Section 9

THE POTENTIAL IMPACT OF OIL RELATED DEBRIS ON THE NEW ENGLAND FISHING INDUSTRY

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FISHING AND PETROLEUM INTERACTIONS ON GEORGES BANK

VOLUME II: THE CHARACTERISTICS OF THE TWO INDUSTRIES, POTENTIAL FUTURE TRENDS, AND AN ASSESSMENT OF FORESEEABLE CONFLICTS

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INTRODUCTION

If experience elsewhere is a reliable guide, offshore oil exploration and development are likely to result in debris on the ocean floor that can foul fishermen's gear. This is expected to produce one of the more noticeable day-to-day conflicts between the petroleum and fishing industries. For example, in the North Sea, Scottish fishermen's representatives have stressed that "debris is possibly the most serious factor affecting fishing operations..." (Dept. Agric. and Fisheries for Scotland (DAFS), October, 1975). It is also a problem that defies simple solution. Assessing the true extent to which fishing operations are affected is a formidable task, and all remedies proposed to date have serious shortcomings.

THE PROBLEM

Exploration and development activities quite naturally generate waste material that once used or damaged must be removed from the work area. Such waste material includes scrap metal, piping, cable, empty barrels and paint cans. Proper disposal calls for the material to be transferred from the rig or platform to a supply boat that carries it to a designated dumping site either onshore or offshore. Instead, waste material may be simply thrown into the sea from the rig, platform or supply boat, to settle on the bottom. Accidents at sea, especially during rough weather, also result in debris being dumped in the ocean. In such cases the debris often is not waste material but rather usable equipment and supplies. Cases have been cited in the North Sea where full paint containers and large machinery have been found on the ocean floor.

Innes (1976) reports some dramatic incidents in the North Sea. The trawler Fear Not struggled for four to five hours with a great weight in its net. When finally hauled on board, 20 large oil drums filled with a variety of waste materials were found. The net was almost entirely destroyed. In another North Sea incident, the trawler Esberg hauled in with its catch a 50-gallon drum of paint, which fell on the deck and burst open. All the fish had to be thrown overboard, and a 12-hour cleaning operation was required before fishing could be resumed. Fishing News International (August, 1974) reports on a fisherman who, on one tow, hauled in a half-ton of fish and a ton of trash. The trash included cable, safety helmets and perforated oil drums.

While a complete loss of the fishing gear is rare, significant damage to it is not. Table I lists the claims

TABLE 1

CLAIMS FOR DEBRIS DAMAGES, SCOTLAND

Period of Time	No. of Claims	Value of: Lost and Damaged Gear	Lost Time
5/74-7/75	41	£20,000	
8/75-12/75	50[a]	21,000	£8,000
1/76-6/76[b]	30	11,376	3,100[c]
TOTAL	121	£52,376	£11,100

[a] Includes 35 claims, amounting to £16,174, filed against individual oil companies.

[b] Data for this period do not include 28 claims by individual oil companies.

[c] Eighteen of the thirty vessels submitted claims for lost fishing time.

SOURCE: Scottish Fishermen's Federation (1976) and Department of Agriculture and Fisheries for Scotland (1976).

made to the compensation fund of the United Kingdom Offshore Operators Association for damages resulting from oil-related debris. From May, 1974, through June, 1976, some 121 claims were filed for a total of £63,476 (about U.S. $123,000 at current exchange rates). These claims are from an area in which some 700 to 800 vessels fish regularly.[1] A few caveats are in order with respect to this data. First, not all of the claims filed are paid in full;[2] second, only since late 1975 have claims been filed for lost fishing time; and lastly, these claim statistics do not include all of the claims filed directly against specific oil companies. Between January 1 and June 30, 1976, a total of 56 claims were filed directly against oil companies. Subsequently, 28 were referred to the managing committee of the fund, 17 were settled, and 11 were still under consideration at the end of 1976. The value of the direct claims is not available.

The majority of the claims submitted to the fund during the first six months of 1976 were in the £100 to £350 range (U.S. $178 - $623, in June, 1976), but 8 of the 30 ranged between £650 to £1500 ($1157 - $2670). Similar data on the other periods are not available.

The cost of replacing gear in New England's offshore fisheries is not insubstantial. Table 2 gives the cost of new fishing gear for two representative trawlers of the type that fish for groundfish on Georges Bank. If new warps are included, the total cost ranges between $7,000 and $10,000. It should be noted that seldom is all the gear lost. Warps must be replaced only if they have to be cut at the surface.

Debris and bottom obstructions may cause not only lost or damaged gear but also lost fishing time. If a trawler or scalloper were forced to return to port for new gear, a day or more could be lost in steaming time from and to the grounds. If an entire new trawl has to be put togehter, two to four days may be spent in port. If new doors must be purchased (new doors are frequently modified to meet the requirements of individual skippers) and new warps stretched and marked, a week may be lost. While the amount can vary widely from vessel to vessel, and by season, the daily loss in gross revenue for a large trawler could well be $2,000. If we assume that 33 percent accounts for variable costs, the net daily loss of income to the vessel owner and crew would be $1,333. A week of lost fishing time could therefore add up to $9,330 in compensation to the vessel owner and crew. The problem of lost fishing time may be further complicated if the vessel is a large trawler operating under New Bedford union rules which stipulate that a minimum of 72 hours must be spent in port between trips. This could cause

TABLE 2

COST OF NEW GEAR FOR SELECTED GROUNDFISH VESSELS

	Vessel No. 1[a]	Vessel No. 2[a]
Trawl Net	$1,600	$4,000
Doors	1,200	1,200
Warps	4,500	4,500
TOTALS	$7,300	$9,700

Source: A. Hillier, Professor of Fisheries Technology, University of Rhode Island (personal communication).

[a]Vessel No. 1 fishes primarily for yellowtail and other flounder.
Vessel No. 2 fishes primarily for cod. The reason for the considerable difference in the cost of the trawl between the two vessels is that flounder are generally harvested on soft bottom while cod are harvested on hard bottom. In the latter case expensive rollers on the footrope are required.

delays from what might otherwise only be a day in port to pick up new gear.

In most cases, however, when the gear is damaged repairs are made at sea. It is common practice for vessels to carry spare gear. Fishermen's union contracts in New Bedford stipulate that trawlers be equipped with a wide variety of spare gear. If gear can be replaced or repaired at sea, the fishing time lost will probably be calculated in terms of hours.

SOLUTIONS

Suggested and attempted solutions to the debris problem fall into three general categories: legal, induced prevention and compensation to fishermen.

Legal

The Department of Interior's OCS Number 7 (Mid-Atlantic Region) prohibits petroleum operators from dumping polluting waste materials into the ocean: "In the conduct of all oil and gas operations, the operator shall prevent pollution of the ocean. Furthermore, the disposal of waste materials into the ocean shall not create conditions which will adversely affect the public health, life or property, aquatic life or wildlife, recreation, navigation, or other uses of the ocean" (Section 1). "Mud containers and other solid waste materials shall be incinerated or transported to shore for disposal in accordance with Federal, State, or local requirements" (Section 1.B (2)). OCS Order 3 (section 2(I)) requires that the operator clear permanently (though not temporarily) abandoned well sites of any obstructions.

The existence of these regulations, however, does not insure that there will be no problems with oil-related debris. The United Kingdom has its Dumping at Sea Act (of 1974) and yet, as noted above, there is considerable difficulty with debris in the North Sea.

The primary reason for the inability of laws and regulations to prevent disposal of waste in the ocean is that effective enforcement of such laws and regulations is difficult, if not impossible, in many cases. Little imagination is required to observe that on the open sea where often no other craft are in view, the dumping of waste material can easily go unobserved. To set up an observation system, which would monitor all oil supply vessels, would be very costly.

Given that the act of dumping will probably go on unobserved, the effect will be detected only when the debris is encountered. To enforce the law, the party responsible for the dumping must be identified. Therefore, the debris will have to be brought to the surface for identification, or divers will have to go to the ocean bottom to examine the material. Hiring divers every time fishing gear becomes snagged on a bottom obstruction is not feasible, and in many cases the trouble may not be due to oil-related objects.

