different New Jersey agencies and citizens' groups) was "worse than a root canal."[35] When construction of the incinerator was finally completed, district staff and the contractor had to perform test burns of PCBs to ensure that no contaminants would be released into the atmosphere, a major concern of local residents. In what must have been an irony for the Superfund team, regulations required that they had to obtain permission to bring PCB-contaminated material from another location onto the highly toxic Superfund site; the team described this as an "administrative nightmare."[36] After a half-year delay, the contractor was finally able to conduct trial burns in March 1991. The incinerator went online in November 1991; it was the first time an incinerator was permitted to burn PCB-contaminated material at a Superfund site.[37]

To burn the enormous amount of contaminated oil, sludge, and soil in the lagoon and to keep the project on schedule, the contractor for that phase of the cleanup operated the incinerator twenty-four hours a day, seven days a week, for four years. The "thermal

destruction facility" incinerated the material at extremely high temperatures, reducing the oil and sludge to an inert ash residue that was eventually used to backfill the lagoon after it was emptied of all pollutants. Excavation of the lagoon sludge was completed in October 1995; by early 1996, 172,000 tons of contaminated material had been incinerated.[38]

As the full extent of the Bridgeport cleanup became clear, and as the district began to tackle other Superfund projects in the vicinity, it opened a civil works and Superfund office adjacent to the Bridgeport site in the summer of 1989. By that time, the district was already engaged in another massive Superfund cleanup project at the Lipari Landfill in Pitman, N.J.[39]

Cleanup tasks at Lipari Landfill were almost as staggering as those at Bridgeport, and the materials at the site were even more toxic. When the district assumed responsibility for the cleanup, Lipari Landfill was number 1 on the NPL—the most contaminated Superfund site in the country. Lipari contained three million gallons of liquid waste and twelve hundred cubic yards of solid waste, which included "solvents, paints and thinners, formaldehyde, dust collector residues, resins, and solid press cakes from the industrial production of paints and solvents."[40] Studies showed that the plume of contaminants had reached underlying aquifers and leached into the area's marshlands, streams, and lakes. Before the New Jersey Department of Environmental Protection was able to close the landfill in 1971, nearby residents had reported at least one large explosion and two fires at the site.[41]

The district's Superfund team tackled cleanup tasks that consisted of a batch flushing system and treatment plant (completed in January 1992) for liquid contaminants extracted from the soil and groundwater. At the completion of the initial phase in 1993, the contractor had extracted and treated a total of "150 million gallons of landfill leachate containing approximately 55 tons of contaminants."[42] In 2000, the district team and contractor adapted the batch flushing system "for

Aerial view of the cleaned-up Lipari Landfill site

simultaneous soil vapor extraction to enhance the removal of volatile, less water soluble site contaminants."[43] By 2002, more than 330 million gallons of leachate that held roughly seventy-seven tons of chemical contaminants had been extracted and treated. The Lipari Landfill Superfund project also entailed offsite extraction, treatment, and monitoring tasks; in 2008, the district was still looking ahead to a significant operation and maintenance role at this site.

Lt. Col. Robert Keyser, Philadelphia District Commander in 1997, said the Superfund team's management of the enormous Bridgeport and Lipari cleanup projects "gained nationwide recognition" for the district.[44] The team's success was a boon for the continued growth of the Superfund program and brought the Support for Others program, of which Superfund was the biggest part, into greater prominence.

The Philadelphia District further solidified its Superfund position in 1993, when EPA Region 2 decided that it would assign all new Superfund sites in New Jersey

The batch flushing and treatment plant at the Lipari Landfill site

south of Trenton to the district. All sites north of Trenton would go to the New York District, although Philadelphia would retain responsibility for the projects it was already conducting north of the line. Technically, the Philadelphia District did not have a bona fide Superfund "mission," but the quality of its early work helped it carve out a niche in the program. From 1989 to 1993, the average value of the district's Superfund projects was roughly $25 million a year; in fiscal year 1994 it was $45 million, and in fiscal year 1995 it was $73 million.[45]

Another challenging Superfund project was the Tranguch Gasoline site in Hazleton, Pa. The project site was in the center of the town, where gasoline vapors from nearby storage tanks were escaping from cracked sewer lines and seeping into the basements of hundreds of houses. The airborne vapors released several toxic compounds, including dissolved benzene, a confirmed carcinogen.[46] Project planning was complicated by the fact that the contractor would have to dig a ditch down one of the town's main streets, risking the release of potentially hazardous fumes into the adjacent houses and the surrounding neighborhood. The district's project design team created a remediation system that was both novel and effective.[47]

The construction contractor carried out a three-tiered cleanup strategy that included sewer replacement, groundwater retention, and "soil vapor extraction," all in a single trench. After removing the old clay sewer pipes, workers installed a new sewer line and two other sets of pipes: one to collect the contaminated groundwater and another to collect the gasoline vapor. Sumps transported

the contaminated groundwater to a nearby mobile treatment facility, while the soil vapor was passed through a vacuum pump and carbon filters. To keep toxic fumes from escaping from the trench, the contractor sprayed a foam suppressant over the soil as it was unearthed, then sealed the trench with an impermeable plastic liner before refilling the ditch. Throughout the process, crews carefully monitored basements for fumes from the trench.[48]

All the cleanup work in Hazleton was completed between May and September 2001, and subsequent testing revealed that the air in all previously affected properties was within state and federal safety levels. The Superfund team's dynamic cleanup design for the Tranguch project was highly lauded and landed the district a spot as one of the four finalists for an OPAL (Outstanding Projects and Leaders) award, which the American Society for Civil Engineers bestows for "innovation and excellence in civil engineering design." Although the district did not win, the nomination garnered national acclaim and boosted morale.[49]

Perhaps more than any other single program in terms of sheer dollars committed, Superfund emerged as a mainstay of the Philadelphia District's workload going into the twenty-first century. As of 2008, in addition to the projects already mentioned, the district had carried out EPA Region 2 remediation work at the following sites in New Jersey (county in parentheses): D'Imperio Property and the adjacent South Jersey Clothing Co. and Garden State Cleaners Co. sites (Atlantic); Helen Kramer

Workers conduct drilling operations in Hazleton, Pa. during remediation of EPA Region 3's Tranguch Gasoline site

Landfill (Gloucester); Industrial Latex Corp. (Bergen); Pepe Field (Morris); Vineland Chemical Co. (Cumberland); and Welsbach & General Gas Mantle (Camden). The last two multiphase cleanups were still under way in 2008 and ultimately surpassed Bridgeport and Lipari in cost and scope.[50]

Groundwater treatment plant, Cosden Chemical Coatings Superfund Site

Cleanup of the Welsbach & General Gas Mantle site in and near Camden, N.J., involved a multi-year, multi-phase project to remove radiological contamination

Work for the U.S. Coast Guard

While most of its installation support for the Army and Air Force fell under the MILCON program, the district also provided reimbursable services to the U.S. Coast Guard. One project of particular interest (and visibility, owing to its close proximity to Interstate 95) was the renovation in 2004 of a vertical lift bridge at the site of the Philadelphia Naval Business Center (formerly the Philadelphia Naval Shipyard). The approximately $23 million contract involved the disassembly of the horizontal span for a full overhaul of the bridge's mechanical, electrical, and structural components, complete with a fresh coat of paint and new decking. The Philadelphia District oversaw design and construction of the project, including the removal of the horizontal span via a float-out, using barges and tugboats to remove the section. As resident engineer Mark Wheeler recalled, the float-out was the most significant

challenge of the project, requiring "three tries over two days until we were successful." The project was a significant success, completed in close to a year and preparing the vertical lift bridge for an indefinite amount of future service.[51]

Work for the Federal Aviation Administration

The Philadelphia District was also engaged by the Federal Aviation Administration (FAA) for remediation services at the Atlantic City International Airport in Pomona, N.J. John Bartholomeo recalled that the district started out conducting "little hazardous cleanups, not major stuff" for the FAA, after which the agency became a regular customer for a wide variety of tasks, including building renovations, maintenance work, and minor construction.[52] This connection helped the district land a much larger project with the FAA: the construction of a runway pavement test facility at the airport.

In 1994, recognizing the constantly advancing nature of technology in the field of aeronautical engineering, the FAA

Float-in of the renovated main span for the Coast Guard's Vertical Lift Bridge project at the former Philadelphia Naval Shipyard (above)

Remediation of the Roebling Steel Company Superfund site involved preservation and restoration of historic artifacts, such as the old gatehouse and this 124-ton, 28-foot-diameter flywheel, both now part of the Roebling Museum

determined that "airport design standards may not accommodate" larger, heavier aircraft "with more complex landing gear."[53] Of primary concern was Boeing's B-777, scheduled for release in 1995, with a set of six wheels on each rear landing gear that "presented a challenge to establish its compatibility with existing runways."[54] With an investment of nearly $4 billion per year on pavement maintenance for a runway infrastructure valued at over $100 billion, the need existed to protect the landing strips from potential harm. To resolve the problem, the FAA and Boeing developed a plan for an innovative airport runway test facility in New Jersey that would "collect real-time data to create new pavement standards."[55]

The FAA asked the district to act as its agent "in the design, construction and operation/prove-out of the facility." The district was involved in the project on a daily basis throughout design and construction, providing a project manager and resident engineer who successfully implemented management decisions at ground level and facilitated communication between the cooperative entities, streamlining project management. The result was the successful completion of a $21 million, state-of-the-art test facility for the FAA in 1999, "delivered on time with an unprecedented cost growth of only $50,000."[56] The William J. Hughes Technical Center was the world's "largest, enclosed, full-scale pavement test facility dedicated solely to pavement research" and has been in continuous operation since its completion.[57]

Work for the City of Philadelphia

The district also completed an award-winning runway project for the city of Philadelphia at Philadelphia International Airport. In 1996, the city applied for a permit for a runway construction project that affected federally regulated wetlands.[58] In the course of reviewing permit applications, attentive Operations Division employees recognized a win-win possibility: the potential

to use material dredged from the Delaware River as fill in the construction of the new runway.[59] The district pitched the plan to the city and a deal was made.

Both sides benefited from the project. The city of Philadelphia saved $7 million by using the locally procured dredged material, and the contract saved the district (and thus the federal government) about $8 million in channel maintenance costs. The cooperative projected eliminated the need for expensive transport from inland fill sources and reduced the pollution that would have occurred in moving the material via highway. Approximately two and a half million cubic yards of dredged material were moved from the Delaware River channel to the airport. The project was a notable achievement. On 21 July 1998, the project team, including the city of Philadelphia and district staff, received the Vice President Gore Hammer Award, in recognition of "teams of federal employees who have helped reinvent government according to the President's four National Performance Review principles: (1) putting customers first, (2) cutting red tape, (3) empowering employees and (4) getting back to basics."[60]

Construction of the Airport Pavement Test Facility at the FAA's William J. Hughes Technical Center

The district also worked on infrastructure for the city of Philadelphia. In 1985, district staff completed a technical study of water mains throughout the city to assess "the current and likely future condition of the City of Philadelphia's water distribution system." The project included analyzing water main problems through the use of computer models and pipe samples to establish "primary structural causes of main breaks" and "develop a profile of mains which are likely to break." The overarching goal was the creation of a computerized information system for the maintenance of the city's water infrastructure.[61] The district completed the study at the request of the Pennsylvania Department of Environmental Resources as part of a program for the development and conservation of Pennsylvania's water resources.[62]

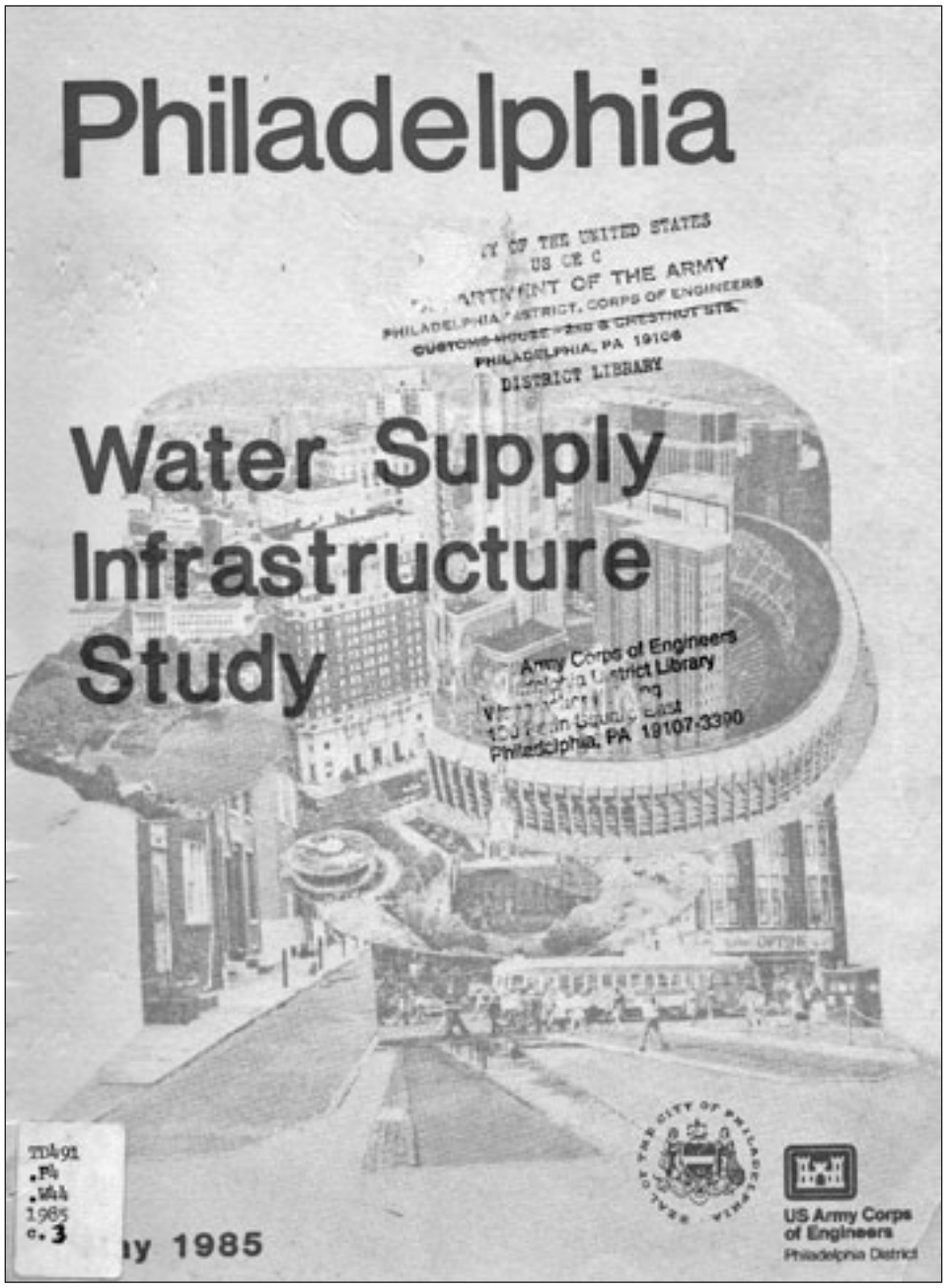
The Philadelphia International Airport Runway Project under construction

Dredging the "Reserve Basin" at the mouth of the Schuylkill River for the Department of the Navy

Additional assignments from the city of Philadelphia covered a broad range of projects. For example, in 1997, the district completed an inspection report of homes on Osage Avenue at the city's request and on a reimbursable basis. Three years later, the district used this information in the rehabilitation and repair of the inspected homes. It prepared "plans, specifications and cost

estimates" for the rehabilitation of housing units, including the replacement of "roofs, windows, sliding doors, cedar siding and exterior brick, drywall repairs, painting, and mechanical and electrical repairs." District personnel provided design services and oversaw construction of the renovations, conducting onsite inspections and schematic reviews.[63]

The city also requested assistance in investigations of residence demolition. In the late 1990s, the district participated in engineering studies regarding houses in the Logan and Wissinoming sections of Philadelphia that were built on foundations of cinder, ash, and "varying amounts of construction debris."[64] The severe differential settlement of the fill material resulted in "sinking homes," rendering the structures uninhabitable and necessitating demolition.[65] The city called on the district to analyze each area; this involved preparing a development scenario to replace demolished homes in Logan and further examining the extent of potential damage to the Wissinoming section. The district researched historical records, mapped the depth of the fill—including a topographic change map to record shifts in surface elevation—and assessed the effects



Cover of the Philadelphia District's report on the City of Philadelphia's water supply infrastructure

Visible settlement cracks characterized "sinking homes" such as this one in Philadelphia's Wissinoming section

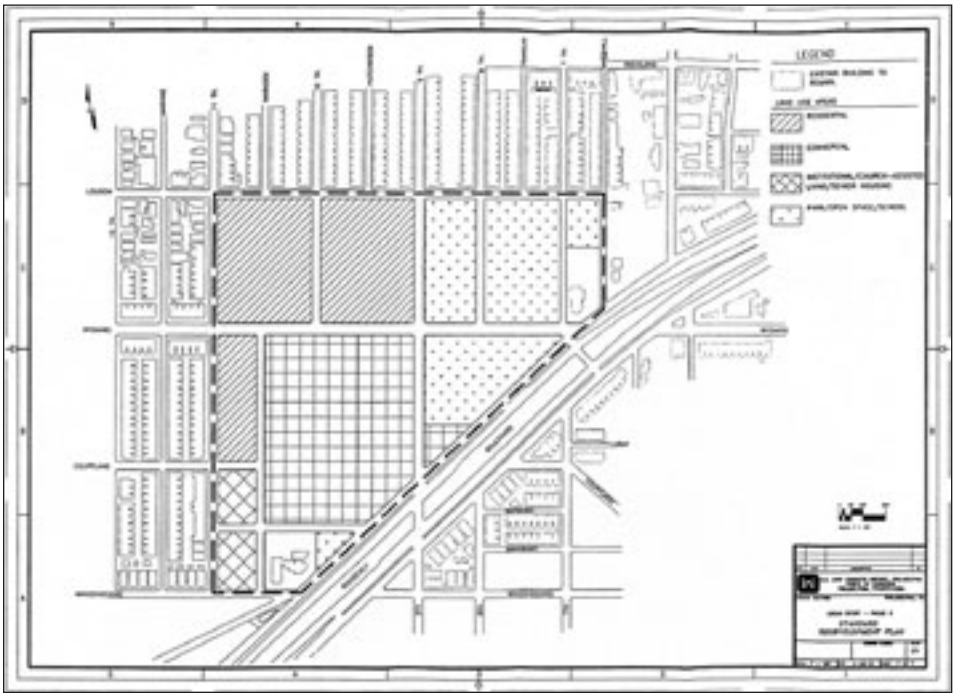
of Philadelphia's water, gas, and sewer infrastructure on the fill material. The district reported its findings to the city, along with recommendations to address the problems.[66]

The district carried its partnership with the city of Philadelphia into the twenty-first century. In 2000, it participated in a cost-share project for the demolition of the East Central Incinerator, which was "built in the 1960s and operated as a municipal trash incinerator until July 1988" but had since become an obstacle to development along Penn's Landing, at the heart of the city's Delaware River waterfront. The district removed hazardous waste from the site, then demolished the inactive facility. Ultimately, the area was slated to provide "much-needed additional parking for growing retail activity in the area."[67]

* * * * * * *

The district's SFO program has encompassed a wide array of services across a large territory. From within walking distance of the district's offices in Philadelphia to locations in the Middle East and Africa, the district has carried out missions in conjunction and cooperation with a variety of government agencies—both before and since the establishment of the Corps-wide program known as Support for Others. The district's ongoing overseas missions ensured opportunities for future support projects, while its successful work within its own footprint created a lasting connection between the district and its hometown, illustrating again the responsiveness that has always been a hallmark of Philadelphia District work.

