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Biological Services Program

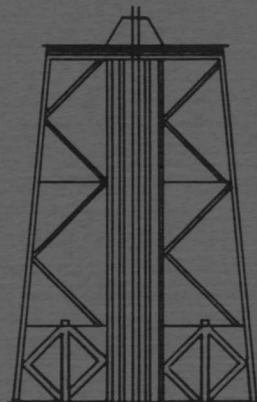
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March 1978

Environmental Planning
for Offshore Oil and Gas

Volume V:

Regional Status Reports

Part 1: New England



78-29

Fish and Wildlife Service

U.S. Department of the Interior

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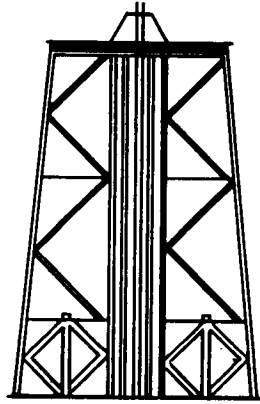
The Biological Services Program was established within the U.S. Fish and Wildlife Service to supply scientific information and methodologies on key environmental issues that impact fish and wildlife resources and their supporting ecosystems. The mission of the program is as follows:

- To strengthen the Fish and Wildlife Service in its role as a primary source of information on national fish and wildlife resources, particularly in respect to environmental impact assessment.
- To gather, analyze, and present information that will aid decisionmakers in the identification and resolution of problems associated with major changes in land and water use.
- To provide better ecological information and evaluation for Department of the Interior development programs, such as those relating to energy development.

Information developed by the Biological Services Program is intended for use in the planning and decisionmaking process to prevent or minimize the impact of development on fish and wildlife. Research activities and technical assistance services are based on an analysis of the issues a determination of the decisionmakers involved and their information needs, and an evaluation of the state of the art to identify information gaps and to determine priorities. This is a strategy that will ensure that the products produced and disseminated are timely and useful.

Projects have been initiated in the following areas: coal extraction and conversion; power plants; geothermal, mineral and oil shale development; water resource analysis, including stream alterations and western water allocation; coastal ecosystems and Outer Continental Shelf development; and systems inventory, including National Wetland Inventory, habitat classification and analysis, and information transfer.

The Biological Services Program consists of the Office of Biological Services in Washington, D.C., which is responsible for overall planning and management; National Teams, which provide the Program's central scientific and technical expertise and arrange for contracting biological services studies with states, universities, consulting firms, and others; Regional Staff, who provide a link to problems at the operating level; and staff at certain Fish and Wildlife Service research facilities, who conduct inhouse research studies.



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March 1978

Environmental Planning for Offshore Oil and Gas

Volume V: Regional Status Reports

Part 1: New England

by

Virginia Tippie, Ph.D.

and

Don Robadue, Graduate Research Assistant

Marine Resources Information Center
Naragansett Bay Campus
University of Rhode Island

Prepared for
The Conservation Foundation
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036

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Larry Shanks, Project Officer
National Coastal Ecosystems Team
National Space Technology Laboratories
NSTL Station, Mississippi 39529

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Environmental Planning for Offshore Oil and Gas

Volume I: Recovery Technology

Volume II: Effects on Coastal Communities

Volume III: Effects on Living Resources
and Habitats

Volume IV: Regulatory Framework for
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Part 1: New England

Part 2: Mid and South Atlantic

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ENVIRONMENTAL PLANNING FOR OFFSHORE OIL AND GAS

FOREWORD

This report is one in a series prepared by The Conservation Foundation for the Office of Biological Services of the U.S. Fish and Wildlife Service (Contract 14-16-0008-962). The series conveys technical information and develops an impact assessment system relating to the recovery of oil and gas resources beyond the three-mile territorial limit of the Outer Continental Shelf (OCS). The series is designed to aid Fish and Wildlife Service personnel in the conduct of environmental reviews and decisions concerning OCS oil and gas development. In addition, the reports are intended to be as helpful as possible to the public, the oil and gas industry, and to all government agencies involved with resource management and environmental protection.

Oil and gas have been recovered for several decades from the Outer Continental Shelf of Texas, Louisiana and California. In the future, the Department of the Interior plans to lease more tracts, not only off these coasts, but also off the frontier regions of the North, Mid- and South Atlantic, eastern Gulf of Mexico, Pacific Northwest and Alaska. Within the set of constraints imposed by the international petroleum market (including supply, demand and price), critical decisions are made jointly by industry and government on whether it is advisable or not to move ahead with leasing and development of each of the offshore frontier areas. Once the decision to develop a field is made, many other decisions are necessary, such as where to locate offshore platforms, where to locate the onshore support areas, and how to transport hydrocarbons to market.

Existing facilities and the size of the resource will dictate which facilities will be needed, what the siting requirements will be, and where facilities will be sited. If the potential for marketable resources is moderate, offshore activities may be staged from areas already having harbor facilities and support industries; therefore, they may have little impact on the coast adjacent to a frontier area. An understanding of these options from industry's perspective will enable Fish and Wildlife Service personnel to anticipate development activities in various OCS areas and to communicate successfully with industry to assure that fish and wildlife resources will be protected.

The major purpose of this report is to describe the technological characteristics and planning strategy of oil and gas development on the Outer Continental Shelf, and to assess the effects of OCS oil and gas operations on living resources and their habitats. This approach should help bridge the gap between a simple reactive mode and effective advanced planning--planning that will result in a better understanding of the wide range of OCS activities that directly and indirectly generate impacts on the environment, and the counter-measures necessary to protect and enhance living resources.

Development of offshore oil and gas resources is a complex industrial process that requires extensive advance planning and coordination of all phases from exploration to processing and shipment. Each of hundreds of system components linking development and production activities has the potential for adverse environmental effects on coastal water resources. Among the advance judgements that OCS planning requires are the probable environmental impacts of various courses of action.

The relevant review functions that the Fish and Wildlife Service is concerned with are: (1) planning for baseline studies and the leasing of oil and gas tracts offshore and (2) reviewing of permit applications and evaluation of environmental impact statements (EIS) that relate to facility development, whether offshore (OCS), near shore (within territorial limits), or onshore (above the mean high tidemark). Because the Service is involved with such a broad array of activities, there is a great deal of private and public interest in its review functions. Therefore, it is most valuable in advance to have some of the principles, criteria and standards that provide the basis for review and decisionmaking. The public, the offshore petroleum industry, and the appropriate Federal, state, and local government agencies are thus able to help solve problems associated with protection of public fish and wildlife resources. With advanced standards, all interests should be able to gauge the environmental impacts of each OCS activity.

A number of working assumptions were used to guide various aspects of the analysis and the preparation of the report series. The assumptions relating to supply, recovery, and impacts of offshore oil and gas were:

1. The Federal Government's initiative in accelerated leasing of OCS tracts will continue, though the pace may change.
2. OCS oil and gas extractions will continue under private enterprise with Federal support and with Federal regulation.

3. No major technological breakthroughs will occur in the near future which could be expected to significantly change the environmental impact potential of OCS development.
4. In established onshore refinery and transportation areas, the significant impacts on fish and wildlife and their habitats will come from the release of hydrocarbons during tanker transfers.
5. A significant potential for both direct and indirect impacts of OCS development on fish and wildlife in frontier areas is expected from site alterations resulting from development of onshore facilities.
6. The potential for onshore impacts on fish and wildlife generally will increase, at least initially, somewhat in proportion to the level of onshore OCS development activity.

The assumptions related to assessment of impacts were:

1. There is sufficient knowledge of the effects of OCS development activities to anticipate direct and indirect impacts on fish and wildlife from known oil and gas recovery systems.
2. This knowledge can be used to formulate advance criteria for conservation of fish and wildlife in relation to specific OCS development activities.
3. Criteria for the protection of environments affected by OCS-related facilities may be broadly applied to equivalent non-OCS-related facilities in the coastal zone.

The products of this project--reported in the series Environmental Planning for Offshore Oil and Gas--consist of five technical report volumes. The five volumes of the technical report series are briefly described below:

- | | |
|----------|---|
| Volume I | Reviews the status of oil and gas resources of the Outer Continental Shelf and programs for their development; describes the recovery process step-by-step in relation to existing environmental regulations and conservation requirements; and provides a detailed analysis for each of fifteen OCS activity and facility development projects ranging from exploration to petroleum processing. |
|----------|---|

- Volume II Discusses growth of coastal communities and effects on living resources induced by OCS and related onshore oil and gas development; reports methods for forecasting characteristics of community development; describes employment characteristics for specific activities and onshore facilities; and reviews environmental impacts of probable types of development.
- Volume III Describes the potential effects of OCS development on living resources and habitats; presents an integrated system for assessment of a broad range of impacts related to location, design, construction, and operation of OCS-related facilities; provides a comprehensive review of sources of ecological disturbance for OCS related primary and secondary development.
- Volume IV Analyzes the regulatory framework related to OCS impacts; enumerates the various laws governing development offshore; and describes the regulatory framework controlling inshore and onshore buildup in support of OCS development.
- Volume V In five parts, reports current and anticipated OCS development in each of five coastal regions of the United States: New England; Mid and South Atlantic; Gulf Coast; California; and Alaska, Washington and Oregon.

John Clark was The Conservation Foundation's project director for the OCS project. He was assisted by Dr. Jeffrey Zinn, Charles Terrell and John Banta. We are grateful to the U.S. Fish and Wildlife Service for its financial support, guidance and assistance in every stage of the project.

William K. Reilly
President
The Conservation Foundation

PREFACE

This report is one of five regional reviews, the fifth volume in a series of background reports on the impacts of Outer Continental Shelf (OCS) oil and gas recovery sponsored by the U.S. Fish and Wildlife Service, Office of Biological Services, and prepared by The Conservation Foundation (under Contract 14-16-0008-962). The five reviews are: New England, Mid and South Atlantic, Gulf Coast, California and Alaska, Washington and Oregon. Other volumes in the series and the overall purposes of the OCS project are described in the Foreword.

The regional reports focus on past and potential impacts on living resources and on their habitats in each region. They also highlight prominent coastal resource-related issues associated with proposed OCS lease sales.

The regional reports present brief overviews of the status of offshore oil and gas activities and impacts for the selected regions. They are meant to inform U.S. Fish and Wildlife Service employees and other interested persons outside the subject region who wish to be generally knowledgeable about the status of OCS around the country and both past and anticipated effects on living resources of the region.

The reports were prepared by analysts who are recognized for their expertise in OCS impacts or coastal zone management. The contents and organization of the reports are as consistent as possible given regional differences in subject matter and differences in the authors' approaches. Each study has five sections:

1. The initial section of each regional report is a discussion of past and present OCS production. This provides a historical perspective that establishes a setting for the remaining sections. Statistics on lease sales, production and reserves are important topics in this section.
2. The second section describes OCS development and future potential, including industry activities, the present leasing schedule and anticipated future projects. This section varies depending upon the amount of anticipatory investigation completed by public agencies and industry.
3. The third section discusses the effects on living resources of activities that accompany OCS petroleum development. A majority of these concerns occur near shore or onshore, where resource values and high impact potential are concentrated. The relative importance of particular habitats

and living resources vary by region. For example, shellfish may be of paramount concern in one region, birds in a second region, and coastal marshes and wetlands in a third region.

4. The fourth section concerns socio economic impacts. These issues are generally treated in less detail, because living resources is the primary subject of the project and the socio economic impact information is only to provide a working background. Since socio economic impacts have been the subject of many other studies, and interest in most areas has centered on socio economic rather than living resource impacts, there is extensive information elsewhere on this subject. Two major topic areas are included in each report: effects of anticipated development and regional interest in OCS.
5. The fifth section is regional information analysis. Publications of regional import are annotated. Each study lists about a dozen publications which contain the best regional research into OCS and related issues.

Each regional report is meant to provide a compilation of information available for the region through midyear 1976.

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Anne Bogar gathered much of the information on the effects of off-shore oil development on living resources and interviewed several state coastal zone planners. Carol Dryfoos typed the draft and final manuscript. Graphics were prepared by Ralph Boragine. These individuals are gratefully acknowledged. In addition, the authors wish to thank the OCS coastal zone planners in the various New England states who provided information on their state planning efforts.