Even if the debris can be examined, no markings may exist to identify the offending party. A partial remedy would be to require oil company labels on all material over a specified size taken offshore. Even with labeling, however, some companies may deny responsibility. They may argue, as some have in the North Sea, that the supply boat operators are separate firms and that they, not the oil companies, are liable for the dumping. If this argument prevails, identification of the specific supply boat operators may be impossible. Effective enforcement will at least require, therefore, that the oil company that uses the material assumes responsibility for proper disposal.

Another approach to identifying the illegal dumper of waste material would be to establish a detailed record of every piece of material taken offshore. Every item taken offshore would have to be accounted for and would be taken off the record only when properly disposed of. There are several obvious problems with this proposal. It would be extremely expensive and cumbersome both for the companies to keep the records and for the government to audit them to insure proper procedures were being followed.

Induced Prevention

Some have argued quite convincingly that intentional dumping of waste material might be reduced if the supply boat crew were not made responsible for unloading at the wharf (Allen, 1975). According to this reasoning, crews prefer to dump material in transit in order to have time free onshore. If onshore stevedores were made responsible for unloading, the supply boat crew would have no incentive to intentionally dump at sea.

Educational efforts to explain to the operators of supply boats how debris damages fishing activities also could have a positive impact. If personnel working offshore are unfamiliar with the fishing industry, they will not realize the harm they are causing. Resort also could be made to easy-to-read flyers or pamphlets describing the operating

characteristics of the commercial fishing and offshore oil and gas industries. Publications of this type have been widely circulated in the North Sea (see DAFS, June ,1975). If one is willing to assume that supply boat operators are well-intentioned human beings, then some educational efforts may reduce intentional dumping.

Of course, neither of the above two preventive measures effectively deals with the problem of accidental dumping. Innes (1976) reports the finding of a large bulldozer on the bottom of the North Sea. That anyone intentionally disposed of a bulldozer at sea is highly improbable under normal circumstances. It is more likely that it was lost accidentally during a storm or collision.

If little can be done to prevent accidental dumping, what can be done to protect the fishing industry? One simple but partial solution is to have the accident reported, giving the exact location and nature of the dumped material. Education efforts of the kind described above would help insure that such accidents are reported, as would fines for not reporting them. Reporting the accident is not a completely adequate solution, however. Debris, even large objects, can be moved by currents or by the fishing gear of a large vessel. Even if fishermen knew the location of a new obstruction a productive fishing area could be lost because the debris prevented them from working that tow (a tow is a specific course that trawlermen navigate when fishing).

Whether oil companies would be legally responsible for removing accidentally dumped material and compensating for damaged or lost gear is not clear. What is clear, however, is that accidental dumping imposes added real costs on the fishing industry in the same way that intentional dumping does.

Compensation

A third set of measures that could mitigate the debris problem involves monetary compensation to the fisherman for his lost or damaged gear. Compensation could be direct, from oil company to fisherman, or indirect, from oil companies to a compensation fund to fisherman.

1. Direct:

The direct method of compensation can result from a boat owner's taking legal action or from informal negotiations between fisherman and oil company.

Formal channels: For a fisherman, formal litigation involves difficulties and high costs. A fishing skipper may hire an attorney to represent him on an hourly basis plus expenses, or on a contingent fee basis. Contingent fees are frequently used by attorneys when the client has a claim with good prospects for recovery. However, for claims involving the loss of or damage to gear, the amount involved is relatively small and the attorney may require a contingent fee as high as 50 percent of the settlement plus his expenses. If the fisherman has a claim that does not appear to have a good chance for recovery, an attorney would probably require an hourly fee that frequently would be beyond the means of a fisherman.

Jurisdiction is another problem facing the fishermen desiring to pursue formal legal channels. General maritime law will apply to cases involving incidents on Georges Bank since it is on the high seas. Under maritime law, actions can be brought in federal district court under certain conditions. However, the Judiciary Act of 1789, 1 Stat. 76, saved "to suitors...the right of a common law remedy where the common law is competent to give it." This "savings clause" has been interpreted to mean that where the suit is in personam, it may be brought in either the federal court under admiralty jurisdiction or, under the savings clause, in an appropriate maritime court, by ordinary civil action. Whatever forum the fisherman chooses, his opponents may attempt to have the matter transferred to another forum.

Consequently, the net result is that legal costs are likely to be so high that even if a vessel owner wins the case, the amount received after legal expenses does not compensate for damages. Moreover, the vessel owner, especially in the case of a skipper-owner (vs. shoreside owner) will lose fishing time as a result of the time spent in litigation.

Informal channels. An alternative to formal legal channels often used is the informal, but direct, compensation paid to fishermen by oil companies for lost and damaged gear. Under this scheme, the fisherman presents "satisfactory" proof to the oil company that its debris damaged the fishing gear. If the company is satisfied that it is at fault, it awards the fisherman what it (the company) regards as a suitable amount of compensation.

This informal system of direct compensation is currently functioning in the Gulf of Mexico and in the North Sea. While there is no evidence (not to mention criteria) upon which to judge the effectiveness of the system, one problem does present itself. The oil company, the alleged offender,

is the final judge of whether it is responsible and, if so, how much it should compensate the fisherman for his loss. Such an arrangement would not seem to serve justice in many cases.

2. Indirect: Compensation Fund

The indirect means of compensation involves establishing a fund administered by a group of individuals who decide whether and how much to compensate the fisherman. This system is presently functioning in Scotland where it applies only to unattributable debris and only for lost or damaged gear. (Recently, however, they have begun to compensate for lost fishing time as well.) Where debris can be attributed to a specific company, the direct method of compensation is pursued. When the oil-related debris cannot be "attributed to the operations of a particular oil company or companies (or their contractors) or if a claim referred to an oil company is rejected...," the claim is considered under the compensation scheme for unattributable debris (DAFS, June, 1975).

The compensation scheme is funded voluntarily by the UK Offshore Operators' Association (UKOOA) which made available (£30,000 ($63,000) to operate it for the period July, 1975, through June, 1976. From July through December, 1975, 15 claims were considered by the managing committee of the fund. Five claims amounting to £826 were paid by the compensation fund and 10 cases amounting to £4,000 ($8,400) were still under consideration by the management committee of the fund at the end of 1975. During the first half of 1976, 30 claims totalling £14,476 ($30,400) were filed against the fund (see Table 1).

Fishermen's organizations in Scotland recently succeeded in their attempt to obtain compensation from the fund for lost fishing time, as well as for lost or damaged gear. The 18 claims filed in the last half of 1976 involving lost fishing time were valued at £3,100 ($6,510) (see Table 1). The relatively low figure for lost fishing time suggests that repairs were made at sea; however, there is an upper limit of £200 per claim which may understate the true value.[3] Generally, oil companies do not pay for lost fishing time in these debris incidents.

The managing committee of the fund determines the amount to be paid for lost fishing time based on the average catch value of the vessels fishing in the same area, of similar size and with the same gear on the particular day in question. This approach has the advantage of accounting for the productivity of a specific fishing ground at a specific

time. However, it fails to account for the productivity of individual skippers. It is generally recognized that two different skippers with essentially the same vessel and gear can have widely different catch values. That is, the specialized skills of the skipper are a significant determinant of productivity. Therefore, it appears more appropriate for compensation for lost fishing time to be based on the vessel's average productivity over, say, its last three trips. If the productivity of the fishing ground where the incident occurred is generally recognized as being significantly different from the grounds of the previous three trips, then the compensation should be adjusted accordingly (based on other vessels' productivity on the ground at the time.)

The compensation fund concept is not without its problems. In the UK, there is no statutory requirement that oil companies finance the scheme and their contributions have been voluntary. Therefore, they decide whether to finance the fund and at what magnitude. The Scottish experience so far suggests that the funding provided is adequate. According to the Scottish Fishermen's Federation (1976), fishing interests as well as the UKOOA consider the compensation fund beneficial by helping to remove "a considerable amount of ill-feeling which existed between the two industries due to loss of or damage to fishing gear caused by debris."

