Session 2: Industry Perspectives, Feasibility Studies and Rigs to Reefs

Platforms and Fish Pens — An Operator’s Perspective

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Introduction

Harvesting fish and shellfish has been a major source of food throughout the history of civilization. Recent overharvest of our ocean resources has raised concern about the future of our fish stocks. In the United States, the authorities have evolved a system of allocating fisheries resources through a combination of seasonal closures, zone closures, and catch limits, administered by the National Marine Fisheries Service (NMFS).

Today, cultivation of fish and shellfish is a major business. Farm-raised trout, catfish, and crawfish are familiar to most of us. These commercial operations take place in ponds and raceways from the extremely large to the quite small. Within the last several years, considerations have been given to the use of oil and gas structures to aid in marine aquaculture-mariculture. This paper provides an industry perspective on the opportunities and obstacles presented by the use of petroleum production platforms in mariculture operations.

Perspective

This paper presents a review of the possible use of offshore platforms for mariculture from the perspective of an offshore oil and gas operator. Views and concerns expressed in this paper are solely those of the author, but are believed to be fairly typical of those in the industry.

Oil and Gas Platforms

There are nearly 4,000 oil and gas platforms in the Gulf of Mexico. These structures vary widely in age, size, and complexity. Water depths range from a few feet to well over 1,000 feet, and in distance from near shoreline to more than 130 miles. Platforms consist of a supporting structure (jacket or caisson) and a topside structure (deck), which supports pro-
duction, processing, storage and safety equipment, quarters (if any), and helideck (if any).

Platforms present some obvious opportunities for mariculture operations:

- They would provide a more or less permanent, solid platform from which to conduct operations. The decks would provide a stable place for storage, feed delivery equipment, and utilities (power, navigation aids, communications, and environmental monitoring). The structure would provide above and below-surface support for anchoring containment and winching systems. An infrastructure for transportation and communication already exists.

- Platforms are well known as artificial reefs, providing healthy ecosystems that are major destinations for recreational fishing. This abundance of associated sea life suggests a healthy environment suitable for cultivation of fish and shellfish.

- The offshore location tends to moderate swings in water temperature, and water currents make the system largely self-cleaning, providing new, oxygenated water and removing wastes from fish and feeding.

**Successes**

**Mussel Harvest**

Platforms located offshore of the California coast are particularly prone to a buildup of sea life attached to the underwater platform support. This "biofouling" creates wave and current drag sufficient to cause structural concerns. To alleviate this problem, operators pay up to a few hundred thousand dollars every few years for divers to remove the growth.

A Santa Barbara, California firm, Ecomar, has capitalized on this market by harvesting this biological abundance and separating, cleaning, and marketing the mussels thus removed to restaurants.

Two things to bear in mind about the Ecomar harvesting operation:

1. Operators view this as a very good way to conduct essential platform maintenance. Because Ecomar is able to market the product, the operators get a cost break on the removal operation. An additional benefit is showcasing the healthy environment that surrounds these platforms.

2. In spite of what should seem an obvious win-win proposal, it took Ecomar's owner, Bob Meek, the better part of ten years to sell the idea to the oil and gas operators and the regulatory authorities. Operators' reluctance can be summed up in two issues: liability and interference in operations.
Rigs-to-Reefs

Another success is the Rigs-to-Reefs Program in Texas and Louisiana. At the end of a platform’s useful life, oil and gas operators are required to plug abandoned wells, sever all structures below the mud line, and physically remove the structure from the lease. Simply stated, the Rigs-to-Reefs Program offers an operator the opportunity to move the structure to a designated reef site rather than transporting it to shore to be cut up for scrap.

From the oil and gas operators’ point of view, the Rigs-to-Reef Program is highly successful for two very good reasons:

1. **Liability**: The Rigs-to-Reef Program presents the operator with an opportunity to fulfill his responsibilities in clearing the oil and gas lease in such a way that long-term liability for the structure is transferred to another **financially responsible entity** (i.e., a government agency).