The District's standard redevelopment plan for the Logan neighborhood in Philadelphia



Demolition of the East Central Incinerator along Philadelphia's Penn's Landing waterfront area

Another federal customer was the U.S. Department of Veterans Affairs, which engaged the District's services to repair and upgrade the roads inside Beverly (N.J.) National Cemetery

[1] Department of the Army, Corps of Engineers, "Support for Others Program," March 1993, Support for Others (SFO) Files in temporary holdings, U.S. Army Corps of Engineers, Office of History, Alexandria, Virginia (hereafter referred to as Office of History).

[2] Arthur E. Williams, Major General, USA, Director of Civil Works, Policy Guidance Memorandum, Conduct of International Activities, 3 April 1992, 2, SFO Files in temporary holdings, Office of History; Donita M. Moorhus and Gregory Graves, "The Limits of Vision: A History of the U.S. Army Corps of Engineers, 1988-1992," April 2000, 96, unpublished manuscript, copy provided by Office of History; Al Bertini, "Information Paper, SUBJECT: Support for Others, FY 95," 18 April 1996, SFO Files in temporary holdings, Office of History; Department of the Army, Corps of Engineers, Support for Others (SFO) Program, "Annual Report for FY 96," n.d., page 1, SFO Files in temporary holdings, Office of History; Edward Voigt, Chief, Public & Legislative Affairs, Philadelphia District, personal communication with Joshua Pollarine, 18 April 2011.

[3] Department of the Army, Corps of Engineers, Support for Others (SFO) Program, "Annual Report for FY 96," n.d., 1–2, SFO Files in temporary holdings, Office of History.

[4] Williams, Policy Guidance Memorandum; Bertini, "Information Paper, SUBJECT: Support for Others, FY 95."

[5] Bertini, "Information Paper, SUBJECT: Support for Others, FY 95."

[6] Moorhus and Graves, "The Limits of Vision," 97; Department of the Army, Corps of Engineers, Support for Others (SFO) Program, "Annual Report for FY 96," 1, 21.

[7] The district's 2007 SFO figures were provided by Mark S. Wheeler, Chief, Interagency and International Services, Environmental Programs Branch, Philadelphia District; Department of the Army, Corps of Engineers, Interagency and Intergovernmental Support (IIS) Program, "Annual Report, Fiscal Year 97," n.d., 22, SFO Files in temporary holdings, Office of History; Department of the Army, Corps of Engineers, Support for Others (SFO) Program, "Annual Report for FY 96," 20; "International Activities News," *Support For Others (SFO) Newsletter* (November 1993): 2–4; U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, "Support for Others" <http://www.crrel.usace.army.mil/rsgisc/sfo.htm> (21 May 2010).

[8] Dutchyshyn interview, 5.

[9] Dutchyshyn interview, 8.

[10] Unpublished Morgan Draft District History, 120; Dutchyshyn interview, 5–8.

[11] Unpublished Morgan Draft District History, 120–121.

[12] Unpublished Morgan Draft District History, 130.

[13] Unpublished Morgan Draft District History, 131.

[14] U.S. Army Corps of Engineers, Philadelphia District, "Technical Report to the Republic of Gabon, Part 2, Roads and Bridges, Section A – Report," December 1979, 1-1, Philadelphia District-Library; U.S. Army Corps of Engineers, Philadelphia District, "Technical Proposal to the Republic of Gabon, Part 1 – Dredging and Port Development, Section B – Proposals," January 1980, 1, 4–5, Philadelphia District-Library.

[15] U.S. Army Corps of Engineers, Philadelphia District, "Technical Report to the Republic of Gabon, Part 2, Roads and Bridges, Section A – Report," 1-1. Section 661 was an amendment to the original 1961 act. Act of 30 December 1974 (88 Stat. 1795).

[16] U.S. Army Corps of Engineers, Philadelphia District, "Technical Proposal to the Republic of Gabon, Part 1 – Dredging and Port Development, Section B – Proposals," January 1980, 1, Philadelphia District-Library; Unpublished Morgan Draft District History, 125–126.

[17] U.S. Army Corps of Engineers, Philadelphia District, "Technical Proposal to the Republic of Gabon, Part 1 – Dredging and Port Development, Section B – Proposals," 1; U.S. Army Corps of Engineers, Philadelphia District, "Technical Report to the Republic of Gabon, Part 2, Roads and Bridges, Section A – Report," 1-2, 1-5.

[18] Unpublished Morgan Draft District History, 126.

[19] U.S. Army Corps of Engineers, Philadelphia District, "Technical Proposal to the Republic of Gabon, Part 1 – Dredging and Port Development, Section B – Proposals," 7–9; Unpublished Morgan Draft District History, 129.

[20] "Minutes, Corps of Engineers Marine Engineering Board, 24–26 April 1979, Philadelphia, PA," 8, Minutes of the Marine Design Engineering Board, Sept 77 thru Apr 79, Marine Design Center Library, Philadelphia District; Calvarese interview, 2.

[21] Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (94 Stat. 2797).

[22] EPA, "Superfund: 20 Years of Protecting Human Health and the Environment," 13 <http://www.epa.gov/superfund/20years/20yrpt1.pdf> (3 March 2010).

[23] Environmental Protection Agency and U.S. Army Corps of Engineers, "Interagency Agreement Between the USACE and the USEPA in Executing P.L. 96-510, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)," Memorandum of Understanding, December 3, 1984, available at Army Corps of Engineers Environmental Community of Practice site, <https://environment.usace.army.mil/what_we_do/superfund/prg_docs> (29 March 2010).

[24] James Woolford, Director, Office of Superfund Remediation and Technology Innovation, to Superfund National Policy Advisors, Memo, 3 April 2008, 2, available at <https://environment.usace.army.mil/downloaddbfile.cfm?file_id=53AEEA04-188B-313F-1B4CE180A876BEC3&CFID=26606635&CFTOKEN=76037752> (3 March 2010).

[25] Bartholomeo interview, 10.

[26] EPA Region 2, "Krysowaty Farm, New Jersey," EPA fact sheet, 5 March 2008 <http://www.epa.gov/region02/superfund/npl/0200670c.pdf> (14 April 2010).

[27] "District Gets Added Superfund Role," The Observer (May 1993): 1. In 1983, district personnel (working out of the Engineering Division's Construction Branch) began two projects at Superfund sites: installing a wall and cap to contain contamination at the Lipari Landfill site and pumping out the lagoon at the Bridgeport Rental and Oil Services site, both located in Gloucester County, N.J. The district's primary role in Superfund remediation at these locations did not begin in earnest until a later date. Voigt personal communication.

[28] Bartholomeo interview, 9.

[29] Maraldo interview, 32. The district's Superfund work came under its Support for Others program.

[30] Bartholomeo interview, 9.

[31] Jeanne Fox quoted in "Superfund 'Poster Child' Moves On to New Phase," *The Observer* (March 1996): 8.

[32] "Superfund 'Poster Child' Moves On to New Phase," 8. Emphasis in original.

[33] Bartholomeo interview, 6.

[34] Bartholomeo interview, 13.

[35] Bartholomeo interview, 12.

[36] Bartholomeo interview, 13.

[37] U.S. Army Corps of Engineers, Philadelphia District, "Superfund," Powerpoint slide, no date, copy provided by John Bartholomeo, U.S. Army Corps of Engineers-retired, Philadelphia District.

[38] "Superfund Projects Get Underway," *The Observer* (September 1989): 2.

[39] "Superfund Projects Get Underway," 2.

[40] EPA, Region 2, "Lipari Landfill, New Jersey," NPL fact sheet, April 2002 <http://www.epa.gov/superfund/sites/nplfs/fs0200557.pdf> (19 May 2010).

[41] EPA, "Lipari Landfill, New Jersey," 1.

[42] EPA, "Lipari Landfill, New Jersey," 1.

[43] EPA, "Lipari Landfill, New Jersey," 2.

[44] Lt. Colonel Robert Keyser, "As I See It," *The Observer* (February 1997): 2.

[45] U.S. Army Corps of Engineers, Philadelphia District, "NAD Superfund Placement," Powerpoint presentation, n.d., copy provided by John Bartholomeo.

[46] EPA, "Tranguch Gasoline, Current Site Information," 26 June 2008 <http://epa.gov/reg3hwmd/npl/PA0001409671.htm> (24 February 2009).

[47] Bartholomeo interview, 24.

[48] "Tranguch Emergency Response Remediation System," *The Observer* (Winter 2004): 4.

[49] Bartholomeo interview, 23; American Society of Civil Engineers, "Outstanding Projects And Leaders (OPAL) Awards" <http://content.asce.org/handa/opal.html> (23 April 2010).

[50] In the same year that Congress passed CERCLA (1980), it also passed the Resource Conservation and Recovery Act (RCRA). In contrast with Superfund, which dealt mostly with pollution at abandoned or inactive sites, RCRA focused on identifying and halting companies that were actively releasing toxic wastes into the environment. The Philadelphia District oversaw RCRA operations not just within its own boundaries but throughout EPA Region 3. Although on a significantly smaller scale than the Superfund work it carried out in support of EPA Region 2, the district was managing RCRA cleanups for EPA Region 3 over much the same time period. Voigt personal communication.

[51] "Restoring a Bridge for the Coast Guard," *The Observer* (Winter 04/05): 11–13.

[52] Bartholomeo interview, 19.

[53] Paul Gaudini, untitled draft document composed for the tenth anniversary of the FAA test facility (hereafter referred to as FAA anniversary draft document), document provided by Paul Gaudini, Philadelphia District.

[54] Federal Aviation Administration, "The National Airport Pavement Test Facility, July 2009," document provided by Paul Gaudini, Philadelphia District.

[55] Quotations from Gaudini, FAA anniversary draft document; Federal Aviation Administration, "The National Airport Pavement Test Facility, July 2009."

[56] Gaudini, FAA anniversary draft document.

[57] Federal Aviation Administration, "The National Airport Pavement Test Facility, July 2009."

[58] "The Runway Built from a River is Now Open for Business in Award-winning Example of 'Beneficial Use' Dredging," *The Observer* (November/December 1999): 5.

[59] "One Good Idea from the Philadelphia District Amounts to $7 Million Cost Savings for the City of Philadelphia," *The Observer* (July 1996): 4; "2 for 1 – Maintain a Waterway, Create a Runway," *The Observer* (February 1997): 5.

[60] "The Runway Built from a River is Now Open for Business in Award-winning Example of 'Beneficial Use' Dredging," 5.

[61] Richard A. Weiss, Theresa M. King, and D. Kelly O'Day et al., "Philadelphia Water Supply Infrastructure Study," May 1985, 1, Philadelphia District-Library.

[62] According to one report, "Section 22 of the Water Resources Development Act of 1974 (PL 93-251) as amended, authorizes the Corps of Engineers to provide Planning Assistance to States for the development, utilization, and conservation of the state's water and related resources." Weiss, King, O'Day et al., "Philadelphia Water Supply Infrastructure Study," May 1985, 1, Philadelphia District-Library.

[63] "City, District Working Together on Multiple Fronts," *The Observer* (January/February 2000): 3.

[64] U.S. Army Corps of Engineers, Philadelphia District, "Wissinoming Sinking Homes Study, Philadelphia, PA," May 2000, 1, document provided by Paul Gaudini, Philadelphia District.

[65] "City, District Working Together on Multiple Fronts," 3

[66] "City, District Working Together on Multiple Fronts," 3; U.S. Army Corps of Engineers, Philadelphia District, "Wissinoming Sinking Homes Study, Philadelphia, PA," 2–4.

[67] "City, District Working Together on Multiple Fronts," 3; Voigt personal communication.

10

Conclusion

Between 1972 and 2008, the Philadelphia District underwent numerous changes—in the scope and variety of its missions, in the size and composition of its workforce, in its organizational relationship with the Marine Design Center, and even in the location of its home office. In 1972, the district had many civil works projects on the horizon, most of them related to the Delaware River Basin Comprehensive Plan. The district was preparing to begin construction on Tocks Island Dam, the linchpin of the comprehensive plan, and was working on other dams at Blue Marsh and Beltzville, with one at Trexler in the planning stages. The district was just beginning a fledgling regulatory program based on new responsibilities given to it by the Clean Water Act. It had no military construction program at the time and, even though it would provide much aid in 1972 after Hurricane Agnes ravaged the eastern coast, it did not have a specific emergency management program. Consisting of approximately six hundred employees and housed in the Customs House, the district primarily focused on navigation and flood control.

By 2008, much of this picture had changed, although certain trends persisted. Navigation was still at the core of the district's civil works program. Within the Corps, the district had long been strongly identified with dredging, hydrographic surveying, and marine design. That was still the case. Although down from its previous fleet of three seagoing hopper

Facing page: The Philadelphia District—which owns more high-level highway bridges (five) than any other Corps district—has been designated a center of expertise for Bridge Inspection and Evaluation, with structural engineers and rope access technicians certified for short span and high-level complex bridges

The C&D Canal at Chesapeake City, Maryland, where District dispatchers monitor and control ship traffic 24/7

dredges, the district still claimed one of only four such dredges owned and operated by the Corps. While one major waterway deepening project was halted in the design stage and another experienced many delays before reaching construction, annual maintenance of those two channels continued without incident. Although the Marine Design Center was now officially separate from the Philadelphia District, it had always been a national resource, and its mission (like its location) remained essentially the same.

"Flood control" in the historic sense no longer took center stage at the district. The concept of "control" had evolved to the more modest and realistic goal of reducing risk and was applied increasingly to coastal storms as well as floods. Soft structures—those more imitative of nature—had come to be preferred over traditional hard structures such as dams and culverts. Most significantly, the district's civil construction workload had experienced a strong eastward shift toward the Atlantic Coast. In a little more than a decade, the district went from dedicating its last dam and reservoir (Blue Marsh Lake, 1979) to beginning its first beach nourishment project (Cape May, 1990). By 2008, eleven of these projects were in place along the New Jersey and Delaware shorelines, and more were being developed.

The end of the dam-building era was a national trend extending far beyond the Tocks Island and Trexler projects. It was linked to the rise of the environmental movement and its influence on the nation's water policy, which subjected Corps projects to more scrutiny than ever and killed some projects that originally seemed to be viable solutions. Yet that same movement and its focus on maintaining the nation's environmental quality would ultimately result in an increase in the district's missions and workload, especially in terms of Superfund cleanup and the implementation of ecosystem restoration projects.

In 2008, the Philadelphia District, with a new home in the Wanamaker Building, had reclaimed a major part of its

historical workload that had been transferred elsewhere by 1972: a flourishing military construction program. In 2009, Philadelphia was again designated a Military District. Two other elements that had historically been present—responding to disasters and working for other agencies and governments—were now represented by a permanent branch and a third major mission area, respectively. After 11 September 2001, the Emergency Management Branch's oversight expanded from disaster to contingency operations; during one stretch, it managed deployments to both the Gulf of Mexico and the Persian Gulf. In terms of total project dollars, in some years the district's Support for Others program surpassed both civil works and MILCON.

Through all of these changes, the Philadelphia District maintained its commitment to excellent service to its customers and to the nation as a whole. Its trademark responsiveness, coupled with flexibility, proved indispensable in the pivotal 1970s and beyond, especially with regard to the challenge

Sunrise at Blue Marsh Lake

The District-built Schuylkill River Park recreation trail at Market Street Bridge, Philadelphia

of adaptation. This responsiveness was apparent in the district's readiness to assume military construction responsibilities when asked and to be able to shuffle the bases on which it worked as needed. It was also shown in the way the district responded to environmental changes in the United States, adapting to reordered priorities in its civil works program and developing innovative ways to fight flooding and keep waterways viable with minimal environmental impact. Across all sectors of its business, the district applied its collective ingenuity and resourcefulness to produce better solutions: using dolosse and CORE-LOC to strengthen the jetties flanking Manasquan Inlet, combining beach nourishment and freshwater wetland restoration to save Lower Cape May Meadows for migratory birds, building a sand bypass plant at Indian River Inlet to continuously counteract littoral drift, constructing one wastewater treatment plant to serve both Fort Dix and McGuire Air Force Base, and renovating and upgrading a fish ladder in the heart of Philadelphia so shad and other native species could flourish again as they did at the nation's founding. Willing to embrace new technology and new applications, the Philadelphia District was well poised to adjust to the dynamism of water policy in the late twentieth and early twenty-first centuries.

Groundbreaking for the C-17 Flight Simulator Facility, Dover Air Force Base, 2006

Challenges remained, of course. Even though the district worked diligently not only to comply with environmental laws and regulations but also to address public concerns, it still faced opposition in some of the work Congress asked it to perform. This opposition led to project delays (as with the Delaware River main channel project); personal attacks on Corps

officials (as with the Tocks Island project); and even unfavorable publicity from both sides of an issue, with the district alternately labeled as hostile to environmental needs or to property rights (as sometimes happened with the regulatory program). No matter how hard the Corps worked to satisfy all interests in a project, it seemed that at least one group always remained dissatisfied. The Philadelphia District persisted in reaching out and doing what it could to hear and consider interested parties' concerns—over time building trust and respect, if not agreement, with some of those in opposition.

The fluctuations in the district's workload also proved to be challenging, especially in the early 1980s, when the district was downsized after the cancellation of the Tocks Island project and the district engineer position was reduced from a colonel to a lieutenant colonel, and in the early 1990s, when a general Corps restructuring targeted the district

Hikers behind the dune—placed for both economic and environmental benefit—in Cape May Meadows State Park, with the Cape May Point Lighthouse in the background

for closure. Such events led to an unsettled feeling in the district that was, at times, compounded by changes in its workload. Having Corps leadership take away missions and functions and later return them (such as with design work in the 1980s and the military mission in general) detracted from a sense of continuity in the district. Thus, the same events that enabled the district to become more flexible and responsive in its work also created difficulties.

The Philadelphia District dealt with these fluctuating workloads and responsibilities through solid internal teamwork and as part of a larger Corps team that included other districts in the North Atlantic Division. In the twenty-first century, this teamwork took the form of regionalization and the USACE 2012 initiative, which promoted working across districts and across division boundaries in an attempt to eliminate the "stove-pipe" perception of the Corps. In contrast to past reorganizations that diminished the Philadelphia District's roles and responsibilities, these changes had a positive overall effect on the district's workload. The most prominent

The vertical lift bridge at the former Philadelphia Naval Shipyard, after complete renovation by the District for the United States Coast Guard

example was the C4ISR program at Aberdeen Proving Ground, which Philadelphia took on as part of a division-wide project reallocation to handle the MILCON surge stemming from BRAC 2005.