Another set of questions concerns the administration of the fund, specifically who shall serve on the administrative body and what criteria should be used for reimbursing fishermen. In Scotland, the administrative body is made up of members from the government, the offshore Operators Association and three fishermen's federations. As of October, 1976, many meetings have been organized in New England so that representatives of oil and fishing interests can discuss how problems between the two industries at sea can be softened or solved. Oil companies have expressed willingness to pay compensation to fishermen for damages or loss of gear and for lost fishing time so long as the loss can be attributed to a specific company. In some cases, claims are being directly negotiated between fishermen and oil companies with the assistance of the New England Fisheries Steering Committe. However, no formal claims board has been established. While there has been discussion of establishing a fund for compensation for oil-related damages that cannot be attributed to a specific company, no formal mechanism as yet exists in New England.

The last, and by no means least, important problem of a compensation fund is the question of proof; the specific evidence that gear was damaged or lost as a result of oil-related debris. The fund must have procedures and standards that

protect it from false and fabricated claims. On the other hand, if the procedures are too strict, some legitimate claims may not be paid, thus negating the intent of the system. The procedures for making claims for compensation in Scotland are presented in Appendix A of this section.

CONCLUSIONS

We have argued in this section that it is unlikely that a single remedy will solve the problem of debris. An effective program may need to combine elements of all the measures discussed as follows:

- Laws and regulations against waste disposal at sea should be fully enforced.

- Labeling should be required of materials used offshore, but implementation of this measure will be feasible only for larger pieces of equipment and supplies.

- The use of onshore personnel for unloading supply boats may reduce the amount of intentional dumping at sea and should be considered.

- Education to dumping regulations and the effects of debris on fishing operations may be useful. Education pamphlets could be helpful.

- Compensation should be paid directly to the fisherman by the oil company where the debris causing the damage can be attributed to a specific company. Formalized standards for calculating losses and procedures should be set up that simplify matters for fishermen and minimize costly litigation proceedings.

- Where legitimate claims exist for gear damage due to oil-related debris, compensation should be made for the value of lost fishing time.

- A compensation fund will probably be necessary to handle claims which involve petroleum-related debris that cannot be attributed to a specific company.

FOOTNOTES

1 The majority of the vessels are seine netters and light trawlers in the 50 to 80 foot class (Department of Agriculture and Fisheries for Scotland, 1976).

2 A claim is rejected if the incident did not occur within the U.K. licensing zone, since this is a prerequisite for filing a claim; and only partial payment is made when there is difficulty establishing that damage or loss of gear was caused by oil-related debris. Also, there is no compensation for damage to the vessel itself (e.g., a damaged propellor due to a floating wire hauser) since this is considered an insurable risk and can be claimed against the fisherman's insurance company.

3 The managing committee of the compensation fund has been empowered to pay for lost fishing time under the following conditions: (i) a £200 upper limit on each claim; (ii) payments are made only where a claim for gear loss or damage has been approved; (iii) such payments would not imply the acceptance of any legal liability by UKOOA for its members; (iv) individual oil companies need not pay for lost fishing time; (v) payment depends upon the discretion of the committee; and (vi) the scheme is for a trial one-year period, after which it will be reviewed.

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Appendix A

Procedures for Claiming Compensation for Damage Due to Oil-Related Debris, Scotland

1. The skipper of a fishing vessel whose gear has been damaged by what he considers to be oil-related debris should record the incident in his log book noting time and location and report the incident to the local Fishery Officer immediately on return to port. The Fishery Officer will provide a claim form and will help as necessary with the completion. The Fishery Officer will also inspect the damage to gear, the debris which wherever possible should have been brought ashore, and any other factual evidence in support of the claim. This, however, does not in any way imply the acceptance of the validity of the claim. If debris proves too awkward to haul on board then a detailed description should be noted. The description should be vouched for by a member of the crew and if any member of the crew has a camera then he should photograph the items.

2. If possible the skipper should obtain a report from a marine surveyor or other suitable qualified person. The fees may be included as part of the claim.

3. A copy of the claim will be given to the skipper for him to give to the vessel owner or his agent, as appropriate for pursual. The Fishery Officer will ascertain from the records available which oil company was operating in the area of the incident (if not already known) and will then inform the owner or agent as appropriate so that the latter may forward a claim to that company. In some instances where there may have been several companies operating in the area, the claim would be sent to each. The Fishery Officer will not be responsible for pursuing claims or for securing a settlement but he will be available to give such assistance as he can.

4. If the Fishery Officer is not able to attribute the oil-related debris to the operations of a particular oil company or companies (or their contractors) or if a claim referred to an oil company is rejected on the grounds that the oil-related debris was not considered to be associated with its operations, a claim will be considered under a compensation scheme for unattributable debris funded by the UK Offshore Operators' Association (UKOOA). The claim should be sent by the owner or agent to the Secretary of the Fund who for the first year of operation will be the Scottish Fishermen's Federation.

5. The compensation scheme applies to incidents which occurred on or after 1 July 1975 which cannot be attributed to a particular company and relates only to oil-related debris in the UK designated area and to UK fishing vessels; claims will not be entertained for damage to fishing gear occurring within the statutory safety zones surrounding offshore installations into which the entry of vessels is generally prohibited. The compensation scheme is restricted to loss or damage to fishing gear and does not extend to damage to fishing vessels, loss of fishing time or other consequential losses. The fishing industry, as represented by the Scottish Trawlers' Federation, the Scottish Fishermen's Federation and the British Trawlers' Federation, is responsible for the operation of the scheme and to this end have arranged the appointment of a Management Committee on which there will be a representative from each of the three federations. The Committee will meet at suitable intervals to consider claims made under the scheme. The settlement of claims will be at the discretion of the Committee depending on the merits of each individual case. The Committee's decision on each claim will be final and binding. In funding this scheme the UKOOA have imposed the condition that any settlement will not imply a legal responsibility on the part of the oil industry and will be on the understanding that the claimant waives any right to claim against a member company of the UKOOA.

Source: DAFS. June, 1975.

Section 10

COMPETITION FOR LABOR BETWEEN THE PETROLEUM AND FISHING INDUSTRIES IN NEW ENGLAND

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INTRODUCTION

During the early 1970s rapidly expanding petroleum operations in the North Sea generated a large increase in employment opportunities in Northeast Scotland (Trimble, 1976). The higher paying jobs in petroleum and related industries attracted large numbers of workers from other trades and forced many nonpetroleum firms to increase their wage rates in order to retain workers (Hutton; White, et al., 1975). Some firms chose to close down in the face of rising labor costs while others reduced the magnitude of their operations. The fishing industry also saw several of its captains, crew and workers in fish processing plants transfer to the petroleum industry. Petroleum development happened to coincide with a period of low prices and low landings in Scotland's fisheries, however, and the added labor demands created by the North Sea petroleum operations did not have a major impact on the Scottish fishing industry.

The New England situation, on the other hand, differs considerably from Scotland's. The New England fishing industry currently is relatively healthy, with high ex-vessel prices and good earnings. Enactment of the Fisheries Management and Conservation Act of 1976 is expected to result in increased landings, thereby creating additional employment opportunities in both the harvesting and processing sectors of the industry. Thus, in New England, we expect to have two expanding industries simultaneously demanding additional labor. Under certain conditions, the petroleum industry could dominate the labor market and effectively slow the expansion of the fishing industry.

The central issue addressed in this section is the likely impact on the fishing industry of the added demand for labor be expanding petroleum operations in New England. To assess this impact we estimate the quantity and type of added demand for labor by fishing, petroleum and related industries in New England, identify the extent of overlapping demands for similar labor skill, and evaluate the importance to the fishing industry of market competition for this pool of commonly demanded laborers.