2. **Economics**: The cost to clear a platform from a lease can be up to $15 million or more, depending on water depth, location, condition and configuration of the structure, and salvage value of parts. This cost can sometimes be dramatically reduced by participation in the Rigs-to-Reef Program. One-half of the estimated savings goes to the agency to pay for long-term maintenance of the reef and for accepting liability.

**Operator Concerns**

The following issues are of primary concern from an oil and gas operator’s perspective.

**Liability**

The greatest concern of oil and gas operators is liability, liability for accidents and liability for lease abandonment. Whether mariculture operations are conducted on a producing or an inactive platform, there are issues of liability for personal injury, environmental damages, and property damage. Not only are authorized personnel working on and under the platform at risk, so are intruders, on and under the platform. Risk of injury, property and environmental damages from collision and natural disasters also must be resolved.

The longer term issue is liability for lease clearance. If an inactive platform is to be used for mariculture operations, somehow the ultimate fate of the structure and eventual cost for dealing with it must be resolved.

The willingness of an entrepreneur to accept the liabilities associated with a platform-based mariculture operation is likely not to be adequate. Somehow, the oil and gas operator needs to be relieved of liability as a previous owner.
Finally, there are requirements for platform maintenance. Navigation aids, cathodic protection, and repair and upkeep of the structure are expense items that must be factored into the economics of such an operation. Together, these costs can exceed $10,000 per year.

Operating Priorities

If shared use of an operating platform is contemplated, interference with platform operations is another major concern. Operations on these facilities are entirely focused on production of oil and gas. Any activities that do not fall within that focus are likely to met with reluctance, unless they can be shown to be: (1) valuable and (2) conducted in a manner that do not interfere with operations.

Permitting

Oil and gas operators work within a tightly regulated environment. However, the agencies with which we work generally have well-defined and understood areas of authority. Reportedly, working through the regulatory framework to obtain all the necessary authorizations to conduct a mariculture operation from an oil and gas platform can be a major challenge. Conflicts include overlapping areas of authority and standards to be applied to the operations.

Suggestions

Ultimately, the concerns expressed above should be resolved. From the perspective of an oil and gas operator, the following are some suggestions that, if implemented, would help move mariculture toward commercial reality.

Relief from Lease Responsibilities

Long-term liabilities and lease clearance responsibilities are a major obstacle to mariculture on oil and gas platforms. Proponents may be inadequately prepared to take on these responsibilities; at the same time, oil and gas operators are likely to be unwilling to retain long-term liabilities. A possibility to consider is a mechanism for site clearance to be funded up front and placed in an appointed trust and the oil and gas operator provided with a legally binding release from future liabilities. There may also be some possibility through or similar to the Rigs-to-Reefs Program to make platforms available.

Streamline Permitting Requirements

Some means of simplifying the permitting process is needed. Use of a
lead agency, and work between the agencies to clarify roles, eliminate overlap, and streamline the process would help dramatically.

**Conclusion**

Oil and gas operators consider offshore platforms to be something of an idyllic microcosm of sea life. We provide structure where one did not previously exist, and sea life is attracted and thrives. It makes a great deal of sense that these circumstances should be capitalized upon somehow. The Rigs-to-Reef Program is a positive step.

Commercial farming in association with these structures appears to be an additional opportunity. Over time, the obstacles, both institutional and technological, will probably be resolved, and mariculture could evolve into a major business and a major food source contributor.

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Abstract

Northern Gulf of Mexico Mariculture Project

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A cooperative agreement between the National Marine Fisheries Service (NMFS) and Waldemar Nelson International Inc. (WNI) stimulated an evaluation of the feasibility of initiating offshore finfish mariculture in the Northern Gulf of Mexico using the oil and gas production platforms situated in the Gulf. The scope for the feasibility study included an assessment of the biological, technical, regulatory, environmental and economic feasibility, together with an assessment of the type and size of platform required and preferred water depths and locations in the northern Gulf. The project evaluation team consisted of an attorney, engineers, industry businessmen with expertise in fish food manufacturing, seafood processing and marketing, and scientists with expertise in marine biology, fisheries, fish pathology, fisheries economics, and international expertise in offshore mariculture operations.

