Section 107 Navigation Improvement Project
Detailed Project Report and
Environmental Assessment

DRAFT

Point Judith Harbor of Refuge and Point Judith Pond Narragansett, Rhode Island

US Army Corps
of Engineers ®
New England District

September 2018

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POINT JUDITH HARBOR OF REFUGE
AND POINT JUDITH POND
NARRAGANSETT, RHODE ISLAND

NAVIGATION IMPROVEMENT PROJECT

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SEPTEMBER 2018

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EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE), in partnership with the Rhode Island Coastal Resources Management Council (CRMC), under took this feasibility study to evaluate the existing navigation conditions in Point Judith Harbor, Narragansett, Rhode Island. The study was conducted to determine the feasibility of Federal involvement in modifying the existing Federal Navigation Project (FNP) for the benefit of commercial fishing vessels. The study concludes that modifications to the existing project in the form of channel widening and channel extension would improve navigational efficiency and increase safety for the port's commercial fishing fleet.

The existing Federal Navigation Project consists of a harbor of refuge located seaward of the inlet and protected by large stone rubblemound breakwaters, jetties to control the inlet, and an inner harbor in Point Judith Pond consisting of channels and anchorage areas. The lower area of Point Judith Pond includes the state operated Port of Galilee which serves New England's third largest fishing port and the ferry services that connect Block Island with the mainland. The entrance and interior channels that serve the port have a design depth of 15 feet at mean lower low water (MLLW). Above Galilee a 6-foot channel provides access to the remaining areas of the Pond to its head at Wakefield, about four miles upstream of the inlet.

The harbor's commercial fishing fleet has increased in size over the years as boats from other harbors have relocated to Point Judith and as larger vessels are added to the fleet to range further seaward in search of profitable catch. The State, which manages the port, has constructed new berthing areas over the past several years to meet increasing demand for use of the Port. The result has been that navigation delays and inefficiencies exist at the western and northern sides of the bulkhead where most of the fishing fleet is based. The western side of the bulkhead is the primary work area and offloading area for fish haul by the larger vessels in the fleet, and is where the facilities of the major fish buyers and fish processors are located. The heavy use of this area by many of the vessels in the harbor and the narrow federal channel width result in frequent and significant congestion delays for the larger fishing boats. Additional delays occur while vessels wait to offload catch. The waiting vessels make it difficult for other vessels to pass safely in the channel to reach their berths, causing additional congestion delays.

Delays also occur off the northern side of the bulkhead due to insufficient depths, since this area to the north of the bulkhead is without a dredged channel. This is the newest developed area of the port where smaller fishing boats have been relocated to make space for the larger boats along the west bulkhead berths. Tidal delays, congestion delays, grounding damages and excess haul-out costs are currently experienced by Point Judith fishermen due to inadequate depths in the approaches to the northern bulkhead berths. Without a dredged channel of adequate depth these delays and damages will continue to occur increase the operating costs of Point Judith fishermen, reducing net incomes and reducing overall economic efficiency.

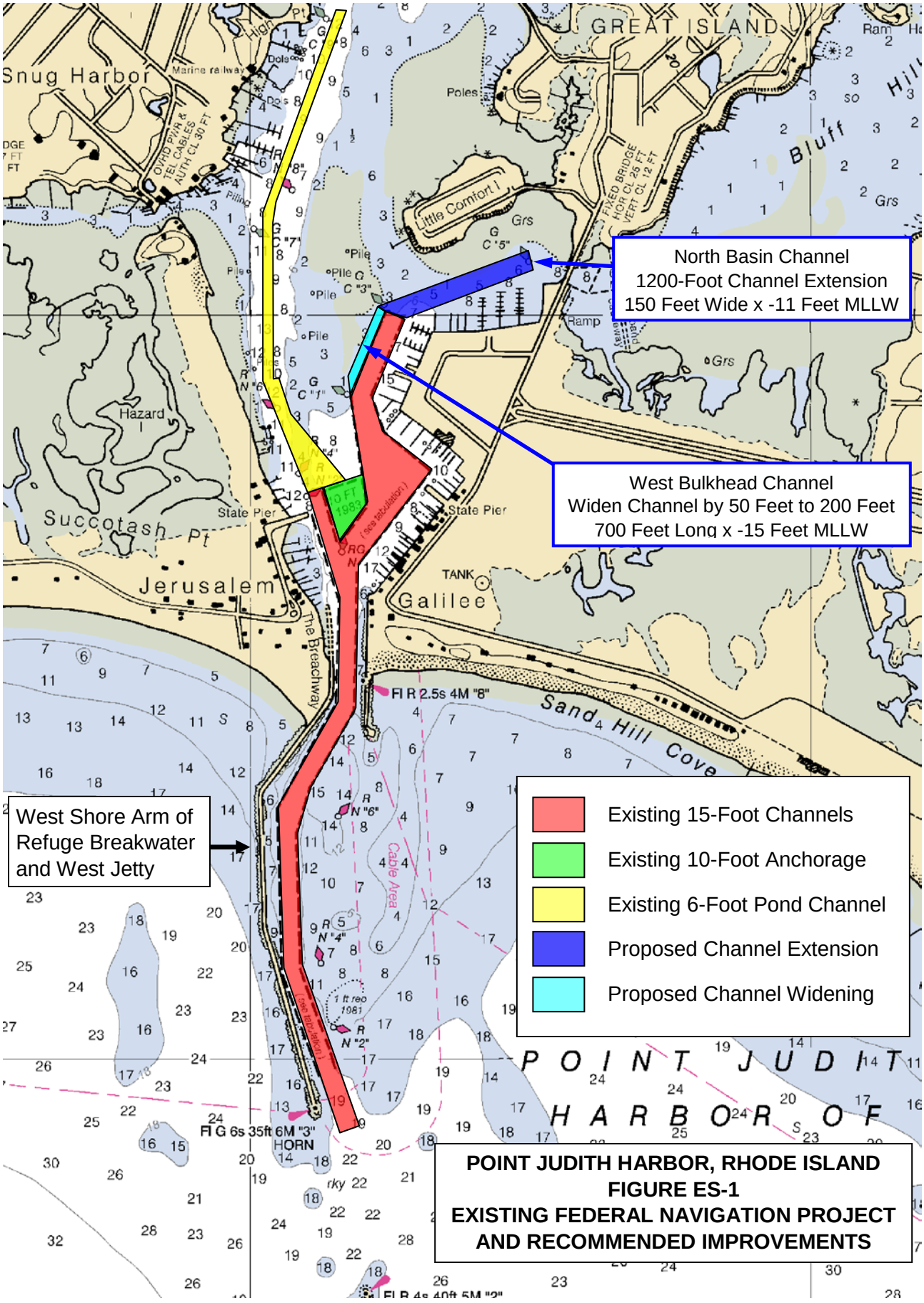
This study analyzed various alternatives for navigation channel improvement and the benefits that each alternative provides to the existing fleet. The existing FNP as designed and constructed more than 40 years ago, no longer provides for safe and efficient vessel operations at the port. Access to new or expanded navigation access needs to be made available to meet the existing and increasing demand. In order to improve current navigation conditions, USACE has tentatively selected a plan that recommends modifying the existing channel to improve navigational safety and efficiency.

Alternatives were developed and evaluated to provide new or increased channel access into areas where fleet movement can be accommodated and potential growth considered. Channel widening along the western bulkhead, channel extension along the northern bulkhead, and anchorage expansion were all considered. After analyzing the alternatives, it was determined that a combination of two alternatives provides the optimum level of improvement that maximizes project benefits. The USACE recommended plan involves two components. First is to widen the existing 15-foot deep (MLLW) channel for about 700 feet along the western bulkhead by 50 feet (for a total width of 200 feet) to increase access and safety for the larger fishing boats now based in this area and for other boats transiting through this area (Plan A). Second is to extend the Federal channel about 1200 feet northeasterly into the port's north basin to access the newer north bulkhead area, at a depth of -11 feet MLLW (Plan B).

Combining both plans A and B as shown in Figure ES-1 would require approximately 23,700 cubic yards of material to be dredged. Widening the west bulkhead channel would require removal of about 7,100 cubic yards, while extending the channel to the north bulkhead would require removal of an estimated 16,600 cubic yards. The dredged material has been tested and determined to be clean sand suitable for beneficial use as beach nourishment. The material would be placed at a previously used nearshore bar nourishment area located about 2.5 miles southwest of the project location off Matunuck Beach. The dredging would be by a small mechanical bucket dredge or excavator with the material placed in scows and towed to the nearshore placement site. Future maintenance dredging of the completed improvements by the Federal government would be contingent upon the availability of maintenance funds, the continued economic justification of the project, and the environmental acceptability of maintenance activities, as with the existing FNP.

The total estimated cost of design and construction for the recommended plan, based on FY2018 (October 2017) price levels and as updated in May 2018, would be $1,630,000. Annual benefits would be $495,700 as compared to annual costs of $84,500 resulting in a benefit to cost ratio of 5.9 to 1, and net annual benefits of $411,200.

The non-Federal Sponsor would be required to provide ten percent of the cost of design and construction ($163,000) up-front upon execution of a Project Partnership Agreement before project design can be completed, and a second ten percent ($163,000) upon completion of construction. The total non-Federal share of project implementation is $326,000. The total Federal share, 90 percent up-front, is $1,467,000.



POINT JUDITH HARBOR, RHODE ISLAND
FIGURE ES-1
EXISTING FEDERAL NAVIGATION PROJECT AND RECOMMENDED IMPROVEMENTS

TABLE ES-1 SECTION 107 NAVIGATION IMPROVEMENT PROJECT SUMMARY RECOMMENDED PLAN PROJECTED COSTS Point Judith Harbor, Rhode Island – FY2018 Price Levels	
General Navigation Feature Improvements	
Dredged Material Removed for GNF Improvements - Cubic Yards	23,700
Construction Costs, including Contingencies (May 2018)	$1,300,000
Planning, Engineering and Design	$217,000
Construction Management	$113,000
Total Project Costs	$1,630,000
Cost-Benefit Analysis (FY 2018 Price Levels)	
Annual Cost	$84,500
Annual Benefits	$495,700
Annual Net Benefits	$411,200
Benefit Cost Ratio	5.9

Federal involvement in navigation improvements at Point Judith Harbor is recommended. The District Engineer finds the proposed action would result in positive economic benefits to the commercial fishing fleet and the local economy, exceeding annualized costs. Based on the review and evaluation of the environmental effects of the proposed action as presented in the Environmental Assessment, the modification of the existing Federal Navigation Project is not a major Federal action significantly affecting the quality of the human environment. Pending public review of this determination, and consideration of comments on the Federal Action, the District Engineer will make a determination on whether the Federal action is exempt from requirements to prepare an EIS.

The USACE recommends that the existing Federal navigation project at Point Judith Harbor of Refuge and Point Judith Pond, Narragansett, Rhode Island, be modified under the authority of Section 107 of the River and Harbor Act of 1960, as amended, in accordance with the Plan identified in this Detailed Project Report, with such further modifications thereto as in the discretion of the Chief of Engineers may be advisable.

The recommendations contained in this report reflect the information available at this time and current USACE Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are authorized for implementation funding.

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1 INTRODUCTION

This study evaluates the justification for the U.S. Army Corps of Engineers (USACE) to participate in improving the existing navigation conditions in Point Judith Harbor, Port of Galilee, Rhode Island, to determine the feasibility of modifying the existing Federal Navigation Project (FNP) for commercial fishing vessels. The modification would increase the FNP's ability to accommodate safe and efficient vessel movement to the western and northern sides of the State Pier at the Port of Galilee. This measure would alleviate crowded conditions for the commercial fishing fleet at the berthing and offloading areas, and provide access to northern berthing areas built to accommodate increased demands for use of the facility. It would also improve transit efficiency and improve safe passage for the commercial fishing fleet that use the western and northern areas of the port.

The existing commercial and recreational vessels that use the facility have increased in number over the years. New berthing areas over the past several years were constructed to meet increasing demand for use of the Port. The result has been that navigation delays and inefficiencies exist at the western and northern sides of the bulkhead. The western side of the bulkhead is the primary work area and offloading area for fish haul, and contains major fish buyers and fish processors. The heavy use of this area by many of the vessels in the harbor and the narrow federal channel width result in frequent and significant congestion delays. Additional delays occur while vessels wait to offload catch. The waiting vessels make it difficult for other vessels to pass safely in the channel to reach their berths, causing additional congestion delays.

Delays also occur off the northern side of the bulkhead due to insufficient depths, since this area to the north of the bulkhead is without an authorized Federal channel. Tidal delays, congestion delays, grounding damages and haul-out costs currently experienced by Point Judith fishermen due to inadequate channel width in the Federal channel from inadequate channel depth off the northern side of the bulkhead will continue to occur. These delays and damages increase the operating costs of Point Judith fishermen, reducing net incomes and reducing overall economic efficiency.

This Detailed Project Report (DPR) is the result of an engineering, economic and environmental feasibility study of navigation improvements in Point Judith Harbor at Narragansett and South Kingstown, Rhode Island. This study is limited to the southern portion of Point Judith Pond (see Figure 1), located on the central Rhode Island coastline, immediately inland from the Point Judith Harbor of Refuge. The harbor is about 40 miles south of the city of Providence. The harbor is home to the largest commercial fishing port in the state of Rhode Island and the fourth largest in New England after Boston, Gloucester and New Bedford.