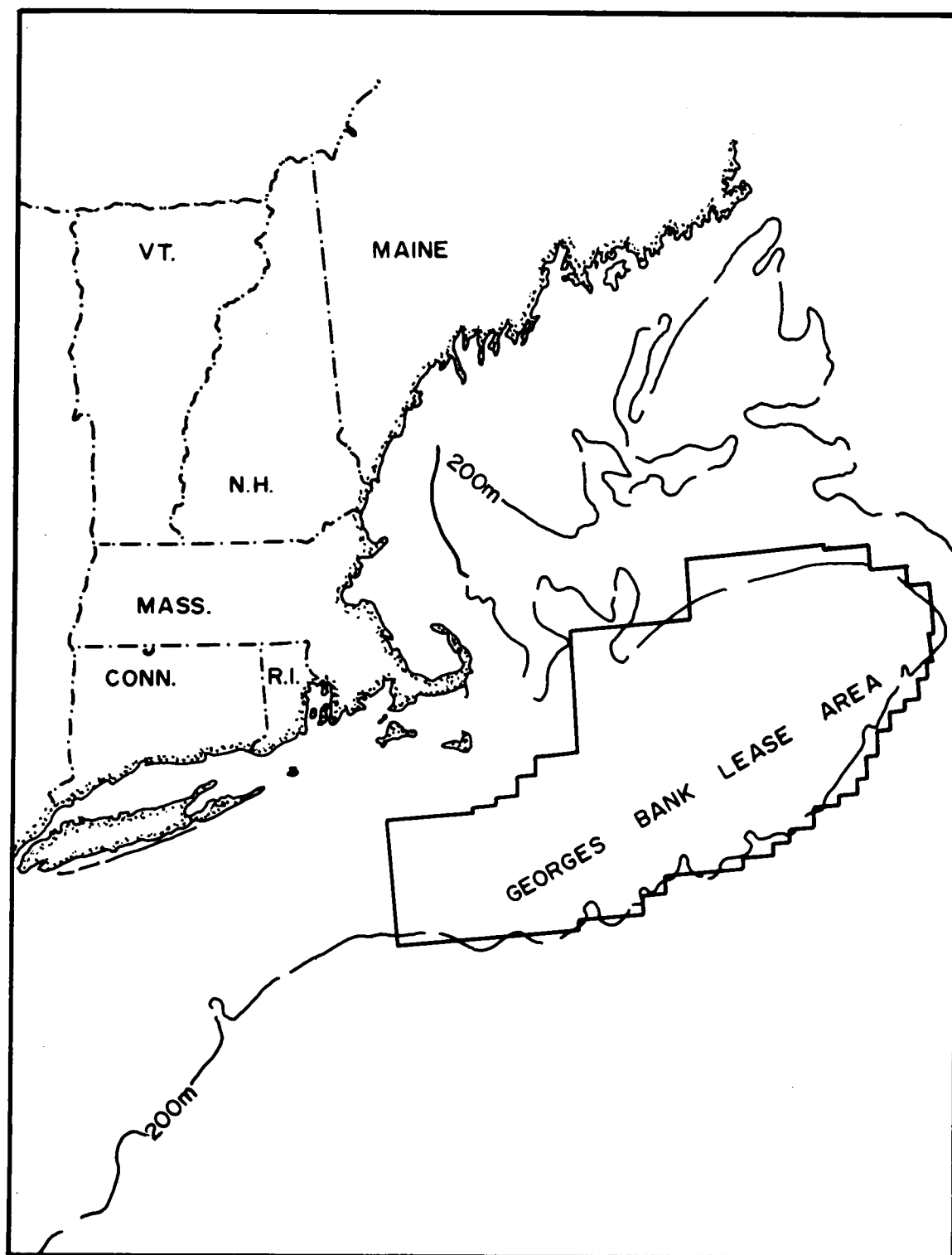
INTRODUCTION

Geological surveys indicate that favorable formations for oil and gas exist on the outer continental shelf off New England in the Georges Bank area (Figure 1). Estimates of recoverable oil and gas for the region range from 0.9 (50% chance) to 2.4 (5% chance) billion barrels of oil and 4.2 (50% chance) to 12.5 (5% chance) trillion cubic feet of gas.¹ Although the development of offshore oil and gas could increase economic activity in certain areas of the region, New Englanders are concerned about the adverse social and environmental impacts such development could bring.

New England is rich in coastal and marine resources. Its offshore areas, in particular Georges Bank, are prime fishing grounds. The many estuaries throughout the region serve as nurseries for commercially important fish and provide sheltered ports for recreational boats and commercial ships. Its coast, characterized by sandy beaches, marshes, rock outcrops and islands, is in great demand for use by residential, recreational and industrial groups. The region's economy depends on these resources and the industries which rely on them.

This report reviews the effects of Georges Bank petroleum and gas development on New England. Since there has been no production to date of oil or gas off New England, the focus of the report is on the projected impacts of OCS development and the concerns of interest groups and public officials. The information presented is based on state and regional studies, a systematic analysis of newspaper accounts, testimony at hearings and interviews with state coastal zone planners.

Figure 1. Georges Bank and proposed lease area (Source: U.S. Dept. of Interior, 1975).



1. OCS PRODUCTION

To date there has been no production of oil or gas off New England. However, the New England states are interested in developing the petroleum and natural gas resources on Georges Bank. Many New Englanders have expressed the hope that a large find of oil and natural gas off their coast would result in lower energy prices, a stable supply of fuel for East Coast refineries, and the possibility of exporting natural gas to other areas. However, it is unlikely that a high find of oil on Georges Bank would affect the price New Englanders pay for oil. Nonetheless, it would mean that the region would be contributing toward reducing our dependence on foreign sources.

2. OCS DEVELOPMENT AND POTENTIAL

The oil industry has expressed interest in the petroleum potential of the OCS off New England since the early 1960s. In response to this interest, the Federal government has issued permits for exploratory seismic and off-structure work in the Georges Bank area. Additionally, it has initiated a call for the nomination of tracts on or near Georges Bank and selected tracts for possible leasing. In the fall of 1976, the Interior Department's Bureau of Land Management released a draft environmental impact statement and held hearings on the first proposed lease sale, No. 42.

2.1 Resource Estimates

Numerous estimates of the amount of recoverable petroleum off the East Coast and on Georges Bank have been made public. These figures vary greatly due to the difficulty of making such estimates. The most probable estimates are those established by the U.S. Geological Survey. As noted in Table 1, the U.S.G.S. (1974) estimates that for the East Coast resource there is a 50%-5% chance of 10-20 billion barrels of oil and 55-110 trillion cu. ft. of gas. For the North Atlantic resource, they predict a 50%-5% chance of 0.9-2.4 billion barrels of oil and 4.2-12.5 trillion cu. ft. of gas. It should be noted that the estimate (50%-5% chance) for the first sale in the North Atlantic (sale No. 42) are .18-.65 billion barrels of oil and 1.2-4.3 trillion cu. ft. of gas.

Despite estimates of how much oil and gas will be found, uncertainty will continue to exist over whether oil and gas is even present in commercially exploitable quantity until drilling is well under way.

For this reason, it is difficult to anticipate the impact of OCS development on New England. Since advanced planning is important, many people feel that time should be allotted for studies after the oil has been found, yet prior to approval of development plans.

Table 1. Petroleum Resource Estimates That Have Received Public Attention. (Sources: N.Y. Times; A.D. Little, Inc., 1974; Grigalunas, 1975; U.S.G.S., 1975; U.S. Department of Interior, Bureau of Land Management, 1976.)

EAST COAST RESOURCE		OIL (billion bbl)	GAS (trillion cu. ft.)
1973	Atlantic Action Program	12	167
	Potential Gas Agency		36
	'Industry experts'	48	217
1974	U.S.G.S. (50%-5% chance)	10-20	55-110
NORTH ATLANTIC RESOURCE			
1975	A.D. Little, Inc.	17.75	38.8
	Grigalunas (50%-5% chance)	0.4-3.0	2-10
	U.S.G.S. (50%-5% chance)	0.9-2.4	4.2-12.5
1976	U.S. Department of Interior, Bureau of Land Management, Sale #42 only. (50%-5% chance)	.18-.65	1.2- 4.3

2.2 Survey Activity in the North Atlantic

Seismic surveys and stratigraphic test programs have been conducted to better understand the stratigraphy of this area of the Atlantic. These studies indicate potential traps in the geological structure of Georges Bank. However, it should be noted that exploratory drilling off Nova Scotia in an adjacent geological structure has not been successful.

During the 1960s and early 1970s, initial surveys were conducted by the oil industry to determine the location and thickness of sediments and structures which might hold petroleum and gas. The most recent seismic survey was completed in 1975 by the Shell vessel Phaedra. The promising results from these surveys and the policy of the Nixon administration to speed up OCS leasing were responsible for the oil industry's desire to proceed as quickly as possible with exploratory stratigraphic drilling.

The Ocean Production Company (a consortium of 31 companies) was organized in the summer of 1975 to drill a continental offshore stratigraphic test (COST) well in the area. Approval for COST well G-1 was given in October 1975, and drilling began in April 1976 and was completed in 90 days. The rig SEDCO-J was used to drill a 16,000-foot test well 75 miles east of Nantucket Island. Although stratigraphic information will not be released to the public until 60 days after the lease sale, the drilling rig served as New England's first experience with offshore drilling. In addition to providing 83 temporary jobs for Rhode Island residents, the SEDCO-J also drew attention to possible conflicts.² It was involved in an accident as it was towed out to the G-1 site, resulting in the loss of several thousand dollars worth of lobster gear. A second COST well project is presently being conducted by the Ocean Production Company with the Ocean Victory. This off-structure well will be drilled to 22,000 feet, 115 miles east of Nantucket.

2.3 The Leasing Schedule

In general, many individuals feel that the OCS leasing program is being carried out at a pace faster than is appropriate for good planning. Leasing might have occurred faster had it not been for the Supreme Court case over ownership of the OCS: U.S. vs Maine. The State of Maine had attempted to lease offshore waters beyond the federally recognized three-mile state boundary, and was challenged by the Justice Department. A lengthy proceeding in the Supreme Court resulted. Maine, which was joined by more than a dozen coastal states, finally lost the case.

Although leasing did not begin until the U.S. vs Maine case was settled, the Nixon administration initiated activities designed to clear the way for the eventual sale of first-round leases in the North Atlantic. These activities began in June of 1971, when the President called for the rapid leasing of all the continental shelves of the United States. At the same time, the Department of Interior released a five-year development plan which included the North Atlantic.

Table 2 summarizes the events which led to the tentative scheduling for 1977 of Lease Sale #42 in the North Atlantic. In several instances, New England states have sought to postpone hearings and other federal actions to gain more time to develop clear statements of state and regional interests. In general, state involvement in offshore OCS activities has been limited to responding to federal initiatives. A detailed discussion of each state's OCS planning efforts is provided in Appendix I.

Table 2. Summary of Federal OCS Development Activities and State and Regional Responses. (Sources: Local newspapers 1972-1977)

<u>Federal OCS Activities</u>	<u>State & Regional Responses</u>
1972	
<u>Spring</u> *USGS report on Atlantic Coast.	<u>Spring</u> *New England Governor's Conference, New England Regional Commission, and New England River Basins Commission collaborate to gather information on OCS petroleum and gas development. *Massachusetts' special legislative commission on marine boundaries and resources holds hearings on OCS issues.
1973	
<u>Spring</u> *President Nixon's speech promoting OCS leasing. *USGS announces that the Atlantic's potential oil-bearing sediments are twice as thick as originally expected. *Delay in leasing of frontier areas of Atlantic and Alaska pending preparation of a study on impacts for the Council on Environmental Quality.	<u>Spring</u> *Regional study on costs and benefits of OCS development by Massachusetts Institute of Technology. <u>Fall</u> *Hearings on OCS study for CEQ held in Boston.
1974	
<u>Winter</u> *Nixon announces ten million acre leasing goal for 1975. *USGS reports on North Atlantic petroleum and gas potential.	<u>Winter</u> *New England Regional Commission announces Energy Research and Policy program.
<u>Spring</u> *Report on Atlantic and Alaska OCS issues released by CEQ. *Work begins on draft of EIS for accelerated leasing program.	<u>Spring</u> *CEQ report criticized for neglect of fishing interests and other issues by legislators and environmentalists.
<u>Fall</u> *Draft of environmental impact statement on accelerated leasing program released. *White House meeting of coastal governors on accelerating the program	<u>Fall</u> *Massachusetts is among states which successfully delay the hearing on the 1975 impact statement, to permit time for state responses. *New England governors argue for slower pace in OCS leasing program.

Table 2 (Con't.)