ADDED DEMAND FOR LABOR BY OFFSHORE PETROLEUM OPERATIONS

The following estimates for the number of jobs to be created directly by offshore petroleum operations in New England are based on the assumption of a high find of oil and natural gas on Georges Bank. The resource assumptions for the high find case are 1.3 billion barrels of oil and 8.6 trillion cubic feet of natural gas. Attention is focused on the most likely areas of interaction, the labor requirements for offshore operations. Thus, labor requirements are not assessed for onshore support and operations bases, nor for petroleum refinery and other possible onshore petroleum-related activities. No attempt is made to assess the full offshore and onshore employment effects; the following results are direct employment effects only, as potential secondary effects are not estimated.[1]

The equipment requirements for the high find case are listed in Table 1. The first lease sale is assumed to occur in early 1977 followed by a second in early 1979. A fifteen year period following the first sale is projected. Estimates for mobile drilling rigs, development platforms and production platforms conform to the latest Bureau of Land Management estimates adjusted to account for a second lease sale, assumed to be of equal magnitude to the first (see Section 7). The estimated number of crew boats, tug-supply boats, and other offshore equipment conforms with the other BLM estimates of equipment and production.[2] A single crude oil pipeline is assumed to be built beginning in 1983; and two natural gas pipelines are assumed, the first beginning in 1984, and the second in 1987. Refinery and other petroleum related operations are not considered here.

Table 2 summarizes the personnel requirements for each unit of equipment and pipeline activity. The personnel requirements have been combined with the equipment requirements of Table 1 to estimate the total personnel requirements for each activity from 1977 through 1991, contained in Table 3.

The total personnel requirements, or direct employment, under the high find assumption is estimated to grow from about 600 jobs in 1977, peaking ten years later at about 4,000 jobs, and dropping to around 2,500 in 1991. Except for pipelines, these estimates are obtained by multiplying the personnel per unit of equipment (from Table 2) by the estimated requirements from Table 1.[3]

TABLE 1. ESTIMATED EQUIPMENT REQUIREMENTS, HIGH FIND CASE
1977-1991

Year	Mobile Drilling Rigs[a]	Develop-ments Platforms[b]	Produc-tion Platforms[b]	Crew Boats[c]	Derrick Barges[c]	Tug-Supply Boats[b]	Heli-copters[d]	Oil pipe-lines[b]	Gas pipe-lines[b]
1977	6			3		12	10		
1978	6			4		12	14		
1979	10			5		16	16		
1980	10			6		40	18		
1981	10	2		7	1	44	20		
1982	10	4		8	1	46	22		
1983	10	9		8	3	49	25	1[e]	
1984	10	14		9	3	48	27	1[e]	1[e]
1985	10	18	2	9	3	47	30	1	1[e]
1986	9	22	4	10	3	45	32	1	1
1987	8	23	9	10	3	41	32	1	2[e]
1988	6	24	14	10	3	35	32	1	2[e]
1989	6	24	20	9	1	22	30	1	2
1990	4	21	26	8		13	25	1	2
1991	4	18	32	7		10	20	1	2

[a]Adjusted BLM estimates, to account for second lease sale assumed for 1979.

[b]Estimates provided by Thomas A. Grigalunas

[c]Author's estimates

[d]A.D. Little's estimates used for 1982 and 1987; author's estimates for other years

[e]Construction phase

TABLE 2. SUMMARY OF A. D. LITTLE'S ESTIMATED PERSONNEL REQUIREMENTS PER UNIT OF EQUIPMENT

Equipment Category	Number of Personnel Required
Mobile Drilling Rig	80
Development Platform	90
Production Platform	8
Crew Boats	2
Derrick Barges	125
Tug-Supply Boats	7
Helicopters	2
Pipeline Construction (2 pipelines)	800
Pipeline Operations (2 pipelines)	101

Source: A. D. Little, 1975.

TABLE 3. ESTIMATED TOTAL PERSONNEL REQUIREMENTS, HIGH FIND CASE
1977-1991

Year	Mobile drilling Rigs	Development Platforms	Production Platforms	Crew Boats	Derrick Barges	Tug-Supply Boats	Helicopters	Pipeline constructions	Pipeline Operation	Total Personnel Requirements
1977	480			6		84	20			590
1978	480			8		84	28			600
1979	800			10		112	32			1204
1980	800			12		280	36			1378
1981	800	180		14	125	308	40			1717
1982	800	360		16	125	322	44			1917
1983	800	810		16	375	343	50	400		2794
1984	800	1260		18	375	336	54	800		3643
1985	800	1620	16	18	375	329	60	400	50	3668
1986	720	1980	32	20	375	315	64		101	3607
1987	640	2070	72	20	375	287	64	400	101	4029
1988	480	2160	112	20	375	245	64	400	101	3957
1989	480	2160	160	18	125	154	60		151	3558
1990	320	1890	208	16		91	50		151	2979
1991	320	1620	256	14		70	40		151	2596

ADDED DEMAND FOR LABOR BY FISHING OPERATIONS

The following estimates of jobs to be created by expanding fishing operations, as a result of extended fisheries jurisdiction, are those developed by Virgil J. Norton in Section 4 of this report. We adopt here the same assumptions concerning his three hypothetical fisheries development cases, and in addition assume that the case followed would be fully realized within five to ten years. Again, these estimates are for direct employment effects only.

Professor Norton's employment estimates are summarized in Table 4. Under the most favorable conditions, employment could expand by approximately 2,400 fishermen (captains, engineers, mates, cooks and crewmen) in the harvesting sector and by approximately 2,300 workers in the processing sector.

The age of fishermen currently in the industry also will affect demand for labor. With the exceptions of Point Judith and Stonington, the average age of New England fishermen is in general quite advanced (see Gersuny, et al., 1975, and Norton and Miller, 1966) and many of them can soon be expected to retire. Therefore, even to maintain the current employment levels, substantial labor replacements will have to flow into the industry. During the next ten years, these replacements could number as many as 3,000 workers.[4]

Coincidental with the probable expansion of U.S. fishing activity, it is likely that a significant demand will exist for management observers on board coast guard ships or foreign fishing vessels. If U.S. observers on board foreign vessels fishing in U.S. waters are required as, many as four per vessel could be needed.[5] These observers would need to know fishing gear and fish species and have some knowledge of navigation and electronic fishery gear. The number of observers required for New England waters could be several hundred.

The combined added labor demand to provide crews, processing workers and management observers for expanding fishing operations, and to replace retiring fishermen, could be as high as 7,700 to 8,500 new jobs during the next ten years.

TABLE 4

SUMMARY OF EMPLOYEE PLACE-OF-RESIDENCE
DATA FOR ATLANTIC COST DRILLING PROJECT, 1976

Place of Residence	Onshore Jobs No.	Onshore Jobs Percent	Offshore Jobs[a] No.	Offshore Jobs[a] Percent	Total No.	Total Percent
New England	25	71%	58	41%	83	47%
Non-New England	10	29%	83	59%	93	53%
TOTAL	35	100%	141	100%	176	100%

Source: Material provided by Mr. Troy Norwood, Operations Manager, Ocean Production Co., April 1, 1976.

[a]Aboard the mobile rig SEDCO J and the two supply boats to support the rig.

ASSESSMENT

The extent to which potential competition for labor will occur between the offshore petroleum and commercial fishing industries will depend on the scale of the increase in labor demands, the supply of labor with the region, the extent to which skills in the two industries overlap, and relative wage rates. The following is an assessment of these considerations.

In this section we have estimated that offshore petroleum employment will peak at around 4,000 in the late 1980's. The proportion of these jobs that could be filled by New England residents will depend upon the extent to which the skills required are available within the region. Of the job categories listed by Arthur D. Little, Inc. (1975) for the various petroleum operations, we estimate that between 35 to 50 percent of the jobs require skills not specific to the petroleum industry, i.e., jobs that could be filled from the general labor force. These job categories include roustabouts, welders, engine mechanics, medics, boat crews, etc. Also, a review of the permanent personnel records for the COST Atlantic drilling project based at Davisville, R.I., revealed that New England residents held 58, or 41 percent, of the 141 offshore positions aboard the exploratory drilling rig SEDCO J and the two supply boats used to support the rig. New Englanders were listed as members of the drilling crew (28 men), galley hands (11 men) and technicians (16 men). In addition, 13 of the 18 crew members on board the two supply boats were listed as residents of New England. Positions involving industry-specific skills, not suprisingly, were filled by personnel from outside the region.