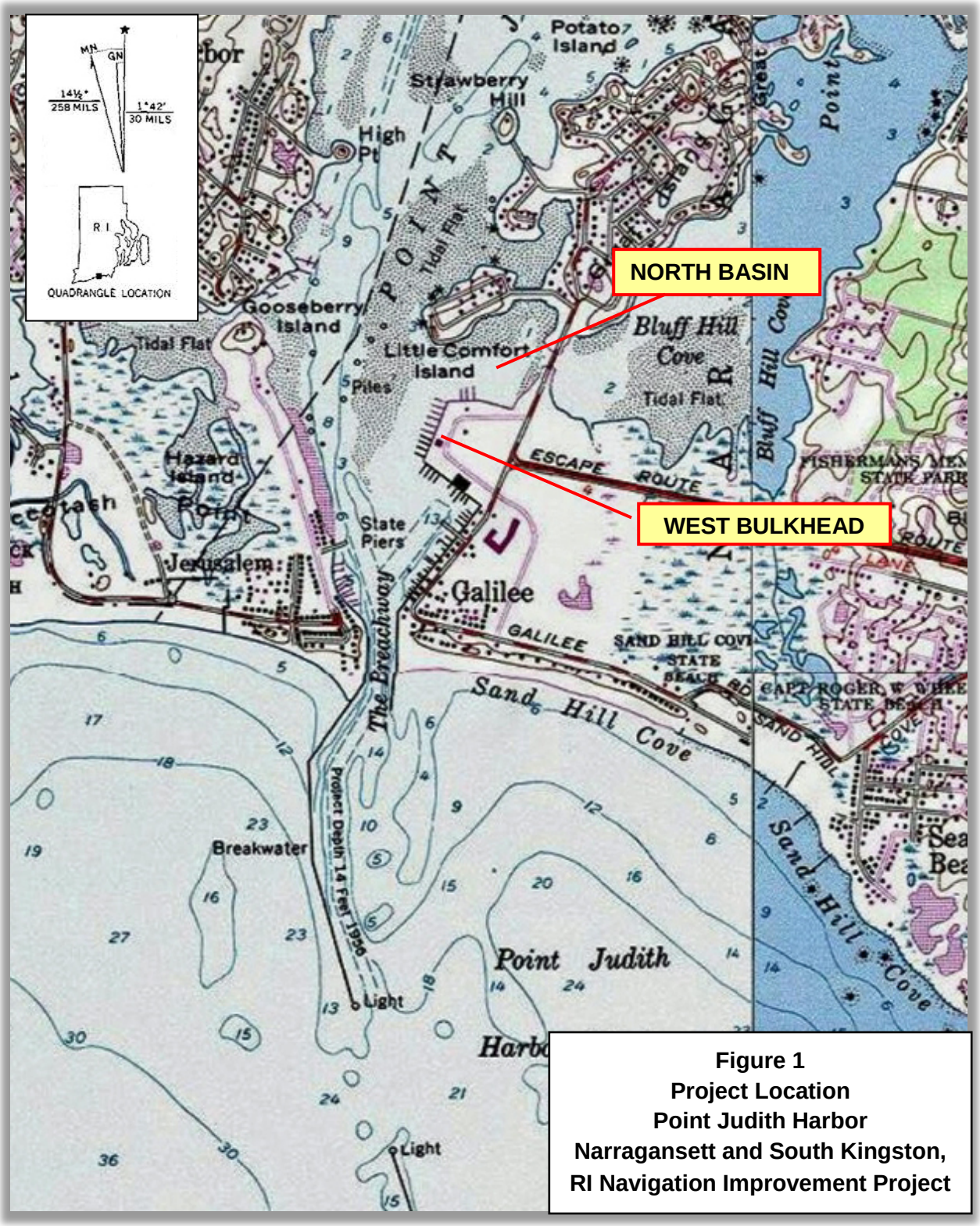


Figure 1
Project Location
Point Judith Harbor
Narragansett and South Kingston,
RI Navigation Improvement Project

A 1989 USACE DPR concluded that channel improvements to Point Judith Harbor were in the Federal interest, but local financing prevented implementation at that time. By letter of September 26, 2006 the Rhode Island Coastal Resources Management Council (CRMC) requested that the USACE revisit the feasibility and Federal interest in the improvements proposed in 1989 for improving the navigation conditions in Point Judith Pond. An initial appraisal and determination of Federal Interest was completed June 12, 2012, and approved by the North Atlantic Division on August 24, 2012. The Section 107 Fact Sheet was approved by the Assistant Secretary of the Army for Civil Works (ASA-CW) on October 17, 2012. A Feasibility Cost-Sharing Agreement was executed between the CRMC and the USACE on April 10, 2015. The principal Federal interests at Point Judith are improving the safety and efficiency of commercial navigation for vessels accessing the western and northern sides of the bulkhead at the Port of Galilee where grounding damages and tidal and congestion delays hinder vessel operations.

1.1 Study Authority

This report is prepared and submitted under the authority and provisions of Section 107 of the 1960 River and Harbor Act, as amended. Section 107 of the River and Harbor Act of 1960 provides authority for the U.S. Army Corps of Engineers to improve navigation including dredging of channels, anchorage areas, and turning basins and construction of breakwaters, jetties and groins, through a partnership with non-Federal government sponsors such as cities, counties, special chartered authorities -such as port authorities- or units of state government.

1.2 Project Study Costs

The feasibility study was cost-shared 50/50 between the Sponsor and the U.S. Army Corps of Engineers, except for the first $100,000 in study costs which is funded 100 percent by the Federal government. The feasibility study examines reasonable alternatives for the problems and needs and determines the best solution consistent with Federal policy. The solution must pass three criteria: economic feasibility, environmental impacts, and it must have a local partnership. The steps in the process are:

1. **Feasibility Study -** The Corps will conduct a Feasibility Study that is 100 percent federally funded up to $100,000. Costs over the $100,000 are cost shared with the non-federal sponsor on a 50/50 basis (up to one-half of the non-federal share can be in the form of in-kind services).
2. **Preparation of Plans and Specifications** - Detailed design and preparation of plans and specifications are treated as part of total project costs for purposes of cost sharing and the non-federal cost share for these activities is collected with the construction cost share.
3. **Non-Federal Share of Construction** - The non-federal share for design and construction of navigation projects with a design depth of 20 feet or less is 10 percent. The Sponsor is also responsible for an additional 10 percent after construction over a period of up to 30-years.

4. **Future Project Maintenance** - The U.S. Army Corps of Engineers is responsible for future project maintenance upon completion for project depths of 50 feet or less, subject to available funding. Funding for shallow draft project maintenance has been constrained in recent years

1.3 Study Location

Point Judith Pond is located on the southern coast of Rhode Island within the Towns of South Kingston and Narragansett, Washington County. The area is bordered to the east by Narragansett Bay, to the west by the Towns of Charlestown and Richmond, to the north by the Towns of Exeter and North Kingstown, and the south by Block Island Sound and the Point Judith Harbor of Refuge. The Towns of South Kingstown and Narragansett are each composed of several villages. The village of Wakefield can be found at the northern end of Point Judith Pond. The villages of Jerusalem and Galilee are located west and east, respectively, of the entrance to the Pond at the southern end. Galilee is located on the eastern shore and Jerusalem sits opposite it on the western shore. Located about 35 miles south of Providence, Rhode Island, the Pond is most easily accessed via U.S. Route 1 and state Route 108. Point Judith Pond and the surrounding location can be found on the U.S. Geological Survey Map entitled "Kingston, R .I.," or on the National Ocean Survey Chart #13219 entitled "Point Judith Harbor."

1.4 Scope of Study

This DPR summarizes the investigation of alternatives for providing navigation improvements at the lower end of Point Judith Pond. The steps in the study included a comprehensive inventory of applicable and available information, performance of topographic and hydrographic surveys, environmental testing and sampling, and preparation of base plans. Public officials have been contacted to provide information and seek input in the study process. Based on these efforts, planning objectives and constraints were developed and plans formulated. These plans were developed and evaluated in coordination with state authorities and the final alternative plans were selected for detailed study.

This report provides for the following:

- Identifying existing conditions and historical trends within the study area;
- Determining the navigational problems and needs of the area;
- Determining the most probable future condition without Federal improvements;
- Developing alternative improvement plans;
- Evaluating and comparing the engineering, economic, environmental, and social impacts of the alternative plans, with respect to the future condition; and
- Recommending improvements that are implementable, economically feasible, environmentally and financially acceptable, and socially beneficial.

The geographic scope includes:

- The lower portion of Point Judith Pond which includes the West Bulkhead and North Basin areas in the Port of Galilee,

- The natural channel area, on the west side of the Pond, from the State Pier in Jerusalem to High Point,
- Areas of possible impacts beyond the immediate vicinity of Point Judith Pond, include the dredged material disposal site and the areas from which resources are harvested by the commercial fleet.

1.5 Prior Studies and Improvements

Navigation improvement studies of the Point Judith area have occurred since 1873 when the first survey of navigation conditions was conducted by USACE. Early studies focused on providing a harbor of refuge by the construction of offshore breakwaters. Work was initiated on the first of three breakwaters in 1891.

*The River and Harbor A*ct *of 1896* authorized a survey of Point Judith Pond for the purpose of securing a stable entrance to the pond. The natural outlet of the pond was a shallow stream navigable only at high tide. The survey report in 1897 recommended construction of an entrance to Point Judith Pond 300 feet wide with a central depth of eight feet and the dredging of a channel of the same depth for a distance of one mile to reach the natural eight foot depth in the pond. No Federal work was initiated, but in 1901 the town of South Kingston began work on dredging a channel through the pond and cutting a channel through the beach separating the pond from the ocean. In 1902 the State of Rhode Island began construction of two jetties to protect the entrance through the beach. This initial entrance channel was 75 feet wide and seven feet below mean low water (MLW).

The River and Harbor Act of 1909 authorized a preliminary examination of Point Judith Pond for the purpose of providing a navigable channel into the pond, but the findings of the report were that Federal funding was not justified.

In 1934 the State of Rhode Island performed additional work in Point Judith Pond. The work involved extending and rebuilding the east jetty, dredging a 35 acre basin to a depth of 12 feet below MLW inside the entrance, constructing state piers at the villages of Jerusalem, in South Kingston, and Galilee, in Narragansett, constructing bulkheads along the basin, and dredging a channel north to Wakefield at the head of the pond.

In 1944 another Federal study of possible improvements to Point Judith Pond was authorized, and in 1946 the Board of Engineers for Rivers and Harbors recommended the following work which was authorized in 1948 and completed two years later:

> *"A channel into Point Judith Pond 15 feet deep and 150 feet wide…to a point 100 feet north of the state pier at Jerusalem with a branch 15 feet deep and 200 feet wide…extending to a point 100 feet north of the state pier at Galilee; an anchorage basin just inside the entrance 10 feet deep with an area of about 5 acres; sand arresting structures…at the entrance; a channel 6 feet deep and 100 feet wide from the -15 foot west branch channel to the vicinity of Wakefield with an anchorage basin 6 feet deep and about 5 acres in area at the upper end."*

In the 1960's, the U.S. Congress provided authority for conducting a feasibility study on navigation improvements at Point Judith. It was later determined during the study that the project would qualify under the Continuing Authorities Program. Funds were provided to complete and submit a Detailed Project Report on the findings, under authority of Section 107 of the River and Harbor Act of 1960, as amended. The report, completed in 1976, recommended extending the existing 15-foot deep east channel 1,400 feet to the north. The project was constructed and in 1977 this 150-foot wide channel provided improved access to the commercial piers along the state bulkhead at Galilee (see Figure 2).

1.6 Study Participants and Coordination

The preparation of this report required the cooperation of Federal agencies, state and local government agencies, elected officials of the state and local governments, local commercial fishermen, and interested individuals. Appendix A contains a record of public involvement, agency coordination, and project correspondence.

1.7 Project Sponsor

The project sponsor is the Rhode Island Coastal Resources Management Council (CRMC), which is the State's Coastal Zone Management authority. The Rhode Island Department of Environmental Management operates the Port of Galilee.

Figure 2 - Point Judith Pond
Looking Northwest from the Port of Galilee with Snug Harbor in the Background

1.8 Environmental Operating Principles

The USACE has reaffirmed its commitment to the environment in a set of "Environmental Operating Principles". These principles foster unity of purpose on environmental issues and reflect a positive tone and direction for dialogue on environmental matters. By implementing these principles within the framework of USACE regulations, the USACE continues its efforts to evaluate the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions in partnership with stakeholders.

The seven "Environmental Operating Principles" are as follows:

1. Foster sustainability as a way of life throughout the organization.
2. Proactively consider environmental consequences of all USACE activities and act accordingly.
3. Create mutually supporting economic and environmentally sustainable solutions.
4. Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the USACE, which may impact human and natural environments.
5. Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
6. Leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.
7. Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

1.9 USACE Campaign Plan

The U.S. Army Corps of Engineers Campaign Plan guides USACE policy decisions on how we organize, train, and equip our personnel; how we plan, prioritize, and allocate resources; and how we respond to emerging requirements and challenges and meet national priorities. The Campaign Plan is regularly updated and the current version of the plan covers the period of FY2018 to FY2022.

The USACE strategic plan effort towards improvement began in August 2006 with the "12 Actions for Change" and has evolved to four goals and associated objectives. Although the effort originally developed with a focus on missions that seek to manage risk associated with flooding and storm damage, the Campaign Plan Goals and Objectives are applied to all aspects of the USACE service to the nation including its civil works mission. USACE Campaign Plan Goals and Objectives are derived, in part, from the Commander's Intent, the Army Campaign Plan, and Office of Management and Budget guidance. The four goals are (1) Support National Security, (2) Deliver Integrated Water Resource Solutions, (3) Reduce Disaster Risk, and (4) Prepare for Tomorrow.

The goal and associated objectives most closely related to the study and recommendation of a navigation improvement project at Point Judith Harbor is:

Goal 2: Deliver Integrated Water Resource Solutions

Objective 2a – Deliver Quality Water Resources Solutions and Services

The Recommended Plan for navigation improvements at Point Judith Harbor meets this objective by delivering a project which, within the limits of Federal participation established by Congress, meets to the extent practicable the expectations of our partners and stakeholders in providing safe and efficient navigation for the commercial fleet operating from the Port of Galilee at Point Judith Harbor and Pond.

Objective 2c – Develop the Civil Works Program to Meet the Future Needs of the Nation

The Recommended Plan for navigation improvements at Point Judith Harbor meets this objective by delivering a project which, within the limits of Federal participation established by Congress, provides sustainable system of channel improvements and improves coastal resilience through beneficial use of the dredged sand to nourish feeder bars off area beaches subject to erosion by coastal storms. The study and recommendation were conducted with stakeholder engagement and the public provided an opportunity to review and comment on the study and its recommendations through the NEPA process.

Objective 2d – Manage the Life-Cycle of Water Resources Infrastructure Systems to Consistently Deliver Reliable and Sustainable Performance

The project has been formulated with the complete life-cycle in mind, with a consideration of the costs and impacts of both initial construction and future operations and maintenance, to determine the most cost-effective alternative solution to address problems and opportunities with navigation at Point Judith Harbor.

2 PROBLEM IDENTIFICATION

This section discusses the project area and the reasons requiring navigational improvements. It establishes the planning objectives and constraints that direct subsequent planning tasks.

2.1 Problems and Needs

The principal navigation issue at Point Judith is the existing Federal Navigation Project does not accommodate safe and efficient vessel movement to the western and northern sides of the bulkhead at the Port of Galilee. Given the regional demands from the commercial fishing fleet, navigation delays and inefficiencies have become problematic for the facilities. The western side of the bulkhead is the primary work area and offloading area for fish haul, and contains major fish buyers and fish processors. The heavy use of this area by many of the vessels in the harbor and the narrow width of the federal channel results in frequent and significant congestion delays. Additional delays occur while vessels wait to offload catch. The waiting vessels make it difficult for other vessels to pass safely in the channel to reach their berths, causing additional congestion delays. The lack of appropriate access to the unloading facilities has caused delays of up to 48 hours for some boats as they wait to unload their catch resulting in excess labor and fuel costs.