Thirteen marine finfish species were evaluated in detail with respect to their biology, status of nursery and grow-out methods, nutritional and feed issues, suitability for cage culture, disease issues, fillet yields, economic value, and other considerations. With the exception of red drum, all species required some additional research or trials in the hatchery or grow-out phases to enable it to be considered viable for offshore culture in the northern Gulf of Mexico. The feasibility study also evaluated the technical (equipment) side of establishing an offshore finfish mariculture industry and determined that there is suitable off the shelf or commercially available equipment for net pens with anchoring systems and feed storage and delivery systems to implement a successful operation. An evaluation was made of the regulatory issues affecting permitting of an offshore mariculture operation.

Other than the standard permits required through the federal and state agencies, the two issues which must be resolved prior to commercial scale operations are the ownership of fish in cages and current restrictions on possession of certain species with size or quota restrictions. The economic analyses of offshore mariculture included estimation of capital and annual
operating costs for a base case. The base case consisted of a relatively large scale commercial operation with up to nine large net pens each holding up to 500 metric tons of product. It also accounted for the demand for finfish products in the U.S.

The economic analysis indicates a large future demand for a cultured product. There are ample numbers of offshore platforms in the northern Gulf of the appropriate size and in ideal water depths for use in mariculture ventures. The environmental impact analyses indicated that a base case project in areas of the Gulf with sufficient depth and current velocities would not create a water quality problem around a well operated and monitored venture. Negative and positive socioeconomic impacts were not considered to be significant for a single venture, but obviously could become significant with multiple installations. In summary, the project team did not find any insurmountable issues that would preclude the development of offshore mariculture in the Gulf.
Abstract

MMS Liability Issues and Bonding Associated with Offshore Platforms

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The MMS Supplemental Bonding Program was implemented to address the abandonment liability issues resulting from the growing number of offshore leases and properties in the Gulf of Mexico that have been sold by offshore oil and gas platform operators. Under the provisions of the MMS Supplemental Bonding Program, an operator of an offshore oil and gas platform is required to post a bond to cover the abandonment liability of the oil and gas lease including removal of the offshore platform.

Covered in this presentation will be a discussion of the details of the MMS Supplemental Bonding Program including how the MMS determines the estimated abandonment liability. Also included will be a discussion of MMS areas of concern which have resulted from the implementation of the MMS Supplemental Bonding Program including safety, potential risk to the environment and areas of opportunity for the program.

The presentation will be concluded by outlining the impact the MMS Supplemental Bonding Program has on Mariculture Operations in the Gulf of Mexico from the standpoint of the operator of the oil and gas platform and the operator of a potential mariculture project that intends to use the oil and gas platform.
Mariculture Options with Texas Rigs to Reefs

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Introduction

Resource managers have been involved in artificial reef development off Texas for nearly 50 years. However, most of the early materials used were not durable and stable and, thus, had little long-term success as artificial reefs. The first highly successful artificial reef development occurred during the mid-1970s when 12 obsolete liberty ships were sunk at five different sites in the Gulf of Mexico.

The most extensive set of artificial reefs placed off Texas were, in fact, unintentional. These include the more than 800 offshore petroleum production structures that have provided extensive underwater havens for reef fish communities. Platform structures are ideal materials because of their engineering and construction design to be able to withstand the horizontal wave forces of 100-year storms. The rounded steel legs of the jackets provide the maximum surface area for biological growth and attachment of sessile organisms.

The sea floor in the Gulf is dominated by soft sediments with only limited quantities of suitable reef habitat. In fact, throughout the Gulf, petroleum platforms account for about 28 percent of the hard substrate critical for reef fish production. With an estimated 900,000 saltwater anglers and 250,000 divers in Texas, demand remains high for fishing and diving opportunities at these easy-to-find sites. With an escalation of rig removals in the early 1980s, the need to preserve the diverse ecosystems created by these offshore rigs was widely recognized.