On the basis of this recent, local experience we assume that the initial participation rate by New Englanders in offshore jobs, on average, is 41 percent.[6] Since residents of the region are likely to acquire the experience and skills to hold more industry-specific jobs as time proceeds, we also expect this participation rate to increase. Therefore, we arbitrarily assume that the regional participation rate increases by one percent per year, peaking at 55 percent in 1991. As a result, some 300 New England residents are expected to be employed in offshore petroleum operations in 1978, and peaking some ten years later at a little more than 2,000. The estimates for each year are contained in Table 5.

TABLE 5
ESTIMATED NUMBER OF TOTAL GEORGES BANK OIL AND GAS OFFSHORE JOBS FILLED BY NEW ENGLAND RESIDENTS 1977-91

YEAR	(1) TOTAL OFFSHORE PERSONNEL	(2) ASSUMED PERCENT FROM NEW ENGLAND	(3)=(1)x(2) NUMBER OF OFF-SHORE JOBS FILLED BY NEW ENGLAND RESIDENTS
1977	590	41%	242
1978	600	42%	252
1979	1,204	43%	518
1980	1,378	44%	606
1981	1,717	45%	773
1982	1,917	46%	882
1983	2,794	47%	1,313
1984	3,643	48%	1,749
1985	3,668	49%	1,797
1986	3,607	50%	1,803
1987	4,029	51%	2,055
1988	3,957	52	2,097
1989	3,558	53	1,885
1990	2,979	54	1,609
1991	2,596	55	1,418

Source: See Tables 1-4 above.

Regional participation in the expanding fishing industry is expected to be nearly 100 percent. Therefore, we assume that all of the additional 7,700 to 8,500 jobs in fisheries by 1987, estimated for the most favorable conditions, will be filled by New England residents.

The question now is to what extent the skills demanded by the two industries overlap. The positions of mechanic, roustabout, radio operator and cook require skills frequently possessed by New England fishermen. These categories will comprise 34, 32 and 25 percent of the personnel requirements for mobile drilling rigs, development platforms and production platforms, respectively (A. D. Little, Inc., 1975). Total personnel required in these categories amount to some 900 workers in 1987. In addition, the captains, mates, engineers, cooks and deckhands to man the crew and tug-supply boats required in 1987 amount to another 300 jobs. Therefore, under the most favorable conditions (i.e., a high find), some 1,200 jobs may result that require skills similar to the skills required by commercial fishermen.

Many of these jobs, however, may not be open to fishermen. Seamen's papers are needed for most positions on supply boats, and captains, mates and engineers must be licensed. No licenses are required on fishing vessels and fishing crews do not need seamen's papers.

In fishing operations some additional 5,400 to 6,200 workers will be needed--again, under the most favorable conditions--to fill positions of captain, mate, engineer, cook and deckhand on groundfish vessels, replace retiring fishermen in the New England fishing industry, and to serve as management observers. The additional personnel required in fish processing plants are believed, in general, not to possess the skills required by most offshore petroleum operations. Also, many of the employees in the processing plants are women and it is unlikely they will be attracted in significant numbers of jobs offshore.

In sum, both industries could demand as many as 6,600 to 7,400 additional regional workers by 1987, all of which possess similar skills. How serious will the effects of ensuing competition be? And, to what extent is it likely to raise wage payments in the fishing industry? First, the projected added demands are for the most favorable conditions for both industries and will build up gradually over a ten year period. In 1973 (the last year

for which aggregate data are available for NMFS) there were some 12,300 full-time commercial fishermen in New England. For the five year period 1969-1973 full-time fishermen increased by over 3,200. Therefore, if conditions (e.g., high general unemployment) continue which have allowed this recent expansion of workers possessing the skills under discussion, an expansion of 6,600 such workers over the next ten years appears achievable with little difficulty.

Second, fishermen's earnings compare favorably with expected earnings in similar job categories in offshore petroleum operations. Many full-time commercial fishermen, at least in Southeastern New England, earn $14,000 to $16,000 a year and, depending on the fishery, may earn twice as much (see Section 3). A. D. Little, Inc. (1975) cites industry sources as expecting to pay $15,000 (1974 dollars) for positions on crew and tug supply boats. Table 6 lists the daily wage rates for the COST project's supply boats operating in late 1976. Only the positions of captain and engineer, at these wage rates, can reasonably expect to earn as much as most full-time commercial fishermen earn in a year. Therefore, there appears to be little if any monetary advantage for a fisherman to work in offshore petroleum operations (except that there likely is less risk than in fishing).

Third, there appears to be ample availability in other sectors of the skills required by offshore petroleum operations. Unlike Northeast Scotland, New England is a highly developed, industrialized region with a large diverse labor force that recently has been experiencing high, but declining, unemployment rates (see Table 7). According to MacKay (1975), petroleum jobs in Scotland have attracted laborers used to working out-of-doors, most notably laborers in construction and agriculture. While agriculture is small in New England, the construction industry is substantial and has been experiencing high rates of unemployment. The wage rates also are comparatively low. In 1974, for example, annual earnings in construction averaged between $10,000 and $11,000 in Rhode Island and Massachusetts. Therefore, to the extent that they are qualified, construction workers can be expected to be attracted by the higher paying jobs in offshore oil operations.

TABLE 6

WAGE RATES FOR CREW ABOARD OFFSHORE SUPPLY BOATS, 1976

Category	Day Rate
Captain	$100.
Engineer	85.
Mate	60.
Ablebodied seaman	45.
Cook	45.
Ordinary seaman	36.

Source: Mr. Billy Sanchez, Operations Manager, EURO-Pirates International, personal communication, September, 1976.

TABLE 7

COMPOSITION OF WORK FORCE FOR SELECTED NEW ENGLAND BOAT REPAIR YARDS, 1974[a]

Category	Percent
Carpenters	15%
Mechanics	8%
Machinists	4%
Welders	17%
Electricians	5%
Riggers	2%
Painters	10%
General Laborers	13%
Stock Room	4%
Security Guards	2%
Other	5%
Foreman	3%
Administrative (clerical, management)	12%

Source: Department of Resource Economics
University of Rhode Island
Vessel Repair Questionnaire

[a]Includes only yards that can haul vessels over 50 feet, but excludes yards that work exclusively on pleasure craft.

The above arguments suggest that relatively few fishermen will transfer into offshore petroleum operations. If any movement of labor from fishing into petroleum operations does occur, it is likely to be a few from the ranks of captains and crews of vessels with low earnings. Inter-industry mobility of this kind is more apt to promote efficiency than hamper the development of the fishing industry. The arguments also suggest that while fishermen's earnings may rise over the next ten to fifteen years, it is unlikely that this rise will be significantly influenced by offshore petroleum operations. It appears that the results of extended fisheries jurisdiction, together with the normal growth of the fishing industry, will have a far greater impact on the numbers of fishermen and their earnings.

We cannot do justice to the issue of labor interactions without considering related problems likely to arise in the onshore vessel repair industry. If there is a substantial increase in demand for vessel repair services by the offshore petroleum operations, the wage rates of workers at vessel repair yards could be bid up with the consequence that the rates charged for repairing fishing vessels will have to rise to cover the increased costs. Sutinen (1975) cites one vessel repair firm in Peterhead, a center of offshore petroleum operations in Northeast Scotland, that experienced a 100 percent increase in wage rates over the previous four years. Wages may account for over half of a repair yard's cost, so a rise in wages could cause significant problems for fishermen and others who regularly depend on these firm's services.

The estimated increase in vessel repair expenditures, due to offshore petroleum operations in the high find case and the high extended fisheries jurisdiction case, implied an increase in annual demand for repair services equivalent to the output of about seven moderate size repair yards (Section 11). If labor demand increased proportionately, some 350 to 525 additional workers would be required. Of these about 50 percent would be skilled marine carpenters, mechanics, machinists, welders and electricians (see Table 7). In addition, by the mid- to late-1980s some 250 mechanics, welders and electricians will be required for various offshore petroleum operations. A survey of boat repair yards (see Section 11) revealed that yard managers have considerable problems attracting certain categories of skilled workers, most notably marine

electricians, machinists, welders, carpenters and ship riggers and fitters. This is reflected in wage rate differentials and in the practice of keeping skilled employees on the payroll during periods of slack activity.