The narrowness of the FNP's East Branch Channel, opposite the West Bulkhead, causes the larger vessels (60 to 95 feet in length) to often run aground as they attempt to maneuver into offloading facilities, berths, and around other vessels. Inadequate depths in the North Basin and the natural channel area between Jerusalem and High Point cause tidal delays and grounding damages to those vessels accessing these areas.

The Point Judith Pond commercial fishing fleet has already maximized the available berthing and offloading space. Due to the increasing demands for use of the Port of Galilee facilities over the past several years, the State of Rhode Island and local authorities completed improvement work to the bulkhead. This work included the addition of several new offloading facilities, and the addition of piers to the West Bulkhead and North Basin areas. State and local authorities completed the berthing dredging needed in conjunction with this work.

The need at Point Judith is to make modifications to the existing federal channels and/or provide new channels to alleviate the commercial fleet's navigation problems. The larger, deeper draft vessels now utilizing Point Judith Pond as a base of operations must be better accommodated if the commercial operators at Point Judith are to continue to be competitive in the New England region fish industry. If accommodations are not made, the existing commercial fleet will continue to experience delays, groundings and berthing difficulties reducing the efficiency of commercial fishing operations.

For improving navigation conditions USACE has tentatively selected a plan that recommends modifying the existing channels and dredging a new channel to enhance the navigation routes and allow vessels to safely reach berthing and offloading areas. This study analyzes the alternatives for channel improvement and the benefits that each alternative provides to the existing fleet.

2.2 Existing Conditions

General Description – Point Judith Pond is a tidal lagoon approximately 4 miles long and more than a mile wide. The Point Judith Harbor area includes an federally constructed 770-acre offshore Harbor of Refuge protected by three breakwaters and an anchorage and berthing area in lower Point Judith Pond (see Figures 2 and 3). The anchorage and berthing area is located between the communities of Galilee and Jerusalem and is the site of several state owned piers and the U.S. Coast Guard Station Point Judith. The entrance to the Pond begins with passage through the Harbor of Refuge. The protected waters of Point Judith Pond are generally less than 5 feet deep, except the areas that are designated as Federal navigation channels. The area has several islands, most of which have been developed as residential summer communities. This area of southern Rhode Island is composed of rocky coasts and long beaches lying between low headlands on the coast, and inland low-lying areas bordering saline ponds and salt marshes that characterize the area.

Figure 3 shows the existing Federal navigation project in Point Judith Pond. It consists of a 15-foot deep (MLLW) 150-foot wide entrance channel from the Point Judith Harbor of Refuge through the breach way into the Pond, a west channel 15 feet deep and 150 feet wide

to a point 100 feet north of the state pier at Jerusalem, an east channel 15 feet deep and 200 feet wide to a point 100 feet north of the state pier at Galilee, continuing west and north to a 15-foot deep 150-foot wide channel along the West Bulkhead. Between the east and west channels is a 10-foot deep 5-acre anchorage. A 6-foot deep 100-foot wide channel extends north from High Point in Snug Harbor approximately 4,900 feet to Turner Cove. The same size channel also extends from the north side of Harbor Island approximately 1,800 feet to a 6-foot deep anchorage in Wakefield.

Land Uses & Facilities - The dominant land use in the Port of Galilee area is commercial. The villages of Jerusalem and Galilee, located near the southern entrance to the pond, contain most of the service facilities available for commercial and recreational boating activities. The commercial properties include restaurants, stores and lodgings at the harbor. Almost all available building frontage has been utilized on both sides of the lower Point Judith Pond area. State and local authorities continue to seek new ways of commercially developing the area to meet the needs of a fishing industry that lacks sufficient access to the berthing and offloading facilities. Commercially, the Point Judith fishing fleet has a considerable advantage over other commercial fishing communities due to the proximity of these villages to the prime fishing areas of Georges Bank and the protection afforded to them by the Harbor of Refuge.

Jerusalem contains docking space and has a state-constructed pier. The State of Rhode Island has invested resources so that Galilee has become a leader in the state's commercial fishing industry. Galilee has seen the most in the way of development. The Port of Galilee contains a state constructed pier, sustains several charter fishing vessels, and provides a base for one of the ferries that run to Block Island. Commercial fishing vessels and shore processing operations have been relocating to Point Judith from surrounding Rhode Island and Connecticut harbors for several years. Point Judith's largest fish processors are the Town Dock Company, Handrigan's Seafood, and Seafreeze Shoreside. Several smaller processors are also located in the Point Judith area: Ocean State Lobster Co., Narragansett Bay Lobster Co., Fox Seafood, Osprey Seafood, and Sea Fresh America. The Local Catch Inc. is a Community Supported Fishery (CSF), which is like a farm share, but for fish (NOAA, 2017).

At the two state constructed piers in Galilee and Jerusalem, the State of Rhode Island installed a bulkhead along the Galilee waterfront in 1934. The bulkhead and adjacent area contain piers for berthing space, and fish packing and processing houses to service the large commercial fleet that use the port.

Between 1978 and 1985 Point Judith's commercial fish landings increased by 200 percent in comparison to the State's 126 percent increase. By 1985, Point Judith ranked fourth in New England commercial fish landings behind only Gloucester, MA, New Bedford, MA, and Rockland, ME. With the increased value of fish as a natural resource and the location Point Judith affords to the fishing grounds, local interests and the State of Rhode Island continue their efforts to maximize the available anchorages and berthing space in the Point Judith area. NOAA's commercial fishing statistics for 2016 rank Point Judith third in New England for both pounds of catch landed and dollar value of catch behind New Bedford and Gloucester.

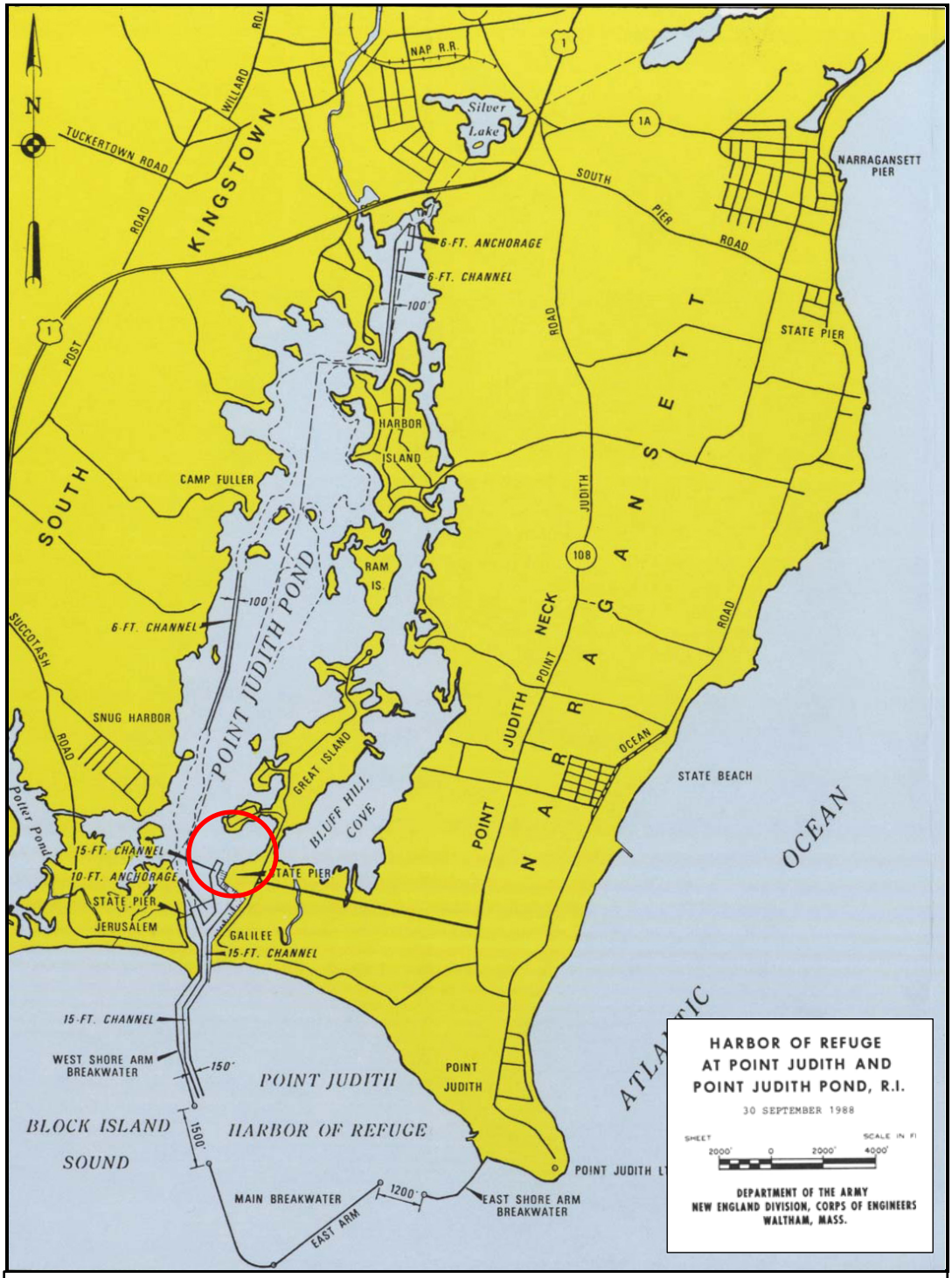


Figure 3 - Existing Federal Navigation Project
Point Judith Harbor of Refuge and Point Judith Pond, RI

Galilee's fishing success over the years has been due to the Point Judith Fisherman's Cooperative and their shore-side facilities that are based in the village. A Federal channel on the eastern edge of the Pond services the charter boat fleet and Block Island Ferry and the commercial fishing fleet. Galilee also has a diversified recreational economy, where small boating services, marinas, beaches and other tourist attractions are available.

Repair facilities for boats are located at High Point in the village of Snug Harbor. To reach these facilities vessels must use the naturally existing channel that runs from Jerusalem to High Point. Due to a lack of depth and width in this natural channel and a mean tidal range of 2.8 feet, large offshore vessels often risk grounding out trying to reach the 12-foot deep marine repair facilities at High Point.

Recreation/Tourism - The Point Judith Pond area is in one of state's busiest tourist areas and provides access to some of Rhode Island's best recreational fishing. As an active tourist destination, the area contains many shops, restaurants, sport fishing boats, sightseeing tour boats, beaches and a motel. East Matunuck State Beach, Sand Hill Cove Beach and Scarborough State Beach are nearby and attract large numbers of summer tourists. In 2010, the year round population of Narragansett was recorded to be about 15,868.

The Block Island Ferry at Point Judith provides a critical link to Block Island, a popular tourist destination, transporting visitors, residents, and supplies to the island year-round. The ferry runs eight to nine trips per day to Block Island in the summer months, tapering somewhat in the fall and spring, and provides a few trips each day in the winter. The ferry's mainland terminal is located along the Galilee west bulkhead.

Economic Conditions – Appendix C contains the Economic Assessment of the proposed Federal Action. The Town of Narragansett is located in Washington County, on the southern coast of Rhode Island. In 2010, the town had a population of 15,868 and contained 9,470 housing units (US Census Bureau, 2010 US Census). Between 2000 and 2010, the population decreased while the number of housing units increased, with a population in 2000 of 16,361 and 9,159 housing units (US Census Bureau, 2000 Census). The median family income in Narragansett in 2010 was $65,842 (US Census Bureau, 2010 Census). This is slightly higher than the median family income in Rhode Island of $56,423.

In 2017, Narragansett had a labor force of 9,044 and an unemployment rate of 3.0% (Rhode Island Department of Labor and Training, Local Area Unemployment Statistics). This compares favorably with the state, which had a 2017 unemployment rate of 4.4%. Rhode Island was hit hard by the economic downturn of 2008-2009, from which it has only recently started to recover. Unemployment in the state peaked at 11.2% in 2010, and remained above 10% through 2012. Throughout this period, unemployment in Narragansett was consistently several points lower than the state average (Rhode Island Department of Labor and Training, Local Area Unemployment Statistics). In terms of total wages, the largest employment sectors in Narragansett in 2015 were Government (19 establishments, $12,910,585 total wages), Food Services and Lodging (75 establishments, $7,910,482 total wages), Retail Trade (48 establishments, $4,504,509 total wages), and Health Care/Social Services (39

establishments, $4,185,754) (Rhode Island Department of Labor and Training, Quarterly Census of Employment & Wages, 2015).

Commercial fishing is a major industry in Rhode Island. The Point Judith Pond area is the largest commercial fishing port in the state and one of the larger fishing ports in the country. It plays a significant role in the economy of Narragansett and the wider regional area. The economic impact of the industry extends beyond the fishermen to include the many fish buyers, fish processors, suppliers, and vessel repair businesses related to Point Judith fishing activity. The Federal channel at Point Judith supports the significant economic activity of the harbor. The Federal project is also used extensively by the Block Island Ferry, a critical supply and transport link from the mainland to Block Island.

Point Judith is one of the larger fishing ports in the country in terms of both pounds landed and value. In 2016, Point Judith was ranked 18th in the nation in terms of pounds landed and 15th in the nation in terms of value, with 53.4 million pounds landed valued at $55.7 million (2016 National Marine Fisheries Service, latest available data). The most valuable species landed are squid, scallop, scup, lobster, summer flounder, herring and clam. Point Judith lands more squid than any port in the United States, and more scup in terms of poundage than any other east coast port. Other significant species landed at the port include Jonah crab, yellowtail flounder, hake, sea bass and skates. A seasonal longline fishery for tuna also operates out of the port, as well as various charter fishing vessels.

Vessel and Fleet Presence – The geographical location of Point Judith Pond provides prime commercial fishing access to Block Island Sound, Rhode Island Sound, the Nantucket Shoals and the Continental Shelf. As a primary center for the region's commercial activity, Point Judith Pond supports a fleet of commercial and recreational craft. As the largest commercial fishing port in Rhode Island, it includes 40 piers, most used for commercial berthing, five fish buyers/processors, repair facilities, and several fuel, bait, and ice suppliers in support of the industry. The harbor also contains a State Pier, a terminal for the Block Island Ferry, and a US Coast Guard facility. The fish piers and berths are controlled by the State of Rhode Island Department of Environmental Management. The largest fishing vessels in the harbor berth at slips along the west and south sides of the bulkhead. The western side of the bulkhead contains the main pier for unloading catch to one of the larger fish processing plants. The northern side of the bulkhead, just south of Little Comfort Island, contains 132 vessels at slips, including lobster boats, charter fishing and party boats, and several small draggers. There is a state boat ramp located east of the northern bulkhead area, east of Great Island Road in Bluff Hill Cove. The boat ramp is used heavily by recreational boaters in the summer months. Boats launched at the ramp typically transit the area north of the bulkhead to exit the harbor.