<u>Federal OCS Activities</u>	<u>State & Regional Responses</u>
1975	
<u>Spring</u> *Hearings on draft EIS for accelerated leasing program.	<u>Spring</u> *East Coast governors strategy meeting is called on national energy policy, environmental studies, planning, and improving Federal/state relations over OCS leasing. *New Hampshire and Massachusetts comment on draft EIS, criticizing lack of concern for fisheries and neglect of oil-spill issues. Leasing process also criticized.
<u>Summer</u> *EIS for accelerated program approved. Ten million acre goal dropped. *Call for nominations on Georges Bank.	<u>Summer</u> *New England states seek delay, without success.
<u>Fall</u> *House Ad Hoc Committee on OCS Lands Act Amendments holds hearings in Boston and New London.	<u>Fall</u> *Substantial testimony delivered at hearings by government leaders, businessmen, laborers, environmentalists, and fishermen.
1976	
<u>Winter</u> *Bureau of Land Management announces 206 tracts to be offered in first lease sale (No. 42) in North Atlantic.	<u>Spring</u> *New England states send delegations to Offshore Technology Conference in Houston, Texas, to promote local ports as bases for petroleum and gas exploration activity.
<u>Summer</u> *Preliminary draft EIS on OCS Sale No. 42 circulated.	<u>Summer</u> *Massachusetts submits recommendations on tract withdrawals.
<u>Fall</u> *Draft EIS of Georges Bank lease sale released. *Hearings on draft EIS held in Boston and Providence.	<u>Fall</u> *New England Regional Commission reviews draft EIS for the New England states. *Each state and many local governments submit testimony at hearings on draft EIS. *New England River Basins Commission publishes RALI study on impacts of Georges Bank development.
1977	
<u>Winter</u> *Mid Atlantic lease sale invalidated pending appeal.	

Table 2 (Con't.)

<u>Federal OCS Activities</u>	<u>State & Regional Responses</u>
*New administration reviews future leasing schedule.	
<u>Spring</u>	<u>Spring</u>
*Final regulations on Coastal Energy Impact Program published.	*New England Regional Commission publishes study on fishing and petroleum interactions on Georges Bank.

2.4 OCS Development Activities

Exploration of the Mid and North Atlantic has generated some economic activity in New England in the past. In 1976, the continental offshore stratigraphic test (COST) well program, based in Davisville, RI, provided 83 Rhode Island residents with employment for eight months and a payroll of about one million dollars. New Englanders hired for the COST project constituted 47 percent of the total 176 workers. The remaining 93 workers were trained individuals brought in from other areas.³ In addition, monies have been spent by individual states and various regional groups on OCS policy and planning. A major portion of the funding for these studies has come from federal sources.

The Draft Environmental Impact Statement for the Georges Bank lease sale predicts that southeastern New England will continue to receive most of the OCS-related facilities and activity.⁴ Service facilities, a pipecoating yard and a platform fabrication yard, if needed, would probably locate in Rhode Island. The deactivated Naval facilities at Davisville, RI will probably be used as the major service base for offshore drilling. In fact, many petroleum-related companies have already leased pier and storage space from the Rhode Island Port Authority

in preparation for the North Atlantic lease sale. According to a report published recently in the Oil and Gas Journal, most of the firms that have applied for exploration permits in the Mid Atlantic also plan to operate out of these facilities.⁵

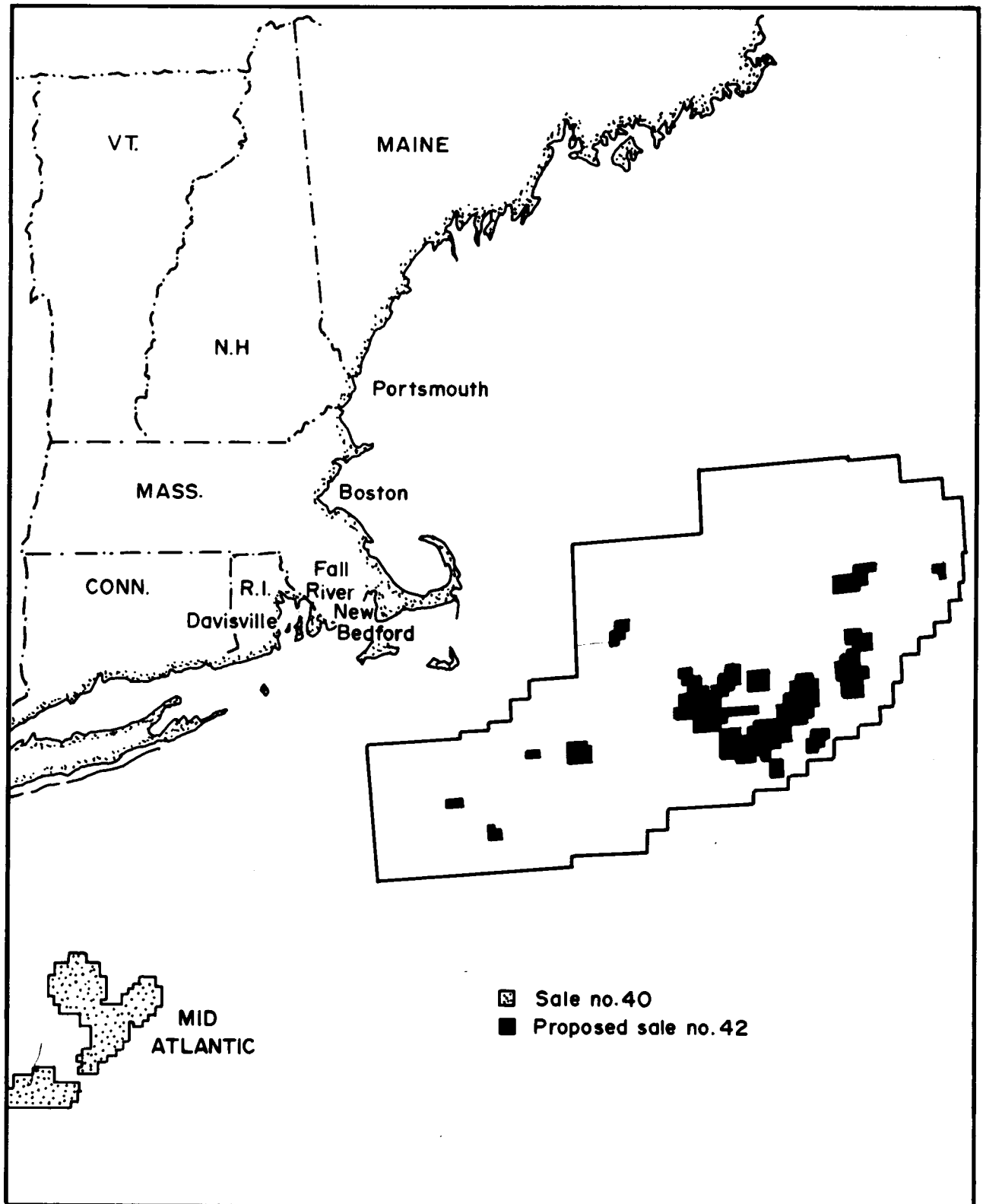
However, other communities in New England, particularly in Massachusetts and New Hampshire, have sought to lease waterfront space and provide services to the oil industry during this early phase. Figure 2 shows the location of areas that hope to benefit from OCS activity. New Hampshire's Governor has promoted its Portsmouth Naval facilities. Massachusetts and individual towns and cities have identified facilities in the Boston area, including the Boston Charleston Navy Yard, East Boston, South Boston Fish Pier, and the South Boston Naval Annex, in addition to the waterfront areas of New Bedford and Fall River.

2.5 Major Issues

The possibility of offshore oil exploration off the New England coast has attracted the attention of environmental groups, the scientific community, and the recreation and fishing industries. Their major concern is the effect of OCS exploration and development on the offshore and coastal environments.

Since the blow-out of a Union Oil platform in the Santa Barbara, California channel in 1969 and the Torrey Canyon Spill off England, environmentalists have been concerned about offshore oil development in general. The series of tanker spills off New England this past year and the blow-out in the North Sea this past spring have heightened this concern. It should be noted, however, that only 1 percent of the petroleum in the marine environment is produced by offshore petroleum

Figure 2. Potential service areas for OCS development in New England.



production, and 18 percent is from tankers.⁶ It can be argued that there would be less likelihood of oil spills if we increased domestic production and relied less on foreign importation. Nonetheless, New Englanders are concerned about accidental oil spills related to off-shore development and its potential effect on the Georges Bank fisheries and coastal ecosystems.

To assess the effect of an oil spill on our marine resources, it is necessary to know what the existing marine resources are, how petroleum is transported by wind and currents, and the effects of the oil on ecosystems. The Department of Interior's Bureau of Land Management has funded a series of environmental studies on Georges Bank to provide much of this information prior to full scale development. However, a great deal of interest has been expressed in the importance of conducting such research prior to OCS exploration. It has also been suggested by eminent scientists throughout the region that such environmental studies be conducted on the coastal and nearshore environments as well.⁷

The onshore facilities needed to support offshore oil development in New England pose a major concern. Temporary and permanent service bases, pipe coating/installation yards, platform fabrication facilities, gas processing plants, and numerous associated industries will be needed if producible quantities are found. Their construction would stimulate local economies, but could also disrupt communities. The environmental and socioeconomic impacts of the facilities would depend on the site characteristics and development stipulations. There would be minor impacts if facilities were to be sited in already developed areas, which have an adequate infrastructure in place and a high unemployment rate, such as deactivated naval lands. Impacts could be quite

significant if major facilities were located in unique natural areas or small communities. For this reason, the Cape Cod communities which are dependent on tourism do not want any major OCS-related facilities. An additional concern is the potential for competition between the fishing and petroleum industries for labor and port facilities.

To assist the states in coping with the impacts of offshore oil development, Congress approved the Coastal Energy Impact Program (CEIP) in 1976 by amendment of the Coastal Zone Management Act. The central objective of the CEIP is to provide coastal states and local communities financial assistance to deal with the effects of new or expanded coastal energy activity. This assistance is provided in the form of planning grants and loans. Grant money is allocated on the basis of a special formula which favors areas with extensive offshore oil development and provides only limited funds to frontier areas such as New England.

3. EFFECTS ON LIVING RESOURCES

The potential detrimental impacts of offshore and onshore OCS development on marine and coastal ecosystems are a major concern of the New England states. Placement of offshore and onshore physical structures associated with OCS development will destroy sessile organisms and disrupt habitats. However, the potential effects of oil pollution are of far greater concern. Oil can kill marine life by poisoning, coating, and asphyxiation. Indirect mortality can result from destruction of food sources or habitat, reduced resistance to infection, and reproductive failures.⁸ It is also known that the more highly refined oils are more toxic than the crude oils.

A more complete discussion of the effects of petroleum hydrocarbons on marine organisms, populations, communities and ecosystems by Hyland and Schneider (1976) is available in the Proceedings of a Symposium on Sources, Effects and Sinks of Hydrocarbons in the Aquatic Environment.

The development of offshore oil may lead to oil spills and chronic low level oil pollution. It will be difficult to assess the impacts on the marine environment since too little is known about how oil moves, concentrates, degrades, cycles through the food web, and sublethally affects organisms. Also, there is a lack of understanding of how components of the offshore and nearshore ecosystems interact with one another and respond to stress induced by humans. The Georges Bank Environmental Studies Program presently underway will attempt to answer many of these questions. Nonetheless, the threat of increased oil spills and their potential adverse impacts is of major concern to New England

residents who have already experienced several oil spills in recent years.
(Table 3).

Table 3. Recent Major Oil Spills Off New England. (Sources: U.S. Department of the Interior, 1976; Providence Journal.)

Date: 5/10/69
Locality: near Portsmouth, New Hampshire
Amount: .19 million gallons
Type of Oil: #2 fuel oil
Vessel: Robert L. Poling
Environmental Impact: Heavy initial mortality of benthic fauna where oil was absorbed in the salt marsh peat. Mortalities occurred in the duck and cormorant populations. Retardation of salt marsh grass.

Date: 9/16/69
Locality: Falmouth, Mass. (Buzzards Bay)
Amount: .16 - .19 million gallons
Type of Oil: #2 fuel oil
Vessel: Florida
Environmental Impact: Immediate massive kill of molluscs, polychaetes and amphipods. As of June 1976, small areas remain closed to shell fishing.

Date: 2/04/70
Locality: Chedabucto Bay, Nova Scotia
Amount: 2.7 million gallons
Type of Oil: Bunker C
Vessel: Arrow
Environmental Impact: No lethal effects on subtidal benthic community, but contaminated animals were found 26 months after the spill.