Texas Artificial Reef Plan

To realize this goal of creating and preserving these valuable habitats, the Texas legislature in 1989 directed the Parks and Wildlife Department to develop the artificial reef potential off Texas for enhancing fishery resources and fishing and diving opportunities. To guide future placement, the Department produced the Texas Artificial Reef Plan in 1990, which followed
an exclusion mapping approach. This technique describes criteria for selecting reef locations in order to provide the optimum benefits to the reef fishery resource and users, while minimizing impacts to other stakeholder groups in the Gulf. Geographic, hydrographic, Geological, biological, social and economic considerations are evaluated as siting criteria. The program incorporates a user-resource planning framework when evaluating each donation offer that includes advanced site planning, permitting requirements, location and design criteria, buoy maintenance, consistent fisheries management goals, and re-evaluation of the program goals.

The enabling legislation also provided a means for the Program to be financially self sufficient by establishing a dedicated Artificial Reef Fund for the revenues received through a requirement that donors, if applicable, provide 50 percent of any monetary savings they realize from the donation. This Artificial Reef Fund is used exclusively to support administration of permits, maintenance of buoys, liability, construction of inshore reef sites, and research monitoring activities. Maintenance of buoys marking each new reef are currently major costs to the Program.

Flexibility is a major strength of the Program and the guiding principle of the Artificial Reef Plan. Acceptance of any reef material donation is assessed on a case by case basis to assure maximize benefits to the State. The Program is mandated by law to facilitate access by fishermen, minimize conflicts among competing users, minimize environmental risks, and not create unreasonable obstructions to navigation. To assure broad-based public input on these issues, the Program established an independent advisory committee composed of Gulf stakeholders to ascertain the appropriateness of each donation. The Artificial Reef Advisory Committee is represented by a salt water fishing group, an oil and gas industry representative, the Texas Department of Commerce representing tourism, the Texas General Land Office representing petroleum and mineral leasing interests in State waters, a commercial shrimping organization, a Texas diving club, the Attorney General's Office, a Texas University, an environmental group, and a Texas marine archeologist. As appropriate for each donation offer, the Program solicits additional input using public hearings and other outreach methods.

Rigs to Reefs

The heart of the Texas Artificial Reef Program is Rigs to Reefs. A key recommendation of the Artificial Reef Plan was to actively pursue the acquisition of offshore petroleum structures and to preserve them in "as near their current form as possible" in order to maximize their biological, social
and economic benefits. The normal method for turning an obsolete rig into an artificial reef is for the legs of the jacket to be severed 15 feet below the mud line using explosives. The jacket is then pulled over on one side. Some disadvantages of this toppling method, however, include the reduction of hard substrate in the upper water column, the loss of the biofouling community formerly at the top of the jacket now lying on the bottom, and the loss of organisms shaken loose and/or killed by the explosive shock.

To overcome these disadvantages and better achieve the Plan goals, the Department in 1995 created the first artificial reef in the Gulf using only mechanical cutting of the top portion of the jacket with the remainder of the jacket left standing in place. The top portion was lifted off by crane and placed next to the remaining structure in an upright position. By cutting off only the top 86 feet, for required Coast Guard clearance, the platform now projects 166 feet above the sea floor as opposed to a 64 feet profile using normal toppling procedures. Three additional reefs have been created using this removal method and another is planned in 1998. These artificial reef creations represent the wave of the future in which ecological niches throughout the water column will be preserved for the benefit of the fishery resources and man alike.

Since the Plan was approved, 30 artificial reef sites have been developed including the placement of 39 rigs and donations of over $4 million. Other materials of opportunity which meet the Plan’s criteria for complex, durable, stable structures at these reef sites include: 12 Liberty ships, a tugboat, 4 barges, 44 concrete culverts, 300 fly-ash blocks, 100 reef balls, 50 quarry rocks and a welded pipe structure. All of these materials have been placed at shallower, nearshore sites to provide better access for small boat anglers and divers.