Currently, the commercial fleet at Point Judith Harbor consists of 273 vessels, of which 230 are fishing vessels and 43 are charter fishing or party vessels. The fishing vessels range in draft from three to fourteen feet, with 90 percent of the vessels having drafts between five and twelve feet. In comparison, in the late 1980's there were 196 commercial vessels assigned berths in the Port of Galilee. Of these, 151 were commercial fishing vessels. The other 45 boats were comprised of charter, sport fishing, party and excursion vessels. The commercial

fleet consists of onshore and offshore lobster boats and draggers. Larger steel hulled vessels have, generally, become the standard for the offshore fleet, especially with the passage of the Fisheries Conservation and Management Act (1976). Nearly half the fleet is made up of large offshore draggers. The State of Rhode Island has been committed to the task of increasing the amount of permanent berths available for the fleet (for example, increased from 74 in 1974 to 151 in 1985). The deeper draft boats encounter and navigational difficulties and increased wait times to access adequate offloading facilities. The state completed various docking and bulkhead improvements in order to continue the development of Galilee as a successful fishing port but delays continue to exist.

The segment of the commercial fleet using the western and northern bulkhead areas at Galilee (the areas under consideration for improvement) consists of 181 vessels as of September 2016, including 138 commercial fishing vessels and 43 charter fishing vessels. This is the segment of the fleet that would potentially benefit from the proposed improvements.

The Block Island Ferry and the Coast Guard vessels operate out of the southern end of the harbor. Ferry operations include five vessels in the peak summer months, reducing to one vessel in the middle of winter. The U.S. Coast Guard keeps two to four vessels at Point Judith, and periodically uses the boat ramp in Bluff Hill Cove to launch its smaller vessels. These smaller vessels then transit the area north of the bulkhead and have drafts of less than 4 feet, which is shallower than the commercial fishing vessels that use the area.

Port Operations –The State Pier at the Port of Galilee, part of Point Judith Harbor, has undergone continuous improvement and expansion over several decades to support the commercial capabilities of the port area. The work involved bulkhead and pier improvements on the West Bulkhead and North Basin areas. Improvements made by the Point Judith Fishermen's Cooperative in the West Bulkhead area that involved new offloading facilities has alleviated the demand for offloading facilities and berthing space in the area; however, it does not alleviate the navigation problems that exist in the East Branch Channel nor provide for a navigable channel in the North Basin area, or to Snug Harbor’s repair facilities.

The expansion of the developed commercial harbor facilities along the north side of the port, upstream and easterly of the existing 15-foot Federal channel allowed the State to shift smaller inshore fishing vessels, with shallower drafts, into the newer berth areas, and allowed the use of the West bulkhead slips along the existing Federal channel to try and accommodate the increased, larger offshore boats.

Ships using the West Bulkhead and North Bulkhead areas have problems with adequate channel depth and width, congestion, and groundings particularly at lower tidal stages. The larger vessels that are now using the West Bulkhead slips have difficulty with the federal channel’s current width. This part of the federal channel doubles as a maneuvering area for craft transiting to and from the access ways between the berth slips. In the North Bulkhead area, the natural depths reduced by shoaling are not adequate to provide access for commercial craft using the north bulkhead area even with the State’s efforts to shift the smaller draft vessels to the north bulkhead area to accommodate the current and expanding fleet that use the facility.

2.3 Without Project Condition

The *"Without Project Condition"* is the expected condition if the federal government takes no action to improve the navigation capabilities in the Point Judith Pond area. In this case, the congestion delays, grounding damages and haul-out costs currently experienced by Point Judith fishermen from inadequate channel width in the Federal channel will continue to occur. Additionally, tidal delays and grounding damages from inadequate channel depth off the northern side of the bulkhead will continue to occur. These delays and damages increase the operating costs of Point Judith fishermen, reducing their net incomes and reducing overall economic efficiency.

Continuing to operate the port in this manner, would result in negative long-term issues from the expected significant reductions in navigation efficiency. Vessel groundings, collisions and tidal delays will continue to plague the commercial fleet as a result of inadequate channel width and depth. The larger vessels will continue to experience problems accessing the repair facilities at High Point in Snug Harbor and will need to travel to other ports for repair work. The navigational problems will intensify and hinder the local fishing industry's efficiency as the fleet continues to grow in vessel size and number. There will be overcrowding of vessels, and the port will not be able to accommodate the increasing demand for space utilization, thereby the State and region would experience an adverse economic loss.

There are other considerations of the *Without Project Condition* that should be identified. Fish catch is difficult to predict and will continue to be so as the fleet at Point Judith has had a history of flexibility in harvesting any species of fish, depending on the market and availability. Furthermore, the state has invested in shorefront improvements thereby reflecting the determination that fish availability does not appear to be at risk. Access to the fishing grounds appears to be unrestricted at this time and will only be regulated by market conditions in the form of net returns. It is expected that the market will continue to be relatively stable as experienced over the last ten years (see Economic Appendix Table C-1). The fleet is expected to experience pressure for greater facility access and safe navigation based on its past record by fishermen continuing to fish those species of fish that are marketable and seeking to open up new markets for underutilized fish.

There are no plans for improvement of the port's channels by non-Federal interests this and it is not expected to occur. The State of Rhode Island has focused its efforts and available funding on the improvement of shorefront infrastructure and is depending on federally assisted channel dredging. The State completed its improvements to the port's shore facilities over a period of many years (since the 1980s). The State has now again requested Federal assistance in modifying the existing Federal channel to improve access to the port's facilities. Such improvements would carry significant cost for a small harbor such as Point Judith, in excess of $1.5 million. As these channel improvements have been proposed for twenty-five years, the most likely non-Federal alternative would be a continuation of existing conditions if Federal assistance in implementing the project were not available. Federal maintenance of the existing USACE Federal navigation project would continue regardless of the issues facing the Port of Galilee.

Point Judith is a small commercial fishing port of relatively shallow draft. This is not a large commercial cargo port. There are no pilots. Vessel masters decide their schedules based on their loaded drafts in and out, the varying range of the tide, and the condition of the channel (dimensions, shoaling, sea states, weather, etc.), among other factors. Traffic generally follows the tide, with resulting delays for larger fishing boats. Underkeel clearance is limited to about two feet for most vessels and would continue, though some of the largest boats need additional clearance in heavier sea states. All of these conditions will continue to exist and constrain future operation and development of the port. Fishing boat masters fully utilize the available channel depths and tides to bring their catch to the dockside processors as quickly as possible while it remains fresh and commands its best value. No increases in catch are proposed or would occur as a result of any channel improvements as the fisheries engaged in by Point Judith's fishing fleet are tightly controlled by Federal and state resource agencies.

At Galilee the commercial port area is now fully developed and improving navigational access to those facilities would increase operational efficiency for the fishing fleet. Any additional commercial port facility improvements, if any were built, would need to occur on the western shore or further up into Point Judith Pond and would require the state to acquire new lands which are now developed for other purposes (marinas, shipyards, residential).

The most likely future condition with navigation at Point Judith Harbor and the Port of Galilee is a continuation of the existing conditions which have constrained operations for more than two decades.

2.4 Planning Objectives and Constraints

Planning Objectives are the desired results of the planning process that will solve the identified problems and typically result in the desired changes between the without- and with-project conditions. Planning objectives serve to eliminate from consideration alternatives and considerations that will not solve the identified problem.

State and local objectives for the project area include the continued development, management and success of the lower Point Judith Pond area as a base for commercial fishing. The Federal objective of water and related land resources project planning is to contribute to National Economic Development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes (National Environmental Policy Act), applicable executive orders, and other Federal planning requirements. This requirement involves:

- Water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.
- Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed.

Planning objectives that have been identified to specifically address the navigation problems and needs of Point Judith Harbor and Pond are:

- Reduce the cost of commercial fishing boat operations in Point Judith Harbor and Pond during the 50 year period of analysis beginning in 2018.
- Contribute to safer conditions for the commercial fishing fleet in Point Judith Harbor and Pond during the 50 year period of analysis beginning in 2018.
- Reduce projected without-project tidal delays and channel congestion for commercial navigation at the state fish pier facilities at the Port of Galilee in Point Judith Harbor and Pond during the 50 year period of analysis beginning in 2018.

Planning Constraints are the parameters that limit the implementation of a proposed plan or plans to allow for improvement of the navigation conditions in support of the commercial and recreational industries at Point Judith.

- The major or primary constraint at Point Judith Pond is the natural conditions. Point Judith Pond is a tidal lagoon that is relatively shallow across most of its area and the logical areas for navigation improvement within this lagoon are the places that currently handle deep draft vessels. The areas are the ports of Galilee, Jerusalem and Snug Harbor. The High Point repair facilities at Snug Harbor would require extensive channel dredging to make them accessible. Jerusalem, a potential site for commercial or other development is not scheduled for improvement by state authorities.
- Another constraint is the nature of the material to be dredged and the limitations that places on suitable disposal alternatives. The material to be dredged for the proposal channel improvements at Point Judith is clean sandy material determined suitable by the USACE, Environmental Protection Agency (EPA) and state for beneficial use as nourishment material for beaches or nearshore littoral bar systems. While the material could be placed in open water, Federal and state resources agencies prefer the beneficial use of such material. The Coastal Zone Management policies of Rhode Island, like most other states, prefer such uses, as do USACE policies, where little to no additional cost results. Beneficial uses for the dredged material were investigated and considered in project planning.

3 FORMULATION OF PLANS

The formulation of alternatives for navigation improvement at Point Judith considered the needs and problems of the study area. An alternative must be considered reasonable and designed to achieve the planning objectives, and are developed with regard to the planning constraints previously identified (Section 2.3, Planning Objectives and Constraints). State and local sponsor objectives are essential considerations in the evaluation of alternative plans.

3.1 Plan Formulation Rationale

The formulation of alternative plans is based on a standard set of criteria. Each of the alternative plans must:

- be complete so that it provides and accounts for necessary investments or other actions to ensure the realization of the planned effects;
- be effective to alleviate the specified problems and achieve the specified opportunities;
- be efficient, demonstrating a cost effective means of alleviating the specified problems and realizing the specified opportunities;
- be acceptable by state and local entities and the public, and;
- be compatible with existing laws, regulations, and public policies.

Each alternative is considered on the basis of its effective contribution to the planning objectives, and the selection of a specific plan is based on technical, economic, and environmental criteria that allows for a fair and objective appraisal of the impacts and feasibility of alternative solutions.

Technical criteria require that the plan have the dimensions necessary to accommodate the expected vessel use, sufficient navigation area to provide for maneuvering of boats, and allow for development or continued use of shore facilities. All plans must contribute to navigational efficiency and be complete within themselves.

Economic criteria require that the benefits of the navigation improvement exceed the economic costs and that the scope of the project is such to provide maximum net benefits.

Environmental criteria require that the tentatively selected plan preserve and protect the environmental quality of the project area. This includes the identification of impacts to the natural and social resources of the area and the minimization of expected impacts that adversely affect the surrounding environment. It also includes the assessment of impacts that are incurred during the construction of the proposed navigation improvements and those activities attracted to the area after plan implementation.

3.2 Management Measures

Management measures can be identified and evaluated as the basis for formulating alternative plans to solve the navigation problems in Point Judith Pond. These management measures are categorized as either structural or non-structural.

Structural measures are those that involve the construction of features that would, to varying degrees, meet the planning objectives developed for Point Judith Pond. These include channel improvements such as deepening and widening existing channels, and extending channels to access additional port areas. Deeper channels would reduce or eliminate tidal delays and the risk of grounding. Wider channels would reduce or eliminate channel congestion and assist in maneuvering for facility access and egress. Channel extensions to newer port areas would provide both types of benefits for fishing boats based in those areas.

Given the limited nature of the improvements under consideration for this Section 107 CAP small navigation project more costly structural solutions such as relocation of port facilities to areas with deeper navigation access were not considered. The Galilee (east) side of the harbor, and the Jerusalem (west) shore already accessed by the existing 15-foot channel are.

now fully developed. Acquisition of private lands for public commercial port development in these areas would also be far more costly than channel modifications at Galilee.

Nonstructural measures involve those that would achieve the same planning objectives, but without resorting to structural improvements. An example of a nonstructural measure applicable to small fishing harbors involves the transfer of commercial fishing vessels to neighboring ports having capacity to sufficiently accommodate additional vessels at existing facilities. Another example of a nonstructural measure for a small fishing harbor would be use of tidal navigation to avoid dredging. These are discussed in the general consideration of alternatives below.

3.3 Analysis of Alternatives Considered

3.3.1 General Considerations and Non-Structural Alternatives

Navigation improvement alternatives were developed and analyzed during the early stages of the planning study. These alternatives included both structural measure (various dredging options) and nonstructural measures, including the possibility of transferring larger commercial fishing vessels to neighboring ports.

Fleet Transfer: The transfer of some of the larger fishing vessels to nearby harbors is contingent on the ability of these harbors to provide adequate protection, capacity, and efficiency of operation. It is not likely that any commercial operators would permanently transfer their vessel if other alternative sites does not have the capacity to provide adequate features and facilities. Point Judith is the state's largest fishing port, and the region's third largest. Point Judith has extensive berthing and offloading facilities, multiple fish/seafood processing plants and buyers, fueling and provisioning facilities, and shipyards for repair of vessels.

USACE planning efforts determined that harbors in the vicinity of Point Judith do not meet the necessary qualifications of an "adequate" fishing port. Nearby harbors, such as Wickford, Rhode Island, suffer from overcrowding and shoaling problems. Other ports cannot handle the potential influx of deep draft vessels due to their lack of adequate berthing space. Another major issue with transfer of portions of the fishing fleet to alternate ports is that none of the nearby ports have the service capability that is found for commercial boats at Point Judith. There are no fish processing facilities, provisioning facilities, or other shore support at these other harbors necessary for the size of the fishing fleet and boats operating from Point Judith. The Port of Galilee alone in southern Rhode Island presently provides the fishermen with the best offloading and fish processing facilities in the area. The closest port that could meet the service and facility needs of Point Judith's commercial fishing fleet is New Bedford Harbor, MA, which is 70 miles by highway and 45 miles by sea from Point Judith; too great a distance to be practicable.

Tidal Navigation: Tidal navigation is presently practiced by most of the fishing fleet at Point Judith. Larger fishing boats in particular must pay close attention to the tides which vary throughout the day, month and year. New England experiences a semidiurnal tide; in general there are two high tides and two low tides every 24 hours and 50 minutes. The highs and

lows (and therefore range of the tide) can vary considerably from one tidal cycle to the next. Experienced fishermen understand the tides in the areas they operate and pay attention to the tide charts. Even so, the effects of storms, waves, swells, surges, currents, winds and other factors all contribute to uncertainties in navigating shallow coastal waters and harbors. Groundings can occur when deeper draft boats are operated without sufficient underkeel clearance to account for these conditions and the effect on a boat's hull in the water and sail area (cross section exposed to the wind) above the water.