Date: 7/22/72
Locality: Portland Harbor, Maine
Amount: .11 - .19 million gallons
Type of Oil: #2 fuel oil
Vessel: Tamano
Environmental Impact: Extensive damage to marine communities. Area closed to shellfishing.

Date: 12/15/76
Locality: Nantucket Shoals
Amount: 7.5 million gallons
Type of Oil: #6 fuel oil
Vessel: Argo Merchant
Environmental Impact: Unknown at this time.

Table 3 (Cont.)

Date: 12/31/76

Locality: Last reported off Nova Scotia

Amount: 8.2 million gallons

Type of Oil: Bunker C

Vessel: Grand Zenith

Environmental Impact: Unknown - spill not identified

Date: 1/28/77

Locality: Cape Cod Canal, Buzzards Bay

Amount: .1 million gallons

Type of Oil: #2 fuel oil

Vessel: Frederick E. Bouchard #65

Environmental Impact: Unknown

3.1 Offshore and Nearshore Environments

Available information on New England's marine environment has been summarized in the Trigom Report: A Socio Economic and Environmental Inventory of the North Atlantic Region and the Draft Environmental Impact Statement for Sale No. 42. A concise description of the living resources on Georges Bank and the effect of petroleum-related activity on these resources is presented in Vol. II of Fishing and Petroleum Interactions on Georges Bank. The information in this section is taken primarily from the above reports. Emphasis was placed on the commercially and ecologically important resources.

Phytoplankton

Microscopic plants exist in abundance on Georges Bank and in our nearshore waters. They are responsible for the high productivity of these waters. Although it is difficult to monitor changes in the population, it is believed that there were no major effects on phytoplankton from the Torrey Canyon spill or the Santa Barbara blowout.

Since phytoplankton rapidly reproduce, a population could easily recover from most losses.

Zooplankton

Zooplankton drift with the currents off the New England coast and feed on phytoplankton. They, in turn, are the primary food source for some fish and benthic species. The eggs and larvae of several commercially important fish and shellfish are included in this category. An oil spill would particularly affect the eggs and larvae of species concentrated near the surface. Short-lived species would be most vulnerable.

Benthos

Benthic communities play an important role in the cycling of nutrients and food through the marine ecosystem for they feed on detrital material and are then in turn consumed by fish and other organisms. Commercially important benthic organisms of the area include clams, quahogs, crabs, lobster and scallops. Physical characteristics of the sediment, available organic matter and mode of attachment govern the distribution of benthic organisms. Rates of accumulation of hydrocarbons in the sediments are not really known. For the Georges Bank area the Council on Environmental Quality (1974) estimates that the recovery time for sandy areas (highest productivity) would be two to three years.⁹ The sublethal effects of oil on the benthos are not known. There is a possibility that reproductive behavior could be disturbed. Oil will affect the taste and color of the shellfish. In fact, MIT (1973) predicted that a large offshore spill on Georges Bank

(3 million gallons) could affect the taste of up to 25% of the scallops.¹⁰

Fish

The fishing grounds off New England are some of the most productive in the world. Commercially important fish on Georges Bank include haddock, cod, pollack, whiting, red hake, cusk, American dab, yellow-tail flounder, grey sole, and sea herring. The nearshore waters also support a rich fishery. Fish found in Buzzards Bay and Narragansett Bay include bluefish, pollack, summer flounder, scup, shad, eel, tomcod, white perch, and menhaden. Long Island Sound supports populations of striped bass, bluefish, summer flounder, pollack, Atlantic mackerel, cunner, black sea bass, weakfish, white hake, sand flounder, American eel, smelt, white perch, and tomcod.¹¹

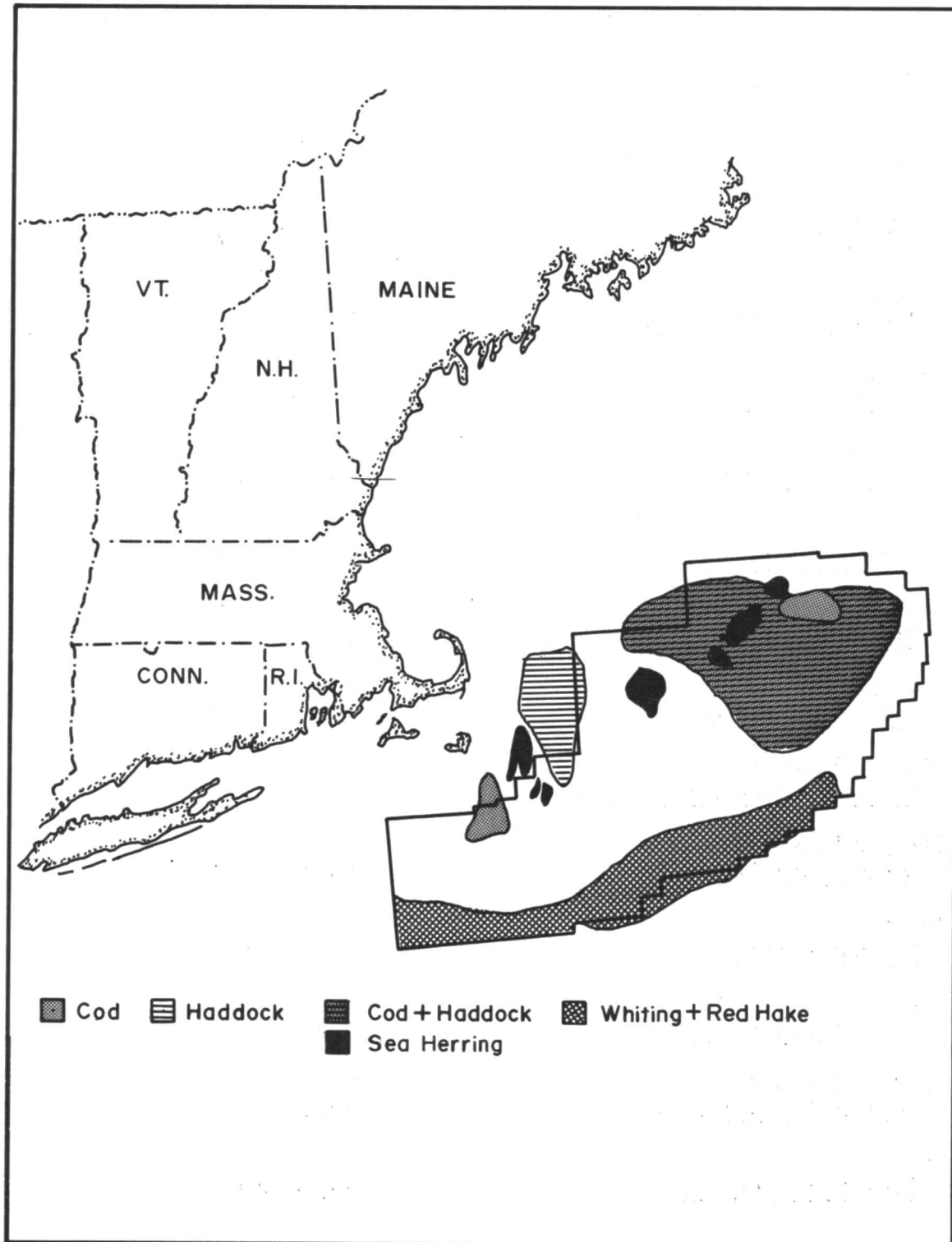
An oil spill would not pose a physical danger to adult fish for they would leave the area. However, it could interrupt their spawning migration, disrupt breeding behavior or injure sensitive larval forms. The spawning seasons of some fish are noted in Table 4. Spawning grounds of selected species are shown in Figure 3.

In the proposed lease area, there are spawning grounds for cod, haddock, sea herring, whiting, and red hake. These species with the exception of sea herring have pelagic larvae which would be most susceptible to an oil slick. Commercially important fish which spawn in nearshore waters include winter flounder, tautog, scup, sea herring, and striped bass (primarily Chesapeake Bay). Their larvae could be killed by a nearshore spill. Other species which could be affected

Table 4. Susceptibility on a Seasonal Basis of Some Fish Which Are Known to Spawn in New England Waters (Source: Coastal Resources Center, 1975, 1976)

Species	Spawning Season
Haddock <u>Melanogrammus aeglefinus</u>	Feb. - June
Atlantic cod <u>Gadus morhua</u>	Jan. - June
Pollack <u>Pollachius virens</u>	Oct. - March
Silver hake <u>Merluccius bilinearis</u>	May - Oct.
Red hake <u>Urophycis chuss</u>	May - Aug.
Atlantic herring <u>Clupea harengus</u>	Sept. - Nov.
Cusk <u>Brosme brosme</u>	March - June
American plaice <u>Hippoglossoides platessoides</u>	Feb. - May
Yellowtail flounder <u>Limanda ferruginea</u>	March - June
Winter flounder <u>Pseudopleuronectes americanus</u>	March - June
Striped bass <u>Morone saxatilis</u>	March - July
Tautog <u>Tautoga onitis</u>	May - June
Alewife <u>Alosa pseudoharengus</u>	April
Summer flounder <u>Paralichthys dentatus</u>	Sept.
Scup <u>Stenotomus chrysops</u>	May - Aug.

Figure 3. Major spawning grounds of selected species on Georges Bank
(Source: Coastal Resources Center, 1976).



are the alewives, American eels, shad, weakfish, northern puffer, and shortnose sturgeon.¹² Alewives and American eels migrate from the sea to freshwater streams along the coast. The shortnose sturgeon, listed as an endangered species, spends most of its life cycle in estuarine waters except when spawning in freshwater in the spring.

Birds

Numerous birds frequent the New England offshore and coastal areas. The birds which would be most susceptible to oil spills would be the diving ducks, such as eiders, scoters, oldsquaw, goldeneyes, scaups, bufflehead, loons, grebes and cormorants. A major concern is that the Cape Cod and Long Island areas, which are important wintering grounds for eiders and occasionally other species, would be impacted by a spill. An oil spill trajectory study conducted by MIT in 1974 indicates that, under certain conditions, there is a chance that an oil spill on Georges Bank could affect Cape Cod, Nantucket and Buzzards Bay.¹³

Marine Mammals

Several species of cetaceans are found in New England waters. Among the cetaceans, six endangered species are found in the Georges Bank area: the finback whale, the humpback whale, the right whale, the blue whale, the sei whale and the sperm whale.¹⁴

The only pinnipeds which occur in New England's waters are the harbor seals and gray seals. Of critical concern is the gray seal population near Muskeget Island off Nantucket. This island, the only breeding area for gray seals in the United States, is located along possible tanker and pipeline routes.¹⁵ It is difficult to assess the

impact an oil spill would have on marine mammals in the area. They would probably move out of the immediate area of the spill; however, little is known about the effects of oil on their physiology.