While an increase of 600 to 775 in demand for these workers in not alone likely to cause an increase in the regional wage rates for these occupations, such an increase could lead to temporary shortages of certain skills in particular geographical areas if the bases of offshore petroleum operations are concentrated outside of major metropolitan areas.

CONCLUSIONS, CAVEATS AND RECOMMENDATIONS

This section has addressed the issue of whether expanding petroleum operations in New England will drive up wage rates for fishermen by competing for similarly skilled workers. We have assumed conditions that would tend to heighten such labor market competition and conclude that even under these extreme conditions expanding petroleum operations alone will not significantly cause a rise in the cost of labor to the fishing industry. Extended fisheries jurisdiction, with its potential for expansion in the New England fishing industry, is likely to be a more significant cause of rising labor costs during the next ten to fifteen years.

The reader of this section should note with caution that when estimating demands for both industries we have used high development assumptions. Our estimates are not meant to be predictions. Eventual, actual demands, depend upon many factors that cannot be predicted with any reasonable degree of certainty. For example, two presently important unknowns are the quantity and quality of petroleum resources on Georges Bank and which of the extended fisheries jurisdiction cases will be realized.

To satisfy their labor requirements, both industries will have to draw from an undefined pool of labor. While regional unemployment has been quite high recently, to assume it will persist over the next ten to fifteen years is risky (Table 8). The existing labor force may not be able to meet the demand by both industries for special skills. Therefore, industry and appropriate local, state and federal agencies would be wise to work together to determine potential labor sources and, if necessary, support training programs. Such action could help prevent labor bottlenecks and conflicts between the two industries.

TABLE 8

COMPARISON OF UNEMPLOYMENT RATES,
AUGUST, 1975 AND, AUGUST, 1976, U.S. AND NEW ENGLAND

	August 1976	August 1975	Difference
United States	7.9%	8.5%	-6
New England	8.1%	11.0%	-2.9
Connecticut	9.4%	10.2%	- .8
Bridgeport	10.7%	11.9%	-1.2
New Haven	9.7%	9.9%	- .2
Rhode Island	9.7%	12.1%	-2.4
Providence	9.7%	12.0%	-2.3
Massachusetts	7.6%	12.2%	-4.6
Boston	7.5%	11.5%	-4.0
New Bedford	7.4%	13.6%	-6.2
New Hampshire	3.8%	6.2%	-2.4
Manchester	4.1%	6.6%	-2.5
Maine	8.5%	9.6%	-1.1
Portland	7.8%	6.5%	+1.3
Vermont	9.4%	10.8%	-1.4
Burlington	7.5%	8.6%	-1.1

Source: Federal Reserve Bank of Boston, "New England Economic Indicators", Boston, October, 1976, p. 13.

Footnotes

[1]Extensive studies of the direct and secondary impacts of Georges Bank oil and natural gas development for various resource assumptions may be found in Grigalunas (1975), Arthur D. Little, Inc. (1975) and Council on Environmental Quality (1974).

[2]The estimates of the number of crewboats and derrick barges used in this section (Table 1) are significantly lower than those contained in the Arthur D. Little, Inc. (1975) study of Georges Bank oil and gas development (Vol. III, pp. 1-67). There are two reasons for this. First, the high find assumption used in this study is considerably lower than the resource assumptions used in the ADL report (see Table 1 of Section 7). Second, it appears that helicopters and not crew boats will be used to transport crews to and from offshore facilities. The crew boat figures used here, in the authors' judgment, represent an upper limit for Georges Bank, given present estimates of oil and natural gas resources and the distance from shore of the areas of petroleum interest.

[3]Arthur D. Little, Inc. (1975) estimates a work force of 800 would be used to construct two pipelines - one gas and one oil. The ADL pipeline operations estimates also are for two pipelines. We have halved these estimates for a single pipeline.

[4]NMFS defines, in this statistical series, a full-time fisherman as one who earns 50 percent or more of his income from commercial fishing. Therefore the some 12,000 "full-time" fishermen are probably equivalent to about 8,000 fishermen spending 100 percent of their working time in commercial fishing. We then assume 25 percent, or 2,000, will retire and be replaced within 10 years. Of the "part-time" fishermen we assume 1,000 full-time equivalents also will be required for replacement during the period.

[5]For example, a possible schedule would be a 12-hour watch per man per day (i.e., 12 hours on and 12 hours off --- or 6 on - 6 off - 6 on - 6 off while on board) and a work week of 7 days with 7 days off between work weeks. This would require two people on board and two onshore for each vessel.

[6] Clearly, the initial participation rate also will depend importantly on the success of efforts to persuade offshore operators to use workers from the region and on the willingness of offshore operators to recruit actively within New England. A lower or higher regional employment participation rate will lead, of course, to a lower or higher estimate of offshore jobs held by residents of the region.

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Section 11

POTENTIAL INTERACTIONS: PORTS AND VESSEL REPAIR FACILITIES

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INTRODUCTION

Petroleum exploration and potential development on Georges Bank, combined with extended fisheries jurisdiction will result in an increase in the demand for port-related services. The following is a discussion of possible competition for vessel repair services, berthing space and the use of adjoining port lands among the offshore oil industry and an expanded commercial fishing industry.

VESSEL REPAIR SERVICES

Time is money in the oil business. The day rental for a mobile rig may be as high as $40,000, and supply boats are contracted at $3,000/day. Consequently, speed of service in a vessel repair yard[1] is a major consideration. Supply boat operators will be likely to use services close to onshore support bases to the extent that physical constraints such as water depths and available facilities allow. Lost fishing time can likewise cost the owner of a fishing vessel several hundred dollars a day and the crew twice as much.

It is conceivable that both industries will lose time because of congestion in repair yards. Whether or not this happens depends on both the scale of additional demands and the excess operating capacity in New England yards.

Additional Demands

Based on data described elsewhere in this report, the hypothetical increase in groundfishing vessels alone could range from 75 to 242 by the mid 1980s (see section 4). This would account for an increase of from 15.5 to 50.8 percent in the number of groundfish vessels over five net tons (generally more than 38 feet long) presently operating out of major New England ports (Table 1). As many as 139 of these additional vessels might work out of major New England ports between Cape Cod and eastern Connecticut.

TABLE 1

ESTIMATED NUMBER OF ADDITIONAL GROUNDFISH VESSELS, BY SECTION OF NEW ENGLAND, FOR ALTERNATIVE EXTENDED FISHERIES JURISDICTION CASES

Area	CASE I		CASE II		CASE III	
	Addi-tions	Total	Addi-tions	Total	Addi-tions	Total
EASTERN CONNECTICUT AND RHODE ISLAND	14	104	39	129	46	136
MASSACHUSETTS						
Cape Cod and South	28	210	80	262	92	274
North of Cape Cod	17	126	48	157	55	164
NEW HAMPSHIRE AND SO. MAINE	14	105	40	131	47	138
Total New England	73	545	207	679	240	712

Source: Preliminary results of research by V. Norton, Department of Resource Economics, University of Rhode Island.

New fishing vessels are expected to be predominantly in a large size class. Currently some 35.4 percent are 70 feet and over; with extended jurisdiction, 57 percent of the groundfish fleet may be in this size range. Unlike many vessels in the current fleet, most will probably be made of steel and may draw up to 11 to 15 feet. Additional expenditures for repair and maintenance generated by those additional fishing vessels could range from $890,000 to 3.07 million.[2] Fishing vessels are likely to be serviced near or in their home port.

Estimates of the number of vessels that could be used in support of offshore oil and gas operations are based on the exploration-only and high-find cases developed in section 7. If no commercial quantities of hydrocarbons are discovered on Georges Bank, as few as 16 supply boats may be used to support offshore operations; if a high find occurs, as many as 50 supply vessels and up to 10 crew boats could be in continuous use by the mid 1980s.[3] Supply boats are likely to be 190 to 220 feet in length, weighing 1,250 tons and drawing 15 feet when fully leaded. Crew boats are less than 100 feet in length. Based on current expenditures for maintenance and repair of support vessels, total expenditures would amount to from $367,000 to $1 million per year.[4]

In summary, the combination of additional demand (expenditures) for vessel maintenance and repair services by both commercial fishing and offshore oil could amount to $4.07 million per year. This amount would be comparable to the annual output of about seven moderate size boat repair yards.