Fishing boats leave the harbor loaded down with provisions, ice, fuel, and bait, and return to the harbor loaded down with catch on ice. When loaded draft, plus a reasonable underkeel clearance for sea and channel conditions, exceeds the available controlling depth in the channel, then groundings can occur. The only solution short of dredging is to delay the channel transit, which costs the boat time, and if inbound fuel and labor. Significant delays inbound can result in spoilage of catch and reduction in the ex-vessel value of the catch.

At Point Judith the state Sponsor and the commercial fleet have requested the USACE to examine channel improvement, including deepening and widening to alleviate tidal delays and groundings. Further reliance by the fleet on tidal navigation would fail to address the problems experienced by the fleet.

3.3.2 Structural Alternatives

The Port of Galilee has made improvements to benefit commercial interests to the North Basin area, located between the West Bulkhead and Little Comfort Island, and is extensively developed. A tidal flat links the main pond to Bluff Hill Cove. A channel extension into the North Basin would provide necessary access to the state constructed docks. Improvements to the east branch channel would provide easier access to the offloading facilities and docks that were added to the West Bulkhead.

Three reasonable alternatives for navigation improvement were analyzed in this study to meet these planning considerations and includes a Plan A, Plan B, and a combined Plan A and B. Figure 4 shows the location of the alternative plans. Two additional alternatives were evaluated and eliminated from further consideration (see Section 3.4).

(1) Plan A – West Bulkhead Expansion – This preferred alternative for navigation improvement near the West Bulkhead proposes to widen the existing 15-foot deep channel from 150 feet to 200 feet. This alternative supports the State of Rhode Island's development and management of the Point Judith area. Based on the vessel size and the amount of congestion in the area it was determined that widening the channel by 50 feet would provide proper clearance for these large vessels to maneuver to the berths, the offloading docks, and around other vessels. The West Bulkhead area has been the focus of development by the State of Rhode Island. The State replaced an outdated dock with a larger one that provided an offloading and berthing area for 20 deep draft vessels. The construction of this dock displaced 36 smaller boats that were relocated to facilities in the North Basin.

The deeper draft vessels continue to encounter navigational difficulties in the east branch channel opposite the West Bulkhead. These navigation problems are evidenced by the

grounding and tidal delays experienced by boats attempting to access this area. The largest class of offshore fishing vessels berthed along or offloading at the west bulkhead have lengths of up to 95 feet. For safe turning into and from the slips and berths these boats would require at least 150 feet of clear channel width, or about 1.5 times their length, for safe turning and maneuvering, and yet boats still ground on the opposite bank with the current 150-foot channel width when attempting to turn with the tide running. The channel is heavily used by boats accessing the west and north bulkheads so additional width to maintain traffic flow is also required. One-way traffic for smaller boats accessing the north basin area to pass while larger boats are maneuvering would add 50 to 60 feet (about three times their average vessel beam of 16 to 20 feet) to the safe channel width. After consulting with the port operators and vessel owners it was determined that a 200-foot channel width along the west bulkhead would be adequate to resolve the present problems.

Depths of 12, 13, 14, and 15 feet were evaluated to aid in determination of the USACE tentatively selected plan. This alternative provides the dimensions necessary to accommodate the expected vessel use at the West Bulkhead and allows for sufficient area for maneuvering boats, and accommodates the need for continued use of shore facilities. It does not meet the need for access to the North Basin berthing areas. Quantity estimates for Plan A are shown below in Table 1.

(2) Plan B – North Basin Extension – The preferred alternative for navigation improvement into the North Basin proposes to dredge a new channel 11 feet deep and 150 feet wide. The North Basin has been the focus of development by the State of Rhode Island. There are five permanent docks that provide berthing space for smaller fishing and recreational charter and party boats. The State has extended the bulkhead area and two piers to accommodate 68 additional boats. The USACE proposed improvement plan consist of dredging a Federal channel into this area to provide access to these piers. For safe, two-way traffic to occur, a channel width of 150 feet is needed based on the size of the vessels that use this area. This improvement alternative also includes dredging the channel to a depth that allows for safe under-keel clearance based on the squat, pitch and roll of these vessels. Five channel depths of 8 to 12 feet, were evaluated to determine the most economical configuration. This alternative provides the dimensions necessary to accommodate the expected vessel uses for the North Basin where there currently is none. It allows for sufficient area for maneuvering boats, and accommodates the need for continued use of shore facilities. It does not meet the need for access to the West Bulkhead berthing areas. Quantity estimates for Plan B are shown below in Table 1.

(3) Plans A & B Combined – West Bulkhead Expansion & North Basin Extension - This combination of the preferred alternatives for widening the FNP near the West Bulkhead and extending the channel into the North Basin involves widening by 50 feet the existing 15-foot deep Federal channel opposite the West Bulkhead in Galilee, and extending this channel 1200 feet into the North Basin area at a depth of 11 feet and a width of 150 feet. This would provide the existing commercial fleet with safe access to existing docking areas, at all tidal stages, thereby increasing operational efficiency.

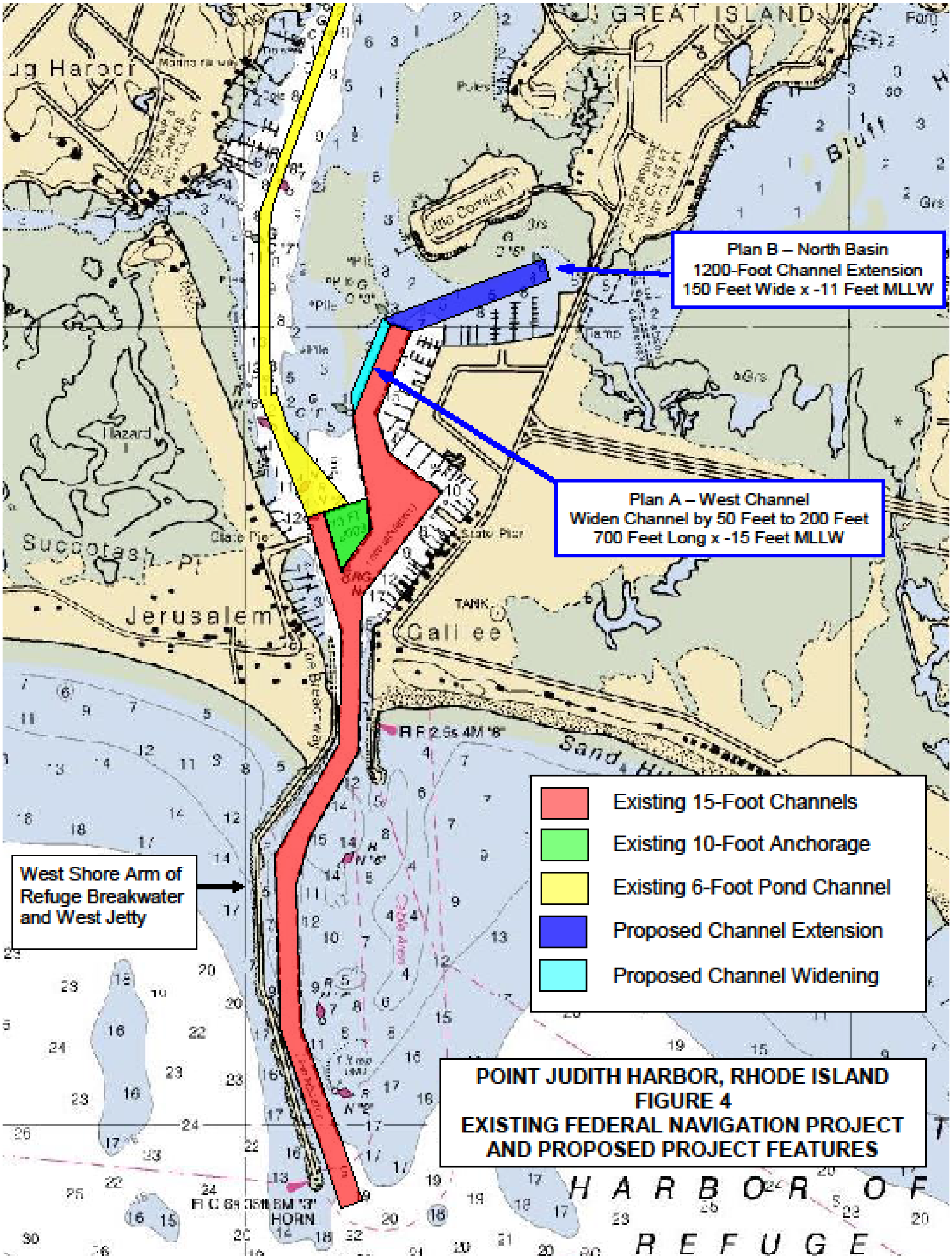

Plan B – North Basin
1200-Foot Channel Extension
150 Feet Wide x -11 Feet MLLW
Plan A – West Channel
Widen Channel by 50 Feet to 200 Feet
700 Feet Long x -15 Feet MLLW
West Shore Arm of
Refuge Breakwater
and West Jetty
Existing 15-Foot Channels
Existing 10-Foot Anchorage
Existing 6-Foot Pond Channel
Proposed Channel Extension
Proposed Channel Widening
GREAT ISLAND
Jerusalem
Galilee
Succotash Pt
HARBOR OF REFUGE
POINT JUDITH HARBOR, RHODE ISLAND
FIGURE 4
EXISTING FEDERAL NAVIGATION PROJECT
AND PROPOSED PROJECT FEATURES

Table 1 – Quantity Estimates (in Cubic Yards) for Plans A and B			
Plan and Depth	Required Removal	Overdepth Allowance	Total Cubic Yards
West Bulkhead Channel Widening			
12-Foot Channel	1,600	1,000	2,600
13-Foot Channel	2,200	1,400	3,600
14-Foot Channel	3,600	1,600	5,200
15-Foot Channel	5,200	1,900	7,100
North Basin Channel Extension			
8-Foot Channel	1,600	2,000	3,600
9-Foot Channel	3,600	3,300	6,900
10-Foot Channel	6,900	4,300	11,200
11-Foot Channel	11,200	5,400	16,600
12-Foot Channel	16,600	6,300	22,900

3.4 Alternatives Considered and Eliminated From Further Analysis

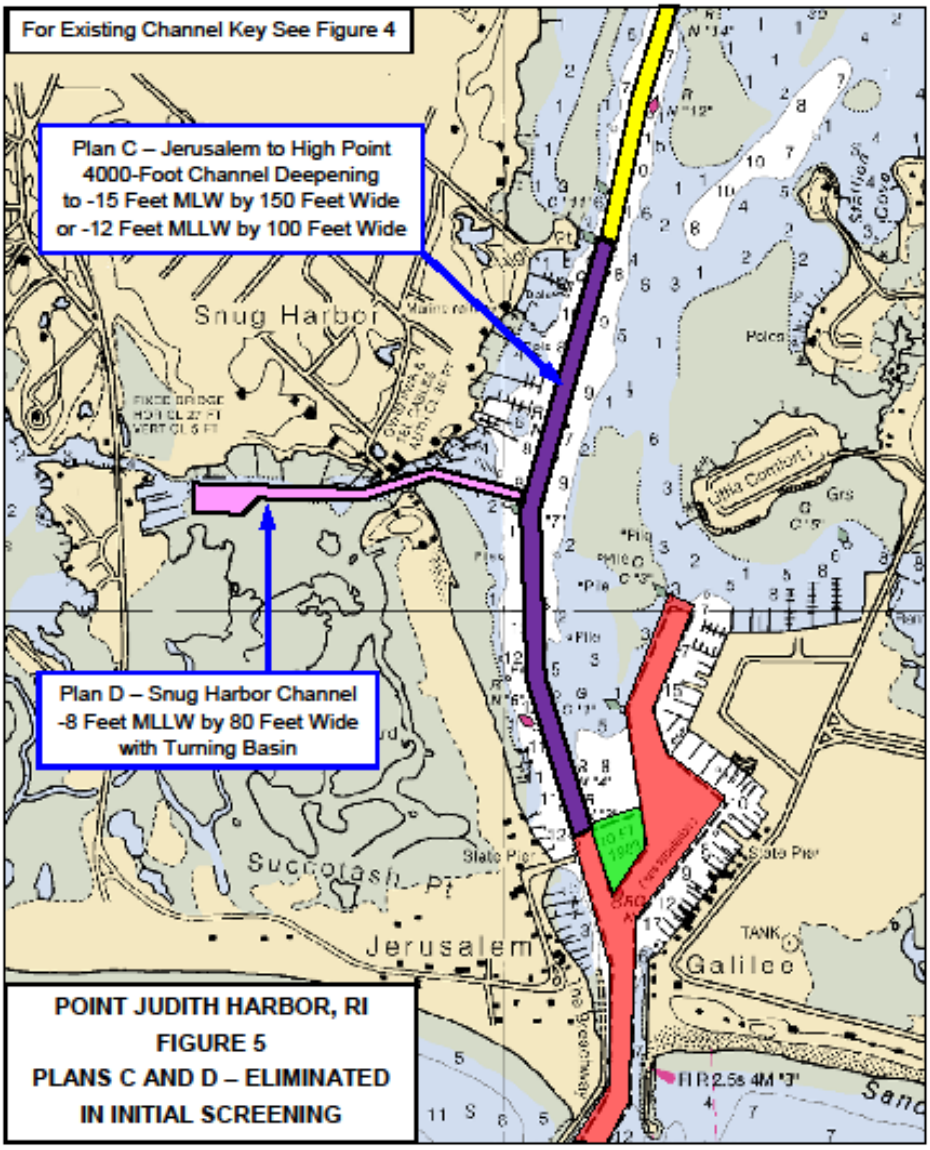
Two other alternatives were initially evaluated to improve navigation within the project area but rejected from further analysis. These include alternatives to provide (1) improved channel access on the west side of the harbor in South Kingstown above the Jerusalem State Pier to High Point, and (2) to provide a channel into Snug Harbor in South Kingstown via the Gooseberry Inlet, a tributary of Point Judith Pond located between the Jerusalem State Pier and High Point. These two plans are shown in Figure 5.

Plan C – Jerusalem – High Point Channel – Originally identified as "Plan C" in the 1989 DPR, the Jerusalem High Point Channel alternative is an alternative with two depth options. The existing FNP provides for a 6-foot channel above the Jerusalem State Pier, generally 100 feet wide, extending about 3.8 miles northerly up the Pond to the village of Wakefield at the head of navigation. This plan would provide for a deeper channel from the Jerusalem State Pier, past Snug Harbor and up to High Point, a distance of about 4,000 feet, in order to access the boat yards and marinas that are mostly locat3ed above the Snug Harbor entrance. Channel dimensions of -12 feet MLLW by 100 feet wide, and -15 feet MLLW by 150 feet wide were considered in 1989 and briefly re-examined for this study.