Sea Turtles

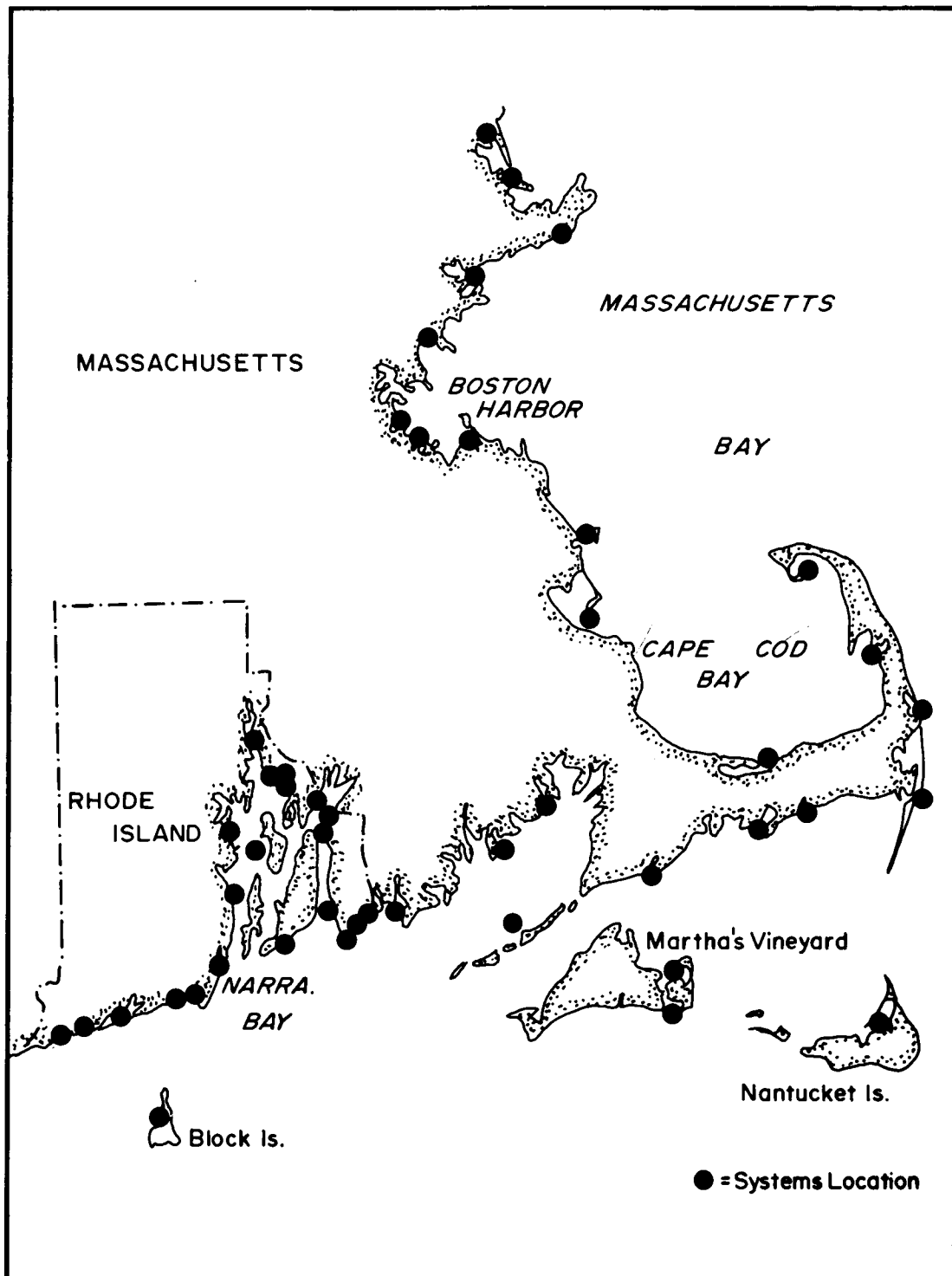
Three endangered species of turtles could be affected by oil development: the Atlantic ridley, the leatherback and green turtle.¹⁶ The Atlantic ridley has been observed in Buzzards Bay and the Vineyard Sound, while the green turtle is found in Nantucket Sound. The leatherback turtle is found in the Gulf of Maine. Very little is known about the effects of oil on turtles.

3.2 Coastal Ecosystems and Shoreland Habitats

New England's coast is characterized by coastal embayments, barrier beaches, rocky shores and salt marshes, all of which could be affected by OCS development. The coastal ecosystems of Massachusetts and Rhode Island would be especially vulnerable to oil spills, since the proposed pipeline corridor and tanker route for sale #42 parallels the southeastern coast of New England. Also, various OCS-related facilities are expected to be situated in the Massachusetts and Rhode Island coastal zones, and their construction and processing activities could damage coastal ecosystems. Figure 4 indicates the location of major coastal systems in southeastern New England.

The environmental impacts associated with OCS-related facilities will primarily result from site preparation, site construction and the operations of the facilities. The physical siting of a major facility in a natural area will destroy the existing vegetation and

Figure 4. Major coastal ecosystems in southeastern New England (Sources: Rhode Island and Massachusetts Coastal Zone Management Programs).



displace resident wildlife. During the construction of a facility, soils will be more easily eroded. Run-off from such an area is usually very turbid and can be environmentally damaging. Also, if additional channels or piers are required, dredging will be necessary. The impacts of dredging include changes in the hydrography, resuspension of sediment and destruction of organisms in the immediate area by physical damage or suffocation. A description of and the potential environmental impacts associated with some OCS-related facilities are summarized in Table 5.

In general, the impacts of an OCS-related facility are similar to the impacts of any large industrial facility. Adverse effects can be minimized by siting these facilities in appropriate areas and by developing effective environmental regulations. The Redevelopment of Quonset/Davisville: An Environmental Assessment prepared by the University of Rhode Island for the R.I. Department of Economic Development assesses the suitability of specific sites for various OCS-related facilities and recommends appropriate environmental regulations. Similar studies will need to be conducted on other areas being considered for onshore OCS-related facilities. Also, careful consideration should be given to the routing of a pipeline. To mitigate potential environmental impacts the pipeline should avoid highly productive fishing grounds and unique natural coastal areas.

Table 5. Potential Environmental Impacts Associated with Major OCS-Related Facilities (Source: Coastal Resources Center, University of Rhode Island, 1977)

	Offshore Oil Support Bases	Platform Fabrication Yard	Pipe Coating and Laydown Yard
DESCRIPTION	Stores & transports materials to & from offshore facilities	Constructs steel platforms & jackets (platform legs) which are barged to sites offshore	Stores, cleans, coats, wraps, cures & tests steel pipe for use in gas or oil pipelines Most of site is used for pipe storage
ENVIRONMENTAL CONCERNS			
Air Quality	Emissions from service vessels, cranes, trucks Emissions from fuel storage & transfer Dust from mud & chemical storage & transfer	Emissions from cranes, trucks, machinery Emissions from organic solvent based paint Sand blasting	Emissions from boilers, ovens, cranes & trucks Solvent fumes White fumes containing oil & toxic gases Strong odor Dust from hydrated lime, iron ore, other coating materials
Water Quality	Accidental & chronic fuel spills Accidental spills of mud & chemicals Run-off from storage & work areas	Cooling & process water from steel rolling, shot blasting & welding Run-off may include heavy metals, particulates, petroleum products & process chemicals	Run-off containing hydrated lime (high pH), hydrocarbons, steel shot, heavy metals Cooling & process water contaminated with hydrocarbons, lime, metals
Landscape/Shoreline	Installation of additional piers, wharf & bulkheading General construction impacts	Possible bulkheading, dredging Highly visible structures General construction impacts	General construction impacts Visual impact
Other (noise, solid waste)	Handling of contaminated solid waste from offshore rigs	Outdoor noise (76-116 dB) 24 hours per day	Noise from shot blasting, boilers & compressors

4. SOCIOECONOMIC IMPACTS

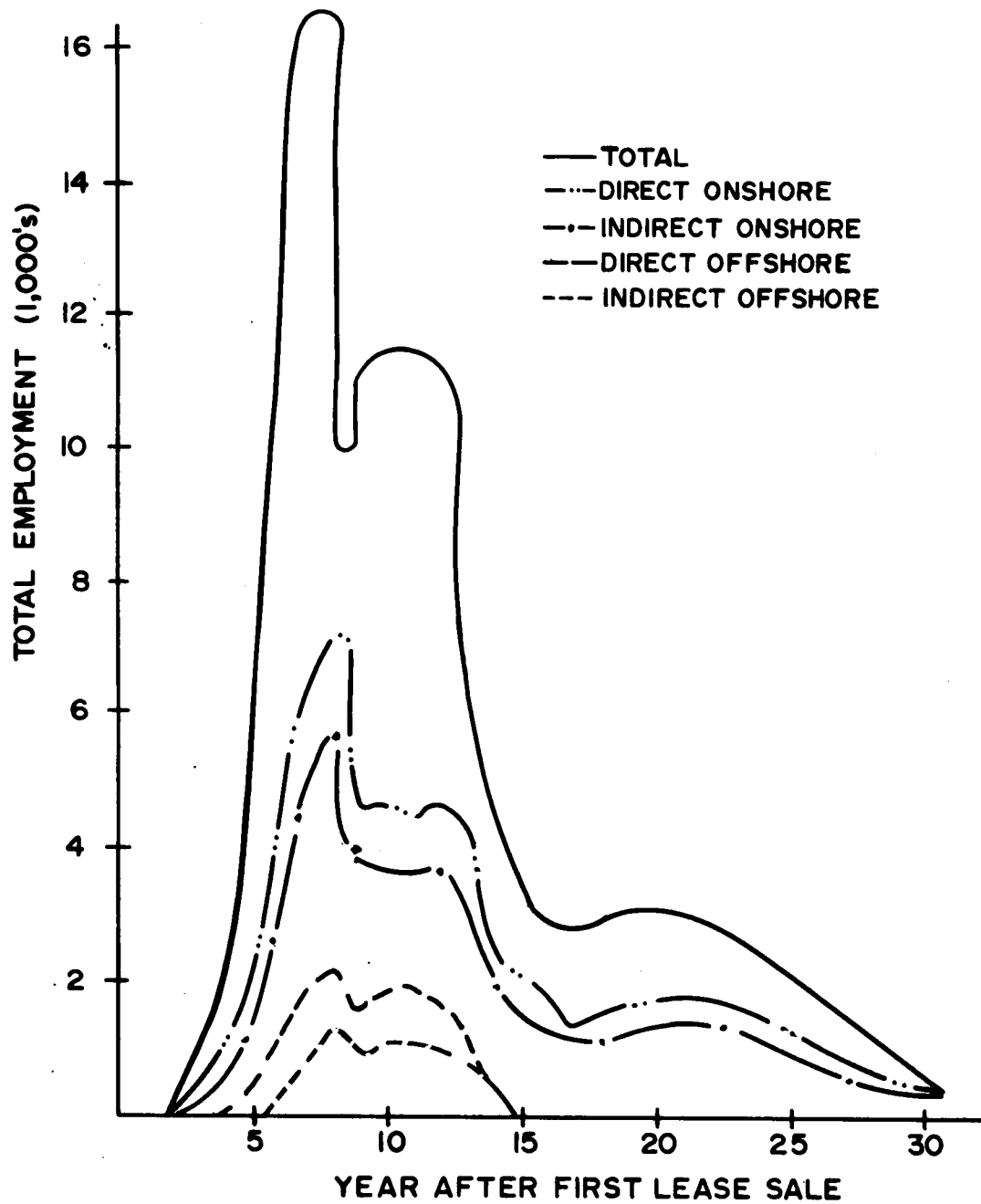
The social and economic impacts of OCS development are a major concern of the New England states. Although the region desperately needs additional employment opportunities to strengthen its economy, planners fear that a rapid influx of workers into a local area could disrupt the social and economic structure of the community. The associated increase in population would result in additional public expenditures that may not be offset by increased revenues. An additional concern is the possibility that OCS-related activities could hurt the tourist and fishing industries which are so vital to the region's economy.

4.1 Employment

Richard Ely observed that "there is a myth that the oil industry will produce a large number of jobs, helping to lower unemployment in New England."¹⁷ The number of people employed and the skills required varies with the size of the field, the stage of development, and the number of rigs. Many of the workers will be imported for short periods of time, and the number of local workers will vary considerably.

Figure 5 shows employment (direct, indirect, onshore and offshore) as estimated by the New England River Basins Commission (NERBC) for its high find scenario. In its "high find" scenario, which assumes an average production of 286,000 barrels of oil per day, an average of 2,800 persons are directly employed over the 30-year development period. Of this total, 1,800 persons will be hired locally. The bulk of the employment

Figure 5. Direct and indirect employment likely to result from OCS development on Georges Bank for a high find scenario (Source: New England River Basins Commission, 1976)



is in short-term construction work on facilities such as rigs, refineries, and related petrochemical processing plants.

Estimates of potential total employment from OCS petroleum and gas exploration vary substantially. Table 6 illustrates the range in the peak employment projections among the five completed regional studies. The size of the assumed daily production level varies as, consequently, does the number of jobs. However, estimates of the number of workers required per 1,000 barrels of daily production also differ from study to study.

The figures in the "high find" portion of the table are a combination of the peak levels of employment for individual facilities. For example, the 83,100 jobs in the CEQ study assumes that all facilities are built simultaneously, when in fact the crew employed for two years in building a rig fabrication yard might subsequently find work constructing an oil refinery. Yet when CEQ's unrealistically high figure is used to estimate how much overall employment would rise because of OCS activities, the result is only three percent higher than a no-development base level.¹⁸ Since this three percent increase in employment is based on a petroleum production level six times greater than the most optimistic recent U.S.G.S. estimate, the regional effect of direct OCS employment is likely to be small.

A vital issue is the proportion of OCS employment that would be held by New Englanders. Estimates vary greatly, ranging from 30 percent to 75 percent. It is interesting to note that about 47 percent of the workers on the COST well G-1 project were from New England.¹⁹ The local availability of specialized skills and services will determine the number of New Englanders hired. For this reason, it may

Table 6. Variations in Estimates of Total Employment in OCS-Related Activities. (Sources listed in table.)