Capacity Utilization

In 1974, ten of fifteen boat yards questioned as part of a survey of port facilities operated at full capacity only during the peak season of April through July. The estimated median rate of capacity utilization was only 65 percent (Table 2). During peak periods, congestion can occur if a large amount of time-consuming work is unanticipated and serious enough to cause lost work time. Repair yards managers

TABLE 2

CAPACITY UTILIZATION FOR SELECTED NEW ENGLAND BOAT REPAIR YARDS, BY SEASON, BY GEOGRAPHICAL AREA, 1974[a]

AREA	Percent Capacity Utilization[b] Jan-March	April-June	July-Sept	Oct-Dec	Average
Southeastern Connecticut and Rhode Island					
1	62	100	100	52	78.5
2	90	100	100	90	95.0
3	47	78	62	54	60.0
4	60	100	67	73	75.0
5	49	50	43	25	40.0
Massachusetts: Cape Cod and South					
1	36	100	41	14	50.0
2	36	90	75	36	59.0
3	20	100	40	40	50.0
4	25	100	100	25	63.0
North of Cape Cod					
1	20	100	75	19	53.5
2	25	100	100	25	63.0
New Hampshire and Southern Maine					
1	45	90	64	31	58.0
2	76	100	94	63	83.0

Source: Department of Resource Economics
University of Rhode Island

[a]Includes only yards that can haul vessels over 50 feet, but excludes yards that work exclusively on pleasure craft.

[b]The yard owner of manager's estimate was used for the peak period. Utilization estimates for other quarters were determined by comparing repair activity in each quarter with the peak period. A simple average of all four quarters was used to derive the average capacity utilization estimate.

as a practice require advance appointments for hauling out at this time. However, the managers interviewed estimated that only 10 to 15 percent of repair work is of an emergency nature. Moreover, yard managers usually encourage informal arrangements to work on emergency repair jobs first, which serves to reduce congestion cost for vessel operators.

Of 45 groundfishing captains interviewed as part of an independent study by the University of Rhode Island, 15 reported that service delays, primarily due to unavailability of parts, resulted in a loss of from two days to two months in 1975. Only two of the 15 attributed the lost time of unavailable service facilities. Thus, while fishermen lost time because of delays in servicing, it appears the delays are primarily due to factors other than congestion.

When assessing the potential for congestion problems, it is also important to recognize that physical constraints at many yards will preclude the undertaking of many major jobs on the largest offshore support vessels (Table 3). Officials at two ship repair yards in Boston that can service large vessels report that their yards are operating at only 20 to 25 percent capacity. The president of the New England Ship Yard Association, an organization made up of fourteen of the larger repair facilities in the region, indicated that ship repair yards in New England are operating considerably below capacity (Hamilton, 1975). These yards work on few fishing vessels because of their high rates. The commercial work at large ship yards is the result of successful bids for major jobs, which means they can often plan months in advance and do not experience the seasonal fluctuations in business seen in most small yards (Table 2).

In summary, given the excess capacity at large ship repair yards in the region year round, and at many of the small yards in the offseason, general congestion problems are not likely to arise, even in the high oil-find and fishing cases considered in this study. Increased oil production and fishing activity should serve to decrease present underutilization and seasonality at many yards.[5] If congestion problems do occur, they are likely to be restricted to the peak season.

TABLE 3

CONTROL CHARACTERISTICS AT SELECTED NEW ENGLAND BOAT REPAIR YARDS, 1974[a]

Area	Control Characteristics of Railways				
	Length (in feet)	Tonnage	Width (in feet)	Draft (in feet)[b]	Draft at Piers (in feet)[b]
NO. CONNECTICUT AND RHODE ISLAND					
	220	800	44	14	14
	75	50	22	12	15
	300	3000	65	20	20
	135	400	30	12.5	14
	120	500	40	13	13
	85	100	25	11	9
MASSACHUSETTS					
Cape Cod & South					
	120	450	31	15	15
	115	300	24	13	12
	70	70	20	11	n.a.[c]
	90	100	--		12
North of Cape Cod					
	140	600	32	16	17
	50	25	14	6	6
NEW HAMPSHIRE AND SO. MAINE					
	200	1200	40	17.5	18
	225	1200	40	18	16
	100	150	28	11.5	12

SOURCE: Department of Resource Economics, University of Rhode Island, Vessel Repair Questionnaire

[a]Includes only yards that can haul vessels over 50 feet, but excludes yards that work exclusively on pleasure craft.

[b]Mean low water

[c]n.a. = not applicable.

If increased demand for service does occur, repair yards will have an incentive to expand their capacity to handle more and larger vessels. Pressure may be particularly strong in the Cape Cod to eastern Connecticut area. Support operations for the exploration and early development phases of Georges Bank activity will be centered here, and the major fishing ports in the area such as New Bedford, may be substantially affected by extended national jurisdiction over fisheries.

In the survey of repair yards, managers were asked what problems, if any, they anticipate either in handling more or larger vessels at existing facilities or in acquiring additional land for expanded operations. Only three of sixteen said they expect no problems in expanding their operations (Table 4). The remaining thirteen yards said they would face one or more problems in any attempt to expand. Seven mentioned the unavailability of adjoining land. The inability to extend facilities into the harbor (cited by six yards), the need to dredge and obtain environmental permits (five yards) and the physical limitations of the harbor (five yards) also were given as constraints on handling either more or larger vessels. This suggests that coastal planners will have to deal with a variety of port management problems as efforts are made to accommodate the increased demands for repair services.

BERTHING AND PORT LAND USE

Although the number of groundfishing vessels in the region could increase by as much as 242, it is highly unlikely that every one of them would be in home port at the same time. In New Bedford, for example, only about a third of the fishing boats are in port at any one time, except on major holidays or during extremely rough weather (Nickerson, 1975; Saunders, 1975). Moreover, fishing boats in port between trips can tie alongside one another, so that the number of additional berths needed will be considerably less than 242. The same is true for the high estimate of 50 supply boats for the offshore oil industry.

TABLE 4

NON-MARKET EXPANSION PROBLEMS,
SELECTED NEW ENGLAND BOAT YARDS, 1975[a]

Area	No. of Yards Interviewed	No Problems	Land	Dredging and Environmental Permits	Limited Opportunity to Expand Water-front Facilities Into Harbor	Depth Limitations of Harbor
NORTHERN CONNECTICUT AND RHODE ISLAND	6	--	4	1	2	2
MASSACHUSETTS						
Cape Cod and South	4	--	1	3	2	1
North of Cape Cod	3	1	2	1	1	2
MAINE	3	2	--	--	1	--
TOTAL	16	3	7	5	6	5

SOURCE: Department of Resource Economics
University of Rhode Island
Vessel Repair Questionnaire

[a]Includes only yards that can haul vessels over 50 feet, but excludes yards that work exclusively on pleasure craft.

In addition to dockage, land area will be needed for onshore operation bases, offices, service support, gas processing facilities and possibly a pipeline terminal for crude oil. Waterfront land may also be required for a pipe-coating yard and possibly for a platform fabrication facility.

Table 5 gives a summary of the amount of land that might be used, grouped by major category of shoreside activity. The "land requirement" for the low and high development cases used in this report was calculated by comparing the unit levels of activity for the development cases with the unit level land use estimates for each activity based on information prepared by the Offshore Operators Committee in the Gulf of Mexico, an industry organization.

The figures in the table indicate that a reasonably large amount of land might be needed for all the major activities resulting from offshore development. However, all the demands for land will not necessarily be in ports or areas of interest to the fishing industry. The results in Table 5 do not include consideration of a platform fabrication yard, a refinery or other activities not specifically included in the table and supporting appendix. The results also assume that development and production in the mid-Atlantic is not based in New England.