The existing Federal channel for upper Point Judith Pond is 6 feet deep, making access difficult for the deep draft boats attempting to reach the repair facilities below High Point. These repair facilities generally have approach depths of 12 feet. Deeper draft boats travelling above the Jerusalem state pier must make the transit at higher tide stages. To make the repair yards and marinas more accessible to the commercial fleet the 6-foot Federal channel would need to be deepened. The 12-foot deep option would provide safe passage for the inshore fishing fleet and for some of the offshore fishing vessels, and would require the removal of about 64,200 cy of material (1989 estimate). The 15-foot deep option would

provide safe passage to High Point for the entire Point Judith commercial fishing fleet and would require the removal of about 179,100 cy of material (1989 estimate).

This plan was evaluated in the original project review and rejected from further consideration at this time because the benefits would be primarily recreational, accruing to the customers of the marinas below High Point and in Snug Harbor. Commercial benefits would be minor and involve reducing tidal delay for infrequent transits to the upper shipyards at High Point and Snug Harbor. Projects with primarily recreational benefits are not a priority for the federal government under the USACE's Civil Works programs.



Plan D – Snug Harbor Branch Channel – Another alternative originally considered in the 1962 report and 1989 DPR and rejected from further consideration upon initial screening in this study was to dredge a branch channel leading westerly off the Pond channel into Snug Harbor in South Kingstown via the Gooseberry Island Inlet with an anchorage/ turning basin

at its upper end below the Succotash Road Bridge. There is no existing authorized Federal channel into Snug Harbor. However this project feature was authorized in 1962 as part of the multi-purpose hurricane protection and navigation improvement. That multipurpose project was never constructed and was deauthorized in 1976. For this analysis a channel depth of 8 feet was evaluated, the same as the 1962 project. The plan would also require deepening that portion of the 6-foot channel between the Jerusalem State Pier and the Snug Harbor entrance below High Point to at least 8 feet. In 1962 this improvement was estimated to require the removal of about 140,000 cy of material.

This plan of improvement was eliminated from detailed consideration because Snug Harbor does not provide berthing space and offloading facilities that are needed for commercial boats. Benefits to be gained would be almost exclusively recreational, accrued to the users and owners of the several marinas and residential docks that line Snug Harbor. As projects with primarily recreational benefits are not a priority for the federal government under the USACE's Civil Works programs, this plan was eliminated from further consideration.

3.5 Dredged Material Management Alternatives

Appropriate suitable disposal of the dredged material can impact project cost and engineering feasibility, due to the distance and location associated with the disposal, special handling of the dredged material, the method of dredging required by the disposal method, and the need for any containment or treatment of the dredged material. The material to be dredged at Point Judith is clean sand (see Environmental Assessment, Section 6.2, Sediment Characteristics). A suitability determination was prepared based on sediment test results and was concurred in by the USACE, EPA and the State of Rhode Island. Three reasonable alternatives exist for disposal of the material: ocean disposal, upland disposal, and beneficial reuse of the material:

- Ocean Placement – The only available ocean disposal site in Rhode Island is the EPA-designated Rhode Island Sound Disposal Site (RISDS). This site is approximately 10 miles southeast of Point Judith. This site is not the preferred disposal site for this dredging project because ocean disposal increases the overall project cost and has the disadvantage of removing sand from the littoral system. USACE policy is to maximize beneficial use of dredged material where appropriate and a closer location that allows for the material to remain in the littoral system through nearshore placement is the best disposal option.
- Upland Disposal – An upland dewatering site behind Escape Road has been used for material placement in past improvement and maintenance dredging efforts. The material was hydraulically pumped to the site and dewatered and then trucked offsite to be used for upland fill. This option is a constraint because this site would not accommodate the amount of material to be dredged and there are negative environmental impacts from the removal of the sandy material from the littoral system. Further, a portion of this site has been restored to salt marsh, and much of the remainder is now used for parking.
- Beneficial Use – The project provides opportunity to evaluate beach nourishment and nearshore disposal. These are considered actions that provide beneficial reuse of the dredged material and are generally considered to have positive environmental benefits and

generally have the least adverse effects from the proposed navigation improvement. Two nearby beaches, East Matunuck State Beach to the west of the Breachway and Roger Wheeler State Beach to the east of the Breachway, are potentially available to accept sandy dredged material. The beaches off of the Matunuck shore to the west of the project are also candidates to receive the dredged sand as beach nourishment but require a longer distance to pump the material (up to three miles). The addition of booster pumps add significant cost increase to the project. The closest nearshore disposal option is about two miles east of the Point Judith Breachway and offers a significant benefit to the project. The site was used in 2009 and 2010 for the placement of sandy material from maintenance dredging.

3.6 Results of Initial Screening of Alternatives

The four plans address the planning objectives in varying ways. While all four plans would improve navigation safety, reduce tidal delays and channel congestion by providing improved channel dimensions, only two of those plans, A and B, which improve access to the facilities on the Galilee side of the harbor, have significant benefits to the commercial fishing fleet. Plans C and D which improve the Jerusalem side of the Harbor and Snug Harbor have primarily recreational benefits and have little benefit to the commercial fleet. Only Plans A and B address the planning objectives.

The four plans are each complete within themselves. No additional work is required for any plan to generate its evaluated benefits relative to the without-project condition. Plans A and B are effective in that they meet the planning objectives while also yielding net economic benefit for the commercial fishing fleet. Those two plans are efficient in that increment depth optimization has identified the channel depths for each that produce the maximum net benefit. Beneficial use of the dredged sand from each plan also contributes to effectiveness and efficiency. Plans A and B are acceptable to the state Sponsor, local community, port users, and regulatory agencies as they contribute to the viability of the commercial fishing industry and maximize beneficial se of the dredged material for nourishment purposes.

Plans C and D are not effective or acceptable, as they do not address the needs of the commercial fishing fleet at Point Judith. Those two plans are also not efficient as they fail to yield sufficient commercial navigation benefits to justify further consideration.

3.6.1 System of Accounts

The Principals and Guidelines for Water and Related and Resource Implementation Studies (P&G) require all studies to consider the impact of various alternatives with respect to four accounts, National Economic Development, Environmental Quality, Regional Economic Development and Other Social Effects.

National Economic Development (NED): Plans A and B both produce net NED benefits (benefits greater than the costs of the improvements) by contributing to improvement in the efficiency of navigation. Combining those two plans maximizes net NED benefits. Plans C and D do not produce net commercial NED benefits.

Environmental Quality (EQ): All four plans involve dredging to improve navigation access and would beneficially use the dredged material for nourishment of nearshore feeder bars located off eroding beaches. Dredging results in disturbance to the harbor bottom and a temporary loss of benthic biota and other minor impacts. Placement of the dredged material will bury benthic biota in the nearshore placement site. All of these impacts will be temporary and are not considered significant. Beneficial use of the dredged material keeps sand in the littoral system and is preferred over placement in ocean disposal sites.

Regional Economic Development (RED): The benefits of port infrastructure improvements typically extend beyond the NED benefits which are measured on the vessel and at the dock in terms of operational efficiencies (crew time, fuel, repairs, etc.), costs of transporting cargo and passengers, and changes in ex-vessel value of catch landed. More economic activity on the water generally means more activity shore side for provisioning ships, servicing ships, offloading and processing, marketing, buying and transporting catch, operating and maintain shore facilities, operating the port, and other activities. These are examples of the RED benefits that could be expected to accrue to the region from harbor improvements. All of the plans considered would yield RED benefits, as all would improve the efficiency of navigation. But only Plans A and B could be expected to generate sufficient RED benefits to justify their cost with respect to commercial navigation, as only these plans address the needs of the commercially developed port areas. Plans C and D would principally benefit existing recreational facilities which would be able to service deeper draft pleasure craft with the deepened channels to High Point and into Snug Harbor.

Other Social Effects (OSE): Other Social Effects include those that extend beyond economic development and environmental quality to include impacts to the community, human health and safety, energy conservation, and cultural resources impacts. Those working in the fishing fleet, those who provision and service the boats and shore facilities, and those who process, transport and distribute their catch are members of the community to which their employment contributes. Infrastructure improvements that improve the efficiency of port operations and navigation safety will have a positive effect on the community as a whole. Improving safety of vessel and port operations, and helping to ensure timely delivery and freshness of catch contribute to human health and safety. Dredging of clean sandy material and beneficial use of that material for nourishment of nearshore feeder bars, as concurred in by EPA and the state, would not have any adverse effect on human health and safety. Improving navigational efficiency would contribute to energy conservation by saving the fishing fleet at sea time and fuel.

The results of cultural resource investigations and coordination with state and tribal cultural resource officials have concluded that dredging and dredged material disposal under Plans A and B will have no significant impact on historic or archaeological resources.

4 COMPARISON OF DETAILED PLANS

4.1 General Comparison

There are three alternatives to improve navigation within the Federal channel and consists of a Plan A, a Plan B, and a combined Plan A & B. Table 2 summaries the three alternatives and the expected results from implementation with respect to the project purpose and need. Each differs in benefits, costs, and the amount of material dredged and are discussed in this section. Figure 4 shows the locations of the proposed alternatives Plan A and Plan B.

Combining Plans A and B would provide enhancement to the non-Federal work completed in Galilee. Subsurface analysis indicates that the removal of rock or ledge is not required for any plan evaluated. The dredged material for Plan A and Plan B is clean sand suitable for beach or nearshore bar nourishment. The material would be placed at one of two previously used nearshore bar placement sites off Matunuck Beach or Moonstone Beach, both located west of the inlet, approximately 2 and 3.5 miles respectively. These sites have been used in the past for disposal of material from the maintenance dredging of the existing FNP.

Table 2
Description of Navigation Improvement Plans for Point Judith Pond, RI

	Proposed Action	Resulting Project Condition
Plan A **West Bulkhead Expansion**	Widens the upper reach of the existing 150-foot wide Federal channel by 50 feet (to 200 feet wide), opposite the West Bulkhead in Galilee.	Provides the necessary channel width for the larger commercial vessels to overcome tidal delays, and avoid groundings on the western side of the channel only.
Plan B **North Basin Extension**	Extends the existing 150-foot wide Federal channel, opposite the West Bulkhead in Galilee, into the North Basin area to reach new berthing and offloading facilities constructed by the State of Rhode Island.	The channel would be 150 feet wide and 11 feet deep, and extend about 1,200 feet into the North Basin area to allow access to berthing areas for deeper draft vessels.
Plans A & B Combined	Combines Plan A widening of the upper reach of the existing 150-foot wide Federal channel by 50 feet (to 200 feet wide), opposite the West Bulkhead in Galilee, and the Plan B extension of the existing 150-foot wide Federal channel opposite the West Bulkhead in Galilee into the North Basin area to reach new berthing and offloading facilities.	Provides for adequate navigational access to the improved on-shore facilities that support the regional fishing industry.

Preliminary screening of the several alternatives and depth options was carried out to determine the optimal depth for each and the combination of alternatives that would yield the greatest net economic benefits. This analysis is summarized here and described in greater detail in Appendix C – Economic Assessment. Cost estimates for each depth increment of each alternative and each combination of alternatives were prepared in October 2017. Annual costs of each increment and combination were compared to the annual benefits estimated for each based on FY18 (1st Quarter) price levels and interest rates. This preliminary screening optimization is shown below in Table 3 and in Appendix C.

In total for the three alternatives, 29 different variations of channel depths and combinations were compared to determine which variation would optimize net economic benefits and be the Feasibility level Selected Plan, pending review of potential environmental effects and public review. The numerous variations included widening the West Bulkhead in 1-foot increments from 12 feet to 15 feet deep, extending the North Basin in 1-foot increments from 8 feet to 12 feet and all possible combinations of these increments. At this level of analysis of the variations, several assumptions were made to evaluate the projected costs. These assumed:

- Mobilization and Demobilization were estimated based on a distance of 400 miles.
- Abbreviated Risk Analysis utilized in the project development stage resulted in contingencies of 32% for construction, 14% for PED, and 18% for S&A.
- Initial Planning, Engineering, and Design (PED) and Supervision and Administration (S&A) amounts were 10% and 4%, respectively, of the contract cost.

Once a Selected Plan was identified, cost engineering further refined the analysis to better estimate project costs. The refined analysis assumed:

- Mob/demob distance of 200 miles resulting in a $351,000 cost, adjusted based on review of similar sized dredge projects in New England over the last several years.
- Abbreviated Risk Analysis was revised to utilize the "Feasibility (Recommended Plan)" project development stage which resulted in contingencies of 27% for construction, 18% for PED, and 9% for S&A.
- PED and S&A amounts were refined to be 14% and 6%, respectively.

Based on preliminary screening, the west bulkhead channel widening at a depth of -15 feet MLLW and the north basin channel extension at a depth of -11 feet MLLW were chosen for detailed development. A description of the plan elements including the combined plan is provided below in Table 4.

Table 3 – Preliminary Screening and Optimization of Alternatives		
Alternative and Depth Increment	Net Annual Benefits	Benefit-Cost Ratio
West Bulkhead Widening – 12 feet	$32,427	1.61
West Bulkhead Widening - 13 feet	$41,989	1.77
West Bulkhead Widening - 14 feet	$48,540	1.86
West Bulkhead Widening - 15 feet	$48,729	1.83
North Basin Extension - 8 feet	$176,649	4.01
North Basin Extension - 9 feet	$266,606	5.19
North Basin Extension - 10 feet	$297,091	5.22
North Basin Extension - 11 feet	$309,652	4.95
North Basin Extension - 12 feet	$300,401	4.43
West Channel 12 Feet – North Channel 8 Feet	$253,530	4.76
West Channel 12 Feet – North Channel 9 Feet	$343,387	5.74
West Channel 12 Feet – North Channel 10 Feet	$373,971	5.73
West Channel 12 Feet – North Channel 11 Feet	$386,533	5.44
West Channel 12 Feet – North Channel 12 Feet	$377,282	4.92
West Channel 13 Feet – North Channel 8 Feet	$263,091	4.84
West Channel 13 Feet – North Channel 9 Feet	$352,949	5.80
West Channel 13 Feet – North Channel 10 Feet	$383,533	5.78
West Channel 13 Feet – North Channel 11 Feet	$396,095	5.49
West Channel 13 Feet – North Channel 12 Feet	$386,844	4.97
West Channel 14 Feet – North Channel 8 Feet	$269,642	4.80
West Channel 14 Feet – North Channel 9 Feet	$359,599	5.74
West Channel 14 Feet – North Channel 10 Feet	$390,083	5.72
West Channel 14 Feet – North Channel 11 Feet	$402,645	5.45
West Channel 14 Feet – North Channel 12 Feet	$393,394	4.94
West Channel 15 Feet – North Channel 8 Feet	$269,831	4.69
West Channel 15 Feet – North Channel 9 Feet	$359,689	5.60
West Channel 15 Feet – North Channel 10 Feet	$390,273	5.60
West Channel 15 Feet – North Channel 11 Feet	$402,835	5.34
West Channel 15 Feet – North Channel 12 Feet	$393,684	4.86

Table 4 Point Judith Pond, Summary of Detailed Plans			
Federal Plan Description	Plan A West Bulkhead Widening Alone	Plan B North Basin Extension Alone	Plans A & B Combined
Channel Depth (Feet MLLW)	15	11	15 & 11
Channel Length (Feet)	700	1,200	700 & 1200
Channel Width (Feet)	50	150	50 & 150
Dredge Quantity (Cubic Yards)	7,100	16,600	23,700
Construction Duration (Weeks)	3	3	4

This final array of plans was carried forward for detailed development and evaluation. Cost estimates were updated and refined in March 2018, but still using at first quarter FY18 price levels and interest rates. The economic benefits of these plans and increments were again compared to the cost estimates to determine net outputs. This process is described in the following sections.