Source	Average Daily Production (1000 bbl)	Total High employment level	Total Workers per 1000 bbl daily production
<u>HIGH FIND</u>			
CEQ, 1974	1,500	83,100	55.4
Grigalunas, 1975	600	7,575	12.6
A.D. Little, Inc., 1975	1,121	33,975	30.3
U.S. Dept. of Interior, 1976	181	10,250	56.6
NERBC, 1976	286	16,696	58.4
<u>LOW FIND</u>			
CEQ, 1974	500	20,200	40.4
Grigalunas, 1975	79	980	12.5
A.D. Little, Inc., 1975		(no low find)	
U.S. Dept. of Interior, 1976	53	6,800	128.3
NERBC, 1976 (medium find)	125	4,916	39.3

be desirable to initiate manpower training programs if employment of local persons is desired. The alternative is an influx of trained employees. However that will also have 'spin-off' effect in other industries and services.

The impact of OCS employment on a county level has been examined in two papers. Both Grigalunas and the CEQ determined OCS employment levels in Bristol County, Massachusetts, which includes the cities of Fall River and New Bedford. It should be noted that even if oil is found on Georges Bank, the industry may not site any facilities in Bristol County. Nonetheless it is interesting to look at the estimates (Table 7). Both authors agree that more employment occurs during the early stages of OCS development. The CEQ, however, gives much higher estimates of the employment levels. The CEQ report notes that OCS activities would add about nine percent to the employment level by 1985, and about seven percent by 2000.²⁰ These figures should be used with care, because the production rate quoted by the CEQ is several times higher than recent figures published by the USGS.

Table 7 Estimates of Employment in OCS Activities in Bristol County, MA.
(Sources listed in table).

Source	Daily production (1,000 bbl)	Employment level			
		9th year after sale		24th year after sale	
		Total	Per 1,000 bbl	Total	Per 1,000 bbl
CEQ, 1974	500	6,700	13.4	5,600	11.2
Grigalunas, 1975	600	5,885	9.8	4,525	7.5

4.2 Demographic Changes

OCS development may result in an influx of population into New England for two reasons, the movement of skilled workers and their families into the area and the migration of the unemployed into the area to find jobs. The latter group may include individuals who do not have skills vital to offshore development, but who hope to benefit in some way from the overall economic activity. The regional studies examined indicate that immigration would occur for up to 25 years after the first lease sale, followed by emigration thereafter. It is possible, however, that in areas with high unemployment a large percentage of the labor force would be supplied locally.

Table 8 summarizes the possible population immigration into Bristol County, Mass. The estimated immigration for each 1,000 barrels of daily production ranges from a low of 19 persons to a high of 60 in 1985. Among the reasons for the variation are the way in which employment levels were calculated, the average family size assumed, assumptions about future population levels not related to OCS activity, and the proportion of employees that do not bring families into the area. The draft EIS for OCS sale #42 indicates that many of the workers would be highly skilled, young, mobile, and unmarried. The impact of these migrations on municipal services will depend on the validity of all these and other assumptions.

Table 8 Estimates of OCS-Related Population Immigration into Bristol County, MA. (Sources listed in table.)

Source	1985		2000	
	Total population	Persons per 1,000 bbl daily production	Total population	Persons per 1,000 bbl daily production
CEQ, 1974	15,000	60	12,000	24
Grigalunas, 1975	11,550	19	9,500	16

4.3 Public Expenditures

A basic planning issue is whether additional public expenditures necessitated by an influx of workers would be offset by the revenue generated by OCS activity. One recently published report indicates that public costs related to OCS activities would exceed revenues in the first three years of development activity; however, revenues would exceed expenditures in the following years.²¹ Arthur D. Little, Inc., calculated property, sales, income and corporate tax revenues and local municipal service costs for its scenario, but did not examine governmental costs. The results for local costs versus local revenues are shown in Table 9.

Table 9 Comparison of Municipal Service Costs and Property Tax Revenues from OCS Development. (Source: A.D. Little, Inc., 1975.)

	Years After Lease Sale		
	5	10	15
Property taxes	\$ 907,000	\$1,493,000	\$3,006,000
Municipal service costs	1,286,000	2,022,000	3,834,000

The property tax is the primary method of paying for municipal services. The A.D. Little calculations show that municipal costs are likely to exceed the property tax revenue generated from OCS activity. The study noted that there is a great deal of uncertainty in New England over whether OCS-related industries are taxable either as real estate or personal property. It quoted an article from the Providence Journal which stated that:

Whatever other benefits an oil refinery might bring to Rhode Island, the Governor's newly enacted economic development program has taken away most of the impact it could have on local revenues...Under the state's revised taxing structure...only a small fraction of this investment will be taxable.²²

The situation is similar elsewhere. It would appear advantageous, therefore, for the New England states to reconsider their tax structures.

In 1976 Congress approved an energy impact amendment to the 1972 Coastal Zone Management Act. The Coastal Energy Impact Fund (CEIP) was established to mitigate the problems communities face in providing front end monies for public services prior to receipt of taxes from OCS-related facilities. It provides loans to finance public services, planning grants and monies to mitigate unavoidable losses. The formula for allocation of the money is based on several criteria including a previous sale, previous OCS employment and adjacency of offshore drilling activity to the state.

4.4 Economic Costs of Environmental Disruptions

Adverse environmental impacts of offshore oil development are especially threatening to tourism and commercial fishing, which are dependent upon a clean and productive coast. Marine organisms, coastal

vegetation and wildlife, wetlands, beaches, and air and water quality all will feel to some degree the pressure of OCS development. Unfortunately, there are no studies available that provide a complete evaluation of the economic costs of the potential damage to these resources from drilling activities off New England.

General Impacts

The MIT study of Georges Bank is the only regional study which examines the overall economic cost of environmental disruptions. The results of this study are presented in Table 10. The data reflect the fact that the increased transport of oil to a regional refinery would increase the likelihood of a major spill, consequently raising the economic and environmental costs. These costs include the value of the product lost and the cost of clean-up. A limitation of the study is that it does not take into account potential losses resulting from the disruption of recreation and fishing.

Recreation and Tourism

The New England coast is an important marine recreational area for both residents and tourists. Major coastal state and Federal parks in the region are shown in Figure 6. The recreation areas in Rhode Island and southeastern Massachusetts are close to the proposed leasing area and are particularly vulnerable to potential oil spills and OCS-related activities associated with OCS development.

The Rhode Island Department of Economic Development (personal communication, December 1976) stated the value of tourism in Rhode Island is estimated at \$100 million per year, and the Cape Code area received more than \$76 million annually from tourist spending.²³ If a major spill washed onto the shores during the summer, the loss could be significant in the short term.

Figure 6. Major coastal state and Federal parks in New England (Source: TRIGOM, 1974).