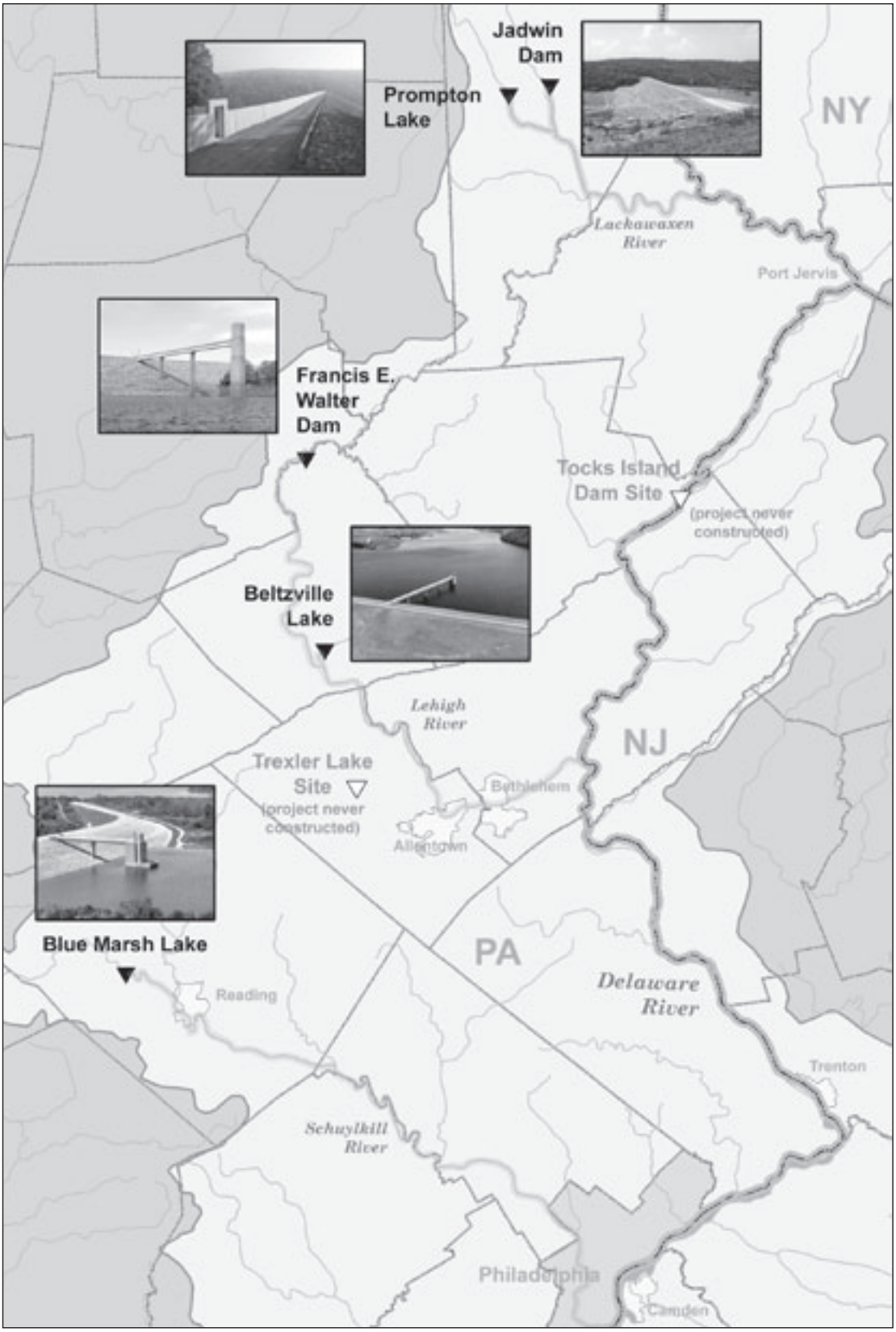
As the Philadelphia District moved into the twenty-first century, its future looked bright. The district was poised to continue its strong environmental work in terms of Superfund cleanup, ecosystem restoration, and wetlands permitting, having developed a large amount of expertise in these fields over the preceding years. Likewise, the district would continue its dredging and navigation functions in the waterways under its jurisdiction and along the coastline, and would continue to use its expertise in beach nourishment projects to protect the shorelines of New Jersey and Delaware. Flood control would still to be an important component of the district's work, although the forms such work took would continue to evolve. The military construction mission was set to become an even larger element of the district's responsibilities, in both project management and contracting, in part because of the excellent work the district had done for years at Fort Dix, McGuire Air Force Base, and Dover Air Force Base. The district would also continue to offer its expertise and experience to a host of other federal, state, and local agencies.

By 2008, the Philadelphia District had built a solid reputation on its ability to adjust to the context of the times while still providing responsive and reliable service to its clients. This flexibility would serve the district well as it carried its legacy into a new century.

Lieutenant General Robert B. Flowers, Chief of Engineers from 2000 to 2004, consults a map on the McFarland *with dredge master Captain Karl Van Florcke*

Appendices

Philadelphia District Dams and Reservoirs



Project		General Edgar Jadwin Dam	Prompton Lake	Francis E. Walter Dam	Beltzville Lake	Blue Marsh Lake
Location		Honesdale, Pa.	Prompton, Pa.	White Haven, Pa.	Beltzville, Pa.	Leesport, Pa.
County		Wayne	Wayne	Carbon & Luzerne	Carbon	Berks
Stream		Dyberry Creek	West Branch Lackawaxen R.	Bear Creek & Lehigh R.	Pohopoco Creek	Tulpehocken Creek
River Basin		Lackawaxen	Lackawaxen	Lehigh	Lehigh	Schuylkill
Upstream Drainage Area		65 sq. mi.	60 sq. mi.	288 sq. mi.	96 sq. mi.	175 sq. mi.
Authorized Purposes		Flood Control	Flood Control	Flood Control Recreation	Flood Control Water Supply Water Quality Recreation	Flood Control Water Supply Water Quality Recreation
Start of Dam Operations		1959	1960	1961	1971	1977
Park Open for Recreation (1) (2)					1972	1979
DAM						
Dam Structure		Earthfill	Earthfill	Earthfill	Earthfill	Earthfill
Elevation at Top of Dam (3)		1,082′	1,233′	1,474′	672′	332′
Height above Stream Bed		109′	147′	234′	170′	98′
Length		1,255′	1,230′	3,000′	4,560′	1,775′
Top Width		30′	30′	30′	30′	30′
OUTLET WORKS						
Conduit Cross-Sectional Area		50 sq. ft.	59 sq. ft.	201 sq. ft.	38 sq. ft.	94 sq. ft.
Conduit Length		530′	548′	1,150′	1,165′	440′
Control Gates		Fixed opening	Fixed opening	3 @ 5′8″x10′	2 @ 2′10″x7′4″	2 @ 6′x10′
SPILLWAY						
Crest Elevation (3)		1,053′	1,200′	1,450′	651′	307′
Crest Length		164′	130′	450′	275′	300′
Design Discharge		69,000 c.f.s.	57,890 c.f.s.	193,721 c.f.s.	47,000 c.f.s.	73,900 c.f.s.
RESERVOIR						
Surface Area	Normal	Dry dam	290 acres	80 acres	947 acres	963 acres
	Recreation/Summer			574 acres		1,147 acres
Top of Pool (3)	Normal		1,125′	1,300′	628′	285′
	Recreation/Summer			1,370′		290′
Total Storage Capacity		8 billion gals.	17 billion gals.	36 billion gals.	22 billion gals.	16 billion gals.

(1) Walter is authorized for recreation, but not as a managed park.
(2) Recreation at Beltzville is managed by the Commonwealth of Pennsylvania (Beltzville State Park).
(3) All elevations are relative to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Philadelphia District Major Vessels

USACE Minimum Fleet Hopper Dredge

McFarland

USACE Survey Vessel

Shuman

Philadelphia District Hopper Dredges (since World War II)						
			Goethals	***Comber***	***Essayons***	***McFarland***
Year Built			1937	1947	1949	1967
Dredge Type			Side Drags	Side Drags	Side Drags	Side Drags
Power			Turbo-Electric	Turbo-Electric	Turbo-Electric	Diesel Electric
Length			476′ 0″	351′ 9″	525′ 2″	300′ 0″
Beam			68′ 0″	60′ 0″	72′ 0″	72′ 0″
Depth			36′ 3″	30′ 0″	40′ 5″	33′ 0″
Hopper Capacity			5,000 c.y.	3,000 c.y.	8,000 c.y.	3,140 c.y.
Maximum Loaded Draft			25′ 0″	22′ 2″	28′ 0″	22′ 0″
Maximum Dredging Depth			60′	62′	60′	55′
Dragpipes	No. – Size		2 – 32″	2 – 30″	2 – 36″	2 – 34″
Dredge Pumps	No. – Size		2 – 30″	2 – 28″	2 – 32″	2 – 26″
	Rating (Each)		1,300 h.p.	1,150 h.p.	1,850 h.p.	2,800 h.p.
Propulsion (All Twin Screw)	Total Shaft Rating		4,500 h.p.	6,000 h.p.	8,000 h.p.	6,000 h.p.
	Speed	Light	15.46 m.p.h.	15.35 m.p.h.	17.30 m.p.h.	15.40 m.p.h.
		Loaded	12.44 m.p.h.	12.85 m.p.h.	16.55 m.p.h.	14.90 m.p.h.
Year Retired			1982	1983	1981	Active

USACE Minimum Fleet Hopper Dredge *McFarland*

Year built	1967
Dimensions	
Length, w/o boom overhang	300′
Length, w/ boom overhang	319′ 8″
Boom length beyond side of vessel	136′
Beam, molded	72′
Depth amidship, molded	33′
Length of drag arms	63′
Material	
Hull & superstructure	Steel
Dredging depth	
Maximum	55′
Minimum	21′
Design mean draft	
Loaded	22′
Hopper capacity	
1 hopper	3,140 c.y.
Total capacity	12 doors
Draft	
Loaded – Forward	23′ 7/8″
Loaded – Aft	23′ 7/8″
Light – Forward	15′ 3″
Light – Aft	16′ 6″
Displacement	
Loaded	9,720 T.
Light	6,152 T.
Tonnage	
Loaded	6,036 T.
Light	5,644 T.
Dredging capabilities	Hopper, Pipeline, Sidecast
Pumping power	
Total output	5,600 h.p.
Motors, electric (2)	2,800 h.p. ea. @ 225/425 r.p.m.
Engines, diesel (3)	2,160 h.p. ea. @ 900 r.p.m.
Pumps (2)	225/425 r.p.m.
No. of vanes	5
Suction pipe	34″ dia.
Discharge pipe	26″ dia.
Propulsion power	
Total output	6,000 h.p.
Engines, direct drive diesel (4)	1,600 h.p. ea. @ 900 r.p.m.
Propellers, 4-blade, variable pitch (2)	13′ 6″ dia.
Bow thruster, electric, reversible	65″ dia.
Thrust	13,000 lbs. @ 500 h.p.
Direct pumpout	
Discharge line	26″ dia.
Maximum length of discharge line	20,000′
Sidecasting	
Discharge pipe	34″ dia.
Length of pipe	175′
Casting distance from side of dredge	163′
Fuel	
Capacity	270,000 gal.
Cruising range	8,500 mi.
Speed (statute miles)	
Light	15.4 m.p.h.
Loaded	14.9 m.p.h.

USACE Survey Vessel *Shuman*

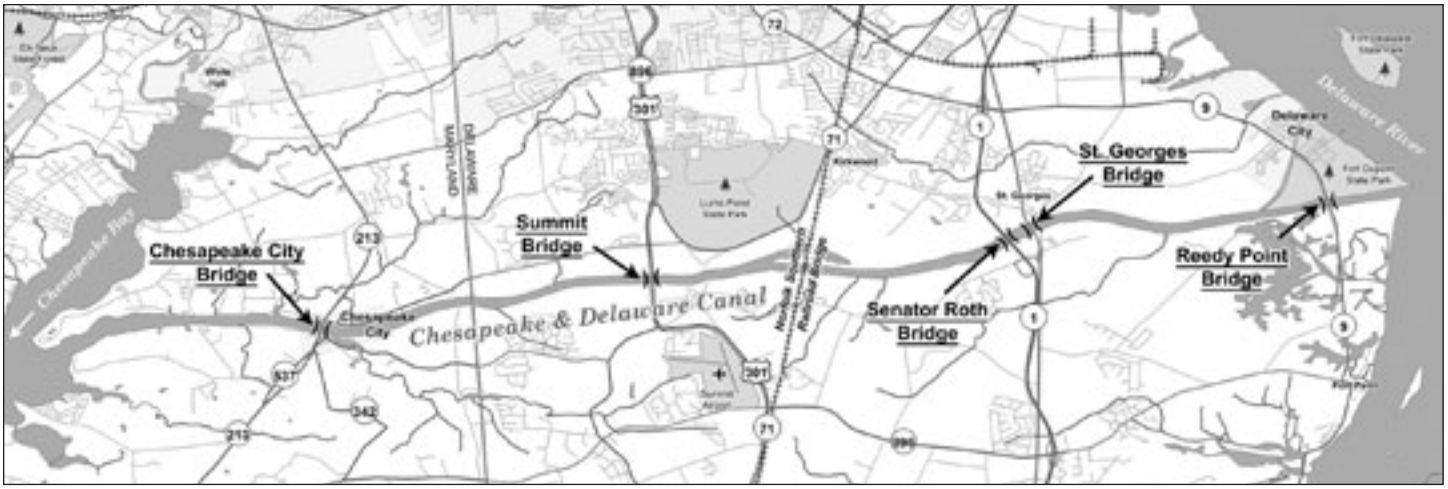
Year built	1970
Dimensions	
Length, overall	65′
Beam, overall	26′
Hull depth	8′ 5″
Clearance, top of mast	30′
Vessel type	Catamaran
Material	
Hull & deckhouse	Aluminum
Draft	
Loaded – Forward	4′ 9″
Loaded – Aft	4′ 9″
Light – Forward	4′ 7″
Light – Aft	4′ 7″
Displacement	
Loaded	53 T.
Light	32 T.
Propulsion	
Total output	1,480 h.p.
Engines, diesel (2)	740 h.p. ea. @ 2,300 r.p.m.
Reduction gears (2)	3:1 ratio
Generators (2)	38 kW.
Propellers, 5–blade, Nibral (2)	40″ dia. x 42 pitch, 3 ¾″ dia. shaft
Fuel	
Capacity	1,128 gal.
Speed (statute miles)	26 m.p.h.
Hydrographic survey equipment	
Hi-res multibeam sonar system	240 kHz., 150° swath
Position & orientation system	0.5-2.0 m. DGPS 0.02-0.10 m. RTK
Digital side scan sonar system	100 kHz. to 450 m. 500 kHz. to 150 m.
Single beam sonar system	0.2-600 m. depth range 0.01 m. resolution

Active Philadelphia District O&M Navigation Projects

Project	Map No.	Authorized	Last Modified	Authorized Channel Dimensions			O&M Length (if less)	Last Dredged
				Depths	Widths	Length		
Absecon Inlet, NJ	1	1922	1946	15′-20′	200′-400′	1.5 mi.		2004
Barnegat Inlet, NJ	2	1935	1946	8′-10′	200′-300′	4.5 mi.		2009
Cedar Creek, DE	3	1981		5′	50′-80′	1.2 mi.		2009
Cohansey River, NJ	4	1907	1937	8′-12′	75′-100′	19.5 mi.		1990
Cold Spring (Cape May) Inlet, NJ	5	1907	1945	20′-25′	300′-400′	2.3 mi.		2009
Delaware River at Camden, NJ	6	1919	1988	18′-40′	varies	~4 mi.		1992
Delaware River, Philadelphia, PA to Trenton, NJ	7	1930	1990	25′-40′	300′-400′	~30 mi.	23.5 mi.	2009
Delaware River, Philadelphia to the Sea, PA, NJ & DE (1)	8	1885	1992	45′	400′-1000′	102.5 mi.		Annual
Indian River Inlet & Bay, DE	9	1937	1945	4′-15′	60′-200′	~13 mi.	~2 mi.	2009
Inland Waterway, Delaware River to Chesapeake Bay, DE & MD (Chesapeake & Delaware Canal)	10	1919	1990	35′	450′	~46 mi.		Annual
Inland Waterway, Rehoboth Bay to Delaware Bay, DE (Lewes & Rehoboth Canal)	11	1912	1990	6′-10′	50′-200′	~12 mi.	~2 mi.	2004
Manasquan River, NJ	12	1930	1990	12′-14′	100′-300′	1.5 mi.		2009
Maurice River , NJ	13	1910	1990	7′	100′-150′	21 mi.		1996
Mispillion River, DE	14	1907	1992	6′	60′	13.6 mi.	~1 mi.	2009
Murderkill River, DE	15	1892	1990	7′	60′	8.5 mi.		2002
New Jersey Intracoastal Waterway	16	1945	1990	6′-12′	100′	117 mi.		2009
Salem River, NJ	17	1925	1990	16′	100′-150′	~5 mi.		2007
Schuylkill River, PA, Mouth to University Avenue	18	1917	1988	22′-33′	200′-400′	6.5 mi.	~4 mi.	2008
Toms River, NJ	19	1910	1979	5′	100′	4.5 mi.		1998
Tuckerton Creek, NJ	20	1902	1916	3′-6′	40′-80′	3.8 mi.		1977
Wilmington Harbor, Christina River, DE	21	1896	1960	7′-38′	100′-340′	9.9 mi.	~1 mi.	Annual

(1) Deepening from 40 to 45 feet per most recent authorization (1992) began in 2010 and was under construction as of this writing.