4.2 Project Costs

The costs and annual charges are directly related to the volume of material to be removed, increasing as the dredging depth increases. Construction costs are from the May 2018 cost estimate reviewed and certified by the USACE Cost Engineering Center of Expertise. Table 5 compares the construction and annual costs associated with each of the plans. The combined plan cost for Plan A and B together is less than the sum of the individual plans. The combined plan is able to spread the mobilization/ demobilization costs over the total of both dredging plans, which results in reduced total contingencies, and additional efficiencies in Planning, Engineering and Design (PED) and Construction Management (CM) costs over the sum of the separate plans. Each of the plans evaluated is small in scope to the point that PED costs are the same for all plans, as whether alone or combined all work would fit on a single drawing, have a single dredging line item, and result in no difference in the cost of design investigation or bid document preparation. Similarly the minor nature of the improvements and the short construction duration result in CM costs that are the same for the three plans. The cost of CM activities from award through mobilization to arrival at the project site, and post-construction will likely be greater than actual inspection costs during dredging. The resulting total first cost of design and implementation is the amount cost-shared with the non-Federal Sponsor. No new aids to navigation would be required. Appendix E, Cost Engineering, provides a more detailed cost breakdown.

Annual costs include interest and amortization of the implementation cost plus the annualized cost of future project operation and maintenance. Interest and amortization (I&A) is based on the interest rate for the current Federal fiscal year, 2-3/4 percent amortized over 50 years in the case of navigation projects, or a factor 0.03704. To compute I&A the cost of interest during construction must first be added to the project first cost. Construction of the project,

given its limited scope and straightforward method is estimated to take about one month, increased to three to four months to cover mobilization and demobilization.

The frequency of USACE navigation channel maintenance in the lower pond is not expected to increase with the construction of any of the proposed alternatives. Sedimentation has not been a major issue because of a strong flushing action in the lower pond. There have been only two maintenance dredging actions in the 40 years after the last USACE navigation improvement effort in 1977. These actions occurred in 2006-2007 and 2009-2010. A total of 67,516 CY of material were removed during these two actions. That represents an annual shoaling average of 2,046 CY over the 33 year period between 1977 and 2010. This equals 2.84% of the 1977 improvement volume of 72,000 CY.

Table 5
Point Judith Pond – Costs of Detailed Plans

Costs Updated May 2018 Cost MDX Certified	Plan A West Bulkhead Widening Alone	Plan B North Basin Extension Alone	Plans A & B Combined
Mobilization/Demobilization	$368,000	$368,000	$368,000
Dredging and Disposal	$190,000	$465,000	$655,000
Contingencies (25% to 27%)	$139,000	$221,000	$277,000
Subtotal	$697,000	$1,054,000	$1,300,000
Planning, Engineering and Design	$217,000	$217,000	$217,000
Construction Management	$113,000	$113,000	$113,000
Total First Costs	$1,027,000	$1,384,000	$1,630,000
Construction Timeline (months)	3	3	4
Interest During Construction (IDC)	$2,000	$3,000	$4,000
Total Implementation Cost	$1,029,000	$1,387,000	$1,634,000
ANNUAL COSTS			
Interest & Amortization (0.03704)	$38,100	$51,400	$60,500
Increased Maintenance Dredging	$13,500	$19,500	$24,000
Total Annual Charges	$51,600	$70,900	$84,500

Plan A - Widen the 15-foot West Bulkhead Channel by 50 feet to a total 200 feet for about 700 feet.
Plan B - Extend the West Bulkhead Channel into North Basin at 150 feet wide by 11 feet deep for about 1,200 feet.
IDC - Calculation of interest on the cost of construction over the construction period.
Increase in annual cost of additional O&M dredging outside the existing Federal Navigation Project.

The combined (A+B) plan of improvement would require removal of about 23,700 cubic yards. A shoaling rate equal to three percent of that amount annually would result in accumulation of about 710 cubic yards each year, or about 17,800 cubic yards every 25 years.

4.3 Project Benefits

This section summarizes the benefits of (1) widening the West Bulkhead, (2) extending the channel into the North Basin, and (3) and combining the two plans and the various combinations of those two strategies. Table 6 summarizes the breakdown of annual project benefits for the three alternative plans providing varying degrees of commercial benefits to commercial boating interests. Commercial benefits were derived from reductions in congestion and tidal delays, including vessel damage cost, lost labor cost, increased fuel consumption cost and increased ordinary maintenance cost to the fishing fleet. Appendix C contains a discussion in greater detail and includes the annual benefits of Plan A by one foot channel depths of 12 to 15 feet and Plan B by one foot channel depths between 8 to 12 feet (see Table C-17 for alternatives screening which uses costs at FY18 price levels).

Table 6
Point Judith Pond
Annual Benefits of Detailed Plans

COMMERCIAL BENEFITS	Plan A West Bulkhead Widening Alone	Plan B North Basin Extension Alone	Plans A & B Combined
Delays - Fishing Vessels	$58,700	$276,400	$335,100
Delays – Charter Vessels	$9,000	$91,800	$100,800
Grounding and Haul-out Cost Savings	$40,000	$19,800	$59,800
Total All Benefits	$107,700	$388,000	$495,700

Plan A - Widen the 15-foot West Bulkhead Channel by 50 feet to a total 200 feet for about 700 feet.
Plan B - Extend the West Bulkhead Channel into North Basin at 150 feet wide by 11 feet deep for about 1,200 feet.

4.4 Comparison Summary

Table 7 provides a summary of annual project benefits compared to annual project costs for the alternative plans where Plan A widens the existing -15-foot MLLW West Bulkhead channel by 50 feet to a total 200 feet for about 700 feet and Plan B extends the existing West Bulkhead channel into North Basin at 150 feet wide by -11 feet MLLW for about 1,200 feet. Appendix C outlines the analysis in greater detail. Each project segment is separately justified based on a benefit-cost ratio greater than 1:1 and the combination of the two plans maximizes net annual benefits.

Plans A and B, and the combination of the two, have been developed consistent the USACE Environmental Operating Principals and in a manner which meets to goals of the USACE Campaign Plan with respect to water resources infrastructure and the civil works program. The plans have been formulated to meet the planning objectives for this project by improving the safety and efficiency of commercial fishing fleet operations at Point Judith Harbor. All

dredged material would be used beneficially for nearshore feeder bar nourishment off area beaches promoting efficient use of public resources. Plans A and B also meet the plan formulation criteria of completeness, effectiveness, efficiency, and acceptability and are compatible with existing laws, regulations, and policies.

Table 7 Point Judith Pond Projected Economic Impacts			
COMMERCIAL BENEFITS	**Plan A**	**Plan B**	**Plans A & B Combined**
	West Bulkhead Widening Alone	**North Basin Extension Alone**	
Annual Benefits	$107,700	$388,000	$495,700
Annual Costs (May 2018)	$51,600	$70,900	$84,500
Net Benefits	$55,400	$317,100	$411,200
Benefits to Costs Ratio	2.07	5.47	5.87

Plans A and B and their combination all produce net NED commercial navigation benefits, will have no significant impact on environmental quality, promote regional economic development through improved port operations, and have an overall positive impact from the perspective of other social effects.

5 ASSESSMENT AND EVALUATION OF DETAILED PLANS

This section summarizes the analyses for the alternatives selected for detailed study based on their impacts on the environment, existing navigation, and social and cultural resources of the study area. The economic costs and benefits of project implementation have also been analyzed.

5.1 Environmental Impacts

The proposed Federal action has been reviewed under the authorities of the National Environmental Policy Act and all applicable Federal environmental laws, regulations, Executive Orders and Executive Memorandums. The NEPA analysis (see Environmental Assessment) outlines the expected impacts to habitats and environmental resources from dredging and at the disposal sites. This section summarizes the expected environmental effects from dredging and disposal of dredged material.

Dredged Material Suitability

The materials to be dredged have been sampled and tested for physical and chemical parameters and subjected to tier III biological testing. All materials have been found to be clean sandy and suitable for placement as nearshore feeder bar nourishment. This would avoid the higher costs associated with hauling the material to the Rhode Island Sound ocean

disposal site further south of the project and would keep the sand in the littoral system. There are no questions of hazardous, toxic, or radioactive waste (HTRW) associated with the project. A Suitability Determination was prepared covering the sampling and testing process and results and determining that the material was suitable for the intended beneficial use (see Appendix J). The EPA and state have concurred in this determination.

Summary of Expected Environmental Effects of Dredging

Dredging would result in the removal of sub-tidal benthic habitat and temporary increases in turbidity. The loss of non-motile benthic organisms from the project area during dredging is unavoidable, however, the area would likely be recolonized by similar species within a matter of months. Motile species such as lobsters, crabs and finfish should be able to avoid the area during dredging operations and are expected to return after the dredging is finished. Dredging will be scheduled between October 1 and January 31, to avoid impacting marine resources (winter flounder). No significant impacts to Submerged Aquatic Vegetation is anticipated as a result of the proposed project. Lobster resources inhabiting the channel jetties and rocky nearshore habitats of Point Judith Pond and shellfish in the pond should not be significantly impacted by the project. No significant shellfish beds are located in the area proposed to be dredged. Temporary short-term impacts to fish resources in the project area are anticipated but not considered significant.

Sediments in the North Basin are finer than those in the West Bulkhead channel area and have a greater turbidity generating potential. The small size of the project and use of the hydraulic dredge however, minimizes the potential for turbidity impacts. Deepening and widening the North Basin has the potential to increase tidal flushing in the area of Bluff Hill Cove. The West Bulkhead plans should not affect the current hydrodynamics of these areas. The NEPA review of the proposed project provides additional information on the projected impacts of construction at the dredge sites.

Summary of Expected Disposal Impacts

The closest nearshore disposal option is located off of the Matunuck shoreline and is about two miles east of the Point Judith Breachway. The site, located to the west of East Matunuck State Beach, was used in 2009 for the placement of sandy material from maintenance dredging. The site was selected over other nearshore locations because the beach areas directly inshore from the site experience substantial erosion and because the littoral drift of sand is from west to east. Placement in the feeder bars offshore of this beach should provide some nourishment value to the beach as the spring and summer seas carry material back onshore.

No eelgrass is located in or adjacent to the nearshore site. Placing sandy material at the proposed nearshore disposal site should not have significant long-term effects on the benthic communities at the site. No significant shellfish or lobster resources are located in the nearshore site. Direct impacts to fish resources at the nearshore placement site are expected to be minimal. Any fish in the vicinity of the placement site would be either expected to avoid the areas of disturbance, be smothered by the material, or be exposed to elevated turbidity for brief periods. Elevated suspended sediment levels should be short-term and

localized to the placement site area since the material to be placed at the site is sand. Benthic organisms buried at the nearshore disposal site will temporarily eliminate a forage area for fish. Recolonization by benthic species from adjacent areas and new recruitment is expected to occur in a relatively short period of time. The proposed dredging and nearshore placement of the sediment for sacrificial beach nourishment will occur during the period of October 1 through January 31. This window minimizes the presence of aquatic resources in the project area and takes advantage of the lower levels of natural, environmental stresses placed on species that may be resident in the work areas. USACE made the preliminary determination that the proposed project is not likely to adversely impact any state or Federally-listed threatened or endangered species. Several listed marine mammals may occur as transient species in the general area, but are unlikely to occur within the shallow depths of the dredging or placement areas.

Summary of the NEPA Evaluation - Finding of No Significant Impact (FONSI)

A NEPA evaluation (EA and draft FONSI) was prepared for the proposed action. Based on the findings the District Engineer has determined that the environmental effects, as presented in the Environmental Assessment, for the improvement dredging of Point Judith Harbor is not a major Federal action significantly affecting the quality of the human environment. The FONSI will be finalized when signed by the District Engineer at the conclusion of the 30-day public review period, and after consideration of all comments received.

5.2 Economic Impacts

The expected economic impacts from construction and operation of the alternatives were evaluated by determining costs and benefits. The cost estimates and annual costs, listed in Table 5 and described fully in Appendix E are based on several factors including the quantity and type of dredged material, mobilization and demobilization costs, equipment costs, project design (engineering and supervision) and administrative costs and contingencies. Charges for interest during construction (IDC) are based on varying construction durations and are computed for the purpose of comparing benefits to costs. IDC charges are not included in the cost apportionment.

Costs and benefits are based on a 50 year evaluation period, starting in 2018, and presented in annual terms using the FY18 Federal interest rate for water resources projects of 2-3/4 percent. The benefits of the proposed plans of improvement have been based on the following assumptions (see Appendix C for descriptions):

- Elimination of tidal delays would result in decreased labor and fuel costs for harvest of the existing catch.
- Increasing the channel depth and length would reduce grounding damage and provide maneuverability and access to existing as well as new facilities built by the state and local interests.

For the widening of the 15-foot west bulkhead channel reach, net annual benefits between the incremental depths increased only several hundred dollars foot by foot, declining as depths increased. This is due to the numbers of ships in each class decreasing as ship size increases.

A closer examination required sensitivity analysis which examined increasing or decreasing the anticipated benefits be 5 and 10 percent, and by examining increasing the percentage of the fleet that would benefit from the channel improvements. In all cases the 15-foot channel depth for the widened segment consistently produced the greatest net annual benefits. Further, from a practical and navigation safety view, widening a 15-foot channel at a depth shallower than 15 feet would not be optimal. To avoid groundings of longer ships the split depth would need to be marked by buoys at an additional initial and annual cost.

The benefits to the existing commercial fleet would occur immediately following the implementation of these improvements. The navigation improvements will not affect harvest rates or prices for the commercial fish market. There will be benefits resulting from a reduction in harvesting costs for the existing level of catch.