In the case of high development on Georges Bank, about 700 acres of land could be directly required for support activities. Land values may rise at ports substantially affected by offshore activities. State and local port officials may face a number of interrelated port management decisions. One set involves developing criteria for allocating land areas to different uses. This section has focused on only two potential activities. People concerned with developing a port management strategy will obviously need to consider many other activities as well. In many ports, much of the land affected by their decisions is in the public domain. Public policy, therefore, has a particularly important role to play in this setting because of the diversity of interests concerned with port development decisions. As

TABLE 5

LAND USE CONSIDERATIONS RELATING TO GEORGES BANK OIL AND GAS DEVELOPMENT

Major Industry Activity[a]	Per Unit of Production[a]	Georges Bank Development Hypotheses[b] (at peak) Low	High	Possible Land Use (acres) Low	High	Comments
Onshore operations Base	200 MBOPD	53 MBOPD 466 MMCF	315 MBOPD 2100 MMCF	25	137	10 MMCF per day of output assumed to generate same onshore base activity requirements as 1 MBOPD.
Gas Processing Plants	300 MMCF	466 MMCF	2100 MMCF	96	300	75 acres used for first 300 MMCF, but additional volumes processed at same plant assumed to require only 1/2 the original land per unit. NOTE: Peak production is not reached until 1990, so that land use demands may be deferred.
Pipeline Shore Terminal	200 MBOPD	53 MBOPD	315 MBOPD	0	63	Probably would have one or other, but not both.
Pipeline Tanker and Barge Terminal	500 MBOPD	53 MBOPD	315 MBOPD	0	38	
Pipe Coating Yard[c]		1 pipeline	3 pipelines	90-100[c,d]	90-100[c]	
Total Service Support	10-20 rigs	2 mobile rigs 8 platform rigs	10 mobile rigs 25 platform rigs	26	99	Includes the sum of all service support activities in Appendix.
				237-247	664-699	

Source: [a]See Appendix
[b]See Table
[c]New England River Basins Commission (1976, p. 111-6).
[d]Since only one pipeline is used in the low case, the figure in the text would likely apply only if pipe-laying activity in the mid-Atlantic was based out of New England.

individual ports become more heavily used, policy makers may need to assess the economic trade-offs of different uses of port lands and the economic returns to providing additional berthing, improving existing facilities and dredging to accommodate additional and larger vessels.

Footnotes

[1]Unless otherwise indicated, the term "vessel repair yard" used in the text includes both boat and ship repair yards. The survey of repair yards described in this section was restricted to those with the capacity to haul out of the water vessels 50 feet or longer, except that yards specializing in pleasure craft were excluded.

[2]Based on a review of the cost records for 12 steel fishing boats in the New England groundfishing fleet, the average amount spent for repair and maintenance in 1974 was $11,845.

[3]Some initial exploratory drilling in the mid-Atlantic (Baltimore Canyon) will be based in southern New England. To the extent this occurs, the "exploration only" Georges Bank case used in the text will understate the vessel activity from all offshore oil operations.

[4]Repair and maintenance expenditures for offshore oil supply boats is estimated to average $16.666 per year, (Sanchez, 1976). The annual expenditures in the text understate potential activity at vessel repair yards to the extent that offshore oil, non-vessel related activity, e.g., marine construction or general fabrication, is commonly undertaken at large yards. On the other hand, the estimates may be overstated because supply boat operators will do a great deal of work dockside at support bases.

[5]To shed some light on the quantitative aspects of the issues raised in the text, some simple regression runs have been made to look at the cost structure of the vessel repair industry. Average cost, AC, is hypothesized to vary directly with the weighted average wage rate, W; the presence or absence of a union U_D (set equal to 0 if there is no union, 1 if the yard is unionized). AC is also hypothesized to be higher, other things the same, for yards that specialize in bid work, which in general would entail more extensive and costly work. B is the percent of bid work (government and commercial vessels) in a yard.

On the other hand, AC is hypothesized to vary negatively with the average annual rate of capacity utilization, C; a dummy variable CON_D, which is set equal to 1 if the yard is diversified into marine construction and is equal to 0 otherwise. AC also is asserted to vary negatively with output, Q, reflecting possible economies of scale. Because of problems inherent in attempting to identify a homogeneous measure of output, the working assumption adopted here is that output can be measured in the number of vessel feet serviced. The results are summarized below. The t statistics are in parentheses under each variable.

$$\ln AC = \underset{(5.3)}{\ln 15} - \underset{(-8.2)}{.93 \ln Q} - \underset{(-7.8)}{2.12 \ln C} + \underset{(2.9)}{3.06 \ln W}$$

$$+ \underset{(9.1)}{.59 \ln B} + \underset{(2.8)}{.95 U_D} - \underset{(-5.3)}{1.07 CON_D}$$

$R^2 = .93$ $\qquad F_{6,8} = 37.49$ $\qquad n = 15$

These early results suggest that a ten percent increase in average capacity utilization will lead to a decline in average costs of 21 percent. A review of these results with an industry official suggests that this estimate is probably a maximum.

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LAND USE CHARACTERISTICS FOR SELECTED OFFSHORE OIL AND GAS DEVELOPMENT ACTIVITIES

Industry Activity	Basis for Calculation: Per Rig Operation	Basis for Calculation: Per Unit of Production	Land Requirements in Acres	Character of Space	Special Factors	Comments
Onshore Operations Base	-	200 MBOPD[a]	50	Industrial Zoning	Inland Water Dockside Location with Atlantic Ocean Access	This type installation designed to service offshore drilling and production Air-3 large helicopters 4 small helicopters Marine-4 Crew Boats 3 Cargo 2 Tugs
Onshore Office	-	200 MBOPD[a]	10,000 sq. ft.	Business Zoned Office	Metropolitan Area	Assumes office space available, but may generate new office building construction
Gas Processing Plant	-	300 MMCF[b]	75	Rural Area Desirable	Highway and Rail Access	
Pipeline Shore Terminal	-	200 MBOPD[a]	40	Rural Area Desirable	Highway Access	This type of installation would be constructed if production of oil is transported to refineries through onshore pipelines
Pipeline Tanker and Barge Terminal	-	500 MBOPD[a]	60	Rural Area Stable Soil Foundation	Waterfront 35' water depth required 2 berths	This type of installation would only be necessary if the decision was made not to use pipelines for oil transportation to refineries
Pipe Coating Yards[c]	-	-	90-100[c]	Industrial Zoned	Minimum of 1,000 linear feet of waterfront land. Minimum water depth 10 ft. up to wharf. Clear channel from wharf to ocean. Highway and/or rail access.[c]	95% of land is[c] required for pipe storage[c]
Service Support						
Mud Supplier	10-20 rigs	-	4	Industrial Zoning	Inland water dockside with access to Atlantic	A minimum of 10 rigs will be necessary to justify establishing this type facility.
Wireline Company	"	-	6	"	Highway Access	"
Gas Lift Company	"	-	.5	"	"	"
Logging and Perforating Company	"	-	4	"	"	"
Welding Shop	"	-	2	"	"	"

LAND USE CHARACTERISTICS FOR SELECTED OFFSHORE OIL AND GAS DEVELOPMENT ACTIVITIES

Industry Activity	Basis for Calculation: Per Rig Operation	Basis for Calculation: Per Unit of Production	Land Requirements in Acres	Character of Space	Special Factors	Comments
Rental Tool Co.	10-20 rigs	-	3.5	Industrial Zoning	Highway Access	A minimum of 10 rigs will be necessary to justify establishing this type facility.
Fishing Tool Co.	"	-	1	"	"	"
Wellhead Equipment Co.	"	-	1.5	"	"	"
Machine Shop	"	-	1	"	"	"
Trucking Firm	"	-	5	"	"	"
Cementing Co.	"	-	5	"	Inland water docksite with access to Atlantic. Highway and rail access.	"
Supply Store	"	-	2	"	Highway access	"
Downhole Equipment Co.	"	-	2	"	"	"
Dining Service	"	-	.5	"	"	"

SOURCE: "Industry Input to Proposed December, 1975, Lease Sale, Mid-Atlantic Region," materials submitted to the Bureau of Land Management, U.S. Department of Interior, (xerox), no date.

[a]MBOPD = Thousand barrels of production per day.

[b]MMCF = Million cubic feet of production per day.

[c]This information taken from New England River Basins Commission (January, 1976, p. III-6).