High-Level Highway Bridges over the Chesapeake & Delaware Canal



Chesapeake City Bridge	Summit Bridge	Senator William V. Roth, Jr. Bridge	Saint Georges Bridge	Reedy Point Bridge
Structure				
Tied Arch	Cantilever Truss	Cable Stay	Tied Arch	Cantilever Truss
Constructed				
1947–1948	1957–1959	1993–1995	1940–1941	1966–1969
Route Designation				
Md. 213	U.S. 301, Del. 896	Del. 1	U.S. 13	Del. 9
Highway Type				
2-lane	4-lane, divided	4-lane, divided, limited access, tolls	4-lane, divided	2-lane
Average Daily Trips (2008)				
14,538	22,801	67,564	10,208	1,742
Overall Bridge Length (between abutments)				
3,954′	2,058′	4,650′	4,209′	8,432′
Main Span Length				
540′	600′	750′	540′	600′
Maximum Height				
240′	196′	335′	240′	190′
Air Gap (ship clearance)				
135′	135′	138′	133′	134′

Marine Design Center Projects, 1982–2008 (in chronological sequence)

- *Yaquina* Hopper Dredge, Small Class Design
- *Essayons* Hopper Dredge, Medium Class Design, Claim Support
- *Wheeler* Hopper Dredge, Large Class Design
- *Gelberman* Tugboat 85′, Design
- *Titan* Crane Barge 96′x48′x8′4″
- LD-707 Shop Barge 140'x36'x9'
- *Brownlee* Standard Floating Crane 90T, 195′x54′x10′
- *Sewell* Standard Floating Crane 75T, 195′x54′x10′
- *Warren* Crane Barge 6CY, 150′x60′
- #869 Dragline Crane Barge 120'x42'x7'
- Standard Floating Crane Barge
- *DeLong A* Kings Bay Jackup DPO
- *Woodie Walden* Floating Crane Design (*Bluestone* Repl.)
- LD 730/731 Deck Cargo Barges (2) 125'x54'x7'
- Deck Barges (3) 120'x30'
- Fish Transport Barge
- *Luckiamute* Emergency Conversion
- *Hurley* Dustpan Dredge (*Burgess* Repl.)
- *Boyd* Surveyboat 45′
- *Azores* Dredge Aid
- SG Cutterhead Dredge
- LD-727 Power Service Barge
- Workboat 50', P&S Review
- Crane Barge Conversion
- *Swath* Surveyboat (*Adams* Repl.)
- *Merritt* Vessel Modifications
- *Roseires* Dredging Plant
- *Racine* Vessel Modifications
- *Peck* Towboat 100′
- *Wallace* Surveyboat 60′
- *Quad Cities* Gatelifter 350T
- USAF Cutterhead Dredge
- HD 290/291 Deck Cargo Barges 150'x50'
- *Warioto* Towboat, Medium Class
- *Bunyan*, Conversion to Diesel-Electric
- *Jadwin*, Conversion to Diesel-Electric
- *Britton* Towboat 100′
- DCB-75/76 Deck Cargo Barges (2) 120'x30'
- #96 Deck Cargo Barge 110'x26'
- SV 101 Service Barge
- *Harvey Hodge* Surveyboat 42′
- *Reynolds* Drift Collection Vessel 60′x20′ (*Patapsco* Repl.)
- SLG-3 Spare Miter Gate Barge
- #100 Gate Barge, Deck Cargo 150'x52'
- *Swath* Surveyboat
- HD 250 Deck Cargo Barge 105'x25'x8'
- #906-909 Deck Cargo Barges (4) 150'x35'x6'
- YMN1 Cutterhead Dredge 82'x27'x6' for MINSY (USN)
- *Bettendorf* Towboat 85′x30′ (*Andrews* Repl.)
- *Lusk* Tender (*Wailes* Repl.)
- *Dauntless* Salvage Support Services
- #8501 Deck Cargo Barge 200'x50'x8'
- Service Launch (*Moore* Repl.)
- #8601 Deck Cargo Barge 200'x50'x8'
- Dustpan Dredge (*Potter* Repl.)
- M/V *Mississippi* Repl.
- LD 733 Deck Cargo Barge 140'x36'x7'
- #850-853 Deck Cargo Barges (4) 110'x26'x6'
- Spud Barge 150'x35'x9'
- #8601-5/701-5 Deck Cargo Barges (10) 160'x34'x9'6"
- Buoy Barge 90'x30'x6'6"
- #8603 Deck Cargo Barge 260'x45'x7'
- #8604 Ramp Barge, Deck Cargo 120'x30'x7'
- *R.W. Davis* Floating Crane 160′x54′x10′6″ (*Upatoi* & *Tallawampe*)
- DB 65 Floating Crane 75'x52'x8.5' (DB 7 Repl.)
- DB 11 Floating Crane 75'7"x52'x8'9" (DB 8 Repl.)
- ND 40 Shop/Spud Barge 150'x52'x9' (DB 10 Repl.)
- HD 251 Deck Cargo Barge 105'x26'x8'
- C: *Bogue* Crewboat (for *Hurley*)
- DD: *Hurley* Drydock # 5801
- PL: *Hurley* Pipeline
- SP: SP1/101-102 Barges (3) (for *Hurley*)
- T: Tender One (for *Hurley*)
- Floating Crane (DB 4401 Repl.)
- #185 Power/Shop Barge
- #910-919 Deck Cargo Barges (10) 150'x35'x6'
- #8801-5\901-5 Deck Cargo Barges (10) 160'x34'x9'6″
- HD 292 Deck Cargo Barge 151'x52'x8'
- #91 Deck Cargo Barge 105'x26'x7'
- #9201 Work Barge 55'x20'x5'
- #869 Barge & Crane Analysis
- Spud Barge 100'x54'
- Towboat 65'
- *Cherneski* Surveyboat 42′

- *Creve Coeur* Tender 1200HP (*Kankakee* Repl.)
- Dredge *Thompson* Repl. Design
- *P. H. Worley* Lock Tender 50’x18’x8’ (Winfield L&D)
- Duluth/Superior Harbor
- M/V *Hatton* Repl.
- *Robinson Bay* Repowering
- DCB-77/78 Stop Log Barges (2), Deck Cargo 120'x30'x7'
- *Rouge* Harbor Tugboat 65’, Repowering
- Dump Scow 200CY
- *Mister Pat* Towboat 1375HP, 82’x35’x10’
- *H. J. Schwartz* Floating Crane (*Coleman* and *Markus* Repl.)
- SES-200 Repowering
- *Moline* Towboat (*Craigel*), Small Size 600–800HP
- Hopper Barge 151'x25'
- *Harrell* Patrol Boat 35’ (*Craney Island* Repl.)
- *Ted Cook* Towboat 1800HP, 82’3”x34’x10’10” (*Anglin* Repl.)
- Utility Barge 30'x12'
- Surveyboat 44'
- *Currituck* Repowering
- Tender (*Marmet*)
- Surveyboat 44'
- Crane Barge 150'x52'x9', R.C. Byrd L&D
- DB-766 Crane Barge 150'x50'x10' (DB-762 Repl.)
- Dredge Pipeline Pontoons (50) 47'6"x16'x4'
- #854-857 Deck Cargo Barges (4) 110'x26'x6'
- #105 Deck Gate Barge 150'x52'x8'
- *Pathfinder* Towboat 75’x30’x8’6” (Repl.)
- *Grand Tower* Towboat Repl.
- *Fisher* Crane Barge (#1 Repl.)
- Deck Cargo Barges
- Deck Cargo Barge (#46 Repl.)
- DB-767 Crane Barge (DB-763 Repl.)
- Surveyboat (*Hickson* Repl.)
- Towboat (*Singleton* Repl.)
- *Fred Lee* Towboat 85’x28’x9’, Red River
- #9502
- Lock Stop Log Barge
- Dam Stop Log Barge
- Utility Boat
- HD 252 Deck Cargo Barge 105'x26'x8'
- *Halcyon* Engineering Support
- *William R. Porter* Tender 50’ (Gallipolis Locks)
- #2256 Crane Barge 150'x50'x8'
- *Wheeler* Repowering
- LCOB *McFarland* Launch Repl.
- *LaSalle* Towboat (*Pekin*)
- Tender (*Cottel* Repl.)
- Stringout Barges
- Floating Crane Barge, Winfield L&D 150'x52'x9'3"
- QB 9401 Quarters Boat, Barge 266'x40'x10'7"
- #9801 Crane Barge
- *Duluth* Tug Repowering
- Floating Crane (*Upatoi* & *Tallawampe*)
- Drift Vessel *Elizabeth* Repl.
- *Tenn-Tom* Towboat 1800HP, 85’x30’x10’
- *Halcyon* Surveyboat 60’ (Swath), Repowering
- M/V *Iroquois* Repl.
- *Tennessee* Towboat 800HP
- USFWS Research Vessel 95'
- QB 9901 CEMVK Quarters/Galley Goat, Mess Barge 301'x40'x11'
- #5801 Casualty to Drydock
- *Henry M. Shreve* Gatelifter Barge, Floating Crane 350T, 300’x100’x14’
- CELMK Fuel Oil Barge 195'x35'x12'
- QB 9501 Quarters/Office Barge 266'x40'x10'7" (Similar to QB 2281)
- HD 294 Deck Cargo Barge 151'x52'x8'
- Olmsted Lock and Dam
- HD 293 Deck Cargo Barge 151'x52'x8'
- *Roger R. Henry* Derrickboat (#49 Repl.)
- *Ossabaw* Surveyboat 32’, Sea Ark (GSA)
- *Donlon* Tug Steel Tender 50’ (*Palmyra/Paulsboro* Repl.)
- Tug Pilot Repl.
- Deck Cargo Barges, 700 Series (2), 150'x35'x6'
- QB 2001 Office/Locker Barge 150'x35'x6'
- *Melvin Price* Docking Barge 150’x48’x9’3”
- #9511 Fuel Oil Barge 125'x26'x7'6”
- ND6 Crane Barge Conversion
- *Sturgeon* Research Vessel Conversion
- Towboat
- Drift Collector 100’x30’x10’ *(Raccoon* Repl.)
- Standard Inland River Crane Barge 150'x50'x10'
- HD 253/254 ORH Deck Cargo Barges 105'x26'x8' with Cargo Box

- *Wildcat* Repl.
- *J. C. Thomas* Towboat 125'
- *Grizzly* Tug, Engineering Support
- *Davenport* Towboat 59'x22'x8.5' (*Monmouth* Repl.)
- #9511 LMK Fuel Oil Barge 125'x26'x7'6"
- *Kenneth Eddy* Towboat Repl. 100'x34'x11'
- Work Layout Barge 230'x68'x12'
- Debris Barge
- *Dobrin* Surveyboat 67'x19'
- *Adams II* Surveyboat 67'x19'
- DB-9 Crane Barge 150'x50'x10'
- DB-10 Crane Barge 150'x50'x10'
- *Hercules* Floating Crane Barge
- *Hiram Downs* Jet Surveyboat 38'
- #9701 Fuel Oil Barge 195'x35'x12'
- Surveyboat 36'-38'
- *Potter* Repowering
- *Goliath* Spud Operating Mechanism
- M/V *Bogue* Crewboat Repairs
- Fuel Oil Barge 130'x35'x12'6"
- Water Barge
- *Bettendorf* Warranty Claim
- *Titan* Floating Crane Barge 205'x108'x17'
- *Evanick* Towboat Repl. 100'x35'x11'
- *Hudson* CENAN Surveyboat/Patrol Boat Repl. 53'
- *Bluestone* Debris Mgt. Vessel 50'x20'
- *Moritz* Surveyboat Repl. 65'
- *Monallo III* Crane Barge 195'x80'x13' *(Monallo II* Repl.)
- *Mckelvey* Steel Workboat 50' (Belleville L&D)
- *Stevens* Steel Workboat 50' (Willow Island)
- Rock Barge, Deck Cargo 150'x35'x8'
- CE 64 Fuel Oil Barge 195'x35'x12'
- CE 407 Fuel Oil Barge 125'x26'x8'
- *Praire Du Rocher* Towboat 880HP, 50'
- *Barron* Launch (*Pittsburgh* Repl.)
- Surveyboat 26'
- Deck Cargo Barges (3) 120'x30'x7'
- *Teche* Surveyboat 55' (M/V *Granada* Repl.)
- *Forney* Tug Repowering
- *Choctawhatcee* Floating Crane (Seatrax)
- *Irvington* Surveyboat Repl. 50'
- PCC Dredge *Mindi* Engineering Support
- *Olmsted* Manuever Barge
- Deck Cargo Barges (3) 105'x26'x7'
- *Redlinger* Surveyboat 32', Truckable (*Rodolf* Repl.)
- *Elton* Surveyboat 65', Deep-Vee (*Hickson* Repl.)
- *Derrick 6* Anchor Handling Barge 75'x35'x5'6"
- Gate Barge 175'x70'x12'
- #37A Maneuver Boat
- Maneuver Boat, Peoria L&D
- MB 2001 & 2002 Maneuver Boat, LaGrange L&D
- *Goetz* Dredge, *Thompson* Dredge Repowering, 595-Old & 659-New
- *Titan* Crane Barge 96'x48'x8'4"
- *Lafourche* (M/V *Alexander* Repl.)
- KIYI Research Vessel
- *Cherneski* Spicer Shaft
- *Shorty Baird* Cooling System Conversion
- *Driftmaster* Boom Repl.
- *Monallo III* Floating Crane Barge
- *Potter* Overhaul & Repair
- Pontoons
- *Channahon* Towboat Repowering
- DB-768 Crane Barge (*Kewanee* Repl.)
- *Essayons* Dredging Control & Automation
- L/D 53 Olmsted Washdown Barge 70'x30'x5'
- *Tanner* Surveyboat *(C.M. Wood* Repl.)
- SG-4 Spare Gate Barge
- *Mike Hendricks* MPLD Floating Crane
- *Yaquina* Repowering
- *Morewood* Drift Control Barge
- CB 11 Crane Barge (*Mazon* Repl.)
- *Bray* Surveyboat, Engineering Support
- #670 Scow, Engineering Support
- *Harvey* Crane Barge
- Barge, Dredge Floating Pipeline 48'x18'x4'
- *William James* Towboat (*Lipscomb* Repl.)
- *Sanderford* (M/V *Wailes* Repl.)
- M/V *Key Woods*
- *Essayons* Launch Repl.
- Fish Stocking Vessel, Jordan Fish Hatchery
- Crane Barge
- *Choctawhatchee* Crane Barge
- *Leitner* Towboat Vibration
- *Yaquina* Hopper Dredge, Crane Repl.
- Rock Island Rock Barges, Deck Cargo (6) 150'x35'x8'
- *Essayons* Repowering
- BD-7 Drift Crane, Floating Crane Barge
- *Kimmswick* Repl.
- *Jadwin* Dredge Repairs
- *Brown* Crane Barge Repl.
- *Gordon M. Stevens* Towboat Repl.

- BD-1 Barge
- *John A B Dillard Jr.,* Debris Vessel
- *City of Ottawa* Towboat 85' (*Peoria* Repl.)
- Workboat for Racine Lock
- *Montgomery Point* Barge
- *Lawson* Towboat 96'x39'x8', (3) screws @ 670 ea. (*Patoka* Repl.)
- *Linthicum* Repowering
- Rock Barge (2) (Peoria)
- Crane Barge
- *Blanchard* Surveyboat 44'
- 934 Deck Barge 150'x35'x6'
- Deck Cargo Barges (6)
- Rock Barges (2)
- *Thompson* Quarters/Galley Boat Barge
- *Gen. Warren* Towboat (*Thompson* Repl.)
- *Shuman* Surveyboat Repowering
- Shallow Draft Dredge Repl., Split Hull
- CN-4 Flat Deck Crane Barge 80'x29'x7' (Existing)
- *Jadwin* Pipeline Repl.
- Anchor Handling Barge Repl. 60'x22'x5'
- *Wheeler* Repowering
- *Breton* Surveyboat Repl. 48'x16'
- M/V *Mississippi* Landing Barge 120'x68'
- Surveyboat
- Pipeline Barges (3)
- ND 45-48 Deck Cargo Barges (4) 120'x28'x7'
- *Yaquina* Launch Repl.
- Crawler Crane
- *Taggatz* Quarters Boat
- Rock Barges (6)
- *Marmet* Workboat (Marmet L&D)
- *Gavins Point* Landing Craft
- *Gordon M. Stevens* Towboat (Olmsted L&D)

Philadelphia District Gallery of Distinguished Employees

Nicholas J. Barbieri, P.E., joined the District in 1952 as a construction engineer and concluded as Chief of the Planning/ Engineering Division. He served as resident engineer for the widening and deepening of the C&D Canal and supervised completion of planning studies for modification of the F.E. Walter Dam. Moreover, he was the driving force behind successful efforts to restore the Military Construction mission at Ft. Dix and McGuire Air Force Base to the Philadelphia District, soon after plans for Tocks Island Dam had been shelved and at a time when the District's workload was near its all-time low. Also, he encouraged the District's shift toward increased reimbursable work for the EPA and other federal agencies. In 1984, he received the Outstanding Manager of the Year award from the Federal Executive Board in Philadelphia, largely in recognition of his transformational leadership. He retired in 1986, following thirty-five years of service.

Lewis A. Caccese, P.E., joined the District in 1941 as a First Lieutenant active duty with the Army. After being discharged in 1946, he remained with the District as a civil engineer, rising to Chief of Operations Division in 1954. He developed the "direct pumpout" dredging technique, allowing material to be pumped directly into onshore disposal areas. He also launched the District's Long Range Disposal Study to develop new concepts allowing use of distant disposal areas. His leadership in applying environmental considerations to Section 10 of the River and Harbor Act of 1899 helped preserve the District's wetlands. In 1971, he became the first employee of the Philadelphia District to receive the Secretary of the Army's Distinguished Civilian Service Award. He was named Engineer of the Year by the Technical Societies of the Delaware Valley in 1974. He retired in 1979 after thirty-eight years of service.

Robert L. Callegari came in as Chief of the District's new Planning Division in 1987 after sixteen years with the North Atlantic Division and New York District. Faced with few active studies and only one project authorized for construction, he reached out to the congressional delegation and to potential non-federal partners to identify the District's civil works capabilities. His efforts led to one of the Corps' largest and most successful coastal programs, including beach nourishment projects for New Jersey's Long Beach Island, Atlantic City, Ocean City, Avalon and Stone Harbor, Cape May, and The Meadows/ Cape May Point, and for Delaware's Lewes, Rehoboth Beach, Bethany Beach, and Fenwick Island. He also made highly effective use of the Corps' Continuing Authorities Program to facilitate small projects for purposes such as aquatic ecosystem restoration and beneficial use of dredged material, and was instrumental in moving the Delaware River Main Channel Deepening from concept to construction.

Vincent L. Calvarese, P.E., began his long career with the District in 1962 as a civil engineer and rose to become Chief of the Design Branch in the Engineering Division. His achievements include the redecking and rehabilitation of the St. Georges and Chesapeake City Bridges; the Tocks Island study; and the construction of the Barnegat Inlet South Jetty. He worked on the construction of the Blue Marsh Dam, the relocation of Gruber Wagon Works, the selective water withdrawal tower at Beltzville and the F.E. Walter Dam modification, all the while serving as a teacher and advisor to others. He was instrumental in Philadelphia becoming the first East Coast District to utilize concrete dolosse, which was done during the reconstruction of the Manasquan Inlet jetties. His insistence on using steel reinforcing rods in that project, contrary to the advice of some experts, proved sound.

Albert J. Depman, C.P.G., joined the District in 1948 as a civil draftsman, having earned his bachelor's degree in geology from the University of Pennsylvania in 1947. As Supervisory Engineering Geologist during the mid-1960s, he supervised a team of geologists sudying the Beltzville and Tocks Island dam sites and conducted subsurface investigations of the Blue Marsh and Trexler sites. He also worked on subsurface investigations for the Chesapeake & Delaware and Point Pleasant canals. Promoted to branch-level Supervisory Geologist in 1968, he was honored by the Corps and by many external customers for his exceptional work as a geologist. He served as president of the Association of Engineering Geologists. He retired in 1978 after nearly thirty-three years of federal service, including active duty with the U.S. Navy during World War II and the Korean conflict.

Elaine H. Dickinson began her career with the District in 1966 and became the District's Equal Employment Opportunity (EEO) officer in 1978. She started a proactive EEO program that included an effective affirmative action plan to recruit minorities and women. Her work with ethnic heritage month celebrations did much to increase employee awareness of different cultures. She founded PRIME, a program designed to encourage minority students to pursue careers in mathematics, science, and technology, in the District. She participated in the Urban League and was a member of the Federal Executive Board's EEO Officers' Council. She reached out to all areas of the District from field offices to the decks of the Dredge *McFarland,* providing sound and valuable advice to District employees. She retired in 1994 with thirty-six years of federal service, leaving a legacy of an innovative EEO program that continues to this day.