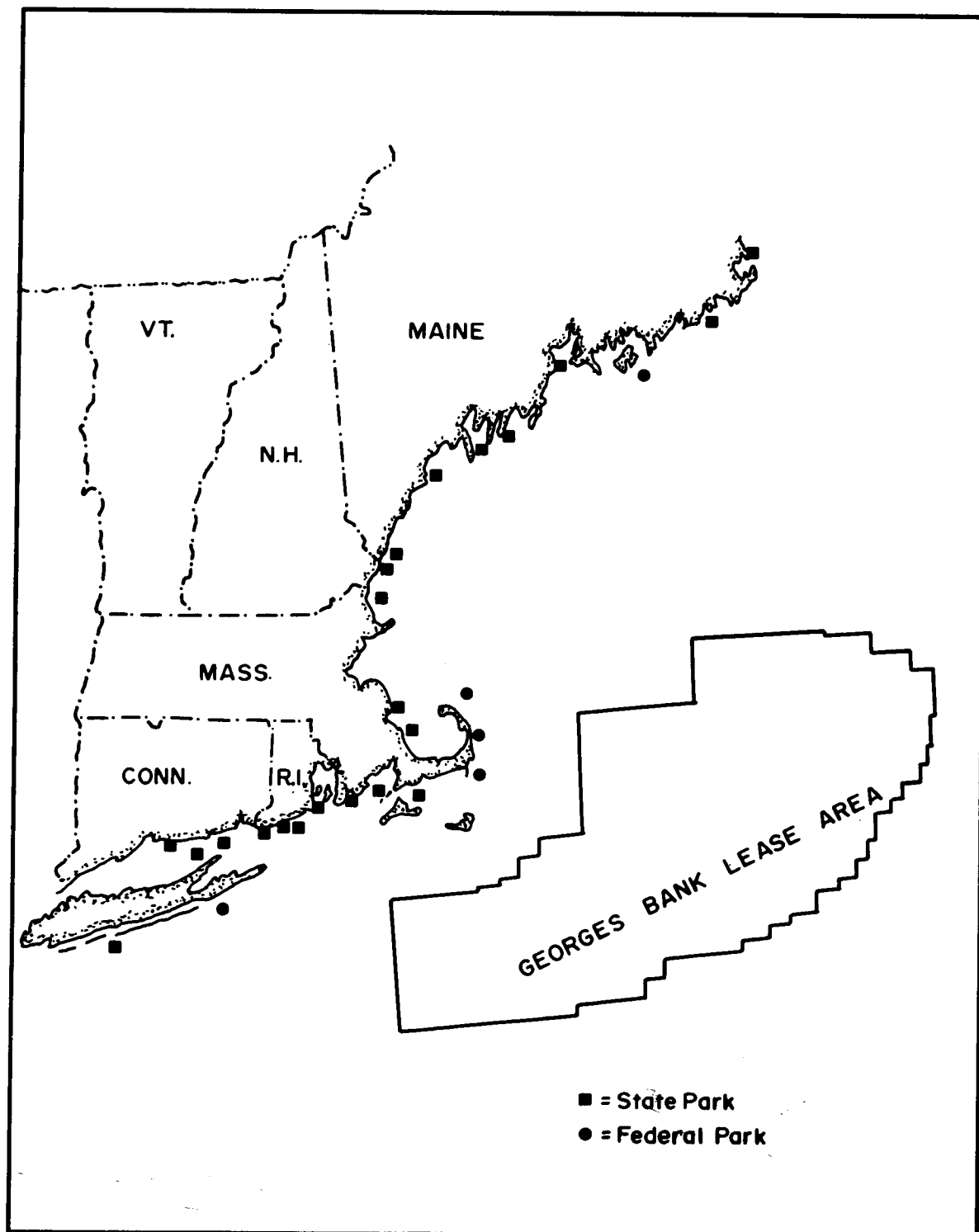


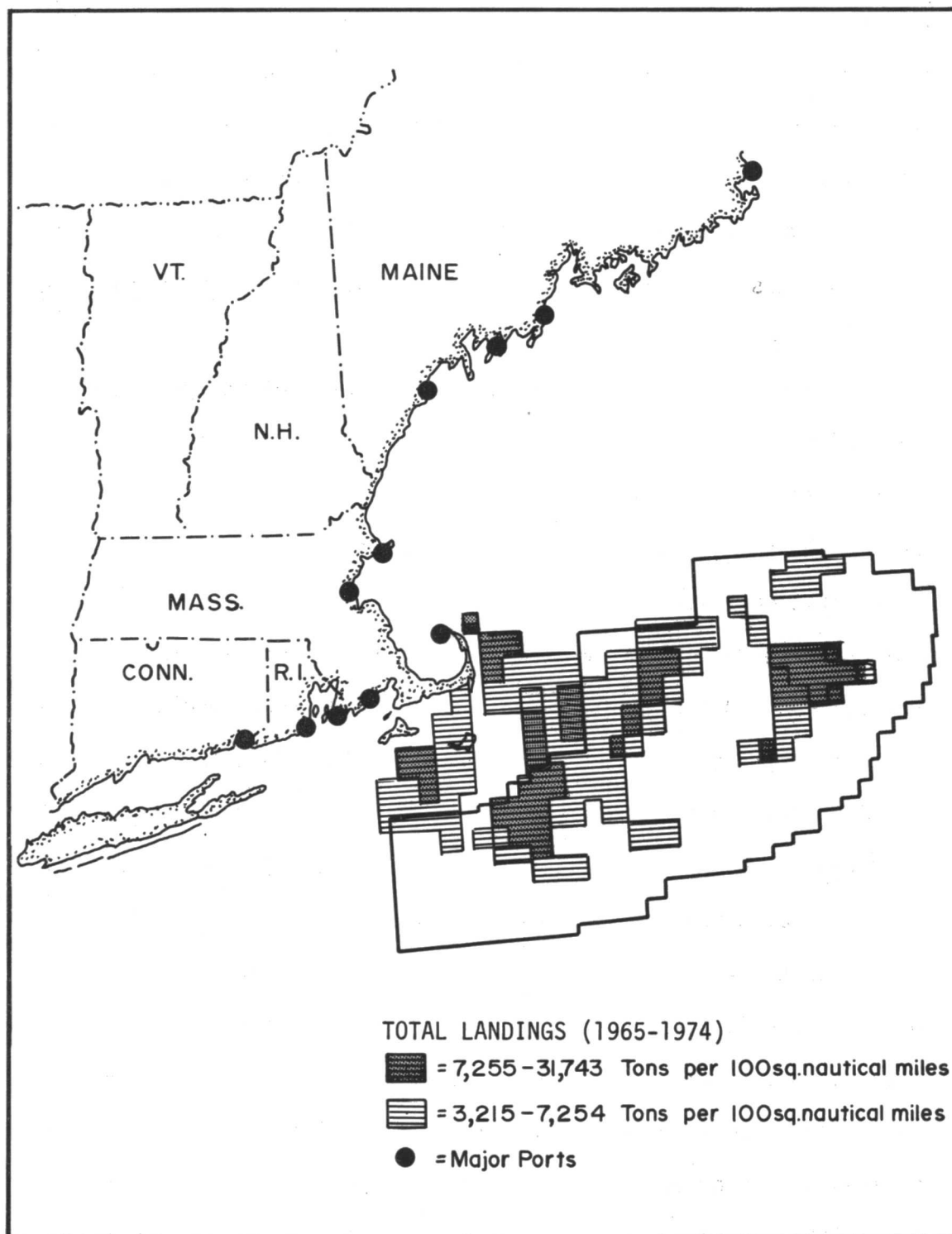
Table 10. Economic Costs of Oil Spills in New England, 1978-2018, Under Various Development Assumptions (Source: Offshore Oil Task Group, 1973.)

	Spilled (millions of gallons)	Cost (millions of 1972 dollars)
Base Case		
No find, no refinery	20	100
Case 1		
No find, refinery		
no pipeline	35	185
pipeline	23	115
Case 2		
Small find, refinery		
no pipeline	35	185
pipeline	23	115
Case 3		
Large find, no refinery	20	100
Refinery		
no pipeline	35	185
pipeline	23	115

Commercial and Sport Fishing

The New England commercial fishing industry is an important industry in the region. In 1975, the total commercial New England landings were 497 million pounds with a dockside value of \$149 million. (The major fishing grounds for New England are located on Georges Bank.) If extended jurisdiction permits stocks to recover and excludes foreign fishing, there is a potential that additional landings from Georges Bank alone could generate for the region an annual total of \$420 million in transactions.²⁴ Figure 7 shows domestic fishing activity in the Georges Bank area based on total landings, 1965-1974.

Figure 7. Major fishing ports and domestic fishing activity on Georges Bank (Source: Coastal Resources Center, 1976)



The MIT study about Georges Bank examined a worst-case scenario of the impact of an oil spill on adult finfish populations and the interference of oil development equipment and production platforms with fishing. It concluded that, although the regional costs of such losses would be minimal, a small segment of the human population would be affected severely. For this reason, it stressed the importance of compensation to individual fishermen suffering losses. This conclusion was reaffirmed by the University of Rhode Island Study: Fishing and Petroleum Interaction on Georges Bank.

The economic impact on the fishing industry of the presence of oil-related facilities and activities was also examined in the University of Rhode Island fish-oil study.²⁵ In calculating a worst-case estimate of the loss of fishing ground due to platform installations, the study concluded that only 1.2 percent of the dollar value of Georges Bank landings would be affected. Areas most likely to be affected are the grounds for sea scallops and flounder. Reduction in these stocks would most severely affect the New Bedford fleet. It was also determined that debris on the sea floor and conflicts between oil-related craft and fishing vessels could result in substantial losses to individual fishermen. The study also examined competition between oil and fishing interests for port facilities and workers. Loss of crews to the oil industry is a major concern, especially since the demand for labor in the fishing industry is expected to increase in the near future. While petroleum development would provide employment for no more than 2,000 New Englanders, the fishing industry is expected to need 6,000 fishermen in the same period. The major fishing ports which could be affected by such competition are shown in Figure 7.

Marine sport fishing is an important activity in the region. The gross value of sport fishing in the Northeast has been estimated at nearly \$1 billion, not including the popular activity of recreational shellfishing. Sport fishing landings account for almost 37 percent of the total harvest of bluefish, striped bass, mackerel, flounder, and cod. Commercial and sport fishermen also compete for scup, haddock and pollack.²⁶ Offshore oil development could disrupt sport fishing to some degree. Offshore and nearshore spills could damage stocks and OCS-related facilities could restrict public access to fishing and shell-fishing areas.

5. REGIONAL INFORMATION AND ANALYSIS

Numerous studies have been prepared to aid regional, state, and local decisionmakers, planners, private organizations, and citizens in understanding and preparing for the likelihood of petroleum and gas development on Georges Bank. Although each study has taken a somewhat different approach in assessing the impact of potential development, all of the studies deal with the environmental or socio-economic effects of development, and in many cases, both. Summaries of the major reports, or relevant sections, have been organized accordingly.

The first important examination of the ecological and economic effects of oil and gas development was The Georges Bank Petroleum Study, prepared by the Offshore Oil Task Group of the Massachusetts Institute of Technology. The New England Regional Commission decided in 1972 that such a study was necessary, and the final report was published in February 1973.

This was followed, in April 1974, by the Council on Environmental Quality's OCS Oil and Gas: A Report to the President. Leasing activities on the Atlantic shelf were suspended by President Nixon in 1972 until the environmental assessment was prepared. The report covered onshore areas along the entire Atlantic coast, including an inventory of the New England area and an analysis of Bristol County, MA, in detail.

Two reports on the potential economic effects of petroleum development in New England were published in 1975. Offshore Petroleum and New England, by Thomas Grigalunas, was supported by Sea Grant funds and published by the University of Rhode Island. A second

report, supported and published by the New England Regional Commission, was Effects on New England of Petroleum-Related Industrial Development by Arthur D. Little, Inc.

Several reports pertaining to Georges Bank have been published in 1976. The first, released in February, was Fishing and Petroleum Interactions on Georges Bank, Volume One: Areas of Particular Interest to the Industries, written by the Coastal Resources Center of the University of Rhode Island and published by the New England Regional Commission. Another fisheries study, Effects on Commercial Fishing of Petroleum Development off the Northeastern United States, was released in April. The document was a compilation of studies by the Marine Policy and Ocean Management Program at Woods Hole Oceanographic Institution funded through grants from W.H.O.I. and the American Petroleum Institute. In November, the New England River Basins Commission distributed Onshore Facilities Related to Offshore Oil and Gas Development: Estimates for New England, and Factbook. In October the Draft Environmental Statement for OCS Sale No. 42 was released by the Bureau of Land Management. The Environmental Statement was essentially a compilation of data about Georges Bank.

In March 1977, the New England Regional Commission released Volume II of Fishing and Petroleum Interactions on Georges Bank. The report prepared by the University of Rhode Island summarizes the characteristics of the two industries, potential future trends, and assesses foreseeable conflicts.

The University of Rhode Island also prepared for the R.I. Department of Economic Development An Environmental Assessment of the Redevelopment of Quonset/Davisville, R.I.. Additionally a site

development and socio economic study was conducted by Keyes Associates and Gladstone Associates respectively. The three-volume study released June/July, 1977 discusses three scenarios for the site (including an all oil scenario).

5.1 Ecological Effects of Petroleum Development

The MIT project, The Georges Bank Study, examined spill probabilities, spill trajectories, spill containment and removal, biological effects of oil in the ocean, and the results of hypothetical spills and discharges. The report assessed various scenarios of offshore development, from no-find to a large find and with or without a refinery. It presented data on the probable quantity of oil spilled annually for the different scenarios. The greatest impact occurred when a refinery was sited in the region.

In April 1974, the Council on Environmental Quality released OCS Oil and Gas, An Environmental Assessment. This study examined the technology for developing offshore energy resources, the impact of natural phenomena on the development process, and the effects of development on the offshore environment and on a local community (Bristol County, MA). In addition, the report quoted the findings of an MIT study prepared for CEQ which indicated that, under worst seasonal conditions, there was a 0.15 - 0.20 probability of oil being washed ashore from hypothetical spills on the eastern portion of the bank, and a 0.35 - 0.50 probability of such an effect from a spill on sites in the western part of the bank. On the basis of their study of eight areas along the Atlantic and Alaskan coasts, CEQ ranked eastern Georges Bank lowest and western Georges Bank third lowest in terms of risk from spills during drilling.

The Arthur D. Little study, Effects on New England of Petroleum Related Industrial Development, released in April 1975, developed several scenarios and examined facilities required for offshore development. The case studies took into account refinery development, petrochemical development, marine terminals, and exploration and development on Georges Bank. The focus was on specific facilities hypothesized for a range of production levels. An environmental element was included in the discussion of each facility: the probable amount of effluents, performance standards, and water and land requirements.

Two investigations in 1976 concerned themselves specifically with the interaction of fishing vessels and petroleum development on Georges Bank.

A general report was prepared by the Woods Hole Oceanographic Institution, Effects on Commercial Fishing of Petroleum Development off the North Eastern United States. This report contains chapters on the potential interactions of the two industries, the Georges Bank environment, the nature of Atlantic coast fishing, characteristics of offshore and onshore operations, a review of the legal framework in which the petroleum industry operates, and the means by which compensation for oil pollution damage can be obtained.

The New England Regional Commission funded a detailed study by the Coastal Resources Center Fishing and Petroleum Interactions on Georges Bank. The first volume of the study provides an overview of the issue and preliminary inventory maps which identify major fishing

grounds, distribution of commercial species, known spawning grounds, benthos, sediments, and currents, as well as the areas of greatest interest to the petroleum industry. All of this data was presented according to the tracts established by the Bureau of Land Management. The second volume of the study printed in March 1977 contains a discussion of the possible characteristics of Georges Bank petroleum development and its impact on the expanding New England fishing industry. To assess the environmental impacts of offshore oil development, the study analyzed data from the National Marine Fisheries Service Groundfish Survey and assessed the effects of petroleum discharges on the Georges Bank environment.

A recent report which has proved useful is Estimates for New England, prepared by the New England River Basins Commission for the Department of Interior's Resources and Land Investigations Program. Like the Arthur D. Little Report, this document calculates a range of petroleum finds and assesses the effluents of possible related facilities including service bases, platform fabrication yards, platform installation, pipelines and landfalls, pipe coating yards, gas processing plants, and refineries. Detailed information for specific facilities is presented for the high-find scenario of 2.4 billion bls. of oil, and 12.5 Tcf gas, and medium-find scenario of .9 billion bls. of oil and 4.2 Tcf.

The environmental assessment of Quonset/Davisville, Rhode Island prepared by the Coastal Resources Center at the University of Rhode Island developed and applied a methodology for determining impacts

associated with the location of major OCS related industries at a specific site. One of the major conclusions of the study was that the site specific environmental impacts of an all oil scenario would be minor if recommended development stipulations were adopted. It suggested, however, that transportation related activities, including accidental spills of oil or toxic materials during transfer, could adversely impact the adjacent marine and land areas if not properly managed.

5.2 The Social and Economic Effects of Petroleum Development

In 1972, the MIT Georges Bank Petroleum Study focused on the "net effect on real regional income." It utilized a computer model which calculated several hypotheses of the cost of petroleum in New England, including variations in the existence of import quotas, refinery location, product mix, regional consumption, control of development, and product distribution. It also examined likely market price changes, and the present value of the capital cost of various development scenarios. Changes in regional income because of spills, chronic discharges, and loss of fishing grounds were also computed. The study concluded that the most important variable in the cost of future oil will be the price of imported oil. Therefore, petroleum development on Georges Bank will have no effect on oil prices, and probably few regional employment benefits. They further noted that an offshore spill would not affect regional income greatly, while a nearshore spill would have a significant impact.

The CEQ report on OCS Oil and Gas predicted that a high find in Georges Bank would yield .75 million bls./day in 1985 and 1.75 million

bbls./day by 2000. Eight gas processing plants and three petrochemical complexes would be required. Employment in the study area, Bristol County, MA, would be seven to nine percent higher than estimates without OCS development. Up to 44,000 people would move into the county.