**Permitting Flexibility**

The Program also offers flexibility for donors by providing several alternative permit options which do not restrict reef development to a specific number of planning areas as is characteristic of some other state artificial reef plans. The Department may apply to the Corps of Engineers for individual artificial reef sites. Each 40-acre permitted reef site encompasses one quarter square mile (1,320 ft by 1,320 ft) and has enough space to cluster at least nine jacket structures on the bottom.

The initial donor at a permitted reef site is allowed to topple the structure in place or partially remove it. Other jacket donations are encouraged to be transported from nearby, with no additional permitting required. There are exceptions to this 40-acre reef size, as exemplified by the five 160-acre
Liberty Ship reefs along the Texas coast, and the 418-acre South Padre Island reef site. These larger permitted areas were created before the current Texas Artificial Reef Plan and were subsequently transferred to the Department.

Although most of Texas' artificial reef sites are individually permitted, the Program also has the advantage of creating artificial reefs in the High Island (OCS) leasing area, under the authority of a General Permit from the Corps of Engineers. In this 2500 square mile area, artificial reefs may be created without the requirement of a 30-day public comment period. To date twelve reef sites have been established within this General Permit area. The special conditions of this permit require the structure location to: be at least five nautical miles from another reef site; be at least two nautical miles from any safety fairway; have at least 85 feet of clear water over the highest portion of the structure; be at least a distance of seven times the depth of water away from any active pipeline; not disturb any abandoned pipelines; and be at least one nautical mile away from any specific hard bottom communities (such as the Flower Garden Marine Sanctuary East and West Banks).

**Mariculture Potential**

Because of their stability and a manned presence, platforms offer unique opportunities for working long-term in the Gulf. One of the goals of the Program is to be flexible in providing opportunities for other beneficial uses of a platform, including mariculture operations. Accepting an intact platform, including the above water deck, into the Artificial Reef Program can be justified, if a greater benefit to the State can be identified, and if the Program does not suffer financially. For example, there have been discussions about the Program acquiring an intact platform that would then be leased by a consortium of research institutes to conduct scientific studies in the Gulf. In the same way, the Program could serve as a lessor of an intact platform with a mariculture company being the lessee. While there is no specific precedent to guide us, the Program is ready to explore the options to make this concept a reality.

Before such an arrangement can be finalized, specific criteria for leaving the structure in place need to be negotiated with the donor. Numerous other government entities with a vested interest in platform use offshore, ranging from the Department of Agriculture to the Department of Defense, would have to be included in the discussions. Proper maintenance and marking of the structure would have to be assured since the Department
would still be liable for the structure as a navigational hazard. Painting decks, replacing cathodic protectors, and maintaining lights and horns will likely cost hundreds of thousands of dollars each year.

When the life of the rig is exhausted or mariculture is no longer feasible, there must be a pre-approved and funded plan to convert the structure into a permanent artificial reef, which would involve cutting or toppling the jacket in place to meet current navigational clearance requirements. This could be a particularly difficult issue given the unknown number of years before that final reef conversion operation is required. What will be the government and industry standards for rig removal in the future? How much money should be escrowed to cover this operation? How do we handle the 50% donation of realized savings from a normal donation? How does the Program keep from incurring a financial penalty or undue liability for serving as a lessor? What is reasonable mitigation for the loss of accessibility to the artificial reef site by other Gulf user groups? Forums such as the Third International Conference on Open Ocean Aquaculture offer excellent opportunities to find answers to many of these questions.

**Conclusion**

The Texas Artificial Reef Program recognizes a need to proceed with caution and patience but also with a sincere expectation of success in trying to merge artificial reef development with environmentally and economically sound offshore mariculture. The State looks forward to building on the accomplishments of our current Program through coordinated planning and research with other government agencies and universities as well as private industries. The future is bright for the efficient and effective creation of artificial reefs in the Gulf. The potential benefits to the State and Gulf stakeholders for mariculture operations that are also artificial reefs justifies a bona fide effort to create this win-win situation.