Harry F. Flynn served with the U.S. Army Corps of Engineers for nearly twenty-four years, from 1910 to 1933, in the Seattle, Wilmington, and Philadelphia Districts. His government career began with the Coast and Geodetics Survey, in 1892, and included a tour of duty with the Bureau of Public Lands in the Philippine Islands. While with the Philadelphia and Wilmington Districts he introduced tidal hydraulics processes that still are used. He designed and built the first tidal model of a portion of the Delaware River and influenced the decision to lower the Chesapeake & Delaware Canal to sea level.

Ernest P. Fortino, P.E., joined the District's Operations Division in 1939 as a student engineer. He transferred to the Marine Design Division and served in various positions, becoming Assistant Chief in 1961 and Chief of the Division in 1975. He was a leader in the division's effort to improve dredge equipment and develop instrumentation that improved efficiency aboard hopper dredges. He personally directed the design of three of the Corps' hopper dredges. He advised several foreign governments on design and construction of floating plant and served as a consultant to the Corps of Engineers' Marine Engineering Board. He retired in 1979 after almost forty years of federal service.

Paul B. Gaudini, P.E., joined the District in 1971, after earning his bachelor's and master's in civil engineering from Drexel University and the University of Missouri, respectively, and serving two years active duty with the U.S. Army. He took on increasing levels of responsibility, from his role as a resident engineer during the Hurricane Agnes response in 1972 to serving as Chief of the Project Development Branch and as Acting Chief of the Planning Division before his retirement in 2004. Throughout a career that covered all aspects of the District's workload, in planning, engineering and project management, he provided technical advice and senior leadership for such diverse projects as the Advanced Tertiary Wastewater Facility, the National Airport Pavement Test Machine, and the Delaware River Basin Study. Known for his dependable and disciplined approach in managing all available resources to accomplish the mission, he also dedicated himself as a mentor and coach to many others who worked for or with him.

T. Brian Heverin, throughout his thirty-seven years of service to the nation, was a dedicated, talented, and valued engineer, friend, and public servant in the Engineering-Construction and Operations Divisions. At various times he served as District Negotiator, Project Engineer, and Chief of the Recreation and Relocation section; Chief of the General Design Section; Chief of the Specification and Estimates Section; and first Chief of the Superfund and Construction Branches. He served on the negotiation team for Israeli air bases as part of the Camp David Accord, and accomplished many notable firsts in the Superfund program. Among his most notable accomplishments were the relocation and restoration of the historic Gruber Wagon Works and the oversight of military construction activities at Fort Dix and McGuire and Dover Air Force Bases. He retired in 2000 as Chief of the Technical Support Branch.

Captain Jerome H. Jackson joined the District in 1931 as Master of a survey boat. He subsequently served as Master or Deck Officer aboard the Corps Dredges *Clatsop, Rossell, Davison, Comber,* and *Essayons*. He is best remembered for his long service with the Philadelphia District as Master of the Dredge Goethals. He served in the Korean theater as a Major in the U.S. Army, engaged in dredging operations. He retired in 1972 after thirty-nine years of service.

George A. Johnson joined the District as a Naval Architect in 1945, after six years in the same capacity with the U.S. Navy. He became Chief, Marine Design Division, in 1958. He participated in the design and construction of the Hopper Dredges *McFarland* and *Markham* and the Sidecasting Dredge *Fry,* and directed the design of a floating nuclear plant and the conversion of a Navy vessel into a sidecasting dredge for duty in Vietnam. He was involved with designing floating plant for Korea, Australia, and the Panama Canal. He retired in 1975 after nearly thirty-six years' federal service.

Wesley E. Jordan joined the Corps in 1937 as a deck hand on the Pipeline Dredge Delaware. He served as Master and Deck Officer aboard the Dredges *Delaware, Rossell, Goethals,* and *Raritan,* and the Sump Rehandler *New Orleans.* As Resident Engineer of the Edgemoor, Del., office, he carried out many innovative projects to improve hopper dredge operations. He participated in direct pumpout operations in the Delaware River and the District's first beach nourishment by direct pumpout at Sea Girt, N.J. He served in the Army during World War II as a captain aboard the Hopper Dredge *Barth.* He retired in 1965 and continued working on dredging projects, serving as a special consultant to the Corps on beach nourishment projects in Norfolk, Va., and Jacksonville, Fla.

Arthur A. Klein, P.E., joined the District in 1947 as a Supervisory Hydraulic Engineer in the Design Branch, having served earlier in both the Huntington and Pittsburgh Districts. He became Chief of the Design Branch in 1960 and retired in that capacity in 1966. He twice served in France in the 1950s as a consultant on military construction. He assisted the U.S. House Appropriations Committee in its 1961 investigation of construction by non-military federal agencies. He contributed to the design and construction of many structural projects in the District and is remembered for his interest in the development of young engineers.

Stephen A. Krajnik, P.G., joined the District in 1965 as a geologist and retired in 1990. During this time he was personally and significantly involved in almost every major project the District planned, constructed, or operated, including Beltzville Dam, Blue Marsh Dam, Barnegat Inlet New South Jetty, Delaware River Main Channel Deepening, Chesapeake & Delaware Canal, Molly Ann's Brook, and the Lipari and Vineland Superfund sites. Despite a heavy workload he always made time to teach those around him, thus aiding the development of scores of professionals, many of whom rose to senior Corps positions. He staunchly advocated repair rather than replacement of instrumentation. By devising and fabricating simple but effective tools out of commonly available materials he saved the government tremendous downtime and tens of thousands of dollars in replacement costs.

H. Ronald Kreh, P.E., began his career with the Army Corps in 1955 after receiving his bachelor's degree from the University of Delaware. He rose to become Chief of Operations in 1978. Under his leadership, Operations and Maintenance programs thrived. He expanded routine testing of sediments to prevent damage to the environment. He was a key member of the Corps' Dredging Research Program and Minimum Fleet Study, and was deeply involved with maritime labor union negotiations. Under his management, the Regulatory Branch became a model for the North Atlantic Division, executing more than 2,500 permit actions annually. His expertise led to his selection on many Corps-wide committees as well as an intergovernmental task force to Africa. His ability to direct a large staff and accomplish complex missions while dealing with the public, media, Congress, and other agencies became legendary. He retired in 1993 after a thirty-seven-year career that, except for the short period as a Lieutenant in the U.S. Army, was spent entirely with the District.

Keith W. Lawrence, P.E., joined the Army Corps as a summer hire in the Detroit District in 1956 and concluded his career as Director of the Marine Design Center in 1990. He consistently distinguished himself in a wide variety of significant marine projects for the Corps. He was responsible for maintaining the three largest seagoing dredges in the Corps' fleet (the *Comber, Goethals,* and *Essayons*) at a time when the Corps performed most of the nation's hopper dredging. He was also responsible for the development of a number of pump-ashore and beach nourishment procedures. He implemented the concepts of individual project management and mentoring prior to their general adoption by the Corps and led the Corps in developing state-of-the art marine design capabilities to satisfy customers' needs.

Leonard J. Lipski, P.E., joined the District in 1957 and obtained his civil engineering degree from Villanova University in 1958. After the Delaware River Basin's 1965 record drought, he helped determine the required level of reservoir releases to prevent the salt line from reaching Philadelphia's water supply. He also studied the effects of shore structures on beach erosion, and employed his own improved analysis techniques in the design of flood control structures. After earning his master's degree from Stanford University in 1973, as chief of the Hydrology & Hydraulics Branch he played a key design role in proposed Walter and Prompton Dam modifications, the Delaware River Main Channel Deepening, Barnegat Inlet New South Jetty, the Molly Ann's Brook flood risk reduction project, several EPA Superfund cleanups, and the Delaware and New Jersey shore protection studies. Later as Chief of the Design Branch, he combined his extensive technical background with a disciplined approach and effective management of all available resources to accomplish the District's missions.

Captain Joseph D. Mahoney served for thirty-seven years in the Philadelphia District, working on the Pipeline Dredges *Raymond* and *Gillespie* and the Sump Rehandler *New Orleans,* of which he was captain. Born in 1899, he died February 14, 1959, while on duty as Master of the *New Orleans.* He died while directing operations and emergency repairs during a storm. Although frequently cautioned by his physician against over-exertion, his devotion to duty proved to be greater than his regard for his personal safety.

Anthony L. Marolda, a 1931 graduate of Rensselaer Polytechnic Institute, began his career with the Army Corps of Engineers in the Nashville District in 1935. A year later he transferred to the Philadelphia District, where he remained until he became part of the New York District in 1960. He became Resident Engineer for McGuire Air Force Base and the Fort Dix Infantry Center in 1952 following the outbreak of hostilities in Korea. Serving in this assignment, he oversaw hundreds of millions of dollars worth of construction as the twin bases became a major military installation.

Douglas C. Moore joined the District in 1962, advancing steadily to become Chief of the Survey Section. He became recognized worldwide—in both government and industry—as an authority in field of hydrographic surveying. Always keeping abreast of technology, he procured and implemented the District's first global positioning system for hydrographic work, followed by its first multibeam system. He was frequently called as an expert witness to resolve disputes on dredging contracts, in once case helping save the government about a quarter of a million dollars. For years he has taught the Corps' Hydrographic Survey course, and helped update the *Hydrographic Survey Manual* in 1998 and 2002. He serves on the American Congress of Surveying and Mapping's five-member board that certifies hydrographic surveyors. After the 9/11 attacks, he deployed to Ground Zero to personally supervise the establishment and operation of a constant building monitoring system. This served to verify the stability of the surviving structures and ensured the safety of the response crews.

Frederic Mullineaux contributed thirty-one years of engineering work to the Wilmington and Philadelphia Districts during his outstanding career. He served as Chief of Construction Division, Chief of Operations Division, and Special Assistant to the District Engineer. He exhibited exceptional leadership and engineering ability during the Korean conflict and in dealing with the floods of 1955 and 1962. He served in the Army Reserve, retiring with the rank of colonel. An engineering graduate of the University of Delaware, he was affiliated with the American Institute of Electrical Engineers. He retired in 1962.

Alfred Padula, P.E., joined the Corps as a Delaware River boatman in the hydrographic survey party. He became Chief of Surveys and then Chief of the Research and Development Branch, Engineering Division. He was instrumental in improving the Corps' dredging techniques and in developing the "harpoon" and "liquid mud" methods of sampling river sediments. He served as Project Engineer for many military projects during the Korean War. He supervised construction at the F.E. Walter, Prompton, Jadwin, and Beltzville Dams. He supervised the dredging of the 40-foot Delaware River navigation channel from Philadelphia to Morrisville, PA, and the widening and deepening of the C&D Canal. He retired in 1969 after a forty-two-year career with the Corps of Engineers.

George W. Padula began his forty-seven-year career with the Corps in 1929 as a survey aide. He subsequently performed in a variety of increasingly responsible positions, including Fiscal Accountant and Administrative Officer. He is best remembered for his long and dedicated service as Financial Manager. His outstanding leadership and fund management substantially contributed to the Corps' accomplishment of its mission.

Charles F. Ruff began his thirty-four-year career with the Corps in 1939 as a junior Clerk Typist. He subsequently held a variety of increasingly responsible positions, including Placement Officer and Employee Utilization Officer. He is best remembered for his long and dedicated service as the District's Personnel Officer. He was responsible for establishing the Corps in a leadership role in developing and implementing a labor management relations program within the Department of the Army. He served as a Captain in the United States Army during World War II and subsequently attained the rank of Lieutenant Colonel in the U.S. Army Reserve. He retired from federal service in 1973.

Thomas Schina joined the District in 1969 as a junior engineer in training and within three years took on the challenge of expanding the old Permit Section, Navigation & Maintenance Branch into what is now the Regulatory Branch following passage of the Clean Water Act in 1972. In 1980 he became Chief, Programs Section, Navigation & Maintenance Branch, where he was essentially the sole project manager for Operation and Maintenance (O&M) navigation projects. In 1989 he took over as Chief, Program Management Branch, Programs & Project Management Division, just before a twofold increase in the District's civil construction workload. He also led a major rehabilitation of the St. Georges Bridge and took on the duties of congressional liaison. He returned to Operations as Assistant Chief in 1996, overseeing an O&M budget that would reach $7.1 million. He worked closely with the states in obtaining multiyear water quality certificates for the Delaware River, Philadelphia-to-Sea and other navigation projects.

Leigh D. Shuman began his federal career in 1903 at the Bureau of Navigation in the Philippines. After six years there he transferred to the Philadelphia District. From January 1918 to January 1919 he had the distinction of being the only civilian to hold the position of Philadelphia District Engineer. He was recognized as a foremost authority on dredging techniques, equipment and organization, and during World War II he was a consultant on port rehabilitation to the commander of the European Theater of Operations. An individualist and a forceful and dedicated leader, he retired in 1950 as Chief of the Operations Division.

Frank Snyder, a graduate of the Fine Arts Academy in Rome, began his career in 1951 as an illustrator, and eventually became the illustrator for the NAD Commander. His knowledge of Corps' missions and projects contributed to his excellent portrayals of District assets. His sketches and paintings greatly enhanced public appreciation of the Corps' many roles. He achieved a virtually flawless record of dependability depicting Corps' plant and projects with exacting detail. Under his direction, the District history team produced an exhaustive, detailed, finely written and illustrated book, *District History, 1866 to 1972.* He participated in the efforts to preserve the Gruber Wagon Works and was effective in providing the renderings that were used by area congressmen to secure funding. After retiring he directed the efforts to preserve the Old Pump House at the C&D Canal as a museum and constructed a scale model of the pump house on his own time.

Henry R. Spies, C.L.S., started his career with the District as a Supervisory Survey Technician in the early 1950s and was promoted to Assistant Chief of Survey Branch in the early 1960s. In 1971, he was promoted to Chief of Surveys and served in that capacity until 1983. His expertise in hydrographic surveying placed him in great demand not only at the District level but nationally. He was the prime developer and coordinator for microwave positioning systems and automated hydrographic data collection and processing. Under his leadership, Philadelphia became one of the first Districts to successfully automate hydrographic surveys. The author of numerous papers on hydrographic surveying, he also served as an instructor of Corps' Prospect courses.

Captain Joseph P. Vilord, following seven years in the Coast Guard, started with the District in 1965 as 3rd Mate of the *Goethals* and eventually served as Master or Assistant Master of all four of the District's hopper dredges. Aboard the *McFarland* from 1982 to 1999, and as Master from 1994, he earned the respect and admiration of all his crew. He was never too busy to discuss a problem or offer guidance, and he always encouraged self-development to supplement the many hours he spent training them. Known Corps-wide for his superb ship handling skills, he also trained the officers of the new *Essayons* in 1983 and helped save the life of a *McFarland* crew member during a 1984 pump room fire. He led the *McFarland* on emergency dredging assignments along both the Atlantic and Gulf Coasts from Maine to Louisiana, including a post-hurricane response in 1997 to reopen the federal channel serving Fort Bragg, N.C. In leadership, customer service, professionalism, and technical expertise, he set a standard for Army Corps of Engineers dredge masters that prevails to this day.

Lee H. Trader began his forty-five-year career with the Corps of Engineers in 1927 as a laborer at the Pedricktown Basin. In 1942, he was promoted to Labor Foreman in charge of maintenance of disposal areas, in which position he directed personnel who assembled and changed the locations of pipelines. He also supervised construction and repairs to trestles, sluices, spillways, and drainage pipe. He completed these assignments under difficult conditions and in the most expeditious manner, receiving many commendations and awards for his proficiency. His leadership contributed immensely to the effective operation of the Fort Mifflin Project Office.

Frank W. Vinci, P.E., joined the District in 1953 after receiving his bachelor's degree in civil engineering from Villanova University. He became Assistant Chief of the General Design Branch in 1963 and was responsible for the engineering and design of the Chesapeake & Delaware Canal expansion, the Beltzville Dam and Reservoir, rehabilitation of the Cold Spring Inlet jetties at Cape May, and ship anchorages in the Delaware River. As Chief of the Engineering Branch from 1974 until his retirement in 1984 he was involved in the design and construction of Blue Marsh Dam and the Bernville Protective Works; rehabilitation of the Manasquan Inlet jetties, using precast concrete armor units; reconstruction of Wilmington Harbor; and a major rehabilitation and upgrade of the Chesapeake City Bridge. He also headed the District's first inspections of non-federal dams, and helped the emerging African nation of Gabon develop its transportation infrastructure.

Eli K. Wells served as a Marine Engineer for thirty-four years prior to his retirement in 1959 from his position as Chief Engineer aboard the Dredge *Goethals.* His entire career was spent in the Philadelphia District except for brief periods of service with the Wilmington and Norfolk Districts. He served as Chief Engineer aboard the *Goethals, Delaware,* and *Clatsop* and acquired a Corps-wide reputation as a top marine engineer both in steam and diesel-powered vessels. His skill frequently enabled the dredges to operate under the most adverse conditions, thus saving the government incalculable hours of labor and substantial sums of money.

Clarence F. Wicker was Chief of the Engineering Division from 1944 to 1962, in which position he provided outstanding direction to numerous military and civil engineering projects. He was recognized internationally as an authority on tidal hydraulics and was engaged as a consultant on a number of programs overseas. As chairman and member of the Corps' Tidal Hydraulics Committee, he contributed enormously to the documentation of knowledge in the field of tidal hydraulics. A Penn State graduate, he retired in 1962 after thirty-three years of federal service.

Mary A. Wilson began her federal career in 1934 with the National Housing Agency and joined the Philadelphia District's Marine Design Division in 1942. In 1951, she was assigned to the Supply & Procurement Division and in 1961 she became Chief of the Division, a position she held until her retirement. She provided procurement support for the Chief of Engineer's worldwide military construction program and became Contracting Officer for the Susquehanna District in 1972 when that District was temporarily established in the wake of Tropical Storm Agnes. She retired in 1973 with thirty-nine years of service.

Lifetime Customer Care Award

Anthony S. Bley began his career with the District as a staff photographer in 1971. His first-rate photographic services covered every major District project and numerous internal and external events. He would work at odd hours or in less than ideal weather to meet tight deadlines, and took many of his pictures from an open helicopter to capture large project areas or post-flood damages. As testament to the superb quality of his photography, some of his project shots are included in the Library of Congress's historical photograph collection. He combined technical mastery with the rare sensibilities of an artist, whether understanding what types of shots best represented the complex design of a facility as realized in construction, or knowing how to orchestrate special "people" ceremonies. Most important, he anticipated needs, knew how to meet them, and did so with total professionalism. He retired in 1973 with thirty-six years of service, having set a high standard for Corps project photography.

Bibliography

The story of the Philadelphia District's history since 1972 emerges from an extensive range of sources. The district itself provided many of these sources, including files and documents housed in its different divisions, active files of current district personnel, reports and publications from the district's library, and a variety of materials from the Marine Design Center. We also reviewed older primary source material currently stored at the Federal Records Center in Philadelphia, Pa. In addition, we consulted records held by the Corps' Office of History in Alexandria, Va. These materials included correspondence, press releases, policy directives, reports such as environmental assessments and feasibility studies, maps, photographs, and charts. Historical Research Associates (HRA) also researched numerous government documents, congressional hearings, and Internet and electronic sources to add to, and provide context for, the district's materials.