Gribalunas' report, Offshore Petroleum and New England, created scenarios on low and high find cases of petroleum production. These were then analyzed according to the direct investments related to that development and the potential of refinery activity in New England. The economic consequences of the scenarios for Bristol County, MA, was presented. Finally, the report included a discussion of adjustment for the net actual increase in national economic activity due to the shifting of investment and resources to petroleum development rather than some other type of activity in the region.

The Arthur D. Little study, Effects on New England of Petroleum Related Development, developed information on the regional effects of 23 modules related to petroleum development, including refineries, petrochemical plants, marine terminals, and exploration/production. The discussion of each module included the capital investment by type of expenditure, operating expenses, and regional economics. Included in the latter were estimates of primary and secondary employment wages in 1974 dollars, state and local taxes generated, and important economic issues related to each facility. The bulk of the report contains a great deal of background material and discussion of the reasoning behind each module summary. The focus of the report is on general regional effects, and a major conclusion is that the majority of both benefits and costs of petroleum development will be felt at the local level.

The Woods Hole study on the Effects on Commercial Fishing of Petroleum Development is general in nature and describes the nature and productivity of the fishing activity on Georges Bank, rather than analyzing hypothetical developments. A general discussion of the effects of accidents and spills on the individual fisherman is presented.

The second volume of the Coastal Resources Center study, Fishing and Petroleum Interactions, discusses how the growing fishing industry in New England will be affected by OCS development. The socio economic element of this study examined the two industries, competition for labor, dock space, and vessel repair facilities, and the consequences of pre-empted fishing grounds, and oil-related debris. One of the general conclusions of the study is that serious disruptions to the fishing industry could be minimized if fishermen are consulted on location of offshore structures and alterations are made if necessary; and if the petroleum related industries site their onshore facilities at presently vacant ports or excessed Navy bases.

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APPENDIX I

STATE CONCERNS AND OCS PLANNING EFFORTS

Each of the New England states hopes to benefit from OCS-related economic activity, yet each desires to protect its coastal resources. Maine is concerned with maintaining the quality of the environment and developing its port facilities. In expectation of increased petroleum-related activities, Maine established an oil pollution damage fund. New Hampshire has consistently supported rapid development and hopes to attract OCS-related industrial activity, including service bases, construction yards, and an oil refinery. However, at the local level there has been some reluctance to site oil facilities along the Maine coast. The Commonwealth of Massachusetts has also been actively seeking OCS support activities, but has remained a strong advocate of safeguards to protect its fishing industry and environmentally sensitive areas. Rhode Island has been the most successful of the New England states in attracting temporary service bases for OCS activities. However, the state is also concerned about the effect of OCS development on its coastal lands and marine life, and has initiated planning studies. Connecticut has little direct concern with present OCS development activities. However, it too is aware of both the costs and benefits of OCS development.

Major Participants in State OCS Planning

Maine:

- State Planning Office (Coastal Management Program)
- Governor's Advisory Committee on Coastal Conservation and Development

New Hampshire:

- New Hampshire Department of Resources and Economic Development
- Strafford-Rockingham Regional Council
- Office of Comprehensive Planning (Coastal Resources Management Program)

Massachusetts:

- Executive Office of Environmental Affairs (Coastal Zone Management Program)
- Energy Policy Office
- Department of Commerce and Development

Rhode Island:

- Governor's Energy Policy Office
- Coastal Resources Management Council
- Department of Environmental Management (Division of Coastal Resources)
- Department of Economic Development
- University of Rhode Island (Division of Marine Resources, Coastal Resources Center)

Connecticut:

- Department of Environmental Protection (Coastal Area Management Program)
- Department of Planning and Energy Policy

Maine

Maine is very interested in offshore oil development. In fact, the state of Maine is the only New England state which tried to lease land on the Outer Continental Shelf, resulting in the case U.S. vs Maine, which Maine lost. It has also been considered a viable site for a refinery and several proposals have been submitted to local communities. The state, however, is very concerned about protecting its resources. Governor Longley has been one of the most active advocates in the struggle for orderly and planned offshore development in New England. The state is interested in port development planning and in acquiring sufficient information for analyzing the social, economic and environmental effects of OCS-related development. Maine already has laws

concerning oil discharge, and the Maine Coastal Protection fund was set up to provide funds for research into oil spill problems. In addition, a board of arbitration has been established to decide damage claims and third party damages. It is funded by a .5 cent tax per barrel of oil transferred in the state. Also, state permits are required from the Board of Environmental Protection for wetlands alterations and development of areas larger than 20 acres.

New Hampshire

Governor Meldrim Thompson is a vigorous supporter of offshore oil development, and this is reflected in New Hampshire's approach toward the building of onshore facilities. With Section 305 of the Coastal Zone Management Act planning money, the state is funding an "OCS Onshore Facility Siting Impact Study." The study consists of an onshore facilities analysis to determine which facilities could be built in the state, site evaluations, and a demonstration computer-based impact analysis. The state published the Impact of Offshore Oil: New Hampshire and the North Sea Experience, which was the result of a trip by New Hampshire officials to investigate North Sea oil developments. They also published Impacts of an Oil Refinery in Southeastern New Hampshire, a study prepared by the University of New Hampshire in 1974. It should be noted that although the state is encouraging development the decision making power on particular facilities lies primarily with local communities.

Massachusetts

Massachusetts has been one of the most active states in responding to federal leasing activities and engaging in planning for

petroleum development along its coast. In 1974, Massachusetts was the only New England state to attend meetings with the Secretary of Interior for the purpose of delaying the public hearing on the accelerated leasing program. It also submitted numerous comments about the draft environmental impact statement in 1975. Furthermore, its energy policy office took the initiative to develop a regional response to delay the August 18, 1975, deadline for formal nominations and comments on Georges Bank. As a result, the governors of Maine, Massachusetts, Rhode Island, and Connecticut signed a telegram sent to DOI, unsuccessfully requesting a delay. In June 1976, Massachusetts submitted its recommendations for tract withdrawals, mitigating actions, and lease stipulations.

The State is interested in attracting the oil industry and, in fact, the governor and several representatives attended the Offshore Technology Conference in Houston in May of 1976 for this purpose. The State's policy is basically that it welcomes offshore exploration and development, if actions onshore are undertaken responsibly, and as long as development does not undermine environmental assets crucial to the fishing industry, tourism, and the quality of life. Massachusetts expects a variety of onshore impacts, and has prepared documents addressing that issue specifically. For example, the coastal management program released a report in August 1975 entitled OCS Development and Massachusetts: A Preliminary Assessment. The Massachusetts coastal zone program has also prepared a draft management plan which addresses the siting of energy-related facilities.

Massachusetts is particularly concerned about potential impacts of offshore oil developments on its fishing industry. In 1966, New Bedford fishermen complained of fish kills as a result of seismic exploration. In recent years, gear losses due to exploratory activities have caused problems for individual fishermen. When the SEDCO-J rig was towed out to drill the COST well, it accidentally destroyed lobster gear. The state has established a 200-mile work-group, in which members of the fishing and processing industries work with the state toward solving fishing problems in the North Atlantic. One of the six subcommittees established deals with future conflicts of petroleum development on Georges Bank. State officials from the energy policy office and other agencies serve as staff to the committee, which is developing goals for the state on fishing and offshore oil.

Many coastal communities in Massachusetts are promoting their port facilities for use in oil development, and several have sent delegations to various oil-related conferences in the hopes of attracting onshore support industries which would stimulate their economy. Other areas, such as Nantucket and southern Cape Cod communities, have expressed strong concern in regional hearings about the possible damage resulting from drilling and production. The state reflected this concern in its 66-nautical-mile oil-spill hazard line, drawn from the Nantucket and Cape Cod coasts, within which it had asked for the withdrawal of seven tracts and requested oil spill trajectory studies be conducted on 17 others. This decision was based on the information published in the initial Georges Bank petroleum study by MIT.

Rhode Island

Rhode Island is very interested in attracting OCS-related facilities to the state. The Governor's office and the Department of Economic Development have encouraged oil companies and service companies to locate in surplus military lands, particularly the Quonset Naval Air Station and the Davisville Construction Battalion Center. In fact, the governor successfully attracted to Davisville, RI the service company for the vessel that drilled the COST hole. The Rhode Island delegation to the May 1975 Offshore Technology Conference in Houston was also successful in calling the industry's attention to the Quonset/Davisville facilities.

The state has been actively planning for the advent of offshore oil activities. In the spring of 1975, the state legislature established a special legislative commission to study the effects of offshore oil development on Rhode Island. In June 1975, the governor established an OCS Technical Task Force, which submitted a report in December of 1975 outlining possible directions of Georges Bank petroleum development and planning strategies for the state. They recommended a functional plan be developed for the use of state resources and that an effort be made to educate public officials and private citizens about offshore development. In September of 1976, the state held a three-day workshop on the technical and planning aspects of offshore oil development. The state has since completed a study of the Quonset/Davisville facility utilizing federal planning funds. The study included land use plans, an environmental impact assessment and socio-economic analysis. In addition, the Coastal Resources

Management Council has prepared policies regarding the siting of petroleum-related facilities as part of their coastal zone management program.

Connecticut

Of all the New England coastal states, Connecticut has shown the least concern about the direct impacts of offshore petroleum development. It has focused instead upon the impact of secondary facilities, such as oil refineries and other large land-based facilities, on its coast. In fact, a Task Force on oil refineries was created in 1974 in response to several refinery proposals for New London County. In January 1975, the task force released its final report, which included a comprehensive review of the nature and land use requirements of refineries. Recently, Connecticut stated in a survey by the BLM and the Office of Coastal Zone Management that the state feels there is insufficient information at the present time to evaluate whether OCS petroleum development activities and facilities should be a major concern of the state. They felt, however, that OCS activity may initiate related developments that would be of concern to the state.

Long Island

Long Island could be affected by OCS developments in the North Atlantic as well as the Mid Atlantic since the proposed tanker route for Georges Bank passes along its coast. Nassau and Suffolk Counties, which are the major governmental bodies on Long Island, are particularly concerned about the effects of petroleum development on the important recreational areas along their south shore. Both counties, along with

several south shore communities, joined in a suit by the Natural Resources Defense Council against the Department of Interior. They sought to rescind the sale of leases for the Mid Atlantic on the basis of violation of the intent of the National Environmental Policy Act. On February 17, 1977, the federal district court in Brooklyn ruled in their favor and annulled the Mid Atlantic sale, pending appeal by the Department of Interior.

APPENDIX II

REGIONAL OCS PLANNING EFFORTS

New England has two major regional organizations involved in OCS planning activities: the New England River Basins Commission (NERBC) and the New England Regional Commission (NERCOM).

The New England River Basins Commission has been active for several years in helping the region plan for offshore oil-related development. They established a New England Coastal Zone Task Force in 1974 which provides a mechanism for the identification of issues of concern and facilitates the transfer of information between state coastal zone management programs. Issues pertaining to offshore oil and gas development have been an important subject for the Task Force. It recently formed subcommittees on oil spill contingency planning and offshore pipeline planning. NERBC also provides the states with valuable technical assistance through an information center and various studies. The New England OCS Technical Assistance Center created in 1974 serves as the central source for information on offshore oil development in the region. Additionally, the Commission conducted several OCS studies under agreement with the Resource and Land Investigations (RALI) Program of the U.S. Department of Interior's Geological Survey. Two of these studies--the Factbook and Estimates for New England have been used extensively by the New England coastal states for planning purposes.

The New England Regional Commission has provided a forum for the state governors to address regional concerns and has also financed several studies which have provided the region with important information regarding offshore oil development. NERCOM supported the first

regional study of the problems and opportunities of OCS development by the Massachusetts Institute of Technology The Georges Bank Petroleum Study, 1973. It then commissioned Arthur D. Little, Inc., to prepare Effects on New England of Petroleum Related Industrial Development, released in 1975. In November of 1976, NERCOM funded the University of Rhode Island to prepare a critical review of the Draft Environmental Impact Statement for proposed lease sale 42. NERCOM also supported a study of Fishing and Petroleum Interactions on Georges Bank, which was prepared by the University of Rhode Island and released in May 1977.

An important informal regional organization concerned with OCS development is an ad hoc group of representatives of the fishing and oil industries. Established in September 1976, the group serves as a forum for problem solving and communication between fishermen and oil-related firms operating in New England waters. One of their primary tasks is to resolve disputes and claims over damaged fishing gear.

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