6 SELECTION OF A PLAN

6.1 The Selected Plan

The Selected Plan for navigation improvements, shown in Figure 6, consists of combining Plan A and Plan B by dredging each improvement channel to the depths that provide the best benefits to costs ratio (BCR). The plan also complements the State of Rhode Island's improvement work at the Port of Galilee. The Selected Plan is based on consideration of economic efficiency, minimization of environmental impacts, navigational safety and the needs of state government and local stakeholders. The combination of Plans A & B result in the greatest net benefits, and is the preferred National Economic Development (NED) plan. This plan provides the most favorable improvement method for meeting the project objective of reducing navigation hazards and delays.

This plan would widen the -15-foot MLLW West Bulkhead channel to the west by 50 feet (to a total width of 200 feet) over a distance of approximately 700 feet, and then extend this same channel to the northeast approximately 1,200 feet into the North Basin area at a width of 150 feet and a depth of -11 feet MLLW. The project would involve the dredging of about 23,700 cubic yards of material, of which 7,100 cubic yards would be from widening the West Bulkhead channel and an estimated 16,600 cubic yards from the expansion of the channel into the North Basin area. The dredging would be by mechanical dredge and scow that will be able to operate in shallow draft areas in the channel.

The dredged material from this navigation improvement project would be beneficially placed at one of two previously used near-shore bar nourishment areas, both located west of the Point Judith inlet. Sites offshore of either Matunuck Beach, 2 miles west, or Moonstone Beach 3.5 miles west would be used. Material would be placed at a depth of 15 to 18 feet MLLW. The dredging would be by mechanical dredge and scows able to operate in shallow draft areas in the channel and nearshore placement sites. USACE work estimates are based on a 10 cubic yard bucket dredge or excavator, two or more scows of about 500 CY, and a tug to tow the scows to the nearshore bar nourishment sites. Small survey and workboats would also be used. All construction equipment would be waterborne plant. No onshore staging would be

required. The contractor would be responsible for securing shore side access for personnel and fuel according to their specific needs.

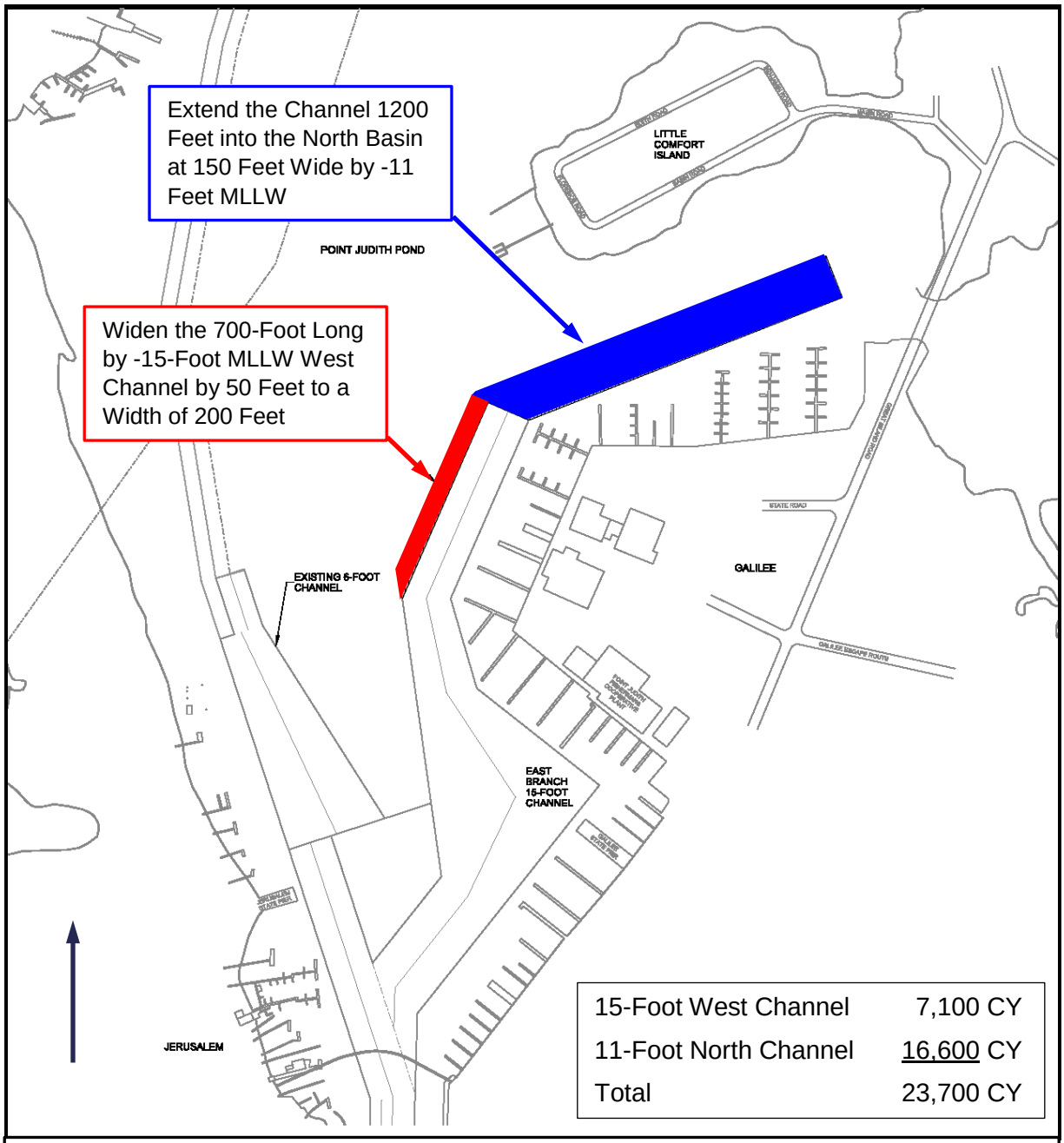


Figure 6
Point Judith Harbor, Rhode Island
Recommended Plan of Improvement

All work at the dredging and disposal sites would be subtidal within the waters of the United States. The Environmental Assessment that accompanies this report addresses in detail the expected impacts to the environmental resources in the project area that would be affected by

dredging and disposal. Section 5.1 in this report summarizes the expected environmental effects of the proposed action.

The total annual benefits in fuel and time cost savings for each project alternative are weighed against the costs of each alternative to determine the benefit-cost ratio. The benefit-cost ratio of each alternative is determined by dividing its total annual benefits by its total annual costs. A project is considered economically justified if it has a benefit to cost ratio of 1.0 or greater. The alternative that maximizes net annual benefits, and with the greatest BCR is the alternative chosen for the National Economic Development (NED) plan. Over a 50-year analysis period, the Selected Plan is the NED plan based on the highest net annual benefits of $411,200 and a benefit to cost ratio of 5.87:1 (at updated FY2018 price levels which take recent fuel prices and bidding climate into account).

6.2 Implementation Responsibilities

Cost Apportionment

For harbor improvements with a design depth of 20 feet or less, local interests are required to provide cost-sharing of ten percent of the cost of design and construction up-front upon execution of a Project Partnership Agreement (PPA). The remaining 90 percent up-front share of the first cost of design and construction is the Federal contribution. A further additional non-Federal contribution of ten percent of the cost of design and construction is payable at the conclusion of construction and can be paid over a period of up to a 30-years. These cost sharing requirements are as specified in the Water Resources Development Act of 1986 (Public Law 99-662), as amended. Table 8 below provides the cost-sharing responsibilities for design and implementation of the Recommended Plan.

Table 8
Cost Apportionment for the Recommended Plan

	Total Cost	Federal Share	Non-Federal Share
First Cost of Design and Construction	$1,630,000	$1,467,000	$163,000
Post-Construction Additional Contribution		- - - - -	$163,000
Total Cost Allocation	$1,630,000	$1,467,000	$326,000

Federal Responsibilities

The Federal government will be responsible for preparation of plans and specifications and contract advertisement, award and supervision and inspection of the work. The Federal government will be responsible for project compliance with Federal environmental laws and regulations, including the National Environmental Compliance Act (NEPA), consistency with the Coastal Zone Management Act (CZM), and the Clean Water Act (CWA). Federal responsibility includes only the dredging and maintenance of the designated Federal channels,

and does not include any berthing facilities, shoreline protection, or site work at upland disposal areas.

Non-Federal Responsibilities

The following is a list of some of the items of local cooperation required for projects authorized under Section 107. The non-Federal sponsor must provide assurance that they intend to meet these items prior to project authorization. The Project Partnership Agreement details these and other requirements of the Government and the Sponsor for implementation and future maintenance of the project.

- Assume full responsibility for all non-Federal costs associated with the project. Current law requires that the non-Federal sponsor provide at least 10 percent of the first cost of design and construction of General Navigation Facilities not exceeding 20 feet in depth up-front, and provide an additional 10 percent after completion of initial construction of the project.
- Provide, maintain and operate without cost to the United States, an adequate public landing open and available to use for all on an equal basis. The state pier and other state and municipal facilities around the harbor are adequate to satisfy this responsibility for both the existing FNP and for the recommended improvement.
- Provide without cost to the United States, all necessary lands, easements, rights of way, relocations, and dredged material disposal and borrow areas (LERRD) necessary for project construction and subsequent maintenance of the project. This project will be constructed using waterborne dredging plant and disposal of the dredged materials will be in nearshore waters. All work areas are subject to the government's navigation servitude. Therefore no LERRDs are required from the Sponsor.
- Hold and save the United States free from damages that may result from construction and maintenance of the project.

6.3 Risk Informed Decision-Making

The Sponsor and the public must be informed of the risks associated with the formulation, evaluation and recommendation of a plan of improvement for Point Judith Harbor. While the comprehensive history of past Civil Works studies, improvements and maintenance in this harbor allow reasoned evaluation of proposed improvements, there will always be some level of risk, mainly dealing with project costs. The contingency risk analysis performed as part of the cost estimate sought to capture these risks and their potential impacts on cost and implementability. The following are some of the risks captured in the contingency analysis.

- With construction limited to late fall to mid-winter for environmental resource impact reasons, severe weather can play a role in construction delays when tug towing scows cannot transit the coast to the nearshore placement site.
- While sediment sampling and subsurface investigations have shown all material encountered to be clean sand material, the work is in an area influenced by glaciation and characterized by ground moraine and outwash plain deposits. It is possible that

other materials such as gravel and small boulders will be encountered. These material can be removed by the mechanical bucket dredge plant that would be used to dredge the project features and can be placed in the nearshore site, but may slow production somewhat if encountered.

- Point Judith is a large active commercial fishing port and debris, such as discarded cables, containers, broken traps and other gear are sometimes encountered in dredging operations. This material can also be readily removed by a bucket dredge and dredging specifications contain provisions specify upland disposal of such materials. The risk that when encountered in significant quantity such debris can slow production.
- The economic benefit of this project has been measured in improved efficiency of vessel operations – fuel and labor savings, reductions in vessel damages, etc. Point Judith is an active stable port which has long held its place as a regional leader in ships, catch volume and catch value. Any risk that the projected benefits will not be achieved is low.
- Availability of competent responsive bidders can be an issue when funding for such small projects regionally results in more work being advertised than the dredging industry can accommodate. In past years some projects have failed to attract any responsive bidders. Given the low level of funding in the past several years for small harbor projects a lack of responsive bidders is not expected to be an issue.
- Knowledge of potential environmental resource impacts from marine construction projects and the concern given species can change over time. If significant time passes between completion of the feasibility phase and project construction, then it is possible that changing resource concerns could change the work window for the project or make mitigation of impacts necessary. New species could be listed as threatened or endangered, or additional habitat could be noted as critical for fisheries resources or climate change could result in a change in species in the project area. At this time coordination with Federal and State resource agencies has not shown any concerns of this nature.
- On rare occasions previously unknown cultural resources can be encountered during construction. In such cases coordination with state and tribal historic preservation officials is re-initiated. Documentation of any finds is a minimal requirement. Depending on the nature of the resource encountered work may be delayed at least in part while coordination is pursued. Research and site investigations made during this study indicate that the potential for such resources in the project area is low.
- Federal funding for small harbor maintenance has been difficult to budget in recent years. Though under current law maintenance of the Federal Navigation Projects is eligible for 100% Federal funding, the budget situation has delayed maintenance of these project. In recent years the State of Connecticut and municipalities in Massachusetts have contributed funds for the maintenance of small harbors. While we cannot predict the situation with respect to future Federal budgets, the Sponsor should be aware that delays in Federal funding may delay necessary maintenance dredging.

6.4 Conclusion

USACE has evaluated the data for the proposed Federal plan for improving navigation at Point Judith Pond. USACE will review, evaluate, and consider the comments and views of interested agencies, stakeholders, and the concerned public regarding the alternative plans. The potential consequences of each alternative will be evaluated on the basis of engineering feasibility, environmental impact and economic efficiency.

We find substantial benefits are to be derived by providing the commercial fishermen with reliable and improved access to the facilities and berthing areas in Point Judith Pond. The proposed Federal action was considered individually and cumulatively under the provisions of the National Environmental Policy Act and the action was determined not to have significant effects on the quality of the human environment. The proposed action also incorporates the provisions for protection and ensures compliance with other Federal environmental laws, regulations, Executive Orders and Executive Memorandum such as, for example, the Endangered Species Act, the Fish and Wildlife Coordination Act, the National Historic Preservation Act, the Clean Water Act, etc. The USACE has concluded the proposed navigation improvements would cause a temporary disruption of the environmental resources present in the construction work area and immediately adjacent during dredging operations and no significant long term effects are anticipated. Due to the significant benefits attributable to the commercial fishing industry, any effects are considered to be offset by the improvement and the resulting overall economic growth of the region.

The Recommended Plan, a combination of Plans A & B, would result in the greatest economic net benefits and is therefore the NED Plan. The Recommended Plan widens the existing -15-foot MLLW West Bulkhead Channel by 50 feet (to a total width of 200 feet) over a length of about 700 feet, and extends this same channel northeasterly about 1,200 feet into the North Basin area at a width of 150 feet and a depth of -11 feet MLLW. It is proposed to beneficially place the dredged sand in the nearshore feeder bars off of Matunuck State Beach about two miles west of the Point Judith Breachway.

7 RECOMMENDATION

The USACE recommends that the existing Federal navigation project at Point Judith Harbor of Refuge and Point Judith Pond, Narragansett, Rhode Island, be modified under the authority of Section 107 of the River and Harbor Act of 1960, as amended, in accordance with the Recommended Plan identified in this Detailed Project Report, with such further modifications thereto as in the discretion of the Chief of Engineers may be advisable.

The recommendations contained in this report reflect the information available at this time and current USACE Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are authorized for implementation funding.