Another important source was the Philadelphia District's newsletter, *The District Observer*. The newsletter provided important information regarding administrative changes in the district, contemporary discussions about the district's various divisions and personnel, and updates on projects as they progressed through time. A column written by the district engineer in each issue addressed significant topics pertinent to the district. The newsletter was a useful resource for the perspective of the district and supplied a valuable reference for projects as they developed.

Oral histories collected by HRA were an essential component in composing this history. HRA interviewed a number of people (with the recommendation of the district) who had tremendous knowledge of the district over time and were familiar with a wide array of projects under the district's purview. These persons (listed in the bibliography below) supplemented factual information about district projects with personal perspective,

allowing a more comprehensive understanding of the district's work over time. Others provided highly useful information through personal communication to supplement areas of interest not recorded in print.

As with any history, secondary sources provided background for a variety of topics, ranging from national environmental policy and water resource management to the perspective of environmentalist organizations, allowing a broader understanding of the issues at hand. Previous Philadelphia District histories and other general Corps histories supplied a foundation from which to launch this one.

A complete bibliography of sources used and consulted follows.

Primary Sources

Manuscripts

1972–1995 unpublished working draft administrative history of the Philadelphia District. Compiled by Joe Morgan. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Administrative Records. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Documents and Reports. Technical Library. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Documents and Reports. Emergency Management Office. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Documents and Reports. Marine Design Center Library. U.S. Army Corps of Engineers, Marine Design Center, Philadelphia, Pa.

Documents and Reports. Planning Division. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Edward Voigt Papers. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

George Bock Papers. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Jeff Gebert Papers. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Moorhus, Donita M., and Gregory Graves. "The Limits of Vision: A History of the U.S. Army Corps of Engineers, 1988-1992." January 1999. Unpublished manuscript. Copy provided by Office of History, U.S. Army Corps of Engineers, Alexandria, Va.

Oral history interviews provided by Scott Watson. U.S. Army Corps of Engineers, Baltimore District, Baltimore, Md.

Paul Gaudini Papers. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Programs and Project Management Division materials. U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pa.

Records of the Office of Chief of Engineers. Record Group 77. Federal Records Center, Philadelphia, Pa.

Research Collections. Office of History, U.S. Army Corps of Engineers, Alexandria, Va.

SFO files in temporary holdings. Office of History, U.S. Army Corps of Engineers, Alexandria, Va.

Oral History Interviews

Burnes, John. Interview by Paul Sadin and Joshua Pollarine. 15 January 2009.

Calvarese, Vince. Interview by Joshua Pollarine. 19 January 2010.

Cianfrani, Frank. Interview by Paul Sadin and Joshua Pollarine. 12 January 2009.

Dutchyshyn, Harry. Interview by Joshua Pollarine. 3 August 2009.

Gebert, Jeff. Interview by Joshua Pollarine. 19 October 2009.

Lawrence, Keith. Interview by Paul Sadin. 9 March 2009.

Locurcio, Ralph. Interview by Paul Sadin. 16 and 20 March 2009.

Maraldo, Richard. Interview by Joshua Pollarine. 19 August 2009.

Schoenebeck, Al. Interview by Joshua Pollarine. 14 January 2009.

Vilord, Joe. Interview by Paul Sadin. 13 January 2009.

Newspapers and Periodicals

Cecil County Times (Maryland).

Gloucester County Times (Woodbury, N.J.).

Morning Call (Allentown, Pa.).

New York Times.

District Observer (newsletter of the U.S. Army Corps of Engineers, Philadelphia District).

Philadelphia Inquirer.

Pocono Record.

Reading Eagle (Reading, Pa.).

Internet Sources

"Background Information on USACE 2012" <http://corpslakes.usace.army.mil/employees/ strategicplan/2012.html> (27 April 2009).

Carter, Nicole T., and Betsy A. Cody. "The Civil Works Program of the Army Corps of Engineers: A Primer." CRS Report for Congress. 20 September 2006. CRS-2 <http://www.nationalaglawcenter.org/ assets/crs/RS20866.pdf> (14 May 2010).

Defense Logistics Agency. Defense Supply Center Philadelphia. "Defense Supply Center Philadelphia" <http://www.dscp.dla.mil/> (21 May 2010).

Defense Logistics Agency. Defense Supply Center Philadelphia. "History of Defense Supply Center Philadelphia" <http://www.dscp.dla.mil/history.asp> (21 May 2010).

Delaware River Basin Commission. "DRBC Overview" <http://www.state.nj.us/drbc/over.htm> (7 May 2009).

FEMA. "About the National Dam Safety Program" <http://www.fema.gov/plan/prevent/ damfailure/ndsp.shtm> (2 April 2010).

_____. "The National Dam Safety Program: 25 Years of Excellence" <http://www.fema.gov/library/file;jsessionid=990ABE86437E65977608FE9C65955AB3.WorkerLibrary?type=publishedFile&file=ndsp_25_years.pdf&fileid=2995cdf0-3d90-11db-8620-000bdba87d5b> (2 April 2010).

"Group: Surf City Alerted to Ordnance; Surfriders Say They Warned of Danger in Beach Project." pressofAtlanticCity.com. 27 March 2007 <http://www.surfriderjsc.org/ press.asp?pid=2> (20 May 2010).

Gruber, Amelia. "Army Corps to Release Final Reorganization Plan Next Week." 3 October 2003 <http://www.govexec.com/dailyfed/1003/100303a1.htm> (27 April 2009).

"Hopper Dredges" <http://www.globalsecurity.org/military/systems/ship/dredge-hopper.htm> (20 May 2010).

"Kanjorski Officially Opens New Road at Francis E. Walter Dam, Increasing Dam's Capacity." News Release. 6 July 2005. The Kanjorski News Room <http://kanjorski.house.gov/ index.php?option=com_frontpage&Itemid=103> (1 April 2010).

Lopez, Ed. Communications-Electronics Command. "Future Army C4ISR Facilities a Convergence of Many Goals." 6 July 2009 <http://www.army.mil/-news/2009/07/06/23924-future-army-c4isr-facilities-a-convergence-of-many-goals/> (21 May 2010).

National Oceanic and Atmospheric Administration. Coastal Services Center. "Beach Nourishment: A Guide for Local Government Officials" <http://www.csc.noaa.gov/beach nourishment/html/human/law/history.htm> (16 April 2010).

NOAA Satellite and Information Service. "The Perfect Storm: October 1991" <http://www.ncdc.noaa.gov/oa/satellite/satelliteseye/cyclones/pfctstorm91/pfctstorm.html> (16 April 2010).

"Pascrell Joins Army Corps to Announce Completion of Molly Ann's Brook Flood Damage Reduction Project." Press Release. 21 April 2008 <http://pascrell.house.gov/list/press/ nj08_pascrell/Pascrell_Joins_Army_Corps_To_Announce_Completion_Of_Molly_Anns_Brook_Flood_Damage_Reduction_Project.shtml> (6 April 2010).

Parsons, Jim. "Owner of the Year: U.S. Army Corps of Engineers Baltimore District." Summer 2009 <http://midatlantic.construction.com/ features/archive/2009/summer09_C_OwnerOfTheYear.asp> (21 May 2010).

Prettyman-Beck, Colonel Yvonne J., Chief of Staff, Corps of Engineers. Memorandum for Commanders, Major Subordinate Commands, Districts, Centers and Labs. Subject: Revision of ER 5-1-11, U.S. Army Corps of Engineers (USACE) Business Process. 12 January 2007 <http://140.194.76.129/publications/eng-regs/er5-1-11/entire.pdf> (21 May 2009).

U.S. Air Force Fact Sheet. "Air Force Mortuary Affairs, Port Mortuary" August 2009 <http://www.mortuary.af.mil/library/factsheets/factsheet_print.asp?fsID=15361&page=1> (21 May 2010).

U.S. Army Corps of Engineers. "USACE 2012: Aligning the U.S. Army Corps of Engineers for Success in the 21st Century." October 2003 <www.aapa-ports-org/files/PDFs/USACE_2012 Final_ExSum.pdf> (27 April 2009).

U.S. Army Corps of Engineers. Engineer Research and Development Center. Cold Regions Research and Engineering Laboratory. "Support for Others" <http://www.crrel.usace.army.mil/ rsgisc/sfo.htm> (21 May 2010).

U.S. Army Corps of Engineers. Headquarters. "Supplemental Report Confirms Economic Justification of Delaware River Deepening after Independent Review." Release No. PA-04-03-19 <http://www.nap.usace.army.mil/cenap-pl/drmcdp/nr.htm> (18 May 2010).

U.S. Army Corps of Engineers. North Atlantic Division. "Corps of Engineers BRAC/MILCON 07-11." 10 August 2006 <http://www.linkedworkforce.org/LWShowcase/past_events/November_2006_Showcase_1/CENADProgAcqPlan06Draft%2010%20Aug%2006%201730.PPT> (21 May 2010).

U.S. Army Corps of Engineers. Marine Design Center. "USACE DREDGE POTTER" <http://www.nap.usace.army.mil/mdc/fs13.htm> (7 April 2010).

_____. "USACE Fisheries Research Vessel KIYI" <http://www.nap.usace.army.mil/mdc/fs12.htm> (7 April 2010).

_____. "Our Mission" <http://www.nap.usace. army.mil/mdc/index.htm> (7 April 2010).

_____. "USACE Fisheries Research Vessel STURGEON" <http://www.nap.usace.army.mil/ mdc/fs17.htm> (7 April 2010).

_____. "USACE Vessel Factsheets" <http://www.nap.usace.army.mil/mdc/factsheets.htm> (7 April 2010).

U.S. Army Corps of Engineers. Philadelphia District. "The Chesapeake & Delaware Canal" <http://www.nap.usace.army.mil/sb/c&d.htm> (27 May 2010).

_____. "Continuing Authorities Program" <http://www.nap.usace.army.mil/cenap-pl/ca.htm> (2 April 2010).

_____. "The Corps and the Federal Response Plan" <http://www.nap.usace.army.mil/emo/nrp.html> (21 May 2010).

_____. "Corps Rehabilitation & Inspection Program" <http://www.nap.usace.army.mil/emo/fcw-list.htm> (12 April 2010).

_____. "Corps Visibility Items" <http://www.nap.usace.army.mil/emo/shirts.htm> (21 May 2010).

_____. "Delaware River Main Channel Deepening Project" <http://www.nap.usace.army.mil/cenap-pl/drmcdp/drmc.htm> (14 May 2010).

_____. "Delaware River Main Channel Deepening Project: LTC Brown's Testimony, Delaware River Main Channel Deepening Project, State of Delaware Public Hearing, Dec. 4 and 5, 2001, Dover, Del." <http://www.nap.usace.army.mil/ cenap-pl/drmcdp/brown.html> (5 May 2010).

_____. "Delaware River Main Stem & Channel Deepening Project" <http://www.nap.usace.army.mil/cenap-pl/drmcdp/drmc.htm> (14 May 2010).

_____. "District Spotlight: Marine Design Center Keeps the Fleet Fit" <http://www.nap.usace.army.mil/cenap-pa/spotlight/index.htm> (7 April 2010).

_____. "Dredging" <http://www.nap.usace.army. mil/dredge/d2.htm> (26 May 2010).

_____. "Emergency Management" <http://www.nap.usace.army.mil/sb/emerg.htm> (21 May 2010).

_____. "Francis E. Walter Dam Flow Management Working Group" <http://www.nap.usace.army.mil/Projects/FEWalter/index.htm> (1 April 2010).

_____. "Innovative Flood Fight Products" <http://www.nap.usace.army.mil/emo/NAP%20Innovative%20Flood%20Fight%20Fact%20Sheet%202007.pdf> (21 May 2010).

_____. "Innovative Flood Fight Products Distribution Process" <http://www.nap.usace.army.mil/emo/NAP%20Flood-Fighting%20Products.pdf> (21 May 2010).

_____. "A New Millenium: 1999-2005" <http://www.nap.usace.army.mil/sb/Time_1999-2005.pdf> (21 May 2010).

_____. "Project Factsheet: Barnegat Inlet, Ocean County, NJ" January 2010 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/NJ/ 5OM_BarnegatInlet.pdf> (30 April 2010).

_____. "Project Factsheet: Cape May Inlet to Lower Township, N.J., January 2010" <http://www.nap.usace.army.mil/ cenap-dp/projects/factsheets/NJ/4CG_CapeMayInlet_to_LowerTwp.pdf> (20 April 2010).

_____. "Project Factsheet: Delaware Coast from Cape Henlopen to Fenwick Island, Bethany Beach/South Bethany, DE" January 2010 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/DE/4CG_DelCoast_Bethany%20S %20Bethany.pdf> (28 April 2010).

_____. "Project Factsheet: Delaware Coast from Cape Henlopen to Fenwick Island, Fenwick Island, DE." January 2010 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/DE/4CG_DelCoast_Fenwick% 20Island.pdf> (28 April 2010).

_____. "Project Factsheet: Delaware Coast from Cape Henlopen to Fenwick Island, Rehoboth Beach/Dewey Beach, DE." January 2010 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/DE/4CG_DelCoast_Rehoboth %20Dewey.pdf> (27 April 2010).

_____. "Project Factsheet: Little Mill Creek, New Castle County, DE, October 2009" <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/DE/Little%20Mill%20Creek%20NCC.pdf> (5 April 2010).

_____. "Project Factsheet: Molly Ann's Brook, Haledon, Prospect Park & Paterson, N.J." October 2009 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/NJ/Molly%20Anns %20Brook.pdf> (6 April 2010).

_____. "Project Factsheet: New Jersey Shore Protection, Brigantine Inlet to Great Egg Harbor Inlet, Absecon Island, N.J." March 2010 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/NJ/ 4CG_NJShore% 20Protection_Absecon%20Island.pdf> (30 April 2010).

_____. "Project Factsheet: Prompton Lake, Prompton, PA, January 2008." May 2009 <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/PA/Prompton%20Lake.pdf> (1 April 2010).

_____. "Project Factsheet: Wilmington Harbor, New Castle County, DE, January 2010" <http://www.nap.usace.army.mil/cenap-dp/projects/factsheets/DE/5OM_Wilmington Harbor.pdf> (27 May 2010).

_____. "Solution Builders." <http://www.nap.usace.army.mil/solution.htm> (21 May 2010).

U.S. Army Corps of Engineers. Philadelphia District. North Atlantic Division. "Delaware River Main Channel Deepening Project (Pennsylvania, New Jersey, and Delaware): Comprehensive Economic Reanalysis Report." Copy at <http://www.nap.usace.army.mil/cenap-pl/ drmcdp/reports/Final%20Main%20Report%20December%2016 %202002.PDF> (18 May 2010).

_____. "Delaware River Main Channel Deepening Project (Pennsylvania, New Jersey, and Delaware): Supplement to Comprehensive Economic Reanalysis Report, December 2002." February 2004. Copy at <http://www.nap.usace.army.mil/cenap-pl/drmcdp/reports/February%202004%20Del% 20Riv %20Final%20Supplemental%20Report.pdf> (18 May 2010).

U.S. Army Corps of Engineers. San Francisco District. "Responding to Emergencies: The Role of the U.S. Army Corps of Engineers in Support of the Nation" <http://www.spn.usace.army.mil/infopaper.pdf> (21 May 2010).

U.S. Army Corps of Engineers. Walla Walla District. "Section 205: Authority for: Flood Damage Reduction Projects" <http://www.nww.usace.army.mil/html/pub/ap/facts/sec205.pdf> (5 April 2010).

U.S. Army Corps of Engineers. Water Resources Support Center. Institute for Water Resources. Shoreline Protection and Beach Erosion Control Study: Final Report: An Analysis of the U.S. Army Corps of Engineers Shore Protection Program. IWR Report 96-PS-1. Alexandria, Va.: U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources, 1996.

U.S. Department of the Army. U.S. Army Corps of Engineers. "Hydraulic Design for Coastal Shore Protection Projects." Engineering Regulation [ER] No. 1110-2-1407 <http://140.194.76.129/publications/eng-regs> (16 April 2010).

_____. Regulation No. 10-1-2. "Organization and Functions, U.S. Army Corps of Engineers, Division and District Office." 31 October 1999 <http://140.194.76.129/ publications/eng-regs/er10-1-2/entire.pdf> (21 May 2009).

_____. Regulation No. ER 5-1-13. "Resource Management: U.S. Army Corps of Engineers Policy on Regional Business Centers (RBCs)" <http://140.194.76.129/ publications/eng-regs/er5-1-13/entire.pdf> (25 January 2008).

U.S. Department of Defense. Defense Secretary's Commission on Base Realignment and Closures. "Base Realignment and Closures: Report of the Defense Secretary's Commission." December 1988. Copy at <http://www.hqda.army.mil/acsimweb/brac/003283.pdf> (21 May 2010).

U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. *Superfund: 20 Years of Protecting Human Health and the Environment*. EPA Report 540-R-00-007 <http://www.epa.gov/superfund/20years/index.htm> (12 May 2009).

Vantran, K. L. "New DOD Mortuary Opens at Dover." *American Forces Press Service*, 30 October 2003 <http://www.af.mil/news/story.asp?storyID=123005914> (21 May 2010).

Government Documents

Catton, Theodore and Matthew C. Godfrey. *Steward of Headwaters: U.S. Army Corps of Engineers, St. Paul District, 1975-2000*. St. Paul, Minn.: U.S. Army Corps of Engineers St. Paul District, 2004.

Mighetto, Lisa, and William F. Willingham. *Service-Tradition-Change: A History of the Fort Worth District, U.S. Army Corps of Engineers, 1975-1999*. Fort Worth, Tex.: U.S. Army Corps of Engineers Fort Worth District, 2000.

Reuss, Martin A. *Reshaping National Water Politics: The Emergence of the Water Resources Development Act of 1986*. Fort Belvoir, Virginia: U.S. Army Corps of Engineers Institute of Water Resources, 1991.

Reuss, Martin. *Shaping Environmental Awareness: The United States Army Corps of Engineers Environmental Advisory Board, 1970-1980*. Washington, D.C.: Historical Division, Office of Administrative Services, Office of the Chief of Engineers, 1983.

Snyder, Frank E., and Brian H. Guss. *The District: A History of the Philadelphia District, U.S. Army Corps of Engineers, 1866-1971*. Philadelphia, Pa.: U.S. Army Engineer District Philadelphia, 1974.

URS/Madigan-Praeger, Inc., and Conklin & Rossant. *A Comprehensive Study of the Tocks Island Lake Project and Alternatives, Vol. B—Review of Tocks Island Lake Project*. New York: URS/Madigan-Praeger, Inc., 1975.

U.S. Army Corps of Engineers. Office of History. *Engineer Profiles: Major General James A. Johnson, U.S. Army, Retired*. Washington, D.C.: U.S. Army Corps of Engineers, Office of History, n.d.

U.S. Army Corps of Engineers. Philadelphia District. *The Chesapeake & Delaware Canal*. Philadelphia, Penn.: U.S. Army Corps of Engineers, Philadelphia District, 1974.

_____. "Design Phase Underway on Deepening Project." *C&D Update* 1 (April 1998): 1-2.

_____. *Small Projects Program*. Philadelphia, Penn.: Philadelphia District, U.S. Army Corps of Engineers, n.d.

U.S. Congress. House. *Beach Nourishment Project: Communication from the Acting Assistant Secretary (Civil Works), the Department of the Army, Transmitting a Report on the Storm Damage Reduction and Shoreline Protection Project for Rehoboth Beach and Dewey Beach, Delaware, Pursuant to Section 101(b)(6) of the Water Resources Development Act of 1996*. 105th Cong., 1st sess., 1997. H. Doc. 105-144.

_____. *Delaware River Basin, New York, New Jersey, Pennsylvania and Delaware: Letter from the Secretary of the Army Transmitting a Letter from the Chief of Engineers, Department of the Army, Dated April 2, 1962, Submitting a Report . . . On a Review of the Delaware River and Tributaries . . . , in Eleven Volumes*. 87th Cong., 2d sess., 1962. H. Doc. 522.

_____. New Jersey Shore Protection Study: *Communication from the Acting Assistant Secretary (Civil Works), the Department of the Army, Transmitting a Report on a Storm Damage Reduction and Shoreline Protection Project for Brigantine Inlet to Great Egg Harbor Inlet, Absecon Island, New Jersey, Pursuant to Pub. L. 104-303, Sec. 101(b)(13)*. 105th Cong., 1st sess., 1997. H. Doc. 105-153.

_____. *Proposed Legislation, Government Reform and Savings Act of 1993: Message from the President of the United States*. 103d Cong., 1st sess., 1993. H. Doc. 103-155.

U.S. Congress. House Subcommittee on Water Resources of the Committee on Public Works and Transportation. *Water Resources Development Act of 1992 and the Reorganization of the U.S. Army Corps of Engineers: Hearings Before the Subcommittee on Water Resources of the Committee on Public Works and Transportation, House of Representatives*. 102d Cong., 2d sess., 1992.

_____. *Water Resources Problems Affecting the Northeast: The Drought, and Present and Future Water Supply Problems: Hearings Before the Subcommittee on Water Resources of the Committee on Public Works and Transportation, House of Representatives*. 97th Cong., 1st sess., 1981.

U.S. Congress. Senate Committee on Environment and Public Works. *Reorganization of the Corps of Engineers: Hearing Before the Committee on Environment and Public Works, United States Senate*. 102d Cong., 2d sess., 1992.

U.S. Congress. Senate Subcommittee on Water Resources of the Committee on Public Works. *Tocks Island Deauthorization: Hearings Before the Subcommittee on Water Resources of the Committee on Public Works, United States Senate*. 94th Cong., 2nd sess., 1976.

U.S. Department of the Army. Office of the Chief of Engineers. *National Program of Inspection of Dams*. Washington, D.C.: Department of the Army, 1975.

U.S. Department of the Army. Philadelphia District. Corps of Engineers. *Blue Marsh Lake: Design Memorandum No. 14, Reservoir Clearing*. Philadelphia, Penn.: Department of the Army, Philadelphia District, Corps of Engineers, 1974.

_____. *Lehigh River Basin, Trexler Lake, Jordan Creek, Pennsylvania: Final Environmental Impact Statement*. Philadelphia, Penn.: Department of the Army, Philadelphia District, Corps of Engineers, 1973.

U.S. Department of the Interior. *Federal Historic Preservation Laws*. Washington, D.C.: U.S. Department of the Interior, 1993.

U.S. General Accounting Office. *Delaware River Deepening Project: Comprehensive Reanalysis Needed*. Washington, D.C.: U.S. General Accounting Office, 2002.

_____. *Military Base Closures: Better Planning Needed for Future Reserve Enclaves*, Report No. GAO-03-723. Washington, D.C.: U.S. General Accounting Office, 2003.

Statutes

Act of 30 June 1948 (62 Stat. 1171).

Act of 28 June 1955 (69 Stat. 186).

Act of 2 October 1968 (82 Stat. 906).

Act of 8 August 1972 (86 Stat. 506).

Act of 22 October 1976 (90 Stat. 2917).

Act of 26 April 1978 (92 Stat. 218).

Act of 15 August 1985 (99 Stat. 293).

The National Environmental Policy Act of 1969 (83 Stat. 852).

National Parks and Recreation Act of 1978 (92 Stat. 3467).

Water Resources Development Act of 1986 (100 Stat. 4082).

Water Resources Development Act of 1992 (106 Stat. 4797).

Water Resources Development Act of 1996 (110 Stat. 3658).

Water Resources Development Act of 1999 (113 Stat. 269).

Water Resources Development Act of 2000 (114 Stat. 2572).

Secondary Sources

Dissertations and Theses

Bloodworth, Gina. "Tocks Island Dam, the Delaware River and the End of the Big-Dam Era." Ph.D. dissertation. State College, Pa.: The Pennsylvania State University Graduate School, Department of Geography, 2005.

Books and Articles

Albert, Richard C. *Damming the Delaware: The Rise and Fall of Tocks Island Dam*. 2nd ed. University Park, Pa.: Pennsylvania State University Press, 1987.

Barnes-Svarney, Patricia. "Awful Agnes." *Weatherwise* (May/June 2002): 38–43.

Burton, W. H., J. S. Farrar, F. Steimle, and B. Conlin. "Assessment of Out-of-Kind Mitigation Success of An Artificial Reef Deployed in Delaware Bay, USA." *ICES Journal of Marine Science* 59 (2002): S106–S110.

Carter, Jimmy. *Keeping Faith: Memoirs of a President*. Toronto: Bantam Books, 1982.

Carter, Luther J. *The Florida Experience: Land and Water Policy in a Growth State*. Baltimore: Resources for the Future, Johns Hopkins University Press, 1974.

"Cost-Benefit Trips Up the Corps." *Business Week* (19 February 1979): 96.

Flippen, J. Brooks. *Nixon and the Environment*. Albuquerque: University of New Mexico Press, 2000.

Kahn, James. "History Takes a Step Forward." *Water Spectrum* 7 (Fall 1975): 40.

Kraft, Michael E. "U.S. Environmental Policy and Politics: From the 1960s to the 1990s." *Journal of Policy History* 12, no. 1 (2000): 17–39.

Mazmanian, Daniel A., and Jeanne Nienaber. *Can Organizations Change? Environmental Protection, Citizen Participation, and the Corps of Engineers*. Washington, D.C.: Brookings Institution, 1979.

Nichols, Margaret S. "Showdown at Tocks Island." *Field & Stream* 80 (August 1975): 14–20.

Reuss, Martin. "Coping with Uncertainty: Social Scientists, Engineers, and Federal Water Resources Planning." *Natural Resources Journal* 32 (Winter 1992): 101–135.

Rome, Adam. "'Give Earth a Chance': The Environmental Movement and the Sixties." *Journal of American History* 90 (September 2003): 525–554.

Sale, Kirkpatrick. *The Green Revolution: The American Environmental Movement, 1962-1992*. New York: Hill and Wang, 1993.

Stansfield, Charles A., Jr. "The Tocks Island Controversy." *Parks and Recreation* 7 (March 1972): 29–33, 53–54.

Steinberg, Bory. "The Federal Perspective." In *Water Resources Administration in the United States: Policy, Practice, and Emerging Issues* (264–273), Martin Reuss, ed. East Lansing, Mich.: American Water Resources Association/Michigan State University Press, 1993.

Stine, Jeffrey K. "Regulating Wetlands in the 1970s: U.S. Army Corps of Engineers and the Environmental Organizations." *Journal of Forest History* 27 (April 1983): 60–75.

Wallace, Mike. *Mickey Mouse History and Other Essays on American Memory*. Philadelphia: Temple University Press, 1996.

Index

A

Aberdeen Proving Ground, 269, 272–273
Absecon Island Coastal Storm Risk Reduction Project, 121–123
Advisory Council on Historic Preservation, 71, 73, 75
Afghanistan, 247–249
Agency for International Development, 301
AID. *See* Agency for International Development
"All-hazards" map, 241–242
American Society for Civil Engineers, 313
Andrews, Robert, 166
Aquashicola Creek Flood Control Project, 100–101
Archeological and Historic Preservation Act, 73
Army Team C4ISR, 272–273
Arsenic, 68–69
Aspin, Les, 22
Athos I oil spill, 246
Atlantic City, NJ risk reduction project, 121–123
Atlantic City Field Survey Section, 145–146
Atlantic City International Airport, 315–316
Atomic Energy Commission, 207

B

Bald Eagle Mountain, 198
Baldwin, Lt. Col. Roger, 201
Ballard, Lt. Gen. Joe N., 24, 175–176
Bardenpho advanced activated sludge process, 258
Barnegat Inlet, NJ, 131–134
Barnegat Lighthouse, 132–133
Base Realignment and Closure Program, 17, 18, 268–275
Batsto River Restoration Project, 210, 221–223
Bayley Report, 16
Beach erosion. *See* Coastal engineering
Beachfill, 118–119, 122–123, 128
Bear Creek Dam. *See* Walter Dam
Bear Creek Reservoir, 81
Beltzville Lake Project, 65–79
Beltzville State Park, 67
Benzene, 312
Berms. *See* Coastal engineering
Bethany Beach, 126–130
Biological nutrient removal, 257–258
Blue Marsh Dam, 67–79
Blue Marsh Lake, 65–79
"Blue Route," 195–197
BNR. *See* Biological nutrient removal
Boeing, 316
Bog turtle, 203
Bongo, Omar, 301
BRAC. *See* Base Realignment and Closure Program
Bradley, Bill, 87, 113
Bridgeport Rental & Oil Services Superfund Site, 205, 307–310, 311
Bridges, 339–340
Brigantine Jetty, 122
Brown, Lt. Col. Tim, 167–168
Bucket dredging, 157–159
Bulkheads, 107
Bureau of Reclamation, 91
Burlington County, NJ, 237
Bush, George, 240, 246
Byrne, Brendan T., 55, 57, 92

C

Cahill, William T., 50–51
Callahan, Lt. Col. Joel T., 154–155, 236–237
Cannonsville Reservoir, 81
Canyon Lake Dam, 91
CAP. *See* Continuing Authorities Program
Cape Fear River, NC, 147, 244
Cape May Harbor, 117–118
Cape May Inlet Beach Nourishment Project, 118–119
Cape May Inlet Federal Navigation Project, 213
Cape May Inlet Shore Protection Project, 109
Cape May Point project, 211–217
Carey, Hugh, 57
Carper, Thomas, 19–20
Carson, Rachel, 4
Carter, Jimmy, 9–10, 27, 63, 92, 303
Case, Clifford, 58
C&D. *See* Chesapeake and Delaware Canal
CEQ. *See* Council on Environmental Quality
CERCLA. *See* Comprehensive Environmental Response, Compensation, and Liability Act
Chapman, Lt. Col. Thomas C., 33–34
Charles C. Carson Center for Mortuary Affairs, 265, 268
Cheney, Richard, 17, 18
Cherry Island, 157
Chesapeake and Delaware Canal
  dredging, 170–180
  high-level highway bridges, 339–340
Civil Works Contract Administration Branch, 247
Civil Works Program, 115, 209
Clean Air Act, 303
Clean Water Act, 1, 13, 186, 188–193, 198, 203, 303
Clinton, Bill, 15, 22, 23, 24, 112–113
Clow, Lt. Col. Kenneth H., 21
Coastal America awards, 209–210, 221
Coastal engineering
  Delaware projects, 124–130
  early coastal protection projects, 109–115
  inlet navigation improvement projects, 131–137
  New Jersey projects, 116–124
Coastal Zone Management Act, 186, 210
Columbia Transmission Communications Corporation, 203
Comber, 143–144, 336
Combined Arms Military Operations in Urban Terrain Task Force, 271
Commission on Base Realignment and Closure, 17, 18
Committee on Public Works and Transportation, 19
Comprehensive Delaware River Basin Plan, 43
Comprehensive Environmental Response, Compensation, and Liability Act, 14, 186, 206, 303–304
The Concerned Citizens, 173
Conklin and Rossant, 55
Construction General Fund, 108
Continuing Authorities Program, 97–101, 211, 221
Cooper River Fish Ladder project, 210, 221
CORE-LOC®, 135–137
Cosden Chemical Coatings Superfund Site, 314
Cost-sharing initiatives, 27–29
Council on Environmental Quality, 6, 48
Crane barges, 285–286
Cuddebackville Dam Removal Project, 210, 217–221
Cutler Group, 202

D

D-Pad computer model, 17
Dam Safety Committee, 93–94
Dam safety inspection program, 91–94
Dams, 334–335. *See also specific dams by name*
David Miller & Associates, 166–167
DDT clean-up, 269
Defense Authorization Amendments and Base Realignment and Closure Act, 17
Defense Base Realignment and Closure Act, 17
Defense Logistics Agency, 269
Defense Personnel Support Center, 269
Delaware Basin Fish and Wildlife Management Cooperative, 157
Delaware Bay Oyster Restoration, 210, 223
Delaware coastal protection projects, 124–130
Delaware Department of Natural Resources and Environmental Control, 127–129, 172
Delaware Estuary Salinity Intrusion Study, 79–83
Delaware River
  dredging disposal study, 150–160
  main channel deepening, 160–170
Delaware River Basin
  basin planning, 41–43
  Beltzville Lake, 65–79
  Blue Marsh Lake, 65–79
  Delaware Estuary Salinity Intrusion Study, 79–83
  flood risk management, 42
  Level B study, 79–83
  Prompton Dam, 83–91
  Tocks Island Dam project, 6–7, 43–62
  Trexler Lake project, 7, 62–65
  Walter Dam, 83–91
Delaware River Basin Commission, 43, 47–52, 55, 57, 60, 68. *See also individual projects by name*
Delaware River Basin Compact, 87
Delaware River Basin Comprehensive Plan, 58, 62, 65–66, 84
Delaware River Comprehensive Navigation Study, 162
Delaware River Port Authority, 163, 168
Delaware Riverkeeper, 163
Delaware Valley Conservation Association, 51
Delaware Water Gap National Recreation Area, 7, 47, 53, 57–58, 61
Dewey Beach, 126–128
D'Imperio Property Superfund Site, 313
Disaster response. *See* Emergency Management Office
Disaster Response Primer, 229
DNREC. *See* Delaware Department of Natural Resources and Environmental Control
DOE. *See* U.S. Department of Energy
Dolosse, 136–137
Door to the Corps initiative, 24
Dorn, Nancy P., 18, 20
Dover Air Force Base, 262–268
DPSC. *See* Defense Personnel Support Center
DRBC. *See* Delaware River Basin Commission
Dredged Material Research Program, 153
Dredging
  bucket dredging, 157–159
  Chesapeake and Delaware Canal, 170–180
  deep draft projects, 155
  Delaware River dredging disposal study, 150–160
  Delaware River main channel deepening, 160–170
  direct pumpout, 146
  environmental effects, 150–160, 163–164, 167–168
  fleet, 143–150
  function of, 150
  Hopper dredges, 143–146, 336–337
  hydraulic dredging, 158–159
  material disposal, 141–142, 150–157
  O&M navigation projects, 338–339
  Wilmington Harbor, 197
DRPA. *See* Delaware River Port Authority
du Pont, Pierre S., 58
Dunes. *See* Coastal engineering
DuPont Chambers Works, 207–209
Dutchyshyn, Col. Harry V., 64, 299–300

E

East Central Incinerator, 320–321
Economy in Government Act, 298
Ecosystem restoration, 15, 209–224
Edelman, Les, 17
Edgar, Robert W., 58
E.I. du Pont de Nemours and Company, 207
EIS. *See* Environmental impact statements
Emergency Management Office
  Disaster Response Primer, 229
  Emergency Operations Center, 230, 234, 237
  emergency responses, 243–246
  flood-fight materials, 231–232
  military contingency operations support, 246–249
  natural disaster response, 233–242
  planning and response teams, 231, 242
  Readiness Branch, 232–233
Emergency Operations Center, 230, 234, 237, 240, 242
EMO. *See* Emergency Management Office
Employees, 346–354
Endangered Species Act, 186, 191, 218
Energy and Water Development Appropriations Act, 16, 206
Engineer Research and Development Center, 232
Environmental Advisory Board, 12
Environmental Defense Fund, 49
Environmental Effects of Dredging, 151
Environmental impact statements, 6, 12, 48–49, 63, 164, 175, 186, 196
Environmental issues. *See also* Environmental Protection Agency; National Environmental Policy Act
  dredging, 150–160, 163–164, 167–168
  ecosystem restoration, 209–224
  penalties for violations, 202–204
  Regulatory Branch operations, 187–205
  waste remediation, 205–209
Environmental Protection Agency
  Resource Conservation and Recovery Act, 185
  Superfund program, 2, 13–14, 24, 185, 205–206, 303–314
  water quality protection, 188, 190, 257
Environmental Resources Branch, 12, 186
EPA. *See* Environmental Protection Agency
Essayons, 143–144, 284, 287, 336
Estuaries and Clean Waters Act, 211
Eutrophication, 48, 56, 63

F

FAA. *See* Federal Aviation Administration
Fairmount Dam Fish Ladder Project, 223–224
Federal Aviation Administration, 315–316
Federal Design Achievement Award, 157
Federal Emergency Management Agency, 93, 127, 230, 231, 240–242
Federal Highway Administration, 198
Federal Power Commission, 91
Federal Water Pollution Control Act, 64, 188

Federal Water Quality Administration, 68
Federal Workforce Restructuring Act, 22
FEMA. *See* Federal Emergency Management Agency
Fenwick, Millicent, 58
Fenwick Island, 126–127, 129–130
F.E.Walter Reservoir, 81
Flight training simulator, 259
Flood Control Act, 47, 84, 94, 98, 229
Flood Plain Management Services Branch, 241
Flood protection. *See also* Emergency Management Office
  Beltzville Lake Project, 65–79
  Blue Marsh Dam, 67–79
  Continuing Authorities Program, 97–101
  flood-fight materials, 231–232
  Molly Ann's Brook Project, 95–97
  risk management, 42, 326
Flowers, Lt. Gen. Robert B., 25, 331
Foglietta, Thomas, 20
Ford, Gerald, 74
Foreign Assistance Act, 298, 301
Formerly Utilized Sites Remedial Action Program, 185, 205, 206–209
Fort Delaware, 243–244
Fort Dix, 254–262, 270–272
Fort Mifflin, 203
Fox, Jeanne, 308
Francis E. Walter Dam, 83–91
Francis E. Walter Dam Flow Management Working Group, 90
FUSRAP. *See* Formerly Utilized Sites Remedial Action Program
FWS. *See* U.S. Fish and Wildlife Service

G

Gabon, 300–303
GAO. *See* General Accounting Office; Government Accountability Office
Garden State Cleaners Co. Superfund Site, 313
Genega, Brig. Gen. Stanley G., 115
General Accounting Office, 47
Geographic Information System, 208, 241–242
Gianelli, William, 27–28
Gilman, Benjamin A., 58
GIS. *See* Geographic Information System
Global Positioning System, 147
Global War on Terror, 246–248
Goddard, Maurice K., 59
Goethals, 143–144, 285, 336
Gore, Albert, 22
Government Accountability Office, 166
GPS. *See* Global Positioning System
Graves, Maj. Gen. Ernest, 58
Great Egg Harbor Inlet, 118, 119
Great Lakes Science Center, 289
Grieder, Col. Felix M., 264
Griffin, Maj. Gen. Robert, 166
Groins, 107, 118, 123, 132
Groves, Maj. Gen. Richard H., 236
Gruber Wagon Works, 70–76

H

Hackettstown Reservoir, 81–82
Hansler, Gerald, 86
Hatch, Lt. Gen. Henry, 16, 17, 29–30
Hazard Ranking System, 305
Hazardous, Toxic, and Radioactive Waste Center of Expertise, 208
Hazardous waste remediation, 205–209
Hazleton, PA, 312–313
Helen Kramer Landfill Superfund Site, 313–314
Historic American Engineering Record, 73
Historic Preservation, Advisory Council on, 71, 73, 75
Home inspections, 318–320
Hopper dredges, 143–146, 336–337
House Committee on Public Works and Transportation, 115, 162, 170
House Subcommittee on Water Resources, 19
Hunter, Brig. Gen. Milton, 262, 264
Hurricane Agnes, 91, 233–236
Hurricane Felix, 119
Hurricane Fran, 147
Hurricane Georges, 242
Hurricane Ike, 239
Hurricane Isabel, 242
Hurricane Marilyn, 242
Hydraulic dredging, 158–159

I

Indian River Inlet, 124–125
Industrial Latex Corp. Superfund Site, 314
Information technology, 2–3
Inlet navigation improvement, 131–137
Inspection program, 91–94
Interagency and International Activities, 14, 298
Interagency Committee on Dam Safety, 93
Intergovernmental Cooperation Act, 298
Iraq, 247–249

J

Jadwin, 286–287
Javits, Jacob K., 58
Jetties, 117–118, 124
Johnson, Col. James A., 50
Junior Ranger program, 78
Jurisdiction Determination, 204

K

Kanjorski, Paul, 87
Kelly, Brig. Gen. James, 57
Keyser, Lt. Col. Robert, 311
Kickapoo River, WI, 7–8
Kilcohook Confined Disposal Facility, 142
Kiyi, 289–290
Kosovo, 249
Krysowaty Farm, 305–306

L

La Farge Dam project, 7–8
Lake Como Dam, 93
Langfitt, 285
LaRue, John, 20
Leni Lenape League, 51
Levees, 107
Level B study, 79–83
Lewes Beach Project, 116
Life-cycle project management, 30
Lipari Landfill Superfund Site, 310–312
Little Mill Creek Flood Control Project, 98–100
Locurcio, Lt. Col. Ralph, 15, 32, 34, 86, 151, 254
Longwood Lake Dam, 92
Love Canal, NY, 14, 303
Loveladies Harbor, 192–194
Loveladies Harbor v. U.S., 194
Lower Cape May Meadows Ecosystem Restoration Project, 123–124, 211–217
Lower Township Beach Nourishment Project, 119
Lower Township Inlet Shore Protection Project, 118

M

Madigan-Praeger study, 55–56
Magnifico, Lt. Col. Robert P., 23–24, 119
Manasquan Inlet, NJ, 134–137
Marine Design Center, 11, 147, 279–294, 325, 326, 342–345
Marine Protection, Research, and Sanctuaries Act, 186, 191
Maryland Department of Transportation, 171–172

Maryland Port Authority, 172, 176
McFarland, 144–149, 284, 336–337
McGuire Air Force Base, 254–262
MDC. *See* Marine Design Center
Merrill Creek Reservoir, 87–88
Meyner, Helen, 58
MILCON. *See* Military construction
Military construction
  Base Realignment and Closure Program effect, 268–275
  Dover Air Force Base, 262–268
  Fort Dix, 254–262
  McGuire Air Force Base, 254–262
  World War II, 253–254
Military contingency operations, 246–249
Military Project Management Branch, 255, 261
Molly Ann's Brook Project, 95–97
Morris, Lt. Gen. John W., 301
Mortuary Affairs, Charles C. Carson Center for, 265, 268
Moss-Bennett Act, 73

N

National Audubon Society, 5
National Contingency Plan, 305
National Dam Safety Program, 91–94
National Defense Reserve Fleet, 144
National Endowment for the Arts, 157
National Environmental Policy Act, 1, 3–10, 48, 164, 185–186, 196
National Estuarine Protection Act, 186, 210
National Geodetic Vertical Datum, 122, 128
National Historic Landmarks, 75
National Historic Preservation Act, 70–71, 186, 191
National Marine Fisheries Service, 157, 191
National Oceanic and Atmospheric Administration, 113
National Park Service, 47, 57, 61, 71–73
National Parks and Recreation Act, 61
National Performance Review, 22
National Priorities List, 305–306
National Program of Inspection of Dams, 91
National Register of Historic Places, 73, 75
National Resources Defense Council, 189
National Resources Defense Council v. Callaway, 189–190
National Wildlife Federation, 189
Natural disasters, 233–242
Nature Conservancy, 203, 211–212, 214, 217, 219
Naval Surface Warfare Center, 289
NAVD. *See* North American Vertical Datum
Navigable waterways. *See* Dredging
NEPA. *See* National Environmental Policy Act
Neshaminy Water Resources Authority, 199
Neshaminy Water Supply System, 201
Neversink River. *See* Cuddebackville Dam Removal Project
New Jersey coastal protection projects, 116–124
New Jersey Department of Environmental Protection, 96, 210, 212, 257, 310
New Jersey Intracoastal Waterway, 135
New Jersey Shore Protection Study, 120, 211
New Jersey State Parks, 217
NGVD. *See* National Geodetic Vertical Datum
NHPA. *See* National Historic Preservation Act
Nixon, Richard, 5, 185–186
NJDEP. *See* New Jersey Department of Environmental Protection
North American Vertical Datum, 128–129
Northwest Lehigh Citizens Association, 63
NPS. *See* National Park Service
NRDC. *See* National Resources Defense Council

O

Oak Ridge National Laboratory, 208
Ocean City, NJ
  beach erosion control project, 118–119
Office of Superfund Remediation and Technology Innovation, 305
Oil spill, 246
OPAL award, 313
Outstanding Coastal Project Award, 125
Outstanding Projects and Leaders award, 313
Overseas Contingency Operations, 248, 268

P

Page, Robert, 29–30
Palmyra Cove Nature Park, 159–160
Pascrell, Bill, Jr., 97
Patten, Edward J., 59
PDHEW. *See* Pennsylvania Department of Health, Education and Welfare
Pea Patch Island, DE, 243–244
Peck Beach Project, 118
Pennsylvania Bureau of State Parks, 67
Pennsylvania Department of Conservation and Natural Resources, 90
Pennsylvania Department of Health, Education and Welfare, 68
Pennsylvania Department of Transportation, 195–198
Pennsylvania Fish and Boat Commission, 90
Pennsylvania Historical and Museum Commission, 71
Pepe Field Superfund Site, 314
Permits Section, 187–188, 190–191
Philadelphia, PA
  Support for Others projects, 316–321
Philadelphia District. *See also specific projects by name*
  Civil Works Contract Administration Branch, 247
  dams and reservoirs, 334–335
  employees, 346–354
  Environmental Resources Branch, 12, 186
  Flood Plain Management Services Branch, 241
  functions of, 325–331
  high-level highway bridges over Chesapeake and Delaware Canal, 340
  hopper dredges, 336–337
  Marine Design Center projects, 342–345
  Military Project Management Branch, 255, 261
  O&M navigation projects, 338–339
  perceptions of, 34–37
  Programs Branch, 32
  Project Management Branch, 32
  Readiness Branch, 232–233
  Regulatory Branch, 12–13, 187–205
Philadelphia International Airport, 316–318
Philadelphia Naval Business Center, 314
Philadelphia Quartermaster Depot, 269
Philadelphia River Port Authority, 168
Pier 34 collapse, 244–245
Pinelands Commission, 257
Pinelands National Reserve, 257
Piping plover, 212, 215
Planning and response teams, 231, 242
PMF. *See* Probable maximum flood
Point Pleasant Water Diversion Project, 199–201
Polychlorinated biphenyls, 269, 306, 308–310
Postal Service, 299–300
Potter, 287

PPMD. *See* Programs and Project Management Division
PRO-LAKE Group, 65
Probable maximum flood, 89–90
Program Management Office, 30
Programs and Project Management Division, 31–32
Programs Branch, 32
Project Management Branch, 32
Project Partnership Agreement, 168
Prompton Dam, 83–91
PRTs. *See* Planning and response teams
Public Works Appropriation Act, 55
Puerto Rico, 242

Q

Qatar, 300–303
Quinby, Lt. Col. G. William, 196

R

Radioactive waste remediation, 205–209
Radium, 206
Radziul, Joseph F., 60
Rainear, Don, 20
RAM-D. *See* Risk Assessment Methodology for Dams
Ramsar List of Wetlands of International Importance, 212
Readiness 2000, 230
Readiness Branch, 232–233
Reagan, Ronald, 27
Receiving, staging, onward movement, and integration, 245
Record of Decision, 164
Reedy Point Bridge, 179
Regional Management Boards, 25–26
Regionalization, 24–27
Regulatory Branch, 12–13, 187–205
Rehabilitation and Inspection Program, 238
Rehoboth Beach, 126–128, 130
Reid, Ogden R., 57
Remoted engagement target system, 258
Reorganization Study Team, 17
Reservoirs, 334–335
Resource Conservation and Recovery Act, 185
Restoration Advisory Board, 209
RETS. *See* Remoted engagement target system
Revetments, 107
Risk Assessment Methodology for Dams, 246
Rivers and Harbors Act, 13, 110, 126, 187
R2K. *See* Readiness 2000
Robinson, Aubrey, 189
Roebling Steel Company Superfund Site, 315
Rooney, Frederick, 7, 65
Roosevelt Inlet/Lewes Beach Project, 116
Roth, William V. Jr., 178
Roth Bridge, 178–179
Roy F. Weston Inc., 48
RSOI. *See* Receiving, staging, onward movement, and integration
Rutgers University, 69

S

Safety inspection program, 91–94
Salinity intrusion study, 79–83
Sand bypassing, 107–108
Save the Delaware Coalition, 51
Schuylkill River. *See* Fairmount Dam Fish Ladder Project
SDF. *See* Spillway Design Flood
Sea turtles, 288
Seawalls, 107
Senate Committee on Environment and Public Works, 125, 152, 162
September 11, 2001, terrorist attacks, 245–246
SFO. *See* Support for Others program
Shapp, Milton, 57, 59
Shore protection fund, 117
Shoreline protection. *See* Coastal engineering
Short-nose sturgeon, 200
Shreve, 287–288
Shuman, 145–146, 337
Shuster, E.G. "Bud," 198
Sierra Club, 5, 51, 198
Silent Spring, 4
Sliwoski, Lt. Col. R.F., 88
South Bethany Beach, 126–130
South Jersey Clothing Co. Superfund Site, 313
Spillway Design Flood, 93
Spruce Run Dam, 92
Squatters, 54
St. Georges Bridge, 178–179
Storm risk management
  Delaware projects, 124–130
  early coastal protection projects, 109–115
  inlet navigation improvement projects, 131–137
  New Jersey projects, 116–124
Sturgeon, 289–290
Sturgis, 280
Sudan, 289–291
Superfund program, 2, 13–14, 24, 185, 205–206, 303–314
Support for Others program, 14, 297–299. *See also individual projects by name*
Surge barriers, 107
Surveillance and Enforcement Section, 197, 201
Survey boats, 145–147

T

Temple University, 71
Terrorist attacks, September 11, 2001, 245–246
The Comprehensive Review Study of the Tocks Island Lake Project and Alternatives, 55–56
Thompson, Frank, 59, 60
Thorium, 206
Tocks Island Dam project, 6–7, 43–62, 169
Ton, Col. James G., 92–93, 151
Torricelli, Robert, 166
TOW. *See* Tube-launched, optically tracked, wire-guided missile
Townsends Inlet Shore Protection Project, 109, 119
Toxic waste remediation, 205–209
Train, Russell, 50
Tranguch Gasoline Superfund Site, 312–313
Trexler Lake project, 7, 62–65
Tribbitt, Sherman, 57, 60
Tropical Storm Agnes, 52, 91, 233–236
Tropical Storm Floyd, 96–97
Trout Unlimited, 51
Tube-launched, optically tracked, wire-guided missile, 258

U

Uranium, 206–208
Urban assault course, 271–272
URS/Madigan-Praeger Inc., 55
U.S. Army Corps of Engineers. *See also specific projects by name*
  benefit-cost analyses, 8
  Emergency Management Office, 229–249
  project management initiatives, 27–34
  Readiness 2000, 230
  regionalization, 24–27
  relationship with Congress, 8–10
  reorganization in the 1990s, 16–24

reorganization in the 1970s and 1980s, 10–16
USACE 2012, 25–27, 330
Waterways Experiment Station, 132, 153
U.S. Army Engineer Research and Development Center, 135–136
U.S. Bureau of Public Roads, 195
U.S. Coast Guard, 246, 314–315
U.S. Congress
project approval and funding, 8–10
U.S. Department of Defense, 265, 268
U.S. Department of Energy, 206
U.S. Department of State, 300–301
U.S. Fish and Wildlife Service, 157, 188, 191, 198, 210
U.S. Geological Survey, 289
U.S. Maritime Administration, 144
U.S. Postal Service, 299–300
U.S. Virgin Islands, 242
U.S. Water Resources Council, 79
USACE 2012 initiative, 25–27, 330

V

Vineland Chemical Company Superfund Site, 307, 314
Visibility items, 232

W

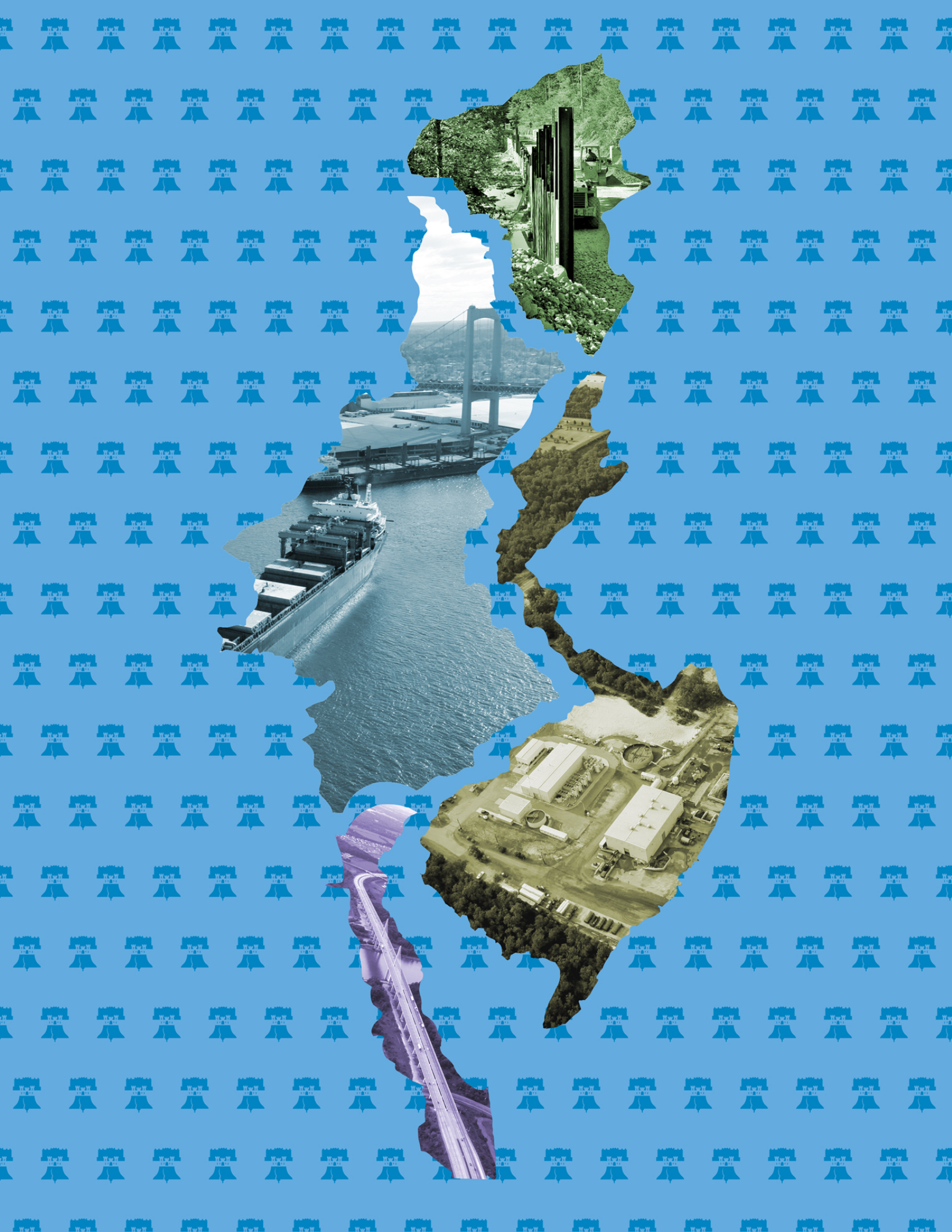
Walter, Francis E., 83
Walter Dam, 83–91
Waste remediation, 205–209
Water Resources Association of the Delaware River Basin, 57
Water Resources Development Act of 1974, 186, 210
Water Resources Development Act of 1976, 74
Water Resources Development Act of 1986, 15, 27–29, 65, 86, 114, 118, 124, 169, 229
Water Resources Development Act of 1992, 163, 211
Water Resources Development Act of 1996, 122, 175
Water Resources Development Act of 1999, 128
Water Resources Development Act of 2000, 129
Water Resources Development Act of 2007, 145, 178, 179
Water Resources Support Center, 11, 281–283
Waterways Experiment Station, 132, 153, 288
Watt, James, 27
Weldon, Wayne "Curt," 19
Welsbach & General Gas Mantle Superfund Site, 314
West Milford Lake Dam, 92
Western Hemisphere Shorebird Reserve Network, 212
Westphal, Joseph, 176
Wheeler, 284–285
Wild and Scenic Rivers Act, 60–61
Wild and Scenic Rivers System, 61
Wilderness Society, 51
William J. Hughes Technical Center, 316, 317
Williams, Harrison A., Jr., 59
Williams, Lt. Gen. Arthur E., 17, 21, 22
Wilmington Harbor, 157–158, 197
Wilmington Harbor South Disposal Area, 155–157
Wilson, Malcolm, 55
Woolford, James, 305
Work for Others Team, 247
World War II facilities construction, 253–254
WRDA. *See* Water Resources Development Act
Wright, James W., 60

Y

Yaquina, 284, 287

Z

Zabel v. Tabb, 188
Zirschky, John H., 115



UNITED STATES ARMY
CORPS OF ENGINEERS
NY
PA
NJ
MD
DE

MARINE SOLUTIONS FOR THE NATION
MDC